2016 – 2nd Quarter Report Support for Conducting Systems & Performance Audits of CASTNET Sites and NADP Monitoring Stations

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Prepared for:

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List of Acronyms and Abbreviations

% diff percent difference

A/D analog to digital converter
ARS Air Resource Specialist, Inc.

ASTM American Society for Testing and Materials
CASTNET Clean Air Status and Trends Network

DAS data acquisition system

DC direct current

deg degree

DVM digital voltmeter

EEMS Environmental, Engineering & Measurement Services, Inc.

EPA U.S. Environmental Protection Agency
ESC Environmental Systems Corporation

FSAD Field Site Audit Database

GPS geographical positioning system

lpm liters per minute
MLM Multilayer Model
m/s meters per second

mv milivolt

NIST National Institute of Standards and Technology NOAA National Oceanic and Atmospheric Administration

NPS National Park Service

QAPP Quality Assurance Project Plan SOP standard operating procedure

TEI Thermo Environmental Instruments
USNO United States Naval Observatory

V volts

WRR World Radiation Reference

1.0 CASTNET Quarterly Report

1.1 Introduction

The Clean Air Status and Trends Network (CASTNET) is a national air monitoring program developed under mandate of the 1990 Clean Air Act Amendments. Each site in the network measures acidic gases and particles and other forms of atmospheric pollution using a continuous collection filter aggregated over a one week period. Hourly averages of surface ozone concentrations and selected meteorological variables are also measured.

Site measurements are used to estimate deposition rates of the various pollutants with the objective of determining relationships between emissions, air quality, deposition, and ecological effects. In conjunction with other national monitoring networks, CASTNET data are used to determine the effectiveness of national emissions control programs and to assess temporal trends and spatial deposition patterns in atmospheric pollutants. CASTNET data are also used for long-range transport model evaluations and effects research.

CASTNET pollutant flux estimates are calculated as the aggregate product of weekly measured chemical concentrations and model-estimated deposition velocities. Currently, the National Oceanic and Atmospheric Administration's multilayer inferential model (NOAA-MLM) described by Meyers et al. [1998] is used to derive deposition velocity estimates.

As of July 2016, the network is comprised of 95 active rural sampling sites across the Untied States and Canada, cooperatively operated by the Environmental Protection Agency (EPA), the National Park Service (NPS), Environment Canada, Bureau of Land Management (BLM) and several independent partners. AMEC Foster Wheeler (AMEC) is responsible for operating the EPA and Environment Canada sponsored sites, and Air Resource Specialist, Inc. (ARS) is responsible for operating the NPS and BLM sponsored sites.

1.2 Project Objectives

The objectives of this project are to establish an independent and unbiased program of performance and systems audits for all CASTNET sampling sites. Ongoing Quality Assurance (QA) programs are an essential part of any long-term monitoring network.

Performance audits verify that all evaluated variables are consistent with the accuracy goals as defined in the CASTNET Quality Assurance Project Plan (QAPP). The parameter specific accuracy goals are presented in Table 1. Only four EPA sponsored sites that are operated by AMEC continue to operate meteorological sensors. Those sites are BEL116, BVL30, CHE185,

and PAL190. Five new sites in WY sponsored by EPA and operated by the BLM/ARS also operate meteorological sensors and are BAS601, NEC602, BUF603, FOR604, and SHE604. Only one meteorological station audit (FOR605) was performed during second quarter 2016.

Some or all of the additional monitored variables, NOy, CO, and SO₂ have been added to the EPA sponsored sites BVL130, HWF187, PND165, PNF126, ROM206, and BEL116. Those variables were audited at the ROM206 and PND165 stations during second quarter 2016. All of the NOy results for those audits were found to be within acceptance criteria. The preliminary reports of those results were delivered following the audits and are not included in this report.

Table 1. Performance Audit Challenge and Acceptance Criteria

Sensor	Parameter	Audit Challenge	Acceptance Criteria
Precipitation	Response	10 manual tips	1 DAS count per tip
Precipitation	Accuracy	2 introductions of known amounts of water	≤±10.0% of input amount
Relative Humidity	Accuracy	Compared to reference instrument or standard solution	≤±10.0% RH
Solar Radiation	Accuracy	Compared to WRR traceable standard	≤±10.0% of daytime average
Surface Wetness	Response	Distilled water spray mist	Positive response
Surface Wetness	Sensitivity	1% decade resistance	N/A
Temperature	Accuracy	Comparison to 3 NIST measured baths (~0° C, ambient, ~ full-scale)	≤± 0.5° C
Temperature Difference	Accuracy	Comparison to station temperature sensor	≤ ± 0.50° C
Wind Direction	Orientation Accuracy	Parallel to alignment rod/crossarm, or sighted to distant point	≤±5° from degrees true
Wind Direction	Linearity	Eight cardinal points on test fixture	≤±5° mean absolute error
Wind Direction	Response Threshold	Starting torque tested with torque gauge	< 10 g-cm Climatronics; < 20 g-cm R.M. Young
Wind Speed	Accuracy	Shaft rotational speed generated and measured with certified synchronous motor	$\leq \pm 0.5$ mps below 5.0 mps input; $\leq \pm 5.0\%$ of input at or above 5.0 mps
Wind Speed	Starting Threshold	Starting torque tested with torque gauge	< 0.5 g-cm
Mass Flow Controller	Flow Rate Comparison with Primary Standard		$\leq \pm 5.0\%$ of designated rate

Sensor	Parameter	Audit Challenge	Acceptance Criteria
Ozone	Slope	Linear regression of multi-	$0.9000 \le m \le 1.1000$
Ozone	Intercept	point test gas concentration as measured with a certified	$-5.0 \text{ ppb} \le b \le 5.0 \text{ ppb}$
Ozone	Correlation Coefficient	transfer standard	0.9950 ≤ r
DAS	Accuracy	Comparison with certified standard	≤ ± 0.003 VDC

Performance audits are conducted using standards that are traceable to the National Institute of Standards and Technology (NIST), or another authoritative organization, and certified as current.

Site systems audits are intended to provide a qualitative appraisal of the total measurement system. Site planning, organization, and operation are evaluated to ensure that good Quality Assurance/Quality Control (QA/QC) practices are being applied. At a minimum the following audit issues were addressed at each site systems audit:

- Site locations and configurations match those provided in the CASTNET QAPP.
- Meteorological instruments are in good physical and operational condition and are sited to meet EPA ambient monitoring guidelines (EPA-600/4-82-060).
- Sites are accessible, orderly, and if applicable, compliant with OSHA safety standards.
- Sampling lines are free of leaks, kinks, visible contamination, weathering, and moisture.
- Site shelters provide adequate temperature control.
- All ambient air quality instruments are functional, being operated in the appropriate range, and the zero air supply desiccant is unsaturated.
- All instruments are in current calibration.
- Site documentation (maintenance schedules, on-site SOPs, etc.) is current and log book records are complete.
- All maintenance and on-site SOPs are performed on schedule.
- Corrective actions are documented and appropriate for required maintenance/repair activity.
- Site operators demonstrate an adequate knowledge and ability to perform required site activities, including documentation and maintenance activities.

1.3 CASTNET Sites Visited Second Quarter 2016

This report consists of the systems and performance and other audit results from the CASTNET sites visited during the second quarter (April through June) of 2016. The locations and dates of the site visits for complete audits are presented in Table 2.

Table 2. Site Audit Visits

Side ID	Audit Type	Sponsor	Site Visit Date	Station Name
COW137	Without Met	EPA	4/13/2016	Coweeta
ESP127	Without Met	EPA	4/14/2016	Edgar Evins SP
CHA467	Without Met	NPS	4/19/2016	Chiricahua NM
GRC474	Without Met	NPS	4/20/2016	Grand Canyon NP
PET427	Without Met	NPS	4/21/2016	Petrified Forest NP
MEV405	Without Met	NPS	5/31/2016	Mesa Verde NP
CAN407	Without Met	NPS	6/1/2016	Canyonlands NP
GRB411	Without Met	NPS	6/3/2016	Great Basin NP
FOR605	Flow + Met	BLM	6/22/2016	Fortification Creek

In addition to the sites listed in Table 2 that were visited for complete audits, the sites listed in Table 3 were visited to conduct Through-The-Probe (TTP) pollutant Performance Evaluations (PE).

Table 3. TTP Pollutant PE Visits

Side ID	PE Audit Type	<u>Sponsor</u>	Site Visit Date	Station Name	
CHE185	Ozone	EPA	4/1/2016	Cherokee Nation	
PIN414	Ozone	NPS	4/4/2016	Pinnacles NM	
DCP114	Ozone	EPA	4/16/2016	Deer Creek	
OXF122	Ozone	EPA	4/16/2016	Oxford	
QAK172	Ozone	EPA	4/17/2016	Quaker City	
ROM206	NOy	EPA	6/15/2016	Rocky Mountain NP	
PND165	Ozone	EPA	6/17/2016	Pinedale	
PND165	NOy	EPA	6/17/2016	Pinedale	
BAS601	Ozone	BLM	6/21/2016	Basin	

1.4 Audit Results

The observations and results of the systems and performance audits are included in Appendix A, *CASTNET Audit Report Forms* by site, arranged by audit date.

Photographs of site conditions are included within each systems report where necessary.

Copies of the spot reports that were sent immediately following the audit of each site are included as Appendix B, *CASTNET Site Spot Report Forms*.

The Ozone PE results and observations are included in Appendix C, CASTNET Ozone Performance Evaluation Forms.

2.0 NADP Quarterly Report

2.1 Introduction

The National Atmospheric Deposition Program (NADP) operates three precipitation chemistry networks and two atmospheric concentration networks. The National Trends Network (NTN) has been measuring acidic precipitation since 1978. The network currently has more than 250 sites. The Atmospheric Integrated Research Monitoring Network (AIRMoN) began operation in 1992 and currently measures event based precipitation events at 6 sites. The Mercury Deposition Network (MDN) measures total mercury in precipitation samples from more than 120 stations. The MDN began operation in 1996 and includes sites throughout the US and Canada. The Atmospheric Mercury Network (AMNet) and the Ammonia Monitoring Network (AMoN) measure ambient concentrations of mercury and ammonia, respectively.

The NADP and other long-term monitoring networks provide critical information to the EPA regarding evaluating the effectiveness of emission reduction control programs from the power industry.

The NADP Program Office operates and administers the three precipitation chemistry networks (NTN, MDN and AIRMON), two atmospheric concentration networks (AMNet and AMON), two analytical laboratories (the Central Analytical Laboratory (CAL) located at the University of Illinois/Illinois State Water Survey and the Mercury Analytical Laboratory (HAL) located at Frontier Global Sciences), and the network equipment depot (NED).

2.2 Project Objectives

The objective of this project is to perform independent and unbiased evaluations of the sites along with its operations. These evaluations provide quality assurance pertaining to siting, sample collection and handling, equipment operation and maintenance, record keeping and field laboratory procedures.

More specifically, the surveys determine and report findings based on an established methodology consisting of completing a site questionnaire, testing the equipment and documenting with photographs the location, siting criteria, existing equipment, and any issues encountered that require such documentation.

2.3 Sites Visited Second Quarter 2016

This report covers the results from the NADP sites surveyed during the second quarter (April through June) of 2016. The station names and dates of the audits are presented in Table 4.

Table 4. Sites Surveyed – Second Quarter 2016

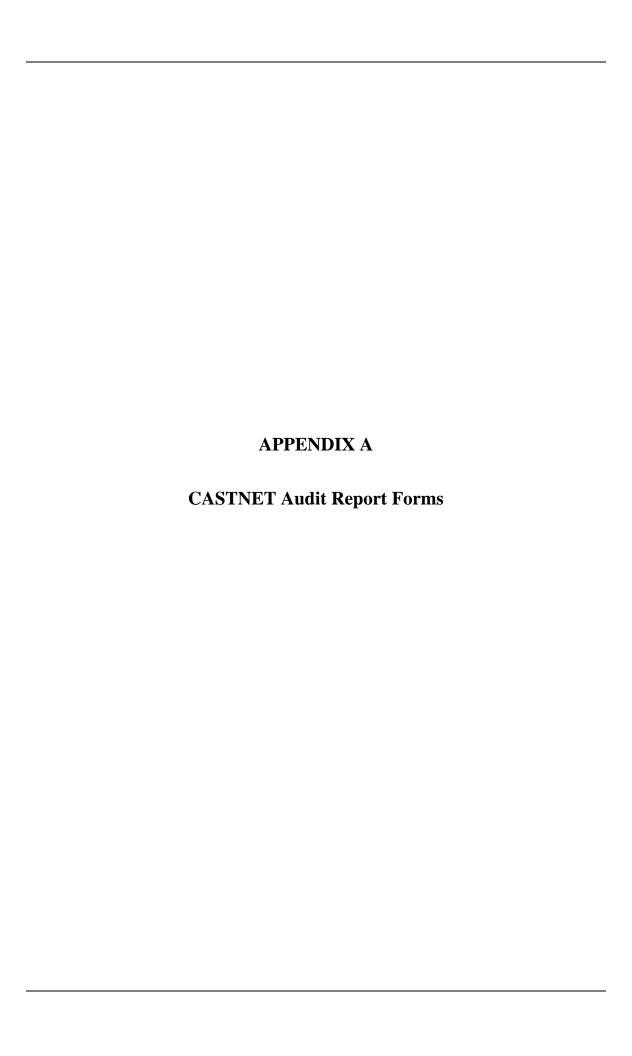
Side ID	<u>Network</u>	Visit Date	Station Name		
CA66	NTN	4/4/2016	Pinnacles National Monument-Bear Valley		
CA88	NTN	4/5/2016	Davis		
KY22	NTN	4/15/2016	Lilley Cornett Woods		
OH59	AMoN	4/16/2016	Oxford		
TN14	NTN	4/05/2016	Hatchie National Wildlife Refuge		
CA20	MDN	5/6/2016	Yurok Tribe-Requa		
CA45	NTN	5/17/2016	Hopland		
CA50	NTN	5/11/2016	Sagehen Creek		
CA75	MDN/NTN	5/10/2016	Sequoia National Park-Giant Forest		
CA76	NTN	5/13/2016	Montague		
CA96	NTN	5/12/2016	Lassen Volcanic National Park-Manzanita Lake		
CA99	NTN	5/9/2016	Yosemite National Park-Hodgdon Meadow		
MA01	MDN/NTN	5/17/2016	North Atlantic Coastal Lab		
MA08	NTN	5/19/2016	Quabbin Reservoir		
MA14	NTN	5/18/2016	Nantucket		
NC25	AMoN	5/4/2016	Coweeta		
NY96	MDN/NTN/AMoN	5/23/2016	Cedar Beach, Southold		
WY26	MDN	6/20/2016	Roundtop Mountain		

2.4 Survey Results

Site survey results are entered into a relational database. The database in turn generates Site Spot Reports which are distributed among the interested parties as soon as all the site data has been entered. Database tables with all the data collected and reviewed are then sent to the NADP Program Office and to the U.S. EPA Project Officers.

Other items gathered during the surveys (i.e., photographs, Belfort charts, etc.) are uploaded to EEMS' server where the NADP PO and the U.S. EPA POs can access them and download them as needed by login into the server site.

Given the volume of data generated, and the fact that data is distributed and/or is available through EEMS' server, no survey results are included in this report.



Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
СО	W137-Sandy	Grenville-04/13/2016				
1	4/13/2016	Computer	Dell	07049	Inspiron 15	1K2MC12
2	4/13/2016	DAS	Campbell	000401	CR3000	2529
3	4/13/2016	elevation	Elevation	none	1	None
4	4/13/2016	Filter pack flow pump	Thomas	02758	107CAB18	001871
5	4/13/2016	Flow Rate	Apex	000467	AXMC105LPMDPCV	43973
6	4/13/2016	Infrastructure	Infrastructure	none	none	none
7	4/13/2016	Modem	Raven	06806	V4221-V	0936444095
8	4/13/2016	Ozone	ThermoElectron Inc	000726	49i A1NAA	1105347314
9	4/13/2016	Ozone Standard	ThermoElectron Inc	000441	49i A3NAA	CM08200017
10	4/13/2016	Sample Tower	Aluma Tower	03499	Α	none
11	4/13/2016	Shelter Temperature	Campbell	none	107-L	none
12	4/13/2016	Siting Criteria	Siting Criteria	None	1	None
13	4/13/2016	Temperature	RM Young	02934	41342	none
14	4/13/2016	UPS	APC	none	650	unknown
15	4/13/2016	Zero air pump	Werther International	06878	C 70/4	000815254

DAS Data Form DAS Time Max Error: 0.65 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2529 COW137 Sandy Grenville 04/13/2016 DAS Primary Das Date: 4 /13/2016 **Audit Date** 4 /13/2016 Datel **Parameter** DAS Mfg 15:30:00 15:29:21 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 104 Das Day: 104 **Audit Day** Tfer ID 01320 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 0.0001 0.0001 0.0001 0.0001 Fluke **Parameter** DAS Mfg Tfer Desc. DVM **Serial Number** 95740135 01311 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 7 0.1000 0.0999 0.0999 0.00007 0.3000 0.2998 0.2997 V V -0.0001 7 0.5000 0.4996 0.4996 V V 0.00007 0.7000 V V -0.0001 0.6996 0.6995 7 V V 0.9000 0.8994 0.8993 -0.00017 1.0000 0.9993 0.9992 V V -0.0001

Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Tec	chnician	Site Visit D	ate Paran	neter	Owner ID
Apex	43973		COW137	Sa	ndy Grenville	04/13/2016	Flow R	Rate	000467
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103471	Т	fer Desc. nex	kus
					Tfer ID	01420			
					Slope	0.9	99091 Int	ercept	0.03172
					Cert Date	2/28	3/2016 Co	rrCoff	0.99988
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. BIC	OS cell
					Tfer ID	01410			
					Slope	0.9	99091 Int	ercept	0.03172
					Cert Date	2/28	3/2016 Co	rrCoff	0.99988
DAS 1:		DAS 2:		L	Cal Factor Z	ero	-0.0	01	
A Avg % Diff:	A Max % Di	A Avg %	Dif A Max	: % Di	Cal Factor F			1	
1.58%	2.03%				Rotometer R		1	.5	
Desc.	Test type	Input 1/n	n Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference
primary	pump off	0.000	0.000	0.01	0.000	0.00	1/m	1/m	
primary	leak check	0.000	0.000	0.00	0.000	0.00	1/m	1/m	
primary	test pt 1	1.499	1.480	1.51	0.000	1.50	1/m	1/m	1.35%
primary	test pt 2	1.499	1.480	1.51	0.000	1.51	1/m	l/m	2.03%
primary	test pt 3	1.496	1.480	1.51	0.000	1.50	1/m	1/m	1.35%
Sensor Compo	onent Leak Tes	st		Conditio	n		Status	pass	
Sensor Compe	onent Tubing C	ondition		Conditio	n Good		Status	pass	
Sensor Compo	onent Filter Pos	sition		Conditio	n Good		Status	pass	
Sensor Compo	nent Rotomete	er Conditio	n	Conditio	n Clean and dry		Status	pass	
Sensor Compo	onent Moisture	Present		Conditio	n No moisture pr	resent	Status	pass	
Sensor Compe	onent Filter Dis	tance		Conditio	n 4.5 cm		Status	pass	
Sensor Compo	onent Filter Dep	oth		Conditio	n 1.2 cm		Status	pass	
Sensor Compo	onent Filter Azi	muth		Conditio	n 180 deg		Status	pass	
	onent System N	/lemo		Conditio	n See comments		Status	pass	

Ozone Data Form

Note	Mfg S	erial Number Ta	Site	Tec	chnician		Site Vi	sit Date	Parame	eter	Owner ID	
DAS 1:	ThermoElectron Inc 1	105347314	COW137	Sa	andy Grenv	ille	04/13/	2016	Ozone		000726	
A Avg % Diff: A Max % Di	Intercept 0.0	3487 Intercept	0.00000		Serial Nu	mber	041960					an
1.0% 1.4%	DAS 1:	DAS 2:			Slope			0.9952	4 Inter	cept	-0.33070	כ
UseDescription ConeGroup Tifer Raw Tifer Corr Site Site Unit PetDifference primary 1 0.01 0.34 0.69 ppb			6Dif A Max %	6 Di	Cert Date	•		1/28/201	6 Corr	·Coff	1.00000	_)
primary 1 0.01 0.34 0.69 ppb												
primary 2 30.00 30.47 30.04 ppb -1.41% primary 3 50.02 50.59 49.98 ppb -1.21% primary 4 79.92 80.63 80.00 ppb -0.78% primary 5 109.96 110.81 110.20 ppb -0.55% Sensor Component Sample Train Condition Good Status pass Sensor Component Sample Train Condition Clean Status pass Sensor Component Battery Backup Condition Not functioning Status fail Sensor Component Offset Condition 0.2 Status pass Sensor Component Span Condition 0.2 Status pass Sensor Component Span Condition N/A Status pass Sensor Component Fullscale Voltage Condition N/A Status pass Sensor Component Cell A Freq. Condition 0.9 ppb Status pass Sensor Component Cell A Freq. Condition 0.9 ppb Status pass Sensor Component Cell A Freq. Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.5 ppb Status pass Sensor Component Cell B Freq. Condition 0.5 ppb Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition Condition Condition Status pass Condition Status pass Condition Condit	•								e Unit	PctDiff	erence	
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Primary 5 109.96 110.81 110.20 ppb -0.55%		3										
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Sensor ComponentCell A FlowCondition0.68 lpmStatuspassSensor ComponentCell A PressureCondition682.5 mmHgStatuspassSensor ComponentCell A Tmp.Condition31.4 CStatuspassSensor ComponentCell B Freq.Condition95.6 kHzStatuspassSensor ComponentCell B NoiseCondition0.5 ppbStatuspassSensor ComponentCell B FlowCondition0.68 lpmStatuspassSensor ComponentCell B PressureCondition681.9 mmHgStatuspassSensor ComponentCell B Tmp.ConditionStatuspassSensor ComponentLine LossConditionNot testedStatuspass	Sensor Component	Cell A Freq.		Conditio	n 115.3 k	Hz			Status	pass		
Sensor Component Cell A Pressure Condition 682.5 mmHg Status pass Sensor Component Cell A Tmp. Condition 31.4 C Status pass Sensor Component Cell B Freq. Condition 95.6 kHz Status pass Sensor Component Cell B Noise Condition 0.5 ppb Status pass Sensor Component Cell B Flow Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 681.9 mmHg Status pass Sensor Component Cell B Tmp. Condition Not tested Status pass	Sensor Component	Cell A Noise		Conditio	0.9 ppb				Status	pass		
Sensor ComponentCell A Tmp.Condition31.4 CStatuspassSensor ComponentCell B Freq.Condition95.6 kHzStatuspassSensor ComponentCell B NoiseCondition0.5 ppbStatuspassSensor ComponentCell B FlowCondition0.68 lpmStatuspassSensor ComponentCell B PressureCondition681.9 mmHgStatuspassSensor ComponentCell B Tmp.ConditionStatuspassSensor ComponentLine LossConditionNot testedStatuspass	Sensor Component	Cell A Flow		Conditio	0.68 lpr	n			Status	pass		
Sensor Component Cell B Freq. Condition 95.6 kHz Status pass Sensor Component Cell B Noise Condition 0.5 ppb Status pass Sensor Component Cell B Flow Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 681.9 mmHg Status pass Sensor Component Cell B Tmp. Condition Status pass Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell A Pressure		Conditio	on 682.5 m	mHg			Status	pass		
Sensor Component Cell B Noise Condition 0.5 ppb Status pass Sensor Component Cell B Flow Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 681.9 mmHg Status pass Sensor Component Cell B Tmp. Condition Status pass Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell A Tmp.		Conditio	31.4 C				Status	pass		
Sensor Component Cell B Flow Condition 0.68 lpm Status pass Sensor Component Cell B Pressure Condition 681.9 mmHg Status pass Sensor Component Cell B Tmp. Condition Status pass Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell B Freq.		Conditio	95.6 kH	Z			Status	pass		
Sensor Component Cell B Pressure Condition 681.9 mmHg Status pass Sensor Component Cell B Tmp. Condition Status pass Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell B Noise		Conditio	0.5 ppb				Status	pass		
Sensor Component Cell B Tmp. Condition Status pass Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell B Flow		Conditio	0.68 lpr	n			Status	pass		
Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Cell B Pressure		Conditio	on 681.9 m	mHg			Status	pass		
	Sensor Component	Cell B Tmp.		Conditio	on				Status	pass		
Sensor Component System Memo Condition Status pass	Sensor Component	Line Loss		Conditio	Not test	ed			Status	pass		
	Sensor Component	System Memo		Conditio	on				Status	pass		

Temperature Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young COW137 04/13/2016 Temperature 02934 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID Slope** 1.00772 **Intercept** 0.12514 **DAS 1: DAS 2:** 2/28/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.07 0.14 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.20 0.07 0.000 0.2 C 0.14 C Temp Mid Range 24.73 24.42 0.000 24.4 primary 0 48.44 48.4 C -0.07 primary Temp High Range 48.94 0.000 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Condition Functioning **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	22.91	22.61	0.000	22.4	C	-0.19
primary	Temp Mid Range	24.32	24.01	0.000	23.5	С	-0.51
primary	Temp Mid Range	24.12	23.81	0.000	23.6	C	-0.21

Infrastructure Data For

Site ID	COW137	Technician	Sandy Grenville	Site Visit Date	04/13/2016

Shelter Make	Shelter Model	Shelter Size	
Ekto	8810	640 cuft	

Sensor Component	Sample Tower Type	Condition	Type A	Status	pass
Sensor Component	Conduit	Condition	N/A	Status	pass
Sensor Component	Met Tower	Condition	Fair	Status	pass
Sensor Component	Moisture Trap	Condition	Installed	Status	pass
Sensor Component	Power Cables	Condition	Good	Status	pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
Sensor Component	Sample Tower	Condition	Fair	Status	pass
Sensor Component	Shelter Condition	Condition	Fair	Status	pass
Sensor Component	Shelter Door	Condition	Fair	Status	pass
Sensor Component	Shelter Roof	Condition	Fair	Status	pass
Sensor Component	Shelter Floor	Condition	Fair	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

Site Visit Comments

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazar	d Problem
Flow Rate	COW137	Sandy Grenville	04/13/2016	System Memo	Apex	3224		✓

There is no plastic bag for the installed filter. The operator uses the received bag for the installed filter to ship the removed filter to the lab.

Field Systems Comments

1 Parameter: DasComments

One leg of the meteorological tower has two holes. The shelter heating and air conditioning systems are operating simultaneously.

2 Parameter: SitingCriteriaCom

Construction was completed on new building with a parking lot, in October 2004. The parking area is within 60 meters of the site.

3 Parameter: ShelterCleanNotes

The shelter is in fair condition with some rot near the air conditioner and at the bottom of the walls. It has degraded since the previous audit.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 04/13/2016 COW137 Technician Sandy Grenville Site ID **Prentiss USGS Map** EPA/USFS Site Sponsor (agency) Map Scale USFS **Operating Group Map Date** 37-113-9991 AQS# Climatronics **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude **Deposition Measurement** dry, wet **QAPP** Longitude woodland - mixed Land Use **QAPP Elevation Meters** complex Terrain **QAPP Declination** No Conforms to MLM **OAPP Declination Date** 8283697919 35.060527 **Site Telephone Audit Latitude** Southeastern Forest Experiment Statio -83.43034 Site Address 1 **Audit Longitude** 3160 Coweeta Lab Road Site Address 2 **Audit Elevation** 683 Macon -5.1 County **Audit Declination** , NC City, State **Present** Fire Extinguisher ✓ 28763 New in 2015 Zip Code Eastern **First Aid Kit** Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # Primary Op. E-mail **Climbing Belt Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail **Shelter Working Room** ✓ **Make** Model 8810 Ekto **Shelter Size** 640 cuft

has degraded since the previous audit.

The shelter is in fair condition with some rot near the air conditioner and at the bottom of the walls. It

✓ Notes

✓ Notes

Shelter Clean

Driving Directions

Site OK

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID COW137 Technician Sandy Grenville Site Visit Date 04/13/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		✓
Limited agricultural operations	200 m		✓
Large parking lot	200 m		✓
Small parking lot	100 m	60 m	
Tree line	50 m	40 m	
Obstacles to wind	10 times obstacle height		V

Siting Distances OK ✓

Siting Criteria Comment

Construction was completed on new building with a parking lot, in October 2004. The parking area is within 60 meters of the site.

