# 2015 – 3<sup>rd</sup> Quarter Report Support for Conducting Systems & Performance Audits of CASTNET Sites and NADP Monitoring Stations

**EPA Contract No. EPW12019** 

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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 October 2015, the network is comprised of 94 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 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 sponsored by EPA and operated by the BLM in WY also operate meteorological sensors and are BAS601, NEC602, BUF603, FOR604, and SHE604.

Some or all of the additional monitored variables, NOy, CO, and SO<sub>2</sub> have been added to the EPA sponsored sites BVL130, HWF187, PND165, PNF126, ROM206, and BEL116. Those variables were audited at the ROM206, PND165, and BVL130 stations during third quarter 2015. All of the SO<sub>2</sub> and NOy results for those audits were found to be within acceptance criteria. The preliminary reports of those results were delivered following the audits; however the results 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	$\leq$ ± 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				
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 Third Quarter 2015

This report consists of the systems and performance and other audit results from the CASTNET sites visited during the third quarter (July through September) of 2015. The locations and dates of the audits are presented in Table 2.

**Table 2. Site Audit Visits** 

Side ID	Audit Type	Sponsor	Site Visit Date	Station Name
GTH161	without met	EPA	7/2/2015	Gothic
CNT169	without met	EPA	7/24/2015	Centennial
GLR468	without met	NPS	7/28/2015	Glacier NP
ROM206	without met	EPA	8/3/2015	Rocky Mountain NP
ROM406	without met	NPS	8/4/2015	Rocky Mountain NP
THR422	without met	NPS	8/4/2015	Theodore Roosevelt NP
PND165	with met	EPA / BLM	8/10/2015	Pinedale
YEL408	without met	NPS	8/13/2015	Yellowstone NP
BAS601	with met	EPA / BLM	8/14/2015	Basin
SHE604	Flow & met	EPA / BLM	8/18/2015	Sheridan
BUF603	Flow & met	EPA / BLM	8/19/2015	Buffalo
NEC602	with met	EPA / BLM	8/20/2015	Newcastle
WNC429	without met	NPS	8/21/2015	Wind Cave NP
PRK134	without met	EPA	9/3/2015	Perkinstown
VIN140	without met	EPA	9/7/2015	Vincennes
VOY413	without met	NPS	9/8/2015	Voyageurs NP
STK138	without met	EPA	9/11/2015	Stockton
BVL130	with met	EPA	9/14/2015	Bondville
BVL130	NO <sub>y</sub> CO SO <sub>2</sub>	EPA	9/14/2015	Bondville
ALH157	without met	EPA	9/16/2015	Alhambra

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) ozone Performance Evaluations (PE).

Table 3. Site Ozone PE Visits

Side ID	Audit Type	Sponsor	Site Visit Date	Station Name
DEN417	Ozone PE	NPS	7/16/2015	Denali NP
UVL124	Ozone PE	EPA	8/27/2015	Unionville
HOX148	Ozone PE	EPA	8/28/2015	Hoxeyville
SAL133	Ozone PE	EPA	9/8/2015	Salamonie Reservoir

#### 1.4 Audit Results

The observations and results of the systems and performance audits are included in Appendix A, *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, *Site Spot Report Forms*.

The Ozone PE results and observations are included in Appendix C, 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 200 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 100 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 Third Quarter 2015

This report covers the results from the NADP sites surveyed during the third quarter (July through September) of 2015. The station names and dates of the audits are presented in Table 4.

**Table 4. Sites Surveyed – Third Quarter 2015** 

Side ID	<u>Network</u>	<u>Visit Date</u>	Station Name
CO08	NTN	7/1/2015	Four Mile Park
CO92	NTN	7/1/2015	Sunlight Peak
CO10	AMoN	7/2/2015	Gothic
CO98	NTN	7/7/2015	Rocky Mountain National Park-Loch Vale
AB13	MDN	7/13/2015	Henry Kroeger
AK04	MDN	7/14/2015	Nome
SK20	NTN	7/14/2015	Cactus Lake
SK21	NTN	7/16/2015	Hudson Bay
AK02	NTN	7/18/2015	Juneau
CO21	NTN	7/20/2015	Manitou
BC24	NTN	7/21/2015	Port Edward
CO02	NTN	7/21/2015	Niwot Saddle
CO90	NTN	7/21/2015	Niwot Ridge-Southeast
BC22	NTN	7/22/2015	Haul Road Station
BC23	NTN	7/22/2015	Lakelse Lake
CO94	NTN	7/22/2015	Sugarloaf
CO09	NTN	7/23/2015	Kawaneechee Meadow
WY00	NTN	7/25/2015	Snowy Range
WY95	NTN / AMoN	7/25/2015	Brooklyn Lake
MT98	NTN	7/27/2015	Havre - Northern Agricultural Research Center
BC16	MDN	7/28/2015	Saturna Island
WY94	NTN / AMoN	7/29/2015	Grand Tetons National Park
WY98	NTN	7/30/2015	Gypsum Creek

Side ID	<u>Network</u>	<u>Visit Date</u>	Station Name		
WY02	NTN	7/31/2015	Sinks Canyon		
WY97	NTN	7/31/2015	South Pass City		
CO22	NTN	8/1/2015	Pawnee		
MT96	NTN	8/3/2015	Poplar River		
SD08	NTN	8/5/2015	Cottonwood		
AB14	MDN	8/7/2015	Genesee		
WY06	NTN/AMoN	8/10/2015	Pinedale		
KS32	MDN/NTN	8/24/2015	Lake Scott State Park		
IN21	MDN	8/25/2015	Clifty Falls State Park		
IN21	MDN	8/25/2015	Clifty Falls State Park		
OH52	MDN	8/26/2015	South Bass Island		
OH52	MDN	8/26/2015	South Bass Island		
MI51	NTN/AMoN	8/27/2015	Unionville		
MI53	NTN	8/28/2015	Wellston		
MI09	MDN/NTN	8/29/2015	Douglas Lake		
MI48	MDN/NTN	8/29/2015	Seney National Wildlife Refuge-Headquarters		
MI98	NTN	8/31/2015	Raco		
WI10	MDN/NTN	9/1/2015	Potawatomi		
WI07	MDN/AMoN	9/2/2015	Horicon Marsh		
WI31	MDN/NTN	9/2/2015	Devil's Lake		
IL63	MDN/NTN	9/6/2015	Dixon Springs Agricultural Center		
IN34	MDN/NTN	9/8/2015	Indiana Dunes National Lakeshore		
IN20	AMoN	9/9/2015	Salamonie Reservoir		
MN01	NTN	9/9/2015	Cedar Creek		
MN98	MDN	9/9/2015	Blaine		
IL78	NTN	9/10/2015	Monmouth		
IL18	NTN	9/11/2015	Shabbona		

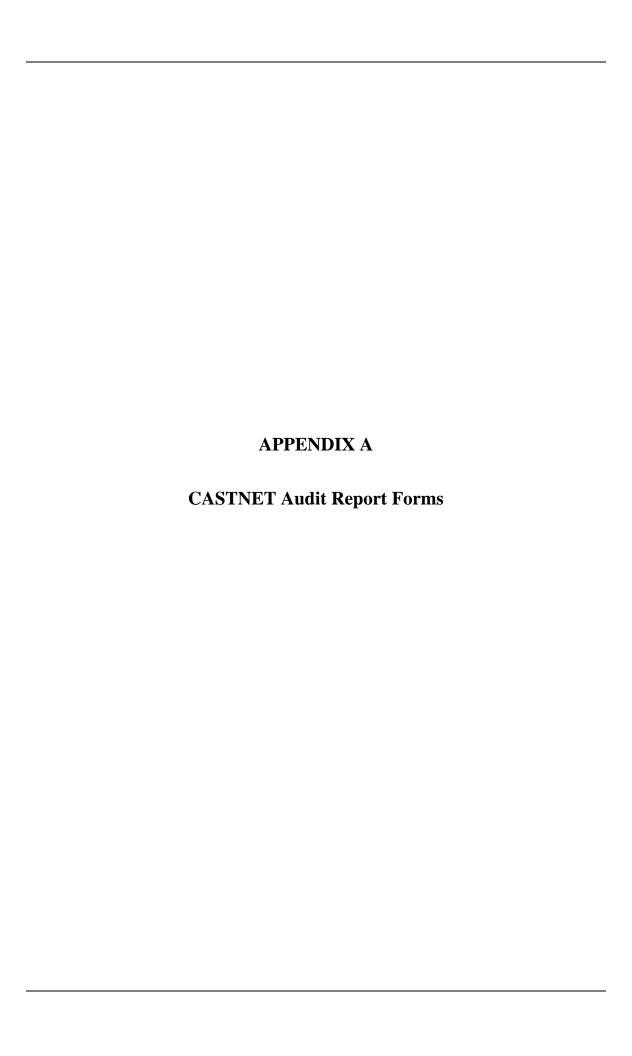
Side ID	<u>Network</u>	<u>Visit Date</u>	Station Name
MN06	MDN	9/11/2015	Leech Lake
WI99	MDN	9/12/2015	Lake Geneva
IL11	MDN/NTN/AMoN	9/15/2015	Bondville
IL11/11IL	AIRMoN	9/15/2015	Bondville
IN22	MDN/AMoN	9/17/2015	Southwest Purdue Agriculture Center
MN27	MDN/NTN	9/18/2015	Lamberton
KS97	NTN/AMoN	9/24/2015	Kickapoo Tribe - Powhattan

#### 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
GTI	H161-Alison	Ray-07/02/2015				
1	7/2/2015	Computer	Dell	000251	D520	5HFNHB1
2	7/2/2015	DAS	Campbell	000416	CR3000	2513
3	7/2/2015	Elevation	Elevation	None	1	None
4	7/2/2015	Filter pack flow pump	Thomas	00517	107CAB18	100300020817
5	7/2/2015	Flow Rate	Apex	000558	AXMC105LPMDPCV	50735
6	7/2/2015	Infrastructure	Infrastructure	none	none	none
7	7/2/2015	Modem	Raven	06611	H4223-C	0844355568
8	7/2/2015	Ozone	ThermoElectron Inc	000618	49i A1NAA	1009241789
9	7/2/2015	Ozone Standard	ThermoElectron Inc	000439	49i A3NAA	CM08200015
10	7/2/2015	Sample Tower	Aluma Tower	03564	Α	none
11	7/2/2015	Shelter Temperature	Campbell	none	107-L	none
12	7/2/2015	Siting Criteria	Siting Criteria	None	1	None
13	7/2/2015	Temperature	RM Young	06120	41342VC	11742
14	7/2/2015	Zero air pump	Werther International	06927	P 70/4	000836211

#### **DAS Data Form** 0.03 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2513 GTH161 Alison Ray 07/02/2015 DAS Primary 7 /3 /2015 7 /3 /2015 Das Date: **Audit Date** ΗY **Parameter** DAS Mfg 8:32:30 8:32:32 Das Time: **Audit Time** Tfer Desc. Source generator (D 12010039329 **Serial Number** 184 184 Das Day: **Audit Day** 01322 Tfer ID **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 0.00000 Slope 1.00000 **Intercept** 0.0002 0.0003 0.0002 0.0003 6/15/2014 1.00000 **Cert Date** CorrCoff Fluke Parameter DAS Mfg Tfer Desc. DVM **Serial Number** 95740243 01312 Tfer ID Slope 1.00000 **Intercept** 0.00000 1.00000 1/22/2015 **Cert Date** CorrCoff Channel **DAS Output** OutputUnit Difference Input **DVM** Output InputUnit V 0.0000 -0.00010.0002 0.0003 7 V V 0.0001 0.1000 0.1005 0.1006 V 7 0.3000 0.3002 0.3003 V 0.0001 V 0.5000 V -0.0001 7 0.5004 0.5003 7 0.7000 0.7005 0.7003 V V -0.0002 7 0.9000 0.9004 0.9001 V V -0.0003 1.0000 V V 0.0002 7 1.0000 1.0002

## Flow Data Form

Mfg	Serial Nun	nber Tag S	Site	Tec	hnician	Site Visit I	Date Parar	neter	Owner ID
Apex	50735		GTH161	Alis	on Ray	07/02/2015		Rate	000558
	Mfg BIOS Paramete		Parameter Flo	er Flow Rate					
					Serial Number	131818	7	Tfer Desc. BIC	OS 220-H
				r	Γfer ID	01417			
					Slope	1.	00316 Int	ercept	-0.00540
					Cert Date	1/7	7/2015 <b>Co</b>	rrCoff	1.00000
DAS 1:		DAS 2:			Cal Factor Z	ero	-0.0	23	
A Avg % Diff:	A Max % Di	A Avg %I	Dif A Max	% Di	Cal Factor F	ull Scale	0.9	83	
1.21%	1.32%				Rotometer R	eading:	3	3.9	
Desc.	Test type	-	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference
primary	pump off	0.000	0.000	0.01	0.000	-0.01	l/m	1/m	
primary	leak check	0.000	0.000	0.01	0.000	0.00	l/m	l/m	
primary	test pt 1	3.037	3.030	2.99	0.000	2.99	1/m	1/m	-1.32%
primary	test pt 2	3.030	3.030	2.99	0.000	2.99	l/m	1/m	-1.32%
primary	test pt 3	3.028	3.020	2.99	0.000	2.99	1/m	l/m	-0.99%
Sensor Compo	<b>Deak</b> Tes	t		Condition	1	Status pass			
Sensor Compo	onent Tubing C	ondition		Condition	Good	Statu	pass		
Sensor Compo	onent Filter Pos	sition		Condition	Good	Statu	pass		
Sensor Compo	onent Rotomete	er Condition	<u> </u>	Condition	Clean and dry	Statu	pass		
Sensor Compo	onent Moisture	Present		Condition	No moisture p	Statu	pass		
Sensor Compo	onent Filter Dist	tance		Condition	5.0 cm	Statu	pass		
Sensor Compo	onent Filter Dep	oth		Condition	0.5 cm	Status pass			
Sensor Compo	onent Filter Azi	muth		Condition	180 deg	Status pass			
Sensor Component System Memo		Condition	1	Status pass					

## **Ozone Data Form**

Mfg	Se	erial Number Tag	Site	Te	echnician		Site Visit Dat	e Paramo	eter Owner ID	)	
ThermoElec	ctron Inc 1	009241789	GTH161	Al	lison Ray		07/02/2015	Ozone	000618		
Slope: Intercept CorrCoff	Intercept -0.91907 Intercept		0.00000 0.00000 0.00000		Mfg Serial Number Tfer ID		ThermoElectro 49CPS-70008		ozone  Ozone primary	stan	
DAS 1: A Avg % I	Diff: A Ma	DAS 2: A Avg % 4.8%	Dif A Max	% Di	Slope Cert Da	nte	1.00		-0.242 rCoff 1.000		
UseDes	scription	ConcGroup	Tfer Raw	Tfer	Corr	Si	ite S	Site Unit	PctDifference		
	mary	1	0.33		56	-0.		one onne	TetDifference		
-	nary	2	28.99	_	.95		.89 ppb		-3.66%		
-	nary	3	48.99		.76	46	1.1		-4.80%		
-	nary	4	79.36	78	.85	75	.93 ppb		-3.70%		
prir	nary	5	108.99	108	3.20	106	6.40 ppb		-1.66%		
Sensor C	Component	Sample Train		Conditi	on Good			Status	pass		
Sensor C	Component	Inlet Filter Conditio	n	Conditi	on Clean	l		Status	pass		
Sensor C	Component	Battery Backup		Conditi	on N/A			Status	pass		
Sensor C	Component	Offset		Condition 0.000				Status	us pass		
Sensor C	Component	Span		Conditi	1.002			Status	pass		
	_	Zero Voltage		Conditi	tion N/A		Status	pass			
		Fullscale Voltage			dition N/A		Status		_		
		Cell A Freq.		Condition 97.2 kHz		Status		pass			
		Cell A Noise		J	Condition 0.8ppb			Status	pass		
		Cell A Flow		Conditi	on 0.56 I	pm		Status	pass		
		Cell A Pressure		J	on 519.2		Status				
		Cell A Tmp.		•	on 38.3 (			Status		_	
	_	Cell B Freq.		1	on 101.1			Status	pass		
		Cell B Noise		]	on 0.8 pp			Status	pass	_	
		Cell B Flow		Conditi	on 0.56 I	pm		Status			
		Cell B Pressure		Conditi	on			Status			
	_	Cell B Tmp.		Conditi				Status			
	Component			Conditi	on Not te	ested		Status			
Sensor C	Component	System Memo		Conditi	on			Status	pass		

#### Temperature Data Form **Technician** Site Visit Date Parameter **Owner ID** Mfg Serial Number Tag Site GTH161 Alison Ray RM Young 11742 07/02/2015 Temperature 06120 **Parameter** Temperature Mfg Eutechnics 01D102193 Tfer Desc. RTD translator Serial Number 01231 Tfer ID 0.99950 -0.03156 Slope Intercept **DAS 1: DAS 2:** Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** 1/28/2015 CorrCoff 0.99999 **Parameter** Temperature Eutechnics Mfg 01H0060 Tfer Desc. RTD probe **Serial Number** 01230 Tfer ID 0.99950 -0.03156 **Intercept** Slope 1/28/2015 0.99999 **Cert Date** CorrCoff 0.32 0.71 UseDesc. Test type InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference Temp Low Range 0.14 0.17 0.000 0.9 $\mathbf{C}$ 0.71 primary 19.27 0.000 19.2 C -0.07 Temp Mid Range 19.23 primary 41.2 -0.17 primary Temp High Range 41.29 41.34 0.000 **Sensor Component** Shield **Condition** Clean Status pass Sensor Component Blower **Condition** N/A 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 Tag	Site	Technician	Site Visit Date	Parameter	Owner ID
Campbell	none	GTH161	Alison Ray	07/02/2015	Shelter Temperatur	e none
DAS 1: Abs Avg Err 0.36	DAS 2:  os Max Er  0.36	Err Abs Max Er	Mfg Serial Number	Eutechnics 01D102193	Parameter St	nelter Temperatur
			Tfer ID Slope Cert Date	0.9995		-0.03156 0.99999
			Mfg Serial Number Tfer ID	Eutechnics 01H0060 01230	Parameter Sh Tfer Desc. R	nelter Temperatur
			Slope Cert Date	0.9995		-0.03156 0.99999

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	26.69	26.73	0.000	27.1	C	0.36
primary	Temp Mid Range	25.43	25.47	0.000	25.8	С	0.35

#### **Infrastructure Data For**

Site ID	GTH161	Technician	Alison Ray	Site Visit Date	07/02/2015
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Shelter Make	Shelter Model	Shelter Size
Ekto	8810 (s/n 2149-12)	640 cuft

Sensor Component	Sample Tower Type	Condition	Type A	Status	pass
Sensor Component	Conduit	Condition	Good	Status	pass
<b>Sensor Component</b>	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	Fair	Status	pass
Sensor Component	Signal Cable	Condition	Fair	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

Due to the remote location of the site, it can take up to a week to return the filter sample to the lab after it is removed from the tower in the winter

2 Parameter: ShelterCleanNotes

Some floor tiles are damaged.

3 Parameter: MetSensorComme

The temperature sensor has been moved to the sample tower and mounted in a naturally aspirated shield facing south and over the shelter roof. The met tower has been removed.

4 Parameter: MetOpMaintCom

The temperature signal cable is showing signs of wear.

#### Field Systems Data Form F-02058-1500-S1-rev002 GTH161 Technician Alison Ray Site Visit Date 07/02/2015 Site ID Gothic **USGS Map EPA** Site Sponsor (agency) Map Scale **Operating Group RMBL Map Date** 08-051-9991 AQS# R.M. Young **Meteorological Type** 38.9573 **Air Pollutant Analyzer** Ozone **OAPP** Latitude **Deposition Measurement** -106.9854 dry, wet **QAPP** Longitude **Land Use** mountain meadow, woodland - mixed **QAPP Elevation Meters** 2926 complex 10.75 Terrain **QAPP Declination** No 2/23/2006 Conforms to MLM **OAPP Declination Date** (970) 349-5691 **Site Telephone Audit Latitude** 38.95627 **RMBL** -106.98587 Site Address 1 **Audit Longitude** Gothic 2915 Site Address 2 **Audit Elevation** Gunnison 9.6 **Audit Declination County** Crested Butte, CO City, State Present Fire Extinguisher 81224 Inspected Nov 1987 Zip Code Time Zone Mountain First Aid Kit **Primary Operator Safety Glasses** Safety Hard Hat **✓** Primary Op. Phone # **✓** Primary Op. E-mail **Climbing Belt Security Fence Backup Operator** Backup Op. Phone # **Secure Shelter** Stable Entry Steps ✓ Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 (s/n 2149-12) Ekto **Shelter Size** 640 cuft **✓** Notes Some floor tiles are damaged. **Shelter Clean ✓** Notes Site OK From Gunnison take route 135 north to Crested Butte. Continue through town to Mount Crested Butte. Continue **Driving Directions** through town past the fire station and the road maintenance facility onto the dirt road to Gothic. Continue

approximately three miles and park at the visitor area at the bottom of the hill below the site. The site is

approximately 200 meters on the path up the hill.

## **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID GTH161 Technician Alison Ray Site Visit Date 07/02/2015

Potential Interferent	Minimum Distance From Measurement Dista Apparatus	nce 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	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comi	nen

#### F-02058-1500-S3-rev002 **Field Systems Data Form** Technician Alison Ray Site ID **GTH161** Site Visit Date 07/02/2015 **✓** Are wind speed and direction sensors sited so as to avoid N/A 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? South Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? Over 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) **V** N/A Is the solar radiation sensor plumb? Is it sited to avoid shading, or any artificial or reflected light? 🗹 N/A **✓** N/A Is the rain gauge plumb? **V** N/A Is it sited to avoid sheltering effects from buildings, trees, towers, etc? **V** 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 temperature sensor has been moved to the sample tower and mounted in a naturally aspirated shield facing south and over the shelter

roof. The met tower has been removed.

Field Systems Data Form	F-02058-1500-S4-rev002
Site ID GTH161 Technician Alison Ray	Site Visit Date 07/02/2015
1 Do all the meterological sensors appear to be intact, in good condition, and well maintained?	d 🗹
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?	✓ 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?	
Are the sensor signal and power cable connections protected from the elements and well maintained?	ed 🗸
Provide any additional explanation (photograph or sketch if nec natural or man-made, that may affect the monitoring parameter	
The temperature signal cable is showing signs of wear.	

### Field Systems Data Form F-02058-1500-S5-rev002 GTH161 Technician Alison Ray Site Visit Date 07/02/2015 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? **V** Are the sample inlets 3 - 15 meters above the ground? **V** Are the sample inlets > 1 meter from any major obstruction, and 20 meters from trees? Pollutant analyzers and deposition equipment operations and maintenance **V** 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 15 meters At inlet only Are in-line filters used in the ozone sample line? (if yes indicate location) **V** Are sample lines clean, free of kinks, moisture, and obstructions? **V** Is the zero air supply desiccant unsaturated? lacksquareAre there moisture traps in the sample lines?

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:

Is there a rotometer in the dry deposition filter line, and is it

clean?

**✓** 

Clean and dry

#### Field Systems Data Form F-02058-1500-S6-rev002 GTH161 Site Visit Date 07/02/2015 Site ID Technician Alison Ray DAS, sensor translators, and peripheral equipment operations and maintenance **V** Do the DAS instruments appear to be in good condition and well maintained? $\checkmark$ Are all the components of the DAS operational? (printers, modem, backup, etc) Met sensors only Do the analyzer and sensor signal leads pass through lightning protection circuitry? **V** Are the signal connections protected from the weather and well maintained? **V** Are the signal leads connected to the correct DAS channel? Are the DAS, sensor translators, and shelter properly **V** grounded? **V** 7 Does the instrument shelter have a stable power source? **V** Is the instrument shelter temperature controlled? **Stable** Grounded Is the met tower stable and grounded? Is the sample tower stable and grounded? **V** Tower does not have ground rod but is bolted to shelter. 11 Tower comments?

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-S7-rev002 GTH161 Technician Alison Ray Site ID Site Visit Date 07/02/2015 **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes Yes No N/A Wind speed sensor $\checkmark$ **V** Data logger П **V** Wind direction sensor **V** Data logger **✓** ~ П Strip chart recorder Temperature sensor **✓ V** Relative humidity sensor Computer **V V** Modem Solar radiation sensor **V** Surface wetness sensor **V Printer V V** Wind sensor translator Zero air pump **V** Temperature translator **✓** Filter flow pump П **V Humidity sensor translator V Surge protector V UPS** Solar radiation translator **~** Tipping bucket rain gauge **Lightning protection device** $\checkmark$ **✓** П Ozone analyzer **Shelter heater V** Filter pack flow controller Shelter air conditioner **V** Filter pack MFC power supply П Does the site have the required and most recent QC documents and report forms? Present Current **Station Log** $\checkmark$ **V SSRF V V V** Site Ops Manual Oct 2001 П П **HASP** Field Ops Manual **✓** July 1990 П **Calibration Reports** Ozone z/s/p Control Charts П Preventive maintenance schedule Is the station log properly completed during every site visit? ✓ **V** Are the Site Status Report Forms being 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:

Are the chain-of-custody forms properly used to document

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

sample transfer to and from lab?

current?

**V** 

Control charts not used

#### Field Systems Data Form F-02058-1500-S8-rev002 **GTH161** Technician Alison Ray Site ID Site Visit Date 07/02/2015 **Site operation procedures** Trained by previous operator 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? **OC Check Performed** Frequency **Compliant V** N/A **Multipoint Calibrations V ~** N/A **Visual Inspections V 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** Frequency **Compliant Multi-point Calibrations V V** Semiannually **V V** Daily Automatic Zero/Span Tests **V V** Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests V V Manual Precision Level Test V V** Weekly **Analyzer Diagnostics Tests V V** Every 2 weeks **In-line Filter Replacement (at inlet) V V** N/A In-line Filter Replacement (at analyze **V ~** Weekly Sample Line Check for Dirt/Water **V** Semiannually **Zero Air Desiccant Check**

- 1 Do multi-point calibration gases go through the complete sample train including all filters?
- 2 Do automatic and manual z/s/p gasses go through the complete sample train including all filters?
- 3 Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

	Unknown
<b>✓</b>	
<b>✓</b>	SSRF, call-in

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-S9-rev002 **GTH161** Technician | Alison Ray Site Visit Date 07/02/2015 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 correctly? No longer required Are data downloads and backups being performed as scheduled? **✓** SSRF. logbook Are general observations being made and recorded? How? **V** Are site supplies on-hand and replenished in a timely fashion? SSRF, call-in Are sample flow rates recorded? How? Are samples sent to the lab on a regular schedule in a timely fashion? Clean gloves on and off Are filters protected from contamination during handling and shipping? How? **V** Are the site conditions reported regularly to the field operations manager or staff? **OC Check Performed Frequency Compliant** ✓ Semiannually **Multi-point MFC Calibrations** Weekly Flow System Leak Checks **Filter Pack Inspection** Weekly Flow Rate Setting Checks Weekly П **Visual Check of Flow Rate Rotometer** ✓ Semiannually **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:

Due to the remote location of the site, it can take up to a week to return the filter sample to the lab after it is removed from the tower in the

winter.

## **Field Systems Data Form**

### F-02058-1500-S10-rev002

Site ID

GTH161 Technician Alison Ray

Site Visit Date 07/02/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D520	5HFNHB1	000251
DAS	Campbell	CR3000	2513	000416
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	100300020817	00517
Flow Rate	Apex	AXMC105LPMDPC	50735	000558
Infrastructure	Infrastructure	none	none	none
Modem	Raven	H4223-C	0844355568	06611
Ozone	ThermoElectron Inc	49i A1NAA	1009241789	000618
Ozone Standard	ThermoElectron Inc	49i A3NAA	CM08200015	000439
Sample Tower	Aluma Tower	A	none	03564
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	11742	06120
Zero air pump	Werther International	P 70/4	000836211	06927

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
CNT	T169-Sandy	Grenville-07/24/2015				
1	7/24/2015	Computer	Dell	000241	D520	unknown
2	7/24/2015	DAS	Campbell	000417	CR3000	2515
3	7/24/2015	Elevation	Elevation	None	1	None
4	7/24/2015	Filter pack flow pump	Thomas	02753	107CAB18	1192001900
5	7/24/2015	Flow Rate	Apex	000823	AXMC105LPMDPCV	illegible
6	7/24/2015	Infrastructure	Infrastructure	none	none	none
7	7/24/2015	Modem	Raven	06600	V4221-V	0844349098
8	7/24/2015	Ozone	ThermoElectron Inc	000699	49i A1NAA	1030244804
9	7/24/2015	Ozone Standard	ThermoElectron Inc	000328	49i A3NAA	0622717850
10	7/24/2015	Sample Tower	Aluma Tower	000179	В	unknown
11	7/24/2015	Shelter Temperature	Campbell	none	107-L	none
12	7/24/2015	Siting Criteria	Siting Criteria	None	1	None
13	7/24/2015	Temperature	RM Young	06501	41342	14606
14	7/24/2015	Zero air pump	Werther International	06925	P 70/4	000836220

#### **DAS Data Form DAS Time Max Error:** 0.02 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2515 CNT169 Sandy Grenville 07/24/2015 DAS Primary Das Date: 7 /25/2015 **Audit Date** 7 /25/2015 Datel **Parameter** DAS Mfg 10:40:00 10:40:01 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 213 213 Das Day: **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** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0001 0.0001 0.0999 V V 7 0.1000 0.0999 0.00007 0.3000 0.2997 0.2998 V V 0.0001 7 0.5000 0.4996 0.4996 V V 0.00007 0.7000 V V 0.0001 0.6995 0.6996 7 V V 0.9000 0.8994 0.8994 0.00007 1.0000 0.9994 0.9993 V V -0.0001

## Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Teo	chnician	Site Visit Date Para		cameter Owner	
Apex	illegible		CNT169	Sa	ndy Grenville	07/24/2015	Flow R	Rate	000823
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103471	T	fer Desc. ne	kus
					Tfer ID	01420			
					Slope	0.9	96664 Int	ercept	0.03078
					Cert Date	2/5	5/2015 Co	rrCoff	0.99996
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. Blo	OS cell
					Tfer ID	01410			
					Slope	0.9	96664 Int	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Co</b> 1	rrCoff	0.99996
DAS 1:		DAS 2:		L	Cal Factor Z	ero	0.0	02	
A Avg % Diff:	A Max % Di	A Avg %	6Dif A Max	: % Di	Cal Factor F		1.0		
1.32%	1.64%				Rotometer R	eading:	3	.6	
Desc.	Test type	Input 1/n	n Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference
primary	pump off	0.000	0.000	0.00	0.000	0.01	1/m	l/m	
primary	leak check	0.000	0.000	0.01	0.000	0.01	1/m	l/m	
primary	test pt 1	2.978	3.050	2.93	2.920	3.00	1/m	1/m	-1.64%
primary	test pt 2	2.974	3.040	2.93	2.920	3.00	1/m	1/m	-1.32%
primary	test pt 3	2.959	3.030	2.93	2.920	3.00	1/m	1/m	-0.99%
Sensor Compo	nent Leak Tes	st		Conditio	n	Status pass			
Sensor Compo	nent Filter Azi	muth		Conditio	n 360 deg		Status	pass	
Sensor Compe	onent Filter Dep	pth		Conditio	n 0.5 cm		Status	pass	
Sensor Compo	onent Filter Pos	sition		Conditio	Good		Status	pass	
Sensor Compo	onent Filter Dis	tance		Conditio	<b>n</b> 4.5 cm		Status	pass	
Sensor Compo	nent Tubing C	Condition		Conditio	n Good		Status	pass	
Sensor Component Rotometer Condition		Conditio	Clean and dry		Status	pass			
Sensor Compo	onent Moisture	Present		Conditio	No moisture present		Status	us pass	
	onent System N	Momo		Conditio			Status	pass	

