COMPLIANCE STACK EMISSION TEST REPORT

NATURAL GAS-FIRED RICE UNIT 1100, UNIT 2100 (EURICE1), UNIT 2200 (EURICE2), UNIT 2300 (EURICE3)

Determination of Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compound Emissions and Carbon Monoxide Destruction Efficiency

Utilizing US EPA Methods 3A, 4, 7E, 10, 18, 19, and 25A

Test Date(s): June 18-20 and June 25, 2019

Facility ID: N7421

Facility Name: DTE Energy - Willow Run Compressor Station

Source Location: Ypsilanti, Michigan

Permit: EGLE Permit-to-Install No. 44-16A

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TEST RESULTS SUMMARY

Source Name: Source ID Number: Control Device:	RICE Unit 1100 - CAT-OX	RICE Unit 2100 EURICE1 CAT-OX
Test Date:	6/18/2019	6/20/2019
Sampling Location(s):	CAT-OX Inlet/Exhaust	CAT-OX Inlet/Exhaust
Engine Load (bhp)*	4,489	4,357
CO Destruction Efficiency (%) [†]	98.4	>99.4
Permit Limit - CO Destruction Efficiency (%)	>93	>93
Compliance Acceptability Criteria Met (Yes/No)	Yes	Yes
	A440 (10 (10 (10 (10 (10 (10 (10 (10 (10 (1	
Source Name: Source ID Number: Control Device:	RICE Unit 2200 EURICE2 CAT-OX	RICE Unit 2300 EURICE3 CAT-OX
Source ID Number:	EURICE2 CAT-OX	EURICE3
Source ID Number: Control Device: Test Date:	EURICE2 CAT-OX 6/19/2019	EURICE3 CAT-OX
Source ID Number: Control Device: Test Date:	EURICE2 CAT-OX 6/19/2019 CAT-OX Inlet/Exhaust	EURICE3 CAT-OX 6/25/2019
Source ID Number: Control Device: Test Date: Sampling Location(s):	EURICE2 CAT-OX 6/19/2019 CAT-OX Inlet/Exhaust	EURICE3 CAT-OX 6/25/2019 CAT-OX Inlet/Exhaust
Source ID Number: Control Device: Test Date: Sampling Location(s): Engine Load (bhp)*	EURICE2 CAT-OX 6/19/2019 CAT-OX Inlet/Exhaust 2,227	EURICE3 CAT-OX 6/25/2019 CAT-OX Inlet/Exhaust 2,204
Source ID Number: Control Device: Test Date: Sampling Location(s): Engine Load (bhp)*	EURICE2 CAT-OX 6/19/2019 CAT-OX Inlet/Exhaust 2,227 >98.4	EURICE3 CAT-OX 6/25/2019 CAT-OX Inlet/Exhaust 2,204 >99.2



TEST RESULTS SUMMARY - CONTINUED

Source Name: Source ID Number: Control Device:	RICE Unit 2100 EURICE1 CAT-OX	RICE Unit 2200 EURICE2 CAT-OX	RICE Unit 2300 EURICE3 CAT-OX
Test Date: Sampling Location:	6/20/2019 Exhaust	6/19/2019 Exhaust	6/25/2019 Exhaust
Engine Load (bhp)*	4,357	2,227	2,204
NO _x Emissions (lb/hr) (as NO ₂)	3.05	1.81	1.59
Permit Limit - NO x Emissions (lb/hr) (as NO 2)	5.51	2.76	2.76
Compliance Acceptability Criteria Met (Yes/No)	Yes	Yes	Yes
NO _x Concentration (ppmvd) (corrected to 15% O ₂)	26	31	29
Permit Limit - NO x Concentration (ppmvd) (corrected to 15% O 2)	83	82	82
Compliance Acceptability Criteria Met (Yes/No)	Yes	Yes	Yes
CO Concentration (ppmvd) (corrected to 15% O ₂)§	<1.0	<1.1	<1.3
Permit Limit - CO Concentration (ppmvd) (corrected to 15% O 2)	271	270	270
Compliance Acceptability Criteria Met (Yes/No)	Yes	Yes	Yes
VOC Concentration (ppmvd) (corrected to 15% O ₂)	35	0.0	55
Permit Limit - VOC Concentration (ppmvd) (corrected to 15% O 2)	83	82	82
Compliance Acceptability Criteria Met (Yes/No)	Yes	Yes	Yes
Permit No.	EGLE P	ermit-to-Install No	o. 44-16A

^{*} Production data was provided by DTE Energy - Willow Run Compressor Station personnel.



[†] The VOC concentration at the EURICE2 Exhaust Duct is assigned a value of zero. See Section 2.3 for details.

[§] The compound was not present in quantities above the Minimum Detection Limit (MDL) of the analytical method.

REVIEW AND CERTIFICATION

The results of the Compliance Test conducted on June 18-20 and June 25, 2019 are a product of the application of the United States Environmental Protection Agency (US EPA) Stationary Source Sampling Methods listed in 40 CFR Part 60, Appendix A, that were in effect at the time of this test.

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature:	Jul Varey P.P	Date:	8/22/19
Name:	Steven Smith	Title:	Client Project Manager
other approp knowledge, tl	wed, technically and editorially, deta riate written materials contained her he presented material is authentic, a se Quality Management System and	ein. I he ccurate,	reby certify that, to the best of my and conforms to the requirements
Signature:	M Jose	Date:	8/22/19
Name [.]	Randal Tysar	Title:	District Manager

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

The DTE Energy - Willow Run Compressor Station (Facility ID: N7421), located in Ypsilanti, Michigan, contracted Montrose Air Quality Services, LLC (Montrose) of Detroit, Michigan, to conduct compliance stack emission testing for their Natural Gas-Fired Reciprocating Internal Combustion Engine (RICE) Units 1100, 2100 (EURICE1), 2200 (EURICE2), and 2300 (EURICE3). Testing was performed to satisfy the emissions testing requirements pursuant to Michigan Department of Environment, Great Lakes and Energy (EGLE) Permitto-Install (PTI) No. 44-16A, 40 CFR Part 60 Subpart JJJJ, and 40 CFR Part 63 Subpart ZZZZ. The testing was performed on June 18-20 and June 25, 2019.

Simultaneous sampling was performed at the oxidation catalyst (CAT-OX) inlet and exhaust ducts associated with RICE Units 1100, 2100, 2200, and 2300 to determine carbon monoxide (CO) destruction efficiency (DE). Testing was conducted during maximum operating conditions.

Sampling was also performed at the CAT-OX exhaust ducts associated RICE Units 2100, 2200, and 2300 to determine the emissions of nitrogen oxides (NO_x) (as NO_2) and the concentrations, corrected to 15% O_2 , of NO_x , CO, and volatile organic compounds (VOC). Testing was conducted during maximum operating conditions.

During this test RICE units 1100, 2100, 2200, and 2300 were each controlled by a CAT-OX.

The test methods that were conducted during this test were US EPA Methods 3A, 4, 7E, 10, 18, 19, and 25A.

1.2 KEY PERSONNEL

The key personnel who coordinated this test program (and their phone numbers) were:

- Jason Logan, Environmental Specialist-Environmental Field Services Group, DTE Energy Corporate Services, LLC, 734-548-2128
- Karen Kajiya-Mills, Environmental Manager, Michigan Department of Environment, Great Lakes and Energy, 517-284-6780
- Mark Dziadosz, Environmental Quality Analyst, Michigan Department of Environment, Great Lakes and Energy, 586-753-3745
- Steve Smith, Client Project Manager, Montrose, 734-751-9701



2.0 SUMMARY AND DISCUSSION OF TEST RESULTS

2.1 OBJECTIVES AND TEST MATRIX

The purpose of this test was to determine the CO DE of the CAT-OXs associated with RICE Units 1100, 2100, 2200, and 2300. The purpose of the test was also to determine the emissions of NO_x (as NO_2) and the concentrations, corrected to 15% O_2 , of NO_x , CO, and VOC at the CAT-OX exhaust ducts associated with RICE Units 2100, 2200, and 2300. Testing was performed during maximum operating conditions. Testing was performed to satisfy the emissions testing requirements pursuant to EGLE PTI No. 44-16A, 40 CFR Part 60 Subpart JJJJ, and 40 CFR Part 63 Subpart ZZZZ.

The specific test objectives for this test were as follows:

- Simultaneously measure the concentrations of oxygen (O₂) and CO at the CAT-OX inlet and exhaust ducts associated with RICE Units 1100, 2100, 2200, and 2300.
- Measure moisture content and the concentration of NO_x, methane (CH₄) ethane (C₂H₆) and TGO at the CAT-OX exhaust ducts associated with RICE Units 2100, 2200, and 2300.
- Utilize the above variables, in conjunction with facility provided fuel flow and US EPA Method 19, to determine the CO DE of the CAT-OXs associated with RICE Units 1100, 2100, 2200, and 2300 during maximum operating conditions.
- Utilize the above variables, in conjunction with facility provided fuel flow and US EPA Method 19, to determine the emissions of NO_x (as NO₂) and the concentrations, corrected to 15% O₂, of NO_x (as NO₂), CO, and VOC (methane/ethane corrected TGO) from the CAT-OX exhaust ducts associated with RICE Units 2100, 2200, and 2300 during maximum operating conditions.

Tables 2.1.1 to 2.1.4 present the sampling matrix log for this test.

2.2 FIELD TEST CHANGES AND PROBLEMS

The US EPA Method 18 Tedlar bag samples for Unit 2100 Run 2 and Unit 2200 Run 1 that were shipped to Enthalpy Analytical, Inc., had deflated upon arrival. As a result, the samples for Unit 2100 Run 2 and Unit 2200 Run 1 were not analyzed. Montrose has calculated the CH_4 and C_2H_6 concentration for Unit 2100 Run 2 by averaging the concentrations of Runs 1 and 3. Similarly, the CH_4 and C_2H_6 concentration for Unit 2200 Run 1 was calculated by averaging the concentrations of Runs 2 and 3.



2.3 PRESENTATION OF RESULTS

One sampling train was utilized at the RICE Unit 1100 CAT-OX Inlet Duct and one sampling train was utilized at the RICE Unit 1100 CAT-OX Exhaust Duct to determine the CO DE of the CAT-OX associated with RICE Unit 1100. These sampling trains measured the concentrations of O_2 and CO at the Rice Unit 1100 CAT-OX Inlet Duct and Rice Unit 1100 CAT-OX Exhaust Duct.

One sampling train was utilized at the CAT-OX inlet ducts associated with RICE Units 2100, 2200, and 2300 and three sample sampling trains were utilized at the CAT-OX exhaust ducts associated with RICE Units 2100, 2200, and 2300 to determine the CO DE of the CAT-OXs, the emissions of NO_x (as NO_2), and concentrations, corrected to 15% O_2 , of NO_x , CO, and VOC. At the CAT-OX Inlet ducts the sampling train measured the concentrations of O_2 and CO. At the CAT-OX exhaust ducts, one sampling train measured the concentrations of O_2 , NO_x , CO, and TGO. A second sampling train was utilized for CH_4 and C_2H_6 concentration determination, and a third sampling train measured the duct gas moisture content.

Table 2.2.1 displays the CO DE of the CAT-OXs associated with RICE Units 1100 and 2100 during maximum achievable operations.

Table 2.2.2 displays the CO DE of the CAT-OXs associated with RICE Units 2200 and 2300 during maximum achievable operations.

Table 2.3.1 displays the emissions of NO_x (as NO_2), CO, and VOC, and the concentration of NO_x , CO, and VOC corrected to 15% O_2 measured at RICE Unit 2100 CAT-OX Exhaust Duct and RICE Unit 2200 CAT-OX Exhaust Duct during maximum achievable operations.

Table 2.3.2 displays the emissions of NO_x (as NO_2), CO, and VOC, and the concentration of NO_x , CO, and VOC corrected to 15% O_2 measured at RICE Unit 2300 CAT-OX Exhaust Duct during maximum achievable operations.

The CH₄/C₂H₆ corrected TGO (VOC) concentration values in Table 2.3 Runs 1 to 3 at the RICE Unit 2200 CAT-OX Exhaust Duct resulted in negative values and are assigned a value of zero.

Concentration values in Tables 2.2.1 to 2.3.2 denoted with a '<' were measured to be below the minimum detection limit (MDL) of the applicable analytical method. Emissions denoted with a '<' in Tables 2.2.1 to 2.3.2 were calculated utilizing the applicable MDL concentration value instead of the "as measured" concentration value.



DTE Energy - Willow Run Compressor Station
June 2019 RICE Units 1100, 2100, 2200, and 2300 Compliance Test

The graphs that present the raw, uncorrected concentration data measured in the field by the US EPA Method 3A, 7E, 10, and 25A sampling systems at the CAT-OX inlet and exhaust ducts associated with RICE Units 1100, 2100, 2200, and 2300 are located in the Field Data section of the Appendix.