Field Systems Data Form F-02058-1500-S3-rev002 Site Visit Date 04/13/2016 Site ID COW137 Technician Sandy Grenville ✓ N/A Are wind speed and direction sensors sited so as to avoid being influenced by obstructions? **✓** N/A Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind) **✓** N/A Are the tower and sensors plumb? **~** Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? **V** Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided) **✓** N/A Is the solar radiation sensor plumb? N/A Is it sited to avoid shading, or any artificial or reflected light? **✓** N/A Is the rain gauge plumb? ✓ N/A Is it sited to avoid sheltering effects from buildings, trees, towers, etc? N/A 10 Is the surface wetness sensor sited with the grid surface

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

✓ N/A

facing north?

11 Is it inclined approximately 30 degrees?

Fie	ld Systems Data Form		F-02058-1500-S4-rev002
Site	Technician Sandy Grenville		Site Visit Date 04/13/2016
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	✓	Temperature only
2	Are all the meteorological sensors operational online, and reporting data?	✓	Temperature only
3	Are the shields for the temperature and RH sensors clean?	✓	
4	Are the aspirated motors working?	✓	
5	Is the solar radiation sensor's lens clean and free of scratches?	✓	N/A
6	Is the surface wetness sensor grid clean and undamaged?	✓	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	✓	
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓	
	de any additional explanation (photograph or sketch if neces al or man-made, that may affect the monitoring parameters:) regarding conditions listed above, or any other features,

Field Systems Data Form F-02058-1500-S5-rev002 COW137 Technician Sandy Grenville Site Visit Date 04/13/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **~** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. 1/4 teflon by 12 meters Describe dry dep sample tube. 3/8 teflon by 12 meters At inlet only Are in-line filters used in the ozone sample line? (if ves indicate location) **~** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? Flow line only Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it Clean and dry clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	COW137	Technician	Sandy Grenville		Site Visi	it Date 04/13/201	6	
	DAS, se	nsor translators, and	peripheral equi	pment operation	ns ai	nd maintena	<u>nce</u>		
1	Do the I	OAS instruments appeintained?	ear to be in good	l condition and	✓				
2		the components of the backup, etc)	DAS operation	al? (printers,	✓				
3		nalyzer and sensor sig g protection circuitry	_	through	✓	Met sensors	only		
4		signal connections prointained?	otected from the	e weather and	✓				
5	Are the	signal leads connected	d to the correct	DAS channel?	✓				
6	Are the grounde	DAS, sensor translateed?	ors, and shelter	properly	✓				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	✓				
8	Is the in	strument shelter temp	perature contro	lled?	✓				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	d grounded?			✓		✓	
11	Tower o	omments?						V	
Pro	ovide anv	additional explanatio	n (nhotograph d	or sketch if nece	essar	v) regarding	g conditions listed	l above, or s	nny other features.
nat	ural or n	nan-made, that may a	ffect the monito	ring parameter	s:				
One	e ieg or th	e meteorological tower	nas two notes. T	he sheller heatir	ıg ar	iu aii conditio	ning systems are	operating sin	iuitaneousiy.

Field Systems Data Form F-02058-1500-S7-rev002 COW137 Technician Sandy Grenville Site Visit Date 04/13/2016 Site ID **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No No N/A Yes **✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger** ✓ **V** Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V** \checkmark **~ Humidity sensor translator Surge protector** П **V ~ UPS Solar radiation translator ~ V** Tipping bucket rain gauge Lightning protection device ~ **✓ Shelter heater** Ozone analyzer \checkmark ~ Filter pack flow controller Shelter air conditioner **V** Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V ✓ SSRF ✓ V ✓ Site Ops Manual** Feb 2014 **HASP V** Feb 2014 **Field Ops Manual Calibration Reports V ✓** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Minimal information Are the Site Status Report Forms being completed and **V** current? Are the chain-of-custody forms properly used to document **✓** sample transfer to and from lab? Control charts not used Are ozone z/s/p control charts properly completed and current?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form F-02058-1500-S8-rev002 COW137 Technician Sandy Grenville Site Visit Date 04/13/2016 Site ID Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** N/A **Visual Inspections V** N/A Translator Zero/Span Tests (climatronics) **✓ V** N/A **Manual Rain Gauge Test V V** N/A **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** As needed Manual Zero/Span Tests **V ~** Daily **Automatic Precision Level Tests V Manual Precision Level Test** As needed **V V** Weekly **Analyzer Diagnostics Tests ~** Every 2 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V V** Weekly Sample Line Check for Dirt/Water **~ V** Weekly **Zero Air Desiccant Check ✓** Do multi-point calibration gases go through the complete sample train including all filters? **✓** Do automatic and manual z/s/p gasses go through the

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

✓

Call-in only

complete sample train including all filters?

reported? If yes, how?

Are the automatic and manual z/s/p checks monitored and

FI	eld Systems Data Form			F-02058-1500-59-rev00.				
Site	COW137 Tec	hnician Sandy Grenville		Site Visit Date	04/13/2016			
	Site operation procedures							
1	Is the filter pack being changed ever	y Tuesday as scheduled?	✓	Filter changed morn	ings			
2	Are the Site Status Report Forms be correctly?	ing completed and filed						
3	Are data downloads and backups be scheduled?		No longer required					
4	Are general observations being made	e and recorded? How?	✓	SSRF				
5	Are site supplies on-hand and replen fashion?	ished in a timely	✓					
6	Are sample flow rates recorded? How	w?	✓	SSRF, logbook, call	-in			
7	Are samples sent to the lab on a regularishion?	lar schedule in a timely	✓					
8	Are filters protected from contamina and shipping? How?	tion during handling	✓	One set of gloves o	nly			
9	Are the site conditions reported reguloperations manager or staff?	larly to the field	✓					
QC	Check Performed	Frequency			Compliant			
N	Multi-point MFC Calibrations	✓ Semiannually			✓			
I	Flow System Leak Checks	Weekly			✓			
I	Filter Pack Inspection							
I	Flow Rate Setting Checks	Weekly			\checkmark			
7	Visual Check of Flow Rate Rotometer	✓ Weekly			\checkmark			
Ι	n-line Filter Inspection/Replacement	✓ Semiannually			\checkmark			
S	Sample Line Check for Dirt/Water	Weekly			\checkmark			
	ride any additional explanation (photo ral or man-made, that may affect the			y) regarding conditi	ons listed above, or a	ny other features,		

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID

COW137

Technician Sandy Grenville

Site Visit Date 04/13/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	Inspiron 15	1K2MC12	07049
DAS	Campbell	CR3000	2529	000401
elevation	Elevation	<u> </u> 1	None	none
Filter pack flow pump	Thomas	107CAB18	001871	02758
Flow Rate	Apex	AXMC105LPMDPC	43973	000467
Infrastructure	Infrastructure	none	none	none
Modem	Raven	V4221-V	0936444095	06806
Ozone	ThermoElectron Inc	49i A1NAA	1105347314	000726
Ozone Standard	ThermoElectron Inc	49i A3NAA	CM08200017	000441
Sample Tower	Aluma Tower	A	none	03499
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	none	02934
UPS	APC	650	unknown	none
Zero air pump	Werther International	C 70/4	000815254	06878

DAS Data Form DAS Time Max Error: 0.68 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 3817 ESP127 Sandy Grenville 04/14/2016 DAS Primary Das Date: 4 /14/2016 **Audit Date** 4 /14/2016 Datel **Parameter** DAS Mfg 13:24:00 13:23:19 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 105 105 Das Day: **Audit Day** Tfer ID 01320 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 0.0000 0.0001 0.0000 0.0001 Fluke **Parameter** DAS Mfg Tfer Desc. DVM **Serial Number** 95740135 01311 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 7 0.1000 0.0999 0.0999 0.00007 0.3000 0.2997 0.2997 V V 0.0000 7 0.5000 0.4996 0.4996 V V 0.00007 0.7000 V V 0.0000 0.6995 0.6995 7 V V 0.9000 0.8994 0.8993 -0.0001 7 1.0000 0.9993 0.9992 V V -0.0001

Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Tec	Technician		ate Paran	neter	Owner ID
Apex	54755		ESP127	Sa	ndy Grenville	04/14/2016	Flow R	Rate	000642
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103471	Т	fer Desc. nex	kus
					Tfer ID	01420			
					Slope	0.9	99091 Int	ercept	0.03172
					Cert Date	2/28	3/2016 Co	rrCoff	0.99988
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. BIC	OS cell
					Tfer ID	01410			
					Slope	0.9	99091 Int	ercept	0.03172
					Cert Date	2/28	3/2016 Co	rrCoff	0.99988
DAS 1:		DAS 2:		L	Cal Factor Z	ero	0.0	04	
A Avg % Diff:	A Max % Di	A Avg %	6Dif A Max	% Di	Cal Factor F	ull Scale	1.0	02	
7.36%	7.36%				Rotometer R	eading:	1	.5	
Desc.	Test type	Input 1/n	n Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference
primary	pump off	0.000	0.000	-0.11	0.000	-0.07	1/m	l/m	
primary	leak check	0.000	0.000	-0.01	0.000	0.03	1/m	1/m	
primary	test pt 1	1.643	1.630	1.50	0.000	1.51	1/m	1/m	-7.36%
primary	test pt 2	1.646	1.630	1.50	0.000	1.51	1/m	1/m	-7.36%
primary	test pt 3	1.644	1.630	1.50	0.000	1.51	1/m	1/m	-7.36%
Sensor Compo	onent Leak Tes	st		Conditio	n		Status	pass	
Sensor Compo	onent Tubing C	Condition		Conditio	n Good		Status	pass	
Sensor Compe	onent Filter Pos	sition		Conditio	n Fair		Status	pass	
Sensor Compo	onent Rotomete	er Conditio	on	Conditio	n Clean and dry		Status	pass	
Sensor Compo	onent Moisture	Present		Conditio	n No moisture pr	resent	Status	pass	
Sensor Compo	onent Filter Dis	tance		Conditio	n 4.5 cm		Status	pass	
Sensor Compo	onent Filter Dep	pth		Conditio	n 0.0 cm	Status	pass		
Sensor Compo	onent Filter Azi	muth		Conditio	n 200 deg		Status	pass	
Sensor Component System Memo		Conditio	n		Status	pass			

Ozone Data Form

ThermoElectron Inc 1009241785 ESP127 Sandy G	l Number [0	04/14/2016 ThermoElectron 0419606966 01112 0.9952	Tf	rameter ozone er Desc. Ozone primary stan
Intercept 0.63082 Intercept 0.00000 Serial CorrCoff 0.99999 CorrCoff 0.00000 Tfer l	l Number	0419606966 01112	Tf	
DAS 1: DAS 2: Slope		0.9952		
	Date		4 Inter	-0.33070
A Avg % Diff: A Max % Di A Avg %Dif A Max % Di 1.3% 2.1% Cert		1/28/201	6 Corr	*Coff 1.00000
UseDescription ConcGroup Tfer Raw Tfer Corr	Site	e Sit	e Unit	PctDifference
primary 1 0.01 0.34	0.9	1.1		
primary 2 30.01 30.48	30.4	1.1		0.00%
primary 3 50.04 50.61 primary 4 80.02 80.73	49.9 79.0	11		-1.24%
primary 5 110.00 110.85	108.	1.1		-1.76%
Sensor Component 22.5 degree rule Condition			Status	pass
Sensor Component Sample Train Condition Good	od		Status	pass
Sensor Component Inlet Filter Condition Condition Cle	ean		Status	pass
Sensor Component Battery Backup Condition N/A	4		Status	pass
Sensor Component Offset Condition -0.1	10		Status	pass
Sensor Component Span Condition 1.00	07		Status	pass
Sensor Component Zero Voltage Condition N/A	4		Status	pass
Sensor Component Fullscale Voltage Condition N/A	4		Status	pass
Sensor Component Cell A Freq. Condition 94.	1 kHz		Status	pass
Sensor Component Cell A Noise Condition 1.5	ppb		Status	pass
Sensor Component Cell A Flow Condition 0.69	9 lpm		Status	pass
Sensor Component Cell A Pressure Condition 705	5.5 mmHg		Status	pass
Sensor Component Cell A Tmp. Condition 33.0	0 C		Status	pass
Sensor Component Cell B Freq. Condition 85.	7 kHz		Status	pass
Sensor Component Cell B Noise Condition 1.4	ppb		Status	pass
Sensor Component Cell B Flow Condition 0.99	5 lpm		Status	pass
Sensor Component Cell B Pressure Condition 705	5.2 mmHg		Status	pass
Sensor Component Cell B Tmp. Condition			Status	pass
Sensor Component Line Loss Condition Not	t tested		Status	pass
Sensor Component System Memo Condition			Status	pass

Temperature Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young 14803 ESP127 04/14/2016 Temperature 06542 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID Slope** 1.00772 **Intercept** 0.12514 **DAS 1: DAS 2:** 2/28/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.23 0.38 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.17 0.04 0.000 0.1 C 0.02 C Temp Mid Range 24.64 24.33 0.000 24.0 -0.3 primary 0.000 47.9 C -0.38 primary Temp High Range 48.73 48.23 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower **Condition** N/A **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For

Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
none	ESP127	Sandy Grenville	04/14/2016	Shelter Temperature	none
DAS 2:		Mfg	Extech	Parameter She	Iter Temperatur
Max Er Abs Avg 1.12	Err Abs Max Er	Serial Number	H232734	Tfer Desc. RTD	D
		Tfer ID	01227		
		Slope	1.00772	2 Intercept	0.12514
		Cert Date	2/28/2016	CorrCoff	1.00000
	none DAS 2: Max Er Abs Avg	none ESP127 DAS 2: Max Er Abs Avg Err Abs Max Er	none DAS 2: Max Er 1.12 Abs Avg Err 1.12 Mfg Serial Number Tfer ID Slope	none ESP127 Sandy Grenville 04/14/2016 DAS 2: Max Er 1.12 Abs Avg Err 1.12 Serial Number H232734 Tfer ID 01227 Slope 1.00772	none ESP127 Sandy Grenville 04/14/2016 Shelter Temperature DAS 2: Mfg Extech Parameter She Serial Number H232734 Tfer Desc. RTE Tfer ID 01227 Slope 1.00772 Intercept

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	26.27	25.94	0.000	27.1	C	1.12
primary	Temp Mid Range	22.61	22.31	0.000	22.8	С	0.48
primary	Temp Mid Range	23.08	22.78	0.000	23.3	С	0.47

Infrastructure Data For

Site ID	ESP127	Technician	Sandy Grenville	Site Visit Date	04/14/2016
---------	--------	------------	-----------------	-----------------	------------

Shelter Make	Shelter Model	Shelter Size	
Ekto	8810	640 cuft	

Sensor Component	Sample Tower Type	Condition	Type A	Status	pass
Sensor Component	Conduit	Condition	N/A	Status	pass
Sensor Component	Met Tower	Condition	N/A	Status	pass
Sensor Component	Moisture Trap	Condition	Installed	Status	pass
Sensor Component	Power Cables	Condition	Good	Status	pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
Sensor Component	Sample Tower	Condition	Fair	Status	pass
Sensor Component	Shelter Condition	Condition	Fair	Status	pass
Sensor Component	Shelter Door	Condition	Fair	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
Sensor Component	Shelter Floor	Condition	Good	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

Site Visit Comments

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	Problem
Flow Rate	ESP127	Sandy Grenville	04/14/2016	Moisture Present	Apex	3540		
There is moisture prese	ent in the dry de	position sample train	inside the shelte	er.				
Shelter Temperature	ESP127	Sandy Grenville	04/14/2016	System Memo	Campbell	3016		
The shelter thermostat	for cooling has	been bypassed and the	e air conditionii	ng system is no long	er being contro	lled by the shelter	thermostat.	
Shelter Temperature	ESP127	Sandy Grenville	04/14/2016	System Memo	Campbell	3016		
The shelter heating and	l air conditionin	g systems are operating	ng simultaneous	sly.				

Field Systems Comments

1 Parameter: ShelterCleanNotes

The shelter floor and roof are currently undergoing repairs.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 04/14/2016 ESP127 Technician Sandy Grenville Site ID Silver Point **USGS Map EPA** Site Sponsor (agency) Map Scale private, TN DEC **Operating Group Map Date** 47-041-9991 AQS# Climatronics **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude dry **Deposition Measurement QAPP** Longitude **Land Use** woodland - mixed **QAPP Elevation Meters Terrain** rolling - complex **QAPP Declination** No Conforms to MLM **OAPP Declination Date** (615) 597-6556 36.03893 **Site Telephone Audit Latitude** Craft Center Rd. -85.73305 Site Address 1 **Audit Longitude** Hurricane Bridge Site Address 2 **Audit Elevation** 302 DeKalb -3.5 County **Audit Declination** Smithville, TN City, State **Present** Fire Extinguisher 37166 No inspection date Zip Code Central **First Aid Kit** Time Zone **✓ Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **V Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 Ekto **Shelter Size** 640 cuft Notes The shelter floor and roof are currently undergoing repairs. Shelter Clean **✓** Notes Site OK

From interstate 40 take exit 273, south on 56. Immediately after crossing the Hurricane Bridge over the Caney Fork

River, turn left at the sign for Tennessee Tech and the Appalachian Center for Crafts. Continue about 1 mile to the

locked (518) yellow gate on the right. The site is up the hill through the gate.

Driving Directions

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID ESP127 Technician Sandy Grenville Site Visit Date 04/14/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		$ lap{\checkmark}$
Feedlot operations	500 m		$ lap{\checkmark}$
Intensive agricultural ops (including aerial spraying)	500 m		$ lap{\checkmark}$
Limited agricultural operations	200 m		lacksquare
Large parking lot	200 m		$ lap{\checkmark}$
Small parking lot	100 m		✓
Tree line	50 m	30 m	
Obstacles to wind	10 times obstacle height		✓

Siting	Distances OK	✓
Siting	Criteria Comn	nen

Field Systems Data Form F-02058-1500-S3-rev002 Site Visit Date 04/14/2016 Site ID ESP127 Technician Sandy Grenville ✓ N/A Are wind speed and direction sensors sited so as to avoid being influenced by obstructions? **✓** N/A Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind) **✓** N/A Are the tower and sensors plumb? **~** Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? **V** Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided) **✓** N/A Is the solar radiation sensor plumb? N/A Is it sited to avoid shading, or any artificial or reflected light? **✓** N/A Is the rain gauge plumb? ✓ N/A Is it sited to avoid sheltering effects from buildings, trees, towers, etc? N/A 10 Is the surface wetness sensor sited with the grid surface

✓ N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

facing north?

11 Is it inclined approximately 30 degrees?

natural or man-made, that may affect the monitoring parameters:

Fie	eld Systems Data Form	F-02058-1500-S4-rev002						
Site	ID ESP127 Technician Sandy Grenville)	Site Visit Date 04/14/2016					
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	✓	Temperature only					
2	Are all the meteorological sensors operational online, and reporting data?	✓	Temperature only					
3	Are the shields for the temperature and RH sensors clean?	✓	Temperature only					
4	Are the aspirated motors working?	✓	N/A					
5	Is the solar radiation sensor's lens clean and free of scratches?	✓	N/A					
6	Is the surface wetness sensor grid clean and undamaged?	✓	N/A					
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	✓						
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓						
	de any additional explanation (photograph or sketch if necestal or man-made, that may affect the monitoring parameters		regarding conditions listed above, or any other features,					
	, , , , , , , , , , , , , , , , , , ,							

Field Systems Data Form F-02058-1500-S5-rev002 ESP127 Technician Sandy Grenville Site Visit Date 04/14/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **~** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. 1/4 teflon by 12 meters Describe dry dep sample tube. 3/8 teflon by 12 meters At inlet only Are in-line filters used in the ozone sample line? (if ves indicate location) **~** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? **~** Are there moisture traps in the sample lines? ✓ Clean and dry Is there a rotometer in the dry deposition filter line, and is it clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	ESP127	Technician	Sandy Grenville		Site Vis	sit Date 04/14	1/2016	
	DAS, sei	nsor translators, and	peripheral equi	pment operation	ıs an	ıd maintena	ance		
1	Do the I	OAS instruments appe		_					
2	Are all t	he components of the	DAS operation	al? (printers,	✓				
3	Do the DAS instruments appear to be in good condition well maintained? Are all the components of the DAS operational? (print modem, backup, etc) Do the analyzer and sensor signal leads pass through lightning protection circuitry? Are the signal connections protected from the weather well maintained? Are the signal leads connected to the correct DAS character than the properly grounded? Does the instrument shelter have a stable power source. Is the instrument shelter temperature controlled?					Met sensors	s only		
4			otected from the	e weather and	✓				
5	Are the	signal leads connected	d to the correct	DAS channel?	✓				
6			ors, and shelter	properly	✓				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	✓				
8	Is the in	strument shelter temp	perature control	lled?	✓				
9	Is the m	et tower stable and gr	counded?			Stable		Grounded	
10	Is the sa	mple tower stable and	d grounded?			<u> </u>		<u> </u>	
11	Tower c	omments?				V		<u>V</u>	
		additional explanationan-made, that may a				y) regardin	g conditions	listed above, or a	ny other features,

Field Systems Data Form F-02058-1500-S7-rev002 ESP127 Technician Sandy Grenville Site Visit Date 04/14/2016 Site ID **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No No N/A Yes **✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger** ✓ **V V** Temperature sensor Strip chart recorder **✓ V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V** \checkmark **V Humidity sensor translator Surge protector** П **V V UPS Solar radiation translator ~ V** Tipping bucket rain gauge **Lightning protection device** ~ \checkmark **Shelter heater** Ozone analyzer **✓ ✓** Filter pack flow controller Shelter air conditioner **~** Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V SSRF ✓ V ✓ Site Ops Manual** Oct 2010 **HASP V** Nov 2010 **Field Ops Manual Calibration Reports V ✓** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Minimal information Are the Site Status Report Forms being completed and **V** current? Are the chain-of-custody forms properly used to document **✓** sample transfer to and from lab? Control charts not used Are ozone z/s/p control charts properly completed and current?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form F-02058-1500-S8-rev002 ESP127 Technician Sandy Grenville Site Visit Date 04/14/2016 Site ID Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed** Frequency **Compliant ✓ V** N/A **Multipoint Calibrations V V** N/A **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** N/A **Manual Rain Gauge Test ✓ V** N/A **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** As needed Manual Zero/Span Tests **V ~** Daily **Automatic Precision Level Tests V Manual Precision Level Test** As needed **V V** Weekly **Analyzer Diagnostics Tests ~** Every 2 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V V** Weekly Sample Line Check for Dirt/Water **~ V** Weekly **Zero Air Desiccant Check ✓** Do multi-point calibration gases go through the complete sample train including all filters?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Do automatic and manual z/s/p gasses go through the

Are the automatic and manual z/s/p checks monitored and

complete sample train including all filters?

reported? If yes, how?

✓

✓

Logbook, call-in

Fi	eld Sy	stems Data Form					F-02058-1	500-S9-rev002
Sit	e ID	ESP127 Te	hnici	an Sandy Grenville) 	Site Visit Date	04/14/2016	
	Site ope	ration procedures						
1	Is the fil	ter pack being changed even	y Tue	esday as scheduled	? ✓			
2	Are the correctly	Site Status Report Forms boy?	ing co	ompleted and filed	✓			
3	Are data	a downloads and backups boad?	ing p	erformed as		No longer required		
4	Are gen	eral observations being mad	e and	recorded? How?	✓	SSRF, call-in		
5	Are site fashion?	supplies on-hand and reple	ished	in a timely	✓			
6	Are sam	ple flow rates recorded? Ho	w?		✓	SSRF, call-in		
7	Are sam	ples sent to the lab on a reg	ılar so	chedule in a timely	✓			
8		rs protected from contamin pping? How?	ation	during handling	✓	Clean gloves on an	d off	
9		site conditions reported reg ons manager or staff?	ılarly	to the field	✓			
QC	Check Po	erformed	F	requency			Compliant	
]	Multi-poir	nt MFC Calibrations	✓ S	Semiannually			✓	
]	Flow Syste	em Leak Checks	✓ ∨	Veekly			✓	
]	Filter Pacl	k Inspection						
]	Flow Rate	Setting Checks	✓ ∨	Veekly			✓	
7	Visual Ch	eck of Flow Rate Rotometer	V	Veekly			✓	
]	In-line Filter Inspection/Replacement						✓	
	Sample Li	ne Check for Dirt/Water	V	Veekly			✓	
		dditional explanation (phot n-made, that may affect the				r) regarding conditi	ons listed above, or	any other features,

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID

ESP127

Technician Sandy Grenville

Site Visit Date 04/14/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	Inspiron 15	894MC12	07060
DAS	Campbell	CR3000	3817	illegible
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	0493002476	02975
Flow Rate	Apex	AXMC105LPMDPC	54755	000642
Infrastructure	Infrastructure	none	none	none
Modem	Raven	H4223-C	0844355622	06606
Ozone	ThermoElectron Inc	49i A1NAA	1009241785	000622
Ozone Standard	ThermoElectron Inc	49i A3NAA	0622717852	000327
Sample Tower	Aluma Tower	A	none	03550
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	14803	06542
Zero air pump	Werther International	C 70/4	000829161	06909

Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number					
СН	CHA467-Martin Valvur-04/19/2016										
1	4/19/2016	Computer	Hewlett Packard	none	65606	5CB22906V1					
2	4/19/2016	DAS	Environmental Sys Corp	90611	8816	2613					
3	4/19/2016	Elevation	Elevation	None	1	None					
4	4/19/2016	Filter pack flow pump	Thomas	01564	107CA18	0688001769					
5	4/19/2016	flow rate	Tylan	none	FC280SAV	AW9706014					
6	4/19/2016	Infrastructure	Infrastructure	none	none	none					
7	4/19/2016	MFC power supply	Tylan	none	RO-32	FP99706005					
8	4/19/2016	Modem	US Robotics	09615	56k	unknown					
9	4/19/2016	Ozone	ThermoElectron Inc	none	49i A3NAA	CM08460007					
10	4/19/2016	Ozone Standard	ThermoElectron Inc	none	49i A1NAA	CM08460051					
11	4/19/2016	Sample Tower	Aluma Tower	03566	Α	none					
12	4/19/2016	Shelter Temperature	ARS	none	none	none					
13	4/19/2016	Siting Criteria	Siting Criteria	None	1	None					
14	4/19/2016	Temperature	RM Young	none	41342	018535					
15	4/19/2016	Zero air pump	Werther International	none	PC70/4	000665785					

DAS Data Form DAS Time Max Error: 2.17 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2613 CHA467 Martin Valvur 04/19/2016 DAS Primary Das Date: 4 /19/2016 **Audit Date** 4 /19/2016 HY Parameter DAS Mfg 7:51:00 7:48:50 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** 110 110 Das Day: **Audit Day** Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0005 0.0003 0.0005 0.0003 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 95740243 Tfer Desc. DVM 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 11 0.0000 -0.0002 0.0001 0.0003 V V 11 0.1000 0.0999 0.0999 0.000011 0.3000 0.2999 0.3001 V V 0.0002 11 0.5000 0.4999 V V 0.00020.4997 0.7000 V V 0.0005 11 0.6999 0.7004 V V 11 0.9000 0.8991 0.8995 0.0004 11 V V 1.0000 1.0000 1.0005 0.0005

Flow Data Form

glan	Α	W970601	4	CHA467	Ma	rtin Valvur	04/19/201	6 flow ra	te	none	
							BIOS		arameter Flo	Doto.	
Mfg	Tylan					Mfg	ыоз	P	arameter FIC	ow Rate	
SN/Owner ID	FP997	706005	none			Serial Number	122974	Т	fer Desc. BIG	OS 220-H	
Parameter MFC power supply					Tfer ID	01416					
						Slope	0.	.99895 Inte	ercept	0.0118	
						Cert Date	2/1	0/2016 Co	rCoff	1.00000	
DAS 1:			DAS 2:		L	Cal Factor Z	ero	0.38	39		
A Avg % Diff: A Max % Di A Avg %Dif A Max			x % Di	Cal Factor F	ull Scale	5.81	2				
0.55%		0.91%				Rotometer R	eading:	3	.3		
Desc.	Tes	st type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	I PctDifference	
primary	pump	off	0.000	0.000	-0.39	-0.3593	0.00	l/m	l/m		
primary	leak c	heck	0.000	0.000	-0.39	-0.3595	0.00	l/m	l/m		
primary	test pt	1	2.999	2.990	2.40	2.4069	3.00	l/m	l/m	0.20%	
primary	test pt	2	2.992	2.980	2.40	2.4048	3.00	l/m	l/m	0.54%	
primary	test pt	3	2.984	2.970	2.40	2.4037	3.00	l/m	l/m	0.91%	
Sensor Comp	onent	Leak Tes	t		Condition	n		Status	Status pass		
Sensor Comp	onent	Tubing C	ondition		Condition	Good		Status	pass		
Sensor Comp	onent	Filter Pos	sition		Condition	Poor	Poor		fail		
Sensor Comp	onent	Rotomete	er Condition		Condition	Clean and dry	Clean and dry		pass		
Sensor Comp	onent	Moisture	Present		Condition	No moisture p	resent	Status	s pass		
Sensor Comp	onent	Filter Dist	tance		Condition	5.5 cm		Status	pass		
Sensor Comp	onent	Filter Dep	oth		Condition	-0.5 cm		Status	fail		
Sensor Comp	onent	Filter Azir	muth		Condition	90 deg		Status	pass		
Sensor Component System Memo			Condition	See comments	3	Status pass					