## **Ozone Data Form**

A Avg % Diff: A Max % Di	Mfg S	erial Number Ta	Site	Techi	nician	Site Visit Date	Parame	eter O	wner ID
Timercept	ThermoElectron Inc 1	030244804	CNT169	Sand	ly Grenville	07/24/2015	Ozone	0	00699
A Avg % Diff: A Max % Di	Intercept -0.0	03683 Intercept	0.00000	Se	erial Number	0419606966			primary stan
primary         1         -0.20         0.21         0.28         ppb           primary         2         29.63         30.22         27.71         ppb         -8.31%           primary         3         49.82         50.54         48.34         ppb         -4.35%           primary         4         79.71         80.61         74.94         ppb         -7.03%           primary         5         110.05         111.14         104.50         ppb         -5.97%           Sensor Component         Sample Train         Condition         Good         Status         pass           Sensor Component         Fullscale Voltage         Condition         N/A         Status         pass           Sensor Component         Zero Voltage         Condition         N/A         Status         pass           Sensor Component         Battery Backup         Condition         N/A         Status         pass           Sensor Component         Offset         Condition         N/A         Status         pass           Sensor Component         Span         Condition         0.90         Status         pass           Sensor Component <td>A Avg % Diff: A Ma</td> <td>x % Di A Avg %</td> <td>Dif A Max %</td> <td>% Di</td> <td>•</td> <td></td> <td></td> <td>-</td> <td>-0.40946 1.00000</td>	A Avg % Diff: A Ma	x % Di A Avg %	Dif A Max %	% Di	•			-	-0.40946 1.00000
primary         2         29.63         30.22         27.71         ppb         -8.31%           primary         3         49.82         50.54         48.34         ppb         -4.35%           primary         4         79.71         80.61         74.94         ppb         -7.03%           primary         5         110.05         111.14         104.50         ppb         -5.97%           Sensor Component         Fullscale Voltage         Condition         Good         Status         pass           Sensor Component         Fullscale Voltage         Condition         N/A         Status         pass           Sensor Component         Zero Voltage         Condition         N/A         Status         pass           Sensor Component         Battery Backup         Condition         N/A         Status         pass           Sensor Component         Offset         Condition         0.90         Status         pass           Sensor Component         Cell A Freq.         Condition         95.6 kHz         Status         pass           Sensor Component         Cell A Flow         Condition         0.55 lpm         Status         pass           Sensor Component         Cell A Flow	UseDescription	ConcGroup	Tfer Raw	Tfer Co	orr Si	te Si	te Unit	PctDifferer	nce
primary 3 49.82 50.54 48.34 ppb -4.35% primary 4 79.71 80.61 74.94 ppb -7.03% primary 5 110.05 111.14 104.50 ppb -5.597% Sensor Component Fullscale Voltage Condition N/A Status pass Sensor Component Inlet Filter Condition Clean Status pass Sensor Component Battery Backup Condition N/A Status pass Sensor Component Offset Condition N/A Status pass Sensor Component Span Condition N/A Status pass Sensor Component Cell A Freq. Condition 1.013 Status pass Sensor Component Cell A Flow Condition 0.55 lpm Status pass Sensor Component Cell A Pressure Condition Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass Sensor Component Cell A Trip. Condition 526.8 mmHg Status pass	primary	1	-0.20			28 ppb			
primary 4 79.71 80.61 74.94 ppb -7.03% primary 5 110.05 111.14 104.50 ppb -5.97%  Sensor Component Sample Train Condition Good Status pass  Sensor Component Fullscale Voltage Condition N/A Status pass  Sensor Component Inlet Filter Condition Clean Status pass  Sensor Component Zero Voltage Condition N/A Status pass  Sensor Component Battery Backup Condition N/A Status pass  Sensor Component Offset Condition 0.90 Status pass  Sensor Component Span Condition 1.013 Status pass  Sensor Component Cell A Freq. Condition 95.6 kHz Status pass  Sensor Component Cell A Noise Condition 1.6 ppb Status pass  Sensor Component Cell A Flow Condition 0.55 lpm Status pass  Sensor Component Cell A Pressure Condition 526.8 mmHg Status pass  Sensor Component Cell A Tmp. Condition 35.0 C Status pass						1.1			
Primary 5 110.05 111.14 104.50 ppb -5.97%  Sensor Component Sample Train Condition Good Status pass  Sensor Component Fullscale Voltage Condition N/A Status pass  Sensor Component Inlet Filter Condition Clean Status pass  Sensor Component Zero Voltage Condition N/A Status pass  Sensor Component Battery Backup Condition N/A Status pass  Sensor Component Offset Condition 0.90 Status pass  Sensor Component Span Condition 1.013 Status pass  Sensor Component Cell A Freq. Condition 95.6 kHz Status pass  Sensor Component Cell A Roise Condition 1.6 ppb Status pass  Sensor Component Cell A Flow Condition 0.55 lpm Status pass  Sensor Component Cell A Freq. Condition 526.8 mmHg Status pass  Sensor Component Cell A Tmp. Condition 35.0 C Status pass						1.1			
Sensor Component       Sample Train       Condition       Good       Status       pass         Sensor Component       Fullscale Voltage       Condition       N/A       Status       pass         Sensor Component       Zero Voltage       Condition       N/A       Status       pass         Sensor Component       Battery Backup       Condition       N/A       Status       pass         Sensor Component       Offset       Condition       0.90       Status       pass         Sensor Component       Span       Condition       1.013       Status       pass         Sensor Component       Cell A Freq.       Condition       95.6 kHz       Status       pass         Sensor Component       Cell A Noise       Condition       0.55 lpm       Status       pass         Sensor Component       Cell A Flow       Condition       526.8 mmHg       Status       pass         Sensor Component       Cell A Tmp.       Condition       35.0 C       Status       pass						1.1			
Sensor Component       Fullscale Voltage       Condition       N/A       Status       pass         Sensor Component       Inlet Filter Condition       Condition       Clean       Status       pass         Sensor Component       Zero Voltage       Condition       N/A       Status       pass         Sensor Component       Battery Backup       Condition       N/A       Status       pass         Sensor Component       Offset       Condition       0.90       Status       pass         Sensor Component       Span       Condition       1.013       Status       pass         Sensor Component       Cell A Freq.       Condition       95.6 kHz       Status       pass         Sensor Component       Cell A Noise       Condition       0.55 lpm       Status       pass         Sensor Component       Cell A Flow       Condition       526.8 mmHg       Status       pass         Sensor Component       Cell A Tmp.       Condition       35.0 C       Status       pass			110.03			.50 ррв	C404		3.7170
Sensor ComponentInlet Filter ConditionConditionCleanStatuspassSensor ComponentZero VoltageConditionN/AStatuspassSensor ComponentBattery BackupConditionN/AStatuspassSensor ComponentOffsetCondition0.90StatuspassSensor ComponentSpanCondition1.013StatuspassSensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Sample Hain					Status	pass	
Sensor ComponentZero VoltageConditionN/AStatuspassSensor ComponentBattery BackupConditionN/AStatuspassSensor ComponentOffsetCondition0.90StatuspassSensor ComponentSpanCondition1.013StatuspassSensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Fullscale Voltage		Condition	N/A		Status	pass	
Sensor ComponentBattery BackupConditionN/AStatuspassSensor ComponentOffsetCondition0.90StatuspassSensor ComponentSpanCondition1.013StatuspassSensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Inlet Filter Condition	n	Condition	Clean		Status	pass	
Sensor ComponentOffsetCondition0.90StatuspassSensor ComponentSpanCondition1.013StatuspassSensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Zero Voltage		Condition	N/A		Status	pass	
Sensor ComponentSpanCondition1.013StatuspassSensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Battery Backup		Condition	N/A		Status	pass	
Sensor ComponentCell A Freq.Condition95.6 kHzStatuspassSensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Offset		Condition	0.90		Status	pass	
Sensor ComponentCell A NoiseCondition1.6 ppbStatuspassSensor ComponentCell A FlowCondition0.55 lpmStatuspassSensor ComponentCell A PressureCondition526.8 mmHgStatuspassSensor ComponentCell A Tmp.Condition35.0 CStatuspass	Sensor Component	Span		Condition	1.013		Status	pass	
Sensor Component       Cell A Flow       Condition       0.55 lpm       Status       pass         Sensor Component       Cell A Pressure       Condition       526.8 mmHg       Status       pass         Sensor Component       Cell A Tmp.       Condition       35.0 C       Status       pass	Sensor Component	Cell A Freq.		Condition	95.6 kHz		Status	pass	
Sensor Component       Cell A Pressure       Condition       526.8 mmHg       Status       pass         Sensor Component       Cell A Tmp.       Condition       35.0 C       Status       pass	Sensor Component	Cell A Noise		Condition	1.6 ppb		Status	pass	
Sensor Component       Cell A Pressure       Condition       526.8 mmHg       Status       pass         Sensor Component       Cell A Tmp.       Condition       35.0 C       Status       pass	Sensor Component	Cell A Flow		Condition	0.55 lpm		Status	pass	
	Sensor Component	Cell A Pressure					Status	pass	
	Sensor Component	Cell A Tmp.		Condition	35.0 C		Status	pass	
Sensor Component Cell B Freq. Condition 92.2 kHz Status pass	Sensor Component	Cell B Freq.		Condition	92.2 kHz		Status	pass	
Sensor Component Cell B Noise Condition 1.5 ppb Status pass	Sensor Component	•					Status	pass	
Sensor Component Cell B Flow Condition 0.55 lpm Status pass	Sensor Component	Cell B Flow							
Sensor Component Cell B Pressure Condition Status pass	_			Condition			Status	pass	
Sensor Component Cell B Tmp. Condition Status pass	Sensor Component	Cell B Tmp.		Condition			Status	pass	
Sensor Component Line Loss Condition Not tested Status pass	Sensor Component	Line Loss		Condition	Not tested		Status	pass	
Sensor Component System Memo Condition Status pass	Sensor Component	System Memo							

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young 14606 CNT169 07/24/2015 Temperature 06501 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID** -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.12 0.21 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.02 0.08 0.000 0.2 $\mathbf{C}$ 0.12 C -0.02 Temp Mid Range 25.45 25.43 0.000 25.4 primary 0.000 48.2 C -0.21 primary Temp High Range 48.55 48.45 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Status pass **Condition** N/A 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	20.40	20.39	0.000	20.1	C	-0.25
primary	Temp Mid Range	21.16	21.15	0.000	20.9	С	-0.3
primary	Temp Mid Range	21.94	21.93	0.000	21.6	С	-0.36

### **Infrastructure Data For**

Site ID CNT169 Technician Sandy Grenville Site Visit Date 07/24/2015

Shelter Make	Shelter Model	Shelter Size	
Ekto	8810 (s/n 2149-19)	640 cuft	

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

# **Field Systems Comments**

1 Parameter: SiteOpsProcedures

The ozone inlet filter is changed once each month and the ozone sample line is leak tested every two weeks.

2 Parameter: ShelterCleanNotes

The shelter is dirty. Some floor tiles are old and broken

#### Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 07/24/2015 CNT169 Technician Sandy Grenville Site ID Centennial **USGS Map EPA** Site Sponsor (agency) Map Scale Forest Service **Operating Group Map Date** 56-001-9991 AQS# R.M. Young **Meteorological Type** Air Pollutant Analyzer Ozone **QAPP** Latitude 41.3722 **QAPP** Longitude dry, wet -106.2422 **Deposition Measurement** 3178 **Land Use** woodland - evergreen **QAPP Elevation Meters** 10.9 Terrain complex **QAPP Declination** Marginally 12/28/2004 Conforms to MLM **OAPP Declination Date** (307) 742-7229 41.364531 **Site Telephone Audit Latitude** Brooklyn Lake Guard Station **Audit Longitude** -106.24002 Site Address 1 Medicine Bow National Forest Site Address 2 **Audit Elevation** 3175 Albany 9.5 County **Audit Declination** Centennial, WY City, State **Present** Fire Extinguisher 82055 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 **Security Fence Backup Operator V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail **Shelter Working Room** ✓ **Make** Model 8810 (s/n 2149-19) Ekto **Shelter Size** 640 cuft Notes The shelter is dirty. Some floor tiles are old and broken Shelter Clean **✓** Notes Site OK From Laramie take route 130 west to Centennial. Continue through town and into the Medicine Bow National Forest. **Driving Directions** Turn right near the summit onto a dirt road at the sign for Brooklyn Lake Campground. Continue approximately 1.5

miles to Little Brooklyn Lake. There will be a small chapel on the right. Park at the chapel and walk approximately

200 meters up the hill past the chapel to the site.

F-02058-1500-S2-rev002

Site ID CNT169 Sandy Grenville Site Visit Date 07/24/2015

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		<b>~</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nen

### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 07/24/2015 Site ID CNT169 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?

Fi	eld Systems Data Form	F-02058-1500-S4-rev002					
Site	CNT169 Technician Sandy Grenville		Site Visit Date 07/24/2015				
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>					
2	Are all the meteorological sensors operational online, and reporting data?	✓					
3	Are the shields for the temperature and RH sensors clean?	<b>✓</b>					
4	Are the aspirated motors working?	<b>✓</b>	N/A				
5	Is the solar radiation sensor's lens clean and free of scratches?	<b>✓</b>	N/A				
6	Is the surface wetness sensor grid clean and undamaged?	<b>✓</b>	N/A				
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	<b>✓</b>					
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓					
	ride any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	sary)	regarding conditions listed above, or any other features,				

### Field Systems Data Form F-02058-1500-S5-rev002 CNT169 Technician Sandy Grenville Site Visit Date 07/24/2015 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:

F-02058-1500-S6-rev002

Site	e ID	CNT169		Technician	Sandy Grenville		Site Visi	it Date 07/24/20	15	
	DAS co	ncor translate	ore and n	perinheral equi	pment operation	ne or	nd maintana	nce		
	DAS, SC	nsor translati	ors, and p	eripheral equi	_		iu mamtena	ince		
1		DAS instrume intained?	ents appea	ar to be in good	l condition and	<b>✓</b>				
2		the componen , backup, etc)	nts of the	DAS operation	al? (printers,	<b>✓</b>				
3	Do the analyzer and sensor signal leads pass through lightning protection circuitry?						Met sensors	only		
4	Are the signal connections protected from the weather and well maintained?					<b>✓</b>				
5	Are the	signal leads c	connected	to the correct	DAS channel?	<b>✓</b>				
6	Are the ground	* * * * * * * * * * * * * * * * * * *	translato	rs, and shelter	properly	<b>✓</b>				
7	Does the	e instrument s	shelter ha	ive a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument she	lter temp	erature contro	lled?	<b>✓</b>				
							Stable		Grounded	
9	Is the m	et tower stab	le and gro	ounded?						
10	Is the sa	ample tower s	table and	grounded?						
11	Tower o	comments?								
					or sketch if nece ring parameters		y) regarding	g conditions liste	ed above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 CNT169 Technician Sandy Grenville Site Visit Date 07/24/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes No N/A Yes **V** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger** ✓ **V** П 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 V V Humidity sensor translator Surge protector** П **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 V SSRF ✓ V ✓ V Site Ops Manual** Feb 2014 **V HASP V** Feb 2014 **✓ Field Ops Manual V** Feb 2014 **Calibration Reports V V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ 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 CNT169 Technician Sandy Grenville Site Visit Date 07/24/2015 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 **✓** 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 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? **Compliant OC Check Performed** 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 V** 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** 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 complete sample train including all filters? ✓ SSRF, call-in Are the automatic and manual z/s/p checks monitored and

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 ozone inlet filter is changed once each month and the ozone sample line is leak tested every two weeks.

reported? If yes, how?

### Field Systems Data Form F-02058-1500-S9-rev002 CNT169 Technician Sandy Grenville Site Visit Date 07/24/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ filter changed afternoons, 80% of the time Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? SSRF, logbook Are general observations being made and recorded? How? **V** Are site supplies on-hand and replenished in a timely fashion? SSRF, call-in 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? **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** ✓ Semiannually **V 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:

### F-02058-1500-S10-rev002

Site ID

CNT169

Technician Sandy Grenville

Site Visit Date 07/24/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D520	unknown	000241
DAS	Campbell	CR3000	2515	000417
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	1192001900	02753
Flow Rate	Apex	AXMC105LPMDPC	illegible	000823
Infrastructure	Infrastructure	none	none	none
Modem	Raven	V4221-V	0844349098	06600
Ozone	ThermoElectron Inc	49i A1NAA	1030244804	000699
Ozone Standard	ThermoElectron Inc	49i A3NAA	0622717850	000328
Sample Tower	Aluma Tower	В	unknown	000179
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	14606	06501
Zero air pump	Werther International	P 70/4	000836220	06925

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
GLI	R468-Sandy	Grenville-07/28/2015				
1	7/28/2015	Computer	Hewlett Packard	none	6560 b	5CB1520H65
2	7/28/2015	DAS	Environmental Sys Corp	90653	8816	2566
3	7/28/2015	Elevation	Elevation	None	1	None
4	7/28/2015	Filter pack flow pump	Thomas	01564	107CAB18	0688001769
5	7/28/2015	Flow Rate	Tylan	none	FC280	AW9710138
6	7/28/2015	Infrastructure	Infrastructure	none	none	none
7	7/28/2015	MFC power supply	Tylan	03687	RO-32	FP9403014
8	7/28/2015	Modem	US Robotics	none	56k	unknown
9	7/28/2015	Ozone	ThermoElectron Inc	none	49i A3NAA	1023943901
10	7/28/2015	Ozone Standard	ThermoElectron Inc	none	49i A3NAA	0733726104
11	7/28/2015	Printer	Hewlett Packard	none	842C	unknown
12	7/28/2015	Sample Tower	Aluma Tower	none	В	none
13	7/28/2015	Shelter Temperature	ARS	77	none	none
14	7/28/2015	Siting Criteria	Siting Criteria	None	1	None
15	7/28/2015	Temperature	RM Young	none	41342	17625
16	7/28/2015	Zero air pump	Werther International	none	PC70/4	000756725

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2566 GLR468 Sandy Grenville 07/28/2015 DAS Primary Das Date: 7 /28/2015 **Audit Date** 7 /28/2015 Datel **Parameter** DAS Mfg 11:40:00 11:40:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 216 216 Das Day: **Audit Day** Tfer ID 01320 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 0.0003 0.0001 0.0003 0.0001 Fluke Parameter DAS Mfg Tfer Desc. DVM **Serial Number** 95740135 01311 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 -0.0001 0.0002 0.0003 V V 7 0.1000 0.0998 0.0999 0.0001 7 0.3000 0.2997 0.2998 V V 0.0001 7 0.5000 0.4996 0.4995 V V -0.0001 7 0.7000 0.6994 V V -0.0001 0.6995 7 V V 0.9000 0.8993 0.8994 0.00017 1.0000 0.9993 0.9992 V V -0.0001

## Flow Data Form

Mfg	Serial Nun	nber Ta S	lite	Tec	hnician	Site Visit Date Paramo		eter Owner ID	
Tylan	AW971013	38	GLR468	Sa	ndy Grenville	07/28/2015	Flow R	Rate	none
Mfg	Tylan				Mfg	BIOS	P	Parameter Flow Rate	
SN/Owner ID	FP9403014	03687			Serial Number	103471	Т	fer Desc. ne	xus
Parameter	MFC power sup	oply			Tfer ID	01420			
					Slope	0.	96664 Into	ercept	0.03078
					Cert Date	2/	5/2015 <b>Co</b> 1	rrCoff	0.99996
					Mfg	BIOS	P	arameter Flo	ow Rate
					Serial Number	103424	Т	fer Desc. BIG	OS cell
					Tfer ID	01410			
					Slope	0.	96664 Into	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Co</b>	rrCoff	0.99996
DAS 1:		DAS 2:		L	Cal Factor Z	ero	0.36	66	
A Avg % Diff:	A Max % Di	A Avg %I	Dif A Max	x % Di	Cal Factor F	ull Scale	6.0	14	
0.41%	0.47%				Rotometer R	eading:	3	.2	
Desc.	Test type	-	Input Corr_	MfcDisp.	OutputSignal	-	•		l PctDifference
primary	pump off	0.000	0.000	-0.35	0.000	-0.31	1/m	1/m	
primary	leak check	0.000	0.000	-0.35	0.000	-0.36	1/m	1/m	
primary	test pt 1	2.919	2.990	2.33	2.330	3.00	1/m	1/m	0.47%
primary	test pt 2	2.919	2.990	2.33	2.330	3.00	1/m	1/m	0.40%
primary	test pt 3	2.919	2.990	2.33	2.330	3.00	l/m	l/m	0.37%
Sensor Comp	onent Leak Tes	it		Conditio	n		Status	pass	
Sensor Comp	onent Filter Azi	muth		Conditio	n Not tested		Status	pass	
Sensor Comp	onent Filter Dep	oth		Conditio	n -0.3 cm		Status	Fail	
Sensor Comp	onent Filter Pos	sition		Conditio	n Poor		Status	Fail	
Sensor Comp	onent Filter Dist	tance		Conditio	<b>n</b> 4.0 cm		Status	pass	
Sensor Comp	onent Tubing C	ondition		Conditio	Good		Status	pass	
Sensor Comp	onent Rotomete	er Condition		Conditio	n Clean and dry		Status	pass	
Sensor Comp	onent Moisture	Present		Conditio	n No moisture p	resent	Status	pass	
	onent System N	_			n See comments		~ · ·	pass	

## **Ozone Data Form**

Mfg So	erial Number Ta	Site	Tec	hnician		Site Visit Da	te Param	eter Owner ID	
ThermoElectron Inc 1	023943901	GLR468	Sa	ndy Grer	ville	07/28/2015	Ozone	none	
Intercept -0.4	Slope: T147 Intercept O9997 CorrCoff	0.00000 0.00000 0.00000		Mfg Serial N	umber	ThermoElectr 0419606966 01112		ozone  Ozone primary s	stan
DAS 1: A Avg % Diff: A Mar 4.4%	DAS 2: x % Di	6Dif A Max %	6 Di	Slope Cert Da	te	0.99		-0.4094 rCoff 1.0000	
UseDescription	ConcGroup	Tfer Raw	Tfer (	Corr	Si	te	Site Unit	PctDifference	
primary	1	-0.18	0.2	.3	0.0	)6 ppb			
primary	2	30.02	30.6		28.	1.1		-5.88%	
primary	3	50.01	50.7		48.	1.1		-4.77%	
primary primary	5	79.99 109.31	80.8		78. 106	1.1		-3.41% -3.71%	
Sensor Component			Conditio		100	.50 рро	Status		
1									
Sensor Component	Battery Backup		Conditio	n N/A			Status	pass	
<b>Sensor Component</b>	Inlet Filter Conditio	n	Conditio	Clean			Status	pass	
Sensor Component	Offset		Conditio	0.6			Status	pass	
Sensor Component	Span		Conditio	n 1.011			Status	pass	
Sensor Component	Fullscale Voltage		Conditio	n N/A			Status	pass	
Sensor Component	Zero Voltage		Conditio	n N/A			Status	pass	
Sensor Component	Cell A Freq.		Conditio	n 89.3 k	Hz		Status	pass	
Sensor Component	Cell A Noise		Conditio	1.0 pp	b		Status	pass	
Sensor Component	Cell A Flow		Conditio	ո 0.51 կ	om		Status	pass	
Sensor Component			Conditio				Status		
Sensor Component	Cell A Tmp.		Conditio	n 32.3 C	;		Status	pass	
Sensor Component			Conditio				Status		
Sensor Component		<del></del>	Conditio				Status		
Sensor Component			Conditio				<b>Status</b>		
Sensor Component			Conditio				Status		
Sensor Component			Conditio				<b>Status</b>		
Sensor Component			Conditio		sted		Status		
Sensor Component			Conditio				Status		
School Component	-,		Conditio				Status	<u></u>	

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young 17625 GLR468 07/28/2015 Temperature none Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 Tfer ID -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.20 0.29 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.24 0.30 0.000 0.5 C 0.19 C 0.29 Temp Mid Range 25.88 25.86 0.000 26.2 primary C primary Temp High Range 48.74 48.64 0.000 48.5 -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**

Mfg	Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
ARS	none	GLR468	Sandy Grenville	07/28/2015	Shelter Temperatu	re 77
DAS 1:	DAS 2:		Mfg	Extech	Parameter S	helter Temperatur
Abs Avg Err Ab	s Max Er Abs Avg 0.57	Err Abs Max Er	Serial Number	H232734	Tfer Desc.	RTD
	0.00		Tfer ID	01227		
			Slope	1.00343	Intercept	-0.06409
			Cert Date	1/30/2015	CorrCoff	1.00000

UseDesc.	Test type	Test type InputTmpRaw InputTmpCorr.		OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	24.05	24.03	0.000	23.6	C	-0.45
primary	Temp Mid Range	26.21	26.18	0.000	25.6	С	-0.57
primary	Temp Mid Range	25.28	25.26	0.000	24.7	C	-0.56

### **Infrastructure Data For**

Sit	te ID	GLR468	Technician	Sandy Grenville	Site Visit Date	07/28/2015	
	Shelter Ma	ake	Shelter Model	Sh	nelter Size		
	Ekto	10.1112.22.00411.02.004.004	8810 (s/n 2149-	20) 64	0 cuft		

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

# **Site Visit Comments**

Pa	rameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	l Problem
Flo	w Rate	GLR468	Sandy Grenville	07/28/2015	Filter Position	Tylan	4079		<b>✓</b>

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: SiteOpsProcComm

The site operator is relatively new and would benefit from additional training.

2 Parameter: SiteOpsProcedures

The ozone inlet filter is being changed weekly while smoke from forest fires is present. The site operator was observed to leave the sample tower down with the dry deposition filter installed and the sample pump running for more than one hour.

3 Parameter: SitingCriteriaCom

The site is located in a small clearing within 100 meters of a horse stable. There is a plywood and aluminum processing plant within 20 km of the site.

4 Parameter: ShelterCleanNotes

The shelter is in good condition. Evidence of repairs to roof leaks attempted.

5 Parameter: MetSensorComme

The recorded temperature data at this site is now being measured at approximately 2 meters above the ground. Current temperature data are no longer comparable to previous temperature measurements at this site.

6 Parameter: MetOpMaintCom

The signal cables are showing signs of wear.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 07/28/2015 GLR468 Technician Sandy Grenville Site ID Lake McDonald West **USGS Map NPS** Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 30-029-8001 AQS# R.M. Young **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 48.5103 dry, wet, Hg **QAPP** Longitude -113.9956 **Deposition Measurement** woodland - mixed 976 **Land Use QAPP Elevation Meters** complex 18 **Terrain QAPP Declination** No 12/27/2004 Conforms to MLM **OAPP Declination Date** (406) 888-7983 48.510301 **Site Telephone Audit Latitude** Horse Stables -113.996807 Site Address 1 **Audit Longitude** Quarter Circle Bridge Rd Site Address 2 **Audit Elevation** 964 Flathead 14.1 County **Audit Declination** West Glacier, MT City, State **Present** Fire Extinguisher 59936 Inspected June 2011 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 (s/n 2149-20) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is in good condition. Evidence of repairs to roof leaks attempted. Shelter Clean **✓** Notes Site OK From Kalispell proceed north on route 2 to West Glacier. Turn left onto Going To The Sun Road into Glacier National

Park. Proceed approximately 0.2 miles past the entrance and fee station, and turn left toward the horse stables. Bear right at the fork and continue through the gate past the stables. The site is visible in the clearing on the left.

**Driving Directions** 

F-02058-1500-S2-rev002

Site ID	GLR468	<b>Technician</b>	Sandy Grenville	Site Visit Date	07/28/2015

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	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	30 m	
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK  $\Box$ 

**Siting Criteria Comment** 

The site is located in a small clearing within 100 meters of a horse stable. There is a plywood and aluminum processing plant within 20 km of the site.

### **Field Systems Data Form** F-02058-1500-S3-rev002 Technician Sandy Grenville Site Visit Date 07/28/2015 Site ID GLR468 ✓ 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? Temperature now at 2 meters 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 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 recorded temperature data at this site is now being measured at approximately 2 meters above the ground. Current temperature data are no longer comparable to previous temperature measurements at this site.

Fic	eld Systems Data Form		F-02058-1500-S4-rev002
Site	ID GLR468 Technician Sandy Grenville		Site Visit Date 07/28/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	✓	
3	Are the shields for the temperature and RH sensors clean?	<b>✓</b>	
4	Are the aspirated motors working?	<b>✓</b>	
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?	<b>✓</b>	Signs of wear
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓	
	de any additional explanation (photograph or sketch if necessal or man-made, that may affect the monitoring parameters:		regarding conditions listed above, or any other features,
The	ignal cables are showing signs of wear.		

### Field Systems Data Form F-02058-1500-S5-rev002 GLR468 Technician Sandy Grenville Site Visit Date 07/28/2015 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 15 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? 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:

F-02058-1500-S6-rev002

Site	e ID	GLR468	Technician	Sandy Grenville		Site Vis	it Date 07/28/201	5	
	DAS, se	nsor translators, and	peripheral equi	pment operation	ns ai	nd maintena	ınce		
1	Do the I	DAS instruments appointained?		_	<b>✓</b>				
2	Are all t	the components of the backup, etc)	DAS operation	al? (printers,	<b>✓</b>				
3	Do the a	nnalyzer and sensor si g protection circuitry		through	<b>✓</b>	Met sensors	only		
4		signal connections printained?	otected from the	e weather and	<b>✓</b>				
5	Are the	signal leads connected	d to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter	properly	<b>✓</b>				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	<b>✓</b>				
8	Is the instrument shelter temperature controlled?								
9	Is the m	et tower stable and gi	rounded?			Stable		Grounded	
10	Is the sa	ample tower stable and	d grounded?					<b>✓</b>	
11	Tower o	comments?						V	
		additional explanationan-made, that may a				ry) regardin	g conditions listed	d above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 GLR468 Technician Sandy Grenville Site Visit Date 07/28/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No Yes N/A Yes No N/A $\overline{\mathbf{V}}$ **✓** Wind speed sensor **Data logger V** Wind direction sensor $\checkmark$ П **Data logger** ✓ **V** П Temperature sensor Strip chart recorder ~ П **V** Relative humidity sensor Computer **V V** Solar radiation sensor Modem П **V** ~ **Printer** Surface wetness sensor ✓ **✓** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V V Humidity sensor translator Surge protector** $\checkmark$ П **V UPS Solar radiation translator** П **V V** Tipping bucket rain gauge Lightning protection device ~ **V Shelter heater** Ozone analyzer **V 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 ✓ ✓** Dataview **SSRF V ✓ ✓ Site Ops Manual** Jan 2006 **✓ HASP** April 2004 **✓ Field Ops Manual** April 2004 **Calibration Reports ✓** 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? Control charts not used Are ozone z/s/p control charts properly completed and

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:

current?

### **Field Systems Data Form** F-02058-1500-S8-rev002 GLR468 Technician Sandy Grenville Site Visit Date 07/28/2015 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** 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? **OC Check Performed Compliant** Frequency **Multi-point Calibrations V V** Monthly and 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** Alarm values only **Analyzer Diagnostics Tests V** Every 2 weeks **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **V 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 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 ozone inlet filter is being changed weekly while smoke from forest fires is present. The site operator was observed to leave the sample tower down with the dry deposition filter installed and the sample pump running for more than one hour.

### Field Systems Data Form F-02058-1500-S9-rev002 GLR468 Technician Sandy Grenville Site Visit Date 07/28/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed morinings 90% of the time Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? **✓** Dataview 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? **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** ✓ 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 site operator is relatively new and would benefit from additional training.

### F-02058-1500-S10-rev002

Site ID

GLR468

Technician Sandy Grenville

Site Visit Date 07/28/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	6560 b	5CB1520H65	none
DAS	Environmental Sys Cor	p 8816	2566	90653
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	0688001769	01564
Flow Rate	Tylan	FC280	AW9710138	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Tylan	RO-32	FP9403014	03687
Modem	US Robotics	56k	unknown	none
Ozone	ThermoElectron Inc	49i A3NAA	1023943901	none
Ozone Standard	ThermoElectron Inc	49i A3NAA	0733726104	none
Printer	Hewlett Packard	842C	unknown	none
Sample Tower	Aluma Tower	В	none	none
Shelter Temperature	ARS	none	none	77
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	17625	none
Zero air pump	Werther International	PC70/4	000756725	none

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
RO	M206-Eric H	Hebert-08/03/2015				
1	8/3/2015	Computer	Dell	000454	D530	unknown
2	8/3/2015	DAS	Campbell	000428	CR3000	2534
3	8/3/2015	Dilution system	Teledyne	000791	T700U	111
4	8/3/2015	Elevation	Elevation	None	1	None
5	8/3/2015	Filter pack flow pump	Thomas	04986	107CA18	040400022185
6	8/3/2015	Flow Rate	Apex	000598	AXMC105LPMDPCV	unknown
7	8/3/2015	Infrastructure	Infrastructure	none	none	none
8	8/3/2015	Modem	Raven	06473	V4221-V	0808311135
9	8/3/2015	Noy	Teledyne	missing	T200U	103
10	8/3/2015	Ozone	ThermoElectron Inc	000676	49i A1NAA	1030244794
11	8/3/2015	Ozone Standard	ThermoElectron Inc	000514	49i A3NAA	0922236892
12	8/3/2015	Sample Tower	Aluma Tower	000810	С	Unknowm
13	8/3/2015	Shelter Temperature	Campbell	none	107-L	none
14	8/3/2015	Siting Criteria	Siting Criteria	None	1	None
15	8/3/2015	Temperature	RM Young	02679	41342	none
16	8/3/2015	Zero air pump	Werther International	06917	PC70/4	000829166
17	8/3/2015	Zero air system	Teledyne	000777	701H	607

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2534 ROM206 Eric Hebert 08/03/2015 DAS Primary Das Date: 8 /3 /2015 **Audit Date** 8 /3 /2015 Mfg Datel Parameter DAS 11:12:00 11:12:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 4000392 **Serial Number** 215 215 Das Day: **Audit Day** Tfer ID 01321 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0001 0.0001 0.0001 0.0001 1/22/2015 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 86590148 Tfer Desc. DVM 01310 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 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 0.1000 0.1000 0.00007 0.3000 0.3000 0.3000 V V 0.0000 7 0.5000 0.5000 0.4999 V V -0.0001 7 0.7000 V V -0.0001 0.7000 0.6999 7 V V 0.9000 0.9000 0.8999 -0.0001 7 1.0000 0.9999 V V -0.0001 1.0000

## Flow Data Form

Mfg	S	erial Num	ber Ta	Site	Тес	chnician	Site Visit I	Date Paran	neter	Owner ID	
Арех	L	ınknown		ROM206	Eri	c Hebert	08/03/201	5 Flow F	tate	000598	
						Mfg	BIOS	P	arameter Flo	ow Rate	
						Serial Number	131818	T	fer Desc. Bl	OS 220-H	
						Tfer ID	01417				
						Slope	1.	00316 Int	ercept	-0.00540	
						Cert Date	1/	7/2015 <b>Co</b>	rrCoff	1.0000	
DAS 1:			DAS 2:		L	Cal Factor Z	Zero	-0.0	02		
A Avg % Diff:	A Ma	x % Di	A Avg %	Dif A Max	% Di	Cal Factor F	ull Scale	0.0	97		
1.07%		1.35%				Rotometer R	leading:	3	.6		
Desc.	Te	est type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSigna	II PctDifference	
primary	pump	off	0.000	0.000	0.00	0.000	-0.02	l/m	l/m		
primary	leak o	check	0.000	0.000	0.01	0.000	-0.01	l/m	l/m		
primary	test p	t 1	3.036	3.030	3.05	0.000	3.00	l/m	l/m	-0.99%	
primary	test p		3.047	3.040	3.04	0.000	3.00	l/m	l/m	-1.35%	
primary	test p	t 3	3.024	3.020	3.04	0.000	2.99	l/m	l/m	-0.86%	
Sensor Compe	onent	Leak Test	t		Conditio	n		Status	pass		
Sensor Compo	onent	Filter Azin	nuth		Conditio	180 deg		Status	pass		
Sensor Compo	onent	Filter Dep	th		Conditio	<b>n</b> 3.0 cm		Status	pass	is	
Sensor Compo	onent	Filter Posi	ition		Conditio	n Good		Status			
Sensor Compo	onent	Moisture I	Present		Conditio	n No moisture p	resent	Status	pass		
Sensor Compo	onent	Rotomete	r Condition	า	Conditio	n Clean and dry		Status	pass		
Sensor Compe	onent	System M	lemo		Conditio	n		Status	pass		
Sensor Compo	onent	Tubing Co	ondition		Conditio	n Good		Status	Status pass		
Sensor Component Filter Distance		Filter Dista	ance		Conditio	n 5.0 cm	Status	Status pass			

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Teo	chnician		Site Vis	it Date	Parame	ter	Owner ID
ThermoElectron Inc 1	030244794	ROM206	Eri	ic Hebert		08/03/2	015	Ozone		000676
Intercept -0.5	88937 Slope: 88729 Intercept 99999 CorrCoff	0.00000	0	Mfg Serial N	umber		Electron 70008-36		rameter ozo	one primary stan
DAS 1: A Avg % Diff: A Ma 2.4%	DAS 2: x % Di	6Dif A Max 9		Slope Cert Dat	te		1.00952		_	-0.24284 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	ite	Site	Unit	PctDiff	erence
primary	1	0.33	0.5	56	0.	13	ppb			
primary	2	26.99	26.9	97	25	.95	ppb			-3.78%
primary	3	49.75	49.:		48		ppb			-2.63%
primary	4	83.22	82.0			.40	ppb			-1.54%
primary	5	117.12	116.			1.40	ppb			-1.59%
Sensor Component	Cell B Noise		Conditio	0.9 pp	b			Status	pass	
Sensor Component	Cell B Tmp.		Conditio	on				Status	pass	
Sensor Component	Fullscale Voltage		Conditio	n N/A				Status	pass	
Sensor Component	Inlet Filter Condition	in	Conditio	Clean				Status	pass	
Sensor Component	Line Loss		Conditio	Not tes	sted			Status	pass	
Sensor Component	Offset		Conditio	on 0.1				Status	pass	
Sensor Component	Span		Conditio	1.006				Status	pass	
Sensor Component	Cell B Freq.		Conditio	87.2 kl	Hz			Status	pass	
Sensor Component	System Memo		Conditio	on				Status	pass	
Sensor Component	Sample Train		Conditio	Good				Status	pass	
Sensor Component	Cell B Pressure		Conditio	on				Status	pass	
Sensor Component	Cell B Flow		Conditio	0.6 lpn	n			Status	pass	
<b>Sensor Component</b>	Cell A Tmp.		Conditio	35.6 C	;			Status	pass	
Sensor Component	Cell A Pressure		Conditio	523 m	mHg			Status	pass	
Sensor Component	Cell A Noise		Conditio	0.9 pp	b			Status	pass	
Sensor Component	Cell A Freq.		Conditio	93.3 kl	Hz			Status	pass	
Sensor Component	Cell A Flow		Conditio	0.6 lpn	n			Status	pass	
Sensor Component	Battery Backup		Conditio	n N/A				Status	pass	
Sensor Component	Zero Voltage		Conditio	n N/A				Status	pass	

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young ROM206 Eric Hebert 08/03/2015 Temperature 02679 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.23 0.36 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range -0.05 0.17 0.000 0.0 C -0.17 C -0.15 Temp Mid Range 12.13 12.28 0.000 12.1 primary C -0.36 primary Temp High Range 43.96 43.93 0.000 43.6 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Status Switch **Condition** N/A Status pass Status pass **Sensor Component** Blower **Condition** N/A Sensor Component System Memo Condition Status pass

## **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	26.19	26.26	0.000	25.9	C	-0.4
primary	Temp Mid Range	25.75	25.82	0.000	25.7	C	-0.13

#### **Infrastructure Data For**

Si	te ID	ROM206	Technician	Eric Hebert	Site Visit Date	08/03/2015	
	Shelter M	ake	Shelter Model	She	lter Size		
	Ekto		8810 (s/n 2182-	1) 640	cuft		
			NORTH A STREET ON A STREET WAS		NESSEMBLY DASHERS AND BAN		

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

## **Field Systems Comments**

#### 1 Parameter: SiteOpsProcComm

It was suggested that the dry deposition filter not be installed and uncovered on the sample tower while the ozone inlet filter is replaced and other activities are performed with the tower down. The NOy analyzer has a blinking "fault" light and the message "system service" is displayed.