TABLE 2.1.1 SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHOD 3A (O₂)	US EPA METHOD 10 (CO)	
			Sampling Time / Duration (min)	Sampling Time / Duration (min)	
6/18/2019	1	RICE Unit 1100 CAT-OX Inlet Duct	8:11 - 8:26 / 15	8:11 - 8:26 / 15	
6/18/2019	2	RICE Unit 1100 CAT-OX Inlet Duct	8:39 - 8:54 / 15	8:39 - 8:54 / 15	
6/18/2019	3	RICE Unit 1100 CAT-OX Inlet Duct	9:02 - 9:17 / 15	9:02 - 9:17 / 15	
6/18/2019	1	RICE Unit 1100 CAT-OX Exhaust Duct	8:11 - 8:26 / 15	8:11 - 8:26 / 15	
6/18/2019	2	RICE Unit 1100 CAT-OX Exhaust Duct	8:39 - 8:54 / 15	8:39 - 8:54 / 15	
6/18/2019	3	RICE Unit 1100 CAT-OX Exhaust Duct	9:02 - 9:17 / 15	9:02 - 9:17 / 15	

TABLE 2.1.2 SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHOD 3A (O₂)	US EPA METHOD 4 (%H₂O)	US EPA METHOD 7E (NO _x)
P			Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
6/19/2019	1	RICE Unit 2200 CAT-OX Inlet Duct	15:52 - 16:52 / 60	-	-
6/19/2019	2	RICE Unit 2200 CAT-OX Inlet Duct	17:10 - 18:10 / 60	-	-
6/19/2019	3	RICE Unit 2200 CAT-OX Inlet Duct	18:32 - 19:32 / 60	-	-
6/19/2019	1	RICE Unit 2200 CAT-OX Exhaust Duct	15:52 - 16:52 / 60	15:58 - 16:48 / 40	15:52 - 16:52 / 60
6/19/2019	2	RICE Unit 2200 CAT-OX Exhaust Duct	17:10 - 18:10 / 60	17:25 - 18:05 / 40	17:10 - 18:10 / 60
6/19/2019	3	RICE Unit 2200 CAT-OX Exhaust Duct	18:32 - 19:32 / 60	18:35 - 19:15 / 40	18:32 - 19:32 / 60
Date	Run No.	Sampling Location	US EPA METHOD 10 (CO)	US EPA METHOD 18 (Methane/Ethane)	US EPA METHOD 25A (TGO)
Date	Run No.	Sampling Location	METHOD 10	METHOD 18	METHOD 25A
	No.		METHOD 10 (CO) Sampling Time / Duration (min)	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
Date 6/19/2019 6/19/2019		Sampling Location RICE Unit 2200 CAT-OX Inlet Duct RICE Unit 2200 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/19/2019	No.	RICE Unit 2200 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 15:52 - 16:52 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/19/2019 6/19/2019	No. 1 2	RICE Unit 2200 CAT-OX Inlet Duct RICE Unit 2200 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 15:52 - 16:52 / 60 17:10 - 18:10 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/19/2019 6/19/2019 6/19/2019	1 2 3	RICE Unit 2200 CAT-OX Inlet Duct RICE Unit 2200 CAT-OX Inlet Duct RICE Unit 2200 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 15:52 - 16:52 / 60 17:10 - 18:10 / 60 18:32 - 19:32 / 60	METHOD 18 (Methane/Ethane) Sampling Time / Duration (min) - - -	METHOD 25A (TGO) Sampling Time / Duration (min) - - -



TABLE 2.1.3 SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHOD 3A (O₂)	US EPA METHOD 4 (%H₂O)	US EPA METHOD 7E (NO _x)
			Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
6/20/2019	1	RICE Unit 2100 CAT-OX Inlet Duct	8:33 - 9:33 / 60	-	-
6/20/2019	2	RICE Unit 2100 CAT-OX Inlet Duct	9:49 - 10:49 / 60	-	-
6/20/2019	3	RICE Unit 2100 CAT-OX Inlet Duct	11:02 - 12:02 / 60	-	-
6/20/2019	1	RICE Unit 2100 CAT-OX Exhaust Duct	8:33 - 9:33 / 60	8:35 - 9:15 / 40	8:33 - 9:33 / 60
6/20/2019	2	RICE Unit 2100 CAT-OX Exhaust Duct	9:49 - 10:49 / 60	9:55 - 10:35 / 40	9:49 - 10:49 / 60
6/20/2019	3	RICE Unit 2100 CAT-OX Exhaust Duct	11:02 - 12:02 / 60	11:15 - 11:55 / 40	11:02 - 12:02 / 60
Date	Run	Sampling Location	US EPA METHOD 10 (CO)	US EPA METHOD 18 (Methane/Ethane)	US EPA METHOD 25A (TGO)
Date	Run No.	Sampling Location	METHOD 10	METHOD 18	METHOD 25A
	No.		METHOD 10 (CO) Sampling Time / Duration (min)	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
Date 6/20/2019 6/20/2019		Sampling Location RICE Unit 2100 CAT-OX Inlet Duct RICE Unit 2100 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/20/2019	No .	RICE Unit 2100 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 8:33 - 9:33 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/20/2019 6/20/2019	No. 1 2	RICE Unit 2100 CAT-OX Inlet Duct RICE Unit 2100 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 8:33 - 9:33 / 60 9:49 - 10:49 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/20/2019 6/20/2019 6/20/2019	No.	RICE Unit 2100 CAT-OX Inlet Duct RICE Unit 2100 CAT-OX Inlet Duct RICE Unit 2100 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 8:33 - 9:33 / 60 9:49 - 10:49 / 60 11:02 - 12:02 / 60	METHOD 18 (Methane/Ethane) Sampling Time / Duration (min) - - -	METHOD 25A (TGO) Sampling Time / Duration (min) - - -



TABLE 2.1.4
SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHOD 3A (O ₂)	US EPA METHOD 4 (%H₂O)	US EPA METHOD 7E (NO _x)
			Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
6/25/2019	1	RICE Unit 2300 CAT-OX Inlet Duct	8:51 - 9:51 / 60	-	-
6/25/2019	2	RICE Unit 2300 CAT-OX Inlet Duct	10:12 - 11:12 / 60	-	-
6/25/2019	3	RICE Unit 2300 CAT-OX Inlet Duct	11:25 - 12:48 / 60	-	-
6/25/2019	1	RICE Unit 2300 CAT-OX Exhaust Duct	8:51 - 9:51 / 60	8:51 - 9:21 / 30	8:51 - 9:51 / 60
6/25/2019	2	RICE Unit 2300 CAT-OX Exhaust Duct	10:12 - 11:12 / 60	10:13 - 10:43 / 30	10:12 - 11:12 / 60
6/25/2019	3	RICE Unit 2300 CAT-OX Exhaust Duct	11:25 - 12:48 / 60	11:33 - 12:13 / 30	11:25 - 12:48 / 60
Date	Run	Sampling Location	US EPA METHOD 10 (CO)	US EPA METHOD 18 (Methane/Ethane)	US EPA METHOD 25A (TGO)
Date	Run No.	Sampling Location	METHOD 10	METHOD 18	METHOD 25A
	No.		METHOD 10 (CO) Sampling Time / Duration (min)	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
Date 6/25/2019 6/25/2019		RICE Unit 2300 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/25/2019	No .		METHOD 10 (CO) Sampling Time / Duration (min) 8:51 - 9:51 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/25/2019 6/25/2019	No.	RICE Unit 2300 CAT-OX Inlet Duct RICE Unit 2300 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 8:51 - 9:51 / 60 10:12 - 11:12 / 60	METHOD 18 (Methane/Ethane) Sampling Time	METHOD 25A (TGO) Sampling Time
6/25/2019 6/25/2019 6/25/2019	1 2 3	RICE Unit 2300 CAT-OX Inlet Duct RICE Unit 2300 CAT-OX Inlet Duct RICE Unit 2300 CAT-OX Inlet Duct	METHOD 10 (CO) Sampling Time / Duration (min) 8:51 - 9:51 / 60 10:12 - 11:12 / 60 11:25 - 12:48 / 60	METHOD 18 (Methane/Ethane) Sampling Time / Duration (min) - - -	METHOD 25A (TGO) Sampling Time / Duration (min) - - -



TABLE 2.2.1 EMISSION RESULTS

Parameter	RICE Unit 1100 CAT-OX Inlet Duct				RICE Unit 1100 CAT-OX Exhaust Duct			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Engine Load (bhp)*	-	-	-	-	4,539	4,482	4,447	4,489
Carbon Monoxide Destruction Efficiency (%)	-	-	-	-	97.4	98.8	99.0	98.4
Carbon Monoxide Emissions (lb/hr)	16.9	17.2	17.2	17.1	0.44	0.21	0.17	0.27
Carbon Monoxide Concentration (ppmvd)	405	410	413	409	10.6	5.06	4.11	6.59
Percent by Volume Oxygen in Stack Gas (%-dry)	11.6	11.7	11.6	11.6	11.6	11.6	11.6	11.6

Parameter	RICE Unit 2100 CAT-OX Inlet Duct				RICE Unit 2100 CAT-OX Exhaust Duct			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Engine Load (bhp)*	-	-	-	-	4,401	4,329	4,342	4,357
Carbon Monoxide Destruction Efficiency (%)	-	-	-	-	> 99.4	> 99.4	> 99.4	> 99.4
Carbon Monoxide Emissions (lb/hr)† Carbon Monoxide Concentration (ppmvd)†	11.6 277	11.6 277	11.6 277	11.6 277	< 0.075 < 1.80	< 0.075 < 1.80	< 0.075 < 1.80	< 0.075 < 1.80
Percent by Volume Oxygen in Stack Gas (%-dry)	10.8	11.0	10.8	10.9	10.7	10.7	10.8	10.7

^{*} Process data provided by DTE-Willow Run Compressor Station personnel.

[†] The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 2.3 for details.

TABLE 2.2.2 EMISSION RESULTS

Run 1	Run 2	Run 3	Average	D 4			
			Average	Run 1	Run 2	Run 3	Average
-	-	-	-	2,220	2,172	2,290	2,227
-	-	-	-	> 98.4	> 98.4	> 98.5	> 98.4
5.53	5.87	5.54	5.64	< 0.038	< 0.039	< 0.037	< 0.038
270	271	269	270	< 1.80	< 1.80	< 1.80	< 1.80
11.0	11.0	10.9	11.0	11.1	11.1	10.9	11.1
	RICE Unit 2300 CAT-OX Inlet Duct			С			ct
Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
	5.53 270 11.0	5.53 5.87 270 271 11.0 11.0 RICE U CAT-OX	5.53 5.87 5.54 270 271 269 11.0 11.0 10.9 RICE Unit 2300 CAT-OX Inlet Duc	5.53 5.87 5.54 5.64 270 271 269 270 11.0 11.0 10.9 11.0 RICE Unit 2300 CAT-OX Inlet Duct	5.53 5.87 5.54 5.64 < 0.038	5.53 5.87 5.54 5.64 < 0.038	5.53 5.87 5.54 5.64 < 0.038

Parameter		CAT-OX		t	C	RICE Ui AT-OX Ex		ıct
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Engine Load (bhp)*	-	-	-	-	2,290	2,169	2,153	2,204
Carbon Monoxide Destruction Efficiency (%)	-	-	-	-	> 99.3	> 99.3	99.0	> 99.2
Carbon Monoxide Emissions (lb/hr)† Carbon Monoxide Concentration (ppmvd)†	5.84 281	5.72 276	5.51 274	5.69 277	< 0.039 < 1.80	< 0.038 < 1.80	0.055 2.69	< 0.044 < 2.10
Percent by Volume Oxygen in Stack Gas (%-dry)	11.2	11.2	11.2	11.2	11.4	11.3	11.3	11.3

^{*} Process data provided by DTE-Willow Run Compressor Station personnel.

[†] The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 2.3 for details.

TABLE 2.3.1 EMISSION RESULTS

Parameter	С	RICE U AT-OX Ex	nit 2100 chaust Du	ıct	RICE Unit 2200 CAT-OX Exhaust Duct			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Engine Load (bhp)*	4,401	4,329	4,342	4,357	2,220	2,172	2,290	2,227
Fuel Flow (scfh)*	30,871	30,919	30,971	30,920	14,804	15,544	14,977	15,108
Nitrogen Oxides Emissions (lb/hr) (as NO ₂) Nitrogen Oxides Concentration (ppmvd) (corrected to 15% O ₂)	3.02 25.6	3.01 25.5	3.10 26.2	3.05 25.8	1.73 30.5	1.88 31.6	1.83 31.9	1.81 31.4
Nitrogen Oxides Concentration (ppmvd)	44.2	43.9	45.1	44.4	50.5	52.6	53.9	52.4
Carbon Monoxide Concentration (ppmvd) (corrected to 15% O_2) [†] Carbon Monoxide Concentration (ppmvd) [†]	< 1.04 < 1.80	< 1.05 < 1.80	< 1.05 < 1.80	< 1.05 < 1.80	< 1.09 < 1.80	< 1.08 < 1.80	< 1.07 < 1.80	< 1.08 < 1.80
VOC (ppmvd as propane) (corrected to 15% O_2)§ CH_4/C_2H_6 Corrected TGO Concentration (ppmvd as propane)§	40.5 69.9	33.7 58.1	31.0 53.5	35.1 60.5	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
Total Gaseous Organic Concentration (ppmvd as propane) Ethane (C_2H_6) Concentration (ppmvd as propane) Methane (CH_4) Concentration (ppmvd as propane)	461 40.6 350	455 40.9 ‡ 356 ‡	456 41.3 361	457 40.9 356	440 50.1** 485**	409 51.2 491	420 49.0 479	409 50.1 485
Measured Stack Gas Percent by Volume Moisture (%H ₂ O)	12.97	11.66	11.48	12.04	9.57	9.02	8.53	9.04
Percent by Volume Oxygen in Stack Gas (%-dry)	10.71	10.73	10.75	10.73	11.14	11.08	10.94	11.05

^{*} Process data provided by DTE-Willow Run Compressor Station personnel.