Ozone Data Form

Mfg Se	erial Number Ta	Site	Те	chnician		Site Visi	it Date	Parame	eter Owner I	D	
ThermoElectron Inc	CM08460007	CHA467	M	artin Valv	ur	04/19/20	016	Ozone	none		
Slope: 0.9	0.00000 0.00000 0.00000		Tfer ID		49CPS-70008-364 101110		34 Tfe	rameter ozone er Desc. Ozone primary			
A Avg % Diff: A Ma		6Dif A Max	% Di	Slope Cert Da	ıto.		0.99832			0000	
4.8%	6.7%			Cert Da	e	'	1/23/2010	Corr	7.00	,000	
UseDescription	ConcGroup	Tfer Raw	Tfer		Si			Unit	PctDifference		
primary primary	2	0.58 30.02	30.		28.		ppb ppb		-6.73%		
primary	3	46.93	47.		44.		ppb		-5.92%		
primary	4	75.79	76.				ppb		-3.45%		
primary	5	112.92	113	.37	110	0.05	ppb		-2.93%		
Sensor Component	22.5 degree rule		Condition	on				Status	pass		
Sensor Component	Sample Train		Condition	Good				Status	pass		
Sensor Component	Inlet Filter Conditio	n	Condition	ition Moderately clean				Status	pass		
Sensor Component	Battery Backup		Condition	dition N/A				Status	pass		
Sensor Component	Offset		Condition	0.000				Status	pass		
Sensor Component	Span		Condition	1.004				Status	pass		
Sensor Component	Zero Voltage		Condition	Condition 0.000				Status	pass		
Sensor Component	Fullscale Voltage		Condition 1.000					Status	pass		
Sensor Component	Cell A Freq.		Condition 81.8 kHz					Status	pass		
Sensor Component	Cell A Noise		Condition 0.4 ppb					Status	pass		
Sensor Component	Cell A Flow		Condition	on 0.71 l	om			Status	pass		
Sensor Component	Cell A Pressure		Conditio	on 625.4	mmHg			Status	pass		
Sensor Component	Cell A Tmp.		Condition	on 32.9 (Status	pass		
Sensor Component	Cell B Freq.		Condition	73.3 k	Hz			Status	pass		
Sensor Component	Cell B Noise		Condition	0.6 pp	b			Status	pass		
Sensor Component	Cell B Flow		Condition	on 0.67 l	om			Status	pass		
Sensor Component	Cell B Pressure		Condition	Not te	sted			Status	pass		
Sensor Component	Cell B Tmp.		Condition	ion				Status	us pass		
Sensor Component	Line Loss	Condition	ion Not tested				Status	pass			
Sensor Component	System Memo		Condition	on				Status	pass		

Temperature Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 018535 CHA467 Martin Valvur 04/19/2016 Temperature none Mfg Fluke Parameter Temperature Tfer Desc. RTD 3275143 **Serial Number** 01229 **Tfer ID** -0.02840 **Slope** 0.99980 **Intercept DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.08 0.14 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. 0.4027 primary Temp Low Range 0.34 0.37 0.4 \mathbf{C} 0.04 23.47 C Temp Mid Range 23.44 0.7335 23.4 -0.07 primary 47.44 47.6 C 0.14 primary Temp High Range 47.40 0.9753 Sensor Component | Shield Condition Clean **Status** pass Sensor Component Blower Condition Functioning **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	23.09	23.12	0.000	23.6	C	0.47
primary	Temp Mid Range	22.38	22.41	0.000	23.6	С	1.21
primary	Temp Mid Range	23.80	23.83	0.000	23.9	C	0.09

Site ID CHA467 Technician Martin Valvur Site Visit Date 04/19/2016 Shelter Make Shelter Model Shelter Size Ekto 8810 George County Sample Tower Type County Type A

Sensor Component	Sample Tower Type	Condition	Type A	Status	pass
Sensor Component	Conduit	Condition	Good	Status	pass
Sensor Component	Met Tower	Condition	Good	Status	pass
Sensor Component	Moisture Trap	Condition	Not installed	Status	pass
Sensor Component	Power Cables	Condition	Good	Status	pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
Sensor Component	Sample Tower	Condition	Fair	Status	pass
Sensor Component	Shelter Condition	Condition	Good	Status	pass
Sensor Component	Shelter Door	Condition	Good	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
Sensor Component	Shelter Floor	Condition	Good	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

Site Visit Comments

Parameter	r Site Technician S.V.		S.V. Date	Component	Mfg	Serial No.	Hazard Pro	zard Problem	
Flow Rate	CHA467	Martin Valvur	04/19/2016	Filter Position	Tylan	458			
au			1	1 61 1 1					

The filter attachment plate is mounted too low in the enclosure resulting in the filter being exposed to wind-driven rain and in the standard geometric orientation

Field Systems Comments

1 Parameter: SiteOpsProcedures

The site operator routinely reviews the previous week's data.

2 Parameter: SitingCriteriaCom

A large point source is located 40 km northwest of the site, just southwest of Wilcox.

3 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, well organized, and well maintained.

4 Parameter: MetSensorComme

The temperature sensor is mounted on the south side of the meteorological tower.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 04/19/2016 CHA467 Technician | Martin Valvur Site ID **Bowie Mountain South USGS Map** NPS/EPA Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 04-003-8001 AQS# R.M. Young **Meteorological Type Air Pollutant Analyzer** Ozone, neph, IMPROVE **QAPP** Latitude dry, wet **Deposition Measurement QAPP** Longitude **Land Use** desert range, woodland - mixed **QAPP Elevation Meters** complex **Terrain QAPP Declination** No Conforms to MLM **OAPP Declination Date** (520) 824-4182 32.009405 **Site Telephone Audit Latitude** 13063 East Bontia Canyon Road -109.389058 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 1569 9.6 Cochise County **Audit Declination** Wilcox, AZ City, State **Present** Fire Extinguisher 85632 March 2012 Zip Code Mountain First Aid Kit Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **V Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is in good condition, clean, well organized, and well maintained. Shelter Clean **✓** Notes Site OK

From I-10 take exit 344 (Wilcox AZ). Continue south on route 186 from Wilcox to Chiricahua National Monument,

approximately 30 miles and turn left at route 181 (follow sign for Chiricahua National Monument). Continue another few miles to park entrance. The site is just before the fee both on the north side of the road about 150 meters.

Driving Directions

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID CHA467 Technician Martin Valvur Site Visit Date 04/19/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		<u> </u>
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		\checkmark
Secondary road, lightly traveled	200 m		~
Feedlot operations	500 m		\checkmark
Intensive agricultural ops (including aerial spraying)	500 m		\checkmark
Limited agricultural operations	200 m		~
Large parking lot	200 m		\checkmark
Small parking lot	100 m		✓
Tree line	50 m		\checkmark
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK

Siting Criteria Comment

A large point source is located 40 km northwest of the site, just southwest of Wilcox.

ite	CHA467 Technician Martin Valvur		Site Visit Date 04/19/2016
	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	✓	N/A
	Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind)		N/A
3	Are the tower and sensors plumb?	✓	N/A
ı	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?		South
5	Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas o standing water should be avoided)	✓ f	
5	Is the solar radiation sensor plumb?	✓	N/A
7	Is it sited to avoid shading, or any artificial or reflected light?	✓	N/A
3	Is the rain gauge plumb?	✓	N/A
)	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	✓	N/A
10	Is the surface wetness sensor sited with the grid surface facing north?	✓	N/A
1	Is it inclined approximately 30 degrees?	✓	N/A

The temperature sensor is mounted on the south side of the meteorological tower.

Fie	eld Sy	stems Data I	Form	F-02058-1500-S4-rev002				
Site	e ID	CHA467	Technician Martin Valvur		Site Visit Date 04/19/2016			
1		he meterological sens	sors appear to be intact, in good ned?	✓	N/A			
2		the meteorological song data?	ensors operational online, and	✓	Temperature only			
3	Are the	shields for the temp	erature and RH sensors clean?	✓	Moderately clean			
4	Are the	aspirated motors we	orking?	✓	N/A			
5	Is the so		's lens clean and free of	✓	N/A			
6	Is the si	urface wetness senso	r grid clean and undamaged?	✓	N/A			
7		sensor signal and po on, and well maintain	ower cables intact, in good ned?	✓				
8		sensor signal and po e elements and well	ower cable connections protected maintained?	✓				
			on (photograph or sketch if neces ffect the monitoring parameters:		regarding conditions listed above, or any other features,			

Fi	eld Sy	stems Data Fo	orm		F-02058-1500-S5-rev002						
Site	e ID	CHA467	Technician Martin	Valvur	Site Visit Date 04/19/2016						
	Siting C	riteria: Are the pollut	ant analyzers and dep	oosition equip	ment sited in accordance with 40 CFR 58, Appendix E						
1		ample inlets have at le	east a 270 degree arc o	of 🗸							
2	Are the	sample inlets 3 - 15 m	eters above the groun	d? ✓							
3		sample inlets > 1 meteneters from trees?	er from any major obs	struction,							
	Pollutant analyzers and deposition equipment operations and maintenance										
1		nalyzers and equipme n and well maintained		od 🗸							
2	Are the reportin	analyzers and monitong data?	rs operational, on-line	e, and							
3	Describe	e ozone sample tube.			1/4 teflon by 15 meters						
4	Describe	e dry dep sample tube			3/8 teflon by 12 meters						
5		ine filters used in the olocation)	ozone sample line? (if	yes	At inlet only						
6	Are sam	ple lines clean, free of ions?	kinks, moisture, and	l 🗸							
7	Is the ze	ro air supply desiccan	t unsaturated?	✓							
8	Are ther	re moisture traps in th	e sample lines?								
9	Is there clean?	a rotometer in the dry	deposition filter line,	, and is it	Clean and dry						
		dditional explanation n-made, that may affo) regarding conditions listed above, or any other features,						

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	CHA467	Technician	Martin Valvur		Site Visi	it Date 04/19/201	6	
	DAS, so	ensor translators, a	nd peripheral equi	<u>pment operation</u>	<u>is ar</u>	<u>ıd maintena</u>	<u>nce</u>		
1		DAS instruments a aintained?	ppear to be in good	l condition and	✓				
2		the components of a, backup, etc)	the DAS operation	al? (printers,	✓				
3		analyzer and senso ng protection circui		through	✓	Met sensors	only		
4		e signal connections aintained?	protected from the	e weather and	✓				
5	Are the	e signal leads conne	cted to the correct	DAS channel?	✓				
6	Are the ground	e DAS, sensor trans ed?	lators, and shelter	properly	✓				
7	Does th	ne instrument shelte	er have a stable pov	ver source?	✓				
8	Is the instrument shelter temperature controlled?								
9	Is the met tower stable and grounded?					Stable 🗸		Grounded	
10	Is the s	ample tower stable	and grounded?			✓			
11	Tower	comments?				towers bolte	d to shelter		
		y additional explans man-made, that ma				y) regardin	g conditions liste	d above, or a	any other features,

Field Systems Data Form F-02058-1500-S7-rev002 CHA467 Technician | Martin Valvur Site Visit Date 04/19/2016 Site ID **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No Yes No N/A **V ✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger V V** П Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V V Humidity sensor translator Surge protector** П П **V V UPS Solar radiation translator ~ V** Tipping bucket rain gauge **Lightning protection device** ~ **V Shelter heater** Ozone analyzer **V ✓** Filter pack flow controller Shelter air conditioner \checkmark Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V V** Dataview **SSRF V ✓ V V Site Ops Manual HASP Field Ops Manual Calibration Reports V V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Flow & observation sections Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document **✓** sample transfer to and from lab?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Are ozone z/s/p control charts properly completed and

current?

Control charts not used

Field Systems Data Form F-02058-1500-S8-rev002 CHA467 Site Visit Date 04/19/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **~** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** N/A **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **OC Check Performed Compliant Frequency Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** Every 2 weeks Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests Manual Precision Level Test V V** Monthly **Analyzer Diagnostics Tests ~** Every 2 weeks **In-line Filter Replacement (at inlet)** N/A In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **~ ~** Weekly **Zero Air Desiccant Check** ✓ Unknown Do multi-point calibration gases go through the complete sample train including all filters? **✓** Do automatic and manual z/s/p gasses go through the complete sample train including all filters? **✓** Dataview Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

natural or man-made, that may affect the monitoring parameters:

The site operator routinely reviews the previous week's data.

Fi	eld Sy	stems Data Form		F-02058-1500-S9-rev002					
Site	e ID	CHA467 Tec	chnician Martin Valvur		Site Visit Date	04/19/2016			
	Site ope	ration procedures							
1	Is the fil	ter pack being changed ever	y Tuesday as scheduled	V	Filter changed mori	nings			
2	Are the correctl	Site Status Report Forms be y?	eing completed and filed	✓					
3	Are data	a downloads and backups be ed?	ing performed as		No longer required				
4	Are gen	eral observations being made	e and recorded? How?	✓	Dataview and SSRF				
5	Are site	supplies on-hand and replen	nished in a timely	✓					
6	Are sam	aple flow rates recorded? Ho	w?	✓	SSRF				
7	Are sam	uples sent to the lab on a regu	ular schedule in a timely	✓					
8		ers protected from contamination	ation during handling	✓	Clean gloves on and off				
9		site conditions reported regu ons manager or staff?	ularly to the field						
QC	Check P	erformed	Frequency			Compliant			
N	Multi-poi	nt MFC Calibrations	✓ Semiannually			✓			
I	Flow Syste	em Leak Checks	✓ Weekly			✓			
I	Filter Pac	k Inspection							
I	Flow Rate	Setting Checks	✓ Weekly			✓			
1	Visual Ch	eck of Flow Rate Rotometer	✓ Weekly			\checkmark			
I	n-line Fil	ter Inspection/Replacement	✓ Semiannually		✓				
5	Sample Li	ne Check for Dirt/Water							
		dditional explanation (photo n-made, that may affect the			y) regarding conditi	ons listed above, or any other features,			

Field Systems Data Form

F-02058-1500-S10-rev002

Technician Martin Valvur Site Visit Date 04/19/2016 CHA467 Site ID

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	65606	5CB22906V1	none
DAS	Environmental Sys Corp	8816	2613	90611
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CA18	0688001769	01564
flow rate	Tylan	FC280SAV	AW9706014	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Tylan	RO-32	FP99706005	none
Modem	US Robotics	56k	unknown	09615
Ozone	ThermoElectron Inc	49i A3NAA	CM08460007	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	CM08460051	none
Sample Tower	Aluma Tower	A	none	03566
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	018535	none
Zero air pump	Werther International	PC70/4	000665785	none

DAS Data Form 0.18 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2270 GRC474 Martin Valvur 04/20/2016 DAS Primary Das Date: 4 /20/2016 **Audit Date** 4 /20/2016 HY Parameter DAS Mfg 11:19:11 11:19:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** Das Day: 111 **Audit Day** 111 Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0004 0.0007 0.0004 0.0007 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 95740243 Tfer Desc. DVM 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 12 0.0000 0.0002 0.0003 0.0001 V V 12 0.1000 0.0998 0.0995 -0.0003 12 0.3000 0.3002 0.2997 V V -0.0005 12 0.5000 0.4995 V V -0.00010.4996 12 0.7000 V V -0.0003 0.6999 0.6996 V V 12 0.9000 0.8995 0.9000 0.000512 V V 1.0000 0.9996 1.0003 0.0007

Flow Data Form

Mfg	Ser	rial Num	ber Ta	Site Technician		chnician	Site Visit I	Date Paran	neter	Owner ID	
Tylan	AV	N980502	7	GRC474	M	artin Valvur	04/20/2016	flow ra	te	none	
Mfg	Tylan					Mfg	BIOS		arameter FI		
SN/Owner ID	illegible	е	none			Serial Number	122974	Т	fer Desc. B	OS 220-H	
Parameter	MFC po	ower sup	ply			Tfer ID	01416				
						Slope	0.	99895 Inte	ercept	0.01185	
						Cert Date	2/10	0/2016 Cor	rrCoff	1.00000	
DAS 1: Cal Factor Zero 0.13											
A Avg % Diff:			A Avg %l	Dif A Ma	x % Di	Cal Factor F	ull Scale	5.4			
0.99%		1.29%				Rotometer R	eading:	3.5	55		
Desc.	Test	t type		Input Corr	MfcDisp	1 0	-	InputUnit	OutputSigna	ll PctDifference	
primary	pump o		0.000	0.000	-0.16	-0.1194	0.00	1/m	l/m		
primary	leak ch		0.000	0.000	-0.14	-0.0979	0.03	1/m	l/m		
primary	test pt		2.960	2.950	2.69	2.7036	2.99	1/m	1/m	1.29%	
primary	test pt		2.963 2.979	2.950 2.970	2.69	2.7031 2.7031	2.99 2.98	1/m 1/m	1/m 1/m	1.22% 0.47%	
primary	test pt 3			2.970						0.47%	
Sensor Compo	onent L	_eak rest			Condition	Condition			pass		
Sensor Compo	onent T	Fubing Co	ondition		Condition	Good			pass		
Sensor Compo	onent F	Filter Posi	ition		Condition	Good	Status		pass		
Sensor Compo	_			1		Clean and dry	Status		pass		
Sensor Compo						No moisture p	resent		pass		
Sensor Compo	onent F	Filter Dista	ance		Condition	3.5 cm		Status	pass		
Sensor Compo	onent F	ilter Dep	th		Condition	0.5 cm		Status	pass		
	Sensor Component Filter Azimuth			Condition	235 deg		Status	pass			
Sensor Compo	Sensor Component System Memo			Condition	on		Status	pass			

Ozone Data Form

Mfg Se	erial Number Ta	Site	Technici	an	Site Visit I	Oate Parame	eter Owne	r ID
ThermoElectron Inc 1	023943902	GRC474	Martin V	alvur	04/20/2016		none	
Intercept -0.5	Slope: Intercept 19999 CorrCoff	0.00000 0.00000 0.00000	Seria	l Number ID			rameter ozone er Desc. Ozone primary stan	
DAS 1: DAS 2:			Slope		0.99832 Interd		cept -0.26452	
A Avg % Diff: A Max % Di			% Di Cert Date		1/29/2016 Corr (Coff 1.00000	
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	C	te	Site Unit	PctDifference	
primary	1	0.71	0.97		57 pp		1 etDifference	
primary	2	31.56	31.87		.04 pp		-5.749	
primary	3 4	50.34 74.77	50.68 75.16		.38 pp		-4.54% -3.74%	
primary	5	108.83	109.27		5.20 pp		-3.729	
Sensor Component	22.5 degree rule		Condition		·	Status	pass	
Sensor Component	Sample Train		Condition Go	od		Status	pass	
Sensor Component	nt Inlet Filter Condition		Condition Clean			Status	pass	
Sensor Component Battery Backup			Condition N/A			Status	pass	
Sensor Component	offset Offset		Condition -0.1			Status	pass	
Sensor Component	Span		Condition 1.003			Status	pass	
Sensor Component	Zero Voltage		Condition 0.0002			Status	pass	
Sensor Component	Fullscale Voltage		Condition 0.9998			Status	pass	
Sensor Component	Cell A Freq.		Condition 89.8 kHz			Status	pass	
Sensor Component	Cell A Noise		Condition 0.8 ppb			Status	pass	
Sensor Component	Cell A Flow		Condition 0.57 lpm			Status	pass	
Sensor Component	Cell A Pressure		Condition 593.7 mmHg			Status		
Sensor Component	Cell A Tmp.		Condition 39.2 C			Status	s pass	
Sensor Component	Cell B Freq.		Condition 87.5 kHz			Status		
Sensor Component			Condition 0.7 ppb			Status		
Sensor Component	Cell B Flow		Condition 0.58 lpm			Status		
Sensor Component	Cell B Pressure		Condition No	ondition Not tested			pass	
Sensor Component	Cell B Tmp.		Condition				pass	
Sensor Component	Line Loss		Condition No	Ondition Not tested			pass	
Sensor Component	System Memo		Condition			Status	pass	

Temperature Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 17626 GRC474 Martin Valvur 04/20/2016 Temperature none Mfg Fluke Parameter Temperature Tfer Desc. RTD 3275143 **Serial Number** 01229 **Tfer ID** -0.02840 **Slope** 0.99980 **Intercept DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.07 0.11 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.40 0.43 0.50460.5 C 0.02 C Temp Mid Range 23.91 23.94 0.7403 24.0 0.08 primary C primary Temp High Range 46.01 46.05 0.9614 46.2 0.11 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Condition Functioning **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	25.16	25.19	0.000	26.0	C	0.83
primary	Temp Mid Range	25.24	25.27	0.000	26.0	C	0.69
primary	Temp Mid Range	25.46	25.49	0.000	26.1	C	0.6

Site ID GRC474 Technician Martin Valvur Site Visit Date 04/20/2016 Shelter Make Shelter Model Shelter Size Ekto 8810 640 cuft

Sensor Component	Sample Tower Type	Condition	Туре В	Status	pass
Sensor Component	Conduit	Condition	N/A	Status	pass
Sensor Component	Met Tower	Condition	Fair	Status	pass
Sensor Component			Not installed	Status	pass
Sensor Component		Condition		Status	
	Shelter Temp Control		Functioning	Status	
Sensor Component		Condition		Status	
Sensor Component		Condition		Status	
Sensor Component		Condition		Status	
Sensor Component		Condition		Status	
Sensor Component		Condition		Status	
		Condition			
Sensor Component				Status	
Sensor Component		Condition		Status	
Sensor Component		Condition		Status	
Sensor Component	Sample I rain	Condition	G000	Status	pass

Field Systems Comments

1 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, neat, and well organized.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 04/20/2016 GRC474 Technician | Martin Valvur Site ID **Grand Canyon USGS Map** NPS/EPA Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 04-005-8001 AQS# R.M. Young **Meteorological Type** Ozone, UV-B **Air Pollutant Analyzer QAPP** Latitude dry, wet, IMPROVE **Deposition Measurement QAPP** Longitude Land Use woodland - evergreen **QAPP Elevation Meters** complex **Terrain QAPP Declination** No Conforms to MLM **OAPP Declination Date** (928) 638-2031 36.058642 **Site Telephone Audit Latitude** 2D Albright Ave -112.183575 Site Address 1 **Audit Longitude** PO Box 129 Site Address 2 **Audit Elevation** 2070 Coconino 11.5 County **Audit Declination** Grand Canyon, AZ City, State **Present** Fire Extinguisher 86023 No inspection date Zip Code Arizona **First Aid Kit** Time Zone **✓ Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is in good condition, clean, neat, and well organized. Shelter Clean

From Flagstaff, AZ take route 180 north to the Grand Canyon National Park. The site operator's office is in the

Mckee building on Albright Ave. Obtain a pass to travel the West Rim Road. The gate code is #1965. The site is a

✓ Notes

few miles along the rim road on the left just past the Abyss.

Site OK

Driving Directions

Field Systems Data Form

F-02058-1500-S2-rev002

~. 	000474		NA (*) / 1		0.4/0.0/0.04.0
Site ID	GRC474	Technician	Martin Valvur	Site Visit Date	04/20/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		✓
Limited agricultural operations	200 m		✓
Large parking lot	200 m		✓
Small parking lot	100 m		✓
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		~

Siting	Distances OK	✓
Siting	Criteria Comn	nen

Field Systems Data Form F-02058-1500-S3-rev002 Site Visit Date 04/20/2016 Technician | Martin Valvur Site ID GRC474 ✓ N/A Are wind speed and direction sensors sited so as to avoid being influenced by obstructions? **✓** N/A Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind) **V** N/A Are the tower and sensors plumb? **~** Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? ✓ Above shelter Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided) **✓** N/A Is the solar radiation sensor plumb? N/A Is it sited to avoid shading, or any artificial or reflected light? **✓** N/A Is the rain gauge plumb? ✓ N/A Is it sited to avoid sheltering effects from buildings, trees, towers, etc? N/A 10 Is the surface wetness sensor sited with the grid surface facing north?

✓ N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

11 Is it inclined approximately 30 degrees?

natural or man-made, that may affect the monitoring parameters:

Fie	eld Systems Data Form	F-02058-1500-S4-rev002
Site	ID GRC474 Technician Martin Valvur	Site Visit Date 04/20/2016
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	✓ N/A
2	Are all the meteorological sensors operational online, and reporting data?	✓ N/A
3	Are the shields for the temperature and RH sensors clean?	
4	Are the aspirated motors working?	
5	Is the solar radiation sensor's lens clean and free of scratches?	✓ N/A
6	Is the surface wetness sensor grid clean and undamaged?	✓ N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	
	ide any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	ssary) regarding conditions listed above, or any other features, :

Fi	eld Systems Data Form		F-02058-1500-S5-rev002
Site	ID GRC474 Technician Martin Valvur		Site Visit Date 04/20/2016
	Siting Criteria: Are the pollutant analyzers and deposition e	quipi	nent sited in accordance with 40 CFR 58, Appendix E
1	Do the sample inlets have at least a 270 degree arc of unrestricted airflow?	✓	
2	Are the sample inlets 3 - 15 meters above the ground?	✓	
3	Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees?	V	
	Pollutant analyzers and deposition equipment operations an	d ma	intenance
1	Do the analyzers and equipment appear to be in good condition and well maintained?	✓	
2	Are the analyzers and monitors operational, on-line, and reporting data?	✓	
3	Describe ozone sample tube.		1/4 teflon by 12 meters
4	Describe dry dep sample tube.		3/8 teflon by 12 meters
5	Are in-line filters used in the ozone sample line? (if yes indicate location)	✓	At inlet only
6	Are sample lines clean, free of kinks, moisture, and obstructions?	✓	
7	Is the zero air supply desiccant unsaturated?	✓	
8	Are there moisture traps in the sample lines?		
9	Is there a rotometer in the dry deposition filter line, and is it clean?	V	Clean and dry
	ide any additional explanation (photograph or sketch if necestral or man-made, that may affect the monitoring parameters:		regarding conditions listed above, or any other features,

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	GRC474	Technician	Martin Valvur		Site Visi	it Date 04/20/201	6	
	DAS, sei	nsor translators, and	peripheral equi	pment operation	ns ar	ıd maintena	nce		
1	Do the I	OAS instruments appe							
2	Are all t	ntained? he components of the backup, etc)	DAS operation	al? (printers,	✓				
3	Do the a	nalyzer and sensor sig	_	through	✓	Met sensors	only		
4		signal connections prontained?	otected from the	e weather and	✓				
5	Are the	signal leads connected	d to the correct	DAS channel?	✓				
6	Are the grounde	DAS, sensor translated?	ors, and shelter	properly	✓				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	✓				
8	Is the in	strument shelter temp	perature control	lled?	✓				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	d grounded?			✓		✓	
11	Tower c	omments?				Sample towe	er not grounded bu	t bolted to th	e shelter
				1					
		additional explanationan-made, that may a				y) regarding	g conditions listed	l above, or a	ny other features,

Field Systems Data Form F-02058-1500-S7-rev002 GRC474 Site Visit Date 04/20/2016 Site ID **Technician** Martin Valvur **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No Yes No N/A **✓ ✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger** ✓ **V** П Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V** ~ **Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V** \checkmark **~ Humidity sensor translator Surge protector** П **V ~ UPS Solar radiation translator ~ V** Tipping bucket rain gauge Lightning protection device ~ **✓ Shelter heater** Ozone analyzer **✓** \checkmark Filter pack flow controller Shelter air conditioner \checkmark Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V ✓** Dataview **SSRF ✓ V ✓ V Site Ops Manual** Oct 2015 **HASP Field Ops Manual Calibration Reports ✓** Not current Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Flow & observation sections Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document **✓**

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Control charts not used

sample transfer to and from lab?

current?

Are ozone z/s/p control charts properly completed and

Field Systems Data Form F-02058-1500-S8-rev002 GRC474 Site Visit Date 04/20/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** N/A **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** Every 3 or 4 weeks Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests V Manual Precision Level Test V V** Alarm values only **Analyzer Diagnostics Tests ~** Every 3 or 4 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V V** Weekly Sample Line Check for Dirt/Water **~ V** Weekly **Zero Air Desiccant Check** ✓ Unknown Do multi-point calibration gases go through the complete sample train including all filters? **✓** Do automatic and manual z/s/p gasses go through the

✓

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

Dataview

complete sample train including all filters?

reported? If yes, how?