#### 2 Parameter: ShelterCleanNotes

The shelter is clean, neat, and well organized. There are signs of previous roof leaks, but they have been repaired. The floor and counter top have been replaced.

#### 3 Parameter: MetSensorComme

The temperature sensor has been removed from the met tower and mounted in a naturally aspirated shield on the sample tower, facing south and over the shelter roof.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 08/03/2015 Technician Eric Hebert ROM206 Site ID Longs Peak **USGS Map EPA** Site Sponsor (agency) Map Scale private **Operating Group Map Date** 08-069-9991 AQS# R.M. Young **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 40.2778 -105.5453 dry **QAPP** Longitude **Deposition Measurement** woodland - mixed 2743 Land Use **QAPP Elevation Meters** complex 10.3 **Terrain QAPP Declination** Marginally 2/22/2006 Conforms to MLM **OAPP Declination Date** (970) 586-2598 40.278129 **Site Telephone Audit Latitude** High Peak Camp -105.545635 Site Address 1 **Audit Longitude** Route 7 Site Address 2 **Audit Elevation** 2742 9.0 Larimer County **Audit Declination** Estes Park, CO City, State **Present** Fire Extinguisher 80517 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 8810 (s/n 2182-1) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is clean, neat, and well organized. There are signs of previous roof leaks, but they have Shelter Clean been repaired. The floor and counter top have been replaced.

From Estes Park take route 7 south approximately 8.5 miles. Turn right onto Preservation Road (dirt road) at the

sign for High Peak Camp operated by the Salvation Army. The site is approximately 100 meters on the left.

**✓** Notes

Site OK

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID ROM206 Eric Hebert Site Visit Date 08/03/2015

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		$\checkmark$
Limited agricultural operations	200 m		✓
Large parking lot	200 m		$ lap{\checkmark}$
Small parking lot	100 m		$\checkmark$
Tree line	50 m		$\checkmark$
Obstacles to wind	10 times obstacle height		✓

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nent

#### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 08/03/2015 Technician Eric Hebert Site ID ROM206 ✓ 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 South 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 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 temperature sensor has been removed from the met tower and mounted in a naturally aspirated shield on the sample tower, facing south and over the shelter roof.

1 Do all the meterological sen condition, and well maintain 2 Are all the meteorological sereporting data? 3 Are the shields for the temp 4 Are the aspirated motors well 5 Is the solar radiation sensor scratches? 6 Is the surface wetness senso 7 Are the sensor signal and pocondition, and well maintain 8 Are the sensor signal and pofrom the elements and well	ned? ensors operational perature and RH seconding? r's lens clean and from grid clean and un ower cables intact, ned? ower cable connect	intact, in good online, and ensors clean? ree of ndamaged? in good		Site Visit Date 08/0 //A //A	3/2015		
condition, and well maintain  2 Are all the meteorological so reporting data?  3 Are the shields for the temp  4 Are the aspirated motors well  5 Is the solar radiation sensor scratches?  6 Is the surface wetness sensor  7 Are the sensor signal and porcondition, and well maintain  8 Are the sensor signal and porcondition and well maintain	ned? ensors operational perature and RH seconding? r's lens clean and from grid clean and un ower cables intact, ned? ower cable connect	online, and ensors clean? ree of ndamaged? in good		/A			
reporting data?  3 Are the shields for the temp  4 Are the aspirated motors we  5 Is the solar radiation sensor scratches?  6 Is the surface wetness senso  7 Are the sensor signal and porcondition, and well maintain  8 Are the sensor signal and porcondition the elements and well	perature and RH seconding?  r's lens clean and from grid clean and unower cables intact, ned?	ensors clean? ree of ndamaged? in good		/A			
<ul> <li>3 Are the shields for the temp</li> <li>4 Are the aspirated motors we</li> <li>5 Is the solar radiation sensor scratches?</li> <li>6 Is the surface wetness senso</li> <li>7 Are the sensor signal and pocondition, and well maintain</li> <li>8 Are the sensor signal and pofrom the elements and well</li> </ul>	orking?  r's lens clean and from the grid clean and under cables intact, ned?	ree of ndamaged? in good		/A			
<ul> <li>5 Is the solar radiation sensor scratches?</li> <li>6 Is the surface wetness senso</li> <li>7 Are the sensor signal and pocondition, and well maintain</li> <li>8 Are the sensor signal and pofrom the elements and well</li> </ul>	r's lens clean and from grid clean and un ower cables intact, ned?	ndamaged?	<b>Y</b>	/A			
scratches?  6 Is the surface wetness senso  7 Are the sensor signal and pocondition, and well maintain  8 Are the sensor signal and pofrom the elements and well	or grid clean and un ower cables intact, ned? ower cable connect	ndamaged?	<b>V</b>				
7 Are the sensor signal and po condition, and well maintain 8 Are the sensor signal and po from the elements and well	ower cables intact, ned? ower cable connect	in good	<b>✓</b>	/A			
condition, and well maintain  8 Are the sensor signal and po from the elements and well	ned? ower cable connect						
from the elements and well		tions protected					
Donomoton	maintained?	•	· 🗸				
Parameter	Manufacturer	Model		S/N		Client ID	
Temperature	RM Young	41342		none		02679	
Provide any additional explanationatural or man-made, that may a						•	

#### Field Systems Data Form F-02058-1500-S5-rev002 ROM206 Technician | Eric Hebert Site Visit Date 08/03/2015 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	ROM206	Technician	Eric Hebert		Site Visi	it Date 08/03/201	5	
	DAC go	ngon tuonglotong and	nouinhoual aquin	mant anauation		d maintana	<b></b>		
	DAS, se	nsor translators, and	peripheral equi	_		<u>ia mamiena</u>	<u>nce</u>		
1		OAS instruments appointained?	ear to be in good	condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operationa	al? (printers,	<b>✓</b>				
3		nalyzer and sensor si g protection circuitry		hrough	✓	Met sensors	only		
4		signal connections pr intained?	otected from the	weather and	<b>✓</b>				
5	Are the	signal leads connected	d to the correct l	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter p	oroperly	<b>✓</b>				
7	Does the instrument shelter have a stable power source?								
8	Is the instrument shelter temperature controlled?				<b>✓</b>				
						Stable		Grounded	
9	Is the m	et tower stable and g	rounded?						
10	Is the sa	mple tower stable an	d grounded?			<u> </u>			
11	Tower c	omments?							
T.				1 . 7 . 10			30,0		
		additional explanation nan-made, that may a				y) regarding	g conditions liste	d above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 ROM206 Technician | Eric Hebert Site Visit Date 08/03/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes No N/A Yes **✓** Wind speed sensor **Data logger** П **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 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 **V V UPS Solar radiation translator ~ V** Tipping bucket rain gauge **Lightning protection device** ~ **V 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 V SSRF ✓ V ✓ V Site Ops Manual** Feb 2014 **V HASP ✓** Feb 2014 **Field Ops Manual Calibration Reports V ✓** Ozone z/s/p Control Charts Preventive maintenance schedul **V** Is the station log properly completed during every site visit? ✓ 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

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

current?

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

# Field Systems Data Form

## F-02058-1500-S8-rev002

Site	ID	ROM206	Technician	Eric Hebert		Site Visit Date 08/03/	/2015	
1	Has the	eration procedures e site operator attende ? If yes, when and who		STNET training	g 🗸	Trained on site by MACTE	C employee duri	ng site installation
2	Has the	e backup operator atte g course? If yes, when	ended a forma			Trained by site operator		
3		te visited regularly on			<b>✓</b>			
4		standard CASTNET o	•	ocedures being	✓			
5	Is the si the requ	te operator(s) knowled uired site activities? (in	lgeable of, and icluding docur	l able to perform nentation)	<u> </u>			
	Are reg	ular operational QA/Q	OC checks perf	formed on mete	orolo	gical instruments?		
QC	Check I	Performed		Frequency			Compliant	
Mu	Multipoint Calibrations			<b>✓</b> N/A			<b>✓</b>	
Vis	Visual Inspections			<b>✓</b> N/A			$\checkmark$	
Tra	Translator Zero/Span Tests (climatronics)			N/A			✓	
Ma	Manual Rain Gauge Test			<b>✓</b> N/A			$\checkmark$	
Cor	Confirm Reasonableness of Current Values			<b>✓</b> N/A			$\checkmark$	
Tes	Test Surface Wetness Response			<b>✓</b> N/A			$\checkmark$	
	Are reg	ular operational QA/Q	OC checks perf	formed on the o	<u>zone</u>	analyzer?		
QC	Check I	Performed		Frequency			Compliant	
Mu	lti-point	Calibrations		<b>✓</b> Semiannua	lly		<b>✓</b>	
Aut	tomatic Z	Zero/Span Tests		<b>✓</b> Daily				
Ma	nual Zer	o/Span Tests						
Aut	tomatic l	<b>Precision Level Tests</b>		<b>✓</b> Daily			✓	
Ma	nual Pre	ecision Level Test						
Ana	alyzer Di	iagnostics Tests		Weekly			✓	
In-l	ine Filte	r Replacement (at inle	•)	✓ Every 2 we	eks		<b>✓</b>	
In-l	ine Filte	r Replacement (at ana	1,5 2.0	N/A			<b>✓</b>	
San	nple Lin	e Check for Dirt/Wate	•	Weekly			<b>✓</b>	
Zer	o Air De	esiccant Check	•	Weekly			✓	
1		ti-point calibration gas train including all filte		the complete		Unknown		
2	Do auto	omatic and manual z/s/ te sample train includi	p gasses go th	rough the	<b>✓</b>			
3	Are the	automatic and manuad? If yes, how?		monitored and	<b>✓</b>	SSRF, logbook, call-in		
	•	additional explanation nan-made, that may aff				y) regarding conditions lis	sted above, or a	ny other features,

#### Field Systems Data Form F-02058-1500-S9-rev002 ROM206 Technician Eric Hebert Site Visit Date 08/03/2015 Site ID **Site operation procedures** Is the filter pack being changed every Tuesday as scheduled? Filter changed afternoons 90% of the time Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? SSRF, logbook Are general observations being made and recorded? How? **V** Are site supplies on-hand and replenished in a timely fashion? SSRF, logbook, call-in 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 V** Weekly **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **In-line Filter Inspection/Replacement**

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:

Weekly

Sample Line Check for Dirt/Water

It was suggested that the dry deposition filter not be installed and uncovered on the sample tower while the ozone inlet filter is replaced and other activities are performed with the tower down. The NOy analyzer has a blinking "fault" light and the message "system service" is displayed.

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID

ROM206

Technician Eric Hebert

Site Visit Date 08/03/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D530	unknown	000454
DAS	Campbell	CR3000	2534	000428
Dilution system	Teledyne	T700U	111	000791
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CA18	040400022185	04986
Flow Rate	Apex	AXMC105LPMDPC	unknown	000598
Infrastructure	Infrastructure	none	none	none
Modem	Raven	V4221-V	0808311135	06473
Noy	Teledyne	T200U	103	missing
Ozone	ThermoElectron Inc	49i A1NAA	1030244794	000676
Ozone Standard	ThermoElectron Inc	49i A3NAA	0922236892	000514
Sample Tower	Aluma Tower	С	Unknowm	000810
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	none	02679
Zero air pump	Werther International	PC70/4	000829166	06917
Zero air system	Teledyne	701H	607	000777

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
RON	1406-Eric I	Hebert-08/04/2015				
1	8/4/2015	DAS	Environmental Sys Corp	90535	8816	2025
2	8/4/2015	Elevation	Elevation	None	1	None
3	8/4/2015	flow rate	Tylan	03393	FC280AV	AW9403024
4	8/4/2015	Infrastructure	Infrastructure	none	none	none
5	8/4/2015	Met tower	Rohn	none	unknown	none
6	8/4/2015	MFC power supply	Tylan	none	RO-32	illegible
7	8/4/2015	Ozone	ThermoElectron Inc	none	49i A3NAA	1030745085
8	8/4/2015	Ozone Standard	ThermoElectron Inc	none	49i A1NAA	CM08460008
9	8/4/2015	Printer	Hewlett Packard	none	842C	unknown
10	8/4/2015	Sample Tower	Aluma Tower	illegible	В	none
11	8/4/2015	Shelter Temperature	ARS	none	unknown	051
12	8/4/2015	Shield (2 meter)	RM Young	none	unknown	none
13	8/4/2015	Siting Criteria	Siting Criteria	None	1	None
14	8/4/2015	Temperature	RM Young	none	41342	17079
15	8/4/2015	Zero air pump	Werther International	none	PC70/4	531392

#### **DAS Data Form** 0.37 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2025 ROM406 Eric Hebert 08/04/2015 DAS Primary Das Date: 8 /4 /2015 **Audit Date** 8 /4 /2015 Datel Parameter DAS Mfg 7:53:38 7:54:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 4000392 **Serial Number** Das Day: 216 **Audit Day** 216 Tfer ID 01321 **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 1/22/2015 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 86590148 Tfer Desc. DVM 01310 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output **DAS** Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 2 0.1000 0.1000 0.1000 0.00002 0.3000 0.3000 0.3000 V V 0.0000 2 0.5000 0.5000 0.5000 V V 0.00002 0.7000 V V 0.0000 0.7000 0.7000 V V 2 0.9000 0.9000 0.9000 0.00002 V V 1.0000 1.0000 1.0000 0.0000

## Flow Data Form

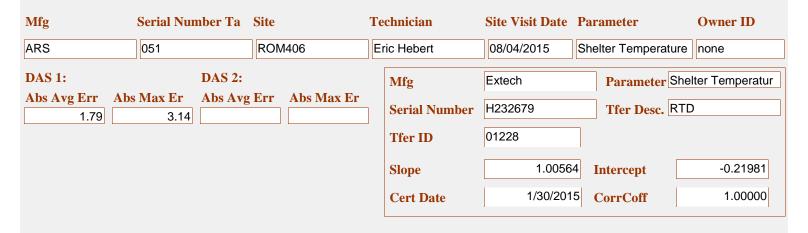
Mfg	S	erial Nun	iber Ta	Site	Tec	hnician	Site Visit I	Date Param	eter	Owner ID	
ylan	P	W940302	24	ROM406	Erio	Hebert	08/04/201	flow ra	te	03393	
Mfg	Tylan	l				Mfg	BIOS	P	arameter Flo	w Rate	
SN/Owner ID	illegib	ole	none			Serial Number 131818			Tfer Desc. BIOS 220-H		
Parameter	MFC	power sup	vlac			<b>Tfer ID</b> 01417					
						C1	1	00316 Inte		-0.0054	
						Slope			ercept		
					1	Cert Date	1/	7/2015 Cor	rCoff	1.0000	
DAS 1:			DAS 2:		_	Cal Factor Z	ero	0.9	98		
A Avg % Diff:	A Ma	x % Di	A Avg %	Dif A Max	: % Di	Cal Factor F	ull Scale	5.31	9		
0.55%		0.66%				Rotometer R	eading:	4.0	05		
Desc.	Te	st type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	I PctDifference	
primary	pump	off	0.000	0.000	-0.06	-0.0240	0.07	1/m	l/m		
primary	leak o	check	0.000	0.000	-0.05	-0.0230	0.08	1/m	l/m		
primary	test p	t 1	3.036	3.030	3.11	2.7870	3.01	l/m	l/m	-0.66%	
primary	test p	t 2	3.038	3.030	3.11	2.7870	3.01	1/m	l/m	-0.66%	
primary	test p	t 3	3.024	3.020	3.11	2.7870	3.01	1/m	l/m	-0.33%	
Sensor Comp	onent	Leak Tes	t		Condition	n		Status	pass		
Sensor Comp	onent	Filter Azir	muth		Condition	180 deg	Status		pass		
Sensor Comp	onent	Filter Dep	oth		Condition	5.0 cm		Status			
Sensor Comp	onent	Filter Pos	sition		Condition	Good		Status	pass		
Sensor Comp	onent	Moisture	Present		Condition	No moisture p	resent	Status	pass		
Sensor Comp				า	Condition	Clean and dry		Status	pass		
Sensor Comp					Condition			Status			
Sensor Comp					Condition						
									Status pass  Status pass		
Sensor Comp	onent	riitei Disi	lance		Condition	3.0 011		Status	pass		

## **Ozone Data Form**

Mfg S	erial Number Ta	Site	Te	chnician		Site Vis	it Date	Paramo	eter	Owner ID
ThermoElectron Inc 1	030745085	ROM406	Er	ic Hebert		08/04/2	015	Ozone		none
Intercept -0.1	Slope:  10314 Intercept 109999 CorrCoff	0.00000 0.00000 0.00000	0	Mfg Serial Nur Tfer ID	nber		Electron   70008-36		rameter Ger Desc.	Ozone primary stan
DAS 1:	DAS 2:			Slope			1.00952	Inte	rcept	-0.24284
A Avg % Diff: A Ma	x % Di A Avg %	Dif A Max	% Di	•				_	•	
3.9%	5.0%			Cert Date			1/7/2015	Cori	rCoff	1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	ite	Site	Unit	PctD	oifference
primary	1	0.17	0.4	10	0	55	ppb			
primary	2	27.41	27.	39	26.	.01	ppb			-5.04%
primary	3	49.76	49.	53	47.	.73	ppb			-3.63%
primary	4	83.73	83.		80.		ppb			-3.62%
primary	5	118.42	117	.54	113	3.50	ppb			-3.44%
<b>Sensor Component</b>	Cell B Noise		Conditio	0.7 ppb				Status	pass	
Sensor Component	Cell B Tmp.		Conditio	n				Status	pass	
Sensor Component	Fullscale Voltage		Condition	1.0061				Status	pass	
Sensor Component	Inlet Filter Conditio	n	Conditio	Clean				Status	pass	
Sensor Component	Line Loss		Conditio	Not test	ed			Status	pass	
Sensor Component	Offset		Conditio	0.000				Status	pass	
Sensor Component	Span		Condition 1.000					Status		
Sensor Component	Cell B Freq.		Conditio	92.3 kHz			Status		pass	
Sensor Component	System Memo		Conditio	See comments			Status	pass		
<b>Sensor Component</b>	Sample Train		Conditio	Good		Status		pass		
Sensor Component	Cell B Pressure		Conditio	on				Status	pass	
Sensor Component	Cell B Flow		Conditio	0.0 L/m				Status	Fail	
Sensor Component	Cell A Tmp.		Conditio	34.2 C				Status	pass	
Sensor Component	Cell A Pressure		Conditio	545 mm	Hg			Status	pass	
Sensor Component	Cell A Noise		Condition	0.6 ppb				Status	pass	
Sensor Component	Cell A Freq.		Condition	97.3 kH	Z			Status	pass	
Sensor Component	Cell A Flow		Condition	0.41 l/m				Status	pass	
Sensor Component	Battery Backup		Conditio	N/A				Status	pass	
Sensor Component	Zero Voltage		Condition	0.0002				Status	pass	

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 17079 ROM406 Eric Hebert 08/04/2015 Temperature none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.29 0.75 Test type OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. InputTmpRaw InputTmpCorr. 0.0000primary Temp Low Range -0.06 0.16 0.9 C 0.75 C Temp Mid Range 26.35 26.42 0.0000 26.5 0.11 primary 44.99 C primary Temp High Range 45.02 0.000045.0 -0.02 Sensor Component | Shield **Condition** Clean **Status** pass Sensor Component Blower Status Switch **Condition** N/A Status pass Status pass **Sensor Component** Blower **Condition** Functioning Sensor Component System Memo **Condition** See comments Status pass

## **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	27.29	27.36	0.000	25.7	C	-1.65
primary	Temp Mid Range	21.86	21.96	0.000	25.1	С	3.14
primary	Temp Mid Range	25.38	25.46	0.000	24.9	С	-0.58

#### **Infrastructure Data For**

Sit	te ID	ROM406	Technician	Eric Hebert	Site Visit Date	08/04/2015	
	Shelter Ma	ıke	Shelter Model	She	elter Size		
	Ekto		8814 (s/n 3062-	1) 896	5 cuft		

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

# **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	Problem
Ozone Additional details can	ROM406 a be found in the h	Eric Hebert nardcopy of the site a	08/04/2015 audit report.	System Memo	ThermoElectron	3590		
Ozone This analyzer diagno	ROM406	Eric Hebert de the manufacturer'	08/04/2015 s recommended	Cell B Flow value.	ThermoElectron	3590		
Temperature Additional details car	ROM406	Eric Hebert	08/04/2015 audit report.	System Memo	RM Young	3774		

## **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator is doing a very good job performing the site duties and expressed an interest in trying to improve any deficiencies. The sample flow rate systems for both the dry deposition and ozone sample trains were explained during the audit at the request of the site operator. Although gloves are not used to handle the filter pack, the operator is careful to touch only the bag and caps and not the filter.

2 Parameter: DasComments

Only RH, temperature, and AMoN are mounted on the meteorological tower.

3 Parameter: SiteOpsProcedures

The ozone analyzer display is indicating a low flow alarm for cell B. The analyzer is functioning properly and the flow meter is likely suspect.

4 Parameter: ShelterCleanNotes

The shelter is clean, neat, organized, and well maintained.

5 Parameter: MetSensorComme

The recorded temperature is being measured at 2.5 meters above the ground (and < 1 foot above the AMoN enclosure) and not 10 meters. Current temperature measurements are no longer comparable to previous temperature measurements at this site.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 08/04/2015 Technician Eric Hebert ROM406 Site ID Longs Peak **USGS Map NPS** Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 08-069-0007 AQS# R.M. Young **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 40.2778 dry **QAPP** Longitude -105.5453 **Deposition Measurement** woodland - mixed 2743 Land Use **QAPP Elevation Meters** complex **Terrain QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** (970) 586-8520 40.278129 **Site Telephone Audit Latitude** High Peak Camp -105.545635 Site Address 1 **Audit Longitude** Route 7 Site Address 2 **Audit Elevation** 2742 Larimer 9.0 County **Audit Declination** Estes Park, CO City, State **Present** Fire Extinguisher ✓ 80517 Inspected June 2013 Zip Code **V** 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 (s/n 3062-1) Ekto **Shelter Size** 896 cuft **✓** Notes The shelter is clean, neat, organized, and well maintained. **Shelter Clean ✓** Notes Site OK

From Estes Park take route 7 south approximately 8.5 miles. Turn right onto Preservation Road (dirt road) at the

sign for High Peak Camp operated by the Salvation Army. The site is approximately 100 meters on the left.

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID	ROM406	<b>Technician</b>	Eric Hebert	Site Visit Date	08/04/2015

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		<b>~</b>
Feedlot operations	500 m		$\checkmark$
Intensive agricultural ops (including aerial spraying)	500 m		$\checkmark$
Limited agricultural operations	200 m		<b>~</b>
Large parking lot	200 m		$\checkmark$
Small parking lot	100 m		$\checkmark$
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		<b>✓</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nen

Fi	eld Systems Data Forn	n				F-02058	3-1500-S3-rev002
Site	e ID ROM406	Sechnician [	Eric Hebert		Site Visit Date	08/04/2015	
1 2	Are wind speed and direction sens being influenced by obstructions?  Are wind sensors mounted so as to (i.e. wind sensors should be mount horizontally extended boom >2x the sensor into the properties wind)	o minimize to	ower effects? tower or on a	<b>✓</b>	N/A N/A		
3	tower into the prevailing wind)  Are the tower and sensors plumb?	•		<b>✓</b>	N/A		
4	Are the temperature shields point avoid radiated heat sources such a			<b>✓</b>	South		
5	Are temperature and RH sensors conditions? (i.e. ground below sen surface and not steeply sloped. Ric standing water should be avoided)	sors should diges, hollows	be natural	✓			
6	Is the solar radiation sensor plum	b?		<b>✓</b>	N/A		
7	Is it sited to avoid shading, or any light?	artificial or	reflected	<b>✓</b>	N/A		
8	Is the rain gauge plumb?			<b>✓</b>	N/A		
9	Is it sited to avoid sheltering effect towers, etc?	s from build	lings, trees,	<b>✓</b>	N/A		
10	Is the surface wetness sensor sited facing north?	with the gri	d surface	✓	N/A		
11	Is it inclined approximately 30 de	grees?		<b>✓</b>	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:

The recorded temperature is being measured at 2.5 meters above the ground (and < 1 foot above the AMoN enclosure) and not 10 meters. Current temperature measurements are no longer comparable to previous temperature measurements at this site.

Fie	ld Systems Dat	a Form			F	F-02058-1500-S4-rev00
Site 1	ID ROM406	Technician Eric	Hebert		Site Visit Date 08/04	/2015
	Do all the meterological condition, and well main	sensors appear to be inta	ct, in good	✓		
	Are all the meteorological sensors operational online, and reporting data?					
3	•			<b>✓</b>		
4				<b>✓</b>		
	Is the solar radiation sensor's lens clean and free of scratches?				N/A	
6 Is the surface wetness sensor grid clean and undamaged?				<b>✓</b>	N/A	
	7 Are the sensor signal and power cables intact, in good condition, and well maintained?					
	Are the sensor signal an from the elements and v	d power cable connection vell maintained?	s protected	✓		
Para	ameter	Manufacturer	Model	L	S/N	Client ID
Tem	perature	RM Young	41342		17079	none
Shiel	ld (2 meter)	RM Young	unknown		none	none
Met t	tower	Rohn	unknown		none	none

#### Field Systems Data Form F-02058-1500-S5-rev002 ROM406 Technician | Eric Hebert Site Visit Date 08/04/2015 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? No 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 ID ROM406 Eric Hebert Site Visit Date 08/04/2015

Site	e ID	ROM406	Technician	Eric Hebert		Site Vis	sit Date 08/04/20	15	
	DAS, sei	nsor translators, and	peripheral equi	oment operation	ns and	maintena	ance		
1		OAS instruments appentained?	ear to be in good	condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operationa	al? (printers,	<b>✓</b>				
3		nalyzer and sensor sig		hrough					
4		signal connections prontained?	otected from the	weather and	<b>✓</b>				
5	Are the	signal leads connected	l to the correct l	OAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter p	oroperly	<b>✓</b>				
7	Does the	instrument shelter h	ave a stable pow	er source?	<b>✓</b>				
8	Is the in	strument shelter temp	perature control	led?	<b>✓</b>				
9	Is the mo	et tower stable and gr	ounded?			<b>Stable</b>		Grounded	
10	Is the sa	mple tower stable and	d grounded?			<u> </u>		<u> </u>	
11	Tower c	omments?							
nat	ural or m	additional explanatio an-made, that may al perature, and AMoN ar	ffect the monitor	ing parameters	s:		g conditions liste	ed above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 ROM406 Technician | Eric Hebert Site Visit Date 08/04/2015 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** 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 V Humidity sensor translator Surge protector** П П **V V UPS Solar radiation translator ~ V** Tipping bucket rain gauge **Lightning protection device** ~ $\checkmark$ **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 V** DataView2 **SSRF V ✓ V V Site Ops Manual HASP V V Field Ops Manual Calibration Reports V ✓** 3/11/2015 Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Flow and 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 ROM406 Technician Eric Hebert Site Visit Date 08/04/2015 Site ID Site operation procedures Trained by ARS on site Has the site operator attended a formal CASTNET training ✓ course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET **V** 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 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? **Compliant QC Check Performed** Frequency **Multi-point Calibrations V V** Monthly and semiannually **V V Automatic Zero/Span Tests** Daily **V V** Every 2 weeks Manual Zero/Span Tests **V** Daily **Automatic Precision Level Tests V Manual Precision Level Test V Analyzer Diagnostics Tests ✓ V** Every 2 weeks **In-line Filter Replacement (at inlet) V V** N/A In-line Filter Replacement (at analyze **V V** Sample Line Check for Dirt/Water Weekly **~ V** Semiannually **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 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:

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

reported? If yes, how?

The ozone analyzer display is indicating a low flow alarm for cell B. The analyzer is functioning properly and the flow meter is likely suspect.

✓

Dataview

#### Field Systems Data Form F-02058-1500-S9-rev002 ROM406 Technician Eric Hebert Site Visit Date 08/04/2015 Site ID **Site operation procedures** Is the filter pack being changed every Tuesday as scheduled? Filter changed various times Are the Site Status Report Forms being completed and filed correctly? no longer required Are data downloads and backups being performed as scheduled? **✓** SSRF 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? **V** 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 **Frequency Compliant V** ✓ Semiannually **Multi-point MFC Calibrations V** Weekly Flow System Leak Checks **Filter Pack Inspection V** Weekly **Flow Rate Setting Checks V** Weekly **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **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 site operator is doing a very good job performing the site duties and expressed an interest in trying to improve any deficiencies. The sample flow rate systems for both the dry deposition and ozone sample trains were explained during the audit at the request of the site operator. Although gloves are not used to handle the filter pack, the operator is careful to touch only the bag and caps and not the filter.

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID

ROM406

Technician Eric Hebert

Site Visit Date 08/04/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Environmental Sys Corp	8816	2025	90535
Elevation	Elevation	1	None	None
flow rate	Tylan	FC280AV	AW9403024	03393
Infrastructure	Infrastructure	none	none	none
Met tower	Rohn	unknown	none	none
MFC power supply	Tylan	RO-32	illegible	none
Ozone	ThermoElectron Inc	49i A3NAA	1030745085	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	CM08460008	none
Printer	Hewlett Packard	842C	unknown	none
Sample Tower	Aluma Tower	В	none	illegible
Shelter Temperature	ARS	unknown	051	none
Shield (2 meter)	RM Young	unknown	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	17079	none
Zero air pump	Werther International	PC70/4	531392	none

#### **DAS Data Form DAS Time Max Error:** 0.13 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 2600 THR422 Sandy Grenville 08/04/2015 DAS Primary Das Date: 8 /5 /2015 **Audit Date** 8 /5 /2015 Datel **Parameter** DAS Mfg 13:59:32 13:59:40 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 217 Das Day: 217 **Audit Day** Tfer ID 01320 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 0.0002 0.0004 0.0002 0.0004 Fluke **Parameter** DAS Mfg Tfer Desc. DVM **Serial Number** 95740135 01311 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 2 0.1000 0.0999 0.1000 0.0001 2 0.3000 0.2998 0.2999 V V 0.0001 2 0.5000 0.4997 0.4998 V V 0.0001 2 0.7000 V V 0.0002 0.6996 0.6998 V V 2 0.9000 0.8994 0.8998 0.0004 2 1.0000 0.9993 0.9997 V V 0.0004

## Flow Data Form

Mfg Serial Number Ta Site Technician		hnician	Site Visit I	Oate Paran	neter	Owner ID			
Tylan	AW022130	004	THR422	Sar	ndy Grenville	08/04/2015	flow ra	te	none
Mfg	Tylan				Mfg	BIOS	P	Parameter Flow Rate	
SN/Owner ID	FP902022	00042			Serial Number	103471	1	fer Desc. nex	cus
Parameter	MFC power su	oply		1	Tfer ID	01420			
					Slope	0.	96664 Int	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Co</b>	rrCoff	0.99996
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424 Tfer Desc			
					Tfer ID	01410			
					Slope	0	96664 Int	ercept	0.03078
			Cert Date			rrCoff	0.99996		
			Ľ	Cert Date	ZIC	0/2013	ircon	0.93930	
DAS 1:		<b>DAS 2:</b>			Cal Factor Z		0.18		
A Avg % Diff: 2.32%	A Max % Di 2.38%	A Avg %I	Dif A Max	x % Di	Cal Factor F Rotometer R			11 3.1	
Desc.	Test type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal				PctDifference
primary	pump off	0.000	0.000	-0.27	-0.110	-0.05	1/m	l/m	T ctDifference
primary	leak check	0.000	0.000	-0.26	-0.110	-0.05	1/m	1/m	
primary	test pt 1	2.997	3.070	2.59	1.300	3.00	1/m	1/m	-2.38%
primary	test pt 2	2.998	3.070	2.59	1.301	3.00	1/m	1/m	-2.38%
primary	test pt 3	2.998	3.070	2.59	1.298	3.00	1/m	1/m	-2.21%
	onent Leak Tes	st		Condition			Status pass		
Sensor Compo	onent Tubing C	ondition		Condition	Good		Status	pass	
Sensor Compo	onent Filter Pos	sition		Condition	Poor		Status	Fail	
Sensor Compo	onent Rotomete	er Condition		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	3.5 cm		Status	pass	
Sensor Compo	onent Filter Dep	oth		Condition	-0.3 cm	Status	Fail		
Sensor Compo	onent Filter Azi	muth		Condition	180 deg	Status	Status pass		

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technicia	an	Site Visit Dat	e Parame	eter Owner ID	
ThermoElectron Inc 0	632119500	THR422	Sandy G	renville	08/04/2015	Ozone	none	
Intercept 1.1	94939         Slope:         0.0000           15039         Intercept         0.0000           99994         CorrCoff         0.0000		Seria	l Number ID			arameter ozone fer Desc. Ozone primary stan	
DAS 1:       DAS 2:         A Avg % Diff: A Max % Di       A Avg %Dif       A Max         2.8%       4.1%			Slope Cert Date		0.99384 <b>Inter</b> 6/25/2015 <b>Corr</b>		-	
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	S	ite S	ite Unit	PctDifference	
primary	1	-0.04	0.37	0.	98 ppb			
primary	2	29.93	30.52		.78 ppb		0.85%	
primary	3	49.92	50.64		.41 ppb		-2.43%	
primary primary	5	79.80 110.00	80.70 111.09		.57 ppb 5.50 ppb		-3.88% -4.13%	
Sensor Component		110.00	Condition Go		).50 pp0	Status		
						J 7		
Sensor Component	Battery Backup		<b>Condition</b> Fur	nctioning		Status	pass	
Sensor Component Inlet Filter Condition		Condition Moderately clean			Status	pass		
Sensor Component Offset			Condition 0.1			Status	pass	
Sensor Component	Span		Condition 0.974			Status	pass	
Sensor Component	Zero Voltage		Condition N/A			Status	pass	
Sensor Component	Cell A Freq.		Condition 96.4 kHz			Status	pass	
Sensor Component	Fullscale Voltage		Condition N/A			Status	pass	
Sensor Component	Cell A Noise		Condition 1.5	ondition 1.5 ppb			pass	
Sensor Component	Cell A Flow		Condition 0.6	ondition 0.64 lpm			pass	
<b>Sensor Component</b>				Condition 656.7 mmHg			pass	
Sensor Component	Cell A Tmp.		Condition 29.	ondition 29.7 C			pass	
Sensor Component	Cell B Freq.		<u> </u>	Condition 60.4 kHz			pass	
Sensor Component	Cell B Noise			ndition 1.2 ppb			pass	
Sensor Component	Cell B Flow			oldition 0.68 lpm			pass	
Sensor Component			Condition				pass	
Sensor Component			Condition				pass	
Sensor Component				ndition Not tested			pass	
Sensor Component			Condition				pass	

#### **Temperature Data Form Technician** Site Visit Date Parameter **Owner ID** Mfg Serial Number Ta Site 7974 Sandy Grenville Temperature Climatronics THR422 08/04/2015 none Mfg Extech Parameter Temperature Climatronics Mfg Tfer Desc. RTD H232734 **Serial Number** 01545 **SN/Owner ID** 01227 Tfer ID **Parameter** Temperature Translator **Slope** 1.00343 **Intercept** -0.06409 **DAS 1: DAS 2:** 1/30/2015 1.00000 **Cert Date** CorrCoff Abs Avg Err **Abs Max Er Abs Avg Err Abs Max Er** 0.15 0.20 UseDesc. InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference Test type primary Temp Low Range 0.22 0.28 0.000 0.2 $\mathbf{C}$ -0.07 C Temp Mid Range 25.86 25.84 0.000 25.6 -0.2 primary Temp High Range C primary 49.41 49.31 0.000 49.1 -0.17 Sensor Component | Shield Condition Clean **Status** pass Sensor Component Blower **Condition** Functioning Status pass Sensor Component Blower Status Switch **Condition** N/A Status pass Sensor Component | System Memo Status pass **Condition** See comments

## **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	23.10	23.08	0.000	24.3	C	1.22
primary	Temp Mid Range	22.54	22.53	0.000	24.0	С	1.49
primary	Temp Mid Range	22.94	22.93	0.000	24.1	C	1.18

### **Infrastructure Data For**

Site ID THR422 Technician Sandy Grenville Site Visit Date 08/04/2015

Shelter Make	Shelter Model	Shelter Size
Ekto	8814 (s/n 3028-1)	896 cuft

Sensor Component	Sample Tower Type	Condition	Type B	Status	pass
Sensor Component	Conduit	Condition	N/A	Status	pass
Sensor Component	Met Tower	Condition	Fair	Status	pass
Sensor Component	Moisture Trap	Condition	Not installed	Status	pass
<b>Sensor Component</b>	Power Cables	Condition	Good	Status	pass
<b>Sensor Component</b>	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	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	d Problem
Flow Rate	THR422	Sandy Grenville	08/04/2015	Filter Position	Tylan	1862		✓
TEN C'I 1	. 1	1 1	1	1 (*1, 1 *	1 1.1.	. 11		

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 ozone sample train does not have a means to introduce test gas at the sample inlet. Results of routine zero, span, precision, and any multipoint calibration checks are maintained by the state personnel who perform the tests.