[†] The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 2.3 for details.

[§] Methane/Ethane corrected TGO (VOC) at the EURICE2 CAT-OX Exhaust Duct, Runs 1-3, were negative and assigned a value of zero. See Section 2.3 for details.

[‡] The concentration of Run 2 is determined by averaging the concentrations of Runs 1 and 3. See Section 2.2 for details.

^{**} The concentration of Run 1 is determined by averaging the concentrations of Runs 2 and 3. See Section 2.2 for details.

TABLE 2.3.2 EMISSION RESULTS

Parameter		RICE Unit 2300 CAT-OX Exhaust Duct				
	Run 1	Run 2	Run 3	Average		
Engine Load (bhp)*	2,290	2,169	2,153	2,204		
Fuel Flow (scfh)*	14,795	14,641	14,259	14,565		
Nitrogen Oxides Emissions (lb/hr) (as NO ₂) Nitrogen Oxides Concentration (ppmvd) (corrected to 15% O ₂) Nitrogen Oxides Concentration (ppmvd)	1.59	1.62	1.57	1.59		
	28.1	28.9	28.7	28.6		
	45.1	47.2	46.7	46.3		
Carbon Monoxide Concentration (ppmvd) (corrected to 15% O ₂)† Carbon Monoxide Concentration (ppmvd)†	< 1.12	< 1.10	1.65	< 1.29		
	< 1.80	< 1.80	2.69	< 2.10		
VOC (ppmvd as propane) (corrected to 15% $\rm O_2$) $\rm CH_4/C_2H_6$ Corrected TGO Concentration (ppmvd as propane)	105.9	31.1	27.3	54.8		
	170.1	50.8	44.5	88.5		
Total Gaseous Organic Concentration (ppmvd as propane) Ethane (C_2H_6) Concentration (ppmvd as propane) Methane (CH_4) Concentration (ppmvd as propane)	507	448	458	451		
	39.4	63.3	40.5	47.8		
	297	388	416	367		
Measured Stack Gas Percent by Volume Moisture (%H ₂ O) Percent by Volume Oxygen in Stack Gas (%-dry)	11.86	10.67	8.66	10.39		
	11.42	11.26	11.30	11.33		

^{*} Process data provided by DTE-Willow Run Compressor Station personnel.

[†] The "<" symbol indicates that compound was below the Minimum Detection Limit (MDL) of the analytical method. See Section 2.3 for details.

3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

3.1 PROCESS DESCRIPTION AND OPERATION

DTE Energy - Willow Run Compressor Station transports natural gas using compressor engines (RICE). RICE Units 1100, 2100, 2200, and 2300 were in operation during this test event.

Table 3.1 displays the process data. Figures 3.1 and 3.2 schematically depict the sampling locations.

3.2 CONTROL EQUIPMENT DESCRIPTION

During this test, emissions from RICE Units 1100, 2100, 2200, and 2300 were each controlled by a CAT-OX.

3.3 SAMPLING LOCATION(S)

3.3.1 RICE Unit 1100 CAT-OX Inlet Duct

The RICE Unit 1100 CAT-OX Inlet Duct had an inner diameter of 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O₂ and CO concentration determination at 16.7%, 50%, and 83.3% of the measurement line.

3.3.2 RICE Unit 1100 CAT-OX Exhaust Duct

The RICE Unit 1100 CAT-OX Exhaust Duct had an inner diameter of 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O₂ and CO concentration determination at 16.7%, 50%, and 83.3% of the measurement line.

3.3.3 RICE Unit 2100 CAT-OX Inlet Duct

The RICE Unit 2100 CAT-OX Inlet Duct had an inner diameter of 36-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O₂ and CO concentration determination at 16.7%, 50%, and 83.3% of the measurement line.

3.3.4 RICE Unit 2100 CAT-OX Exhaust Duct

The RICE Unit 2100 CAT-OX Exhaust Duct had an inner diameter of 36-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O_2 NO_x , CO, and TGO concentration determination at 16.7%, 50%, and 83.3% of the measurement line. A point in the duct was utilized to measure duct gas moisture content. A second point in the duct was utilized for CH_4 and C_2H_6 sampling.



3.3.5 RICE Unit 2200 CAT-OX Inlet Duct

The RICE Unit 2200 CAT-OX Inlet Duct had an inner diameter of 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O₂ and CO concentration determination at 16.7%, 50%, and 83.3% of the measurement line.

3.3.6 RICE Unit 2200 CAT-OX Exhaust Duct

The RICE Unit 2200 CAT-OX Exhaust Duct had an inner diameter of 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O_2 NO_x , CO, and TGO concentration determination at 16.7%, 50%, and 83.3% of the measurement line. A point in the duct was utilized to measure duct gas moisture content. A second point in the duct was utilized for CH_4 and C_2H_6 sampling.

3.3.7 RICE Unit 2300 CAT-OX Inlet Duct

The RICE 2300 CAT-OX Inlet Duct had an inner diameter of 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O_2 and CO concentration determination at 16.7%, 50%, and 83.3% of the measurement line.

3.3.8 RICE Unit 2300 CAT-OX Exhaust Duct

The RICE Unit 2300 CAT-OX Exhaust Duct had an inner diameter of approximately 24-inches and was oriented in the horizontal plane. During emissions sampling, the duct was traversed for O_2 , NO_x , CO, and TGO concentration determination at 16.7%, 50%, and 83.3% of the measurement line. A point in the duct was utilized to measure duct gas moisture content. A second point in the duct was utilized for CH_4 and C_2H_6 sampling.

3.4 PROCESS SAMPLING LOCATION(S)

The US EPA Reference Test Methods performed did not specifically require that process samples were to be taken during the performance of this testing event. It is in the best knowledge of Montrose that no process samples were obtained and therefore no process sampling location was identified in this report.



TABLE 3.1 PROCESS DATA

Parameter	R	CE Unit 11	00	RI	CE Unit 21	00
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
RICE Unit Rating (bhp)	4735	4735	4735	5000	5000	5000
Fuel Flow Reading 1 (scfh)	28,296	28,325	28,028	31,114	31,102	30,91
Fuel Flow Reading 2 (scfh)	28,042	28,061	28,198	30,853	30,777	31,22
Fuel Flow Reading 3 (scfh)	-	-	-	30,647	30,877	30,78
Average Fuel Flow Reading (scfh)	28,169	28,193	28,113	30,871	30,919	30,97
Actual RICE BHP Reading 1 (bhp)	4,582	4,494	4,449	4449	4350	4339
Actual RICE BHP Reading 2 (bhp)	4,492	4,398	4,446	4423	4311	4341
Actual RICE BHP Reading 3 (bhp)	4,589	4,495	4,447	4333	4325	4346
Actual RICE BHP Reading 4 (bhp)	4,494	4,542	4,444	4440	4349	4342
Actual RICE BHP Reading 5 (bhp)	-	-	-	4423	4312	4340
Actual RICE BHP Reading 6 (bhp)	-	-	-	4335	4325	4343
Average RICE Load (bhp)	4,539	4,482	4,447	4,401	4,329	4,342
Parameter	R	ICE Unit 22	00	RI	CE Unit 23	00
. aramotor	Dun 1	Dun 2	Dun 2	Dun 4	D 2	D

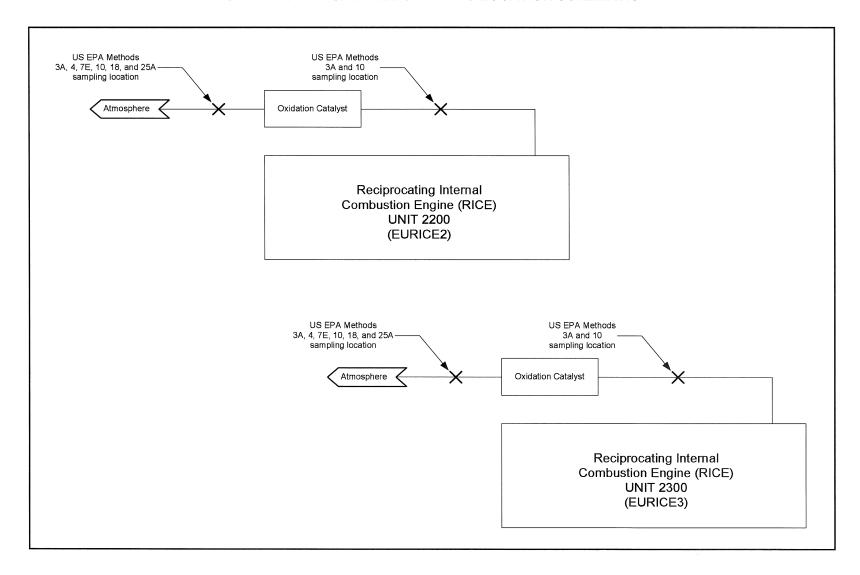
Parameter	R	ICE Unit 22	00	RI	CE Unit 23	00
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
RICE Unit Rating (bhp)	2500	2500	2500	2500	2500	2500
Fuel Flow Reading 1 (scfh)	14,840	15,511	14,982	13,658	14,636	14,528
Fuel Flow Reading 2 (scfh)	14,829	15,617	14,918	15,418	14,798	14,004
Fuel Flow Reading 3 (scfh)	14,742	15,505	15,031	15,309	14,488	14,245
Average Fuel Flow Reading (scfh)	14,804	15,544	14,977	14,795	14,641	14,259
Actual RICE BHP Reading 1 (bhp)	2198.0	2193.0	2182	2182	2151	2165
Actual RICE BHP Reading 2 (bhp)	2227.0	2166.0	2430	2430	2173	2144
Actual RICE BHP Reading 3 (bhp)	2240.0	2153.0	2269	2269	2170	2167
Actual RICE BHP Reading 4 (bhp)	2189.0	2184.0	2162	2162	2173	2165
Actual RICE BHP Reading 5 (bhp)	2222.0	2177.0	2419	2419	2180	2134
Actual RICE BHP Reading 6 (bhp)	2243.0	2158.0	2275	2275	2164	2145
Average RICE Load (bhp)	2,220	2,172	2,290	2,290	2,169	2,153

US EPA Methods US EPA Methods 3A and 10 3A and 10 sampling location sampling location Atmosphere Oxidation Catalyst Reciprocating Internal Combustion Engine (RICE) **UNIT 1100** US EPA Methods US EPA Methods 3A, 4, 7E, 10, 18, and 25A 3A and 10 sampling location sampling location Atmosphere Oxidation Catalyst Reciprocating Internal Combustion Engine (RICE) **UNIT 2100** (EURICE1)

FIGURE 3.1
UNIT 1100 AND 2100 SAMPLING LOCATION SCHEMATIC



FIGURE 3.2
UNIT 2200 AND UNIT 2300 SAMPLING LOCATION SCHEMATIC





4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

4.1.1 US EPA Method 3A: "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"

Principle: A gas sample is continuously extracted from the effluent stream. A portion of the sample stream is conveyed to an instrumental analyzer(s) for determination of O_2 and CO_2 concentration(s). Performance specifications and test procedures are provided to ensure reliable data. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A. During this test event, only O_2 was measured.

4.1.2 US EPA Method 4: "Determination of Moisture Content in Stack Gases"

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined either volumetrically or gravimetrically. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.3 US EPA Method 7E: "Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)"

Principle: A gas sample is continuously extracted from the effluent stream. A portion of the sample stream is conveyed to an instrumental analyzer for the determination of NO_x concentration. NO and NO_2 may be measured separately or simultaneously. For the purposes of this method, NO_x is the sum of NO and NO_2 . Performance specifications and test procedures are provided to ensure reliable data. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.4 US EPA Method 10: "Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)"

Principle: A gas sample is continuously extracted from the effluent stream. A portion of the sample stream is conveyed to an instrumental analyzer for determination of CO concentration. Performance specifications and test procedures are provided to ensure reliable data. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.