Are the automatic and manual z/s/p checks monitored and

natural or man-made, that may affect the monitoring parameters:

Fie	la Systems Data Form		F-02058-1500-89-rev00				
Site	ID GRC474 Tec	hnician Martin Valvur		Site Visit Date	04/20/2016		
	Site operation procedures						
1	Is the filter pack being changed ever	y Tuesday as scheduled?	✓	Filter changed mori	nings 95% of the time		
	Are the Site Status Report Forms be correctly?	✓					
	Are data downloads and backups be scheduled?		No longer required				
4	Are general observations being made	e and recorded? How?	✓	SSRF			
	Are site supplies on-hand and replen fashion?	✓					
6	Are sample flow rates recorded? How	w?	✓	SSRF			
	Are samples sent to the lab on a regulation?	lar schedule in a timely	✓				
	Are filters protected from contamina and shipping? How?	tion during handling	✓	Clean gloves on an	d off		
	Are the site conditions reported regu operations manager or staff?	larly to the field					
QC	Check Performed	Frequency			Compliant		
M	fulti-point MFC Calibrations	✓ Semiannually			✓		
Fl	ow System Leak Checks	Weekly			✓		
Fi	lter Pack Inspection						
Fl	ow Rate Setting Checks	✓ Weekly			✓		
\mathbf{V}	isual Check of Flow Rate Rotometer	✓ Weekly			✓		
In	-line Filter Inspection/Replacement	✓ Semiannually			\checkmark		
Sa	ample Line Check for Dirt/Water	Weekly			\checkmark		
	de any additional explanation (photo al or man-made, that may affect the			y) regarding conditi	ons listed above, or an	y other features,	

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID

GRC474

Technician Martin Valvur

Site Visit Date 04/20/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	6560 b	5CB22906T9	none
DAS	Environmental Sys Corp	8816	2270	90602
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	1192001865	02910
flow rate	Tylan	FC280SAV	AW9805027	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Tylan	RO-32	illegible	none
Modem	Sierra wireless	GX450	LA54620247001003	none
Ozone	ThermoElectron Inc	49i A3NAA	1023943902	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	1130450196	none
Printer	Hewlett Packard	842C	unknown	none
Sample Tower	Aluma Tower	В	none	03570
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	17626	none
Zero air pump	Werther International	PC70/4	531380	none

DAS Data Form 2.12 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2526 PET427 Martin Valvur 04/21/2016 DAS Primary Das Date: 4 /21/2016 **Audit Date** 4 /21/2016 HY Parameter DAS Mfg 10:48:53 10:51:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** Das Day: 112 **Audit Day** 112 Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0009 0.0005 0.0009 0.0005 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 95740243 Tfer Desc. DVM 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 13 0.0000 -0.0005 0.0004 0.0009 V V 13 0.1000 0.0996 0.0997 0.0001 13 0.3000 0.3002 0.3004 V V 0.0002 13 0.5000 0.4993 0.4998 V V 0.0005 0.7000 V V 0.0007 13 0.6999 0.7006 V V 13 0.9000 0.9014 0.9020 0.0006 13 0.9999 V V 1.0000 1.0005 0.0006

Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Tecl	hnician	Site Visit I	Oate Param	neter	Owner ID	
Mykrolis	AW951005	56	PET427	Mai	rtin Valvur	04/21/2016	Flow R	ate	none	
Mfg	Mykrolis			1	Mfg	BIOS	P	Parameter Flow Rate		
SN/Owner ID	FP9510004	9510004 none			Serial Number	122974	Т	fer Desc. BI	OS 220-H	
Parameter	MFC power sup	C power supply		7	Гfer ID	01416				
					Slope	0.	99895 Inte	ercept	0.01185	
					Cert Date	2/10)/2016 Col	rCoff	1.00000	
DAS 1:		DAS 2:		<u></u>	Cal Factor Z	ero	-0.07	77		
A Avg % Diff:		A Avg %	Dif A Max	% Di	Cal Factor F	ull Scale	4.98			
1.12%	1.85%				Rotometer R	eading:	3	.5		
Desc.	Test type	-	Input Corr_	MfcDisp.	1 0	Output S E	InputUnit	OutputSigna	ll PctDifference	
primary	pump off	0.000	0.000	0.09	0.0927	0.02	1/m	l/m		
primary	leak check	0.000	0.000	0.10	0.1008	0.02	1/m	l/m	1.0.7.	
primary	test pt 1	2.989	2.980	3.09	3.0721	3.04	1/m	1/m	1.85%	
primary primary	test pt 2 test pt 3	2.999 3.034	2.990 3.030	3.09	3.0725 3.0781	3.03	1/m 1/m	1/m 1/m	0.07%	
	onent Leak Tes		3.030	Condition		3.03	Status		0.0770	
	onent Tubing C			Condition			Status			
Sensor Compo	onent Filter Pos	sition		Condition	Good		Status	pass		
Sensor Compo	onent Rotomete	er Condition	า	Condition	Clean and dry		Status	pass		
Sensor Compo	onent Moisture	Present		Condition	No moisture p	resent	Status	pass		
Sensor Compo	onent Filter Dis	tance		Condition	4.5 cm		Status	pass		
Sensor Compo	onent Filter Dep	oth		Condition	0.5 cm		Status	pass		
Sensor Compo	onent Filter Azi	muth		Condition	n 90 deg		Status	pass		
Sensor Compo	onent System N	Memo		Condition	1		Status	pass		

Ozone Data Form

Mfg Se	erial Number Ta	Site	Te	chnician		Site Visit	Date Pa	rame	ter Owner ID	
ThermoElectron Inc	CM08460048	PET427	Ma	artin Valv	ur	04/21/20	16 Oz	zone	none	
Intercept -0.4	7261 Slope: 1686 Intercept 19999 CorrCoff	0.00000	0	Mfg Serial N Tfer ID	lumber	49CPS-70		Tfe	rameter ozone er Desc. Ozone primary sta	
A Avg % Diff: A Ma		6Dif A Max	% Di	Slope				Inter	-	_
3.5%	3.8%			Cert Da	te	1/2	29/2016	Corr	Coff 1.00000	<u>'</u>
UseDescription primary	ConcGroup 1	Tfer Raw 0.61	Tfer 0.8	37	Si 0	51 p	Site U	nit	PctDifference	
primary primary	3	31.28 51.94	31. 52.			-	opb opb		-3.70% -3.84%	
primary	4	76.74	77.	13	74	.34 p	ppb		-3.62%	
primary	5	108.43	108		105	5.70 p	ppb	Г	-2.91%	
Sensor Component	Sample Train		Conditio	Good			St	tatus	pass	
Sensor Component	22.5 degree rule		Conditio	on			St	tatus	pass	
Sensor Component	Inlet Filter Condition		Conditio	ndition Clean			Status pa		pass	
Sensor Component	Battery Backup		Conditio	ition N/A		St	tatus	pass		
Sensor Component	Offset		Conditio	Condition 0.1			St	tatus	pass	
Sensor Component	Span		Conditio	Condition 0.989			St	tatus	pass	
Sensor Component	Zero Voltage		Conditio	0.000	2		St	tatus	pass	
Sensor Component	Fullscale Voltage		Conditio	0.999	9		St	tatus	pass	
Sensor Component	Cell A Freq.		Conditio	62.1 k	Hz		St	tatus	pass	
Sensor Component	Cell A Noise		Conditio	0.4 pp	b		St	tatus	pass	
Sensor Component	Cell A Flow		Conditio	0.66 l	om		St	tatus	pass	
Sensor Component	Cell A Pressure		Conditio	608.9	mmHg		St	tatus	pass	
Sensor Component	Cell A Tmp.		Conditio	36.0 C)		St	tatus	pass	
Sensor Component	Cell B Freq.		Conditio	70.2 k	Hz		St	tatus	pass	
Sensor Component	Cell B Noise		Conditio	0.9 pp	b		St	tatus	pass	
Sensor Component	Cell B Flow		Conditio	0.66 l	om		St	tatus	pass	
Sensor Component	Cell B Pressure		Conditio					tatus		
Sensor Component	Cell B Tmp.		Conditio				St	tatus	pass	
Sensor Component	Line Loss		Conditio		sted			tatus		
Sensor Component			Condition					tatus		
1										

Temperature Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 7036 PET427 Martin Valvur 04/21/2016 Temperature none Mfg Fluke Parameter Temperature Tfer Desc. RTD 3275143 **Serial Number** 01229 **Tfer ID** -0.02840 **Slope** 0.99980 **Intercept DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.22 0.27 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. 0.0000 primary Temp Low Range 0.16 0.19 -0.1 \mathbf{C} -0.27 C Temp Mid Range 24.39 24.42 0.0000 24.3 -0.16 primary 47.96 47.7 C -0.23 primary Temp High Range 47.92 0.0000Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Condition Functioning **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Martin Valvur ARS PET427 04/21/2016 Shelter Temperature none none **DAS 1: DAS 2:** Mfg Fluke Parameter Shelter Temperatur Abs Avg Err Abs Max Er **Abs Avg Err** Abs Max Er Tfer Desc. RTD 3275143 **Serial Number** 0.38 0.76 01229 **Tfer ID** -0.02840 **Slope** 0.99980 Intercept 1/19/2016 1.00000 **Cert Date** CorrCoff OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. 29.58 0.000primary Temp Mid Range 29.55 29.4 C -0.15 29.64 0.000 29.9 C 0.24 Temp Mid Range 29.61 primary primary 28.71 28.74 0.000 C 0.76 Temp Mid Range 29.5

Condition

Status pass

Sensor Component | System Memo

Infrastructure Data For

Sit	e ID	PET427	Technician	Martin Valvur	Site Visit Date	04/21/2016	
	Shelter Ma	ake	Shelter Model	She	lter Size		
	Ekto	managana depolativament	8814	896	cuft		

Sensor Component	Sample Tower Type	Condition	Type B	Status	pass
Sensor Component	Conduit	Condition	Good	Status	pass
Sensor Component	Met Tower	Condition	Fair	Status	pass
Sensor Component	Moisture Trap	Condition	Not installed	Status	pass
Sensor Component	Power Cables	Condition	Good	Status	pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
Sensor Component	Sample Tower	Condition	Good	Status	pass
Sensor Component	Shelter Condition	Condition	Good	Status	pass
Sensor Component	Shelter Door	Condition	Good	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
Sensor Component	Shelter Floor	Condition	Good	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

Field Systems Comments

1 Parameter: SiteOpsProcComm

completing the site observation section of the SSRF was discussed with the operator. The filter bag is used as a glove to remove and install the dry deposition filter pack.

2 Parameter: DasComments

The heating and air conditioning systems run simultaneously.

3 Parameter: DocumentationCo

The most recent calibration and maintenance report is not available onsite.

4 Parameter: ShelterCleanNotes

The shelter is dusty, but in good condition, well organized and maintained.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 04/21/2016 PET427 Technician Martin Valvur Site ID Padilla Tank **USGS Map** NPS/EPA Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 04-017-0119 AQS# R.M. Young **Meteorological Type Air Pollutant Analyzer** Ozone, neph **QAPP** Latitude **Deposition Measurement** dry, wet **QAPP** Longitude desert Land Use **QAPP Elevation Meters** flat Terrain **QAPP Declination** Yes Conforms to MLM **OAPP Declination Date** (928) 524-6668 34.822508 **Site Telephone Audit Latitude** -109.892485 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 1712 Navajo 10.5 County **Audit Declination** Petrified Forest, AZ City, State **Present** Fire Extinguisher 85942 Inspected April 2016 Zip Code Mountain First Aid Kit Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail **Shelter Working Room** ✓ **Make** Model 8814 Ekto **Shelter Size** 896 cuft **✓** Notes The shelter is dusty, but in good condition, well organized and maintained. Shelter Clean **✓** Notes Site OK From I-40 take exit 311 to the Petrified Forest. The site operator's office is located in the visitors center. The site is **Driving Directions** another 25 miles further south on the park road near the Rainbow Forest at the south end of the park, 1.5 miles west

of the main road on a closed side road. The gate at the side road is usually open. The park ranger horse stable is

located past the site on the side road.

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID PET427 Technician Martin Valvur Site Visit Date 04/21/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		~
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		✓
Limited agricultural operations	200 m		✓
Large parking lot	200 m		✓
Small parking lot	100 m		~
Tree line	50 m		~
Obstacles to wind	10 times obstacle height		~

Siting	Distances OK	✓
Siting	Criteria Comn	nent

Fi	eld Systems Data Form		F-02058-1500-S3-rev002
Site	PET427 Technician Martin Valvur		Site Visit Date 04/21/2016
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	✓	N/A
2	Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind)	✓	N/A
3	Are the tower and sensors plumb?	✓	N/A
4	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?	✓	
5	Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided)	✓	
6	Is the solar radiation sensor plumb?	✓	N/A
7	Is it sited to avoid shading, or any artificial or reflected light?	✓	N/A
8	Is the rain gauge plumb?	✓	N/A
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	✓	N/A
10	Is the surface wetness sensor sited with the grid surface facing north?	✓	N/A
11	Is it inclined approximately 30 degrees?	~	N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

11 Is it inclined approximately 30 degrees?

Fi	el	d Sy	stems l	Data F	orm			F-02058-1500-S4-rev002					
Site	te I	D	PET427		Technic	ian Martin Va	alvur		Site Visit Date 0	4/21/2016			
1			he meterolo			o be intact, in	good		Temperature only				
2			the meteorong data?	ological sen	sors operat	ional online, a	and		Temperature only				
3	A	Are the	shields for	the temper	rature and I	RH sensors clo	ean?		Temperature only				
4	A	Are the	aspirated 1	notors wor	king?		•						
5		s the so		on sensor's	lens clean a	and free of	•		N/A				
6	Is	s the sı	urface wetn	ess sensor	grid clean a	nd undamage	ed? ✓		N/A				
7			sensor sign			ntact, in good	•		Signs of wear				
8			sensor sign e elements			nnections pro	otected •						
						oh or sketch if itoring paran		·y)	regarding condition	s listed abov	e, or any	other feat	ures,
						81							

Fi	eld Systems Data Form		F-02058-1500-S5-rev002
Site	PET427 Technician Martin Valvur		Site Visit Date 04/21/2016
	Siting Criteria: Are the pollutant analyzers and deposition eq	<u>(uipı</u>	nent sited in accordance with 40 CFR 58, Appendix E
1	Do the sample inlets have at least a 270 degree arc of unrestricted airflow?	✓	
2	Are the sample inlets 3 - 15 meters above the ground?	✓	
3	Are the sample inlets $>$ 1 meter from any major obstruction, and 20 meters from trees?	✓	
	Pollutant analyzers and deposition equipment operations and	l ma	intenance
1	Do the analyzers and equipment appear to be in good condition and well maintained?	✓	
2	Are the analyzers and monitors operational, on-line, and reporting data?	✓	
3	Describe ozone sample tube.		1/4 teflon by 12 meters
4	Describe dry dep sample tube.		3/8 teflon by 8 meters
5	Are in-line filters used in the ozone sample line? (if yes indicate location)	✓	At inlet only
6	Are sample lines clean, free of kinks, moisture, and obstructions?	✓	
7	Is the zero air supply desiccant unsaturated?	✓	
8	Are there moisture traps in the sample lines?		
9	Is there a rotometer in the dry deposition filter line, and is it clean?	✓	Clean and dry
	ide any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	ary)	regarding conditions listed above, or any other features,

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	PET427	Technician	Martin Valvur		Site Vis	sit Date 04/21/201	6	
	DAG so			···· ··· · · · · · · · · · · · · · · ·		. J			
	DAS, se	nsor translators, and	<u>peripheral equil</u>	<u>ment operation</u>	is ai	<u>ia mamiena</u>	<u>ince</u>		
1		OAS instruments appeintained?	ar to be in good	condition and	✓				
2		he components of the backup, etc)	DAS operationa	al? (printers,	✓				
3		nalyzer and sensor sig g protection circuitry		hrough	✓	Met sensors	s only		
4		signal connections prointained?	otected from the	weather and	✓				
5	Are the	signal leads connected	l to the correct I	DAS channel?	✓				
6	Are the grounde	DAS, sensor translated?	rs, and shelter p	properly	✓				
7	Does the	e instrument shelter h	ave a stable pow	er source?	✓				
8	Is the in	strument shelter temp	erature control	led?	✓				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	l grounded?			V			
11	Tower c	omments?							
		additional explanatio nan-made, that may af				y) regardin	g conditions liste	d above, or a	any other features,
The	heating a	and air conditioning syst	ems run simultar	neously.					

Field Systems Data Form F-02058-1500-S7-rev002 PET427 Site Visit Date 04/21/2016 Site ID Technician | Martin Valvur **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A Yes No N/A **✓ V** Wind speed sensor **Data logger V V** Wind direction sensor **Data logger** ✓ **V** П Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** П Solar radiation sensor **V** Modem ✓ П **V Printer** Surface wetness sensor ✓ **V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V V Humidity sensor translator Surge protector** П П **V V UPS Solar radiation translator ~ V** Tipping bucket rain gauge Lightning protection device ~ **✓ Shelter heater** Ozone analyzer **✓** \checkmark Filter pack flow controller Shelter air conditioner \checkmark Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V V** Dataview **SSRF ✓ V V V Site Ops Manual** Oct 2015 **HASP Field Ops Manual V Calibration Reports** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Flow & observation sections Are the Site Status Report Forms being completed and current? **V** Are the chain-of-custody forms properly used to document sample transfer to and from lab? Control charts not used Are ozone z/s/p control charts properly completed and current?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

The most recent calibration and maintenance report is not available onsite.

Field Systems Data Form F-02058-1500-S8-rev002 PET427 Site Visit Date 04/21/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** N/A **Visual Inspections V** N/A Translator Zero/Span Tests (climatronics) **✓ V** N/A **Manual Rain Gauge Test V V** N/A **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** Every 4 weeks Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests Manual Precision Level Test V V** Alarm values only **Analyzer Diagnostics Tests ~** Every 4 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V V** Sample Line Check for Dirt/Water Weekly **~ ~** Semiannually **Zero Air Desiccant Check ✓** Do multi-point calibration gases go through the complete sample train including all filters?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Do automatic and manual z/s/p gasses go through the

Are the automatic and manual z/s/p checks monitored and

complete sample train including all filters?

reported? If yes, how?

✓

✓

Dataview

Field Systems Data Form F-02058-1500-S9-rev002 PET427 Technician | Martin Valvur Site Visit Date 04/21/2016 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed morinings. Are the Site Status Report Forms being completed and filed No observations correctly? No longer required Are data downloads and backups being performed as scheduled? Are general observations being made and recorded? How? **V** Are site supplies on-hand and replenished in a timely fashion? SSRF Are sample flow rates recorded? How? Are samples sent to the lab on a regular schedule in a timely second day fashion? Bag is used as glove Are filters protected from contamination during handling and shipping? How? Are the site conditions reported regularly to the field operations manager or staff? **QC Check Performed Compliant Frequency V** ✓ Semiannually **Multi-point MFC Calibrations** Weekly **V** Flow System Leak Checks **Filter Pack Inspection V ✓** Weekly **Flow Rate Setting Checks V ✓** Weekly **Visual Check of Flow Rate Rotometer V ✓** Unknown **In-line Filter Inspection/Replacement** Weekly Sample Line Check for Dirt/Water Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

natural or man-made, that may affect the monitoring parameters:

completing the site observation section of the SSRF was discussed with the operator. The filter bag is used as a glove to remove and install the dry deposition filter pack.

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID

PET427

Technician Martin Valvur

Site Visit Date 04/21/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	6560 b	5CB22906TB	none
DAS	Environmental Sys Corp	8816	2526	90641
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB114	none	none
Flow Rate	Mykrolis	FC280SAV-4S	AW9510056	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Mykrolis	RO-32	FP9510004	none
Modem	US Robotics	56k	unknown	none
Ozone	ThermoElectron Inc	49i A3NAA	CM08460048	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	1211052489	none
Sample Tower	Aluma Tower	В	none	none
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	7036	none
Zero air pump	Werther International	PC 70/4	531382	none

Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
ME	V405-Marti	n Valvur-05/31/2016				
1	5/31/2016	Computer	Hewlett Packard	none	EliteBook	CNV347CS41
2	5/31/2016	DAS	Environmental Sys Corp	90613	8816	2616
3	5/31/2016	Elevation	Elevation	None	1	None
4	5/31/2016	Filter pack flow pump	Thomas	01718	107CA18	00000599
5	5/31/2016	flow rate	Tylan	none	FC280AV-4S	AW9403013
6	5/31/2016	Infrastructure	Infrastructure	none	none	none
7	5/31/2016	MFC power supply	Tylan	none	RO-32	FP9710002
8	5/31/2016	Modem	Sierra wireless	none	GX450	LA54620331001003
9	5/31/2016	Ozone	ThermoElectron Inc	none	49C	0425208058
10	5/31/2016	Ozone Standard	ThermoElectron Inc	90717	49C	49C-66823-354
11	5/31/2016	Sample Tower	Aluma Tower	illegible	В	none
12	5/31/2016	Shelter Temperature	ARS	none	none	none
13	5/31/2016	Siting Criteria	Siting Criteria	None	1	None
14	5/31/2016	Temperature2meter	RM Young	none	41342	15106
15	5/31/2016	Zero air pump	Werther International	none	PC40/4	526289

DAS Data Form DAS Time Max Error: 3 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2616 MEV405 Martin Valvur 05/31/2016 DAS Primary Das Date: 5 /31/2016 **Audit Date** 5 /31/2016 HY Parameter DAS Mfg 7:38:00 7:35:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** Das Day: 152 **Audit Day** 152 Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0002 0.0001 0.0002 0.0001 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 95740243 Tfer Desc. DVM 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 -0.0003 -0.0005 -0.0002 V V 7 0.1000 0.1002 0.1004 0.00027 0.3000 0.2996 0.2995 V V -0.0001 7 0.5000 0.4993 0.4992 V V -0.0001 7 0.7000 V V 0.0002 0.7000 0.7002 V V 7 0.9000 0.8993 0.8992 -0.0001

1.0001

V

V

-0.0001

7

1.0000

1.0002

Flow Data Form

Mfg		Serial Number Ta Site		Tec	hnician	Site Visit	Date Parar	neter	Owner ID		
Tylan		W940301	403013 MEV405		Ма	rtin Valvur	05/31/201	6 flow ra	ate	none	
Mfg	Tylan					Mfg	BIOS	BIOS		Parameter Flow Rate	
SN/Owner ID	FP97	10002	none			Serial Number	122974	7	Tfer Desc. BIG	OS 220-H	
Parameter	MEC	power sur	only			Tfer ID	01416				
rarameter	IVII C	power sup	рріу								
						Slope	0	.99895 Int	ercept	0.0118	
						Cert Date	2/1	0/2016 Co	rrCoff	1.0000	
DAS 1:			DAS 2:		L	Cal Factor Z	ero	0.	08		
A Avg % Diff:	A Max	x % Di	A Avg %l	Dif A Max	w % Di	Cal Factor F	ull Scale	5.5	05		
7.20%		8.94%				Rotometer R	eading:	3.	75		
Desc.	Te	st type	Input l/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference	
primary	pump	off	0.000	0.000	-0.01	-0.055	0.02	l/m	l/m		
primary	leak c	heck	0.000	0.000	0.11	0.123	0.22	l/m	l/m		
primary	test p	t 1	3.140	3.130	2.69	2.688	3.00	l/m	l/m	-4.28%	
primary	test p	t 2	3.282	3.270	2.68	2.685	3.00	l/m	l/m	-8.38%	
primary	test p	t 3	3.301	3.290	2.68	2.687	3.00	l/m	l/m	-8.94%	
Sensor Comp	onent	Leak Tes	t		Conditio	n		Statu	s pass		
Sensor Comp	onent	Tubing C	ondition		Conditio	n Good		Statu	s pass		
Sensor Compo	onent	Filter Pos	sition		Conditio	Good	Stat		tus pass		
Sensor Compo	onent	Rotomete	er Condition	1	Conditio	Clean and dry		Status			
Sensor Comp	onent	Moisture	Present		Conditio	n No moisture p	resent	Statu	s pass		
Sensor Comp	onent	Filter Dist	tance		Conditio	7.0 cm		Statu	s pass		
Sensor Comp	onent	Filter Dep	oth		Conditio	2.0 cm		Statu	s pass		
Sensor Comp	onent	Filter Azir	muth		Conditio	n 360 deg	Status		pass		
Sensor Component Syste		System N	/lemo		Conditio	n		Statu	s pass		

Ozone Data Form

Mfg Se	erial Number Ta	Site	Te	chnician		Site Visit	Date Param	eter Owner ID	
ThermoElectron Inc 0	425208058	MEV405	Ma	artin Valv	ur	05/31/20	16 Ozone	none	
Intercept -1.6	Slope: 2584 Intercept CorrCoff	0.00000 0.00000 0.00000	D	Mfg Serial N Tfer ID	umber	ThermoEl 49CPS-70		arameter ozone fer Desc. Ozone primary sta	an
DAS 1:	DAS 2:			Slope			0.99832 Inte	-0.26452	2
A Avg % Diff: A Mar	8 % Di A Avg % 6.3%	6Dif A Max 9	% Di	Cert Da	te	1/2	29/2016 Co	rCoff 1.00000	0
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	C	te	Site Unit	PctDifference	
primary	Concoroup 1	0.75	1.0				opb	rctDifference	
primary	2	30.45	30.			1	pb	-6.31%	
primary	3	50.54	50.	89	48	.31 p	pb	-5.07%	
primary	4	74.40	74.				pb	-4.61%	
primary	5	101.42	101	.85	104	1.36 p	pb	2.46%	
Sensor Component	Sample Train		Condition	Good			Status	pass	
Sensor Component	22.5 degree rule		Conditio	on			Status	pass	
Sensor Component	Inlet Filter Conditio	n	Conditio	on Clean			Status	pass	
Sensor Component	Battery Backup		Condition N/A				Status	pass	
Sensor Component	Offset		Condition -0.6				Status	pass	
Sensor Component	Span		Condition 1.019				Status	pass	
Sensor Component	Zero Voltage		Condition 0.0001				Status	pass	
Sensor Component	Fullscale Voltage		Condition 1.0001				Status	pass	
Sensor Component	Cell A Freq.		Condition	n 80.2 k	Hz		Status	pass	
Sensor Component	Cell A Noise		Condition	0.7 pp	b	Status		pass	
Sensor Component	Cell A Flow		Condition	on 0.68 lpm		Status	pass		
Sensor Component	Cell A Pressure		Condition	570 m	n 570 mmHg		Status	pass	
Sensor Component	Cell A Tmp.		Condition	36.9 C	;		Status	pass	
Sensor Component	Cell B Freq.		Conditio	n 110.3	kHz		Status	pass	
Sensor Component	Cell B Noise		Conditio	0.6 pp	b		Status	pass	
Sensor Component	Cell B Flow		Condition	0.58 lp	om		Status	pass	
Sensor Component	Cell B Pressure		Condition	Not te	sted		Status	pass	
Sensor Component	Cell B Tmp.		Condition	on			Status	pass	
Sensor Component	Line Loss		Condition	Not te	sted		Status	pass	
Sensor Component	System Memo		Condition	on			Status	pass	

2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter Mfg Site **Owner ID** Martin Valvur RM Young 15106 MEV405 05/31/2016 Temperature2meter none Parameter Temperature Mfg Fluke Tfer Desc. RTD 3275143 **Serial Number** 01229 Tfer ID **Slope** 0.99980 **Intercept** -0.02840 **DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.33 0.49 Test type UseDescription InputTmpRaw InputTmpCorrected | OutputTmpSignal | OutputSignalEng | OSE Unit Difference primary Temp Low Rang 0.28 0.31 0.000 0.80 C 0.49 Temp Mid Rang 24.24 24.27 0.000 24.64 C 0.37 primary primary Temp High Rang 47.26 47.30 0.000 47.43 C 0.13 Sensor Component | Properly Sited **Condition** Properly sited **Status** pass Sensor Component | Shield Condition Clean **Status** pass Condition Functioning Status pass Sensor Component Blower Sensor Component Blower Status Switch Status pass **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Martin Valvur ARS MEV405 05/31/2016 Shelter Temperature none none **DAS 1: DAS 2:** Mfg Fluke Parameter Shelter Temperatur **Abs Avg Err** Abs Max Er **Abs Avg Err** Abs Max Er Tfer Desc. RTD 3275143 **Serial Number** 0.21 0.46 01229 **Tfer ID** -0.02840 **Slope** 0.99980 Intercept 1/19/2016 1.00000 **Cert Date** CorrCoff OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. 0.000-0.08 primary Temp Mid Range 24.49 24.52 24.4C

0.000

0.000

C

C

Status pass

24.3

24.4

-0.1

-0.46

24.42

24.82

Condition

24.39

24.79

Temp Mid Range

Temp Mid Range

Sensor Component | System Memo

primary primary

Infrastructure Data For MEV405 Technician | Martin Valvur Site Visit Date 05/31/2016 Site ID **Shelter Make Shelter Model Shelter Size** 888 Ekto 512 cuft Sensor Component | Sample Tower Type **Condition** Type B Status pass **Condition** Good Sensor Component | Conduit Status pass Sensor Component Met Tower **Condition** Good Status pass

Condition Not installed

Condition Functioning

Condition Installed

Condition Good

Condition 3/8 teflon

Condition Good

Status pass

Status pass

Status pass

Status pass

Status pass

Status pass

Sensor Component Moisture Trap

Sensor Component | Power Cables

Sensor Component Rotometer

Sensor Component | Sample Tower

Sensor Component | Shelter Door

Sensor Component | Shelter Roof

Sensor Component | Shelter Floor

Sensor Component | Signal Cable

Sensor Component Tubing Type

Sensor Component | Sample Train

Sensor Component | Shelter Condition

Sensor Component | Shelter Temp Control

Field Systems Comments

1 Parameter: SitingCriteriaCom

A large parking lot for park service employees is located approximately 30 meters north of the site.