2 Parameter: SitingCriteriaCom

The site is located 200 meters from an interstate rest area, and 300 meters from interstate 94. The rest area can have parked and idling vehicles for extended periods.

3 Parameter: ShelterCleanNotes

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

4 Parameter: PollAnalyzerCom

The ozone analyzer is operated by the state of North Dakota. The sample train contains a glass manifold. There is no means to introduce on-site generated test gas at the sample inlet. A through-the-probe audit was conducted using the EEMS system.

5 Parameter: MetSensorComme

The recorded temperature data is being measured at approximately 2 meters above the ground. The current temperature data are no longer comparable to previous temperature data at this site.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 08/04/2015 THR422 Technician Sandy Grenville Site ID Fryburg NW **USGS Map** NPS Site Sponsor (agency) Map Scale NPS and state of ND **Operating Group Map Date** 38-007-0002 AQS# Climatronics **Meteorological Type** Ozone, SO2, IMPROVE, PM2.5 46.8947 **Air Pollutant Analyzer QAPP** Latitude **Deposition Measurement** dry, wet **QAPP** Longitude -103.3778 850 Land Use prairie **QAPP Elevation Meters** rolling - complex **Terrain QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** 46.894844 Site Telephone **Audit Latitude** Painted Canyon Visitor Center -103.377719 Site Address 1 **Audit Longitude** Exit 32 Interstate 94 Site Address 2 **Audit Elevation** 840 Billings 8.2 County **Audit Declination** Medora, ND City, State **Present** Fire Extinguisher 58645 Zip Code **✓** Mountain **Time Zone First Aid Kit 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 8814 (s/n 3028-1) Ekto **Shelter Size** 896 cuft

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

From Interstate 94 take exit 32 to the Painted Canyon rest area and visitor center. The site is just east of the parking

**✓** Notes

**✓** Notes

lot on a gravel road.

Shelter Clean

**Driving Directions** 

Site OK

## **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID	THR422	<b>Technician</b>	Sandy Grenville	Site Visit Date	08/04/2015

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		<b>✓</b>
Major highway, airport or rail yard	2 km	300 m	
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	200 m	
Small parking lot	100 m		✓
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK  $\Box$ 

**Siting Criteria Comment** 

The site is located 200 meters from an interstate rest area, and 300 meters from interstate 94. The rest area can have parked and idling vehicles for extended periods.

Fi	eld Sy	stems Data Fo	orm		F-02058-1500-S3-rev0					-rev002
Site	e ID	THR422	Technician	Sandy Grenville		Site Visit Date	08/04/2015			
1		d speed and direction fluenced by obstruction		as to avoid	<b>✓</b>	N/A				
2	(i.e. win	d sensors mounted so d sensors should be m tally extended boom > to the prevailing wind	ounted atop the 2x the max dia	e tower or on a	<b>✓</b>	N/A				
3	Are the	tower and sensors plu	mb?		<b>✓</b>	N/A				
4		temperature shields p diated heat sources su			<b>✓</b>					
5	conditio surface	perature and RH sens ns? (i.e. ground below and not steeply sloped g water should be avoi	sensors should . Ridges, hollov	l be natural	<b>✓</b>					
6	Is the so	lar radiation sensor p	lumb?		<b>✓</b>	N/A				
7	Is it site light?	d to avoid shading, or	any artificial o	r reflected	<b>✓</b>	N/A				
8	Is the ra	in gauge plumb?			✓	N/A				
9	Is it site towers,	d to avoid sheltering e etc?	ffects from bui	ldings, trees,	<b>✓</b>	N/A				
10	Is the su facing n	orth?	sited with the g	rid surface	<b>✓</b>	N/A				
11	Is it inc	lined approximately 3	0 degrees?		<b>✓</b>	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:

The recorded temperature data is being measured at approximately 2 meters above the ground. The current temperature data are no longer comparable to previous temperature data at this site.

Fic	eld Systems Data Form		F-02058-1500-S4-rev002
Site	THR422 Technician Sandy Grenville		Site Visit Date 08/04/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	<b>✓</b>	
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?	<b>✓</b>	N/A
6	Is the surface wetness sensor grid clean and undamaged?	<b>✓</b>	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	<b>✓</b>	Signs of wear
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓	
	ride any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	sary	) regarding conditions listed above, or any other features,

### Field Systems Data Form F-02058-1500-S5-rev002 THR422 Technician Sandy Grenville Site Visit Date 08/04/2015 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. 3/8 teflon by 10 meters and glass manifold Describe dry dep sample tube. 3/8 teflon by 12 meters At inlet and analyzer 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:

The ozone analyzer is operated by the state of North Dakota. The sample train contains a glass manifold. There is no means to introduce on-site generated test gas at the sample inlet. A through-the-probe audit was conducted using the EEMS system.

# Field Systems Data Form

F-02058-1500-S6-rev002

e ID	THR422	Technician	Sandy Grenville		Site Vis	sit Date 08/04/20	)15		
DAS, se	nsor translators, and t	nerinheral equi	nment operation	ıs ar	ıd maintena	ance			
Do the I well mai	OAS instruments appeintained?	ear to be in good	l condition and	<b>✓</b>					
		DAS operations	al? (printers,	<b>✓</b>					
			through	<b>✓</b>	Met sensors	s only			
Are the signal connections protected from the weather and well maintained?				<b>✓</b>					
Are the signal leads connected to the correct DAS channel?									
		ors, and shelter j	properly	<b>✓</b>					
Does the	e instrument shelter h	ave a stable pov	ver source?	<b>✓</b>					
Is the in	strument shelter temp	perature control	lled?	✓					
Is the met tower stable and grounded?					<b>Stable</b>		Grounded		
Is the sa	mple tower stable and	d grounded?							
Tower c	omments?								
					y) regardin	g conditions list	ed above, or a	any other features,	
	DAS, ser  Do the I well mai Are all the modem, Do the alightning Are the well mai Are the grounder Does the Is the in Is the sar Tower convide any	DAS, sensor translators, and the DAS instruments apperwell maintained?  Are all the components of the modem, backup, etc)  Do the analyzer and sensor siglightning protection circuitry. Are the signal connections prowell maintained?  Are the DAS, sensor translated grounded?  Does the instrument shelter has the instrument shelter temporary in the sample tower stable and grounded. Tower comments?	DAS, sensor translators, and peripheral equively be a possible of the DAS instruments appear to be in good well maintained?  Are all the components of the DAS operation modem, backup, etc)  Do the analyzer and sensor signal leads passiblightning protection circuitry?  Are the signal connections protected from the well maintained?  Are the signal leads connected to the correct of the correct of the product of the product of the instrument shelter have a stable power of the instrument shelter temperature control of the sample tower stable and grounded?  Is the met tower stable and grounded?  Tower comments?	DAS, sensor translators, and peripheral equipment operation  Do the DAS instruments appear to be in good condition and well maintained?  Are all the components of the DAS operational? (printers, modem, backup, etc)  Do the analyzer and sensor signal leads pass through lightning protection circuitry?  Are the signal connections protected from the weather and well maintained?  Are the signal leads connected to the correct DAS channel?  Are the DAS, sensor translators, and shelter properly grounded?  Does the instrument shelter have a stable power source?  Is the instrument shelter temperature controlled?  Is the met tower stable and grounded?  Tower comments?	DAS, sensor translators, and peripheral equipment operations and well maintained?  Are all the components of the DAS operational? (printers, modem, backup, etc)  Do the analyzer and sensor signal leads pass through lightning protection circuitry?  Are the signal connections protected from the weather and well maintained?  Are the signal leads connected to the correct DAS channel?  Are the DAS, sensor translators, and shelter properly grounded?  Does the instrument shelter have a stable power source?  Is the instrument shelter temperature controlled?  Is the sample tower stable and grounded?  Tower comments?	DAS, sensor translators, and peripheral equipment operations and maintens well maintained?  Are all the components of the DAS operational? (printers, modem, backup, etc)  Do the analyzer and sensor signal leads pass through lightning protection circuitry?  Are the signal connections protected from the weather and well maintained?  Are the signal leads connected to the correct DAS channel?  Are the DAS, sensor translators, and shelter properly grounded?  Does the instrument shelter have a stable power source?  Is the instrument shelter temperature controlled?  Stable  Is the sample tower stable and grounded?  Tower comments?	DAS, sensor translators, and peripheral equipment operations and maintenance  Do the DAS instruments appear to be in good condition and well maintained?  Are all the components of the DAS operational? (printers, modem, backup, etc)  Do the analyzer and sensor signal leads pass through lightning protection circuitry?  Are the signal connections protected from the weather and well maintained?  Are the signal leads connected to the correct DAS channel?  Are the DAS, sensor translators, and shelter properly grounded?  Does the instrument shelter have a stable power source?  Is the instrument shelter temperature controlled?  Stable  Is the sample tower stable and grounded?  Tower comments?	DAS, sensor translators, and peripheral equipment operations and maintenance  Do the DAS instruments appear to be in good condition and well maintained?  Are all the components of the DAS operational? (printers, modem, backup, etc)  Do the analyzer and sensor signal leads pass through lightning protection circuitry?  Are the signal connections protected from the weather and well maintained?  Are the signal leads connected to the correct DAS channel?  Are the DAS, sensor translators, and shelter properly grounded?  Does the instrument shelter have a stable power source?  Is the instrument shelter temperature controlled?  Stable  Grounded  Is the met tower stable and grounded?  Tower comments?  Stable  Grounded  Tower comments?	

#### **Field Systems Data Form** F-02058-1500-S7-rev002 THR422 Technician Sandy Grenville Site Visit Date 08/04/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No Yes N/A Yes No N/A **V ✓** Wind speed sensor **Data logger V** ✓ П Wind direction sensor **Data logger V** ✓ П Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V** П ✓ Solar radiation sensor Modem П П **V ~ Printer** Surface wetness sensor $\checkmark$ П **V** Wind sensor translator Zero air pump **V V** Filter flow pump **Temperature translator** П **V ~ Humidity sensor translator Surge protector V 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 ✓ 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? ✓ Dataview Flow section only 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 THR422 Technician Sandy Grenville Site Visit Date 08/04/2015 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 V** N/A **Confirm Reasonableness of Current Values V V 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** N/A **Automatic Zero/Span Tests V** Every 2 weeks Manual Zero/Span Tests **V** N/A **Automatic Precision Level Tests V** Every 2 weeks **Manual Precision Level Test V V** Semiannually **Analyzer Diagnostics Tests V** Quarterly **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **V** Semiannually **Zero Air Desiccant Check** Not performed 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 Not performed complete sample train including all filters? 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 ozone sample train does not have a means to introduce test gas at the sample inlet. Results of routine zero, span, precision, and any

multipoint calibration checks are maintained by the state personnel who perform the tests.

Fi	Field Systems Data Form						F-02058-1500-S9-rev002			
Sit	e ID	THR422	Techni	cian	Sandy Grenville		Site Visit Date	08/04/2015		
	Site ope	ration procedures								
1	Is the fil	ter pack being change	d every T	uesda	ay as scheduled?	<b>V</b>	Filter changed morin	nings		
2	2 Are the Site Status Report Forms being completed and filed correctly?					<b>✓</b>				
3	Are data downloads and backups being performed as scheduled?						No longer required			
4	4 Are general observations being made and recorded? How?					<b>✓</b>	SSRF			
5	5 Are site supplies on-hand and replenished in a timely fashion?					<b>✓</b>				
6	6 Are sample flow rates recorded? How?					<b>✓</b>	SSRF			
7	7 Are samples sent to the lab on a regular schedule in a timely fashion?				<b>✓</b>					
8		ers protected from con oping? How?	taminatio	ı du	ring handling	✓	One set of gloves only			
9		site conditions reporte ons manager or staff?	d regular	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			✓		
J	Filter Pac	k Inspection								
]	Flow Rate Setting Checks Weekly				✓					
•	Visual Check of Flow Rate Rotometer ✓ Weekly				✓					
]	In-line Filter Inspection/Replacement ✓ As needed				✓					
5	Sample Line Check for Dirt/Water									
		dditional explanation n-made, that may affe					regarding condition	ons listed above, or a	any other features,	

## Field Systems Data Form

### F-02058-1500-S10-rev002

Site ID

THR422

Technician Sandy Grenville

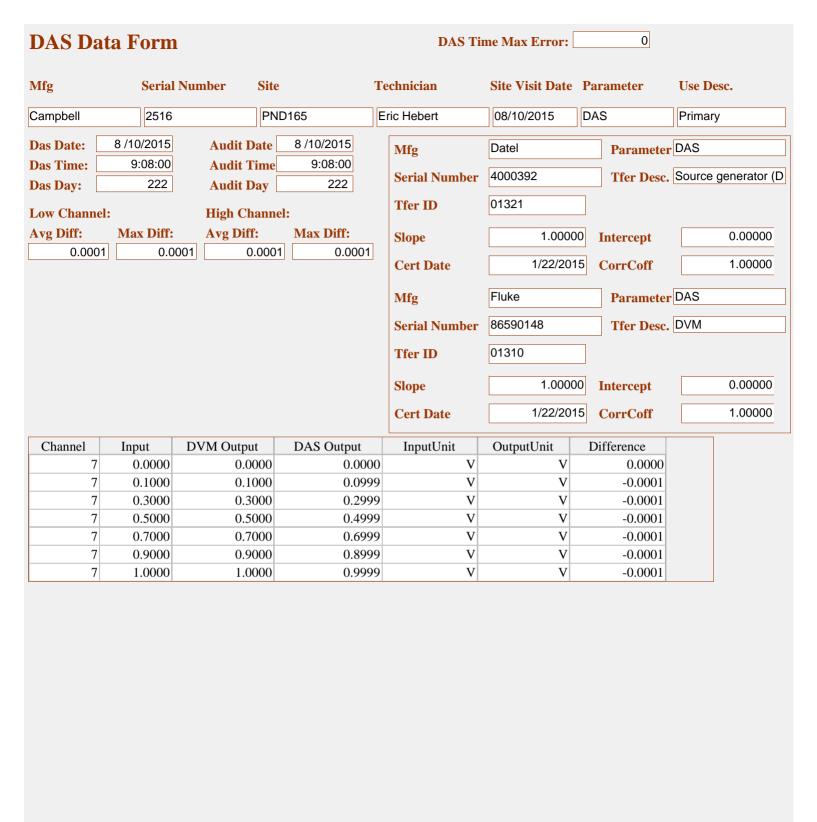
Site Visit Date 08/04/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	65606	5CB1520H68	none
DAS	Environmental Sys Corp	8816	2600	90656
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	049400004441	03634
flow rate	Tylan	FC280SAV	AW02213004	none
Infrastructure	Infrastructure	none	none	none
Mainframe	Climatronics	100081	1911	none
Mainframe power supply	Climatronics	101074	unknown	none
Met tower	Rohn	unknown	none	none
MFC power supply	Tylan	RO-32	FP902022	00042
Modem	US Robotics	14.4 fax modem	9244894	none
Ozone	ThermoElectron Inc	49i A3NAA	0632119500	none
Sample Tower	Aluma Tower	В	AT-81077-J5	none
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	Climatronics	100093	7974	none
Temperature Translator	Climatronics	100088-2	217	01545
Zero air pump	Thomas	607CA22C	039500000348	none

# Site Inventory by Site Visit

Site V	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
PND	165-Eric H	lebert-08/10/2015				
1	8/10/2015	Computer	Dell	000257	D520	unknown
2	8/10/2015	DAS	Campbell	000403	CR3000	2516
3	8/10/2015	Elevation	Elevation	None	1	None
4	8/10/2015	Filter pack flow pump	Thomas	03631	107CAB18	049400004449
5	8/10/2015	Flow Rate	Apex	000549	AXMC105LPMDPCV	illegible
6	8/10/2015	Infrastructure	Infrastructure	none	none	none
7	8/10/2015	Modem	Raven	06608	V4221-V	0844349088
8	8/10/2015	Noy	Teledyne	000807	T200U	112
9	8/10/2015	Ozone	ThermoElectron Inc	000619	49i A1NAA	1009241791
10	8/10/2015	Ozone Standard	ThermoElectron Inc	000329	49i A3NAA	0622717853
11	8/10/2015	Precipitation	Texas Electronics	none	TR-525i-HT	59576-414
12	8/10/2015	Relative Humidity	Vaisala	05026	HMP50	Z4320017
13	8/10/2015	Sample Tower	Aluma Tower	000055	В	AT-81213-J12
14	8/10/2015	Shelter Temperature	Campbell	none	107-L	none
15	8/10/2015	Siting Criteria	Siting Criteria	None	1	None
16	8/10/2015	Solar Radiation	Licor	missing	LI-200	illegible
17	8/10/2015	Solar Radiation Translator	RM Young	02532	70101-X	none
18	8/10/2015	Surface Wetness	RM Young	illegible	58101	none
19	8/10/2015	Temperature	RM Young	06539	41342	14800
20	8/10/2015	Temperature2meter	RM Young	06305	41342VC	12544
21	8/10/2015	Wind Direction	RM Young	03924	AQ05103-5	21835wdr
22	8/10/2015	Wind Speed	RM Young	03924	AQ05103-5	21835wsp
23	8/10/2015	Zero air system	Teledyne	000773	701H	609



## Flow Data Form

Mfg	Se	erial Numl	ber Ta	Site	Tec	chnician	Site Visit I	Date Paran	neter	Owner ID
Apex	il	legible		PND165	Er	ic Hebert	08/10/201	Flow F	Rate	000549
						Mfg	BIOS	I	Parameter Flo	ow Rate
						Serial Number	131818	T	fer Desc. Bl	OS 220-H
						Tfer ID	01417			
						Slope	1.	00316 Int	ercept	-0.00540
						Cert Date	1/	7/2015 <b>Co</b>	rrCoff	1.00000
DAS 1:		]	DAS 2:		L	Cal Factor Z	Zero	-0.	06	
A Avg % Diff:	A Ma	x % Di	A Avg %l	Dif A Max	x % Di	Cal Factor F	ull Scale	0.5	96	
1.74%		1.95%				Rotometer R	Reading:	3.	65	
Desc.	Те	st type	Input l/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSigna	ll PctDifference
primary	pump		0.000	0.000	0.00	0.000	-0.05	l/m	l/m	
primary	leak c		0.000	0.000	0.02	0.000	-0.04	l/m	l/m	
primary	test p		3.055	3.050	3.01	0.000	3.00	1/m	1/m	-1.64%
primary	test p		3.058	3.050	3.02	0.000	3.00	1/m	1/m	-1.64%
primary	test p		3.074	3.070	3.02	0.000	3.01	1/m	1/m	-1.95%
Sensor Compo	onent	Leak Test			Conditio	on		Statu	pass	
Sensor Compe	onent	Filter Azim	uth		Conditio	180 deg		Statu	pass	
Sensor Compo	onent	Filter Dept	h		Conditio	4.0 cm		Statu	pass	
Sensor Compo	onent	Filter Posit	tion		Conditio	on Good		Statu	pass	
Sensor Compo	onent	Moisture F	resent		Conditio	No moisture p	resent	Statu	pass	
Sensor Compo	onent	Rotometer	· Condition	1	Conditio	Clean and dry		Statu	pass	
Sensor Component System Memo			Conditio	on		Statu	pass			
Sensor Compo	onent	Tubing Co	ndition		Conditio	Good		Status pass		
Sensor Compo	onent	Filter Dista	ance		Conditio	5.0 cm		Statu	pass	

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technician	ı	Site Visit Date	Parame	eter Owner ID
ThermoElectron Inc 1	009241791	PND165	Eric Heber	t	08/10/2015	Ozone	000619
Intercept 0.1	88497 Slope: 6680 Intercept 9999 CorrCoff	0.00000 0.00000	Serial I	Number	ThermoElectron 49CPS-70008-3		er Desc. Ozone primary stan
DAS 1: A Avg % Diff: A Ma  1.1%	DAS 2: x % Di	6Dif A Max 9	% Di Cert Da	ate	1.0095	Inter	
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	Si	te Sit	te Unit	PctDifference
primary	1	0.17	0.40	0.4	11		
primary	2	29.01	28.97	28.	1.1		-0.93%
primary	3	50.64	50.40	49.			-0.89%
primary primary	5	74.92 106.27	74.45 105.50	73. 103	- 11		-1.06% -1.52%
		100.27		1	.90 ppo	G	
Sensor Component	Cell B Noise		<b>Condition</b> 0.3 p	рр		Status	pass
<b>Sensor Component</b>	Cell B Tmp.		Condition			Status	pass
<b>Sensor Component</b>	Fullscale Voltage		<b>Condition</b> N/A			Status	pass
Sensor Component	Inlet Filter Conditio	n	Condition Clear	1		Status	pass
Sensor Component	Line Loss		<b>Condition</b> Not to	ested		Status	pass
Sensor Component	Offset		<b>Condition</b> -0.60			Status	pass
Sensor Component	Span		Condition 1.033	}		Status	pass
Sensor Component	Cell B Freq.		<b>Condition</b> 91.2	kHz		Status	pass
Sensor Component	System Memo		Condition See	comments		Status	pass
Sensor Component	Sample Train		Condition Good			Status	pass
Sensor Component	Cell B Pressure		Condition			Status	pass
Sensor Component	Cell B Flow		<b>Condition</b> 0.64	lpm		Status	pass
Sensor Component	Cell A Tmp.		Condition 33.1	С		Status	pass
Sensor Component	Cell A Pressure		Condition 568.6	mmHg		Status	pass
Sensor Component	Cell A Noise		Condition 0.8 p	pb		Status	pass
Sensor Component	Cell A Freq.		Condition 100.2	2 kHz		Status	pass
Sensor Component	Cell A Flow		<b>Condition</b> 1.45	lpm		Status	pass
Sensor Component	Battery Backup		Condition N/A			Status	pass
Sensor Component	Zero Voltage		Condition N/A			Status	pass

#### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID PND165 Wind Speed 03924 RM Young 21835wsp Eric Hebert 08/10/2015 RM Young Parameter wind speed Mfg Tfer Desc. wind speed motor (h **Serial Number** 01262 Tfer ID 1.00000 0.00000 **Slope Intercept** 54461 Prop or Cups SN 0.2 **to** 0.3 **Prop or Cups Torque Cert Date** 12/22/2014 CorrCoff 1.00000 **Prop Correction Fact** 0.0512 **DAS 1: DAS 2:** Low Range Low Range **High Range High Range** 0.05 0.00% Abs Avg Err 0.20 0.00% Abs Max Er Out V UseDescription: Input Device Input RPM Input m/s DAS m/s Diff/ % Diff Diff WsM 0 0.20 0.0 0.0 -0.20 primary none 01262 200 1.02 0.0 1.0 0.00 primary 01262 400 2.05 0.0 2.1 0.00 primary 800 4.10 0.0 4.1 0.00 primary 01262 0.0 6.1 0.00% primary 01262 1200 6.14 12.29 0.0 12.3 0.00% primary 01262 2400 primary 01262 4000 20.48 0.0 20.5 0.00% 01262 9400 48.13 0.0 48.1 0.00% primary Sensor Component | System Memo **Condition Status** pass Sensor Component | Sensor Plumb Condition Plumb **Status** pass Sensor Component Sensor Heater **Condition** N/A **Status** pass Sensor Component Prop or Cups Condition **Condition** Good **Status** pass Sensor Component | Condition **Condition** Good **Status** pass Condition Good Status pass **Sensor Component** Torque

## **Wind Direction Data Form**

Mfg	Serial Nu	mber Ta	Site		Tec	hnician		Site Visit	Date	Param	eter	Owner II	)
RM Young	21835wdı	r	PND16	5	Eri	c Hebert		08/10/20	15	Wind D	Direction	03924	
						Mfg		RM Youn	g	P	arameter	wind direction	
						Serial Num	ıber			T	fer Desc.	wind direction v	vheel
						Tfer ID		01264		]			
=									4 0000	J + .	,	0.000	200
=	N/A 5 <b>to</b>	<b>C.</b> A	A. Align.	deg. true:		Slope			1.00000		ercept	0.000	
VaneTorque_	5 <b>to</b>	10	L	339		Cert Date		1/	16/201	5 Cor	rCoff	1.000	000
						Mfg		Ushikata		P	arameter	wind direction	
						Serial Num	ıber	191832		Т	fer Desc. [t	ransit	
						Tfer ID		01272					
						Slope			1.00000	] Inte	ercept	0.000	200
						_				_	_		
						Cert Date		2/	19/201	Cor	rCoff	1.000	J00
	DAS 1:		]	DAS 2:									
	Orientation	Linearit		Orientation	Li	inearity:							
Abs Avg Err	1.0		2.0										
Abs Max Er	2		4	1									
UseDescription		I1	nput Raw		уС	Output V	Outp	ut Deg.	Differ		Change	Error	
primary	01264		0			0.000		1		1	48	3	
primary	01264 01264		45 90	<b>V</b>		0.000		42 89		3	41 47	-4	
primary primary	01264		135			0.000		89 131		4	47	-3	
primary	01204		180	<u> </u>		0.000		178		2	47	2	
primary	01204		225			0.000		224		1	46	1	
primary	01264		270			0.000		268		2	44	-1	
primary	01264		315	<u> </u>		0.000		313		2	45	0	
primary	01204		89			0.000		89		0	43	0	
primary	01272		179			0.000		178		1		1	
primary	01272		269			0.000		268		1		1	
primary	01272		359			0.000		1		2		2	
Sensor Comp				Cor	nditio	n Good				Status	pass	2)	
Sensor Comp	ponent Condition	n		Cor	nditio	n Good				Status	pass		]
													]
	ponent Sensor					n N/A				Status			_
Sensor Component Sensor Plumb				Cor	nditio	n Plumb				Status	pass		
Sensor Comp	Sensor Component Vane Condition				nditio	<b>n</b> Good		Status pass		pass			
Sensor Comp	ponent Torque			Cor	nditio	n Good				Status	pass		
Sensor Comp	ponent System	Memo		Cor	ndition					Status	pass		

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 14800 PND165 Eric Hebert 08/10/2015 Temperature 06539 Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.33 0.53 UseDesc. Test type InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference primary Temp Low Range -0.07 0.15 0.000 0.68 $\mathbf{C}$ 0.53 C Temp Mid Range 20.27 20.37 0.000 20.36 -0.01 primary 43.41 C -0.46 primary Temp High Range 43.90 43.87 0.000 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Status Switch **Condition** N/A Status pass Status pass **Sensor Component** Blower **Condition** Functioning Sensor Component System Memo **Condition** See comments Status pass

#### 2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg PND165 Eric Hebert 06305 RM Young 12544 08/10/2015 Temperature2meter Mfg Extech **Parameter** Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 Tfer ID **Slope** 1.00564 **Intercept** -0.21981 **DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.35 0.67 Test type UseDescription InputTmpRaw InputTmpCorrected | OutputTmpSignal | OutputSignalEng | OSE Unit Difference primary Temp Low Rang -0.07 0.15 0.000 $0.05\,\mathrm{C}$ -0.1 Temp Mid Rang 20.27 20.37 0.000 20.10 C -0.27 primary primary Temp High Rang 43.90 43.87 0.000 43.20 C -0.67Sensor Component Blower Status Switch **Condition** N/A **Status** pass Sensor Component System Memo Status pass **Condition Sensor Component** Blower **Condition** Functioning **Status** pass Sensor Component | Properly Sited Condition Properly sited Status pass Condition Clean Status pass Sensor Component | Shield

#### **Humidity Data Form** Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg Site PND165 Eric Hebert 08/10/2015 Relative Humidity 05026 Vaisala Z4320017 Mfg Rotronic Parameter Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 Tfer ID 4.53330 **Slope** 0.91000 **Intercept Cert Date** 1/21/2015 0.99800 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 2.2 5.9 Abs Avg Err 3.3 5.9 Abs Max Er UseDesc. Test type Device Input RH GTL Raw RH Corr. DAS Volts DAS %RH Difference RH Low Range Hygroclip 0.000 0.7 primary 23.1 23.1 16.1 16.8 RH Low Range -2.6 primary Hygroclip 32.8 34.0 32.8 0.000 30.2 primary RH Low Range Hygroclip 52.9 56.4 52.9 0.000 49.6 -3.3 93.6 83.1 93.6 0.000 87.7 -5.9 primary RH High Range Hygroclip Sensor Component | System Memo Condition Status pass Status pass Sensor Component Blower **Condition** N/A Sensor Component Blower Status Switch **Condition** N/A Status pass **Sensor Component** RH Filter **Condition** Clean **Status** pass Sensor Component | Shield **Condition** N/A **Status** pass

#### **Solar Radiation Data Form** Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg PND165 Eric Hebert 08/10/2015 Solar Radiation Licor illegible missing Mfg **Eppley** Parameter solar radiation RM Young Mfg Tfer Desc. SR transfer sensor 34341F3 **Serial Number** 02532 **SN/Owner ID** none 01245 Tfer ID **Parameter** Solar Radiation Translator 0.00000 **Slope** 1.00000 **Intercept DAS 1: DAS 2:** 1/16/2015 1.00000 % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max **Cert Date** CorrCoff 1.2% 1.2% 0.0% 0.0% Tfer Corr UseDescription Measure Date MeasureTime PctDifference Tfer Raw DAS w/m2 primary 8/10/2015 10:00 731 731 716 -2.1% -1.7% 11:00 862 862 847 primary 8/10/2015 primary 8/10/2015 12:00 940 940 928 -1.3% -0.4% 8/10/2015 13:00 977 977 973 primary 1.2% 999 8/10/2015 14:00 987 987 primary 15:00 450 450 460 2.2% primary 8/10/2015 495 495 560 primary 8/10/2015 16:00 13.1% 430 6.5% 8/10/2015 17:00 430 458 primary Sensor Component | Sensor Level **Condition** Level Status pass Sensor Component | Sensor Clean **Condition** Clean **Status** pass Sensor Component | Properly Sited Condition Properly sited Status pass Sensor Component | System Memo Status pass Condition

# **Precipitation Data Form**

Mfg		Serial N	Number Ta	Site		Te	echnician		Site	Visit Date	Paramo	eter		Owner ID
Texas Electron	nics	59576-	414	PND1	65	Eı	ric Hebert		08/	10/2015	Precipit	ation		none
							Mfg		PMF	)	Pa	ıram	eter Pr	ecipitation
DAS 1:			<b>DAS 2:</b>				Serial Nun	nber	EW-	06134-50	Tf	er D	esc. 25	60ml graduate
A Avg % Diff		<b>Iax % D</b> 6.0		Dif .	A Max	% Di	Tfer ID		0125	50				
	J L						Slope			1.0000	0 Inte	rcept	;	0.00000
							Cert Date			9/5/200	Cor	rCoff	f	1.00000
UseDesc.	Tes	t type	TferVolume	Iteration	on Tin	nePerTip	Eq.Ht	DAS	eng	Eq.HtUnit	OSE Ur	nit T	ferUnit	ts PctDifference
primary	test 1		231.5	1		- 10 sec	0.50	0.5	50	in	in		ml	0.0%
primary	test 2		231.5	2	8	- 10 sec	0.50	0.4	47	in	in		ml	-6.0%
Sensor Com	poner	Syste	m Memo			Condition	on				Status	pass	3	
Sensor Com	poner	Senso	or Heater			Condition	on Not teste	d			Status	pass	}	
Sensor Com	poner	Prope	erly Sited			Condition	on Properly	sited			Status	pass	3	
Sensor Com	poner	t Gaug	e Drain Scree	n		Condition	on Installed				Status	pass	<b>i</b>	
Sensor Com	poner	Level				Condition	on Level				Status	pass	<b>i</b>	
Sensor Com	poner	t Gaug	e Clean			Condition	on Clean				Status	pass	<b>3</b>	
Sensor Com	poner	Funne	el Clean			Condition	on Clean				Status	pass	;	
Sensor Com	poner	Condi	tion			Condition	Good				Status	pass	;	
Sensor Com	poner	t Gaug	e Screen			Condition	on Installed				Status	pass	}	

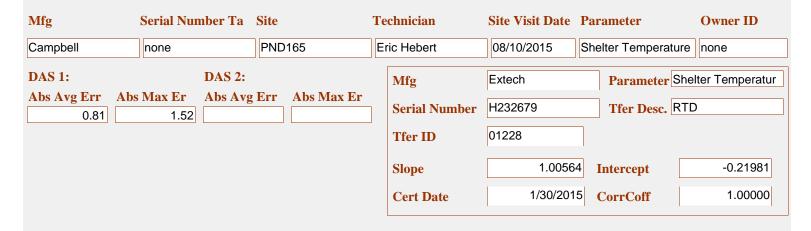
### **Surface Wetness Data Form** Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter Owner ID RM Young PND165 Eric Hebert none 08/10/2015 Surface Wetness illegible Parameter surface wetness Ohmite Mfg Tfer Desc. decade box 296-1200 **Serial Number** 01210 Tfer ID

### **☐** Manual Test Pass

UseDescription	Test Type	Tfer kOhms	OutputSignal	DAS eng	OutputSignalEngUni	TferUnits	OutputSignalUnit
primary	dry	N/A	0.000	0.01	V	N/A	V
primary	wet	N/A	0.000	1.01	V	N/A	V

<b>Sensor Component</b>	Grid Orientation	<b>Condition</b> North	Status pass
<b>Sensor Component</b>	Grid Clean	Condition Clean	Status pass
<b>Sensor Component</b>	Grid Angle	Condition about 45 deg	Status pass
<b>Sensor Component</b>	Grid Condition	Condition Poor	Status Fail
<b>Sensor Component</b>	Properly Sited	Condition Properly sited	Status pass
Sensor Component	System Memo	Condition See comments	Status pass
<b>Sensor Component</b>	Grid Type	Condition Grid without holes	Status pass

## **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	25.77	25.84	0.000	26.3	C	0.47
primary	Temp Mid Range	24.10	24.18	0.000	25.7	С	1.52
primary	Temp Mid Range	25.70	25.77	0.000	26.2	С	0.43

### **Infrastructure Data For**

Si	te ID	PND165	Technician	Eric Hebert	Site Visit Date	08/10/2015	
	Shelter M	ake	Shelter Model	She	lter Size		
	Ekto		8810 (s/n 2149-	22) 640	cuft		
		Mark Company and C			NE SERVICIO DE LA COMPANSIONE DE LA CO		

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

## **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	Problem
Ozone This analyzer diagnostic	PND165	Eric Hebert le the manufacturer's	08/10/2015 s recommended	Cell A Flow value.	ThermoElectron	3360		
Surface Wetness The surface wetness ser	PND165 nsor did not resp	Eric Hebert ond to one drop of v	08/10/2015 water placed in t	System Memo he center of the grid	RM Young d.	2855		
Temperature The temperature sensor	PND165 is mounted dire	Eric Hebert	08/10/2015 er roof.	System Memo	RM Young	2851		

## **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator does not use gloves to handle the filter. He handles the filter by the stem and carries it upside down to reduce the chance of contamination from the shelter to the tower.