4.1.5 US EPA Method 18: "Determination of Gaseous Organic Compound Emissions Chromatography"

Principle: This method is based on separating the major components of a gas mixture with a gas chromatograph (GC) and measuring the separated components with a suitable detector. The retention times of each separated component are compared with those of known compounds under identical conditions. Therefore, the analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A. During this test the gas mixture was only analyzed for methane and ethane.

4.1.6 US EPA Method 19: "Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxides Emission Rates"

Principle: Oxygen (O_2) or carbon dioxide (CO_2) concentrations and appropriate F factors (ratios of combustion gas volumes to heat inputs) are used to calculate pollutant emission rates from pollutant concentrations. During this test only O_2 was utilized to calculate pollutant emission rates.

4.1.7 US EPA Method 25A: "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer"

Principle: A gas sample is extracted from the source through a heated sample line, if necessary, and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents. Performance specifications and test procedures are provided to ensure reliable data. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

The sampling trains utilized during this testing project are depicted in Figures 4.1 to 4.4.

4.2 PROCEDURES FOR OBTAINING PROCESS DATA

Process data was recorded by DTE Energy - Willow Run Compressor Station personnel utilizing their typical record keeping procedures. Recorded process data was provided to Montrose personnel at the conclusion of this test event. The process data is displayed in Tables 2.2.1, 2.2.2, 2.3.1, 2.3.2, 3.1, and in the Process Data section of the Appendix.



THERMOCOUPLE PROBE SAMPLE LINE VACUUM LINE ADAPTOR ICE BATH CONDENSING 100 mL (modified/no tip) REAGENT CONDENSING (modified/no tip) REAGENT 200-300g Silica Gel (modified/no tip) VACUUM (standard tip) LINE BY-PASS VALVE (fine adjust) VACUUM GAUGE THERMOCOUPLES 0 MAIN → ORIFICE VALVE (coarse adjust) MANOMETER ───▷ 0 GAS DRY GAS AIR TIGHT EXIT PUMP METER

FIGURE 4.1
US EPA METHOD 4 SAMPLING TRAIN SCHEMATIC

Vent Flowmeter Needle Valve Sample Sample Line Vacuum Line Probe **Check Valves** Pump Method 18 Tedlar Bag Rigid Leakproof Container

FIGURE 4.2
US EPA METHOD 18 SAMPLING TRAIN SCHEMATIC



SIGNAL Exhaust O₂ ANALYZER Sample / Calibration Gas DATA DAS OUTPUT Exhaust CO ANALYZER Sample / Calibration Gas SIGNAL SAMPLE PROBE "ANALYZER" ROTAMETERS WITH FLOW CONTROL BY-PASS VALVES HEATED THREE WAY "BIAS" ROTAMETER WITH FLOW CONTROL VALVE "SAMPLE" AND "BY-PASS"
ROTAMETERS WITH FLOW
CONTROL VALVES HEATED STACK SAMPLE SAMPLE CALIBRATION CONDITIONING LINE GAS LINE SYSTEM WITH **PUMP** EPA Protocol MASS FLOW CONTROLLER / Calibration Gases CALIBRATION GAS MANIFOLD

FIGURE 4.3
US EPA METHOD 3A AND 10 SAMPLING TRAIN SCHEMATIC

NEEDLE VALVE Exhaust SIGNAL VOC Analyzer Sample / Calibration Gas with Pump Sample / Calibration Gas SIGNAL Exhaust O: ANALYZER Sample / Calibration Gas DATA OUTPUT DAS NO. ANALYZER Sample / Calibration Gas SIGNAL Exhaust CO ANALYZER Sample / Calibration Gas SIGNAL STACK WALL HEATED SAMPLE LINE -SAMPLE PROBE "ANALYZER"
ROTAMETERS WITH
FLOW CONTROL
VALVES 1⊗ 1⊗ ▲ BY-F'ASS "BIAS" ROTAMETER WITH FLOW CONTROL VALVE "SAMPLE" AND "BY-PASS" ROTAMETERS WITH FLOW CONTROL VALVES HEATED STACK SAMPLE SAMPLE WALL CALIBRATION CONDITIONING LINE GAS LINE SYSTEM WITH PUMP EPA Protocol Calibration Gases

FIGURE 4.4
US EPA METHOD 3A, 7E, 10, AND 25A SAMPLING TRAIN SCHEMATIC

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA AUDITS

Tables 5.1 to 5.9 illustrate the QA audits that were performed during this test.

All meter boxes and sampling trains used during sampling performed within the requirements of their respective methods as is shown in Tables 5.1 and 5.2. All post-test leak checks were well below the applicable limit. Minimum metered volumes were also met where applicable.

Tables 5.3.1 to 5.5.4 illustrate the O_2 , NO_x , and CO calibration audits which were performed during this test (and integral to performing US EPA Method 3A, 7E, and 10 correctly) were all within the Measurement System Performance Specifications of $\pm 3\%$ of span for the Zero and Calibration Drift Checks, $\pm 5\%$ of span for the System Calibration Bias Checks, and $\pm 2\%$ of span for the Calibration Error Checks.

Tables 5.6 illustrate the FIA calibration audits which were performed during this test (and integral to performing US EPA Method 25A correctly) were, except where noted, within the Measurement System Performance Specifications of $\pm 3\%$ of span for the Zero and Calibration Drift Checks, and $\pm 5\%$ of the respective cylinder concentrations for the Calibration Error Checks.

Table 5.7 displays the NO_2 to NO converter efficiency check. The converter efficiency check was conducted as per the procedures contained in US EPA Method 7E, Section 8.2.4.1 which require a conversion of at least 90%. As shown, an average converter efficiency of 93.81% was achieved for the NO_x analyzer utilized at RICE Unit 1100 Exhaust Duct, RICE Unit 2100 Exhaust Duct, RICE Unit 2200 Exhaust Duct, and RICE Unit 2300 Exhaust Duct.

Table 5.8 displays the US EPA Method 205 field evaluation of the calibration gas dilution system utilized during this test event. As shown, the average concentration output at each dilution level was within $\pm 2\%$ of the predicted value. The average concentration output of the direct inject gas was also within $\pm 2\%$ of the certified concentration.

Table 5.9 displays the laboratory QA results for US EPA Method 18. The average spike recovery efficiencies were within the acceptable range of 70% to 130%.

5.2 QA/QC PROBLEMS

No QA/QC problems occurred during this test event.



5.3 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is presented in the report appendices.



TABLE 5.1
US EPA METHOD 4 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	RICE Uni	it 2100 CAT-OX Exh	aust Duct
Post-Test Leak Rate Observed (cfm)	0.000	0.002	0.005
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	22.146	21.074	21.820
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Sampling Location	RICE Uni	it 2200 CAT-OX Exha	aust Duct
Post-Test Leak Rate Observed (cfm)	0.000	0.001	0.002
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	21.387	21.887	21.755
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Sampling Location	RICE Uni	it 2300 CAT-OX Exha	aust Duct
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	22.430	22.505	22.383
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes

TABLE 5.2
US EPA METHOD 4 DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Check Value (Yqa)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
RICE Unit 2100 CAT-OX Exhaust Duct	1.0210	1.0179	0.30%	5.00%	Yes
RICE Unit 2200 CAT-OX Exhaust Duct	1.0210	1.0119	0.89%	5.00%	Yes
RICE Unit 2300 CAT-OX Exhaust Duct	1.0210	1.0521	-3.05%	5.00%	Yes

TABLE 5.3.1 US EPA METHOD 3A (O_2) ANALYZER CALIBRATION AND QA

		RICE	Unit 1100	CAT-OX Inlet	Duct	
OXYGEN ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (%)	20.3	YES	20.3	YES	20.3	YES
Initial System Calibration Response for Zero Gas (%)	0.02	N/A	0.00	N/A	0.00	N/A
Final System Calibration Response for Zero Gas (%)	0.00	N/A	0.00	N/A	0.01	N/A
Actual Concentration of the Upscale Calibration Gas (%)	10.01	N/A	10.01	N/A	10.01	N/A
Initial System Calibration Response for Upscale Gas (%)	9.94	N/A	9.97	N/A	9.96	N/A
Final System Calibration Response for Upscale Gas (%)	9.97	N/A	9.96	N/A	9.97	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.10	YES	0.00	YES	0.00	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.00	YES	0.00	YES	0.05	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	-0.30	YES	-0.15	YES	-0.20	YES
Final System Calibration Bias for Upscale Gas (% of Span)	-0.15	YES	-0.20	YES	-0.15	YES
System Drift for Zero Gas (% of Span)	-0.10	YES	0.00	YES	0.05	YES
System Drift for Upscale Gas (% of Span)	0.15	YES	-0.05	YES	0.05	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.00	YES	0.00	YES	0.00	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.05	YES	-0.05	YES	-0.05	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	0.15	YES	0.15	YES	0.15	YES
		RICE U	nit 1100 C	AT-OX Exhaus	t Duct	talin ali talin ali
OXYGEN ANALYZER	RUN 1	RICE U Acceptable	nit 1100 C RUN 2	AT-OX Exhaus Acceptable	t Duct RUN 3	Acceptabl
OXYGEN ANALYZER Analyzer Span During Test Run (%)	RUN 1 20.3					Acceptab
		Acceptable	RUN 2	Acceptable	RUN 3	
Analyzer Span During Test Run (%)	20.3	Acceptable YES	20.3	Acceptable YES	RUN 3 20.3	YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%)	20.3 0.18	Acceptable YES N/A	20.3 0.12	Acceptable YES N/A	20.3 0.16	YES N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%)	20.3 0.18 0.12	YES N/A N/A	20.3 0.12 0.16	YES N/A N/A	20.3 0.16 0.13	YES N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%)	20.3 0.18 0.12 10.01	YES N/A N/A N/A	20.3 0.12 0.16 10.01	YES N/A N/A N/A	20.3 0.16 0.13 10.01	YES N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%)	20.3 0.18 0.12 10.01 10.13	YES N/A N/A N/A N/A	20.3 0.12 0.16 10.01 10.09	YES N/A N/A N/A N/A	20.3 0.16 0.13 10.01 10.10	YES N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%)	20.3 0.18 0.12 10.01 10.13 10.09	YES N/A N/A N/A N/A N/A N/A	20.3 0.12 0.16 10.01 10.09 10.10	YES N/A N/A N/A N/A N/A N/A	20.3 0.16 0.13 10.01 10.10 10.08	YES N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59	YES N/A N/A N/A N/A N/A N/A YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30	YES N/A N/A N/A N/A N/A N/A N/A YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49	YES N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59 0.30	YES N/A N/A N/A N/A N/A YES YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30 0.49	YES N/A N/A N/A N/A N/A N/A YES YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49 0.35	YES N/A N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59 0.30 0.00	YES N/A N/A N/A N/A N/A YES YES YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30 0.49 -0.20	YES N/A N/A N/A N/A N/A YES YES YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49 0.35 -0.15	YES N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59 0.30 0.00 -0.20	YES N/A N/A N/A N/A N/A YES YES YES YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30 0.49 -0.20 -0.15	YES N/A N/A N/A N/A N/A YES YES YES YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49 0.35 -0.15 -0.25	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59 0.30 0.00 -0.20 -0.30	YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30 0.49 -0.20 -0.15 0.20	YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49 0.35 -0.15 -0.25 -0.15	YES N/A N/A N/A N/A N/A YES YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	20.3 0.18 0.12 10.01 10.13 10.09 0.59 0.30 0.00 -0.20 -0.30 -0.20	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	20.3 0.12 0.16 10.01 10.09 10.10 0.30 0.49 -0.20 -0.15 0.20 0.05	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	20.3 0.16 0.13 10.01 10.10 10.08 0.49 0.35 -0.15 -0.25 -0.15	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES



TABLE 5.3.2 US EPA METHOD 3A (O_2) ANALYZER CALIBRATION AND QA

		RICE	Unit 2100	CAT-OX Inlet	Duct	
 OXYGEN ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (%)	20.3	YES	20.3	YES	20.3	YES
Initial System Calibration Response for Zero Gas (%)	0.11	N/A	0.05	N/A	0.04	N/A
Final System Calibration Response for Zero Gas (%)	0.05	N/A	0.04	N/A	0.12	N/A
Actual Concentration of the Upscale Calibration Gas (%)	10.03	N/A	10.03	N/A	10.03	N/A
Initial System Calibration Response for Upscale Gas (%)	10.00	N/A	9.95	N/A	9.96	N/A
Final System Calibration Response for Upscale Gas (%)	9.95	N/A	9.96	N/A	9.96	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.35	YES	0.05	YES	0.00	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.05	YES	0.00	YES	0.39	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	-0.15	YES	-0.39	YES	-0.35	YES
Final System Calibration Bias for Upscale Gas (% of Span)	-0.39	YES	-0.35	YES	-0.35	YES
System Drift for Zero Gas (% of Span)	-0.30	YES	-0.05	YES	0.39	YES
System Drift for Upscale Gas (% of Span)	-0.25	YES	0.05	YES	0.00	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.20	YES	0.20	YES	0.20	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	0.00	YES	0.00	YES	0.00	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	-0.30	YES	-0.30	YES	-0.30	YES
		RICE U	nit 2100 C	AT-OX Exhaus	t Duct	
OXYGEN ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (%)	20.3	YES	20.3	YES	20.3	YES
Initial System Calibration Response for Zero Gas (%)	0.16	N/A	0.15	N/A	0.14	N/A
Final System Calibration Response for Zero Gas (%)		1477	0.10	14// 1	0.11	14// (
	0.15	N/A	0.14	N/A	0.14	N/A
, , ,	0.15 10.03	N/A N/A	0.14 10.03	N/A N/A	0.14 10.03	N/A N/A
Actual Concentration of the Upscale Calibration Gas (%)	10.03	N/A	10.03	N/A	10.03	N/A
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%)	10.03 10.05	N/A N/A	10.03 10.05	N/A N/A	10.03 10.03	N/A N/A
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%)	10.03 10.05 10.05	N/A N/A N/A	10.03 10.05 10.03	N/A N/A N/A	10.03 10.03 10.04	N/A N/A N/A
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span)	10.03 10.05 10.05 0.59	N/A N/A N/A YES	10.03 10.05 10.03 0.54	N/A N/A N/A YES	10.03 10.03 10.04 0.49	N/A N/A N/A YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	10.03 10.05 10.05 0.59 0.54	N/A N/A N/A YES YES	10.03 10.05 10.03 0.54 0.49	N/A N/A N/A YES YES	10.03 10.03 10.04 0.49 0.49	N/A N/A N/A YES YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	10.03 10.05 10.05 0.59 0.54 0.10	N/A N/A N/A YES YES YES	10.03 10.05 10.03 0.54 0.49 0.10	N/A N/A N/A YES YES YES	10.03 10.03 10.04 0.49 0.49 0.00	N/A N/A N/A YES YES YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	10.03 10.05 10.05 0.59 0.54 0.10	N/A N/A N/A YES YES YES YES	10.03 10.05 10.03 0.54 0.49 0.10	N/A N/A N/A YES YES YES YES	10.03 10.03 10.04 0.49 0.49 0.00	N/A N/A N/A YES YES YES YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	10.03 10.05 10.05 0.59 0.54 0.10 0.10	N/A N/A N/A YES YES YES YES	10.03 10.05 10.03 0.54 0.49 0.10 0.00	N/A N/A N/A YES YES YES YES	10.03 10.03 10.04 0.49 0.49 0.00 0.05	N/A N/A N/A YES YES YES YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	10.03 10.05 10.05 0.59 0.54 0.10 0.10 -0.05 0.00	N/A N/A N/A YES YES YES YES YES	10.03 10.05 10.03 0.54 0.49 0.10 0.00 -0.05	N/A N/A N/A YES YES YES YES YES	10.03 10.03 10.04 0.49 0.49 0.00 0.05 0.00	N/A N/A N/A YES YES YES YES YES
Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	10.03 10.05 10.05 0.59 0.54 0.10 0.10	N/A N/A N/A YES YES YES YES	10.03 10.05 10.03 0.54 0.49 0.10 0.00	N/A N/A N/A YES YES YES YES	10.03 10.03 10.04 0.49 0.49 0.00 0.05	N/A N/A N/A YES YES YES YES



TABLE 5.3.3 US EPA METHOD 3A (O_2) ANALYZER CALIBRATION AND QA

		RICE	Unit 2200	CAT-OX Inlet	Duct	
OXYGEN ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (%)	20.3	YES	20.3	YES	20.3	YES
Initial System Calibration Response for Zero Gas (%)	0.24	N/A	0.21	N/A	0.24	N/A
Final System Calibration Response for Zero Gas (%)	0.23	N/A	-0.02	N/A	0.23	N/A
Actual Concentration of the Upscale Calibration Gas (%)	10.03	N/A	10.03	N/A	10.03	N/A
Initial System Calibration Response for Upscale Gas (%)	9.92	N/A	9.89	N/A	9.92	N/A
Final System Calibration Response for Upscale Gas (%)	9.85	N/A	9.93	N/A	9.85	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	1.18	YES	1.04	YES	1.18	YES
Final System Calibration Bias for Zero Gas (% of Span)	1.14	YES	-0.10	YES	1.14	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	-0.79	YES	-0.94	YES	-0.79	YES
Final System Calibration Bias for Upscale Gas (% of Span)	-1.14	YES	-0.74	YES	-1.14	YES
System Drift for Zero Gas (% of Span)	-0.05	YES	-1.14	YES	-0.05	YES
System Drift for Upscale Gas (% of Span)	-0.35	YES	0.20	YES	-0.35	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.00	YES	0.00	YES	0.00	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	0.25	YES	0.25	YES	0.25	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	-0.74	YES	-0.74	YES	-0.74	YES
Trialyzor Cambration Error for Fight Ecvor Cab (18 or Opart)	-0.74	120	0.74	120	-0.74	120
Analyzar administration and ringin zation and (18 or appair)	-0.74			CAT-OX Inlet		120
OXYGEN ANALYZER	RUN 1					Acceptable
	_	RICE	Unit 2200	CAT-OX Inlet	Duct	
OXYGEN ANALYZER	RUN 1	RICE Acceptable	Unit 2200 RUN 2	CAT-OX Inlet Acceptable	Duct RUN 3	Acceptable
OXYGEN ANALYZER Analyzer Span During Test Run (%)	RUN 1 20.3	RICE Acceptable	Unit 2200 RUN 2	CAT-OX Inlet Acceptable YES	Duct RUN 3	Acceptable YES
OXYGEN ANALYZER Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%)	RUN 1 20.3 0.15	RICE Acceptable YES N/A	Unit 2200 RUN 2 20.3 0.18	CAT-OX Inlet Acceptable YES N/A	Duct RUN 3 20.3 0.16	Acceptable YES N/A
OXYGEN ANALYZER Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%)	RUN 1 20.3 0.15 0.15	RICE Acceptable YES N/A N/A	Unit 2200 RUN 2 20.3 0.18 0.16	CAT-OX Inlet Acceptable YES N/A N/A	Duct RUN 3 20.3 0.16 0.16	Acceptable YES N/A N/A
OXYGEN ANALYZER Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%)	RUN 1 20.3 0.15 0.15 10.03	RICE Acceptable YES N/A N/A N/A	20.3 0.18 0.16 10.03	CAT-OX Inlet Acceptable YES N/A N/A N/A	20.3 0.16 0.16 10.03	Acceptable YES N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%)	20.3 0.15 0.15 10.03 10.11	RICE Acceptable YES N/A N/A N/A N/A	Unit 2200 RUN 2 20.3 0.18 0.16 10.03 10.09	CAT-OX Inlet Acceptable YES N/A N/A N/A N/A	20.3 0.16 0.16 10.03 10.08	Acceptable YES N/A N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%)	20.3 0.15 0.15 10.03 10.11 10.13	RICE Acceptable YES N/A N/A N/A N/A N/A	20.3 0.18 0.16 10.03 10.09 10.08	YES N/A N/A N/A N/A N/A N/A	20.3 0.16 0.16 10.03 10.08 10.13	YES N/A N/A N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span)	20.3 0.15 0.15 10.03 10.11 10.13 0.49	RICE Acceptable YES N/A N/A N/A N/A N/A N/A YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64	YES N/A N/A N/A N/A N/A N/A N/A YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54	YES N/A N/A N/A N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	20.3 0.15 0.15 10.03 10.11 10.13 0.49 0.49	RICE Acceptable YES N/A N/A N/A N/A N/A N/A YES YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64 0.54	YES N/A N/A N/A N/A N/A N/A YES YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54 0.54	YES N/A N/A N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	20.3 0.15 0.15 10.03 10.11 10.13 0.49 0.49 -0.30	RICE Acceptable YES N/A N/A N/A N/A N/A YES YES YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64 0.54 -0.39	YES N/A N/A N/A N/A N/A YES YES YES YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54 0.54 -0.44	YES N/A N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	RUN 1 20.3 0.15 0.15 10.03 10.11 10.13 0.49 0.49 -0.30 -0.20	RICE Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64 0.54 -0.39 -0.44	YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54 0.54 -0.44 -0.20	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	RUN 1 20.3 0.15 0.15 10.03 10.11 10.13 0.49 0.49 -0.30 -0.20 0.00	RICE Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64 0.54 -0.39 -0.44 -0.10	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54 0.54 -0.44 -0.20 0.00	YES N/A N/A N/A N/A N/A YES YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	RUN 1 20.3 0.15 0.15 10.03 10.11 10.13 0.49 0.49 -0.30 -0.20 0.00 0.10	RICE Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES YES	20.3 0.18 0.16 10.03 10.09 10.08 0.64 0.54 -0.39 -0.44 -0.10 -0.05	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES YES YES	20.3 0.16 0.16 10.03 10.08 10.13 0.54 0.54 -0.44 -0.20 0.00 0.25	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES



TABLE 5.3.4
US EPA METHOD 3A (O₂) ANALYZER CALIBRATION AND QA

	-	RICE	Unit 2300	CAT-OX Inlet	Duct	
OXYGEN ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (%)	20.3	YES	20.3	YES	20.3	YES
Initial System Calibration Response for Zero Gas (%)	-0.07	N/A	0.21	N/A	-0.16	N/A
Final System Calibration Response for Zero Gas (%)	-0.17	N/A	-0.16	N/A	-0.12	N/A
Actual Concentration of the Upscale Calibration Gas (%)	10.03	N/A	10.03	N/A	10.03	N/A
Initial System Calibration Response for Upscale Gas (%)	9.90	N/A	9.89	N/A	9.85	N/A
Final System Calibration Response for Upscale Gas (%)	9.86	N/A	9.85	N/A	9.87	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.49	YES	1.88	YES	0.05	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.00	YES	0.05	YES	0.25	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	-0.25	YES	-0.30	YES	-0.49	YES
Final System Calibration Bias for Upscale Gas (% of Span)	-0.44	YES	-0.49	YES	-0.39	YES
System Drift for Zero Gas (% of Span)	-0.49	YES	-1.83	YES	0.20	YES
System Drift for Upscale Gas (% of Span)	-0.20	YES	-0.20	YES	0.10	YES
Analyzer Calibration Error for Zero Gas (% of Span)	-0.84	YES	-0.84	YES	-0.84	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.39	YES	-0.39	YES	-0.39	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	-0.20	YES	-0.20	YES	-0.20	YES
		RICE U	Init 2300 C	AT-OX Exhaus	t Duct	
OXYGEN ANALYZER	RUN 1	RICE U Acceptable	Init 2300 C RUN 2	AT-OX Exhaus Acceptable	t Duct RUN 3	Acceptable
OXYGEN ANALYZER Analyzer Span During Test Run (%)	RUN 1					Acceptable YES
		Acceptable	RUN 2	Acceptable	RUN 3	Acceptable YES N/A
Analyzer Span During Test Run (%)	20.3	Acceptable YES	RUN 2 20.3	Acceptable YES	RUN 3 20.3	YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%)	20.3 0.13	Acceptable YES N/A	20.3 0.18	Acceptable YES N/A	20.3 0.15	YES N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%)	20.3 0.13 0.14	YES N/A N/A	20.3 0.18 0.15	YES N/A N/A	20.3 0.15 0.15	YES N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%)	20.3 0.13 0.14 10.03	YES N/A N/A N/A	20.3 0.18 0.15 10.03	YES N/A N/A N/A	20.3 0.15 0.15 10.03	YES N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%)	20.3 0.13 0.14 10.03 10.09	YES N/A N/A N/A N/A	20.3 0.18 0.15 10.03 10.09	YES N/A N/A N/A N/A	20.3 0.15 0.15 10.03 10.15	YES N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%)	20.3 0.13 0.14 10.03 10.09 10.11	YES N/A N/A N/A N/A N/A N/A	20.3 0.18 0.15 10.03 10.09 10.15	YES N/A N/A N/A N/A N/A N/A	20.3 0.15 0.15 10.03 10.15 10.14	YES N/A N/A N/A N/A
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44	YES N/A N/A N/A N/A N/A N/A N/A YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69	YES N/A N/A N/A N/A N/A N/A YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54	YES N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44 0.49	YES N/A N/A N/A N/A N/A N/A YES YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69 0.54	YES N/A N/A N/A N/A N/A YES YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54 0.54	YES N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44 0.49	YES N/A N/A N/A N/A N/A N/A YES YES YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69 0.54 -0.05	YES N/A N/A N/A N/A N/A YES YES YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54 0.54 0.25	YES N/A N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44 0.49 -0.05 0.05	YES N/A N/A N/A N/A N/A YES YES YES YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69 0.54 -0.05 0.25	YES N/A N/A N/A N/A N/A YES YES YES YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54 0.54 0.25 0.20	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44 0.49 -0.05 0.05	YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69 0.54 -0.05 0.25 -0.15	YES N/A N/A N/A N/A N/A YES YES YES YES YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54 0.54 0.25 0.20	YES N/A N/A N/A N/A N/A N/A YES YES YES YES YES
Analyzer Span During Test Run (%) Initial System Calibration Response for Zero Gas (%) Final System Calibration Response for Zero Gas (%) Actual Concentration of the Upscale Calibration Gas (%) Initial System Calibration Response for Upscale Gas (%) Final System Calibration Response for Upscale Gas (%) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	20.3 0.13 0.14 10.03 10.09 10.11 0.44 0.49 -0.05 0.05 0.05	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	20.3 0.18 0.15 10.03 10.09 10.15 0.69 0.54 -0.05 0.25 -0.15 0.30	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	20.3 0.15 0.15 10.03 10.15 10.14 0.54 0.54 0.25 0.20 0.00 -0.05	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES



TABLE 5.4.1
US EPA METHOD 7E ANALYZER CALIBRATION AND QA

		RICE U	nit 2100 C	AT-OX Exhaus	t Duct	
NITROGEN OXIDES ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppm)	93.9	YES	93.9	YES	93.9	YES
Initial System Calibration Response for Zero Gas (ppm)	0.48	N/A	0.75	N/A	1.02	N/A
Final System Calibration Response for Zero Gas (ppm)	0.75	N/A	1.02	N/A	1.22	N/A
Actual Concentration of the Upscale Calibration Gas (ppm)	50.38	N/A	50.38	N/A	50.38	N/A
Initial System Calibration Response for Upscale Gas (ppm)	48.86	N/A	48.57	N/A	49.17	N/A
Final System Calibration Response for Upscale Gas (ppm)	48.57	N/A	49.17	N/A	48.76	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.45	YES	0.73	YES	1.02	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.73	YES	1.02	YES	1.24	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	-0.35	YES	-0.66	YES	-0.02	YES
Final System Calibration Bias for Upscale Gas (% of Span)	-0.66	YES	-0.02	YES	-0.46	YES
System Drift for Zero Gas (% of Span)	0.29	YES	0.29	YES	0.21	YES
System Drift for Upscale Gas (% of Span)	-0.31	YES	0.64	YES	-0.44	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.06	YES	0.06	YES	0.06	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-1.27	YES	-1.27	YES	-1.27	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	-1.00	YES	-1.00	YES	-1.00	YES
		RICE U	nit 2200 C	AT-OX Exhaus	t Duct	
NITROGEN OXIDES ANALYZER	RUN 1	RICE U Acceptable	nit 2200 C RUN 2	AT-OX Exhaus	t Duct RUN 3	Acceptable
NITROGEN OXIDES ANALYZER Analyzer Span During Test Run (ppm)	RUN 1					Acceptable YES
		Acceptable	RUN 2	Acceptable	RUN 3	· · · · · · · · · · · · · · · · · · ·
Analyzer Span During Test Run (ppm)	93.9	Acceptable YES	RUN 2 93.9	Acceptable YES	RUN 3 93.9	YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm)	93.9 0.61	Acceptable YES N/A	93.9 0.42	Acceptable YES N/A	93.9 1.63	YES N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm)	93.9 0.61 2.14	YES N/A N/A	93.9 0.42 1.63	YES N/A N/A	93.9 1.63 0.88	YES N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm)	93.9 0.61 2.14 50.38	YES N/A N/A N/A	93.9 0.42 1.63 50.38	YES N/A N/A N/A	93.9 1.63 0.88 50.38	YES N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm)	93.9 0.61 2.14 50.38 50.36	YES N/A N/A N/A N/A	93.9 0.42 1.63 50.38 49.72	YES N/A N/A N/A N/A	93.9 1.63 0.88 50.38 49.59	YES N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm)	93.9 0.61 2.14 50.38 50.36 50.45	YES N/A N/A N/A N/A N/A N/A	93.9 0.42 1.63 50.38 49.72 49.59	YES N/A N/A N/A N/A N/A	93.9 1.63 0.88 50.38 49.59 48.28	YES N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64	YES N/A N/A N/A N/A N/A N/A YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44	YES N/A N/A N/A N/A N/A N/A YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73	YES N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64 2.27	YES N/A N/A N/A N/A N/A YES YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44 1.73	YES N/A N/A N/A N/A N/A YES YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73 0.93	YES N/A N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64 2.27 0.47	YES N/A N/A N/A N/A N/A YES YES YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44 1.73 -0.21	YES N/A N/A N/A N/A N/A YES YES YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73 0.93 -0.35	YES N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64 2.27 0.47	YES N/A N/A N/A N/A N/A YES YES YES YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44 1.73 -0.21 -0.35	YES N/A N/A N/A N/A N/A YES YES YES YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73 0.93 -0.35 -1.75	YES N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64 2.27 0.47 0.56 1.63	YES N/A N/A N/A N/A N/A YES YES YES YES YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44 1.73 -0.21 -0.35 1.29	YES N/A N/A N/A N/A N/A YES YES YES YES YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73 0.93 -0.35 -1.75 -0.80	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	93.9 0.61 2.14 50.38 50.36 50.45 0.64 2.27 0.47 0.56 1.63 0.10	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	93.9 0.42 1.63 50.38 49.72 49.59 0.44 1.73 -0.21 -0.35 1.29 -0.14	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	93.9 1.63 0.88 50.38 49.59 48.28 1.73 0.93 -0.35 -1.75 -0.80 -1.40	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES



TABLE 5.4.2
US EPA METHOD 7E ANALYZER CALIBRATION AND QA

	RICE Unit 2300 CAT-OX Exhaust Duct						
NITROGEN OXIDES ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable	
Analyzer Span During Test Run (ppm)	94	YES	94	YES	94	YES	
Initial System Calibration Response for Zero Gas (ppm)	0.6	N/A	0.4	N/A	1.1	N/A	
Final System Calibration Response for Zero Gas (ppm)	1.0	N/A	1.1	N/A	1.5	N/A	
Actual Concentration of the Upscale Calibration Gas (ppm)	50.4	N/A	50.4	N/A	50.4	N/A	
Initial System Calibration Response for Upscale Gas (ppm)	50.2	N/A	49.7	N/A	50.1	N/A	
Final System Calibration Response for Upscale Gas (ppm)	50.3	N/A	50.1	N/A	50.2	N/A	
Initial System Calibration Bias for Zero Gas (% of Span)	0.47	YES	0.33	YES	1.03	YES	
Final System Calibration Bias for Zero Gas (% of Span)	0.99	YES	1.03	YES	1.43	YES	
Initial System Calibration Bias for Upscale Gas (% of Span)	0.20	YES	-0.30	YES	0.07	YES	
Final System Calibration Bias for Upscale Gas (% of Span)	0.32	YES	0.07	YES	0.24	YES	
System Drift for Zero Gas (% of Span)	0.52	YES	0.70	YES	0.39	YES	
System Drift for Upscale Gas (% of Span)	0.12	YES	0.37	YES	0.17	YES	
Analyzer Calibration Error for Zero Gas (% of Span)	0.12	YES	0.12	YES	0.12	YES	
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.40	YES	-0.40	YES	-0.40	YES	
Analyzer Calibration Error for High-Level Gas (% of Span)	-0.28	YES	-0.28	YES	-0.28	YES	



TABLE 5.5.1
US EPA METHOD 10 ANALYZER CALIBRATION AND QA

			RICE	Unit 1100	CAT-OX Inlet I	Duct	
CARBON MONOXIDE ANALYZER		RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During 1	est Run (ppm)	900.0	YES	900.0	YES	900.0	YES
Initial System Calibration Response for Z	ero Gas (ppm)	4.33	N/A	4.52	N/A	4.99	N/A
Final System Calibration Response for Z	ero Gas (ppm)	4.52	N/A	4.99	N/A	4.66	N/A
Actual Concentration of the Upscale Calibra	tion Gas (ppm)	500.00	N/A	500.00	N/A	500.00	N/A
Initial System Calibration Response for Upso	ale Gas (ppm)	501.94	N/A	502.77	N/A	503.52	N/A
Final System Calibration Response for Upso	cale Gas (ppm)	502.77	N/A	503.52	N/A	502.39	N/A
Initial System Calibration Bias for Zero G	as (% of Span)	0.17	YES	0.19	YES	0.24	YES
Final System Calibration Bias for Zero G	as (% of Span)	0.19	YES	0.24	YES	0.21	YES
Initial System Calibration Bias for Upscale G	as (% of Span)	0.72	YES	0.82	YES	0.90	YES
Final System Calibration Bias for Upscale G	as (% of Span)	0.82	YES	0.90	YES	0.77	YES
System Drift for Zero Ga	as (% of Span)	0.02	YES	0.05	YES	-0.04	YES
System Drift for Upscale G	as (% of Span)	0.09	YES	0.08	YES	-0.13	YES
Analyzer Calibration Error for Zero G	as (% of Span)	0.31	YES	0.31	YES	0.31	YES
Analyzer Calibration Error for Mid-Level G	as (% of Span)	-0.51	YES	-0.51	YES	-0.51	YES
Analysis Calibratian Farantan High Laurah O			VE0	0.23	YES	0.23	YES
Analyzer Calibration Error for High-Level G	as (% of Span)	0.23	YES	0.23	TES	0.23	123
Analyzer Calibration Error for High-Level G	as (% of Span)	0.23			AT-OX Exhaus		ILO
CARBON MONOXIDE ANALYZER	as (% of Span)	0.23					Acceptable
CARBON MONOXIDE ANALYZER			RICE U	nit 1100 C	AT-OX Exhaus Acceptable	t Duct RUN 3	Acceptable
CARBON MONOXIDE ANALYZER Analyzer Span During 7	est Run (ppm)	RUN 1	RICE U Acceptable	nit 1100 C RUN 2	AT-OX Exhaus	t Duct	
CARBON MONOXIDE ANALYZER	est Run (ppm)	RUN 1 90.0	RICE U Acceptable	nit 1100 C RUN 2	AT-OX Exhaus Acceptable YES	RUN 3	Acceptable YES
CARBON MONOXIDE ANALYZER Analyzer Span During To Initial System Calibration Response for Z	est Run (ppm) ero Gas (ppm) ero Gas (ppm)	RUN 1 90.0 2.62	RICE U Acceptable YES N/A	nit 1100 C RUN 2 90.0 1.85	ACCEPTABLE YES N/A	90.0 1.90	Acceptable YES N/A
CARBON MONOXIDE ANALYZER Analyzer Span During To Initial System Calibration Response for Zonal System Response for Zo	Fest Run (ppm) Eero Gas (ppm) Eero Gas (ppm) tion Gas (ppm)	RUN 1 90.0 2.62 1.85	RICE U Acceptable YES N/A N/A	90.0 1.85 1.90	ACCEPTABLE YES N/A N/A	90.0 1.90 1.61	Acceptable YES N/A N/A
CARBON MONOXIDE ANALYZER Analyzer Span During To Initial System Calibration Response for Zone Final System Calibration Response for Zone Actual Concentration of the Upscale Calibration	Fest Run (ppm) Eero Gas (ppm) Eero Gas (ppm) Eition Gas (ppm) Eale Gas (ppm)	90.0 2.62 1.85 50.00	RICE U Acceptable YES N/A N/A N/A	90.0 1.85 1.90 50.00	ACCEPTABLE YES N/A N/A N/A	90.0 1.90 1.61 50.00	Acceptable YES N/A N/A N/A
CARBON MONOXIDE ANALYZER Analyzer Span During To the Initial System Calibration Response for Zone Calibration Response for Zone Calibration Response for Zone Calibration of the Upscale Calibration Response for Upscale Calibration	Test Run (ppm) Eero Gas (ppm) Eero Gas (ppm) Eition Gas (ppm) Eale Gas (ppm) Eale Gas (ppm)	90.0 2.62 1.85 50.00 50.04 51.58	RICE U Acceptable YES N/A N/A N/A N/A N/A N/A	90.0 1.85 1.90 50.00 51.58 51.46	ACCEPTABLE YES N/A N/A N/A N/A	90.0 1.90 1.61 50.00 51.46 51.04	YES N/A N/A N/A N/A N/A N/A
CARBON MONOXIDE ANALYZER Analyzer Span During To the Initial System Calibration Response for Zone Calibration Response for Zone Calibration Calibration Calibration Calibration Calibration Response for Upscale Calibration Response	Test Run (ppm) Eero Gas (ppm) Eero Gas (ppm) Eero Gas (ppm) Eale Gas (ppm)	90.0 2.62 1.85 50.00 50.04	RICE U Acceptable YES N/A N/A N/A N/A	90.0 1.85 1.90 50.00 51.58	ACCEPTABLE YES N/A N/A N/A N/A N/A	90.0 1.90 1.61 50.00 51.46	Acceptable YES N/A N/A N/A N/A
Analyzer Span During To Initial System Calibration Response for Zamer Calibration Response for Zamer Calibration Response for Zamer Calibration Response for Upscale Calibration Bias for Zero Gamer Calibration Bias f	Test Run (ppm) dero Gas (ppm) dero Gas (ppm) tion Gas (ppm) cale Gas (ppm) cale Gas (ppm) as (% of Span) as (% of Span)	90.0 2.62 1.85 50.00 50.04 51.58 2.79	RICE U Acceptable YES N/A N/A N/A N/A N/A N/A YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93	ACCEPTABLE YES N/A N/A N/A N/A N/A N/A YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99	YES N/A N/A N/A N/A N/A N/A N/A N/A YES
Analyzer Span During To Initial System Calibration Response for Zanal Concentration Response for Zanatual Concentration of the Upscale Calibration Response for Upscale Calibration Bias for Zero Ganal System Calibration Bias for Zero Ganal System Calibration Bias for Upscale G	Test Run (ppm) Eero Gas (ppm) Eero Gas (ppm) Eero Gas (ppm) Eale Gas (ppm)	90.0 2.62 1.85 50.00 50.04 51.58 2.79 1.93 1.01	RICE U Acceptable YES N/A N/A N/A N/A N/A N/A YES YES YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93 1.99 2.72	ACCEPTABLE YES N/A N/A N/A N/A N/A N/A YES YES YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99 1.67 2.59	YES N/A N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During To Initial System Calibration Response for Zamer Calibration Response for Zamer Calibration Response for Zamer Calibration Response for Upscale	Test Run (ppm) Alero Gas (ppm)	90.0 2.62 1.85 50.00 50.04 51.58 2.79 1.93	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93 1.99	ACCEPTABLE YES N/A N/A N/A N/A N/A YES YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99 1.67	YES N/A N/A N/A N/A N/A N/A YES YES
Analyzer Span During To Initial System Calibration Response for Zanal Concentration Response for Zanal Concentration of the Upscale Calibration Response for Upscale Calibration Bias for Zero Ganal System Calibration Bias for Zero Ganal System Calibration Bias for Upscale Gana	Test Run (ppm) dero Gas (ppm) dero Gas (ppm) dion Gas (ppm) dale Gas (ppm) dale Gas (ppm) as (% of Span)	90.0 2.62 1.85 50.00 50.04 51.58 2.79 1.93 1.01 2.72	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93 1.99 2.72 2.59	ACCEPTABLE YES N/A N/A N/A N/A N/A N/A YES YES YES YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99 1.67 2.59 2.12	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During To Initial System Calibration Response for Zanal Concentration Response for Zanal Concentration of the Upscale Calibration Response for Upscale Calibration Response for Upscale Calibration Response for Upscale Calibration Response for Upscale System Calibration Response for Upscale Galibration Bias for Zero Galibration Bias for Upscale Galib	Test Run (ppm) dero Gas (ppm) dero Gas (ppm) dion Gas (ppm) dale Gas (ppm) dale Gas (ppm) as (% of Span)	90.0 2.62 1.85 50.00 50.04 51.58 2.79 1.93 1.01 2.72 -0.86	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93 1.99 2.72 2.59 0.06	ACCEPTABLE YES N/A N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99 1.67 2.59 2.12 -0.32	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES
Analyzer Span During To Initial System Calibration Response for Zanal Concentration Response for Zanal Concentration of the Upscale Calibration Response for Upscale Calibration Response for Upscale Calibration Response for Upscale Calibration Response for Upscale System Calibration Response for Upscale Galibration Bias for Zero Galibration Bias for Upscale Galib	Test Run (ppm) dero Gas (ppm) dero Gas (ppm) dion Gas (ppm) dale Gas (ppm) dale Gas (ppm) as (% of Span)	90.0 2.62 1.85 50.00 50.04 51.58 2.79 1.93 1.01 2.72 -0.86 1.71	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.0 1.85 1.90 50.00 51.58 51.46 1.93 1.99 2.72 2.59 0.06 -0.13	ACCEPTABLE YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES YES	90.0 1.90 1.61 50.00 51.46 51.04 1.99 1.67 2.59 2.12 -0.32 -0.47	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES YES