2 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, and well organized.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 05/31/2016 MEV405 Technician | Martin Valvur Site ID Moccasin Mesa **USGS Map** NPS/EPA Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 08-083-0101 AQS# Climatronics **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude dry, wet, IMPROVE **Deposition Measurement QAPP** Longitude Land Use woodland - evergreen **QAPP Elevation Meters** complex **Terrain QAPP Declination** No Conforms to MLM **OAPP Declination Date** 37.198398 **Site Telephone Audit Latitude** Natural Resources -108.490462 Site Address 1 **Audit Longitude** Mesa Verde National Park Site Address 2 **Audit Elevation** 2170 Montezuma 10.3 County **Audit Declination** Cortez, CO City, State **Present** Fire Extinguisher 81330 No inspection date Zip Code Mountain **First Aid Kit** Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 888 Ekto **Shelter Size** 512 cuft **✓** Notes The shelter is in good condition, clean, and well organized. Shelter Clean **✓** Notes Site OK From the main entrance on highway 160, go through the park gate and drive about 35 minutes to mile marker 19. **Driving Directions**

Just after mile marker 19 turn right on the paved service road. The air quality office is the stone building about 200

yards down the road. Continue on the same road to the site.

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID	MEV405	Technician	Martin Valvur	Site Visit Date	05/31/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		\checkmark
Intensive agricultural ops (including aerial spraying)	500 m		\checkmark
Limited agricultural operations	200 m		✓
Large parking lot	200 m	30 m	
Small parking lot	100 m		✓
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK	
---------------------	--

Siting Criteria Comment

A large parking lot for park service employees is located approximately 30 meters north of the site.

Fie	eld Systems Data Form		F-02058-1500-S3-rev002
Site	MEV405 Technician Martin Valvur		Site Visit Date 05/31/2016
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	✓	N/A
2	Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the	✓	N/A
	tower into the prevailing wind)		F
3	Are the tower and sensors plumb?	✓	N/A
4	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?	✓	
5	Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided)	✓	
6	Is the solar radiation sensor plumb?	✓	N/A
7	Is it sited to avoid shading, or any artificial or reflected light?	✓	N/A
8	Is the rain gauge plumb?	✓	N/A
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	✓	N/A
10	Is the surface wetness sensor sited with the grid surface facing north?	✓	N/A
11	Is it inclined approximately 30 degrees?	✓	N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Fie	eld Systems Data Form		F-02058-1500-S4-rev002
Site	ID MEV405 Technician Martin Valvur		Site Visit Date 05/31/2016
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	✓	Temperature only
2	Are all the meteorological sensors operational online, and reporting data?	✓	Temperature only
3	Are the shields for the temperature and RH sensors clean?	✓	
4	Are the aspirated motors working?	✓	
5	Is the solar radiation sensor's lens clean and free of scratches?	✓	N/A
6	Is the surface wetness sensor grid clean and undamaged?	✓	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	✓	
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	~	
	de any additional explanation (photograph or sketch if neces ral or man-made, that may affect the monitoring parameters:) regarding conditions listed above, or any other features,

Field Systems Data Form F-02058-1500-S5-rev002 MEV405 Technician | Martin Valvur Site Visit Date 05/31/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **~** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. 1/4 teflon by 10 meters Describe dry dep sample tube. 3/8 teflon by 10 meters At inlet only Are in-line filters used in the ozone sample line? (if ves indicate location) **~** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? Flow line only Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it Clean and dry clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	MEV405	Technician M	artin Valvur		Site Visi	it Date 05/31/201	6	
	DAS, se	nsor translators, and p	peripheral equipn	nent operation	ıs ar	nd maintena	<u>nce</u>		
1		OAS instruments appeintained?	ar to be in good c	ondition and	✓				
2		he components of the backup, etc)	DAS operational?	? (printers,	✓				
3		nalyzer and sensor sig g protection circuitry		rough	✓	Met sensors	only		
4		signal connections prointained?	otected from the w	veather and	✓				
5	Are the	signal leads connected	to the correct DA	AS channel?	✓				
6	Are the grounde	DAS, sensor translatord?	rs, and shelter pr	operly	✓				
7	Does the	e instrument shelter h	ave a stable power	r source?	✓				
8	Is the in	strument shelter temp	oerature controlle	d?	✓				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	l grounded?			✓		V	
11	Tower c	omments?				✓		V	
		additional explanatio an-made, that may al				y) regardinį	g conditions listed	d above, or a	any other features,

Field Systems Data Form F-02058-1500-S7-rev002 MEV405 Site Visit Date 05/31/2016 Site ID **Technician** Martin Valvur **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No Yes No N/A **✓ ✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger V V** П Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V ~ Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V ~ Humidity sensor translator Surge protector** П П **V ~ UPS Solar radiation translator ~ V** Tipping bucket rain gauge Lightning protection device ~ \checkmark **Shelter heater** Ozone analyzer ~ \checkmark Filter pack flow controller Shelter air conditioner \checkmark Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V ✓** Dataview **SSRF V ✓ V Site Ops Manual HASP Field Ops Manual Calibration Reports V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Flow & observation sections Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document **✓**

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Control charts not used

sample transfer to and from lab?

current?

Are ozone z/s/p control charts properly completed and

Field Systems Data Form F-02058-1500-S8-rev002 MEV405 Site Visit Date 05/31/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections ✓ V** Weekly Translator Zero/Span Tests (climatronics) **✓ V** Monthly **Manual Rain Gauge Test ✓ V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Monthly **V Automatic Zero/Span Tests** Daily **V V** Monthly Manual Zero/Span Tests **V** Daily **Automatic Precision Level Tests Manual Precision Level Test V V** Weekly **Analyzer Diagnostics Tests ~** Monthly **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **~ ~ Zero Air Desiccant Check** Semiannually ✓ Unknown Do multi-point calibration gases go through the complete sample train including all filters? **✓**

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

✓

Dataview

Do automatic and manual z/s/p gasses go through the

Are the automatic and manual z/s/p checks monitored and

complete sample train including all filters?

reported? If yes, how?

Fi	eld Sy	stems Data Form				F-02058-1500-S9-rev0					
Sit	e ID	MEV405 Te	chniciaı	Martin Valvur		Site Visit Date	05/31/2016				
	Site ope	ration procedures									
1	Is the fil	ter pack being changed eve	ry Tueso	day as scheduled	? ✓	Filter changed mor	inings				
2	Are the correctly	Site Status Report Forms b	eing con	npleted and filed	✓						
3	Are data	a downloads and backups b ed?	eing per	formed as		No longer required					
4	Are gen	eral observations being mad	le and r	ecorded? How?	✓	SSRF					
5	Are site	supplies on-hand and reple	nished i	n a timely	✓						
6	Are sam	pple flow rates recorded? Ho	ow?		✓	SSRF					
7	Are sam	uples sent to the lab on a reg	ular sch	edule in a timely	✓						
8		ers protected from contamin oping? How?	ation dı	uring handling	✓	Uses bag as glove					
9		site conditions reported reg ons manager or staff?	ularly to	o the field							
QC	Check Po	erformed	Fr	equency			Compliant				
I	Multi-poi	nt MFC Calibrations	✓ Se	miannually			✓				
]	Flow Syste	em Leak Checks	✓ We	eekly			✓				
]	Filter Pac	k Inspection									
]	Flow Rate	Setting Checks	✓ We				✓				
1	Visual Ch	eck of Flow Rate Rotometer					✓				
]	In-line Fil	ter Inspection/Replacement	✓ As	needed			▽				
	Sample Li	ne Check for Dirt/Water									
		dditional explanation (phot n-made, that may affect the				r) regarding condit	ions listed above, or any other features,				

Field Systems Data Form

F-02058-1500-S10-rev002

MEV405 Site ID

Technician Martin Valvur

Site Visit Date 05/31/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	EliteBook	CNV347CS41	none
DAS	Environmental Sys Corp	8816	2616	90613
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CA18	00000599	01718
flow rate	Tylan	FC280AV-4S	AW9403013	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Tylan	RO-32	FP9710002	none
Modem	Sierra wireless	GX450	LA54620331001003	none
Ozone	ThermoElectron Inc	49C	0425208058	none
Ozone Standard	ThermoElectron Inc	49C	49C-66823-354	90717
Sample Tower	Aluma Tower	В	none	illegible
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature2meter	RM Young	41342	15106	none
Zero air pump	Werther International	PC40/4	526289	none

Site Inventory by Site Visit

Site V	isit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
CAN4	407-Martii	n Valvur-06/01/2016				
1	6/1/2016	Computer	Hewlett Packard	none	EliteBook	CNV1360668
2	6/1/2016	DAS	Environmental Sys Corp	09638	8816	2523
3	6/1/2016	Elevation	Elevation	None	1	None
4	6/1/2016	Filter pack flow pump	Thomas	none	107CA18A	00005251
5	6/1/2016	flow rate	Mykrolis	03388	FC280SAV-4S	AW9403022
6	6/1/2016	Infrastructure	Infrastructure	none	none	none
7	6/1/2016	Met tower	Universal Tower	01357	unknown	none
8	6/1/2016	Modem	Sierra wireless	none	GX450	LA54620441001003
9	6/1/2016	Ozone	ThermoElectron Inc	none	49i A3NAA	1030745086
10	6/1/2016	Ozone Standard	ThermoElectron Inc	none	49i A1NAA	1030745084
11	6/1/2016	Sample Tower	Aluma Tower	illegible	В	none
12	6/1/2016	Shelter Temperature	ARS	none	none	none
13	6/1/2016	Siting Criteria	Siting Criteria	None	1	None
14	6/1/2016	Temperature2meter	Climatronics	none	100093	5708
15	6/1/2016	Zero air pump	Twin Tower Engineering	90721	TT70/E4	526297

DAS Data Form DAS Time Max Error: 0.33 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2523 CAN407 Martin Valvur 06/01/2016 DAS Primary Das Date: 6 /1 /2016 **Audit Date** 6 /1 /2016 HY Parameter DAS Mfg 8:37:40 8:38:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** Das Day: 153 **Audit Day** 153 Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0001 0.0002 0.0001 0.0002 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 95740243 Tfer Desc. DVM 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 12 0.0000 -0.0008 -0.0007 0.0001 V V 12 0.1000 0.0999 0.0998 -0.0001 12 0.3000 0.2997 0.2997 V V 0.0000 12 0.5000 0.4994 0.4996 V V 0.0002 12 0.7000 V V 0.0001 0.6999 0.7000 V V 12 0.9000 0.9001 0.9003 0.000212 V V 1.0000 1.0002 1.0004 0.0002

Flow Data Form

Mfg	Se	rial Num	ber Ta	Site	Tec	hnician	Site Visit I	Date Paran	neter	Owner ID
Mykrolis	A	W940302	2	CAN407	Ма	rtin Valvur	06/01/2010	flow ra	ite	03388
						Mfg	BIOS	I	Parameter Flo	ow Rate
						Serial Number	122974	7	fer Desc. Blo	OS 220-H
						Tfer ID	01416			
						Slope	0.	99895 Int	ercept	0.01185
						Cert Date	2/1	0/2016 Co	rrCoff	1.00000
DAS 1:			DAS 2:		L	Cal Factor Z	ero	-0.0	29	
A Avg % Diff:	A Max	x % Di	A Avg %I	Dif A Max	% Di	Cal Factor F	ull Scale	5.4	52	
2.28%		2.56%				Rotometer R	eading:	3	3.5	
Desc.	Tes	st type	Input l/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	I PctDifference
primary	pump	off	0.000	0.000	-0.02	0.019	-0.01	l/m	l/m	
primary	leak c	heck	0.000	0.000	0.00	0.025	0.00	l/m	l/m	
primary	test pt	1	2.965	2.960	2.77	2.784	3.03	l/m	l/m	2.20%
primary	test pt	2	2.956	2.950	2.76	2.773	3.01	1/m	l/m	2.07%
primary	test pt	3	2.941	2.930	2.76	2.770	3.01	l/m	l/m	2.56%
Sensor Compo	onent	Leak Tes	t		Conditio	n		Statu	pass	
Sensor Compo	onent	Tubing Co	ondition		Conditio	n Good		Statu	pass	
Sensor Compo	onent	Filter Pos	ition		Conditio	n Good		Statu	pass	
_	L				_					
Sensor Compe	onent	Rotomete	er Condition		Conditio	n Clean and dry		Statu	pass	
Sensor Compo	onent [Moisture	Present		Conditio	No moisture p	resent	Statu	pass	
Sensor Compo	onent [Filter Dist	ance		Conditio	n 5.0 cm		Statu	pass	
Sensor Compo	onent	Filter Dep	oth		Conditio	1.0 cm		Statu	pass	
Sensor Compo	onent	Filter Azir	muth		Conditio	270 deg		Statu	pass	
Sensor Compo	onent	System M	1emo		Conditio	n		Statu	pass	

Ozone Data Form

Mfg S	erial Number Ta	Site	Technicia	1	Site Visit	Date Parame	eter (Owner ID
ThermoElectron Inc 1	030745086	CAN407	Martin Val	vur	06/01/20	Ozone	n	one
Intercept -0.5	Slope: 50561 Intercept 509997 CorrCoff	0.00000 0.00000 0.00000	Serial 1	Number	ThermoE 49CPS-7 01110		rameter ozone er Desc. Ozone	primary stan
DAS 1:	DAS 2:		Slope			0.99832 Inter	cept	-0.26452
A Avg % Diff: A Ma	x % Di A Avg %	6Dif A Max %	6 Di Cert D	ate	1,	/29/2016 Corr	Coff	1.00000
							D. Dice	'
UseDescription primary	ConcGroup 1	Tfer Raw 0.64	Tfer Corr 0.90		te 64 1	Site Unit	PctDiffere	nce
primary	2	30.90	31.21			ppb	-	1.95%
primary	3	51.80	52.15			ppb		2.59%
primary primary	5	75.60 110.30	75.99 110.75			ppb ppb		1.04% 0.77%
Sensor Component	Sample Train		Condition Good			Status		
Sensor Component	22.5 degree rule		Condition			Status	pass	
Sensor Component	Inlet Filter Condition	n	Condition Clea	n		Status	pass	
Sensor Component	Battery Backup		Condition N/A			Status	pass	
Sensor Component	Offset		Condition -0.2			Status	pass	
Sensor Component	Span		Condition 1.010	6		Status	pass	
Sensor Component	Zero Voltage		Condition -0.00	02		Status	pass	
Sensor Component	Fullscale Voltage		Condition 0.99	97		Status	pass	
Sensor Component	Cell A Freq.		Condition 78.5	kHz		Status	pass	
Sensor Component	Cell A Noise		Condition 0.5 p	pb		Status	pass	
Sensor Component	Cell A Flow		Condition 0.71	lpm		Status	pass	
Sensor Component	Cell A Pressure		Condition 601.	7 mmHg		Status	pass	
Sensor Component	Cell A Tmp.		Condition 37.6	С		Status	pass	
Sensor Component	Cell B Freq.		Condition 83.9	kHz		Status	pass	
Sensor Component	Cell B Noise		Condition 0.8 p	pb		Status	pass	
Sensor Component	Cell B Flow		Condition 0.69	lpm		Status	pass	
Sensor Component	Cell B Pressure		Condition Not t	ested		Status	pass	
Sensor Component	Cell B Tmp.		Condition			Status	pass	
Sensor Component	Line Loss		Condition Not t	ested		Status	pass	
Sensor Component	System Memo		Condition			Status	pass	

2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter Mfg **Owner ID** CAN407 Martin Valvur Climatronics 5708 06/01/2016 Temperature2meter none Parameter Temperature Mfg Fluke Tfer Desc. RTD 3275143 **Serial Number** 01229 Tfer ID **Slope** 0.99980 **Intercept** -0.02840 **DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.02 0.03 Test type UseDescription InputTmpRaw InputTmpCorrected | OutputTmpSignal | OutputSignalEng | OSE Unit Difference primary Temp Low Rang 0.27 0.30 0.000 0.27 C -0.03 Temp Mid Rang 25.61 25.64 0.000 25.62 C -0.02 primary primary Temp High Rang 46.81 46.85 0.000 46.84 C -0.01Sensor Component | Properly Sited **Condition** Properly sited **Status** pass Sensor Component | Shield Condition Clean **Status** pass Condition Functioning Sensor Component Blower **Status** pass Sensor Component Blower Status Switch Status pass **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** ARS CAN407 Martin Valvur 06/01/2016 Shelter Temperature none none **DAS 1: DAS 2:** Mfg Fluke Parameter Shelter Temperatur Abs Avg Err Abs Max Er Abs Avg Err **Abs Max Er** Tfer Desc. RTD 3275143 **Serial Number** 0.83 1.01 01229 **Tfer ID** 0.99980 -0.02840 Slope Intercept 1/19/2016 CorrCoff 1.00000 **Cert Date**

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	24.62	24.65	0.000	25.4	C	0.73
primary	Temp Mid Range	24.89	24.92	0.000	25.7	С	0.76
primary	Temp Mid Range	24.54	24.57	0.000	25.6	С	1.01
Sensor Component System Memo Condition Status pass							

Infrastructure Data For Site ID CAN407 Technician Martin Valvur Site Visit Date 06/01/2016

Shelter Make	Shelter Model	Shelter Size
NPS	R46453	640 cuft

Sensor Component	Sample Tower Type	Condition	Type B	Status pass
Sensor Component	Conduit	Condition	Good	Status pass
Sensor Component	Met Tower	Condition	Good	Status pass
Sensor Component	Moisture Trap	Condition	Not installed	Status pass
Sensor Component	Power Cables	Condition	Good	Status pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status pass
Sensor Component	Rotometer	Condition	Installed	Status pass
Sensor Component	Sample Tower	Condition	Good	Status pass
Sensor Component	Shelter Condition	Condition	Good	Status pass
Sensor Component	Shelter Door	Condition	Good	Status pass
Sensor Component	Shelter Roof	Condition	Good	Status pass
Sensor Component	Shelter Floor	Condition	Good	Status pass
Sensor Component	Signal Cable	Condition	Good	Status pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status pass
Sensor Component	Sample Train	Condition	Good	Status pass

Field Systems Comments

1 Parameter: SitingCriteriaCom

The small parking lot at the visitors center is approximately 100m to the northeast.

2 Parameter: ShelterCleanNotes

The shelter is in good condition, well organized and well maintained.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 06/01/2016 CAN407 Technician | Martin Valvur Site ID Musselman Arch **USGS Map** NPS/EPA Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 49-037-0101 AQS# Climatronics **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude dry, wet **Deposition Measurement QAPP** Longitude Land Use woodland - mixed, desert range **QAPP Elevation Meters Terrain** complex **QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** (435) 259-4141 38.458323 **Site Telephone Audit Latitude** Visitors Center **Audit Longitude** -109.82126 Site Address 1 route 313 Site Address 2 **Audit Elevation** 1794 San Juan 11.6 County **Audit Declination** Moab, UT City, State **Present** Fire Extinguisher 84532 Inspected April 2015 Zip Code Mountain **First Aid Kit** in vehicle Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make NPS Model R46453 **Shelter Size** 640 cuft **✓** Notes The shelter is in good condition, well organized and well maintained. Shelter Clean **✓** Notes Site OK

From I-70, take exit 180 south on route 191. Approximately 9 miles north of Moab, turn right (west) on route 313 at

the sign for Canyonlands National Park. Follow 313 west for 25 miles passing the state park and continuing straight

to Canyonlands. The site is at the end of the dirt road behind the visitors center, in the maintenance area.

Driving Directions

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID CAN407 Technician Martin Valvur Site Visit Date 06/01/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		$ lap{\checkmark}$
Secondary road, heavily traveled	500 m		$ lap{\checkmark}$
Secondary road, lightly traveled	200 m		$ lap{\checkmark}$
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		$ lap{\checkmark}$
Limited agricultural operations	200 m		lacksquare
Large parking lot	200 m		lacksquare
Small parking lot	100 m		lacksquare
Tree line	50 m		lacksquare
Obstacles to wind	10 times obstacle height		

Siting Distances OK ✓

Siting Criteria Comment

The small parking lot at the visitors center is approximately 100m to the northeast.

Fie	eld Systems Data Form		F-02058-1500-S3-rev002
Site	CAN407 Technician Martin Valvur		Site Visit Date 06/01/2016
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	✓	N/A
2	Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the	✓	N/A
	tower into the prevailing wind)		F
3	Are the tower and sensors plumb?	✓	N/A
4	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?	✓	
5	Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided)	✓	
6	Is the solar radiation sensor plumb?	✓	N/A
7	Is it sited to avoid shading, or any artificial or reflected light?	✓	N/A
8	Is the rain gauge plumb?	✓	N/A
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	✓	N/A
10	Is the surface wetness sensor sited with the grid surface facing north?	✓	N/A
11	Is it inclined approximately 30 degrees?	✓	N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Fie	ld Systems Data Form		F-02058-1500-S4-rev00					
Site	ID CAN407 Technician Martin Valvur		Site Visit Date 06/01/2016					
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	✓	Temperature only					
2	Are all the meteorological sensors operational online, and reporting data?	✓	Temperature only					
3	Are the shields for the temperature and RH sensors clean?	✓						
4	Are the aspirated motors working?	✓						
5	Is the solar radiation sensor's lens clean and free of scratches?	✓	N/A					
6	Is the surface wetness sensor grid clean and undamaged?	✓	N/A					
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	✓						
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓						
	de any additional explanation (photograph or sketch if neces al or man-made, that may affect the monitoring parameters:		regarding conditions listed above, or any other features,					
	<u> </u>							

Field Systems Data Form F-02058-1500-S5-rev002 CAN407 Technician | Martin Valvur Site Visit Date 06/01/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **~** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. 1/4 teflon by 10 meters Describe dry dep sample tube. 3/8 teflon by 10 meters At inlet only Are in-line filters used in the ozone sample line? (if ves indicate location) **✓** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? Flow line only Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it Clean and dry clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

natural or man-made, that may affect the monitoring parameters:

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	CAN407	Technician	Martin Valvur		Site Vis	sit Date 06/01/201	16		
	DAS, sensor translators, and peripheral equipment operations and maintenance									
1	Do the I	OAS instruments appe		_						
2		the components of the backup, etc)	DAS operational	l? (printers,	✓					
3		nalyzer and sensor sig g protection circuitry		nrough	✓	Met sensors	s only			
4		signal connections prointained?	otected from the	weather and	✓					
5	Are the	signal leads connected	to the correct D	AS channel?	✓					
6	Are the grounde	DAS, sensor translatoed?	rs, and shelter p	roperly	✓					
7	Does the	e instrument shelter ha	ave a stable powe	er source?	✓					
8	Is the in	strument shelter temp	erature controll	ed?	✓					
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded		
10	Is the sa	mple tower stable and	grounded?			<u> </u>		<u> </u>		
11	Tower c	omments?								
		additional explanatio nan-made, that may af				y) regardin	ng conditions liste	d above, or a	any other features,	

Field Systems Data Form F-02058-1500-S7-rev002 CAN407 Site Visit Date 06/01/2016 Site ID **Technician** Martin Valvur **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No Yes No N/A **✓ ✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger V V** П Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V V** Filter flow pump **Temperature translator** П **V ~ Humidity sensor translator Surge protector ✓** П П **~ UPS Solar radiation translator** \checkmark **~** Tipping bucket rain gauge Lightning protection device ~ **V Shelter heater** Ozone analyzer **V ✓** Filter pack flow controller Shelter air conditioner Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V ✓** Dataview **SSRF V ✓ V V Site Ops Manual HASP Field Ops Manual Calibration Reports V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Flow & observation sections Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document **✓**

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Control charts not used

sample transfer to and from lab?

current?

Are ozone z/s/p control charts properly completed and

Field Systems Data Form F-02058-1500-S8-rev002 CAN407 Site Visit Date 06/01/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections ✓ V** Weekly Translator Zero/Span Tests (climatronics) **✓ V** N/A **Manual Rain Gauge Test ✓ V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** Monthly Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests Manual Precision Level Test V V** Alarm values only weekly **Analyzer Diagnostics Tests ~** Monthly **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V V** Weekly Sample Line Check for Dirt/Water **V ~** As needed **Zero Air Desiccant Check ✓** Unknown Do multi-point calibration gases go through the complete sample train including all filters?

reported? If yes, how?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

Do automatic and manual z/s/p gasses go through the

Are the automatic and manual z/s/p checks monitored and

natural or man-made, that may affect the monitoring parameters:

complete sample train including all filters?