2 Parameter: DasComments

The site operator recently replaced the shelter air conditioner.

3 Parameter: SitingCriteriaCom

There is new construction at the entrance to the access road approximately 200 meters to the west of the site. The area is to be used as a staging and rock crushing site for the road improvement project scheduled to take place for the next two years.

4 Parameter: ShelterCleanNotes

The shelter is well maintained.

5 Parameter: MetSensorComme

The RH sensor is not mounted in a shield, but rather in a plastic funnel taped to the meteorological tower. Both the RH and temperature sensors are mounted above the shelter. The surface wetness sensor grid is in poor condition and only responded as wet after excessive amounts of water were applied to the entire surface of the grid.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 08/10/2015 Technician Eric Hebert PND165 Site ID Fremont Lake South **USGS Map EPA** Site Sponsor (agency) Map Scale Private / BLM **Operating Group Map Date** 56-035-9991 AQS# R.M. Young **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude 42.9214 dry, wet **QAPP** Longitude -109.7900 **Deposition Measurement** 2388 Land Use range **QAPP Elevation Meters** 12.75 **Terrain** complex **QAPP Declination** Marginally 2/22/2006 Conforms to MLM **OAPP Declination Date** (307) 367-6584 42.929031 **Site Telephone Audit Latitude** Skyline Drive -109.787796 Site Address 1 **Audit Longitude** Fremont Lake Rd. Site Address 2 **Audit Elevation** 2386 Sublette 11.4 County **Audit Declination** Pinedale, WY City, State **Present** Fire Extinguisher 82941 No inspection date 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 (s/n 2149-22) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is well maintained. Shelter Clean **✓** Notes Site OK From Rock Springs take route 191 north to Pinedale. At the south edge of town turn right onto Fremont Lake Rd.

Continue approximately 6.5 miles on the main road, past Fremont Lake. The road changes to Skyline Drive. The

site is visible on a ridge on the right. There is a dirt access road to the site in the summer.

**Driving Directions** 

### **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID PND165 Technician Eric Hebert Site Visit Date 08/10/2015

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		<b>✓</b>
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 Comment** 

There is new construction at the entrance to the access road approximately 200 meters to the west of the site. The area is to be used as a staging and rock crushing site for the road improvement project scheduled to take place for the next two years.

### F-02058-1500-S3-rev002 Field Systems Data Form Technician Eric Hebert Site Visit Date 08/10/2015 Site ID PND165 **✓** 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? ✓ Over shelter Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc? ✓ Over 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) **V** Is the solar radiation sensor plumb? **✓** Is it sited to avoid shading, or any artificial or reflected **✓** Is the rain gauge plumb? **✓** Is it sited to avoid sheltering effects from buildings, trees, towers, etc? **✓** 10 Is the surface wetness sensor sited with the grid surface facing north? 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 RH sensor is not mounted in a shield, but rather in a plastic funnel taped to the meteorological tower. Both the RH and temperature sensors are mounted above the shelter. The surface wetness sensor grid is in poor condition and only responded as wet after excessive amounts of water were applied to the entire surface of the grid.

Fie	eld Sy	stems Data	Form			F-020	058-1500-S4-rev002
Site	e ID	PND165	Technician Eric	c Hebert	S	ite Visit Date 08/10/2015	
1		ne meterological se n, and well mainta	ensors appear to be inta nined?	act, in good			
2	Are all reporting		sensors operational on	lline, and			
3	Are the	shields for the ten	perature and RH sens	ors clean?			
4	Are the	aspirated motors	working?	V	•		
5	Is the so		or's lens clean and free	•			
6	Is the su	ırface wetness sens	sor grid clean and und	amaged?	•		
7		sensor signal and n, and well mainta	power cables intact, in ained?	_			
8		sensor signal and e elements and wel	power cable connection Il maintained?	ns protected	<u>1</u>		
Par	rameter		Manufacturer	Model		S/N	Client ID
Ten	nperature		RM Young	41342		14800	06539
Sur	face Wet	ness	RM Young	58101		none	illegible
Ten	nperature	2meter	RM Young	41342VC		12544	06305
Rel	ative Hun	nidity	Vaisala	HMP50		Z4320017	05026
Pre	cipitation		Texas Electronics	TR-525i-HT		59576-414	none
Sol	ar Radiati	on	Licor	LI-200		illegible	missing
Wir	nd Direction	on	RM Young	AQ05103-5		21835wdr	03924
Wir	nd Speed		RM Young		21835wsp	03924	
			tion (photograph or ske affect the monitoring		y) rega	arding conditions listed ab	ove, or any other features,

### Field Systems Data Form F-02058-1500-S5-rev002 PND165 Technician | Eric Hebert Site Visit Date 08/10/2015 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	PND165	Technician	Eric Hebert		Site Vis	it Date 08/10/201	5	
	DAS, se	nsor translators, and p	peripheral equi	oment operatio	ns aı	nd maintena	<u>nce</u>		
1		OAS instruments appe intained?	ar to be in good	condition and	<b>✓</b>				
2		the components of the backup, etc)	DAS operations	al? (printers,	<b>✓</b>				
3		nnalyzer and sensor sig g protection circuitry?		hrough	<b>✓</b>	Met sensors	only		
4		signal connections pro intained?	otected from the	weather and	<b>✓</b>				
5	Are the	signal leads connected	to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translatoed?	rs, and shelter j	properly	<b>✓</b>				
7	Does the	e instrument shelter ha	ave a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument shelter temp	erature control	led?	<b>✓</b>				
9	Is the m	et tower stable and gr	ounded?			<b>Stable</b>		Grounded	
10	Is the sa	ample tower stable and	grounded?			<b>✓</b>		<b>✓</b>	
11	Tower c	comments?							
nat	ural or n	additional explanation	fect the monito	ring parameter		y) regardin	g conditions listed	d above, or a	ny other features,
ine	site oper	ator recently replaced th	ne sneiter air con	attoner.					

#### **Field Systems Data Form** F-02058-1500-S7-rev002 PND165 Technician | Eric Hebert Site Visit Date 08/10/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes No N/A Yes **V** Wind speed sensor **Data logger** П **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** ~ **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** ~ **✓ Shelter heater** Ozone analyzer **V 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 SSRF ✓ V ✓ V Site Ops Manual** Feb 2014 **V HASP V** Feb 2014 **✓ Field Ops Manual V** Feb 2014 **Calibration Reports V V** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ 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 PND165 Technician Eric Hebert Site Visit Date 08/10/2015 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 **✓** 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 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** N/A Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests V** N/A **Manual Precision Level Test 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** ✓ 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:

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?

**✓** 

**✓** 

SSRF, call-in

### Field Systems Data Form F-02058-1500-S9-rev002 PND165 Technician Eric Hebert Site Visit Date 08/10/2015 Site ID **Site operation procedures** Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed afternoons approximately 80% Are the Site Status Report Forms being completed and filed **✓** correctly? No longer required Are data downloads and backups being performed as scheduled? **✓** SSRF Are general observations being made and recorded? How? **~** Are site supplies on-hand and replenished in a timely fashion? SSRF, call-in Are sample flow rates recorded? How? Are samples sent to the lab on a regular schedule in a timely fashion? **✓** 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** ✓ Semiannually **V 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:

The site operator does not use gloves to handle the filter. He handles the filter by the stem and carries it upside down to reduce the chance of contamination from the shelter to the tower.

# Field Systems Data Form

### F-02058-1500-S10-rev002

**Site ID** 

PND165

Technician Eric Hebert

Site Visit Date 08/10/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D520	unknown	000257
DAS	Campbell	CR3000	2516	000403
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	049400004449	03631
Flow Rate	Apex	AXMC105LPMDPC	illegible	000549
Infrastructure	Infrastructure	none	none	none
Modem	Raven	V4221-V	0844349088	06608
Noy	Teledyne	T200U	112	000807
Ozone	ThermoElectron Inc	49i A1NAA	1009241791	000619
Ozone Standard	ThermoElectron Inc	49i A3NAA	0622717853	000329
Precipitation	Texas Electronics	TR-525i-HT	59576-414	none
Relative Humidity	Vaisala	HMP50	Z4320017	05026
Sample Tower	Aluma Tower	В	AT-81213-J12	000055
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Solar Radiation	Licor	LI-200	illegible	missing
Solar Radiation Translator	RM Young	70101-X	none	02532
Surface Wetness	RM Young	58101	none	illegible
Temperature	RM Young	41342	14800	06539
Temperature2meter	RM Young	41342VC	12544	06305
Wind Direction	RM Young	AQ05103-5	21835wdr	03924
Wind Speed	RM Young	AQ05103-5	21835wsp	03924
Zero air system	Teledyne	701H	609	000773

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
YEL-	408-Eric H	lebert-08/13/2015				
1	8/13/2015	Computer	Hewlett Packard	none	8470p	CNU347CS5G
2	8/13/2015	DAS	Environmental Sys Corp	90632	8816	2505
3	8/13/2015	Elevation	Elevation	None	1	None
4	8/13/2015	Filter pack flow pump	Thomas	none	107CA18B	049800008583
5	8/13/2015	flow rate	Tylan	none	FC280SAV	AW9706012
6	8/13/2015	Infrastructure	Infrastructure	none	none	none
7	8/13/2015	Mainframe	Climatronics	none	100081	1380
8	8/13/2015	Mainframe power supply	Climatronics	none	101074	688
9	8/13/2015	Met tower	Climatronics	01362	14 inch taper	illegible
10	8/13/2015	MFC power supply	Tylan	03944	RO-32	FP9605010
11	8/13/2015	Ozone	ThermoElectron Inc	90714	49C	49C-66828-354
12	8/13/2015	Ozone Standard	ThermoElectron Inc	90606	49C	49C-61991-333
13	8/13/2015	Printer	Hewlett Packard	none	840C	unknown
14	8/13/2015	Sample Tower	Aluma Tower	illegible	В	none
15	8/13/2015	Shelter Temperature	ARS	none	none	none
16	8/13/2015	Shield (2 meter)	Climatronics	01050	100325	illegible
17	8/13/2015	Siting Criteria	Siting Criteria	None	1	None
18	8/13/2015	Temperature	Climatronics	ARS100	100093	none
19	8/13/2015	Temperature Translator	Climatronics	03626	100088-2	396
20	8/13/2015	Zero air pump	Werther International	none	PC70/4	531393

# **DAS Data Form**

DAS Time Max Error:

0.17

Mfg	Serial Number	Site	Technician	Site Visit Date	Parameter	Use Desc.
Environmental Sys	2505	YEL408	Eric Hebert	08/13/2015	DAS	Primary
	3/2015 Audit D :05:10 Audit T 225 Audit D	ime 9:05:00	Mfg Serial Number	Datel 4000392	Parameter Tfer Desc.	DAS Source generator (D
Low Channel:	High Ch		Tfer ID	01321		
<b>Avg Diff: Ma</b> 0.0002	x Diff: Avg Diff 0.0004 0	<b>Max Diff:</b> 0.0000 0.0002	Slope	1.0000	0 Intercept	0.00000
0.0002	0.0004	0.0002	Cert Date	1/22/201	5 CorrCoff	1.00000
			Mfg	Fluke	Parameter	DAS
			Serial Number	86590148	Tfer Desc.	DVM
			Tfer ID	01310		
			Slope	1.0000	0 Intercept	0.00000
			Cert Date	1/22/201	5 CorrCoff	1.00000
Channel Inr	out DVM Outpu	t DAS Output	InputUnit	OutputUnit	Difference	

Channel	Input	DVM Output	DAS Output	InputUnit	OutputUnit	Difference
2	0.0000	0.0000	0.0000	V	V	0.0000
2	0.1000	0.1000	0.1000	V	V	0.0000
2	0.3000	0.3000	0.3001	V	V	0.0001
2	0.5000	0.5000	0.5002	V	V	0.0002
2	0.7000	0.7000	0.7002	V	V	0.0002
2	0.9000	0.9000	0.9003	V	V	0.0003
2	1.0000	1.0000	1.0004	V	V	0.0004
10	0.0000	0.0000	0.0000	V	V	0.0000
10	0.1000	0.1000	0.1000	V	V	0.0000
10	0.3000	0.3000	0.3000	V	V	0.0000
10	0.5000	0.5000	0.4999	V	V	-0.0001
10	0.7000	0.7000	0.7002	V	V	0.0002
10	0.9000	0.9000	0.9000	V	V	0.0000
10	1.0000	1.0000	1.0000	V	V	0.0000

# Flow Data Form

Mfg	Se	erial Num	iber Ta	Site	Tec	hnician	Site Visit I	Date Param	eter	Owner ID
Tylan	A	W970601	2	YEL408	Erio	Eric Hebert		flow ra	te	none
Mfg SN/Owner ID				Mfg Serial Number				rameter Flow Rate  fer Desc. BIOS 220-H		
Parameter	MFC p	power sup	pply			Tfer ID	01417			
	<u> </u>					Slope	1.	00316 Inte	ercept	-0.00540
						Cert Date	1/	7/2015 Cor	rCoff	1.00000
DAS 1: A Avg % Diff:	A May		DAS 2: A Avg %l	Dif A Max	% Di	Cal Factor Z Cal Factor F		0.48 5.48		
0.44%		0.67%				Rotometer R			.4	
Desc.	Tes	st type	-	Input Corr_	MfcDisp.		-	InputUnit		I PctDifference
primary	pump		0.000	0.000	-0.37	-0.340	0.14	l/m	l/m	
primary	leak c		0.000	0.000	-0.34	-0.300	0.19	1/m	1/m	
primary	test pt		3.015	3.010	2.53	2.539	3.02	1/m	1/m	0.33%
primary	test pt		3.019	3.010	2.52	2.539	3.02	1/m	1/m	0.33%
primary	test pt	: 3	3.007	3.000	2.52	2.539	3.02	1/m	1/m	0.67%
Sensor Comp	onent	Leak Tes	t		Condition	n		Status	pass	
Sensor Comp	onent	Filter Azir	muth		Condition	n 90 deg		Status	pass	
Sensor Comp	onent	Filter Dep	oth		Condition	2.0 cm		Status	pass	
Sensor Comp	onent	Filter Pos	sition		Condition	Good		Status	pass	
Sensor Comp	onent	Moisture	Present		Condition	No moisture p	resent	Status	pass	
Sensor Comp	onent	Rotomete	er Condition	1	Condition	Clean and dry		Status	pass	
Sensor Component System Memo		Condition	See comments	3	Status	pass				
Sensor Comp	onent	Tubing C	ondition		Condition	Good		Status	pass	
Sensor Comp	onent	Filter Dist	ance		Condition	5.5 cm		Status	pass	

# **Ozone Data Form**

Mfg So	erial Number Ta	Site	Tec	chniciar	1	Site Vis	it Date	Parame	eter Owner	ID
ThermoElectron Inc 4	9C-66828-354	YEL408	Er	c Heber	ť	08/13/2	015	Ozone	90714	
Intercept -0.9	8473 Slope: 0442 Intercept 9995 CorrCoff	0.00000 0.00000 0.00000	D	Mfg Serial l	Number		Electron 70008-36		rameter ozone er Desc. Ozone prima	ry stan
DAS 1: A Avg % Diff: A Mar 3.7%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert D			1.00952			24284
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	te	Site	Unit	PctDifference	
primary	1	0.25	0.4		0.		ppb	Omt	TetBinerence	
primary	2	30.26	30.	21	28		ppb		-5.86%	
primary	3	52.68	52.	42	50	.45	ppb		-3.76%	
primary	4	74.01	73.	55	71	.23	ppb		-3.15%	
primary	5	116.42	115	.56	113	3.30	ppb		-1.96%	
<b>Sensor Component</b>	Cell B Noise		Conditio	0.3 p	pb			Status	pass	
<b>Sensor Component</b>	Cell B Tmp.		Conditio	on				Status	pass	
<b>Sensor Component</b>	Fullscale Voltage		Conditio	n 1.001	15			Status	pass	
Sensor Component	Inlet Filter Condition	n	Conditio	n Clea	n			Status	pass	
Sensor Component	Line Loss		Conditio	Not to	ested			Status	pass	
Sensor Component	Offset		Conditio	n 1.2				Status	pass	
Sensor Component	Span		Conditio	n 1.004	1			Status	pass	
Sensor Component	Cell B Freq.		Conditio	76.7	kHz			Status	pass	
Sensor Component	System Memo		Conditio	on				Status	pass	
Sensor Component	Sample Train		Conditio	n Good	j			Status	pass	
Sensor Component	Cell B Pressure		Conditio	on				Status	pass	
Sensor Component	Cell B Flow		Conditio	on 0.68	lpm			Status	pass	
Sensor Component	Cell A Tmp.		Conditio	<b>n</b> 39.2	С			Status	pass	
<b>Sensor Component</b>	Cell A Pressure		Conditio	n 565.1	I mmHg			Status	pass	
<b>Sensor Component</b>	Cell A Noise		Conditio	0.5 p	pb			Status	pass	
<b>Sensor Component</b>	Cell A Freq.		Conditio	92.1	kHz			Status	pass	
<b>Sensor Component</b>	Cell A Flow		Conditio	0.66	lpm			Status	pass	
<b>Sensor Component</b>	Battery Backup		Conditio	n N/A				Status	pass	
<b>Sensor Component</b>	Zero Voltage		Conditio	0.000	01			Status	pass	

### **Temperature Data Form Technician** Site Visit Date Parameter **Owner ID** Mfg Serial Number Ta Site YEL408 Eric Hebert 08/13/2015 Temperature ARS100 Climatronics none Mfg Extech Parameter Temperature Climatronics Mfg Tfer Desc. RTD H232679 **Serial Number** 03626 **SN/Owner ID** 396 01228 Tfer ID **Parameter** Temperature Translator **Slope** 1.00564 **Intercept** -0.21981 **DAS 1: DAS 2:** 1/30/2015 1.00000 **Cert Date** CorrCoff Abs Avg Err **Abs Max Er Abs Avg Err Abs Max Er** 0.13 0.18 UseDesc. InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference Test type primary Temp Low Range -0.04 0.18 0.000 0.4 $\mathbf{C}$ 0.18 C Temp Mid Range 22.08 22.17 0.000 22.0 -0.17 primary Temp High Range C primary 46.97 46.93 0.000 46.9 -0.03 Sensor Component | Shield Condition Clean **Status** pass Sensor Component Blower Status Switch **Condition** N/A **Status** pass **Sensor Component** Blower **Condition** Functioning **Status** pass Condition See comments Sensor Component | System Memo Status pass

# **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	24.97	25.05	0.000	26.0	C	0.96
primary	Temp Mid Range	25.79	25.86	0.000	27.3	С	1.39
primary	Temp Mid Range	27.85	27.91	0.000	29.4	С	1.44

### **Infrastructure Data For**

Sit	te ID	YEL408	Technician	Eric Hebert	Site Visit Date	08/13/2015	
	Shelter Ma	ake	Shelter Model	She	lter Size		
	Ekto		8810 (s/n 2880-	1) 640	cuft		
	Name (San San San San San San San San San San						

<b>Sensor Component</b>	Shelter Roof	Condition	Good	Status	pass
Sensor Component	Sample Tower Type	Condition	Туре В	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	Rotometer	Condition	Installed	Status	pass
<b>Sensor Component</b>	Conduit	Condition	Good	Status	pass
<b>Sensor Component</b>	Sample Tower	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Condition	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Floor	Condition	Fair	Status	pass
<b>Sensor Component</b>	Shelter Temp Control	Condition	Functioning	Status	pass
<b>Sensor Component</b>	Signal Cable	Condition	Fair	Status	pass
<b>Sensor Component</b>	Tubing Type	Condition	3/8 teflon	Status	pass
Sensor Component	Shelter Door	Condition	Good	Status	pass
<b>Sensor Component</b>	Sample Train	Condition	Good	Status	pass

# **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazar	d Problem
Flow Rate	YEL408	Eric Hebert	08/13/2015	System Memo	Tylan	648		
The recorded flow ra	ate data are accurat	te as recorded. The t	flow rate is not a	at the target flow rat	e.			
Temperature	YEL408	Eric Hebert	08/13/2015	System Memo	Climatronics	1637		<b>✓</b>
Additional details ca				~, ~				

# **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator was not available during the site audit visit. Reported information was obtained from the site documentation.

2 Parameter: DasComments

The shelter heat is operating continuously. The air conditioning is cycling and able to overcome the additional heat and maintain the shelter temperature within specifications.

3 Parameter: SiteOpsProcedures

The ozone inlet filter is replaced and the system is leak tested every two weeks.

4 Parameter: SitingCriteriaCom

The site is located at the edge of a tree line. Trees as tall as the sample inlet are approximately 10 to 15 meters from the sample tower and cover the area from west to east on the north side of the site. Other trees have been cut and the forest has been thinned. There may be a few trees still in violation of the 22.5 degree rule to the north of the inlet. A new communication tower has been constructed since the previous site audit visit.

5 Parameter: ShelterCleanNotes

The shelter is organized and well maintained.

6 Parameter: PollAnalyzerCom

The desiccant canister is spent.

7 Parameter: MetOpMaintCom

The recorded temperature is now being measured at approximately 2 meters above the ground. Current temperature measurements are no longer comparable to previous temperature measurements at this site.

### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 08/04/2015 Technician Eric Hebert ROM406 Site ID Longs Peak **USGS Map NPS** Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 08-069-0007 AQS# R.M. Young **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 40.2778 dry **QAPP** Longitude -105.5453 **Deposition Measurement** woodland - mixed 2743 Land Use **QAPP Elevation Meters** complex **Terrain QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** (970) 586-8520 40.278129 **Site Telephone Audit Latitude** High Peak Camp -105.545635 Site Address 1 **Audit Longitude** Route 7 Site Address 2 **Audit Elevation** 2742 Larimer 9.0 County **Audit Declination** Estes Park, CO City, State **Present** Fire Extinguisher ✓ 80517 Inspected June 2013 Zip Code **V** 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 (s/n 3062-1) Ekto **Shelter Size** 896 cuft **✓** Notes The shelter is clean, neat, organized, and well maintained. **Shelter Clean ✓** Notes Site OK

From Estes Park take route 7 south approximately 8.5 miles. Turn right onto Preservation Road (dirt road) at the

sign for High Peak Camp operated by the Salvation Army. The site is approximately 100 meters on the left.

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID	ROM406	<b>Technician</b>	Eric Hebert	Site Visit Date	08/04/2015

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		<b>~</b>
Feedlot operations	500 m		$\checkmark$
Intensive agricultural ops (including aerial spraying)	500 m		$\checkmark$
Limited agricultural operations	200 m		$\checkmark$
Large parking lot	200 m		$\checkmark$
Small parking lot	100 m		$\checkmark$
Tree line	50 m		$\checkmark$
Obstacles to wind	10 times obstacle height		<b>✓</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nen

Fi	eld Systems Data Forn	n				F-02058	3-1500-S3-rev002
Site	e ID ROM406	Sechnician [	Eric Hebert		Site Visit Date	08/04/2015	
1 2	Are wind speed and direction sens being influenced by obstructions?  Are wind sensors mounted so as to (i.e. wind sensors should be mount horizontally extended boom >2x the sensor into the properties wind)	o minimize to	ower effects? tower or on a	<b>✓</b>	N/A N/A		
3	tower into the prevailing wind)  Are the tower and sensors plumb?	•		<b>✓</b>	N/A		
4	Are the temperature shields point avoid radiated heat sources such a			<b>✓</b>	South		
5	Are temperature and RH sensors conditions? (i.e. ground below sen surface and not steeply sloped. Ric standing water should be avoided)	sors should diges, hollows	be natural	✓			
6	Is the solar radiation sensor plum	b?		<b>✓</b>	N/A		
7	Is it sited to avoid shading, or any light?	artificial or	reflected	<b>✓</b>	N/A		
8	Is the rain gauge plumb?			<b>✓</b>	N/A		
9	Is it sited to avoid sheltering effect towers, etc?	s from build	lings, trees,	<b>✓</b>	N/A		
10	Is the surface wetness sensor sited facing north?	with the gri	d surface	✓	N/A		
11	Is it inclined approximately 30 de	grees?		<b>✓</b>	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:

The recorded temperature is being measured at 2.5 meters above the ground (and < 1 foot above the AMoN enclosure) and not 10 meters. Current temperature measurements are no longer comparable to previous temperature measurements at this site.

Fie	ld Systems Dat	a Form			F	F-02058-1500-S4-rev00
Site 1	ID ROM406	Technician Eric	Hebert		Site Visit Date 08/04	/2015
	Do all the meterological condition, and well main	sensors appear to be inta	ct, in good	✓		
	Are all the meteorologic reporting data?	al sensors operational on	line, and	<b>✓</b>		
3	Are the shields for the to	emperature and RH senso	ors clean?	<b>✓</b>		
4	Are the aspirated motor	rs working?		<b>✓</b>		
	Is the solar radiation serscratches?	nsor's lens clean and free	of	<b>✓</b>	N/A	
6	Is the surface wetness se	ensor grid clean and unda	maged?	<b>✓</b>	N/A	
	Are the sensor signal an condition, and well main	d power cables intact, in a	good	<b>✓</b>		
	Are the sensor signal an from the elements and v	d power cable connection vell maintained?	s protected	✓		
Para	ameter	Manufacturer	Model	L	S/N	Client ID
Tem	perature	RM Young	41342		17079	none
Shiel	ld (2 meter)	RM Young	unknown		none	none
Met t	tower	Rohn	unknown		none	none

### Field Systems Data Form F-02058-1500-S5-rev002 ROM406 Technician | Eric Hebert Site Visit Date 08/04/2015 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? No 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 ID ROM406 Eric Hebert Site Visit Date 08/04/2015

Site	e ID	ROM406	Technician	Eric Hebert		Site Vis	sit Date 08/04/20	15	
	DAS, sei	nsor translators, and	peripheral equi	oment operation	ns and	maintena	ance		
1		OAS instruments appentained?	ear to be in good	condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operationa	al? (printers,	<b>✓</b>				
3		nalyzer and sensor sig g protection circuitry		hrough					
4		signal connections prontained?	otected from the	weather and	<b>✓</b>				
5	Are the	signal leads connected	l to the correct l	OAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter p	oroperly	<b>✓</b>				
7	Does the	instrument shelter h	ave a stable pow	er source?	<b>✓</b>				
8	Is the ins	strument shelter temp	perature control	led?	<b>✓</b>				
9	Is the mo	et tower stable and gr	ounded?			<b>Stable</b>		Grounded	
10	Is the sa	mple tower stable and	d grounded?			<u> </u>		<u> </u>	
11	Tower c	omments?							
nat	ural or m	additional explanatio an-made, that may al perature, and AMoN ar	ffect the monitor	ing parameters	s:		g conditions liste	ed above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 ROM406 Technician | Eric Hebert Site Visit Date 08/04/2015 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** 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 **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 V** DataView2 **SSRF V ✓ V V Site Ops Manual HASP V V Field Ops Manual Calibration Reports V ✓** 3/11/2015 Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ Dataview Flow and 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 ROM406 Technician Eric Hebert Site Visit Date 08/04/2015 Site ID Site operation procedures Trained by ARS on site Has the site operator attended a formal CASTNET training ✓ course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET **V** 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 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? **Compliant QC Check Performed** Frequency **Multi-point Calibrations V V** Monthly and semiannually **V V Automatic Zero/Span Tests** Daily **V V** Every 2 weeks Manual Zero/Span Tests **V** Daily **Automatic Precision Level Tests V Manual Precision Level Test V Analyzer Diagnostics Tests ✓ V** Every 2 weeks **In-line Filter Replacement (at inlet) V V** N/A In-line Filter Replacement (at analyze **V V** Sample Line Check for Dirt/Water Weekly **~ V** Semiannually **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 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:

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

reported? If yes, how?

The ozone analyzer display is indicating a low flow alarm for cell B. The analyzer is functioning properly and the flow meter is likely suspect.

✓

Dataview

### Field Systems Data Form F-02058-1500-S9-rev002 ROM406 Technician Eric Hebert Site Visit Date 08/04/2015 Site ID **Site operation procedures** Is the filter pack being changed every Tuesday as scheduled? Filter changed various times Are the Site Status Report Forms being completed and filed correctly? no longer required Are data downloads and backups being performed as scheduled? **✓** SSRF 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? **V** 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 **Frequency Compliant V** ✓ Semiannually **Multi-point MFC Calibrations V** Weekly Flow System Leak Checks **Filter Pack Inspection V** Weekly **Flow Rate Setting Checks V** Weekly **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **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 site operator is doing a very good job performing the site duties and expressed an interest in trying to improve any deficiencies. The sample flow rate systems for both the dry deposition and ozone sample trains were explained during the audit at the request of the site operator. Although gloves are not used to handle the filter pack, the operator is careful to touch only the bag and caps and not the filter.

# Field Systems Data Form

### F-02058-1500-S10-rev002

Site ID

ROM406

Technician Eric Hebert

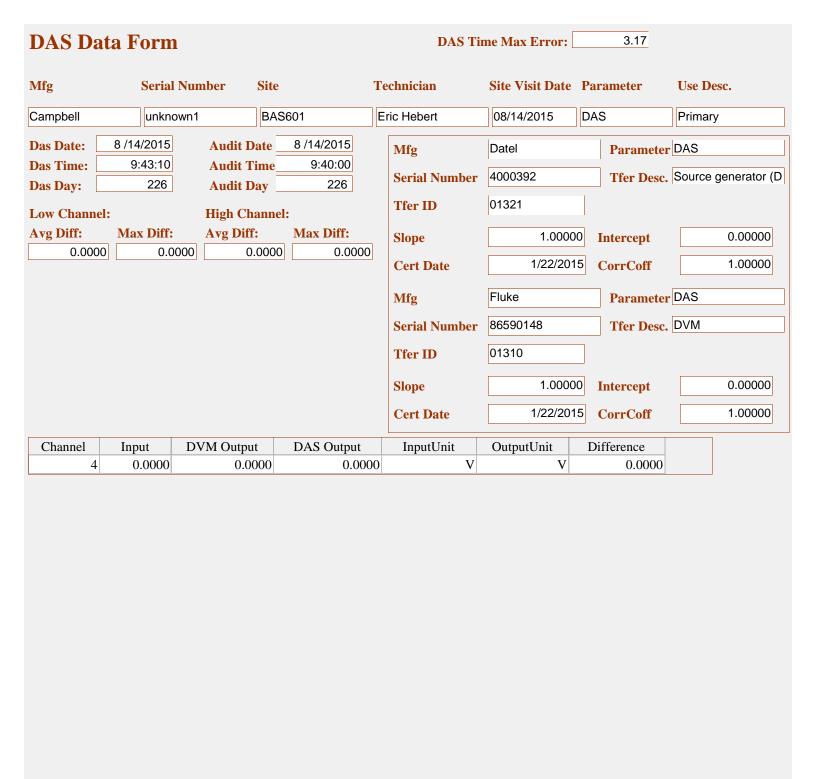
Site Visit Date 08/04/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Environmental Sys Corp	8816	2025	90535
Elevation	Elevation	1	None	None
flow rate	Tylan	FC280AV	AW9403024	03393
Infrastructure	Infrastructure	none	none	none
Met tower	Rohn	unknown	none	none
MFC power supply	Tylan	RO-32	illegible	none
Ozone	ThermoElectron Inc	49i A3NAA	1030745085	none
Ozone Standard	ThermoElectron Inc	49i A1NAA	CM08460008	none
Printer	Hewlett Packard	842C	unknown	none
Sample Tower	Aluma Tower	В	none	illegible
Shelter Temperature	ARS	unknown	051	none
Shield (2 meter)	RM Young	unknown	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	17079	none
Zero air pump	Werther International	PC70/4	531392	none

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
BAS	5601-Eric H	ebert-08/14/2015				
1	8/14/2015	DAS	Campbell	none	CR1000	unknown1
2	8/14/2015	elevation	Elevation	none	none	none
3	8/14/2015	Filter pack flow pump	Thomas	none	107CAB18	099800009743
4	8/14/2015	Flow Rate	Omega	none	FMA6518ST-RS232	318559-1
5	8/14/2015	Infrastructure	Infrastructure	none	none	none
6	8/14/2015	Met tower	unknown	none	unknown	none
7	8/14/2015	Ozone	ThermoElectron Inc	L0534684	49i A1NAA	1214552973
8	8/14/2015	Ozone Standard	ThermoElectron Inc	none	49i E3CAA	1214552971
9	8/14/2015	Precipitation	Met One	T15382	385	T15382
10	8/14/2015	Relative Humidity	Vaisala	none	HMP45AC	E3720077
11	8/14/2015	Shelter Temperature	unknown	none	unknown	none
12	8/14/2015	siting criteria	Siting Criteria	none	none	None
13	8/14/2015	Solar Radiation	Licor	none	LI-200	PY47987
14	8/14/2015	Temperature	Vaisala	none	HMP45AC	E3720077
15	8/14/2015	Wind Direction	Met One	illegible	024	Illegible
16	8/14/2015	Wind Speed	Met One	J2228	014	12208
17	8/14/2015	Zero air pump	Thomas	none	107CAB18	100800033636