TABLE 5.5.2
US EPA METHOD 10 ANALYZER CALIBRATION AND QA

		RICE	Unit 2100	CAT-OX Inlet	Duct	
CARBON MONOXIDE ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppm)	900.0	YES	900.0	YES	900.0	YES
Initial System Calibration Response for Zero Gas (ppm)	3.83	N/A	3.68	N/A	4.18	N/A
Final System Calibration Response for Zero Gas (ppm)	3.68	N/A	4.18	N/A	4.13	N/A
Actual Concentration of the Upscale Calibration Gas (ppm)	500.00	N/A	500.00	N/A	500.00	N/A
Initial System Calibration Response for Upscale Gas (ppm)	499.86	N/A	498.55	N/A	500.23	N/A
Final System Calibration Response for Upscale Gas (ppm)	498.55	N/A	500.23	N/A	489.25	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.01	YES	0.00	YES	0.05	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.00	YES	0.05	YES	0.05	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	0.28	YES	0.13	YES	0.32	YES
Final System Calibration Bias for Upscale Gas (% of Span)	0.13	YES	0.32	YES	-0.90	YES
System Drift for Zero Gas (% of Span)	-0.02	YES	0.06	YES	-0.01	YES
System Drift for Upscale Gas (% of Span)	-0.15	YES	0.19	YES	-1.22	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.41	YES	0.41	YES	0.41	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.29	YES	-0.29	YES	-0.29	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	0.31	YES	0.31	YES	0.31	YES
		RICE Unit 2100 CAT-OX Exhaust Duct				
		RICE U	nit 2100 C	AT-OX Exhaus	t Duct	
CARBON MONOXIDE ANALYZER	RUN 1	RICE U	Init 2100 C RUN 2	CAT-OX Exhaus	st Duct RUN 3	Acceptable
		Acceptable	RUN 2	Acceptable	RUN 3	
Analyzer Span During Test Run (ppm)	90.1	Acceptable YES	RUN 2 90.1	Acceptable YES	RUN 3 90.1	YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm)	90.1 1.54	Acceptable YES N/A	90.1 1.31	Acceptable YES N/A	90.1 1.43	YES N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm)	90.1 1.54 1.31	YES N/A N/A	90.1 1.31 1.43	YES N/A N/A	90.1 1.43 1.30	YES N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm)	90.1 1.54 1.31 49.40	YES N/A N/A N/A	90.1 1.31 1.43 49.40	YES N/A N/A N/A	90.1 1.43 1.30 49.40	YES N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm)	90.1 1.54 1.31 49.40 49.51	YES N/A N/A N/A N/A	90.1 1.31 1.43 49.40 48.92	YES N/A N/A N/A N/A	90.1 1.43 1.30 49.40 49.26	YES N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm)	90.1 1.54 1.31 49.40 49.51 48.92	YES N/A N/A N/A N/A N/A N/A	90.1 1.31 1.43 49.40 48.92 49.26	YES N/A N/A N/A N/A N/A N/A	90.1 1.43 1.30 49.40 49.26 49.08	YES N/A N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm)	90.1 1.54 1.31 49.40 49.51	YES N/A N/A N/A N/A	90.1 1.31 1.43 49.40 48.92 49.26 0.80	YES N/A N/A N/A N/A N/A N/A YES	90.1 1.43 1.30 49.40 49.26	YES N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05	YES N/A N/A N/A N/A N/A N/A YES	90.1 1.31 1.43 49.40 48.92 49.26	YES N/A N/A N/A N/A N/A N/A	90.1 1.43 1.30 49.40 49.26 49.08 0.93	YES N/A N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05 0.80	YES N/A N/A N/A N/A N/A YES YES	90.1 1.31 1.43 49.40 48.92 49.26 0.80 0.93	YES N/A N/A N/A N/A N/A YES YES	90.1 1.43 1.30 49.40 49.26 49.08 0.93 0.79	YES N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05 0.80 0.02	YES N/A N/A N/A N/A N/A YES YES YES	90.1 1.31 1.43 49.40 48.92 49.26 0.80 0.93 -0.63	YES N/A N/A N/A N/A N/A YES YES YES	90.1 1.43 1.30 49.40 49.26 49.08 0.93 0.79 -0.26	YES N/A N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05 0.80 0.02 -0.63	YES N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.31 1.43 49.40 48.92 49.26 0.80 0.93 -0.63 -0.26	YES N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.43 1.30 49.40 49.26 49.08 0.93 0.79 -0.26 -0.45	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05 0.80 0.02 -0.63 -0.26	YES N/A N/A N/A N/A N/A YES YES YES YES YES	90.1 1.31 1.43 49.40 48.92 49.26 0.80 0.93 -0.63 -0.26 0.13	YES N/A N/A N/A N/A N/A YES YES YES YES YES	90.1 1.43 1.30 49.40 49.26 49.08 0.93 0.79 -0.26 -0.45 -0.14	YES N/A N/A N/A N/A N/A YES YES YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	90.1 1.54 1.31 49.40 49.51 48.92 1.05 0.80 0.02 -0.63 -0.26	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.1 1.31 1.43 49.40 48.92 49.26 0.80 0.93 -0.63 -0.26 0.13 0.38	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.1 1.43 1.30 49.40 49.26 49.08 0.93 0.79 -0.26 -0.45 -0.14 -0.20	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES



TABLE 5.5.3
US EPA METHOD 10 ANALYZER CALIBRATION AND QA

		RICE	Unit 2200	CAT-OX Inlet	Duct	
CARBON MONOXIDE ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppm)	900.0	YES	900.0	YES	900.0	YES
Initial System Calibration Response for Zero Gas (ppm)	4.12	N/A	3.62	N/A	3.92	N/A
Final System Calibration Response for Zero Gas (ppm)	3.92	N/A	3.92	N/A	3.98	N/A
Actual Concentration of the Upscale Calibration Gas (ppm)	500.00	N/A	500.00	N/A	500.00	N/A
Initial System Calibration Response for Upscale Gas (ppm)	500.75	N/A	500.41	N/A	501.35	N/A
Final System Calibration Response for Upscale Gas (ppm)	500.15	N/A	501.35	N/A	503.80	N/A
Initial System Calibration Bias for Zero Gas (% of Span)	0.05	YES	-0.01	YES	0.02	YES
Final System Calibration Bias for Zero Gas (% of Span)	0.02	YES	0.02	YES	0.03	YES
Initial System Calibration Bias for Upscale Gas (% of Span)	0.37	YES	0.34	YES	0.44	YES
Final System Calibration Bias for Upscale Gas (% of Span)	0.31	YES	0.44	YES	0.71	YES
System Drift for Zero Gas (% of Span)	-0.02	YES	0.03	YES	0.01	YES
System Drift for Upscale Gas (% of Span)	-0.07	YES	0.10	YES	0.27	YES
Analyzer Calibration Error for Zero Gas (% of Span)	0.41	YES	0.41	YES	0.41	YES
Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.29	YES	-0.29	YES	-0.29	YES
Analyzer Calibration Error for High-Level Gas (% of Span)	0.31	YES	0.31	YES	0.31	YES ·
	RICE Unit 2200 CAT-OX Exhaust Duct					
		RICE U	nit 2200 C	AT-OX Exhaus	st Duct	
CARBON MONOXIDE ANALYZER	RUN 1	RICE U Acceptable	nit 2200 C RUN 2	AT-OX Exhaus	st Duct RUN 3	Acceptab
CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm)	RUN 1 90.1					Acceptab
		Acceptable	RUN 2	Acceptable	RUN 3	
Analyzer Span During Test Run (ppm)	90.1	Acceptable YES	RUN 2 90.1	Acceptable YES	RUN 3 90.1	YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm)	90.1 2.13	Acceptable YES N/A	90.1 1.46	Acceptable YES N/A	90.1 1.37	YES N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm)	90.1 2.13 1.87	YES N/A N/A	90.1 1.46 1.37	Acceptable YES N/A N/A	90.1 1.37 1.39	YES N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm)	90.1 2.13 1.87 49.40	YES N/A N/A N/A	90.1 1.46 1.37 49.40	YES N/A N/A N/A	90.1 1.37 1.39 49.40	YES N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm)	90.1 2.13 1.87 49.40 49.10	YES N/A N/A N/A N/A	90.1 1.46 1.37 49.40 48.84	YES N/A N/A N/A N/A	90.1 1.37 1.39 49.40 49.03	YES N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm)	90.1 2.13 1.87 49.40 49.10 49.48	YES N/A N/A N/A N/A N/A N/A	90.1 1.46 1.37 49.40 48.84 49.03	YES N/A N/A N/A N/A N/A N/A	90.1 1.37 1.39 49.40 49.03 48.89	YES N/A N/A N/A N/A
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80	YES N/A N/A N/A N/A N/A N/A YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05	YES N/A N/A N/A N/A N/A N/A YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95	YES N/A N/A N/A N/A N/A YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80 1.51	YES N/A N/A N/A N/A N/A YES YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05 0.95	YES N/A N/A N/A N/A N/A YES YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95 0.98	YES N/A N/A N/A N/A N/A YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80 1.51 0.06	YES N/A N/A N/A N/A N/A YES YES YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05 0.95 -0.23	YES N/A N/A N/A N/A N/A YES YES YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95 0.98 -0.02	YES N/A N/A N/A N/A N/A N/A YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80 1.51 0.06 0.48	YES N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05 0.95 -0.23 -0.02	YES N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95 0.98 -0.02 -0.18	YES N/A N/A N/A N/A N/A YES YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80 1.51 0.06 0.48 -0.29	YES N/A N/A N/A N/A N/A YES YES YES YES YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05 0.95 -0.23 -0.02 -0.10	YES N/A N/A N/A N/A N/A YES YES YES YES YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95 0.98 -0.02 -0.18 0.02	YES N/A N/A N/A N/A N/A YES YES YES YES YES
Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	90.1 2.13 1.87 49.40 49.10 49.48 1.80 1.51 0.06 0.48 -0.29 0.42	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.1 1.46 1.37 49.40 48.84 49.03 1.05 0.95 -0.23 -0.02 -0.10 0.21	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.1 1.37 1.39 49.40 49.03 48.89 0.95 0.98 -0.02 -0.18 0.02 -0.16	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES



TABLE 5.5.4
US EPA METHOD 10 ANALYZER CALIBRATION AND QA

			RICE	Unit 2300	CAT-OX Inlet	Duct	
-	CARBON MONOXIDE ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
	Analyzer Span During Test Run (ppm)	900.0	YES	900.0	YES	900.0	YES
	Initial System Calibration Response for Zero Gas (ppm)	5.15	N/A	3.62	N/A	3.56	N/A
	Final System Calibration Response for Zero Gas (ppm)	3.75	N/A	3.56	N/A	3.48	N/A
	Actual Concentration of the Upscale Calibration Gas (ppm)	500.00	N/A	500.00	N/A	500.00	N/A
	Initial System Calibration Response for Upscale Gas (ppm)	500.32	N/A	500.41	N/A	500.40	N/A
	Final System Calibration Response for Upscale Gas (ppm)	503.41	N/A	500.40	N/A	500.10	N/A
	Initial System Calibration Bias for Zero Gas (% of Span)	0.23	YES	0.06	YES	0.05	YES
	Final System Calibration Bias for Zero Gas (% of Span)	0.07	YES	0.05	YES	0.04	YES
	Initial System Calibration Bias for Upscale Gas (% of Span)	0.91	YES	0.92	YES	0.91	YES
	Final System Calibration Bias for Upscale Gas (% of Span)	1.25	YES	0.91	YES	0.88	YES
	System Drift for Zero Gas (% of Span)	-0.16	YES	-0.01	YES	-0.01	YES
	System Drift for Upscale Gas (% of Span)	0.34	YES	0.00	YES	-0.03	YES
	Analyzer Calibration Error for Zero Gas (% of Span)	0.34	YES	0.34	YES	0.34	YES
	Analyzer Calibration Error for Mid-Level Gas (% of Span)	-0.87	YES	-0.87	YES	-0.87	YES
	Analyzer Calibration Error for High-Level Gas (% of Span)	0.08	YES	0.08	YES	0.08	YES
	Analyzer Calibration Error for High-Level Gas (/6 or Span)	0.00	120	0.00	, 20	0.00	120
	Analyzer Calibration Effortor High-Level Gas (% of Spair)	0.00			AT-OX Exhaus		120
	CARBON MONOXIDE ANALYZER	RUN 1					Acceptable
	CARBON MONOXIDE ANALYZER	RUN 1	RICE U Acceptable	nit 2300 C RUN 2	AT-OX Exhaus	st Duct RUN 3	Acceptable
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm)	RUN 1 90.1	RICE U Acceptable	nit 2300 C RUN 2 90.1	AT-OX Exhaus Acceptable YES	St Duct RUN 3	Acceptable YES
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm)	RUN 1 90.1 1.13	RICE U Acceptable YES N/A	90.1 1.46	CAT-OX Exhaus Acceptable YES N/A	90.1 1.27	Acceptable YES N/A
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm)	RUN 1 90.1 1.13 1.08	RICE U Acceptable YES N/A N/A	90.1 1.46 1.27	CAT-OX Exhaus Acceptable YES N/A N/A	90.1 1.27 1.27	Acceptable YES N/A N/A
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm)	90.1 1.13 1.08 49.40	RICE U Acceptable YES N/A N/A N/A	90.1 1.46 1.27 49.40	CAT-OX Exhaus Acceptable YES N/A N/A N/A	90.1 1.27 1.27 49.40	Acceptable YES N/A N/A N/A
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm)	90.1 1.13 1.08 49.40 49.31	RICE U Acceptable YES N/A N/A N/A N/A	90.1 1.46 1.27 49.40 48.84	CAT-OX Exhaus Acceptable YES N/A N/A N/A N/A	90.1 1.27 1.27 49.40 50.46	Acceptable YES N/A N/A N/A N/A
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm)	90.1 1.13 1.08 49.40 49.31 50.46	RICE U Acceptable YES N/A N/A N/A N/A N/A N/A	90.1 1.46 1.27 49.40 48.84 50.46	CAT-OX Exhaus Acceptable YES N/A N/A N/A N/A N/A N/A	90.1 1.27 1.27 49.40 50.46 50.21	Acceptable YES N/A N/A N/A N/A N/A N/A N/A
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94	RICE U Acceptable YES N/A N/A N/A N/A N/A N/A YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31	CAT-OX Exhaus Acceptable YES N/A N/A N/A N/A N/A N/A N/A YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10	YES N/A N/A N/A N/A N/A N/A N/A N/A YES
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10	CAT-OX Exhaus Acceptable YES N/A N/A N/A N/A N/A N/A YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10	YES N/A N/A N/A N/A N/A N/A YES YES
	CARBON MONOXIDE ANALYZER Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89 -0.02	PES N/A N/A N/A N/A N/A N/A YES YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10 -0.54	YES N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10 1.10 1.25	YES N/A N/A N/A N/A N/A N/A YES YES YES
	Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89 -0.02 1.25	PES N/A N/A N/A N/A N/A N/A YES YES YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10 -0.54 1.25	YES N/A N/A N/A N/A N/A YES YES YES YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10 1.25 0.98	YES N/A N/A N/A N/A N/A N/A YES YES YES YES
	Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89 -0.02 1.25 -0.06	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10 -0.54 1.25 -0.21	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10 1.10 1.25 0.98 0.00	YES N/A N/A N/A N/A N/A N/A YES YES YES YES YES
	Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span) System Drift for Upscale Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89 -0.02 1.25 -0.06 1.28	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10 -0.54 1.25 -0.21 1.80	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10 1.10 1.25 0.98 0.00 -0.28	YES N/A N/A N/A N/A N/A N/A YES YES YES YES YES YES YES
	Analyzer Span During Test Run (ppm) Initial System Calibration Response for Zero Gas (ppm) Final System Calibration Response for Zero Gas (ppm) Actual Concentration of the Upscale Calibration Gas (ppm) Initial System Calibration Response for Upscale Gas (ppm) Final System Calibration Response for Upscale Gas (ppm) Initial System Calibration Bias for Zero Gas (% of Span) Final System Calibration Bias for Zero Gas (% of Span) Initial System Calibration Bias for Upscale Gas (% of Span) Final System Calibration Bias for Upscale Gas (% of Span) System Drift for Zero Gas (% of Span)	90.1 1.13 1.08 49.40 49.31 50.46 0.94 0.89 -0.02 1.25 -0.06	RICE U Acceptable YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.1 1.46 1.27 49.40 48.84 50.46 1.31 1.10 -0.54 1.25 -0.21	YES N/A N/A N/A N/A N/A YES YES YES YES YES YES	90.1 1.27 1.27 49.40 50.46 50.21 1.10 1.10 1.25 0.98 0.00	YES N/A N/A N/A N/A N/A YES YES YES YES YES



TABLE 5.6
US EPA METHOD 25A ANALYZER CALIBRATION AND QA

		RICE U	nit 2100 C	AT-OX Exhau	st Duct	
FID ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppmv as propane)	905.4	YES	905.4	YES	905.4	YES
Average Stack Gas Concentration (ppmv as propane)	395.1	YES	392.0	YES	394.3	YES
Zero Drift (% of Span)	-0.09	YES	-0.06	YES	0.13	YES
Calibration Drift for Mid-Level Gas (% of Span)	-0.90	YES	-0.16	YES	0.23	YES
Calibration Error for Low-Level Gas (% of Cal. Gas Tag Value)	1.26	YES	1.26	YES	1.26	YES
Calibration Error for Mid-Level Gas (% of Cal. Gas Tag Value)	0.65	YES	0.65	YES	0.65	YES
		RICE U	nit 2200 C	AT-OX Exhau	st Duct	
FID ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppmv as propane)	905.4	YES	905.4	YES	905.4	YES
Average Stack Gas Concentration (ppmv as propane)	393.1	YES	400.9	YES	413.0	YES
Zero Drift (% of Span)	-0.02	YES	-0.14	YES	-0.04	YES
Calibration Drift for Mid-Level Gas (% of Span)	-1.44	YES	-0.11	YES	0.35	YES
Calibration Error for Low-Level Gas (% of Cal. Gas Tag Value)	-0.35	YES	-0.35	YES	-0.35	YES
Calibration Error for Mid-Level Gas (% of Cal. Gas Tag Value)	0.07	YES	0.07	YES	0.07	YES
		RICE U	nit 2300 C	AT-OX Exhau	st Duct	
FID ANALYZER	RUN 1	Acceptable	RUN 2	Acceptable	RUN 3	Acceptable
Analyzer Span During Test Run (ppmv as propane)	905.4	YES	905.4	YES	905.4	YES
Average Stack Gas Concentration (ppmv as propane)	444.3	YES	444.1	YES	460.0	YES
Zero Drift (% of Span)	-0.14	YES	-0.09	YES	-0.10	YES
Calibration Drift for Mid-Level Gas (% of Span)	-0.32	YES	1.08	YES	0.57	YES
` ',			0.00	VEC		
Calibration Error for Low-Level Gas (% of Cal. Gas Tag Value)	0.33	YES	0.33	YES	0.33	YES

Date / Time	Certified Cylinder Concentration (ppm NO₂)	Analyzer Concentration (ppm NO _x)	Conversion Efficiency (%)	Required Conversion Efficiency (%)	Acceptable
6/18/2019 13:19	49.68	46.47	93.55	90.00	Yes
6/18/2019 13:20	49.68	46.74	94.07	90.00	Yes
AVERAGE	49.68	46.61	93.81	90.00	Yes

Analyzer Serial Number: 42i

Cylinder Number: CC501876

TABLE 5.8 US EPA METHOD 205 GAS DILUTION SYSTEM QA

Analyzer Serial Number: 42i

Dilution System Serial Number: 3090400001

CGD Mass Flow Controllers Used: 1 & 2

	Dilution Level 1	Dilution Level 2	Direct Inject Gas
Calibration Tag Value (ppm):	905.4	905.4	90.33
Dilution Ratio:	10.06	18.108	-
Predicted Diluted Value (ppm):	90.0	50.0	-
Injection 1 Response (ppm):	90.0	49.8	90.5
Injection 2 Response (ppm):	90.4	49.4	90.6
Injection 3 Response (ppm):	90.3	49.6	90.6
Average Response (ppm):	90.23	49.60	90.57
Difference From Predicted (%):	-0.26	0.80	-0.26
Acceptable (YES/NO):	Yes	Yes	Yes



TABLE 5.9
US EPA METHOD 18 SPIKE RECOVERY RESULTS

Parameter	Methane	Ethane
Sample ID	Engine 21	00 R1 SP
Initial Sample Concentration (ppmv)	906	57.9
Theoretical Spike Concentration (ppmv)	517	33.6
Final Sample Concentration (ppmv)	1,403	93.5
Recovery (%)	96.1	106
Acceptable per U.S. EPA Method 18 (Yes/No) (Expected Range 70%-130%)	Yes	Yes
Parameter	Methane	Ethane
Sample ID	Engine 22	00 R2 SP
Initial Sample Concentration (ppmv)	821	55.4
Theoretical Spike Concentration (ppmv)	505	30.8
Final Sample Concentration (ppmv)	1,189	83.4
Recovery (%)	73	91.1
Acceptable per U.S. EPA Method 18 (Yes/No) (Expected Range 70%-130%)	Yes	Yes
Parameter	Methane	Ethane
Sample ID	Engine 23	00 R3 SP
Initial Sample Concentration (ppmv)	1,077	51.6
Theoretical Spike Concentration (ppmv)	548	27.8
Final Sample Concentration (ppmv)	1,602.0	77.9
Recovery (%)	95.9	94.5
Acceptable per U.S. EPA Method 18 (Yes/No) (Expected Range 70%-130%)	Yes	Yes