✓

✓

Dataview

Fi	eld Sy	stems Data Form			F-02058-1500-S9-rev002				
Sit	e ID	CAN407 Tec	hnician Martin Valvur		Site Visit Date	06/01/2016			
	Site ope	ration procedures							
1	Is the fil	ter pack being changed ever	y Tuesday as scheduled?	V	Filter changed morn	ings			
2	Are the correctl	Site Status Report Forms be y?	ing completed and filed	✓					
3	Are data	a downloads and backups be ed?	ing performed as		No longer required				
4	Are gen	eral observations being made	e and recorded? How?	✓	Dataview and SSRF	:			
5	Are site fashion	supplies on-hand and replen	ished in a timely	✓					
6	Are sam	aple flow rates recorded? Ho	w?	✓	SSRF				
7	Are sam	aples sent to the lab on a regu	llar schedule in a timely	✓					
8		ers protected from contamina oping? How?	ntion during handling	✓	Clean gloves on and	d off			
9		site conditions reported regu ons manager or staff?	larly to the field						
QC	Check P	erformed	Frequency			Compliant			
I	Multi-poi	nt MFC Calibrations	✓ Semiannually			\checkmark			
I	Flow Syste	em Leak Checks	✓ Weekly			\checkmark			
I	Filter Pack Inspection								
I	Flow Rate Setting Checks Weekly				V				
•	Visual Check of Flow Rate Rotometer ✓ Weekly				✓				
I	In-line Filter Inspection/Replacement ✓ As needed				✓				
5	Sample Li	ne Check for Dirt/Water							
		dditional explanation (photo n-made, that may affect the			y) regarding conditi	ons listed above, or a	ny other features,		

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID CAN407 Technician Martin Valvur Site Visit Date 06/01/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	EliteBook	CNV1360668	none
DAS	Environmental Sys Corp	8816	2523	09638
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CA18A	00005251	none
flow rate	Mykrolis	FC280SAV-4S	AW9403022	03388
Infrastructure	Infrastructure	none	none	none
Met tower	Universal Tower	unknown	none	01357
Modem	Sierra wireless	GX450	LA54620441001003	none
Ozone	ThermoElectron Inc	49i A3NAA	1030745086	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	1030745084	none
Sample Tower	Aluma Tower	В	none	illegible
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature2meter	Climatronics	100093	5708	none
Zero air pump	Twin Tower Engineering	TT70/E4	526297	90721

Site Inventory by Site Visit

Site V	isit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
GRB4	11-Martii	n Valvur-06/03/2016				
1	6/3/2016	Computer	Hewlett Packard	none	ProBook	5CB22906VO
2	6/3/2016	DAS	Environmental Sys Corp	90635	8816	2507
3	6/3/2016	Elevation	Elevation	None	1	None
4	6/3/2016	Filter pack flow pump	Thomas	none	107CAB115	0000109-840
5	6/3/2016	flow rate	Tylan	03387	FC280AV	AW9403026
6	6/3/2016	Infrastructure	Infrastructure	none	none	none
7	6/3/2016	Met tower	Climatronics	01358	18 inch taper	none
8	6/3/2016	MFC power supply	Tylan	03681	RO-32	FP9404004
9	6/3/2016	Modem	US Robotics	none	56.6k	24CGG57C027R
10	6/3/2016	Ozone	ThermoElectron Inc	90565	49C	49C-59285-322
11	6/3/2016	Ozone Standard	ThermoElectron Inc	none	49C	0330302753
12	6/3/2016	Sample Tower	Aluma Tower	none	В	AT-5381-F9-2
13	6/3/2016	Shelter Temperature	ARS	none	none	80
14	6/3/2016	Siting Criteria	Siting Criteria	None	1	None
15	6/3/2016	Temperature2meter	RM Young	none	41342	018532
16	6/3/2016	Zero air pump	Werther International	90722	TT70/4E	507782

DAS Data Form DAS Time Max Error: 0 Mfg **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. **Environmental Sys** 2507 GRB411 Martin Valvur 06/03/2016 DAS Primary Das Date: 6 /3 /2016 **Audit Date** 6 /3 /2016 HY **Parameter** DAS Mfg 8:38:45 8:38:15 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** Das Day: 155 **Audit Day** 155 **Tfer ID** 01322 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0000 0.0000 0.0000 0.0000 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg Tfer Desc. DVM **Serial Number** 95740243 01312 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff

Flow Data Form

Mfg		Serial Number Ta		Site		chnician	Site Visit I	Date Paran	neter	Owner ID	
Tylan	P	AW9403026		GRB411 M		artin Valvur	06/03/2016	flow ra	ite	03387	
Mfg	Tylan					Mfg	BIOS	I	Parameter Flo	ow Rate	
SN/Owner ID	FP94	04004	03681			Serial Number	122974]	Tfer Desc. Bl	OS 220-H	
						Tfer ID	01416				
Parameter	MFC	power sup	opiy			Tiel ID	01410				
						Slope	0.	99895 Int	ercept	0.0118	
						Cert Date	2/10	0/2016 Co	rrCoff	1.0000	
DAS 1:			DAS 2:		L	Cal Factor Z	ero	0.3	42		
A Avg % Diff:	A Ma	x % Di	A Avg %	Dif A Max	w % Di	Cal Factor F	ull Scale	5.8	94		
1.21%		2.25%				Rotometer R	eading:	3.	75		
Desc.	Te	st type	Input l/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	II PctDifference	
primary	pump	off	0.000	0.000	-0.28	-0.250	0.06	1/m	1/m		
primary	leak o	check	0.000	0.000	-0.28	-0.242	0.07	l/m	l/m		
primary	test p	t 1	3.079	3.070	2.39	2.395	3.00	l/m	l/m	-2.25%	
primary	test p		2.986	2.980	2.39	2.394	3.00	l/m	l/m	0.70%	
primary	test p	t 3	2.990	2.980	2.39	2.395	3.00 1/m		l/m	0.67%	
Sensor Comp	onent	Leak Tes	t		Conditio	lition		Statu	pass		
Sensor Comp	onent	Tubing C	ondition		Conditio	Condition Good		Status		pass	
Sensor Comp	onent	Filter Pos	sition		Conditio	n Poor		Statu	s Fail		
Sensor Comp	onent	Rotomete	er Condition	า	Conditio	Clean and dry		Statu	pass		
Sensor Comp	onent	Moisture	Present		Conditio	n No moisture p	No moisture present		pass		
Sensor Comp	onent	Filter Dist	tance		Conditio	6.0 cm		Statu	tus pass		
Sensor Comp	onent	Filter Dep	oth		Conditio	n -2.5 cm		Statu	s Fail		
Sensor Comp	onent	Filter Aziı	muth		Conditio	n 200 deg		Statu	pass		
Sensor Component System Memo		Conditio	n		Statu	pass					

Ozone Data Form

Mfg Se	erial Number Ta	Site	Tec	chnician		Site Visi	it Date	Parame	eter Own	er ID
ThermoElectron Inc 4	9C-59285-322	GRB411	Ma	artin Valv	ur	06/03/2	016	Ozone	9056	5
Intercept -1.9	0.95038 Slope: 0.0000 -1.97991 Intercept 0.0000 0.99957 CorrCoff 0.0000		Serial Number				rameter ozone er Desc. Ozone prir	mary stan		
DAS 1: A Avg % Diff: A Ma: 9.7%	DAS 2: x % Di	oDif A Max 9	% Di	Slope Cert Da	te	1	0.99832 1/29/2016			0.26452
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	te	Site	Unit	PctDifference	
primary	1	0.86	1.1	12	0	52	ppb			
primary	2	31.50	31.			.30	ppb		-14.18	
primary	3 4	52.80 78.20	53. 78.			.50	ppb		-10.63 -8.26	
primary primary	5	113.00	113				ppb ppb		-5.69	
Sensor Component			Conditio				FF	Status		
Sensor Component	22.5 degree rule		Conditio	on				Status	pass	
Sensor Component	Inlet Filter Conditio	n	Conditio	n Clean				Status		
Sensor Component			Conditio						tatus pass	
Sensor Component				lition -0.2					tatus pass	
Sensor Component				ondition 0.998					pass	
Sensor Component				dition -0.0005				Status		
Sensor Component	Fullscale Voltage		Conditio					Status	pass	
Sensor Component			Conditio					Status		
Sensor Component			Conditio					Status		
Sensor Component			Conditio					Status		
Sensor Component	Cell A Pressure		Conditio					Status pass		
Sensor Component	Cell A Tmp.		Conditio					Status		
Sensor Component	Cell B Freq.		Conditio					Status		
Sensor Component	Cell B Noise		Conditio					Status		
Sensor Component			Conditio	0.65 lj	om			Status	pass	
Sensor Component			Conditio					Status		
Sensor Component			Conditio					Status		
Sensor Component			Conditio					Status		
Sensor Component	System Memo		Conditio		omments	1		Status		
•										

2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter Mfg **Owner ID** Martin Valvur RM Young 018532 GRB411 06/03/2016 Temperature2meter none Parameter Temperature Mfg Fluke Tfer Desc. RTD 3275143 **Serial Number** 01229 Tfer ID **Slope** 0.99980 **Intercept** -0.02840 **DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.1 0.15 Test type UseDescription InputTmpRaw InputTmpCorrected | OutputTmpSignal | OutputSignalEng | OSE Unit Difference primary Temp Low Rang 0.18 0.21 0.000 0.36 C 0.15 Temp Mid Rang 24.38 24.41 0.000 24.51 C 0.1 primary primary Temp High Rang 49.13 49.17 0.000 49.11 C -0.06 Sensor Component | Properly Sited **Condition** Properly sited **Status** pass Sensor Component | Shield Condition Clean **Status** pass Condition Functioning Status pass Sensor Component Blower Sensor Component Blower Status Switch Status pass **Condition** N/A Sensor Component | System Memo Status pass Condition

Shelter Temperature Data For Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Martin Valvur ARS 80 GRB411 06/03/2016 Shelter Temperature none **DAS 1: DAS 2:** Mfg Fluke Parameter Shelter Temperatur Abs Avg Err Abs Max Er **Abs Avg Err** Abs Max Er Tfer Desc. RTD 3275143 **Serial Number** 0.66 0.81 01229 **Tfer ID** -0.02840 **Slope** 0.99980 Intercept 1/19/2016 1.00000 **Cert Date** CorrCoff InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw primary 25.39 0.000Temp Mid Range 25.36 26.2C 0.76 25.53 25.56 0.000 C 0.81 Temp Mid Range 26.4 primary primary 0.000 26.9 C 0.41 Temp Mid Range 26.45 26.48

Condition

Status pass

Sensor Component | System Memo

Infrastructure Data For

Si	te ID	GRB411	Technician	Martin Valvur	Site Visit Date	06/03/2016	
	Shelter Ma	ake	Shelter Model	Sh	elter Size		
	Ekto		8810 (s/n 2652-	1) 64	0 cuft		

Sensor Component	Sample Tower Type	Condition	Type B	Status	pass
Sensor Component	Conduit	Condition	Good	Status	pass
Sensor Component	Met Tower	Condition	Good	Status	pass
Sensor Component	Moisture Trap	Condition	Installed	Status	pass
Sensor Component	Power Cables	Condition	Good	Status	pass
Sensor Component	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
Sensor Component	Sample Tower	Condition	Good	Status	pass
Sensor Component	Shelter Condition	Condition	Good	Status	pass
Sensor Component	Shelter Door	Condition	Good	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
Sensor Component	Shelter Floor	Condition	Fair	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
Sensor Component	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

Site Visit Comments

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard Pro	oblem
Flow Rate	GRB411	Martin Valvur	06/03/2016	Filter Position	Tylan	698		
TEL CIL 1			1	1 61 1 1				

The filter attachment plate is mounted too low in the enclosure resulting in the filter being exposed to wind-driven rain and in the standard geometric orientation

Field Systems Comments

1 Parameter: DasComments

A digital to analog test of the data logger could not be performed since there were no available channels on the logger to test.

2 Parameter: ShelterCleanNotes

The shelter is in fair condition, The shelter floor has missing and crumbled tiles.

3 Parameter: PollAnalyzerCom

An ozone sample line test was performed which indicated a loss > 8% at 50 ppb in the sample line.

Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 06/03/2016 GRB411 Technician | Martin Valvur Site ID Lehman Caves **USGS Map NPS** Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 32-033-0101 AQS# Climatronics **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 39.0053 dry, wet **QAPP** Longitude -114.2158 **Deposition Measurement** 2060 Land Use woodland - evergreen **QAPP Elevation Meters Terrain** complex (dessert basin and mountain) **QAPP Declination** No Conforms to MLM **OAPP Declination Date** (775) 234-7104 39.005121 **Site Telephone Audit Latitude** Great Basin Nat. Park -114.215932 Site Address 1 **Audit Longitude** Hwy 488 Site Address 2 **Audit Elevation** 2058 White Pine 12.5 County **Audit Declination** Baker, NV City, State **Present** Fire Extinguisher 89311 Zip Code Pacific **First Aid Kit** Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Backup Operator Security Fence V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 (s/n 2652-1) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is in fair condition. The shelter floor has missing and crumbled tiles. Shelter Clean **✓** Notes Site OK From Las Vegas travel north on Interstate 15 to exit 109 in Beaver, Utah. Travel west on 21 to Garrison, Nevada and **Driving Directions**

turn left on route 487 and continue to Baker. Turn left on 488 in Baker and follow the signs to Great Basin National

Park. The site is on the left of the road to the residential and office area.

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID	GRB411	Technician	Martin Valvur	Site Visit Date	06/03/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km	mines to west	
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		lacksquare
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		✓
Limited agricultural operations	200 m		✓
Large parking lot	200 m		✓
Small parking lot	100 m		✓
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		✓

Siting	Distances OK	✓
Siting	Criteria Comn	nen

Fic	eld Systems Data Form		F-02058-1500-S3-rev002
Site	GRB411 Technician Martin Valvur		Site Visit Date 06/03/2016
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	✓	N/A
2	Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the	✓	N/A
3	tower into the prevailing wind) Are the tower and sensors plumb?	✓	N/A
4	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?	✓	
5	Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided)	✓	
6	Is the solar radiation sensor plumb?	✓	N/A
7	Is it sited to avoid shading, or any artificial or reflected light?	✓	N/A
8	Is the rain gauge plumb?	~	N/A
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	✓	N/A
10	Is the surface wetness sensor sited with the grid surface facing north?	✓	N/A
11	Is it inclined approximately 30 degrees?	✓	N/A

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Fic	eld Systems Data Form	F-02058-1500-S4-rev002
Site	ID GRB411 Technician Martin Valvur	Site Visit Date 06/03/2016
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	Temperature only
2	Are all the meteorological sensors operational online, and reporting data?	Temperature only
3	Are the shields for the temperature and RH sensors clean?	
4	Are the aspirated motors working?	
5	Is the solar radiation sensor's lens clean and free of scratches?	N/A
6	Is the surface wetness sensor grid clean and undamaged?	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	d 🗸
	ide any additional explanation (photograph or sketch if necestal or man-made, that may affect the monitoring parameters	essary) regarding conditions listed above, or any other features, s:

Field Systems Data Form F-02058-1500-S5-rev002 GRB411 Technician | Martin Valvur Site Visit Date 06/03/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **V** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. 1/4 teflon by 12 meters Describe dry dep sample tube. 3/8 teflon by 12 meters At inlet only Are in-line filters used in the ozone sample line? (if ves indicate location) **~** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? Flow line only Are there moisture traps in the sample lines? Clean and dry Is there a rotometer in the dry deposition filter line, and is it clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

An ozone sample line test was performed which indicated a loss > 8% at 50 ppb in the sample line.

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	GRB411	Technician	Martin Valvur		Site Visi	it Date 06/03/20	16	
	DAG	4				. 3 ! 4			
	DAS, sei	nsor translators, and	<u>peripheral equi</u>	pment operation	ns ai	<u>id maintena</u>	<u>nce</u>		
1	1 Do the DAS instruments appear to be in good condition and well maintained?								
2		he components of the backup, etc)	DAS operation	al? (printers,	✓				
3		nalyzer and sensor sig	_	through	✓	Met sensors	only		
4		signal connections prontained?	otected from the	e weather and	✓				
5	Are the	signal leads connected	d to the correct	DAS channel?	✓				
6	Are the grounde	DAS, sensor translated?	ors, and shelter j	properly	✓				
7	Does the	instrument shelter h	ave a stable pov	ver source?	✓				
8	Is the in	strument shelter temp	perature control	lled?	✓				
9	Is the mo	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	l grounded?			✓			
11	Tower c	omments?							
		additional explanatio an-made, that may a				y) regarding	g conditions liste	d above, or a	any other features,
A d	A digital to analog test of the data logger could not be performed since there were no available channels on the logger to test.								

Field Systems Data Form F-02058-1500-S7-rev002 GRB411 Technician | Martin Valvur Site Visit Date 06/03/2016 Site ID **Documentation** Does the site have the required instrument and equipment manuals? N/A Yes No Yes No N/A **✓ ✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger** ✓ **V** Temperature sensor Strip chart recorder **V V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V ~ Humidity sensor translator Surge protector** П П **V ~ UPS Solar radiation translator ~ V** Tipping bucket rain gauge **Lightning protection device** ~ \checkmark **Shelter heater** Ozone analyzer **V** \checkmark Filter pack flow controller Shelter air conditioner \checkmark Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log V ✓** Dataview **SSRF ✓ V V V Site Ops Manual** June 2000 **HASP Field Ops Manual Calibration Reports V V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Are the Site Status Report Forms being completed and **V** current? Are the chain-of-custody forms properly used to document **✓** sample transfer to and from lab?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

Are ozone z/s/p control charts properly completed and

current?

Control charts not used

Field Systems Data Form F-02058-1500-S8-rev002 GRB411 Site Visit Date 06/03/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections ✓ V** N/A Translator Zero/Span Tests (climatronics) **✓ V** N/A **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Semiannually **V V Automatic Zero/Span Tests** Daily **V V** Monthly Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests V Manual Precision Level Test ✓ V** Alarm values only **Analyzer Diagnostics Tests ~** Every 2 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **~ ~ Zero Air Desiccant Check** As needed ✓ Unknown Do multi-point calibration gases go through the complete sample train including all filters? **✓** Do automatic and manual z/s/p gasses go through the

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

✓

Dataview

complete sample train including all filters?

reported? If yes, how?

Are the automatic and manual z/s/p checks monitored and

Fi	Field Systems Data Form							F-02058-1	500-S9-rev002	
Sit	e ID	GRB411	Technic	ian	Martin Valvur		Site Visit Date	06/03/2016		
	Site ope	ration procedures								
1	Is the fil	ter pack being changed	every Tu	esd	ay as scheduled?	V	Filter changed morin	nings		
2 Are the Site Status Report Forms being completed and filed correctly?				✓	Flow & observation sections					
3	Are data	a downloads and backuped?	os being	erf	ormed as		No longer required			
4	Are gen	eral observations being	made an	d re	corded? How?	✓	SSRF			
5	Are site	supplies on-hand and re	eplenishe	d in	a timely	✓				
6	Are sam	ple flow rates recorded	? How?			✓	SSRF			
7	Are sam	aples sent to the lab on a	regular	sche	dule in a timely	✓				
8		ers protected from conta oping? How?	minatior	du	ring handling	✓	Clean gloves on and	d off		
9		site conditions reported ons manager or staff?	regularl	y to	the field					
QC	Check Po	erformed		Fre	quency			Compliant		
I	Multi-poi	nt MFC Calibrations	✓	Sen	niannually			✓		
J	Flow Syste	em Leak Checks	✓	Wee	ekly					
]	Filter Pac	k Inspection								
J	Flow Rate	Setting Checks		Wee				✓		
1	Visual Ch	eck of Flow Rate Rotom		Wee				✓		
J	In-line Filter Inspection/Replacement ✓ As needed				✓					
5	Sample Li	ne Check for Dirt/Wate	r 🗆							
		dditional explanation (pan-made, that may affect					regarding condition	ons listed above, or a	any other features,	

Field Systems Data Form

F-02058-1500-S10-rev002

Site ID

GRB411

Technician Martin Valvur

Site Visit Date 06/03/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	ProBook	5CB22906VO	none
DAS	Environmental Sys Corp	8816	2507	90635
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB115	0000109-840	none
flow rate	Tylan	FC280AV	AW9403026	03387
Infrastructure	Infrastructure	none	none	none
Met tower	Climatronics	18 inch taper	none	01358
MFC power supply	Tylan	RO-32	FP9404004	03681
Modem	US Robotics	56.6k	24CGG57C027R	none
Ozone	ThermoElectron Inc	49C	49C-59285-322	90565
Ozone Standard	ThermoElectron Inc	49C	0330302753	none
Sample Tower	Aluma Tower	В	AT-5381-F9-2	none
Shelter Temperature	ARS	none	80	none
Siting Criteria	Siting Criteria	1	None	None
Temperature2meter	RM Young	41342	018532	none
Zero air pump	Werther International	TT70/4E	507782	90722

Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
FOR	2605-Martir	ı Valvur-06/22/2016				
1	6/22/2016	DAS	Campbell	49922	CR1000	illegible
2	6/22/2016	elevation	Elevation	none	none	none
3	6/22/2016	Flow Rate	AALBORG	none	GFMS-012446	196706-5
4	6/22/2016	Infrastructure	Infrastructure	none	none	none
5	6/22/2016	Precipitation	Handar	none	444A	2998
6	6/22/2016	Relative Humidity	Vaisala	none	HMP45AC	Y3730020
7	6/22/2016	siting criteria	Siting Criteria	none	none	None
8	6/22/2016	Solar Radiation	Licor	none	LI-200	PY47986
9	6/22/2016	Temperature2meter	Vaisala	none	HMP45AC	Y3730020
10	6/22/2016	Wind Direction	Met One	illegible	024	J5213
11	6/22/2016	Wind Speed	Met One	none	014	39022

DAS Data Form DAS Time Max Error: 1.68 Mfg **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Campbell illegible FOR605 Martin Valvur 06/22/2016 DAS Primary Das Date: 6 /22/2016 **Audit Date** 6 /22/2016 Mfg HY **Parameter** DAS 7:55:41 7:54:00 **Das Time: Audit Time** Tfer Desc. Source generator (D **Serial Number** 12010039329 174 174 Das Day: **Audit Day** Tfer ID 01322 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0000 0.0000 0.0000 0.0000 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg Tfer Desc. DVM **Serial Number** 95740243 01312 Tfer ID **Slope** 1.00000 0.00000 **Intercept** 12/23/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output **DAS** Output InputUnit OutputUnit Difference 0.0000 0.0000 0.9000 0.0000 V V 4 1.0000 0.0000 0.0000 0.0000

Flow Data Form

Afg	Se	erial Num	ber Ta	Site	Tec	hnician	Site Visit I	Date Paran	ieter	Owner ID
ALBORG	1	96706-5		FOR605	Ма	rtin Valvur	06/22/2016	Flow R	ate	none
						Mfg	BIOS	P	arameter Flo	w Rate
						Serial Number	122974	Т	fer Desc. BIG	OS 220-H
						Tfer ID	01416			
						Slope	0.	99895 Int	ercept	0.0118
						Cert Date	2/10	0/2016 Co	rrCoff	1.0000
DAS 1:]	DAS 2:		L	Cal Factor Z	ero	0.0	33	
A Avg % Diff:	A Max		A Avg %I	Dif A Max	: % Di	Cal Factor F	_	0.0018	35	
2.90%		3.53%				Rotometer R	eading:		0	
Desc.	Tes	st type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	l PctDifference
primary	pump		0.000	0.000	0.00	0.000	0.35	1/m	l/m	
primary	leak c	heck	0.000	0.000	0.00	0.000	0.36	1/m	1/m	
primary	test pt	t 1	3.300	3.290	0.00	0.000	3.37	1/m	l/m	2.439
primary	test pt	t 2	3.289	3.280	0.00	0.000	3.37	1/m	1/m	2.749
primary	test pt	t 3	3.272	3.260	0.00	0.000	3.38	1/m	1/m	3.53%
Sensor Comp	onent	Leak Test			Condition	n		Status	pass	
Sensor Comp	onent	Tubing Co	ndition		Condition	Good		Status	pass	
Sensor Comp	onent	Filter Posi	tion		Condition	n Fair		Status	pass	
Sensor Comp	onent	Rotometei	r Condition		Condition	n N/A		Status	pass	
Sensor Comp	onent	Moisture Present			Condition	No moisture p	resent	Status	pass	
Sensor Comp	onent	Filter Dista	ance		Condition	3.5 cm		Status	pass	
Sensor Compo	onent	Filter Dept	th		Condition	4.0 cm		Status	pass	
Sensor Comp	onent	Filter Azim	nuth		Condition	160 deg		Status	pass	
~ ~	onent	System M	emo		Condition	See comments	3	Status	pass	

Wind Speed Data Form Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID FOR605 Wind Speed Met One 39022 Martin Valvur 06/22/2016 none Parameter wind speed Mfg RM Young Tfer Desc. wind speed motor (I **Serial Number** 01261 Tfer ID 1.00000 0.00000 **Slope Intercept** N/A Prop or Cups SN 0.4 **to** 0.5 **Prop or Cups Torque Cert Date** 12/11/2015 **CorrCoff** 1.00000 **Prop Correction Fact** N/A RM Young Parameter wind speed Mfg Tfer Desc. wind speed motor (h **Serial Number** 01262 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/11/2015 1.00000 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.09 0.80% Abs Avg Err 0.31 1.89% Abs Max Er UseDescription: Input RPM Out V Diff/ % Diff Diff WsM Input Device Input m/s DAS m/s primary none 0.45 0.0 0.5 0.00 0 01261 40 1.67 0.0 1.6 -0.03 primary primary 01261 80 2.75 0.0 2.4 -0.31 4.26 0.0 4.2 -0.02 01261 140 primary -0.49% primary 01261 210 6.07 0.0 6.0 400 11.11 0.0 11.2 0.81% primary 01262 22.22 01262 800 0.0 21.8 -1.89% primary primary 01262 1800 48.44 0.0 48.4 0.00% Sensor Component | Condition **Condition** Good Status pass Sensor Component Prop or Cups Condition **Condition** Good **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component | Torque **Status** pass Condition Sensor Component | Sensor Plumb **Condition** Plumb **Status** pass

Condition

Sensor Component System Memo

Status pass

Wind Direction Data Form Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg FOR605 Martin Valvur Wind Direction Met One J5213 06/22/2016 illegible Mfg Ushikata Parameter wind direction 191832 Tfer Desc. transit **Serial Number** 01272 Tfer ID 0.00000 **Slope** 1.00000 **Intercept** Vane SN: N/A C. A. Align. deg. true: 0 177 0 VaneTorque to 2/19/2015 1.00000 **Cert Date** CorrCoff **DAS 1: DAS 2: Orientation Linearity: Orientation Linearity:** 12.5 Abs Avg Err 13 Abs Max Er UseDescription TferID Input Raw Linearity Output V Output Deg. Difference Change Error 01272 0.00012 12 primary 87 76 177 0.000 165 12 12 primary 01272 267 254 13 13 primary 01272 0.000 01272 357 0.000 344 13 13 primary Sensor Component | Sensor Heater **Condition** N/A Status pass **Condition** Good **Sensor Component** Mast **Status** pass Sensor Component | Sensor Plumb **Condition** Plumb Status pass **Sensor Component** Condition **Condition** Good Status pass Condition Not tested Sensor Component | Torque **Status** pass Sensor Component | Vane Condition **Condition** Good **Status** pass Sensor Component | System Memo Condition Status pass

2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter Mfg **Owner ID** FOR605 Martin Valvur Vaisala Y3730020 06/22/2016 Temperature2meter none Mfg Fluke **Parameter** Temperature 3275143 Tfer Desc. RTD **Serial Number** 01229 Tfer ID **Slope** 0.99980 **Intercept** -0.02840 **DAS 1: DAS 2:** 1/19/2016 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 1.27 2.22 Test type UseDescription InputTmpRaw InputTmpCorrected OutputTmpSignal OutputSignalEng | OSE Unit Difference primary Temp Low Rang 1.16 1.19 0.000 3.41 C 2.22 Temp Mid Rang 27.19 27.22 0.000 28.61 C 1.39 primary primary Temp Mid Rang 34.96 35.00 0.000 36.36 C 1.36 0.09 Temp Mid Rang 32.14 32.17 0.000 32.26 C primary Sensor Component | Properly Sited Condition Properly sited **Status** pass Sensor Component | Shield Condition Clean **Status** pass **Sensor Component** Blower Condition N/A **Status** pass Sensor Component Blower Status Switch **Condition** N/A **Status** pass Sensor Component | System Memo Status pass Condition | See comments

Humidity Data Form Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg FOR605 Martin Valvur Relative Humidity Vaisala Y3730020 06/22/2016 none Mfg Rotronic Parameter Relative Humidity Tfer Desc. GTL 75296 **Serial Number** 01220 Tfer ID 1.69354 **Slope** 0.98507 **Intercept Cert Date** 1/23/2016 0.99870 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.5 2.1 Abs Avg Err 0.9 2.1 Abs Max Er UseDesc. Test type Device Input RH GTL Raw RH Corr. DAS Volts DAS %RH Difference 32.8 RH Low Range GTL 0.000 -0.7 primary 31.6 32.8 32.1 RH Low Range GTL 51.6 0.0000.0 primary 52.9 52.9 52.9 primary RH Low Range GTL 20.1 20.1 0.000 21.0 0.9 GTL 93.6 90.9 93.6 0.00091.5 -2.1 primary RH High Range Sensor Component | RH Filter Condition Clean Status pass Sensor Component Shield **Condition** Clean **Status** pass Sensor Component Blower **Status** pass **Condition** N/A Sensor Component Blower Status Switch **Condition** N/A Status pass **Status** pass **Sensor Component** System Memo Condition

Solar Radiation Data Form Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg PY47986 FOR605 Martin Valvur Solar Radiation Licor 06/22/2016 none Mfg RM Young Parameter solar radiation Tfer Desc. SR transfer sensor PY89592 **Serial Number** 01244 **Tfer ID** 27.00000 **Slope** 1.34000 **Intercept DAS 1: DAS 2:** 7/3/2016 0.99700 % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max **Cert Date** CorrCoff 0.1% 0.1% 0.0% 0.0% UseDescription Measure Date MeasureTime Tfer Corr PctDifference Tfer Raw DAS w/m2 primary 6/22/2016 9:00 915 663 665 0.3% 10:00 1102 802 801 -0.1% primary 6/22/2016 primary 6/22/2016 11:00 1235 901 901 0.0% 1297 949 primary 6/22/2016 12:00 948 0.1% 0.4% 1296 947 951 primary 6/22/2016 13:00 Sensor Component | Sensor Clean **Condition** Clean Status pass Sensor Component | Sensor Level **Condition** Level **Status** pass Sensor Component | Properly Sited **Condition** Properly sited Status pass Sensor Component System Memo Status pass **Condition**

Precipitation Data Form

Mfg	S	erial N	Number Ta	Site		Teo	chnician		Site	Visit Date	Paramo	eter	•	Owner ID
Handar	2	2998		FOR605		Ma	artin Valvur		06/2	22/2016	Precipit	atio	n	none
							Mfg		PMF)	Pa	aran	neter Pre	ecipitation
DAS 1:			DAS 2:				Serial Num	ıber	EW-	06134-50	Tf	fer I	Desc. 250	ml graduate
A Avg % Diff				Dif A N	Max % Di		Tfer ID		0125	50	7			
1.9%		1.9	%											
							Slope		Ļ	1.0000	0 Inte	rcep	ot	0.00000
							Cert Date			9/5/200	5 Corr	rCo	ff	1.00000
UseDesc.	Test	type	TferVolume	Iteration	TimePerT	ip	Eq.Ht	DAS	eng	Eq.HtUnit	OSE Ur	nit	TferUnits	PctDifference
primary	test 1		231.5	1	10 sec		7.25	7.		mm	mm		ml	-1.9%
primary	test 2		231.5	2	10 sec		7.25	7.	11	mm	mm		ml	-1.9%
primary	test 3		231.5	3	10 sec		7.25	7.	11	mm	mm		ml	-1.9%
Sensor Com	ponent	Gauge	e Drain Scree	en	Cond	litio	Installed				Status	pas	SS	
Sensor Com	ponent	Funne	el Clean		Cond	litio	Dirty				Status	pas	SS	
Sensor Com	ponent	Condi	tion		Cond	litio	n Fair				Status	pas	SS	
Sensor Com	ponent	Prope	rly Sited		Cond	litio	45 degree	e rule			Status	pas	SS	
Sensor Com	ponent	Gauge	e Screen		Cond	litio	nstalled				Status	pas	SS	
Sensor Com	ponent	Gauge	e Clean		Cond	litio	Dirty				Status	pas	SS	
Sensor Com	ponent	Level					Level				Status	pas	SS	
Sensor Com	ponent	Senso	or Heater		Cond	litio	n N/A				Status	pas	SS	
Sensor Com					Cond	litio	on				Status	pas	SS	

Infrastructure Data For FOR605 Technician | Martin Valvur Site Visit Date 06/22/2016 Site ID **Shelter Make Shelter Model Shelter Size** Sensor Component | Sample Tower Type Condition Pole type Status pass **Condition** Good Sensor Component | Conduit Status pass **Sensor Component** Met Tower **Condition** Good Status pass **Sensor Component** Moisture Trap **Condition** Not installed **Status** pass **Condition** Good Sensor Component | Power Cables **Status** pass Sensor Component | Shelter Temp Control **Condition** N/A **Status** pass **Condition** Not installed Status Fail Sensor Component Rotometer Sensor Component | Sample Tower **Condition** Good Status pass Sensor Component | Shelter Condition **Condition** Good Status pass Sensor Component | Shelter Door **Condition** N/A Status pass Sensor Component | Shelter Roof **Condition** N/A Status pass Sensor Component | Shelter Floor **Condition** N/A Status pass Sensor Component | Signal Cable **Condition** Good Status pass Condition 3/8 teflon Status pass **Sensor Component** Tubing Type Sensor Component | Sample Train **Condition** Good Status pass

Site Visit Comments

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazar	d Problem
Flow Rate	FOR605	Martin Valvur	06/22/2016	System Memo	AALBORG	4202		✓

The recorded flow rate data are accurate as recorded. The flow rate is not at the target flow rate.