# Flow Data Form

Mfg	Seria	l Number Ta	Site	Tec	chnician	Site Visit I	Date Paran	neter	Owner ID
Omega	3185	59-1	BAS601	Eri	c Hebert	08/14/201	Flow F	Rate	none
					Mfg	BIOS	I	arameter Fl	ow Rate
					Serial Number	131818	Г	fer Desc. BI	OS 220-H
					Tfer ID	01417			
					C1	1	.00316 Int		-0.00540
					Slope			ercept	
					Cert Date	1/	7/2015 <b>Co</b>	rrCoff	1.00000
DAS 1:		DAS 2:			Cal Factor Z	Zero	0.2	93	
A Avg % Diff:	A Max %	Di A Avg %	6Dif A Max	% <b>Di</b>	Cal Factor F	ull Scale	1.4	59	
2.12%	3.	01%			Rotometer R	Reading:		0	
Desc.	Test ty	pe Input l/r	n Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSigna	ll PctDifference
primary	pump off	0.000	0.000	0.00	0.000	0.29	1/m	1/m	
primary	leak chec	k 0.000	0.000	0.00	0.000	0.29	l/m	l/m	
primary	test pt 1	3.265	3.260	0.00	0.000	3.21	l/m	l/m	-1.53%
	test pt 2	3.286	3.280	0.00	0.000	3.22	1/m	l/m	-1.83%
primary	test pt 3	3.327	3.320	0.00	0.000	3.22	1/m	l/m	-3.01%
Sensor Compo	onent Lea	ak Test		Conditio	n		Statu	pass	
Sensor Compo	nent Filt	er Azimuth		Conditio	<b>n</b> 360 deg		Statu	pass	
Sensor Compo	nent Filt	er Depth		Conditio	n -3.0 cm		Statu	Fail	
Sensor Compo	nent Filt	er Position		Conditio	n Poor		Statu	Fail	
Sensor Compo	onent Mo	isture Present		Conditio	n No moisture p	resent	Statu	pass	
Sensor Compo	nent Rot	tometer Condition	on	Conditio	n N/A		Statu	pass	
Sensor Compo				<b>-</b>	n See comments	S		pass	
Sensor Compo				Condition				pass	
Sensor Compo				Conditio				pass	

# **Ozone Data Form**

Mfg S	erial Number Ta	Site	Technician	ı	Site Visit Date	Parame	eter	Owner ID
ThermoElectron Inc 1	214552973	BAS601	Eric Heber	t	08/14/2015	Ozone		L0534684
Intercept -0.0	Note: Slope: Note:	0.00000 0.00000	Serial N	Number	ThermoElectron 49CPS-70008-3		er Desc. Ozo	ne primary stan
DAS 1: A Avg % Diff: A Ma 2.6%	DAS 2: x % Di	6Dif A Max 9	Slope Cert Da	nte	1.0099	52 Inter	_	-0.24284 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	Si	te Si	te Unit	PctDiffe	rence
primary	1	0.28	0.51	0.:	11			
primary	2	28.27	28.24	27.	1.1			-2.55%
primary	3 4	48.91 73.35	48.68 72.89	70.	1.1			-2.44% -2.96%
primary primary	5	115.05	114.20	111	1.1			-2.28%
Sensor Component		113.03	Condition 0.6 pp		тоо рро	Status	nace	2.2070
Sensor Component	Cell B Noise		Condition 0.0 p	JD		Status	pass	
<b>Sensor Component</b>	Cell B Tmp.		Condition			Status	pass	
Sensor Component	Fullscale Voltage		<b>Condition</b> N/A			Status	pass	
Sensor Component	Inlet Filter Condition	n	Condition Clear	1		Status	pass	
Sensor Component	Line Loss		<b>Condition</b> Not to	ested		Status	pass	
Sensor Component	Offset		<b>Condition</b> -0.4			Status	pass	
Sensor Component	Span		Condition 1.024			Status	pass	
Sensor Component	Cell B Freq.		Condition 91.3	кНz		Status	pass	
Sensor Component	System Memo		Condition			Status	pass	
Sensor Component			Condition Good			Status	pass	
Sensor Component			Condition			Status		
Sensor Component			Condition 0.68	pm		Status		
Sensor Component			Condition 45.4			Status		
Sensor Component			Condition 646 n			Status		
Sensor Component			Condition 0.7 pp			Status		
Sensor Component			Condition 112.3			Status		
Sensor Component			Condition 0.65	htti		Status		
Sensor Component			Condition N/A			Status		
Sensor Component	Zero Voltage		<b>Condition</b> N/A			Status	pass	

### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Wind Speed J2228 Met One 12208 BAS601 Eric Hebert 08/14/2015 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 **to** 0 **Prop or Cups Torque Cert Date** 12/22/2014 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** 1.00000 12/22/2014 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.01 0.52% Abs Avg Err Abs Max Er 0.05 1.21% UseDescription: Input RPM Out V Diff/ % Diff Diff WsM Input Device Input m/s DAS m/s primary none 0 0.50 0.0 0.5 -0.05 01261 30 1.25 0.0 1.3 0.00 primary primary 01261 60 2.05 0.0 2.1 0.00 01261 120 3.65 0.0 3.7 0.00 primary 5.9 primary 01262 200 5.78 0.0 1.21% 01262 400 11.11 0.0 11.1 -0.54% primary 01262 800 21.78 0.0 21.9 0.32% primary primary 01262 1800 48.44 0.0 48.5 0.02% Sensor Component | System Memo Status pass **Condition** Sensor Component | Sensor Plumb Condition Plumb **Status** pass Sensor Component | Sensor Heater **Condition** N/A Status pass Sensor Component | Prop or Cups Condition **Condition** Good Status pass Sensor Component | Condition **Condition** Good Status pass Sensor Component | Torque **Condition** Not tested **Status** pass

### **Wind Direction Data Form** Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg BAS601 Eric Hebert Wind Direction Met One Illegible 08/14/2015 illegible Mfg RM Young Parameter wind direction Tfer Desc. wind direction wheel **Serial Number** 01264 Tfer ID Slope 1.00000 **Intercept** 0.00000 Vane SN: N/A C. A. Align. deg. true: 0 **to** 360 0 VaneTorque 1/16/2015 1.00000 Cert Date CorrCoff Parameter wind direction Ushikata Mfg **Serial Number** 191832 Tfer Desc. transit Tfer ID 01272 1.00000 0.00000 Slope **Intercept Cert Date** 2/19/2015 CorrCoff 1.00000 **DAS 1: DAS 2: Orientation Linearity: Orientation Linearity:** 1.3 Abs Avg Err 2 Abs Max Er UseDescription TferID Input Raw Linearity Output V Output Deg. Difference Change Error 90 2 primary 01272 0.000 92 01272 180 0.000 181 1 1 primary 01272 270 0.000 270 0 0 primary 01272 360 0.000 2 2 2 primary Sensor Component | Mast **Condition** Good Status pass Sensor Component | Condition **Condition** Good Status pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component | Sensor Plumb **Condition** Plumb Status pass Sensor Component | Vane Condition Condition Good Status pass Condition Not tested Status pass Sensor Component | Torque Sensor Component | System Memo Condition Status pass

### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Vaisala BAS601 Eric Hebert 08/14/2015 Temperature E3720077 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.79 1.56 UseDesc. Test type InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference 8.99 primary Temp Low Range 8.82 0.00010.6 C 1.56 C Temp Mid Range 26.53 26.60 0.000 26.8 0.23 primary C -0.59 primary Temp High Range 44.02 43.99 0.000 43.4 Condition Clean Sensor Component | Shield **Status** pass Sensor Component Blower Status Switch **Condition** N/A Status pass Status pass **Sensor Component** Blower **Condition** N/A Sensor Component System Memo **Condition** See comments Status pass

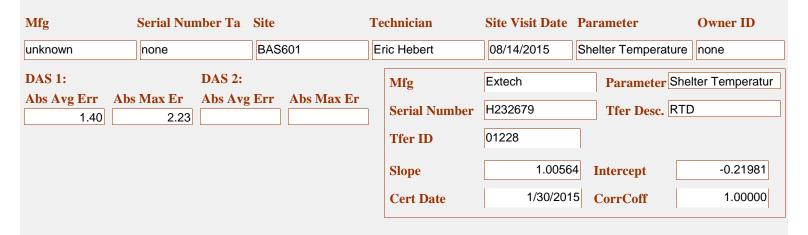
### **Humidity Data Form** Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg Site BAS601 Eric Hebert 08/14/2015 Relative Humidity Vaisala E3720077 none Mfg Rotronic **Parameter** Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 Tfer ID 4.53330 **Slope** 0.91000 **Intercept Cert Date** 1/21/2015 0.99800 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 8.5 Abs Avg Err 3.8 14.5 3.8 Abs Max Er UseDesc. Test type Device Input RH GTL Raw RH Corr. DAS Volts DAS %RH Difference RH Low Range Hygroclip 32.8 32.9 0.000 primary 32.8 47.3 14.5 RH Low Range 52.9 54.6 0.0002.5 primary Hygroclip 52.9 55.4 primary RH High Range Hygroclip 93.6 83.8 93.6 0.000 89.8 -3.8 Condition See comments Status pass Sensor Component | System Memo Sensor Component Blower **Condition** N/A Status pass Sensor Component Blower Status Switch **Condition** N/A Status pass Sensor Component | RH Filter Condition Clean **Status** pass Status pass Sensor Component | Shield **Condition** Clean

### **Solar Radiation Data Form** Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg PY47987 BAS601 Eric Hebert 08/14/2015 Solar Radiation Licor none Mfg **Eppley** Parameter solar radiation Tfer Desc. SR transfer sensor 34341F3 **Serial Number** 01245 Tfer ID 0.00000 **Slope** 1.00000 **Intercept DAS 1: DAS 2:** 1/16/2015 1.00000 % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max **Cert Date** CorrCoff 0.6% 1.4% 0.0% 0.0% Tfer Corr UseDescription Measure Date MeasureTime PctDifference Tfer Raw DAS w/m2 primary 8/14/2015 11:00 723 723 723 0.0% -1.2% 12:00 833 833 823 primary 8/14/2015 primary 8/14/2015 13:00 858 858 846 -1.4% -2.1% primary 8/14/2015 14:00 726 726 711 440 448 1.8% primary 8/14/2015 15:00 440 8/14/2015 16:00 195 195 201 3.3% primary Sensor Component | Sensor Level Status pass **Condition** Level Sensor Component | Sensor Clean Condition Clean **Status** pass **Sensor Component** Properly Sited **Condition** Properly sited **Status** pass Status pass Sensor Component System Memo Condition

# **Precipitation Data Form**

Mfg	Serial	Number Ta	Site	,	Tec	chnician		Site	Visit Date	Paramo	eter		Owner II	D
Met One	T1538	2	BAS601		Eri	ic Hebert		08/	14/2015	Precipit	ation		T15382	
						Mfg		PMF	)	Pa	ıram	eter Pr	recipitation	
DAS 1:		<b>DAS 2:</b>				Serial Nun	ıber	EW-	06134-50	Tf	er D	esc. 25	50ml graduate	Э
A Avg % Diff: 7.0%		Di A Avg %	Dif A	Max % Di		Tfer ID		0125	50					
						Slope			1.0000	0 Inte	rcept	t	0.00	000
						Cert Date			9/5/200	Cor	rCof	f	1.00	000
UseDesc.	Test type	TferVolume	Iteration	TimePerTi	ip	Eq.Ht	DAS	Seng	Eq.HtUnit	OSE Ur	nit T	ferUni	ts PctDiffere	nce
primary	test 1	231.5	1	10 sec		7.10	6.	60	mm	mm		ml	-7.0	
primary	test 2	231.5	2	10 sec		7.10	6.	60	mm	mm		ml	-7.0	)%
Sensor Comp	ponent Syst	em Memo		Cond	litio	n				Status	pass	3		
Sensor Comp	ponent Sens	sor Heater		Cond	litio	Not teste	d			Status	pass	3		
Sensor Comp	ponent Prop	erly Sited		Cond	litio	n Properly	sited			Status	pass	3		
Sensor Comp	ponent Gau	ge Drain Scree	en	Cond	litio	n Installed				Status	pass	3		
Sensor Comp	ponent Leve	l		Cond	litio	Level				Status	pass	5		
Sensor Comp	ponent Gau	ge Clean		Cond	litio	Clean				Status	pass	3		
Sensor Comp	ponent Funr	nel Clean		Cond	litio	Clean				Status	pass	3		
Sensor Comp	ponent Con	dition		Cond	litio	Good				Status	pass	3		
Sensor Comp	ponent Gau	ge Screen		Cond	litio	nstalled				Status	pass	3		

# **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	28.68	28.74	0.000	29.3	C	0.58
primary	Temp Mid Range	26.56	26.63	0.000	28.9	С	2.23

# Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015 Shelter Make Shelter Model Shelter Size Shelter One AR 263648 24 cuft Shelter Make Shelter Model Shelter Size Shelter Make Shelter Model Shelter Size Sensor Component Shelter Roof Condition Good Status pass Sensor Component Sample Tower Type Condition Pole type Status pass

<b>Sensor Component</b>	Shelter Roof	Condition	Good	Status	pass
<b>Sensor Component</b>	Sample Tower Type	Condition	Pole type	Status	pass
<b>Sensor Component</b>	Met Tower	Condition	Fair	Status	pass
<b>Sensor Component</b>	Moisture Trap	Condition	Not installed	Status	pass
<b>Sensor Component</b>	Power Cables	Condition	Good	Status	pass
<b>Sensor Component</b>	Rotometer	Condition	Not installed	Status	Fail
<b>Sensor Component</b>	Conduit	Condition	N/A	Status	pass
<b>Sensor Component</b>	Sample Tower	Condition	Fair	Status	pass
<b>Sensor Component</b>	Shelter Condition	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Floor	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Temp Control	Condition	Functioning	Status	pass
<b>Sensor Component</b>	Signal Cable	Condition	Good	Status	pass
<b>Sensor Component</b>	Tubing Type	Condition	3/8 Nylon	Status	pass
Sensor Component	Shelter Door	Condition	Good	Status	pass
Sensor Component	Sample Train	Condition	Good	Status	pass

### Field Systems Data Form F-02058-1500-S1-rev002 Site Visit Date 08/14/2015 BAS601 Technician Eric Hebert Site ID **USGS Map EPA** Site Sponsor (agency) Map Scale BLM **Operating Group Map Date** 56-003-0002 AQS# **Meteorological Type Air Pollutant Analyzer QAPP** Latitude **Deposition Measurement QAPP** Longitude Land Use **QAPP Elevation Meters Terrain QAPP Declination** Conforms to MLM **OAPP Declination Date** 44.279947 **Site Telephone Audit Latitude** -108.04082 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 1241 Big Horn 10.5 County **Audit Declination** Basin, WY City, State **Present** Fire Extinguisher 82410 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 V** Backup Op. Phone # **Secure Shelter** Stable Entry Step Backup Op. E-mail Model AR 263648 Shelter Working Room 24 cuft Make Shelter One **Shelter Size ✓** Notes The shelter houses the ozone, DAS, and MFC only. Shelter Clean Site OK Notes **Driving Directions BAS601** Technician Eric Hebert Site Visit Date 08/14/2015 Site ID **USGS Map** EPA Site Sponsor (agency)

**Map Scale** 

BLM

**Operating Group** 

# **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015

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	100 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		<b>V</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nent

Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015

Fie	eld Systems Data Form	F-02058-1500-S3-rev002				
Site	BAS601 Technician Eric Hebert	Site Visit Date 08/14/2015				
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?					
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)					
3	Are the tower and sensors plumb?					
4	Are the temperature shields pointed north or positioned to avoid radiated heat sources such as buildings, walls, etc?	Pointing 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 of standing water should be avoided)					
6	Is the solar radiation sensor plumb?					
7	Is it sited to avoid shading, or any artificial or reflected light?					
8	Is the rain gauge plumb?					
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	45 degree rule violation				
10	Is the surface wetness sensor sited with the grid surface facing north?	N/A				
11	Is it inclined approximately 30 degrees?	N/A				
nat	vide any additional explanation (photograph or sketch if necural or man-made, that may affect the monitoring parameter ne objects violate the 45 degree rule for the tipping bucket rain gar					
	od at 2 meters.					
Site	BAS601 Technician Eric Hebert	Site Visit Date 08/14/2015				
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?					
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)					

Field Sy	stems Data I	Form			F-02058-1500-S4-rev002						
Site ID	BAS601	Technician	Eric Hebert		Si	te Visit Date	08/14/2015				
	ne meterological sen n, and well maintair		intact, in good	<b>✓</b>							
2 Are all treporting	the meteorological so ng data?	l online, and	<b>✓</b>								
3 Are the	shields for the temp	ensors clean?	<b>✓</b>								
4 Are the	aspirated motors we		<b>✓</b>	N/A							
5 Is the so scratche	lar radiation sensor	's lens clean and f	ree of	<b>✓</b>							
	urface wetness senso	r grid clean and u	ndamaged?	<b>✓</b>	N/A						
	7 Are the sensor signal and power cables intact, in good condition, and well maintained?										
8 Are the	sensor signal and po e elements and well	ower cable connec	tions protected	<b>✓</b>							
Parameter	1	Manufacturer	Model			S/N		Clie	ent ID		
Solar Radiati	on	_icor	LI-200			PY47987		non	е		
Wind Speed		Met One	014			12208		J22	28		
Met tower	l	unknown	unknown			none		non	е		
Relative Hum	nidity	√aisala	HMP45AC	;		E3720077		non	е		
Temperature		√aisala	HMP45AC	;		E3720077		non	е		
Precipitation		Met One	385			T15382		T15	382		
Wind Direction	n	Met One	024			Illegible		illeg	ible		
natural or ma The site utilize sensor is now	dditional explanation made, that may a series a combination sense mounted at approximation perature data. The accordance of the series are series and the series are series and the series are series and the series are series are series are series and the series are	ffect the monitorion or for humidity and ately 2 meters from	ng parameters: temperature. It the ground. Cu	was a	udited	d without subm	nersion in a water re at this site is n	bath.	The temperat	ture	
Site ID	BAS601	Technician	Eric Hebert		Sit	te Visit Date	08/14/2015				

## **Field Systems Data Form** F-02058-1500-S5-rev002 **BAS601** Technician | Eric Hebert Site Visit Date 08/14/2015 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 15 meters Describe dry dep sample tube. 3/8 nylon by 15 meters **~** 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? Not present Are there moisture traps in the sample lines? Not present 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: Technician Eric Hebert Site Visit Date 08/14/2015 **BAS601** 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?

and 20 meters from trees?

Are the sample inlets > 1 meter from any major obstruction,

## Field Systems Data Form F-02058-1500-S6-rev002 BAS601 Technician | Eric Hebert Site Visit Date 08/14/2015 Site ID DAS, sensor translators, and peripheral equipment operations and maintenance Do the DAS instruments appear to be in good condition and well maintained? **✓** Are all the components of the DAS operational? (printers, modem, backup, etc) Not present Do the analyzer and sensor signal leads pass through lightning protection circuitry? **V** Are the signal connections protected from the weather and well maintained? **✓** Are the signal leads connected to the correct DAS channel? Are the DAS, sensor translators, and shelter properly **~** grounded? **✓** Does the instrument shelter have a stable power source? 7 ~ Is the instrument shelter temperature controlled? Grounded **Stable** Is the met tower stable and grounded? **✓ V** Is the sample tower stable and grounded? **V V** 11 Tower comments?

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:

Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015

DAS, sensor translators, and peripheral equipment operations and maintenance

#### **Field Systems Data Form** F-02058-1500-S7-rev002 **BAS601** Site Visit Date 08/14/2015 Site ID Technician | Eric Hebert **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A No N/A Yes $\overline{\mathbf{V}}$ Wind speed sensor **Data logger V** $\checkmark$ П Wind direction sensor **Data logger V V** Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V** П **V** Modem Solar radiation sensor П П **V V** Surface wetness sensor **Printer V V** Wind sensor translator Zero air pump **V Temperature translator V** Filter flow pump **V V** Humidity sensor translator **Surge protector** П **V UPS V Solar radiation translator V V** Tipping bucket rain gauge **Lightning protection device V V Shelter heater** Ozone analyzer ~ $\checkmark$ Shelter air conditioner Filter pack flow controller **~** Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log** Not present **✓ V SSRF V Site Ops Manual** in BLM office **V HASP** in BLM office **Field Ops Manual V** in BLM office **Calibration Reports** Not present Ozone z/s/p Control Charts Preventive maintenance schedul Not present Is the station log properly completed during every site visit? Are the Site Status Report Forms being completed and current? Are the chain-of-custody forms properly used to document **V** 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 use of the filter pack chain-of-custody was discussed with the site operator. Site Visit Date 08/14/2015 **BAS601** Technician Eric Hebert Site ID

**Documentation** 

#### **Field Systems Data Form** F-02058-1500-S8-rev002 **BAS601** Technician Eric Hebert Site Visit Date 08/14/2015 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** Weekly **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** Monthly **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values 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** Manual Zero/Span Tests **V V** Daily **Automatic Precision Level Tests V Manual Precision Level Test V V** Weekly **Analyzer Diagnostics Tests V** Monthly **In-line Filter Replacement (at inlet) V** N/A In-line Filter Replacement (at analyze **V** 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

complete sample train including all filters?

3 Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

Unknown

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:

i ne ozone inie	The ozone inlet filter is replaced and the system is leak tested each month.							
Site ID	BAS601	Technician	Eric Hebert	Site Visit Date	08/14/2015			

### Field Systems Data Form F-02058-1500-S9-rev002 **BAS601** Technician Eric Hebert Site Visit Date 08/14/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? Filter changed mid-day 90% of the time Are the Site Status Report Forms being completed and filed 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 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? QC Check Performed **Frequency Compliant V** ✓ Semiannually **Multi-point MFC Calibrations V** Weekly Flow System Leak Checks **Filter Pack Inspection V ✓** Weekly **Flow Rate Setting Checks** Not present **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **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 proper completion of the filter chain-of-custody form was discussed with the site operator. There are no clean spare filter caps or Ziploc filter bags on site as was the case during the previous site audit visit. The bag and caps for the received filter are being used to send the removed filter back to the lab. The importance of keeping the shipping material with each filter was discussed with the operator. Site Visit Date 08/14/2015 Technician | Eric Hebert BAS601 Site ID

Site operation procedures

# **Field Systems Data Form**

# F-02058-1500-S10-rev002

Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015

**Site Visit Sensors** 

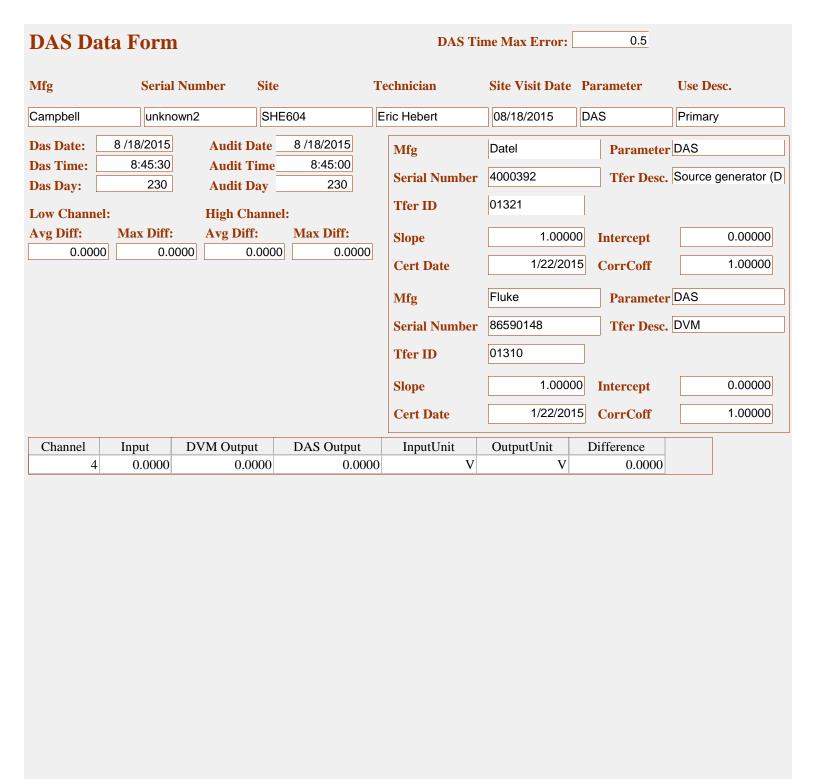
Parameter	Manufacturer	Model	S/N	Client ID
DAS	Campbell	CR1000	unknown1	none
elevation	Elevation	none	none	none
Filter pack flow pump	Thomas	107CAB18	099800009743	none
Flow Rate	Omega	FMA6518ST-RS232	318559-1	none
Infrastructure	Infrastructure	none	none	none
Met tower	unknown	unknown	none	none
Ozone	ThermoElectron Inc	49i A1NAA	1214552973	L0534684
Ozone Standard	ThermoElectron Inc	49i E3CAA	1214552971	none
Precipitation	Met One	385	T15382	T15382
Relative Humidity	Vaisala	HMP45AC	E3720077	none
Shelter Temperature	unknown	unknown	none	none
siting criteria	Siting Criteria	none	None	none
Solar Radiation	Licor	LI-200	PY47987	none
Temperature	Vaisala	HMP45AC	E3720077	none
Wind Direction	Met One	024	Illegible	illegible
Wind Speed	Met One	014	12208	J2228
Zero air pump	Thomas	107CAB18	100800033636	none

Site ID BAS601 Technician Eric Hebert Site Visit Date 08/14/2015

**Site Visit Sensors** 

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
SHI	E604-Eric H	lebert-08/18/2015				
1	8/18/2015	DAS	Campbell	49923	CR1000	unknown2
2	8/18/2015	elevation	Elevation	none	none	none
3	8/18/2015	Flow Rate	Omega	none	FMA6518ST-RS232	32433-2
4	8/18/2015	Infrastructure	Infrastructure	none	none	none
5	8/18/2015	Precipitation	Met One	none	370C	N8139
6	8/18/2015	Relative Humidity	Vaisala	none	HMP45AC	C2730121
7	8/18/2015	Sample Tower	Unknown	none	Unknown	None
8	8/18/2015	siting criteria	Siting Criteria	none	none	None
9	8/18/2015	Solar Radiation	Licor	none	LI-200	illegible
10	8/18/2015	Temperature	Vaisala	none	HMP45AC	C2730121
11	8/18/2015	Wind Direction	Met One	none	024	W4808
12	8/18/2015	Wind Speed	Met One	J1234	014	J1234



# Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Tecl	hnician	Site Visit I	Oate Param	eter	Owner ID
Omega	32433-2		SHE604	Eric	Hebert	08/18/2015	Flow R	ate	none
				1	Mfg	BIOS	P	arameter Flo	w Rate
				5	Serial Number	131818	Т	fer Desc. BIC	S 220-H
				r	Γfer ID	01417			
					Slope	1	00316 Inte	ercept	-0.00540
					•			-	
					Cert Date	1//	7/2015 Cor	rCoff	1.00000
DAS 1:		DAS 2:			Cal Factor Z	ero	0.37	'3	
A Avg % Diff:	A Max % Di	A Avg %I	Oif A Max	x % Di	Cal Factor F	ull Scale	0.93	33	
4.80%	5.09%				Rotometer R	eading:		0	
Desc.	Test type	-	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignall	PctDifference
primary	pump off	0.000	0.000	0.00	0.000	0.37	l/m	1/m	
primary	leak check	0.000	0.000	0.00	0.000	0.37	1/m	1/m	
primary	test pt 1	3.341	3.340	0.00	0.000	3.17	1/m 1/m	1/m	-5.09%
primary primary	test pt 2 test pt 3	3.336	3.330 3.320	0.00	0.000	0.000         3.17           0.000         3.17		1/m 1/m	-4.80% -4.52%
	onent Leak Tes		3.320	_		3.17	1/m		-4.3270
•				Condition			Status		
Sensor Compo	onent Filter Azi	muth		Condition	270 deg		Status	pass	
Sensor Compo	onent Filter Dep	oth		Condition	1.5 cm	Status		pass	
Sensor Compo	onent Filter Pos	sition		Condition	Good		Status	pass	
Sensor Compo	onent Filter Dis	tance		Condition	2.0 cm		Status	pass	
Sensor Compo	onent Tubing C	ondition		Condition	Good		Status	pass	
	onent Rotomete		l	Condition	N/A		Status	pass	
Sensor Compo	onent Moisture	Present		Condition	No moisture p	resent	Status	pass	
	ensor Component System Memo			Condition	See comments	2	Status	nass	

#### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Wind Speed J1234 Met One J1234 SHE604 Eric Hebert 08/18/2015 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 **to** 0 **Prop or Cups Torque Cert Date** 12/22/2014 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** 1.00000 12/22/2014 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 1.03% 0.01 Abs Avg Err 0.05 2.25% Abs Max Er UseDescription: Input Device Input RPM Out V Diff/ % Diff Diff WsM Input m/s DAS m/s primary 00000 0 0.50 0.0 0.5 -0.05 01261 30 1.25 0.0 1.3 0.00 primary primary 01261 60 2.05 0.0 2.1 0.00 120 3.65 0.0 3.7 0.00 01261 primary 5.7 -2.25% primary 01262 200 5.78 0.0 400 0.0 11.3 1.26% primary 01262 11.11 01262 800 21.78 0.0 21.7 -0.60% primary primary 01262 1800 48.44 0.0 48.5 0.02% Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Plumb **Condition** Plumb **Status** pass Sensor Component | Torque **Condition** Not tested **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component Prop or Cups Condition **Condition** Good **Status** pass Status pass **Sensor Component** System Memo **Condition**

#### Wind Direction Data Form Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg SHE604 Wind Direction Met One W4808 Eric Hebert 08/18/2015 none Mfg RM Young Parameter wind direction Tfer Desc. wind direction wheel **Serial Number** 01264 Tfer ID Slope 1.00000 **Intercept** 0.00000 Vane SN: N/A C. A. Align. deg. true: 0 **to** 0 VaneTorque 1/16/2015 1.00000 Cert Date CorrCoff Parameter wind direction Ushikata Mfg **Serial Number** 191832 Tfer Desc. transit Tfer ID 01272 1.00000 0.00000 **Slope Intercept Cert Date** 2/19/2015 CorrCoff 1.00000 **DAS 1: DAS 2: Orientation Linearity: Orientation Linearity:** 2.0 Abs Avg Err Abs Max Er 3 UseDescription TferID Input Raw Linearity Output V Output Deg. Difference Change Error primary 01272 2 0.000 1 01272 92 0.000 94 2 2 primary 2 01272 182 0.000 184 2 primary 01272 272 0.000 269 3 3 primary Sensor Component Mast **Condition** Good Status pass Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component | Sensor Plumb Status pass **Condition** Plumb **Condition** Not tested Sensor Component | Torque Status pass Sensor Component Vane Condition **Condition** Good **Status** pass **Sensor Component** System Memo **Status** pass **Condition**

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Vaisala SHE604 Eric Hebert 08/18/2015 Temperature C2730121 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 Tfer ID -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 1.54 3.28 UseDesc. Test type InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference primary Temp Mid Range 15.65 15.78 0.000 17.0 $\mathbf{C}$ 1.25 C Temp Mid Range 17.00 17.12 0.000 17.0 -0.08 primary 19.8 C -3.28 primary Temp Mid Range 22.99 23.08 0.000 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 Condition See comments Status pass

#### **Humidity Data Form** Mfg Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** SHE604 Eric Hebert 08/18/2015 Relative Humidity Vaisala C2730121 none Mfg Rotronic **Parameter** Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 **Tfer ID** 4.53330 **Slope** 0.91000 **Intercept** 1/21/2015 0.99800 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.7 Abs Avg Err 0.7 **Abs Max Er** UseDesc. Test type Device Input RH GTL Raw RH Corr. **DAS Volts** DAS %RH Difference 50.8 0.000 0.7 primary RH Low Range Hygroclip 52.9 52.9 53.6 Condition Clean Status pass **Sensor Component** RH Filter 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

# **Precipitation Data Form**

Mfg	S	erial N	lumber Ta	Site		Tec	echnician		Site	Visit Date	e Parameter		Owner ID		
Met One	١	N8139		SHE604		Eri	c Hebert		08/	8/2015	Precipit	atio	n	none	
							Mfg		PMF	)	Pa	araı	meter Pre	cipitation	
DAS 1:			<b>DAS 2:</b>				Serial Nun	nber	EW-	06134-50	Tf	fer l	Desc. 250	ml graduate	
<b>A Avg % Dif</b>	_	<b>x % D</b> 9.8°		Dif A	Max % Di	1	Tfer ID		0125	50					
							Slope			1.0000	0 Inte	rce	pt	0.00000	)
							Cert Date			9/5/200	Cor	rCo	off	1.00000	)
UseDesc.	Test t	ype	TferVolume	Iteration	TimePerT	ip	Eq.Ht	DAS	Seng	Eq.HtUnit	OSE Uı	nit	TferUnits	PctDifference	2
primary	test 1		465.0	1	10 sec		14.34	15	.75	mm	mm		ml	9.8%	
Sensor Com	ponent	Prope	rly Sited		Cond	litio	on 45 degree rule			Status	pa	SS			
Sensor Com	ponent	Gauge	e Drain Scree	en	Cond	litio	tion Installed				Status	pa	SS		
Sensor Com	ponent	Funne	el Clean		Cond	litio	Clean				Status	pa	SS		
Sensor Com	ponent	Condi	tion		Cond	litio	Good				Status	pa	SS		
Sensor Com	ponent	Gauge	e Screen		Cond	litio	n Installed				Status	Status pass			
Sensor Com	ponent	Gauge	e Clean		Cond	litio	Clean				Status	pa	SS		
Sensor Com	ponent	Level			Cond	litio	ion Level				Status	pa	SS		
Sensor Com	ponent	Senso	r Heater		Cond	litio	ion N/A				Status	pa	SS		
Sensor Com	ponent	Syster	m Memo		Cond	litio	n				Status	pa	SS		

### **Infrastructure Data For** Site Visit Date 08/18/2015 SHE604 Technician Eric Hebert Site ID **Shelter Make Shelter Model Shelter Size** Sensor Component Shelter Roof **Condition** Good Status pass Sensor Component | Sample Tower Type **Condition** Pole type Status pass Sensor Component | Met Tower **Condition** Fair Status pass Sensor Component | Power Cables **Condition** Good **Status** pass Sensor Component | Conduit **Condition** N/A **Status** pass Sensor Component | Sample Tower **Condition** Fair **Status** pass Sensor Component | Shelter Condition **Condition** Good Status pass Sensor Component | Shelter Floor **Condition** Good Status pass Sensor Component | Shelter Temp Control **Condition** Functioning Status pass Sensor Component | Signal Cable **Condition** Good Status pass Sensor Component | Shelter Door **Condition** Good Status pass Sensor Component | Sample Train **Condition** Good Status pass Condition 3/8 teflon Sensor Component Tubing Type Status pass Sensor Component Rotometer **Condition** Not installed **Status** Fail Sensor Component | Moisture Trap **Condition** Not installed Status pass

# **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	l Problem
Flow Rate Additional details can b	SHE604 e found in the ha	Eric Hebert rdcopy of the site a	08/18/2015 udit report.	System Memo	Omega	3819		
Temperature Additional details can b	SHE604 e found in the ha	Eric Hebert rdcopy of the site a	08/18/2015 udit report.	System Memo	Vaisala	4058		

# **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator uses the caps and bag from the received filter to seal and send back the removed filter. A spare set of caps and bag should be sent to the site. This was reported during the previous site audit.

2 Parameter: DasComments

The site power source is solar and wind with battery storage. The NEMA enclosure has a cooling fan.

3 Parameter: SiteOpsProcedures

observations of current meteorological measurements are recorded on a hardcopy checklist for ARS and not on the SSRF.

4 Parameter: DocumentationCo

The site operator received a disc with the 2013 QAPP, operating procedures, and HASP which is kept at his office.

5 Parameter: SitingCriteriaCom

The site is located in range land. There is an active rail line with coal trains within one kilometer of the site.

6 Parameter: ShelterCleanNotes

NEMA enclosure, solar power

7 Parameter: PollAnalyzerCom

The dry deposition filter pack enclosure is not the standard "pot" size as at the other CASTNET sites. The diameter is much smaller. It is not clear if this will impact particle collection efficiency.

8 Parameter: MetSensorComme

The site is a small footprint solar powered site that has been operating as part of the WARMS network for 10 years. Objects violate the 45 degree rule for the tipping bucket rain gage. Temperature and RH are measured with a combined sensor that cannot be immersed making a temperature audit difficult. The temperature and RH are being measured at 2.5 meters above the ground.

9 Parameter: MetOpMaintCom

Due to limited time at the site caused by approaching thunder storm, only ambient comparisons of temperature were performed using the EEMS RTD standard. One standard salt solution was used for the RH comparison. The accuracy of the DAS was not tested with a voltage source since there were no available test channels.

### F-02058-1500-S1-rev002 Field Systems Data Form SHE604 Site Visit Date 08/18/2015 Site ID Technician Eric Hebert **USGS Map EPA** Site Sponsor (agency) **Map Scale** BLM **Operating Group Map Date** AQS# Climatronics **Meteorological Type** Air Pollutant Analyzer **QAPP** Latitude **Deposition Measurement QAPP** Longitude **Land Use QAPP Elevation Meters** Terrain **QAPP Declination** Conforms to MLM **OAPP Declination Date** 44.933601 **Site Telephone Audit Latitude** -106.847161 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 1141 Sheridan 10.0 **Audit Declination County** Sheridan, WY City, State **Present** Fire Extinguisher 82801 Zip Code Mountain Time Zone First Aid Kit **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 NEMA enclosure, solar power **Shelter Clean** □ Notes Site OK

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID SHE604 Technician Eric Hebert Site Visit Date 08/18/2015

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		<b>~</b>
Feedlot operations	500 m		$\checkmark$
Intensive agricultural ops (including aerial spraying)	500 m		$\checkmark$
Limited agricultural operations	200 m		<b>~</b>
Large parking lot	200 m		$\checkmark$
Small parking lot	100 m		$\checkmark$
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		<b>✓</b>

Siting Distances OK

**Siting Criteria Comment** 

The site is located in range land. There is an active rail line with coal trains within one kilometer of the site.

### **Field Systems Data Form** F-02058-1500-S3-rev002 Technician Eric Hebert Site Visit Date 08/18/2015 Site ID SHE604 **~** 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? **V** 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,

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 is a small footprint solar powered site that has been operating as part of the WARMS network for 10 years. Objects violate the 45 degree rule for the tipping bucket rain gage. Temperature and RH are measured with a combined sensor that cannot be immersed making a temperature audit difficult. The temperature and RH are being measured at 2.5 meters above the ground.

Fie	eld Sy	ystems Data	Form		F-02058-1500-S4-rev002						
Site	ID	SHE604	Technician Eric Heb	pert	Site Visit Date 08/18/2015						
		the meterological so on, and well mainta	ensors appear to be intact, in aimed?	n good							
		the meteorological ng data?	sensors operational online,	, and							
3	Are the	e shields for the ten	nperature and RH sensors c	elean? ✓							
4	Are the	e aspirated motors	working?	V	N/A						
	Is the s		or's lens clean and free of	<b>✓</b>							
6	Is the s	urface wetness sens	sor grid clean and undamag	ged? ✓	N/A						
7		e sensor signal and on, and well mainta	power cables intact, in good	d 🔽							
		e sensor signal and ne elements and we	power cable connections pr ll maintained?	rotected ~							
atur ue t	ral or m	an-made, that may	affect the monitoring para sed by approaching thunder s	meters:	y) regarding conditions listed above, or any other features, ambient comparisons of temperature were performed using the aparison. The accuracy of the DAS was not tested with a voltage						
		there were no availal		the Kircon	ipanson. The accuracy of the DAO was not tested with a voltage						

### Field Systems Data Form F-02058-1500-S5-rev002 SHE604 Technician Eric Hebert Site Visit Date 08/18/2015 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 **✓** N/A Do the analyzers and equipment appear to be in good condition and well maintained? **V** N/A 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 10 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? Not present Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it Not present clean? Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,

The dry deposition filter pack enclosure is not the standard "pot" size as at the other CASTNET sites. The diameter is much smaller. It is not

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

clear if this will impact particle collection efficiency.

## Field Systems Data Form F-02058-1500-S6-rev002 SHE604 Technician | Eric Hebert Site Visit Date 08/18/2015 Site ID DAS, sensor translators, and peripheral equipment operations and maintenance Do the DAS instruments appear to be in good condition and well maintained? **✓** Are all the components of the DAS operational? (printers, modem, backup, etc) Not present Do the analyzer and sensor signal leads pass through lightning protection circuitry? **✓** Are the signal connections protected from the weather and well maintained? **✓** Are the signal leads connected to the correct DAS channel? Are the DAS, sensor translators, and shelter properly **~** grounded? **✓** Does the instrument shelter have a stable power source? 7 Marginally Is the instrument shelter temperature controlled?

**Stable** 

**✓** 

**V** 

Grounded

**✓** 

**V** 

Is the met tower stable and grounded?

10 Is the sample tower stable and grounded?

11 Tower comments?

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 power source is solar and wind with battery storage. The NEMA enclosure has a cooling fan.

#### SHE604 Technician | Eric Hebert Site Visit Date 08/18/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A No N/A Yes Wind speed sensor **Data logger V** $\checkmark$ П Wind direction sensor **Data logger V** $\checkmark$ П Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V** П ✓ Solar radiation sensor Modem П 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 **V V UPS Solar radiation translator** $\checkmark$ **V** Tipping bucket rain gauge **Lightning protection device V V Shelter heater** Ozone analyzer $\checkmark$ **V** 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** Not present **SSRF ✓ V ✓ V Site Ops Manual** 2013 **V HASP ✓** 2013 **✓ Field Ops Manual** 2013 **V Calibration Reports** Not present Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? Not performed 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? **~** 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:

The site operator received a disc with the 2013 QAPP, operating procedures, and HASP which is kept at his office.

F-02058-1500-S7-rev002

Field Systems Data Form

#### Field Systems Data Form F-02058-1500-S8-rev002 SHE604 Technician Eric Hebert Site Visit Date 08/18/2015 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** Weekly **Visual Inspections** N/A **Translator Zero/Span Tests (climatronics) ✓ V** Monthly **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values** 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** 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 V** 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? Do automatic and manual z/s/p gasses go through the N/A complete sample train including all filters? **✓** N/A 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:

observations of current meteorological measurements are recorded on a hardcopy checklist for ARS and not on the SSRF.

### Field Systems Data Form F-02058-1500-S9-rev002 SHE604 Technician Eric Hebert Site Visit Date 08/18/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? Filter changed mornings 90% Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? **✓** SSRF 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? **✓** Clean gloves on and off 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** Not present **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **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 site operator uses the caps and bag from the received filter to seal and send back the removed filter. A spare set of caps and bag

should be sent to the site. This was reported during the previous site audit.

# Field Systems Data Form

# F-02058-1500-S10-rev002

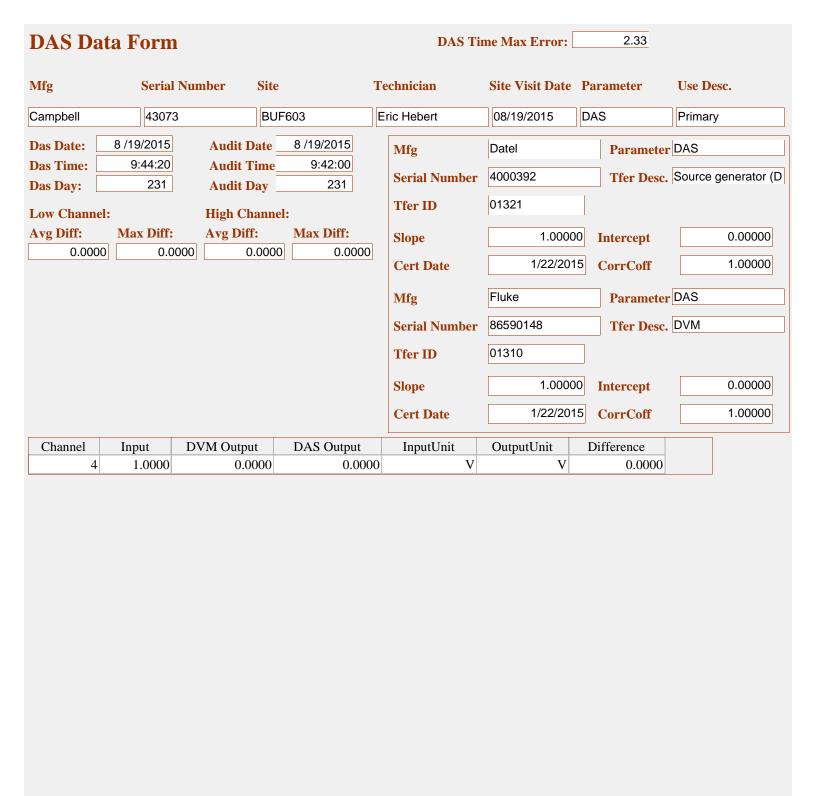
Site ID SHE604 Technician Eric Hebert Site Visit Date 08/18/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID	
DAS	Campbell	CR1000	unknown2	49923	
elevation	Elevation	none	none	none	
Flow Rate	Omega	FMA6518ST-RS232	32433-2	none	
Infrastructure	Infrastructure	none	none	none	
Precipitation	Met One	370C	N8139	none	
Relative Humidity	Vaisala	HMP45AC	C2730121	none	
Sample Tower	Unknown	Unknown	None	none	
siting criteria	Siting Criteria	none	None	none	
Solar Radiation	Licor	LI-200	illegible	none	
Temperature	Vaisala	HMP45AC	C2730121	none	
Wind Direction	Met One	024	W4808	none	
Wind Speed	Met One	014	J1234	J1234	

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number					
BUF	603-Eric H	lebert-08/19/2015	Campbell 49917 CR1000 43073  Elevation none none none Thomas none 107CAB18 Illegible Omega none FMA6518ST-RS232 315688-1  Infrastructure none none none Sceptre none FMA65PWC 295106-12  Met One none HMP45AC C2730144								
1	8/19/2015	DAS	Campbell	49917	CR1000	43073					
2	8/19/2015	elevation	Elevation	none	none	none					
3	8/19/2015	Filter pack flow pump	Thomas	none	107CAB18	Illegible					
4	8/19/2015	Flow Rate	Omega	none	FMA6518ST-RS232	315688-1					
5	8/19/2015	Infrastructure	Infrastructure	none	none	none					
6	8/19/2015	MFC power supply	Sceptre	none	FMA65PWC	295106-12					
7	8/19/2015	Precipitation	Met One	none	385	J7547					
8	8/19/2015	Relative Humidity	Vaisala	none	HMP45AC	C2730144					
9	8/19/2015	Sample Tower	Unknown	none	Unknown	None					
10	8/19/2015	siting criteria	Siting Criteria	none	none	None					
11	8/19/2015	Solar Radiation	Licor	none	LI-200	illegible					
12	8/19/2015	Temperature	Vaisala	none	HMP45AC	C2730144					
13	8/19/2015	Wind Direction	Met One	none	024	J7269					
14	8/19/2015	Wind Speed	Met One	K2277	014	K2277					



# Flow Data Form

Mfg	S	erial Nun	iber Ta	Site	Tec	hnician	Site Visit	Date Parar	neter	Owner ID	
Omega	3	15688-1		BUF603	Eri	c Hebert	08/19/201	5 Flow F	Rate	none	
Mfg	Sceptre					Mfg	BIOS	I	Parameter Flow Rate		
SN/Owner ID	29510	95106-12 none				Serial Number	131818	7	Tfer Desc. BIOS 220-H		
Parameter		FC power supply				Tfer ID	01417				
1 at afficted	IVII O	power sup	Priy					00040		0.0054	
						Slope	1	.00316 Int	ercept	-0.0054	
						Cert Date	1/	/7/2015 Co	rrCoff	1.0000	
DAS 1:			DAS 2:			Cal Factor Z	ero	0.	36		
A Avg % Diff: A Max % Di A Avg %Dif A Max			x % Di	Cal Factor F	ull Scale	0.	0.99				
0.89%		1.19%				Rotometer R	eading:		0		
Desc.	Te	st type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	PctDifference	
primary	pump	off	0.000	0.000	0.00	0.000	0.36	l/m	1/m		
primary	leak o	heck	0.000	0.000	0.00	0.000	0.36	l/m	l/m		
primary	test p	t 1	3.365	3.360	0.00	0.000	3.33	l/m	l/m	-0.89%	
primary	test p	t 2	3.355	3.350	0.00	0.000	3.31	l/m	l/m	-1.19%	
primary	test p	t 3	3.359	3.350	0.00	0.000	3.33	l/m	l/m	-0.60%	
Sensor Comp	onent	Leak Tes	t		Condition	n		Statu	s pass		
Sensor Component Filter Az		Filter Azir	muth		Condition	135 deg		Status pass			
Sensor Component		Filter Depth		Condition	10.0 cm		Statu	Status pass			
Sensor Component Fil		Filter Pos	r Position C		Condition	Poor		Statu	Status Pass		
Sensor Component Filter Distan		tance		Condition 2.5 cm			Status pass				
Sensor Component Tubing Condition		Condition	Good		Status pass						
Sensor Component Rotometer Condition		Condition	n N/A		Statu	Status pass					
Sensor Component Moisture Present			Condition	No moisture p	resent	Statu	Status pass				
Sensor Component System Memo		Condition	See comments	S	Statu	Status pass					

#### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID BUF603 Wind Speed K2277 Met One K2277 Eric Hebert 08/19/2015 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 **to** 0 **Prop or Cups Torque Cert Date** 12/22/2014 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** 1.00000 12/22/2014 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.01 0.78% Abs Avg Err 0.05 2.25% Abs Max Er UseDescription: Input Device Input RPM Out V Diff/ % Diff Diff WsM Input m/s DAS m/s primary 00000 0 0.50 0.0 0.5 -0.05 01261 30 1.25 0.0 1.3 0.00 primary primary 01261 60 2.05 0.0 2.1 0.00 120 3.65 0.0 3.7 0.00 01261 primary 5.7 primary 01262 200 5.78 0.0 -2.25% 01262 400 0.0 11.1 -0.54% primary 11.11 01262 800 21.78 0.0 21.9 0.32% primary primary 01262 1800 48.44 0.0 48.5 0.02% Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Plumb **Condition** Plumb **Status** pass Sensor Component | Torque **Condition** Not tested **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component Prop or Cups Condition **Condition** Good **Status** pass Status pass **Sensor Component** System Memo **Condition**

#### **Wind Direction Data Form Technician** Site Visit Date Parameter Owner ID Mfg Serial Number Ta BUF603 Wind Direction Met One J7269 Eric Hebert 08/19/2015 none Mfg RM Young Parameter wind direction Tfer Desc. wind direction wheel **Serial Number** 01264 Tfer ID Slope 1.00000 **Intercept** 0.00000 Vane SN: N/A C. A. Align. deg. true: 0 **to** 1.5 0 VaneTorque 1/16/2015 1.00000 Cert Date CorrCoff Parameter wind direction Ushikata Mfg **Serial Number** 191832 Tfer Desc. transit Tfer ID 01272 1.00000 0.00000 **Slope Intercept Cert Date** 2/19/2015 CorrCoff 1.00000 **DAS 1: DAS 2: Orientation Linearity: Orientation Linearity:** 1.8 Abs Avg Err Abs Max Er 4 UseDescription TferID Input Raw Linearity Output V Output Deg. Difference Change Error primary 01272 1 0.000 2 1 01272 91 0.000 91 0 0 primary 2 01272 181 0.000 179 2 primary 01272 271 0.000 267 4 4 primary Sensor Component Mast **Condition** Good Status pass Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component | Sensor Plumb Status pass **Condition** Plumb **Condition** Not tested Sensor Component | Torque Status pass Sensor Component Vane Condition **Condition** Good **Status** pass **Sensor Component** System Memo **Status** pass **Condition**

### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Vaisala BUF603 Eric Hebert 08/19/2015 Temperature C2730144 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 Tfer ID -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.23 0.39 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 7.62 7.80 0.000 7.5 C -0.27 25.97 C Temp Mid Range 25.90 0.000 26.0 0.03 primary 0.000 42.3 C -0.39 primary Temp High Range 42.71 42.69 Sensor Component | Shield **Condition** Clean **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

#### **Humidity Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg BUF603 Eric Hebert 08/19/2015 Relative Humidity Vaisala C2730144 none Mfg Rotronic **Parameter** Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 Tfer ID 4.53330 **Slope** 0.91000 **Intercept Cert Date** 1/21/2015 0.99800 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 1.8 **Abs Avg Err** 2.4 2.6 2.4 **Abs Max Er** UseDesc. Test type Device Input RH GTL Raw RH Corr. **DAS Volts** DAS %RH Difference RH Low Range 34.7 0.000 -1.0 primary Hygroclip 32.8 32.8 31.8 52.9 56.1 0.000 -2.6 primary RH Low Range Hygroclip 52.9 50.3 primary RH High Range Hygroclip 93.6 86.8 93.6 0.000 91.2 -2.4 Condition Clean Status pass Sensor Component | RH Filter 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

#### **Solar Radiation Data Form** Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg BUF603 Eric Hebert 08/19/2015 Solar Radiation Licor illegible none Mfg **Eppley** Parameter solar radiation Tfer Desc. SR transfer sensor 34341F3 **Serial Number** 01245 **Tfer ID** 0.00000 **Slope** 1.00000 **Intercept DAS 1: DAS 2:** 1/16/2015 1.00000 % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max **Cert Date** CorrCoff 1.3% 1.3% 0.0% 0.0% Tfer Corr UseDescription Measure Date MeasureTime PctDifference Tfer Raw DAS w/m2 primary 8/19/2015 11:00 840 840 861 2.5% 12:00 901 901 920 2.1% primary 8/19/2015 primary 8/19/2015 13:00 910 910 922 1.3% 0.0% primary 8/19/2015 14:00 869 868 868 0.6% 758 758 762 primary 8/19/2015 15:00 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		Technician Site Visit Date				Visit Date	Parameter			Owner ID
Met One	J	17547		BUF603		Eri	ic Hebert		08/	19/2015	Precipita	ation		none
							Mfg PMP			Parameter Precipitation				
DAS 1:			<b>DAS 2:</b>				Serial Num	ıber	EW-	06134-50	Tf	er Desc.	250r	nl graduate
A Avg % Diff		<b>x % D</b> 9.0		6Dif A N	Max % Di	]	Tfer ID		0125	50				
							Slope			1.0000	0 Inter	cept		0.00000
							Cert Date			9/5/200	Corr	Coff		1.00000
UseDesc.	Test t	ype	TferVolume	Iteration	TimePerT	ip	Eq.Ht	DAS	eng	Eq.HtUnit	OSE Un	it TferU	nits	PctDifference
primary	test 1		231	1	10 sec		3.35	3.	05	mm	mm	ml		-9.0%
primary	test 2		231	2	10 sec		3.35	3.	30	mm	mm	ml	.	-1.5%
Sensor Com	ponent	Prope	erly Sited		Cond	litio	45 degree	e rule			Status	pass		
Sensor Com	ponent	Gaug	e Drain Scree	en	Cond	litio	Installed				Status	pass		
Sensor Com	ponent	Funne	el Clean		Cond	litio	Clean				Status pass			
Sensor Com	ponent	Condi	ition		Cond	litio	Good				Status	pass		
Sensor Com	ponent	Gaug	e Screen		Cond	litio	Installed				Status	pass		
Sensor Com	ponent	Gaug	e Clean		Cond	litio	Clean				Status	pass		
Sensor Com	ponent	Level			Cond	litio	Level				Status	pass		
Sensor Com	ponent	Senso	or Heater		Cond	litio	Functioning				Status pass			
Sensor Com	ponent	Syste	m Memo		Cond	litio	on				Status	pass		

### **Infrastructure Data For** BUF603 Technician Eric Hebert Site Visit Date 08/19/2015 Site ID **Shelter Make Shelter Model Shelter Size** Sensor Component Shelter Roof **Condition** Good Status pass Sensor Component | Sample Tower Type **Condition** Pole type Status pass Sensor Component | Met Tower **Condition** Fair Status pass Sensor Component | Power Cables **Condition** Good **Status** pass Sensor Component | Conduit **Condition** N/A **Status** pass Sensor Component | Sample Tower **Condition** Fair **Status** pass Sensor Component | Shelter Condition **Condition** Good Status pass Sensor Component | Shelter Floor Status pass **Condition** Good Sensor Component | Shelter Temp Control **Condition** N/A Status pass Sensor Component | Signal Cable **Condition** Good Status pass Sensor Component | Shelter Door **Condition** Good Status pass Sensor Component | Sample Train **Condition** Good Status pass Condition 3/8 teflon Sensor Component Tubing Type Status pass Sensor Component Rotometer **Condition** Not installed Status pass Sensor Component | Moisture Trap **Condition** Not installed Status pass

## **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Haza	rd Problem
Flow Rate	BUF603	Eric Hebert	08/19/2015	System Memo	Omega	3827		
The filter attachment pl	ate is mounted to	oo high in the enclos	sure resulting in	the filter being reco	essed in the enc	losure and not expo	sed in th	e standard

The filter attachment plate is mounted too high in the enclosure resulting in the filter being recessed in the enclosure and not exposed in the standard geometric orientation.

## **Field Systems Comments**

1 Parameter: DasComments

The NEMA enclosure has a cooling fan.

2 Parameter: DocumentationCo

A disc with the current QAPP has been received and is kept at the site operator's office.

3 Parameter: ShelterCleanNotes

NEMA enclosure, 120 VAC power

4 Parameter: PollAnalyzerCom

The dry deposition filter pack enclosure is not the standard "pot" size that is used at the other CASTNET sites. The diameter of the enclosure is much smaller and the filter is mounted much deeper inside the opening. The geometry of the filter pack and enclosure is likely to impact particle collection efficiency.

5 Parameter: MetSensorComme

The temperature and RH are measured using a combined sensor which cannot be immersed making a temperature audit difficult. The temperature and RH are measured at 2.5 meters above the ground.

### F-02058-1500-S1-rev002 Field Systems Data Form BUF603 Site Visit Date 08/19/2015 Site ID Technician Eric Hebert **USGS Map EPA** Site Sponsor (agency) **Map Scale** BLM **Operating Group Map Date** AQS# **Meteorological Type** Air Pollutant Analyzer **QAPP** Latitude **Deposition Measurement QAPP** Longitude **Land Use QAPP Elevation Meters** Terrain **QAPP Declination** Conforms to MLM **OAPP Declination Date** 44.144135 **Site Telephone Audit Latitude** -106.108771 Site Address 1 **Audit Longitude** Site Address 2 1320 **Audit Elevation** Johnson 9.5 **Audit Declination County** Buffalo, WY City, State **Present** Fire Extinguisher 82834 Zip Code Mountain Time Zone First Aid Kit **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 NEMA enclosure, 120 VAC power **Shelter Clean** Site OK Notes

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID	BUF603	Technician	Eric Hebert	Site Visit Date	08/19/2015

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		ightharpoons
Small parking lot	100 m		ightharpoons
Tree line	50 m		
Obstacles to wind	10 times obstacle height		<b>~</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comn	nen

Fi	eld Systems Data Form	F-02058-1500-S3-rev002
Site	BUF603 Technician Eric Hebert	Site Visit Date 08/19/2015
1	Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?	
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)	
3	Are the tower and sensors plumb?	
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)	f
6	Is the solar radiation sensor plumb?	
7	Is it sited to avoid shading, or any artificial or reflected light?	
8	Is the rain gauge plumb?	
9	Is it sited to avoid sheltering effects from buildings, trees, towers, etc?	45 degree rule violation
10	Is the surface wetness sensor sited with the grid surface facing north?	N/A
11	Is it inclined approximately 30 degrees?	N/A
	ovide any additional explanation (photograph or sketch if necoural or man-made, that may affect the monitoring parameter	cessary) regarding conditions listed above, or any other features,

The temperature and RH are measured using a combined sensor which cannot be immersed making a temperature audit difficult. The temperature and RH are measured at 2.5 meters above the ground.

Site ID BUF603 Technician Fric Hebert Site Visit Date 08/19/2015  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? 5 Is the solar radiation sensor's lens clean and free of scratches? 6 Is the surface wetness sensor grid clean and undamaged? 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? 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:	Fi	eld Systems Data Form	F-02058-1500-S4-rev002					
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?  5 Is the solar radiation sensor's lens clean and free of scratches?  6 Is the surface wetness sensor grid clean and undamaged?  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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	Site	ID BUF603 Technician Eric Hebert	Site Visit Date 08/19/2015					
reporting data?  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?  6 Is the surface wetness sensor grid clean and undamaged?  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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	1							
4 Are the aspirated motors working?  5 Is the solar radiation sensor's lens clean and free of scratches?  6 Is the surface wetness sensor grid clean and undamaged?  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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	2							
5 Is the solar radiation sensor's lens clean and free of scratches? 6 Is the surface wetness sensor grid clean and undamaged? 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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	3	Are the shields for the temperature and RH sensors clean?						
scratches?  6 Is the surface wetness sensor grid clean and undamaged?  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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	4	Are the aspirated motors working?	✓ 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?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	5							
condition, and well maintained?  8 Are the sensor signal and power cable connections protected from the elements and well maintained?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	6	Is the surface wetness sensor grid clean and undamaged?	✓ N/A					
from the elements and well maintained?  Provide any additional explanation (photograph or sketch if necessary) regarding conditions listed above, or any other features,	7							
	8							

### Field Systems Data Form F-02058-1500-S5-rev002 BUF603 Technician | Eric Hebert Site Visit Date 08/19/2015 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 **✓** N/A Do the analyzers and equipment appear to be in good condition and well maintained? **V** N/A 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 10 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? Not present Are there moisture traps in the sample lines? Is there a rotometer in the dry deposition filter line, and is it Not present 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 dry deposition filter pack enclosure is not the standard "pot" size that is used at the other CASTNET sites. The diameter of the enclosure is much smaller and the filter is mounted much deeper inside the opening. The geometry of the filter pack and enclosure is likely to impact particle collection efficiency.

### Field Systems Data Form F-02058-1500-S6-rev002 BUF603 Technician | Eric Hebert Site Visit Date 08/19/2015 Site ID DAS, sensor translators, and peripheral equipment operations and maintenance Do the DAS instruments appear to be in good condition and well maintained? **~** Are all the components of the DAS operational? (printers, modem, backup, etc) Not present Do the analyzer and sensor signal leads pass through lightning protection circuitry? **V** Are the signal connections protected from the weather and well maintained? **V** Are the signal leads connected to the correct DAS channel? Are the DAS, sensor translators, and shelter properly **~** grounded? **✓** Does the instrument shelter have a stable power source? 7 Marginally Is the instrument shelter temperature controlled? Grounded **Stable** Is the met tower stable and grounded? **✓** Is the sample tower stable and grounded? **V** 11 Tower comments?

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 NEMA enclosure has a cooling fan.

#### **Field Systems Data Form** BUF603 Technician | Eric Hebert Site Visit Date 08/19/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No Yes N/A No N/A Yes $\overline{\mathbf{V}}$ Wind speed sensor **Data logger V** $\checkmark$ П Wind direction sensor **Data logger V** $\checkmark$ П Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V** П ✓ Solar radiation sensor Modem П П **V V Printer** Surface wetness sensor **V V** Wind sensor translator Zero air pump **V Temperature translator V** Filter flow pump **V ~ Humidity sensor translator Surge protector** П **V ~ UPS Solar radiation translator** $\checkmark$ **V** Tipping bucket rain gauge **Lightning protection device V V Shelter heater** Ozone analyzer $\checkmark$ **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** Not present **SSRF ✓ V ✓ V Site Ops Manual** 2013 **V HASP ✓** 2013 **✓ Field Ops Manual** 2013 **V Calibration Reports** Not present Ozone z/s/p Control Charts N/A **V** Preventive maintenance schedul Not present Is the station log properly completed during every site visit? Not present 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? **~** 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:

A disc with the current QAPP has been received and is kept at the site operator's office.

F-02058-1500-S7-rev002

### **Field Systems Data Form** F-02058-1500-S8-rev002 BUF603 Technician Eric Hebert Site Visit Date 08/19/2015 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 **✓** 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 V** Weekly **Confirm Reasonableness of Current Values 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? Do automatic and manual z/s/p gasses go through the N/A

✓ N/A

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

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:

Fi	eld Sy	stems Data Forn	n		F-02058-1500-S9-rev002						
Site	e ID	BUF603	echnician Er	ic Hebert		Site Visit Date	08/19/2015				
	Site ope	ration procedures									
1	Is the fil	ter pack being changed ev	ery Tuesday a	s scheduled?	<b>✓</b>	Filter changed after	rnoons				
2	Are the correctly	Site Status Report Forms y?	being complet	ed and filed	<b>✓</b>						
3	Are data	a downloads and backups	being perform	ned as		No longer required					
4	Are general observations being made and recorded? How?					SSRF					
5	Are site supplies on-hand and replenished in a timely fashion?										
6	Are sample flow rates recorded? How?					SSRF					
7	Are samples sent to the lab on a regular schedule in a timely fashion?										
8		ers protected from contamoping? How?	ination during	g handling	Clean gloves on and off						
9		site conditions reported reons manager or staff?	gularly to the	field							
QC	Check Po	erformed	Freque	ncy			Compliant				
N	Aulti-poir	nt MFC Calibrations	✓ Semian	nually			✓				
F	low Syste	em Leak Checks	<b>✓</b> Weekly				✓				
F	ilter Pac	k Inspection									
F	Flow Rate Setting Checks Weekly					✓					
7	Visual Check of Flow Rate Rotometer  Not present										
I	n-line Fil	ter Inspection/Replacemen	t Semian	nually							
S	ample Li	ne Check for Dirt/Water									
		dditional explanation (phonomenade, that may affect the			sary	) regarding condit	ions listed above, or any other features,				

## Field Systems Data Form

### F-02058-1500-S10-rev002

Site ID BUF603

Technician Eric Hebert

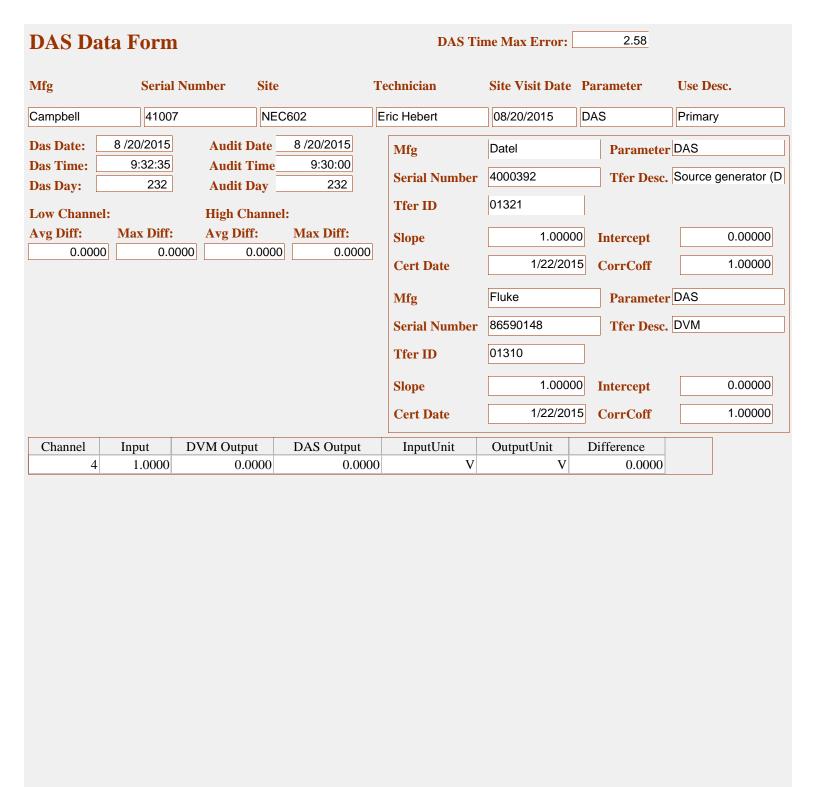
Site Visit Date 08/19/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Campbell	CR1000	43073	49917
elevation	Elevation	none	none	none
Filter pack flow pump	Thomas	107CAB18	Illegible	none
Flow Rate	Omega	FMA6518ST-RS232	315688-1	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Sceptre	FMA65PWC	295106-12	none
Precipitation	Met One	385	J7547	none
Relative Humidity	Vaisala	HMP45AC	C2730144	none
Sample Tower	Unknown	Unknown	None	none
siting criteria	Siting Criteria	none	None	none
Solar Radiation	Licor	LI-200	illegible	none
Temperature	Vaisala	HMP45AC	C2730144	none
Wind Direction	Met One	024	J7269	none
Wind Speed	Met One	014	K2277	K2277

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
NE	C602-Eric H	lebert-08/20/2015				
1	8/20/2015	DAS	Campbell	none	CR1000	41007
2	8/20/2015	elevation	Elevation	none	none	none
3	8/20/2015	Filter pack flow pump	Thomas	none	107CAB18	061200041880
4	8/20/2015	Flow Rate	Omega	none	FMA6518ST-RS232	324333-1
5	8/20/2015	Infrastructure	Infrastructure	none	none	none
6	8/20/2015	MFC power supply	Sceptre	none	FMA65PWC	295106-8
7	8/20/2015	Ozone	ThermoElectron Inc	none	49i A1NAA	1214552974
8	8/20/2015	Ozone Standard	ThermoElectron Inc	L0534683	49i E3CAA	1214552972
9	8/20/2015	Precipitation	Met One	none	099C-1	J3064
10	8/20/2015	Relative Humidity	Vaisala	none	HMP45AC	Z1050067
11	8/20/2015	Sample Tower	Unknown	none	Unknown	None
12	8/20/2015	Shelter Temperature	ARS	none	Thermocouple	none
13	8/20/2015	siting criteria	Siting Criteria	none	none	None
14	8/20/2015	Solar Radiation	Licor	none	LI-200	PY18362
15	8/20/2015	Temperature	Vaisala	none	HMP45AC	Z1050067
16	8/20/2015	Wind Direction	Met One	none	024	Illegible
17	8/20/2015	Wind Speed	Met One	W4806	014	W4806
18	8/20/2015	Zero air pump	Thomas	none	107CAB18	081000036785



## Flow Data Form

Mfg		Serial Number Ta Site			Tec	hnician	Site Visit I	Date Param	eter	Owner ID	
Omega	3	324333-1		NEC602	Erio	Hebert	08/20/201	5 Flow R	ate	none	
Mfg	Scept	tre				Mfg	BIOS	P	arameter FI	ow Rate	
SN/Owner ID				Serial Number 131818			Tfer Desc. BIOS 220-H				
			,	Tfer ID	01417						
Parameter	IVIFC	power sup	opiy								
						Slope	1.	00316 Inte	rcept	-0.00540	
					•	Cert Date	1/	7/2015 <b>Cor</b>	rCoff	1.0000	
DAS 1:			DAS 2:		L	Cal Factor Z	ero	0.	2		
A Avg % Diff: A Max % Di A Avg % Dif A Max				% <b>Di</b>	Cal Factor F	ull Scale	1.0	3			
1.74% 3.49% Rotometer Reading:				eading:		0					
Desc.	Te	st type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit (	OutputSigna	ll PctDifference	
primary	pump	off	0.000	0.000	0.00	0.000	0.20	1/m	1/m		
primary	leak o	check	0.000	0.000	0.00	0.000	0.20	l/m	l/m		
primary	test p	t 1	3.268	3.260	0.00	0.000	3.27	1/m	1/m	0.31%	
primary	test p	t 2	3.159	3.150	0.00	0.000	3.26	1/m	1/m	3.49%	
primary	test p	t 3	3.229	3.220	0.00	0.000	3.30	1/m	1/m	2.48%	
primary	test p	t 4	3.288	3.280	0.00	0.000	3.33	1/m	1/m	1.52%	
primary	test p	t 5	3.315	3.310	0.00	0.000	3.34	1/m	1/m	0.91%	
Sensor Comp	onent	Leak Tes	t		Condition	1		Status	pass		
Sensor Comp	onent	Filter Azimuth			Condition	90 deg	Status	Status pass			
Sensor Comp	onent	Filter Depth			Condition	0 cm	Status	Status pass			
Sensor Comp	onent	Filter Pos	sition		Condition	Fair		Status	Status pass		
Sensor Comp	onent	Filter Dist	tance		Condition	5.0 cm		Status	pass	ass	
Sensor Comp	onent	Tubing C	ondition		Condition	Good		Status	Status pass		
Sensor Comp	onent	Rotomete	er Condition		Condition	N/A		Status	pass		
Sensor Comp	onent	Moisture	Present		Condition	No moisture p	resent	Status	Status pass		
Sensor Comp	onent	System N	/lemo		Condition	See comments	3	Status	pass		