Field Systems Comments

1 Parameter: SiteOpsProcComm

The dry deposition sample height is approximately 6 meters and not 10 meters. The observation section of the SSRF is not used. The site operator mentioned that he occasionally does not receive site support in a timely manner.

2 Parameter: DocumentationCo

There is no documentation available at the site since there is no place to store documents. The site does not have a computer or shelter other than the small enclosure. The site operator completes a site checklist which remains in his vehicle. Information from the checklist is later filed at his office. Per instruction from ARS the COC portion of the SSRF is not being used.

3 Parameter: SitingCriteriaCom

The site is located in a wellfield with oil and gas operations nearby.

4 Parameter: ShelterCleanNotes

This is a small footprint site with instruments mounted in enclosure on tripod tower.

5 Parameter: PollAnalyzerCom

The enclosure protecting the dry deposition filter pack is much smaller in diameter than the normal filter pack enclosure. The geometry of the enclosure may effect particulate collection making data not directly comparable to other CASTNET sites.

6 Parameter: MetSensorComme

The wind direction bearing torque could not be tested since it was not possible to remove the sensor from the tower without changing the sensor alignment.

7 Parameter: MetOpMaintCom

The temperature and relative humidity sensor is a combination sensor which cannot be submersed making it difficult to audit throughout a range of temperatures. The height of the temperature and humidity measurement is 1.2 meters above the ground.

F-02058-1500-S1-rev002 Field Systems Data Form FOR605 Technician Martin Valvur Site Visit Date 06/22/2016 Site ID **USGS Map EPA** Site Sponsor (agency) **Map Scale** BLM **Operating Group Map Date** AQS# Met One **Meteorological Type Air Pollutant Analyzer QAPP** Latitude **Deposition Measurement** dry **QAPP** Longitude Range **Land Use QAPP Elevation Meters** Rolling Terrain **QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** 44.339232 **Site Telephone Audit Latitude** -105.92023 Site Address 1 **Audit Longitude** 1402 Site Address 2 **Audit Elevation** Campbell 9.3 County **Audit Declination** Gillette, WY City, State **Present** Fire Extinguisher 82716 Zip Code Mountain **First Aid Kit** Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # Primary Op. E-mail **Climbing Belt Backup Operator Security Fence ~** Backup Op. Phone # **Secure Shelter** Stable Entry Step Backup Op. E-mail Shelter Working Room Model **Shelter Size** Notes This is a small footprint site with instruments mounted in enclosure on tripod tower. **Shelter Clean** Site OK Notes

Driving Directions

Field Systems Data Form

F-02058-1500-S2-rev002

Site ID FOR605 Technician Martin Valvur Site Visit Date 06/22/2016

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		
Major industrial complex	10 to 20 km		✓
City > 50,000 population	40 km		✓
City 10,000 to 50,000 population	10 km		✓
City 1,000 to 10,000 population	5 km		✓
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m		✓
Secondary road, lightly traveled	200 m		$ lap{\checkmark}$
Feedlot operations	500 m		lacksquare
Intensive agricultural ops (including aerial spraying)	500 m		ightharpoons
Limited agricultural operations	200 m		lacksquare
Large parking lot	200 m		lacksquare
Small parking lot	100 m		lacksquare
Tree line	50 m		lacksquare
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK ✓

Siting Criteria Comment

The site is located in a wellfield with oil and gas operations nearby.

Field Systems Data Form F-02058-1500-S3-rev002 Site Visit Date 06/22/2016 Technician | Martin Valvur Site ID FOR605 **~** Are wind speed and direction sensors sited so as to avoid being influenced by obstructions? **~** Are wind sensors mounted so as to minimize tower effects? (i.e. wind sensors should be mounted atop the tower or on a horizontally extended boom >2x the max diameter of the tower into the prevailing wind) **~** Are the tower and sensors plumb? **~** Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? **V** Are temperature and RH sensors sited to avoid unnatural conditions? (i.e. ground below sensors should be natural surface and not steeply sloped. Ridges, hollows, and areas of standing water should be avoided) **~** Is the solar radiation sensor plumb? **~** Is it sited to avoid shading, or any artificial or reflected light? ~ Is the rain gauge plumb? 45 degree rule violation Is it sited to avoid sheltering effects from buildings, trees, towers, etc? **✓** N/A 10 Is the surface wetness sensor sited with the grid surface facing north? N/A 11 Is it inclined approximately 30 degrees? Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

The wind direction bearing torque could not be tested since it was not possible to remove the sensor from the tower without changing the

sensor alignment.

Fi	ld Systems Data Form	F-02058-1500-S4-rev002
Site	ID FOR605 Technician Martin Valvur	Site Visit Date 06/22/2016
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	
2	Are all the meteorological sensors operational online, and reporting data?	
3	Are the shields for the temperature and RH sensors clean?	
4	Are the aspirated motors working?	✓ N/A
5	Is the solar radiation sensor's lens clean and free of scratches?	
6	Is the surface wetness sensor grid clean and undamaged?	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	
	de any additional explanation (photograph or sketch if necestal or man-made, that may affect the monitoring parameters:	sary) regarding conditions listed above, or any other features,
	emperature and relative humidity sensor is a combination sensor very temperatures. The height of the temperature and humidity me	which cannot be submersed making it difficult to audit throughout a easurement is 1.2 meters above the ground.

Field Systems Data Form F-02058-1500-S5-rev002 FOR605 Technician | Martin Valvur Site Visit Date 06/22/2016 Site ID Siting Criteria: Are the pollutant analyzers and deposition equipment sited in accordance with 40 CFR 58, Appendix E **~** Do the sample inlets have at least a 270 degree arc of unrestricted airflow? **~** Are the sample inlets 3 - 15 meters above the ground? **~** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **~** Do the analyzers and equipment appear to be in good condition and well maintained? **~** Are the analyzers and monitors operational, on-line, and reporting data? Describe ozone sample tube. N/A Describe dry dep sample tube. 3/8 teflon by 8 meters ✓ N/A Are in-line filters used in the ozone sample line? (if ves indicate location) **~** Are sample lines clean, free of kinks, moisture, and obstructions? ✓ N/A Is the zero air supply desiccant unsaturated? Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it clean?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

The enclosure protecting the dry deposition filter pack is much smaller in diameter than the normal filter pack enclosure. The geometry of the enclosure may effect particulate collection making data not directly comparable to other CASTNET sites.

Field Systems Data Form

F-02058-1500-S6-rev002

Site	e ID	FOR605	Technician	Martin Valvur		Site Vis	it Date 06/22/201	6	
	DAS so	nsor translators, and	norinhoral aqui	nment energies	3C 01	nd maintana	maa		
	DAS, SC	iisor translators, and	peripheral equi	pinent operation	15 a1	<u>ilu mamitena</u>	<u>ince</u>		
1	Do the l well ma	OAS instruments appeintained?	ear to be in good	l condition and	✓				
2		the components of the backup, etc)	DAS operation	al? (printers,	✓				
3		nnalyzer and sensor sig g protection circuitry		through	✓				
4		signal connections pro intained?	otected from the	e weather and	✓				
5	Are the	signal leads connected	d to the correct	DAS channel?	✓				
6	Are the grounde	DAS, sensor translated?	ors, and shelter	properly	✓				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	✓	Solar power			
8	Is the in	strument shelter temp	perature contro	lled?	✓	N/A			
9	Is the m	et tower stable and gr	ounded?			Stable <		Grounded	
10	Is the sa	imple tower stable and	d grounded?			V		✓	
11	Tower o	comments?							
		additional explanationan-made, that may a				y) regardin	g conditions listed	d above, or a	any other features,
		·							

FOR605 Site Visit Date 06/22/2016 Site ID Technician Martin Valvur **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A N/A Yes No Wind speed sensor **Data logger** П Wind direction sensor **Data logger** П Temperature sensor Strip chart recorder П Relative humidity sensor Computer П П Solar radiation sensor Modem П П П **Printer** Surface wetness sensor П Wind sensor translator Zero air pump **Temperature translator** Filter flow pump **Humidity sensor translator Surge protector** П П **UPS Solar radiation translator** Tipping bucket rain gauge **Lightning protection device Shelter heater** Ozone analyzer Filter pack flow controller Shelter air conditioner Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log SSRF V Site Ops Manual HASP Field Ops Manual Calibration Reports** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? **V** Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document sample transfer to and from lab? **~** N/A Are ozone z/s/p control charts properly completed and current? Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters: There is no documentation available at the site since there is no place to store documents. The site does not have a computer or shelter

other than the small enclosure. The site operator completes a site checklist which remains in his vehicle. Information from the checklist is

later filed at his office. Per instruction from ARS the COC portion of the SSRF is not being used.

F-02058-1500-S7-rev002

Field Systems Data Form

Field Systems Data Form F-02058-1500-S8-rev002 FOR605 Site Visit Date 06/22/2016 Site ID Technician | Martin Valvur Site operation procedures Has the site operator attended a formal CASTNET training course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET training course? If yes, when and who instructed? Is the site visited regularly on the required Tuesday **V** schedule? **✓** Are the standard CASTNET operational procedures being flollowed by the site operator? Is the site operator(s) knowledgeable of, and able to perform ✓ the required site activities? (including documentation) Are regular operational QA/QC checks performed on meteorological instruments? **QC Check Performed Frequency Compliant ✓ V** Semiannually **Multipoint Calibrations V V** Weekly **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** Monthly **Manual Rain Gauge Test ✓ V** Weekly **Confirm Reasonableness of Current Values V V** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Compliant** Frequency **Multi-point Calibrations V** N/A **V** N/A **Automatic Zero/Span Tests V** N/A Manual Zero/Span Tests **V** N/A **Automatic Precision Level Tests V** N/A **Manual Precision Level Test V** N/A **Analyzer Diagnostics Tests ~** N/A **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V** N/A Sample Line Check for Dirt/Water **~** N/A **Zero Air Desiccant Check ✓** N/A Do multi-point calibration gases go through the complete sample train including all filters?

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

N/A

✓ N/A

Do automatic and manual z/s/p gasses go through the

Are the automatic and manual z/s/p checks monitored and

complete sample train including all filters?

reported? If yes, how?

Field Systems Data Form F-02058-1500-S9-rev002 FOR605 Technician | Martin Valvur Site Visit Date 06/22/2016 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed mornings Are the Site Status Report Forms being completed and filed Flow section only correctly? No longer required Are data downloads and backups being performed as scheduled? Are general observations being made and recorded? How? **~** Are site supplies on-hand and replenished in a timely fashion? SSRF Are sample flow rates recorded? How? Are samples sent to the lab on a regular schedule in a timely fashion? **✓** One set of gloves only Are filters protected from contamination during handling and shipping? How? Are the site conditions reported regularly to the field operations manager or staff? **Compliant** QC Check Performed **Frequency V** ✓ Semiannually **Multi-point MFC Calibrations V** Weekly Flow System Leak Checks **Filter Pack Inspection V ✓** Weekly **Flow Rate Setting Checks** □ N/A **V Visual Check of Flow Rate Rotometer** ✓ As needed **V In-line Filter Inspection/Replacement** Sample Line Check for Dirt/Water

Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features, natural or man-made, that may affect the monitoring parameters:

The dry deposition sample height is approximately 6 meters and not 10 meters. The observation section of the SSRF is not used. The site operator mentioned that he occasionally does not receive site support in a timely manner.

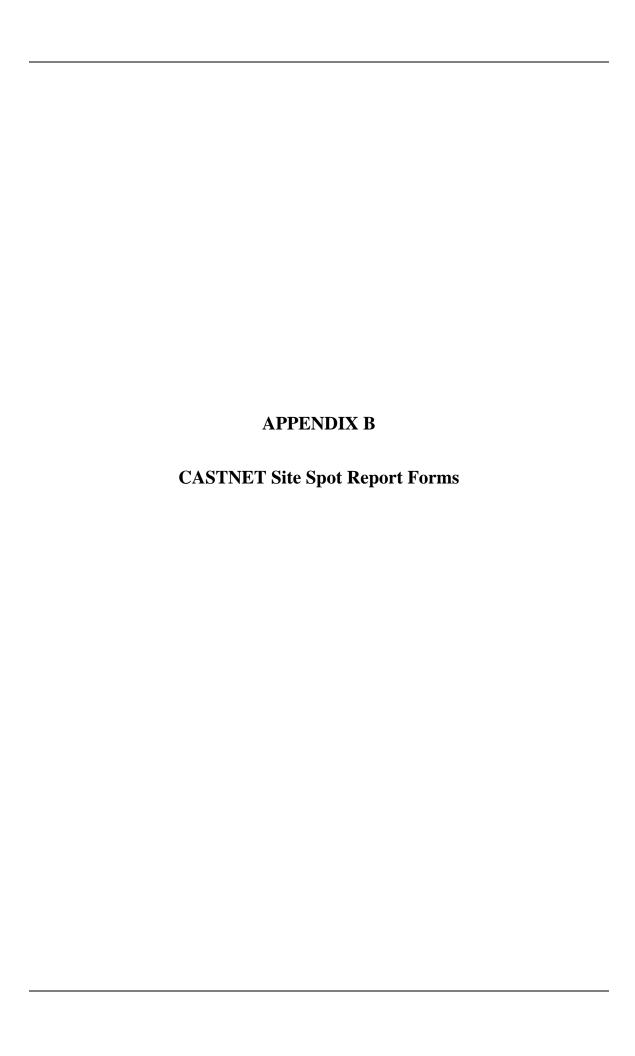
Field Systems Data Form

F-02058-1500-S10-rev002

Site ID FOR605 Technician Martin Valvur Site Visit Date 06/22/2016

Site Visit Sensors

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Campbell	CR1000	illegible	49922
elevation	Elevation	none	none	none
Flow Rate	AALBORG	GFMS-012446	196706-5	none
Infrastructure	Infrastructure	none	none	none
Precipitation	Handar	444A	2998	none
Relative Humidity	Vaisala	HMP45AC	Y3730020	none
siting criteria	Siting Criteria	none	None	none
Solar Radiation	Licor	LI-200	PY47986	none
Temperature2meter	Vaisala	HMP45AC	Y3730020	none
Wind Direction	Met One	024	J5213	illegible
Wind Speed	Met One	014	39022	none



Data Compiled:

SiteVisitDate Site

7/6/2016 9:24:49 AM

Technician

06/21/2	2016 BAS601	Martin Valvur						
Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.95939	unitless	P
2	Ozone Intercept	P	0	5	4	0.02332	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99996	unitless	P
4	Ozone % difference avg	P	7	10	4	4.4	%	P
5	Ozone % difference max	Р	7	10	4	5.4	%	P

Data Compiled: 6/10/2016 10:58:12 AM

SiteVisitDate	Site	Technician
06/01/2016	CAN407	Martin Valvur

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.99509	unitless	P
2	Ozone Intercept	P	0	5	4	-0.50561	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99997	unitless	P
4	Ozone % difference avg	P	7	10	4	1.6	%	P
5	Ozone % difference max	P	7	10	4	2.6	%	P
6	Flow Rate average % difference	P	10	5	9	2.27	%	P
7	Flow Rate max % difference	P	10	5	9	2.56	%	P
8	DAS Time maximum error	P	0	5	1	0.33	min	P
9	DAS Voltage average error	P	12	0.003	49	0.0001	V	P
10	Shelter Temperature average error	P	5	2	15	0.83	c	P
11	Shelter Temperature max error	P	5	2	15	1.01	c	P

Field Systems Comments

1 Parameter: SitingCriteriaCom

The small parking lot at the visitors center is approximately 100m to the northeast.

2 Parameter: ShelterCleanNotes

The shelter is in good condition, well organized and well maintained.

Data Compiled:

7/11/2016 9:05:07 AM

SiteVisitDate	Site	Technician
04/19/2016	CHA467	Martin Valvur

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	6	0.08	c	P
2	Temperature max error	P	4	0.5	6	0.14	c	P
3	Ozone Slope	P	0	1.1	4	0.97534	unitless	P
4	Ozone Intercept	P	0	5	4	-0.8701	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99990	unitless	P
6	Ozone % difference avg	P	1	10	4	4.8	%	P
7	Ozone % difference max	P	1	10	4	6.7	%	P
8	Flow Rate average % difference	P	10	5	9	0.55	%	P
9	Flow Rate max % difference	P	10	5	9	0.91	%	P
10	DAS Time maximum error	P	0	5	1	2.17	min	P
11	DAS Voltage average error	P	11	0.003	56	0.0003	V	P
12	Shelter Temperature average error	P	5	2	15	0.59	c	P
13	Shelter Temperature max error	P	5	2	15	1.21	c	P

CHA467

Martin Valvur

Field Performance Comments

1 Parameter: Flow Rate SensorComponent: Filter Position CommentCode 71

The filter attachment plate is mounted too low in the enclosure resulting in the filter being exposed to wind-driven rain and in the standard geometric orientation.

Field Systems Comments

1 Parameter: SiteOpsProcedures

The site operator routinely reviews the previous week's data.

2 Parameter: SitingCriteriaCom

A large point source is located 40 km northwest of the site, just southwest of Wilcox.

3 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, well organized, and well maintained.

4 Parameter: MetSensorComme

The temperature sensor is mounted on the south side of the meteorological tower.

Data Compiled:

7/6/2016 10:09:47 AM

SiteVisitDate	Site	Technician
04/01/2016	CHE185	Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.97361	unitless	P
2	Ozone Intercept	P	0	5	4	1.6448	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99973	unitless	P
4	Ozone % difference avg	P	7	10	4	2.4	%	P
5	Ozone % difference max	P	7	10	4	6.2	%	P

Data Compiled:

7/11/2016 9:46:59 AM

SiteVisitDate	Site	Technician
04/13/2016	COW137	Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	9	0.07	c	P
2	Temperature max error	P	4	0.5	9	0.14	c	P
3	Ozone Slope	P	0	1.1	4	0.99229	unitless	P
4	Ozone Intercept	P	0	5	4	0.03487	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99998	unitless	P
6	Ozone % difference avg	P	7	10	4	1.0	%	P
7	Ozone % difference max	P	7	10	4	1.4	%	P
8	Flow Rate average % difference	P	10	5	4	1.58	%	P
9	Flow Rate max % difference	P	10	5	4	2.03	%	P
10	DAS Time maximum error	P	0	5	1	0.65	min	P
11	DAS Voltage average error	P	7	0.003	49	0.0001	V	P
12	Shelter Temperature average error	P	5	2	12	0.30	c	P
13	Shelter Temperature max error	P	5	2	12	0.51	c	P

04/13/2016

COW137

Sandy Grenville

Field Performance Comments

1 Parameter: Flow Rate SensorComponent: System Memo CommentCode 81

There is no plastic bag for the installed filter. The operator uses the received bag for the installed filter to ship the removed filter to the lab.

Field Systems Comments

1 Parameter: DasComments

One leg of the meteorological tower has two holes. The shelter heating and air conditioning systems are operating simultaneously.

2 Parameter: SitingCriteriaCom

Construction was completed on new building with a parking lot, in October 2004. The parking area is within 60 meters of the site.

3 Parameter: ShelterCleanNotes

The shelter is in fair condition with some rot near the air conditioner and at the bottom of the walls. It has degraded since the previous audit.

Data Compiled:

SiteVisitDate Site

7/11/2016 10:11:58 AM

04/16/2	2016 DCP114	Sandy Grenville	e					
Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.97443	unitless	P
2	Ozone Intercept	P	0	5	4	0.55974	ppb	P

Technician

Data Compiled:

7/11/2016 9:59:20 AM

SiteVisitDate	Site	Technician
04/14/2016	ESP127	Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	12	0.23	c	P
2	Temperature max error	P	4	0.5	12	0.38	c	P
3	Ozone Slope	P	0	1.1	4	0.97500	unitless	P
4	Ozone Intercept	P	0	5	4	0.63082	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
6	Ozone % difference avg	P	7	10	4	1.3	%	P
7	Ozone % difference max	P	7	10	4	2.1	%	P
8	Flow Rate average % difference	P	10	5	4	7.36	%	Fail
9	Flow Rate max % difference	P	10	5	4	7.36	%	Fail
10	DAS Time maximum error	P	0	5	1	0.68	min	P
11	DAS Voltage average error	P	7	0.003	49	0.0000	V	P
12	Shelter Temperature average error	P	5	2	12	0.69	c	P
13	Shelter Temperature max error	P	5	2	12	1.12	c	P

04/14/2016

ESP127

Sandy Grenville

Field Performance Comments

1 Parameter: Flow Rate SensorComponent: Moisture Present CommentCode 204

There is moisture present in the dry deposition sample train inside the shelter.

2 Parameter: Shelter Temperatur SensorComponent: System Memo CommentCode 215

The shelter thermostat for cooling has been bypassed and the air conditioning system is no longer being controlled by the shelter

thermostat.

3 Parameter: Shelter Temperatur SensorComponent: System Memo CommentCode 214

The shelter heating and air conditioning systems are operating simultaneously.

Field Systems Comments

1 Parameter: ShelterCleanNotes

The shelter floor and roof are currently undergoing repairs.

Data Compiled:

7/11/2016 11:15:54 AM

SiteVisitDate	Site	Technician			
06/22/2016	FOR605	Martin Valvur			

Line	ne Audited Parameter		Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature2meter average error	P	5	0.5	4	1.26	c	Fail
2	Temperature2meter max error	P	5	0.5	4	2.22	c	Fail
3	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.09	m/s	P
4	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.31	m/s	P
5	Wind Speed average % difference above 5 m/s	P	3	5	4	0.8	%	P
6	Wind Speed max % difference above 5 m/s	P	3	5	4	1.9	%	P
7	Wind Speed Torque average error	P	3	0.5	1	0.45	g-cm	P
8	Wind Speed Torque max error	P	3	0.5	1	0.5	g-cm	Fail
9	Wind Direction Input Deg True average error (de	P	2	5	4	12.5	degrees	Fail
10	Wind Direction Input Deg True max error (deg)	P	2	5	4	13	degrees	Fail
11	Relative Humidity average above 85%	P	6	10	1	2.1	%	P
12	Relative Humidity max above 85%	P	6	10	1	2.1	%	P
13	Relative Humidity average below 85%	P	6	10	3	0.5	%	P
14	Relative Humidity max below 85%	P	6	10	3	0.9	%	P
15	Solar Radiation % diff of avg	P	9	10	10	0.14	%	P
16	Solar Radiation % diff of max STD value	P	9	10	10	0.10	%	P
17	Precipitation average % difference	P	1	10	3	1.9	%	P
18	Precipitation max % difference	P	1	10	3	1.9	%	P
19	Flow Rate average % difference	P	10	5	3	2.9	%	P
20	Flow Rate max % difference	P	10	5	3	3.53	%	P
21	DAS Time maximum error	P	0	5	1	1.68	min	P
22	DAS Voltage average error	P	4	0.003	4	0.0000	V	P

FOR605

Martin Valvur

Field Performance Comments

1 Parameter: Flow Rate SensorComponent: System Memo CommentCode 77

The recorded flow rate data are accurate as recorded. The flow rate is not at the target flow rate.

Field Systems Comments

1 Parameter: SiteOpsProcComm

The dry deposition sample height is approximately 6 meters and not 10 meters. The observation section of the SSRF is not used. The site operator mentioned that he occasionally does not receive site support in a timely manner.

2 Parameter: DocumentationCo

There is no documentation available at the site since there is no place to store documents. The site does not have a computer or shelter other than the small enclosure. The site operator completes a site checklist which remains in his vehicle. Information from the checklist is later filed at his office. Per instruction from ARS the COC portion of the SSRF is not being used.

3 Parameter: SitingCriteriaCom

The site is located in a wellfield with oil and gas operations nearby.

4 Parameter: ShelterCleanNotes

This is a small footprint site with instruments mounted in enclosure on tripod tower.

5 Parameter: PollAnalyzerCom

The enclosure protecting the dry deposition filter pack is much smaller in diameter than the normal filter pack enclosure. The geometry of the enclosure may effect particulate collection making data not directly comparable to other CASTNET sites.

6 Parameter: MetSensorComme

The wind direction bearing torque could not be tested since it was not possible to remove the sensor from the tower without changing the sensor alignment.

7 Parameter: MetOpMaintCom

The temperature and relative humidity sensor is a combination sensor which cannot be submersed making it difficult to audit throughout a range of temperatures. The height of the temperature and humidity measurement is 1.2 meters above the ground.

Data Compiled: 6/10/2016 12:01:50 PM

SiteVisitDate	Site	Technician		
06/03/2016	GRB411	Martin Valvur		

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.95038	unitless	P
2	Ozone Intercept	P	0	5	4	-1.97991	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99957	unitless	P
4	Ozone % difference avg	P	7	10	4	9.7	%	P
5	Ozone % difference max	P	7	10	4	14.2	%	Fail
6	Flow Rate average % difference	P	10	5	9	1.21	%	P
7	Flow Rate max % difference	P	10	5	9	2.25	%	P
8	Shelter Temperature average error	P	5	2	15	0.66	c	P
9	Shelter Temperature max error	P	5	2	15	0.81	c	P

Field Performance Comments

1 Parameter: Flow Rate SensorComponent: Filter Position CommentCode 71

The filter attachment plate is mounted too low in the enclosure resulting in the filter being exposed to wind-driven rain and in the standard geometric orientation.

Field Systems Comments

1 Parameter: DasComments

A digital to analog test of the data logger could not be performed since there were no available channels on the logger to test.

2 Parameter: ShelterCleanNotes

The shelter is in fair condition, The shelter floor has missing and crumbled tiles.

3 Parameter: PollAnalyzerCom

An ozone sample line test was performed which indicated a loss > 8% at 50 ppb in the sample line.

Data Compiled: 7/11/2016 9:25:03 AM

SiteVisitDate	Site	Technician
04/20/2016	GRC474	Martin Valvur

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	9	0.07	c	P
2	Temperature max error	P	4	0.5	9	0.11	c	P
3	Ozone Slope	P	0	1.1	4	0.96775	unitless	P
4	Ozone Intercept	P	0	5	4	-0.55396	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
6	Ozone % difference avg	P	7	10	4	4.4	%	P
7	Ozone % difference max	P	7	10	4	5.7	%	P
8	Flow Rate average % difference	P	10	5	8	0.99	%	P
9	Flow Rate max % difference	P	10	5	8	1.29	%	P
10	DAS Time maximum error	P	0	5	1	0.18	min	P
11	DAS Voltage average error	P	12	0.003	56	0.0004	V	P
12	Shelter Temperature average error	P	5	2	15	0.71	c	P
13	Shelter Temperature max error	P	5	2	15	0.83	c	P

Field Systems Comments

1 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, neat, and well organized.

Data Compiled: 6/10/2016 9:41:44 AM

SiteVisitDate	Site	Technician		
05/31/2016	MEV405	Martin Valvur		

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	1.01172	unitless	P
2	Ozone Intercept	P	0	5	4	-1.62584	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99817	unitless	P
4	Ozone % difference avg	P	7	10	4	4.6	%	P
5	Ozone % difference max	P	7	10	4	6.3	%	P
6	Flow Rate average % difference	P	10	5	9	7.2	%	Fail
7	Flow Rate max % difference	P	10	5	9	8.94	%	Fail
8	DAS Time maximum error	P	0	5	1	3.00	min	P
9	DAS Voltage average error	P	7	0.003	28	0.0001	V	P
10	Shelter Temperature average error	P	5	2	15	0.21	c	P
11	Shelter Temperature max error	P	5	2	15	0.46	c	P

Field Systems Comments

1 Parameter: SitingCriteriaCom

A large parking lot for park service employees is located approximately 30 meters north of the site.

2 Parameter: ShelterCleanNotes

The shelter is in good condition, clean, and well organized.

Data Compiled:

SiteVisitDate Site

7/11/2016 10:09:30 AM

04/16/2	2016 OXF122	Sandy Grenville	e					
Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.98772	unitless	P
2	Ozone Intercent	р	0	5	4	-0.26958	nnh	p

Technician

Data Compiled: 7/11/2016 9:32:27 AM

SiteVisitDate	Site	Technician
04/21/2016	PET427	Martin Valvur

Line	Audited Parameter	DAS	Ch #	Criteria +/-	Counts	Oa Posult	Units	Pass/Fail
Line	Audited Parameter	DAS	CII.#	Criteria +/-	Counts	Wakesuit	Ullits	Fa55/Faii
1	Temperature average error	P	4	0.5	15	0.22	c	P
2	Temperature max error	P	4	0.5	15	0.27	c	P
3	Ozone Slope	P	0	1.1	4	0.97261	unitless	P
4	Ozone Intercept	P	0	5	4	-0.41686	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
6	Ozone % difference avg	P	7	10	4	3.5	%	P
7	Ozone % difference max	P	7	10	4	3.8	%	P
8	Flow Rate average % difference	P	11	5	4	1.12	%	P
9	Flow Rate max % difference	P	11	5	4	1.85	%	P
10	DAS Time maximum error	P	0	5	1	2.12	min	P
11	DAS Voltage average error	P	13	0.003	49	0.0005	V	P
12	Shelter Temperature average error	P	5	2	15	0.38	c	P
13	Shelter Temperature max error	P	5	2	15	0.76	c	P

Field Systems Comments

1 Parameter: SiteOpsProcComm

completing the site observation section of the SSRF was discussed with the operator. The filter bag is used as a glove to remove and install the dry deposition filter pack.

2 Parameter: DasComments

The heating and air conditioning systems run simultaneously.

3 Parameter: DocumentationCo

The most recent calibration and maintenance report is not available onsite.

4 Parameter: ShelterCleanNotes

The shelter is dusty, but in good condition, well organized and maintained.

Ozone % difference avg

5 Ozone % difference max

Data Compiled:

SiteVisitDate Site

7/11/2016 9:01:18 AM

04/04/2	2016	PIN414	Martin Valvur						
Line	Audited	d Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Sl	lope	P	0	1.1	4	1.03331	unitless	P
2	Ozone In	tercept	P	0	5	4	-0.71228	ppb	P
3	Ozone co	orrelation	P	0	0.995	4	0.99990	unitless	P

7

10

10

2.1

3.3

Field Performance Comments

1 Parameter: Ozone SensorComponent: Cell B Freq. CommentCode 99

P

Technician

This analyzer diagnostic check is outside the manufacturer's recommended value.

P

P

%

%

4 Ozone % difference avg

5 Ozone % difference max

Data Compiled:

SiteVisitDate Site

7/6/2016 8:41:22 AM

06/17/2	2016	PND165	Martir	ı Valvur						
Line	Audite	d Parameter		DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone S	lope		P	0	1.1	4	0.97932	unitless	P
2	Ozone In	ntercept		P	0	5	4	-0.7121	ppb	P
3	Ozone co	orrelation		P	0	0.995	4	0.99980	unitless	P

10

10

4.3

8.7

P

P

Field Performance Comments

1 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

P

Technician

This analyzer diagnostic check is outside the manufacturer's recommended value.

2 Parameter: Ozone SensorComponent: Cell A Flow CommentCode 99

This analyzer diagnostic check is outside the manufacturer's recommended value.

Data Compiled:

SiteVisitDate Site

3 Ozone correlation

4 Ozone % difference avg

5 Ozone % difference max

7/11/2016 10:14:33 AM

04/17/2	2016	QAK172	Sa	andy Grenville	e					
Line	Audited	d Parameter		DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Sl	ope		P	0	1.1	4	0.96998	unitless	P
2	Ozone In	tercept		P	0	5	4	0.98659	ppb	P

0

7

7

0.995

10

10

4

4

4

1.00000

1.3

2.1

unitless

%

%

P

P

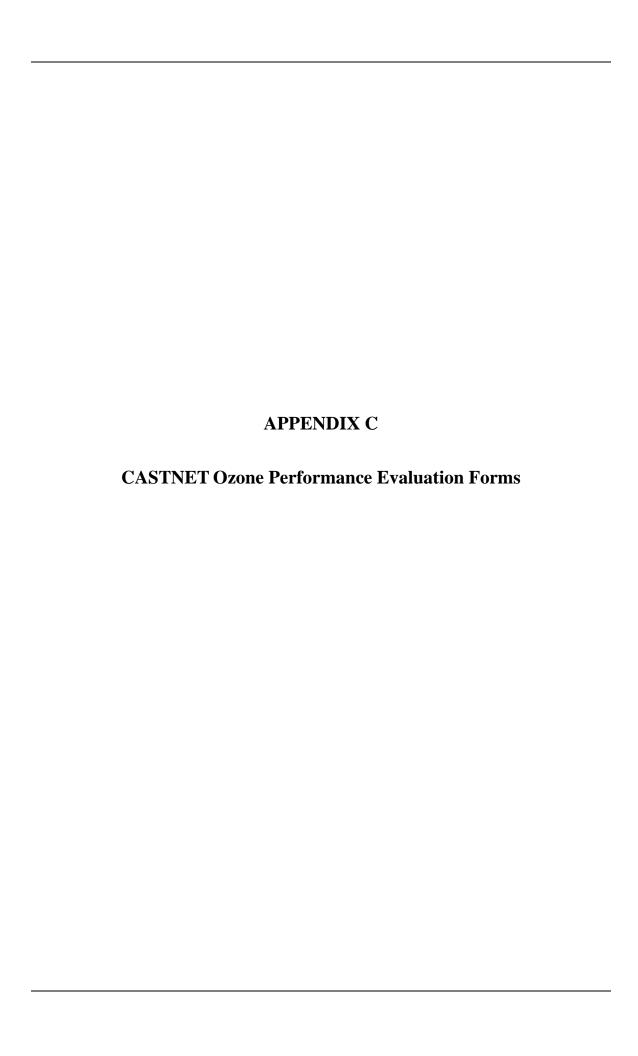
P

Technician

P

P

P



Site V	isit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
СНЕ	185-Eric H	Hebert-04/01/2016				
1	4/1/2016	DAS	Environmental Sys Corp	73955	8832	A0656-b
2	4/1/2016	Ozone	Monitor Labs, Inc.	54901	ML9811	191
3	4/1/2016	Sample Tower	Aluma Tower	000054	В	AT-81213-T12
4	4/1/2016	Zero air pump	Ecotech	none	8301LC	01-0658

Mfg Se	erial Number Ta	Site	Te	chnician		Site Visit I	Oate Param	eter Owner ID
Monitor Labs, Inc.	91	CHE185	Er	ic Hebert		04/01/201	6 Ozone	54901
Intercept 1.6	Slope: Harden Sl	0.00000	0.00000 0.00000 0.00000		lumber	ThermoEle 051711216 01113		fer Desc. Ozone primary stan
DAS 1: A Avg % Diff: A Ma 2.4%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert Da	te			rcept -0.28841 rCoff 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	te	Site Unit	PctDifference
primary	1	1.00	1.2	28	3.	10 pr	b	
primary	2	26.95	27.			.78 pr		6.20%
primary	3	49.15	49.		47	- 1		-2.60%
primary	4	80.35	80.			.20 pr		-0.04%
primary	5	106.69	106			5.50 pr		-0.88%
Sensor Component	Sample Train		Conditio	Good			Status	pass
Sensor Component	22.5 degree rule		Conditio	on			Status	pass
Sensor Component	Inlet Filter Condition	on	Conditio	Clean			Status	pass
Sensor Component	Battery Backup		Conditio	N/A			Status	pass
Sensor Component	Offset		Conditio	N/A			Status	pass
Sensor Component	Span		Conditio	N/A			Status	pass
Sensor Component	Zero Voltage		Conditio	N/A			Status	pass
Sensor Component	Fullscale Voltage		Conditio	on N/A			Status	pass
Sensor Component	Cell A Freq.		Conditio	on N/A			Status	pass
Sensor Component	Cell A Noise		Conditio	on N/A			Status	pass
Sensor Component	Cell A Flow		Conditio	0.50 lp	om		Status	pass
Sensor Component	Cell A Pressure		Conditio	on N/A			Status	pass
Sensor Component	Cell A Tmp.		Conditio	on N/A			Status	pass
Sensor Component	Cell B Freq.		Conditio	on N/A			Status	pass
Sensor Component	Cell B Noise		Conditio	N/A			Status	pass
Sensor Component	Cell B Flow		Conditio	on N/A			Status	pass
Sensor Component	Cell B Pressure		Conditio	on N/A			Status	pass
Sensor Component	Cell B Tmp.		Conditio	on N/A			Status	pass
Sensor Component	Line Loss		Conditio	on ~ 4%			Status	pass
Sensor Component	System Memo		Conditio	on			Status	pass

Site V	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
PIN4	14-Martin	Valvur-04/04/2016				
1	4/4/2016	DAS	Environmental Sys Corp	90612	8816	2615
2	4/4/2016	Ozone	ThermoElectron Inc	90765	49C	49c-74530376
3	4/4/2016	Ozone Standard	ThermoElectron Inc	none	49C	0425208055
4	4/4/2016	Zero air pump	Werther International	none	PC 70/4	000706556

Mfg Se	erial Number Ta	Site	Te	chnician		Site Vis	it Date	Parame	eter (Owner ID	
ThermoElectron Inc 4	9c-74530376	PIN414	Ma	artin Valv	ur	04/04/2	016	Ozone	Ş	90765	
Intercept -0.7 CorrCoff 0.9	Intercept -0.71228 Intercept			Serial Number [4			ThermoElectron Inc 49CPS-70008-364 Tfer De			e primary stan	
DAS 1: A Avg % Diff: A Max		oDif A Max (% Di	Slope			0.9983		cept	-0.26452	
2.2%	3.3%			Cert Da	te	,	1/29/201	6 Corr	·Coff	1.00000	
UseDescription primary primary	ConcGroup 1 2	Tfer Raw 0.40 27.77	Tfer 0.6	56	-0.	te 42 .10	Site	e Unit	PctDiffere	0.07%	
primary	3	49.72	50.			.70	ppb			3.28%	
primary primary	5	79.94 109.80	80. 110			.90 2.50	ppb ppb			3.20% 2.05%	
Sensor Component				Good			III -	Status	pass		
Sensor Component		Condition	on				Status	pass			
Sensor Component	Sensor Component Inlet Filter Condition			Condition Clean				Status	pass		
Sensor Component	Battery Backup		Condition	n N/A				Status	pass		
Sensor Component	Offset		Conditio	on 0.90				Status	pass		
Sensor Component	Span		Conditio	on 0.999				Status	pass		
Sensor Component	Zero Voltage		Condition 0.0002					Status			
Sensor Component	Fullscale Voltage		Condition	1.000	n 1.0004			Status	pass		
Sensor Component	Cell A Freq.		Condition	71.7 k	Hz			Status	pass		
Sensor Component	Cell A Noise		Conditio	0.5 pp	b			Status	pass		
Sensor Component	Cell A Flow		Conditio	0.79 l	om			Status	pass		
Sensor Component	Cell A Pressure		Conditio	719.4	mmHg			Status	pass		
Sensor Component	Cell A Tmp.		Condition	on 30.4 (;			Status	pass		
Sensor Component	Cell B Freq.		Condition	on 51.7 k	Hz			Status	pass		
Sensor Component	Cell B Noise		Condition	0.5 pp	b			Status	pass		
Sensor Component	Cell B Flow		Condition	0.79 l	om			Status	pass		
Sensor Component	Cell B Pressure		Condition	Not te	sted			Status	pass		
Sensor Component	Cell B Tmp.		Condition	on				Status	pass		
Sensor Component	Line Loss		Condition	Not te	sted			Status	pass pass		
Sensor Component	Sensor Component System Memo		Condition	See c	omments	.		Status	pass		
,											

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
DCP	9114-Sandy	Grenville-04/16/2016				
1	4/16/2016	DAS	Campbell	000345	CR3000	2124
2	4/16/2016	Ozone	ThermoElectron Inc	000615	49i A1NAA	1009241787
3	4/16/2016	Ozone Standard	ThermoElectron Inc	000515	49i A3NAA	0922236891
4	4/16/2016	Zero air pump	Werther International	06939	PC70/4	000829175

Mfg S	erial Number Ta	Site	Te	chnician		Site Vis	sit Date	Parame	eter	Owner ID	
ThermoElectron Inc 1	1009241787	DCP114	Sa	andy Grei	nville	04/16/2	2016	Ozone		000615	
Intercept 0.5	Slope: 55974 Intercept 199999 CorrCoff	0.00000 0.00000 0.00000)	Serial Number					Parameter ozone Tfer Desc. Ozone primary		
DAS 1: A Avg % Diff: A Ma 1.7%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert Da	ite		0.9952 1/28/201		-	-0.33070 1.00000	
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	te	Sit	e Unit	PctDif	fference	
primary	1	0.01	0.3		1.0		ppb				
primary	3	30.02 50.02	30. 50.		29		ppb			-1.77% -1.38%	
primary primary	4	79.94	80.		49 79	.89 .35	ppb ppb			-1.61%	
primary	5	110.00	110			3.50	ppb			-2.12%	
Sensor Component	22.5 degree rule		Conditio	on				Status	pass		
Sensor Component	Sample Train		Conditio	Good				Status	pass		
Sensor Component	Inlet Filter Condition	on		ion Clean				Status	pass		
Sensor Component	Battery Backup		Conditio	n N/A				Status	pass		
Sensor Component	Offset		Conditio	0.000				Status	pass		
Sensor Component	Span		Conditio	on 0.999				Status	pass		
Sensor Component	Zero Voltage		Conditio	n N/A				Status	pass		
Sensor Component	Fullscale Voltage		Conditio	n N/A				Status	pass		
Sensor Component	Cell A Freq.		Conditio	93.7 k	Hz			Status	pass		
Sensor Component	Cell A Noise		Conditio	1.0 pp	b			Status	pass		
Sensor Component	Cell A Flow		Conditio	on 0.73 l	om			Status	pass		
Sensor Component	Cell A Pressure		Conditio	728.1	mmHg			Status	pass		
Sensor Component	Cell A Tmp.		Conditio	38.1 C				Status	pass		
Sensor Component	Cell B Freq.		Conditio	92.0 k	Hz			Status	pass		
Sensor Component	Cell B Noise		Conditio	0.6 pp	b			Status	pass		
Sensor Component	Cell B Flow		Conditio	0.74 l	om			Status	pass		
Sensor Component	Sensor Component Cell B Pressure		Conditio	728.7	mmHg			Status	pass		
Sensor Component	Cell B Tmp.		Conditio	on				Status	pass		
Sensor Component	Sensor Component Line Loss		Condition	Not te	sted			Status	Status pass		
Sensor Component	Sensor Component System Memo		Conditio	on				Status	pass		

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
OXF	122-Sandy	Grenville-04/16/2016				
1	4/16/2016	DAS	Campbell	000425	CR3000	2528
2	4/16/2016	Ozone	ThermoElectron Inc	000737	49i A1NAA	1105347312
3	4/16/2016	Ozone Standard	ThermoElectron Inc	000372	49i A3NAA	0726124884
4	4/16/2016	Zero air pump	Werther International	06911	PC70/4	000829167

Mfg Se	erial Number Ta	Site	Te	chnician		Site Visit	t Date	Parame	ter Owner I	D	
ThermoElectron Inc 1	105347312	OXF122	Sa	andy Gre	nville	04/16/20	016	Ozone	000737		
Intercept -0.2 CorrCoff 0.9	Intercept -0.26958 Intercept			50			lectron II	Tfo	rameter ozone er Desc. Ozone primary		
A Avg % Diff: A Ma		6Dif A Max 9	% Di	Slope			0.99524]	•		
1.4%	1.7%			Cert Da	ite	1,	/28/2016	Corr	Coff 1.00	000	
UseDescription primary	ConcGroup	Tfer Raw		Corr 34	Si -0.		Site ppb	Unit	PctDifference		
primary	2	30.01		.48			ppb		-1.12%		
primary	1			.60	50		ppb		-1.17%		
primary primary	5	80.02 109.95	80.	0.80	79 109		ppb ppb		-1.65% -1.62%		
Sensor Component		107.75	Condition		10)	.00		Status			
Sensor Component			on Good				Status				
Sensor Component		ın		on Clean				Status			
Sensor Component				ondition N/A				Status			
_			Condition							_	
Sensor Component								Status			
Sensor Component				on 1.023				Status			
Sensor Component			Condition N					Status			
Sensor Component	Fullscale Voltage		Condition					Status			
Sensor Component	Cell A Freq.		Condition	on 99.8 k	Hz			Status	pass		
Sensor Component	Cell A Noise		Condition	on 0.6 pp	bb			Status	pass		
Sensor Component	Cell A Flow		Condition	on 0.70 l	pm			Status	pass		
Sensor Component	Cell A Pressure		Condition	on 707.1	mmHg			Status	pass		
Sensor Component	Cell A Tmp.		Condition	on 33.6 (Status	pass		
Sensor Component	Cell B Freq.		Condition	on 100.9	kHz			Status	pass		
Sensor Component	Cell B Noise		Condition	on 0.9 pp	b			Status	pass		
Sensor Component	Cell B Flow		Condition	on 0.75 l	pm			Status	pass		
Sensor Component	Sensor Component Cell B Pressure		Condition	on 707.7	mmHg			Status	pass		
Sensor Component	Cell B Tmp.		Condition	on				Status	pass		
Sensor Component	Line Loss		Condition	on Not te	sted			Status	tus pass		
Sensor Component	Sensor Component System Memo		Condition					Status	pass		
•									_		

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
QAK	172-Sandy	Grenville-04/17/2016				
1	4/17/2016	DAS	Campbell	000418	CR3000	2518
2	4/17/2016	Ozone	ThermoElectron Inc	000613	49i A1NAA	1009241783
3	4/17/2016	Ozone Standard	ThermoElectron Inc	000368	49i A3NAA	0726124682
4	4/17/2016	Zero air pump	Werther International	06870	PC70/4	000814278

Mfg Se	erial Number Ta	Site	Tecl	hnician		Site Visit Dat		Parame	ter	Owner ID
ThermoElectron Inc 1	009241783	QAK172	Sar	ndy Grenville		04/17/2	016	Ozone		000613
Intercept 0.9	Slope: Reference Slope: Refere	0.00000 0.00000 0.00000		Mfg Serial Number Tfer ID		ThermoElectron In 0419606966 01112				ne primary stan
DAS 1:	DAS 2:			Slope			0.9952	4 Inter	cept	-0.33070
A Avg % Diff: A Ma	x % Di A Avg %	6Dif A Max %		Cert Date			1/28/201	6 Corr	Coff	1.00000
					~.	1				
UseDescription primary	ConcGroup 1	Tfer Raw 0.01	Tfer C		Si 1.4		ppb	e Unit	PctDiffe	erence
primary	2	29.99	30.4		30.		ppb			-0.10%
primary	3	50.01	50.5		49.		ppb			-1.23%
primary primary	5	80.01 110.00	80.7 110.8		79. 108	.59 5.50	ppb ppb			-1.65% -2.12%
Sensor Component	22.5 degree rule		Condition				ļi I	Status	pass	
Sensor Component Sample Train			Condition	Good				Status	pass	
Sensor Component	Sensor Component Inlet Filter Condit		Condition Clean Sta			Status	pass			
Sensor Component	Battery Backup		Condition	n N/A				Status	pass	
Sensor Component	Offset		Condition	0.10				Status	pass	
Sensor Component	Span		Condition	1.001				Status	pass	
Sensor Component	Zero Voltage		Condition	ondition N/A Status pass						
Sensor Component	Fullscale Voltage		Condition	N/A				Status	pass	
Sensor Component	Cell A Freq.		Condition	91.9 kHz				Status	pass	
Sensor Component	Cell A Noise		Condition	0.8 ppb				Status	pass	
Sensor Component	Cell A Flow		Condition	0.71 lpm				Status	pass	
Sensor Component	Cell A Pressure		Condition	713.2 mmH	g			Status	pass	
Sensor Component	Cell A Tmp.		Condition	30.7 C				Status	pass	
Sensor Component	Cell B Freq.			99.6 kHz				Status	pass	
Sensor Component	Cell B Noise		Condition	0.9 ppb				Status		
Sensor Component	Cell B Flow			0.71 lpm				Status		
Sensor Component	Cell B Pressure		Condition	713.8 mmH	g			Status	pass	
Sensor Component	Cell B Tmp.		Condition					Status		
Sensor Component	Line Loss		Condition	Not tested				Status	pass	
Sensor Component	System Memo		Condition	n				Status	pass	

Site \	Site Visit Date Parameter		Mfg	Owner ID	Model Number	Serial Number		
PND165-Martin Valvur-06/17/2016								
1	6/17/2016	DAS	Campbell	000403	CR3000	2516		
2	6/17/2016	Ozone	ThermoElectron Inc	000619	49i A1NAA	1009241791		
3	6/17/2016	Ozone Standard	ThermoElectron Inc	000329	49i A3NAA	0622717853		
4	6/17/2016	Sample Tower	Aluma Tower	000055	В	AT-81213-J12		
5	6/17/2016	Zero air system	Teledyne	000773	701H	609		

Mfg Serial Number Ta		Site	Tecl		hnician		Date Para	meter	Owner ID	
ThermoElectron Inc 1	009241791	PND165	Ma	artin Valv	ur	06/17/20	16 Ozor	ie	000619	
Slope: 0.97932 Slope: Intercept -0.71210 Intercept CorrCoff 0.99980 CorrCoff		0.00000 0.00000 0.00000						Paramet	ozone Ozone primary stan	
DAS 1:		Slope			0.99832 Interc			-0.26452		
A Avg % Diff: A Ma	8.7% A Avg %	Dif A Max % Di Cert		Cert Da	Cert Date 1/29/2		/29/2016 C	orrCoff	1.00000	
									V.D. CC	
UseDescription primary	ConcGroup 1	Tfer Raw 0.61	0.8				Site Unit	P	CctDifference	
primary	2	30.66		30.97		1	opb		-8.72%	
primary	3	50.56	50.	50.91		49.24 pp			-3.28%	
primary	4	74.66	75.		73		opb		-2.58%	
primary	5	108.72	109	.16	106	5.30 p	opb		-2.62%	
Sensor Component	Sensor Component Sample Train		Conditio	Good	t		Status P			
Sensor Component	22.5 degree rule		Conditio	on			Stat	us pass		
Sensor Component	Inlet Filter Condition		Conditio	Condition Clean			Status		pass	
Sensor Component	Battery Backup		Conditio	Condition N/A			Status pass			
Sensor Component	Offset		Conditio	on -0.6			Stat	us pass		
Sensor Component	Span		Conditio	dition 1.033			Stat	us pass		
Sensor Component	Zero Voltage		Conditio	ondition N/A			Stat	us pass		
Sensor Component	Fullscale Voltage		Condition N/A				Stat	us pass		
Sensor Component	Cell A Freq.		Conditio	Condition 102.2 kHz			Stat	us pass		
Sensor Component	Cell A Noise		Conditio	Condition 0.5 ppb			Status			
Sensor Component	Cell A Flow		Condition 1.45 lpm				Stat	us Fail		
Sensor Component	Cell A Pressure		Conditio	dition 563.8 mmHg			Status			
Sensor Component	Cell A Tmp.		Conditio	Condition 35.1 C		Status		us pass	pass	
Sensor Component	Cell B Freq.		Conditio	92.6 kHz		Statu		us pass		
Sensor Component	Cell B Noise		Conditio	o.7 ppb		Status		us pass		
Sensor Component	Cell B Flow		Conditio	on 0.0 lpm			Stat	us Fail		
Sensor Component	Cell B Pressure		Conditio	Not tested			Status			
Sensor Component	Cell B Tmp.		Conditio	ion			Status			
Sensor Component	Line Loss		Conditio	on < 1 %			Stat	Status pass		
Sensor Component	System Memo		Conditio	See c	omments	i	Stat	us pass		

Site Visit Date		Parameter	Mfg	Owner ID	Model Number	Serial Number	
BAS601-Martin Valvur-06/21/2016							
1	6/21/2016	DAS	Campbell	none	CR1000	41006	
2	6/21/2016	Ozone	ThermoElectron Inc	L0534684	49i A1NAA	1214552973	
3	6/21/2016	Ozone Standard	ThermoElectron Inc	none	49i E3CAA	1214552971	
4	6/21/2016	Zero air pump	Thomas	none	107CAB18	100800033636	

ThermoElectron Inc 12	14552973		Technician							
	14552975	BAS601	Ma	artin Valvı	ır	06/21/201	16 Ozone	!	L0534684	
Slope: 0.95939 Slope: Intercept 0.02332 Intercept CorrCoff 0.99996 CorrCoff		0.00000 0.00000 0.00000						arameter o	zone zone primary stan	
DAS 1:		Slope			(0.99832 Int	ercept	-0.26452		
A Avg % Diff: A Max 9	Dif A Max %	A Max % Di Cert Date		1/2	29/2016 Co	rrCoff	1.00000			
								fforma		
primary	UseDescription ConcGroup		Tfer Corr 0.64		1.04		pb	PCIDI	Treferice	
primary	2	0.38 29.67		29.98		1	pb		-5.37%	
primary	3	50.37	50.71		48.	.42 p	pb		-4.52%	
primary	4	73.64	74.		71.	1	pb		-3.89%	
primary	5	106.10	106	.54	102	2.40 p	pb		-3.89%	
Sensor Component S	Sample Train		Conditio	Good	ood		Statu	pass		
Sensor Component 2	2.5 degree rule		Conditio	on			Statu	pass		
Sensor Component Ir	Inlet Filter Condition		Condition Clean			Status		pass		
Sensor Component B	Battery Backup		Condition N/A			Status pass				
Sensor Component C	Offset		Condition -0.4			Statu	pass			
Sensor Component S	Span		Condition 1.024			Statu	pass			
Sensor Component Z	Zero Voltage		Condition N/A			Statu	pass			
Sensor Component F	Fullscale Voltage		Condition N/A				Statu	pass		
Sensor Component C	Cell A Freq.		Condition 100.8 kHz				Statu	Status pass		
Sensor Component C	Cell A Noise		Condition 1.0 ppb				Statu	pass		
Sensor Component C	Cell A Flow		Condition 0.65 lpm				Statu	pass		
Sensor Component C	Cell A Pressure		Condition 643.3 mmHg				Statu	pass		
Sensor Component C	Cell A Tmp.		Condition 49.3 C		Status		pass			
Sensor Component C	Cell B Freq.		Conditio	ndition 81.9 kHz		Status		pass		
Sensor Component C	Cell B Noise		Condition 0.8 ppb		Status		pass			
Sensor Component C	Cell B Flow		Conditio	0.70 lpm			Status pa			
Sensor Component C	Cell B Pressure		Conditio	Not tested			Statu	s pass		
Sensor Component C	Cell B Tmp.		Conditio	ion		Status		pass		
Sensor Component L	Line Loss		Conditio	on Not tested		Status P		pass	pass	
Sensor Component S	System Memo		Conditio	on			Statu	pass		