## **Ozone Data Form**

Mfg S	erial Number Ta	Site	Teo	chnician		Site Visi	t Date	Parame	eter	Owner ID	
ThermoElectron Inc 1	214552974	NEC602	Eri	c Hebert		08/20/20	015	Ozone		none	
Slope:         0.97150         Slope:         0.0           Intercept         -0.47079         Intercept         0.0           CorrCoff         1.00000         CorrCoff         0.0			Serial Number						rameter ozone er Desc. Ozone primary stan		
DAS 1: A Avg % Diff: A Ma 3.9%	DAS 2: x % Di	oDif A Max 9	% <b>D</b> i	Slope Cert Da	te		1.00952 1/7/2015		_	-0.24284 1.00000	
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	Si	ite	Site	Unit	PctDiffe	erence	
primary	1	0.17	0.4	-0	0.	04	ppb				
primary	2	26.39	26.3	38	25	.03	ppb			-5.12%	
primary	3	46.77	46.:				ppb			-3.87%	
primary	4	78.19	77.0				ppb			-3.57%	
primary	5	109.26	108.		105	5.00	ppb			-3.20%	
<b>Sensor Component</b>	Sample Train		Conditio	Good				Status	pass		
Sensor Component	Fullscale Voltage		Conditio	n N/A				Status	pass		
Sensor Component	Inlet Filter Conditio	n	Conditio	Clean				Status	pass		
Sensor Component	Zero Voltage		Conditio	n N/A				Status	pass		
Sensor Component	Battery Backup		Conditio	n N/A				Status	pass		
Sensor Component	Offset		Conditio	Condition -0.6				Status	pass		
Sensor Component	Span		Conditio	ondition 1.013				Status	pass		
Sensor Component	Cell A Freq.		Conditio	Condition 73.3 kHz				Status	pass		
Sensor Component	Cell A Noise		Conditio	Condition 0.6 ppb				Status	s pass		
Sensor Component	Cell A Flow		Conditio	dition 0.60 lpm				Status	s pass		
Sensor Component	Cell A Pressure		Conditio	Condition 628.3 mmHg				Status	pass		
Sensor Component	Cell A Tmp.		<b>Condition</b> 37.2 C					Status	pass		
Sensor Component	Cell B Freq.		Conditio	dition 57.5 kHz				Status	Fail		
Sensor Component	Cell B Noise		Conditio	0.4 pp	b			Status	pass		
Sensor Component	Cell B Flow		Conditio	0.59 lp	om			Status	pass		
Sensor Component	Cell B Pressure		Conditio	on				Status	pass		
Sensor Component	Cell B Tmp.		Conditio	n				Status	pass		
Sensor Component	Line Loss		Conditio	Not te	sted			Status	pass		
Sensor Component	System Memo		Conditio	See co	omments	<b>i</b>		Status	pass		

#### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID NEC602 Wind Speed W4806 Met One W4806 Eric Hebert 08/20/2015 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 **to** 0 **Prop or Cups Torque Cert Date** 12/22/2014 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** 1.00000 12/22/2014 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.00 0.52% Abs Avg Err 0.01 1.21% Abs Max Er UseDescription: Input Device Input RPM Out V Diff/ % Diff Diff WsM Input m/s DAS m/s primary 00000 0 0.45 0.0 0.5 0.00 01261 30 1.25 0.0 1.3 0.00 primary primary 01261 60 2.05 0.0 2.0 -0.01 120 3.65 0.0 3.7 0.00 01261 primary 5.9 primary 01262 200 5.78 0.0 1.21% 01262 400 0.0 11.1 -0.54% primary 11.11 01262 800 21.78 0.0 21.9 0.32% primary primary 01262 1800 48.44 0.0 48.5 0.02% Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Plumb **Condition** Plumb **Status** pass Sensor Component | Torque **Condition** Not tested **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component Prop or Cups Condition **Condition** Good **Status** pass

**Condition** 

**Sensor Component** System Memo

Status pass

#### Wind Direction Data Form Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg Wind Direction Met One Illegible NEC602 Eric Hebert 08/20/2015 none Mfg RM Young Parameter wind direction Tfer Desc. wind direction wheel **Serial Number** 01264 Tfer ID Slope 1.00000 **Intercept** 0.00000 Vane SN: N/A C. A. Align. deg. true: 0 **to** 360 0 VaneTorque 1/16/2015 1.00000 Cert Date CorrCoff Parameter wind direction Ushikata Mfg **Serial Number** 191832 Tfer Desc. transit Tfer ID 01272 1.00000 0.00000 **Slope Intercept Cert Date** 2/19/2015 CorrCoff 1.00000 **DAS 1: DAS 2: Orientation Linearity: Orientation Linearity:** 1.5 Abs Avg Err Abs Max Er 3 UseDescription TferID Input Raw Linearity Output V Output Deg. Difference Change Error 90 0 primary 01272 0.000 90 0 01272 180 0.000 178 2 2 primary 01272 270 0.000 267 3 3 primary 01272 360 0.000 1 1 primary 1 Sensor Component Mast **Condition** Good Status pass Sensor Component | Condition **Condition** Good **Status** pass Sensor Component | Sensor Heater **Condition** N/A **Status** pass Sensor Component | Sensor Plumb Status pass **Condition** Plumb **Condition** Not tested Sensor Component | Torque Status pass Sensor Component Vane Condition **Condition** Fair **Status** pass

**Condition** See comments

**Sensor Component** System Memo

Status pass

### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Vaisala Z1050067 NEC602 Eric Hebert 08/20/2015 Temperature none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.26 0.37 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 5.51 5.70 0.000 5.8 $\mathbf{C}$ 0.13 C -0.29 Temp Mid Range 23.00 23.09 0.000 22.8 primary 41.0 C -0.37 primary Temp High Range 41.33 41.32 0.000 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

#### **Humidity Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg NEC602 Eric Hebert Relative Humidity Vaisala Z1050067 08/20/2015 none Mfg Rotronic **Parameter** Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 **Tfer ID** 4.53330 **Slope** 0.91000 **Intercept Cert Date** 1/21/2015 0.99800 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.6 3.2 **Abs Avg Err** 1.0 3.2 **Abs Max Er** UseDesc. Test type Device Input RH GTL Raw RH Corr. **DAS Volts** DAS %RH Difference RH Low Range 0.000 -0.1primary Hygroclip 32.8 35.2 32.8 32.7 52.9 50.4 0.000 1.0 primary RH Low Range Hygroclip 52.9 53.9 primary RH High Range Hygroclip 93.6 86.9 93.6 0.000 90.4 -3.2 Condition Clean Status pass Sensor Component | RH Filter 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

#### **Solar Radiation Data Form** Serial Number Ta **Technician** Site Visit Date Parameter **Owner ID** Mfg PY18362 NEC602 Eric Hebert Solar Radiation Licor 08/20/2015 none Mfg **Eppley** Parameter solar radiation Tfer Desc. SR transfer sensor 34341F3 **Serial Number** 01245 **Tfer ID** 0.00000 **Slope** 1.00000 **Intercept DAS 1: DAS 2:** 1/16/2015 1.00000 % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max **Cert Date** CorrCoff 9.3% 10.0% 0.0% 0.0% UseDescription MeasureTime Tfer Corr PctDifference Measure Date Tfer Raw DAS w/m2 primary 8/20/2015 11:00 803 803 726 -9.6% 12:00 864 864 778 -10.0% primary 8/20/2015 -9.7% primary 8/20/2015 13:00 858 858 774 -9.1% primary 8/20/2015 14:00 816 816 742 693 693 -8.0% primary 8/20/2015 15:00 638 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	Parame	eter		Owner ID
Met One	J	J3064		NEC602		Er	ic Hebert		08/2	20/2015	Precipita	ation		none
							Mfg		PMF	)	Pa	rameter	Pred	cipitation
<b>DAS 1:</b>			<b>DAS 2:</b>				Serial Nun	ıber	EW-	06134-50	Tf	er Desc.	250	ml graduate
A Avg % Diff				Dif A N	Max % Di	,	Tfer ID		012	50				
3.6%		3.6	6%				a-			4.0000	- ·			0.00000
							Slope			1.0000	0 Inter	rcept		0.00000
							<b>Cert Date</b>			9/5/200	05 Cori	Coff		1.00000
UseDesc.	T		TC - X7 - 1	T(	Т' ВТ	,	E. II	DAG	1	E. ILII.	OGELL	TC. I	T*4.	D. (D. CC
primary	Test t	lype	TferVolume 231.5	1 1	TimePerT 10 sec	ıp	Eq.Ht 0.28	0.1		in	in	m m		PctDifference 3.6%
primary	test 2		231.5	2	10 sec		0.28	0		in	in	m		3.6%
Sensor Com	nonent	Prope	arly Sitad	I	Cond	1:4:0	n 45 degree	ם ווום			Status	nace		
								Tuic						
Sensor Com	ponent	Gaug	e Drain Scree	en	Cond	litio	Installed				Status	pass		
Sensor Com	ponent	Funne	el Clean		Cond	litio	Clean				Status	pass		
Sensor Com	ponent	Cond	ition		Cond	litio	Good				Status	pass		
Sensor Com	ponent	Gaug	e Screen		Cond	litio	Not instal	led			Status	Fail		
Sensor Component Gauge Clean Con			Cond	litio	Clean				Status	pass				
Sensor Component Level Condi			litio	Level				Status	pass					
Sensor Component Sensor Heater Condition			litio	n N/A				Status	pass					
Sensor Com	ponent	Syste	m Memo		Cond	litio	on				Status	pass		

# **Shelter Temperature Data For**

Mfg	Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
ARS	none	NEC602	Eric Hebert	08/20/2015	Shelter Temperature	e none
DAS 1:	DAS 2:		Mfg	Extech	Parameter Sh	nelter Temperatur
Abs Avg Err Ab	s Max Er Abs Avg 0.79	Err Abs Max Er	Serial Number	H232679	Tfer Desc. R	ГD
			Tfer ID	01228		
			Slope	1.00564	1 Intercept	-0.21981
			Cert Date	1/30/2015	CorrCoff	1.00000

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	28.22	28.28	0.000	28.3	C	0.02
primary	Temp Mid Range	25.52	25.60	0.000	26.4	С	0.79
primary	Temp Mid Range	28.38	28.44	0.000	28.5	C	0.07

### **Infrastructure Data For**

Site ID NEC602 Technician Eric Hebert Site Visit Date 08/20/2015

Shelter Make	Shelter Model	Shelter Size	
Shelter One	AR 263648	24 cuft	

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

## **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	Problem
Flow Rate	NEC602	Eric Hebert	08/20/2015	System Memo	Omega	3842		
An excessive amount of fluctuation in the signal recorded by the DAS for this variable was observed during the audit.								
Ozone	NEC602	Eric Hebert	08/20/2015	Cell B Freq.	ThermoElectron	3838		<b>✓</b>
This analyzer diagno	ostic check is outsic	de the manufacturer'	's recommended	value.				
Wind Direction	NEC602	Eric Hebert	08/20/2015	Vane Condition	Met One	4071		<b>✓</b>
The wind direction v	vane is slightly ben	t and could be causi	ng additional bia	s in wind direction	measurements.			

## **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator is doing a good job with filter change and filter handling.

2 Parameter: SiteOpsProcedures

The site operator is aware that the desiccant is in need of replacement. Some of the items on the SSRF were discussed and the site operator's questions were answered regarding the correct procedures.

3 Parameter: DocumentationCo

The site operator received a disc with the current QAPP which is kept at his office. The purpose and procedures for "upping" and "downing" channels was discussed during the audit.

4 Parameter: SitingCriteriaCom

The site is located approximately 2 km northeast of Newcastle WY which has a population of approximately 3500. There is an oil refinery in Newcastle. A heavily traveled road is approximately 100m west of the site.

5 Parameter: ShelterCleanNotes

The shelter houses the ozone, DAS, and MFC only.

6 Parameter: MetSensorComme

Some objects violate the 45 degree rule for the tipping bucket rain gage.

7 Parameter: MetOpMaintCom

Met One wind direction and wind speed sensors have been added to the tower with the Climatronics AIO all-in-one weather sensor for wind direction, wind speed, and temperature. The Met One sensors were audited.

A separate sensor for humidity and temperature was audited.

### F-02058-1500-S1-rev002 Field Systems Data Form Site Visit Date 08/20/2015 Site ID NEC602 Technician Eric Hebert **USGS Map EPA** Site Sponsor (agency) **Map Scale** BLM **Operating Group Map Date** AQS# Climatronics **Meteorological Type Air Pollutant Analyzer QAPP** Latitude **Deposition Measurement QAPP** Longitude **Land Use QAPP Elevation Meters** Terrain **QAPP Declination** Conforms to MLM **OAPP Declination Date** 43.8731 **Site Telephone Audit Latitude** -104.192009 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 1469 Weston 8.4 County **Audit Declination** Newcastle, WY City, State **Present** Fire Extinguisher 82701 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 Make Model AR 263648 24 cuft Shelter One **Shelter Size** Notes The shelter houses the ozone, DAS, and MFC only. **Shelter Clean** Site OK Notes

**Driving Directions** 

## **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID	NEC602	<b>Technician</b>	Eric Hebert	Site Visit Date	08/20/2015

Potential Interferent	Minimum Distance From Measurement Apparatus	Distance	Pass = Checked
Large Point Source of SO2 or NOx	20 to 40 km		<b>V</b>
Major industrial complex	10 to 20 km	< 10 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	2 km	
Major highway, airport or rail yard	2 km		✓
Secondary road, heavily traveled	500 m	100 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  $\Box$ 

**Siting Criteria Comment** 

The site is located approximately 2 km northeast of Newcastle WY which has a population of approximately 3500. There is an oil refinery in Newcastle. A heavily traveled road is approximately 100m west of the site.

### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 08/20/2015 Technician | Eric Hebert Site ID NEC602 **~** 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:

Some objects violate the 45 degree rule for the tipping bucket rain gage.

Field Systems Data Form	F-02058-1500-S4-rev002
Site ID NEC602 Technician Eric Hebert	Site Visit Date 08/20/2015
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?	
Are the sensor signal and power cable connections protected from the elements and well maintained?	
Provide any additional explanation (photograph or sketch if necessatural or man-made, that may affect the monitoring parameters	:
Met One wind direction and wind speed sensors have been added to the direction, wind speed, and temperature. The Met One sensors were au A separate sensor for humidity and temperature was audited.	dited.

### Field Systems Data Form F-02058-1500-S5-rev002 NEC602 Technician | Eric Hebert Site Visit Date 08/20/2015 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 Nylon by 10 meters **~** Are in-line filters used in the ozone sample line? (if ves indicate location) **✓** Are sample lines clean, free of kinks, moisture, and obstructions? 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 Not present 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	NEC602	Technician	Eric Hebert		Site Vis	it Date 08/20/201	5	
	DAS so	ensor translators, and	nerinheral equi	nment operation	าร ๑ท	d maintena	nce		
				_		a mameena	aree .		
1	Do the well ma	DAS instruments appenintained?	ear to be in good	l condition and	<b>✓</b>				
2		the components of the , backup, etc)	DAS operation	al? (printers,	<b>✓</b>				
3	Do the analyzer and sensor signal leads pass through lightning protection circuitry?					Not present			
4		signal connections pro nintained?	otected from the	e weather and	<b>✓</b>				
5	Are the	e signal leads connected	d to the correct	DAS channel?	<b>✓</b>				
6	Are the ground	e DAS, sensor translate ed?	ors, and shelter	properly	✓				
7	Does th	e instrument shelter h	ave a stable pov	ver source?	<b>✓</b>				
8	Is the i	nstrument shelter temp	perature contro	lled?	✓				
9	Is the n	net tower stable and gr	ounded?			Stable		Grounded	
10	Is the s	ample tower stable and	d grounded?						
11	Tower	comments?				✓		<b>V</b>	
	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-S7-rev002 NEC602 Site Visit Date 08/20/2015 Site ID Technician | Eric Hebert **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A No N/A Yes Wind speed sensor **Data logger V** ✓ П Wind direction sensor **Data logger** ✓ П **V** Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V** П ✓ Solar radiation sensor Modem П П **V V** Surface wetness sensor **Printer** П **V V** Wind sensor translator Zero air pump **V Temperature translator V** Filter flow pump **V V Humidity sensor translator Surge protector** П **~ UPS V Solar radiation translator** П **V V** Tipping bucket rain gauge **Lightning protection device V** П **V Shelter heater** Ozone analyzer ~ $\checkmark$ Shelter air conditioner Filter pack flow controller **~** Filter pack MFC power supply Does the site have the required and most recent QC documents and report forms? **Present Current Station Log** Not present **SSRF ✓ V V V Site Ops Manual** 2013 **V HASP V** 2013 **Field Ops Manual V** 2013 **V Calibration Reports** Not present Ozone z/s/p Control Charts Not present Preventive maintenance schedul Not present Is the station log properly completed during every site visit? Not present Are the Site Status Report Forms being completed and **V** current? Are the chain-of-custody forms properly used to document **V** 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 site operator received a disc with the current QAPP which is kept at his office. The purpose and procedures for "upping" and "downing" channels was discussed during the audit.

#### **Field Systems Data Form** F-02058-1500-S8-rev002 NEC602 Technician Eric Hebert Site Visit Date 08/20/2015 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** Weekly **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** Monthly **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values 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** As needed Manual Zero/Span Tests **V ~** Daily **Automatic Precision Level Tests V Manual Precision Level Test** As needed **Analyzer Diagnostics Tests V ✓** 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 **~** 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? Unknown 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 is aware that the desiccant is in need of replacement. Some of the items on the SSRF were discussed and the site operator's questions were answered regarding the correct procedures.

### Field Systems Data Form F-02058-1500-S9-rev002 NEC602 Technician Eric Hebert Site Visit Date 08/20/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed various times Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? **✓** SSRF 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? **✓** Clean gloves on and off 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** ☐ Not present **Visual Check of Flow Rate Rotometer V** ✓ Semiannually **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 site operator is doing a good job with filter change and filter handling.

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID NEC602 Technician Eric Hebert

Si

Site Visit Date 08/20/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Campbell	CR1000	41007	none
elevation	Elevation	none	none	none
Filter pack flow pump	Thomas	107CAB18	061200041880	none
Flow Rate	Omega	FMA6518ST-RS232	324333-1	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Sceptre	FMA65PWC	295106-8	none
Ozone	ThermoElectron Inc	49i A1NAA	1214552974	none
Ozone Standard	ThermoElectron Inc	49i E3CAA	1214552972	L0534683
Precipitation	Met One	099C-1	J3064	none
Relative Humidity	Vaisala	HMP45AC	Z1050067	none
Sample Tower	Unknown	Unknown	None	none
Shelter Temperature	ARS	Thermocouple	none	none
siting criteria	Siting Criteria	none	None	none
Solar Radiation	Licor	LI-200	PY18362	none
Temperature	Vaisala	HMP45AC	Z1050067	none
Wind Direction	Met One	024	Illegible	none
Wind Speed	Met One	014	W4806	W4806
Zero air pump	Thomas	107CAB18	081000036785	none

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
WN	C429-Eric I	Hebert-08/21/2015				
1	8/21/2015	Computer	Hewlett Packard	none	6560 b	5CB1520H5J
2	8/21/2015	DAS	Environmental Sys Corp	missing	8816	4159
3	8/21/2015	Elevation	Elevation	None	1	None
4	8/21/2015	Filter pack flow pump	Thomas	none	107CAB18B	070000013426
5	8/21/2015	Flow Rate	Mykrolis	02270	FC280SAV-4S	AW901295
6	8/21/2015	Infrastructure	Infrastructure	none	none	none
7	8/21/2015	Met tower	unknown	none	unknown	none
8	8/21/2015	MFC power supply	Tylan	02176	RO-32	FP902017
9	8/21/2015	Modem	US Robotics	none	56k fax modem	unknown
10	8/21/2015	Ozone	ThermoElectron Inc	none	49i A3NAA	0615817056
11	8/21/2015	Ozone Standard	ThermoElectron Inc	none	49i PSA2AB	0807328333
12	8/21/2015	Sample Tower	Aluma Tower	none	В	none
13	8/21/2015	Shelter Temperature	RM Young	none	41342	018819
14	8/21/2015	Shield (2 meter)	RM Young	none	43532	none
15	8/21/2015	Siting Criteria	Siting Criteria	None	1	None
16	8/21/2015	Temperature	RM Young	none	41342	14264
17	8/21/2015	Zero air pump	ThermoElectron Inc	none	111	111-78387-388

#### **DAS Data Form** 0.33 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 4159 WNC429 Eric Hebert 08/21/2015 DAS Primary Das Date: 8 /21/2015 **Audit Date** 8 /21/2015 Datel Parameter DAS Mfg 7:58:40 7:59:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 4000392 **Serial Number** Das Day: 233 **Audit Day** 233 Tfer ID 01321 **Low Channel: High Channel: Avg Diff: Max Diff: Avg Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0002 0.0004 0.0002 0.0004 1/22/2015 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 86590148 Tfer Desc. DVM 01310 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output **DAS** Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 2 0.1000 0.1000 0.1000 0.00002 0.3000 0.3000 0.2999 V V -0.0001 2 0.5000 0.5000 0.4998 V V -0.00022 0.7000 V V -0.0003 0.7000 0.6997 V V 2 0.9000 0.9000 0.8997 -0.0003 2 V V -0.0004 1.0000 1.0000 0.9996

## Flow Data Form

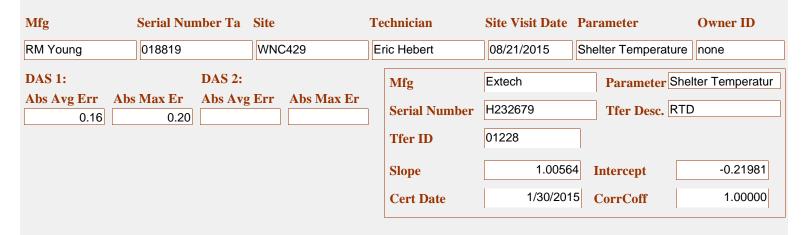
Mfg	9	Serial Num	nber Ta	Site	Tec	nnician Site Visit Da		Oate Paran	neter	Owner ID	
Mykrolis		AW901295	j	WNC429	Eri	c Hebert	08/21/2015	Flow R	Rate	02270	
Mfg	Tyla					Mfg	BIOS 131818	'	Parameter Flow Rate		
SN/Owner ID	FP9	02017	02176			Serial Number	131010	1	fer Desc. Blo	JS 220-FI	
Parameter	MFC	power sup	r supply			Tfer ID	01417				
						Slope	1.	00316 Into	ercept	-0.00540	
						Cert Date	1/7	7/2015 <b>Co</b>	rrCoff	1.00000	
DAS 1:	DAS 1: Cal Factor Zero 0										
A Avg % Diff:	A M	ax % Di	A Avg %	Dif A Ma	x % Di	Cal Factor F	'ull Scale		0		
0.56%		0.67%				Rotometer R	Reading:	3	.3		
Desc.	Т	est type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	utSignal Output S E In		OutputSignal	I PctDifference	
primary	pum	p off	0.000	0.000	0.19	0.097	0.01	1/m	1/m		
primary	leak	check	0.000	0.000	0.19	0.097	0.01	1/m	1/m		
primary	test	pt 1	2.996	2.990	2.93	2.863	3.01	l/m	1/m	0.67%	
primary	test	pt 2	2.998	2.990	2.93	2.863	3.01	1/m	1/m	0.67%	
primary	test	pt 3	3.005	3.000	2.93	2.863	3.01	l/m	l/m	0.33%	
Sensor Compo	onent	Leak Tes	t		Conditio			Status	Status pass		
Sensor Compo	onent	Filter Azir	muth		Conditio	360 deg	eg		pass		
Sensor Compo	onen	Filter Dep	oth		Conditio	n -2.0 cm		Status	Fail		
Sensor Compo	onent	Filter Pos	ition		Conditio	Poor		Status Fail			
Sensor Compo	onen	Filter Dist	tance		Conditio	5.0 cm		Status	pass		
Sensor Compo	onen	t Tubing C	ondition		Conditio	Good		Status	pass		
Sensor Compo	onen	Rotomete	er Condition	n	Conditio	Clean and dry		Status	pass		
Sensor Compo					Conditio	No moisture p	resent	esent Status			
Sensor Component		System M	1emo		Conditio	See comments	S	Status			

## **Ozone Data Form**

Mfg S	erial Number Ta	Site	Tec	chnician		Site Vi	sit Date	Parame	eter	Owner ID	
ThermoElectron Inc	0615817056	WNC429	Er	ic Hebert		08/21/	2015	Ozone		none	
Intercept -0.4	Slope: Intercept OPSIGN CORP.	0.00000	D	Mfg Serial Num Tfer ID	ber		Electron		rameter	ozone Ozone primary s	stan
DAS 1: A Avg % Diff: A Ma 4.7%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert Date			1.0095	Inter	•	-0.2428 1.0000	
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	S	ite	Sit	e Unit	PctI	Difference	
primary	1	0.21	0.4			.07	ppb				
primary	2	33.55	33.			.45	ppb			-6.04%	
primary primary	3 4	52.96 76.67	52. 76.			.46	ppb ppb			-4.57% -3.57%	
primary	5	114.41	113			3.50	ppb			-4.46%	
Sensor Component	Sample Train		Conditio	Good			11	Status	pass		
Sensor Component				on 0.9976				Status	pass		
Sensor Component	Inlet Filter Condition	n	Conditio	Dirty				Status	Fail		
Sensor Component	Zero Voltage		Conditio	0.0060				Status	pass		
Sensor Component	Battery Backup		Conditio	N/A				Status	pass		
<b>Sensor Component</b>	Offset		Condition 0.000				Status	pass			
<b>Sensor Component</b>	Span		Condition 1.368				Status	pass			
<b>Sensor Component</b>	Cell A Freq.		Condition 54.1 kHz			Status		Fail			
<b>Sensor Component</b>	Cell A Noise		Conditio	0.9 ppb		Status		pass			
Sensor Component	Cell A Flow		Conditio	0.64 lpm				Status	pass		
<b>Sensor Component</b>	Cell A Pressure		Conditio	638 mmH	lg			Status	pass		
<b>Sensor Component</b>	Cell A Tmp.		Conditio	on 34.3 C				Status	pass		
<b>Sensor Component</b>	Cell B Freq.			62.4 kHz				Status	pass		
Sensor Component	Cell B Noise			0.6 ppb				Status			
Sensor Component	Cell B Flow		Conditio	1.33 lpm				Status	Fail		
Sensor Component	Cell B Pressure		Conditio	on				Status	pass		
Sensor Component			Conditio					Status			
Sensor Component				Not tested				Status	pass		
Sensor Component	System Memo		Conditio	See com	nents	3		Status	pass		

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young WNC429 Eric Hebert Temperature 14264 08/21/2015 none Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.04 0.04 Test type OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. InputTmpRaw InputTmpCorr. primary Temp Low Range 0.33 0.55 0.000 0.5 C -0.04 C Temp Mid Range 19.12 19.23 0.000 19.3 0.03 primary C -0.04 primary Temp High Range 45.65 45.61 0.000 45.6 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** See comments

## **Shelter Temperature Data For**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	23.22	23.31	0.000	23.4	С	0.11
primary	Temp Mid Range	24.08	24.16	0.000	24.0	С	-0.2

## **Infrastructure Data For**

Site ID WNC429 Technician Eric Hebert Site Visit Date 08/21/2015

Shelter Make	Shelter Model	Shelter Size
Ekto	8810 (s/n 3034-1)	640 cuft
A SAN DAN DESCRIPTION DE VOICE NA CREATION DE VIDENTE DE VOICE NA CREATION DE VOICE NA CREATI		

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

# **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	l Problem		
Flow Rate The filter attachment plorientation.	WNC429 ate is mounted to	Eric Hebert oo low in the enclos	08/21/2015 ture resulting in	Filter Position the filter being expe	Mykrolis osed to wind-driver	4073 n rain and in the	standard ge	<b>✓</b> eometric		
Ozone WNC429 Eric Hebert 08/21/2015 System Memo ThermoElectron 3398  The ozone sample train does not include a means to introduce the zero/span/precision test gas, or the multi-point test gas, to the complete sample train. The inlet filter at the analyzer is not conditioned as described in the station procedures.										
Ozone This analyzer diagnosti	WNC429	Eric Hebert e the manufacturer's	08/21/2015 s recommended	Cell B Flow value.	ThermoElectron	3398		<b>✓</b>		
Ozone This analyzer diagnosti	WNC429	Eric Hebert e the manufacturer's	08/21/2015 s recommended	Cell A Freq. value.	ThermoElectron	3398		<b>✓</b>		
Temperature Additional details can b	WNC429 be found in the ha	Eric Hebert ardcopy of the site a	08/21/2015 audit report.	System Memo	RM Young	3859		<b>✓</b>		

## **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The general observations section of the SSRF is still not completed. Gloves are not used when handling the filter pack.

2 Parameter: SiteOpsProcedures

The ozone analyzer is operated by the state of South Dakota. There is no means for introducing routine test gas at the sample inlet and all routine checks are performed at the back of the analyzer. Audit test gas was introduced through the sample inlet flooding the glass manifold.

3 Parameter: DocumentationCo

Records of the routine checks performed by the state personnel are kept onsite in a logbook.

4 Parameter: ShelterCleanNotes

One shelter houses the gas analyzers and is in good condition and clean. The analyzer sample train is a glass manifold with an exhaust fan. The second shelter houses the flow system, met translator, and IMPROVE. It is older and not climate controlled.

5 Parameter: PollAnalyzerCom

The dry deposition filter is mounted low in the enclosure which changes the particle collection characteristics, and can allow precipitation to enter. The ozone sample train is a 3 meter glass manifold with a 1/4 inch Teflon tubing connection to the analyzer.

6 Parameter: MetSensorComme

The recorded temperature is measured at approximately 2 meters above the ground. Previously measured temperature data are no longer comparable to the current temperature measurements.

7 Parameter: MetOpMaintCom

The temperature sensor signal cable insulation is cracked and showing signs of extreme wear.

#### Field Systems Data Form F-02058-1500-S1-rev002 WNC429 Technician Eric Hebert Site Visit Date 08/21/2015 Site ID Wind Cave **USGS Map NPS** Site Sponsor (agency) Map Scale NPS and state of SD **Operating Group Map Date** 46-033-0132 AQS# R.M. Young **Meteorological Type** Ozone, SO2, NOx, PM2.5, PM10, IMP **Air Pollutant Analyzer QAPP** Latitude 43.5578 dry, wet -103.4839 **Deposition Measurement QAPP** Longitude 1292 Land Use prairie - woodland - evergreen **QAPP Elevation Meters Terrain** rolling **QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** 43.557639 Site Telephone **Audit Latitude** Visitor Center **Audit Longitude** -103.483856 Site Address 1 Route 385 Wind Cave National Park Site Address 2 **Audit Elevation** 1288 Custer 8.1 County **Audit Declination** Hot Springs, SD City, State **Present** Fire Extinguisher 57747 Zip Code Mountain Time Zone First Aid Kit **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **Climbing Belt** Primary Op. E-mail **Security Fence Backup Operator V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail **Shelter Working Room** ✓ **Make** Model 8810 (s/n 3034-1) Ekto **Shelter Size** 640 cuft **✓** Notes One shelter houses the gas analyzers and is in good condition and clean. The analyzer sample train Shelter Clean is a glass manifold with an exhaust fan. The second shelter houses the flow system, met translator, and IMPROVE. It is older and not climate controlled.

## **Driving Directions**

Site OK

**✓** Notes

From Hot Springs proceed north on 385 into Wind Cave National Park. Turn left onto the visitor center loop road. The site operator's office is in the visitors center. The site is up the gravel access road to the park water supply on the opposite side of the parking lot from the visitor center.

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID WNC429 Eric Hebert Site Visit Date 08/21/2015

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		<b>~</b>

Siting	<b>Distances OK</b>	<b>✓</b>
Siting	Criteria Comr	nen

Fi	eld Systems Data	Form	F-02058-1500-S3-rev002					
Site	wNC429	Technician Eric Hebert		Site Visit Date	08/21/2015			
1	Are wind speed and direct being influenced by obstru	tion sensors sited so as to avoid actions?	<b>✓</b>	N/A				
2	(i.e. wind sensors should b	d so as to minimize tower effects? be mounted atop the tower or on a m >2x the max diameter of the wind)	✓	N/A				
3	Are the tower and sensors	s plumb?	✓	N/A				
4		ds pointed north or positioned to es such as buildings, walls, etc?	<b>✓</b>					
5	conditions? (i.e. ground b	sensors sited to avoid unnatural elow sensors should be natural oped. Ridges, hollows, and areas of avoided)	<b>✓</b>					
6	Is the solar radiation sens	or plumb?	<b>✓</b>	N/A				
7	Is it sited to avoid shading light?	, or any artificial or reflected	<b>✓</b>	N/A				
8	Is the rain gauge plumb?		<b>✓</b>	N/A				
9	Is it sited to avoid shelteri towers, etc?	ng effects from buildings, trees,	<b>✓</b>	N/A				
10	Is the surface wetness sentacing north?	sor sited with the grid surface	✓	N/A				
11	Is it inclined approximate	ely 30 degrees?	<b>✓</b>	N/A				
		ation (photograph or sketch if nece y affect the monitoring parameter		y) regarding condi	tions listed above, or	any other features,		

The recorded temperature is measured at approximately 2 meters above the ground. Previously measured temperature data are no longer comparable to the current temperature measurements.

Fie	eld Systems Data Form		F-02058-1500-S4-rev002
Site	ID WNC429 Technician Eric Hebert		Site Visit Date 08/21/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	<b>✓</b>	
3	Are the shields for the temperature and RH sensors clean?	<b>✓</b>	
4	Are the aspirated motors working?	<b>✓</b>	
5	Is the solar radiation sensor's lens clean and free of scratches?	<b>✓</b>	N/A
6	Is the surface wetness sensor grid clean and undamaged?	<b>✓</b>	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	<b>✓</b>	Signs of wear
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	<b>~</b>	
	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,
The t	emperature sensor signal cable insulation is cracked and showing	sign	s of extreme wear.

## Field Systems Data Form F-02058-1500-S5-rev002 WNC429 Technician | Eric Hebert Site Visit Date 08/21/2015 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? **✓** 3 meter glass 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. 3 meter glass manifold and 1/4 inch teflon with tee fittings Describe dry dep sample tube. 3/8 teflon by 12 meters At analyzer 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:

The dry deposition filter is mounted low in the enclosure which changes the particle collection characteristics, and can allow precipitation to enter. The ozone sample train is a 3 meter glass manifold with a 1/4 inch Teflon tubing connection to the analyzer.

# Field Systems Data Form

F-02058-1500-S6-rev002

Site	· ID	WNC429	Technician	Eric Hebert		Site Vis	sit Date 08/21/20	15	
	DAS, sei	nsor translators, and	peripheral equi	pment operation	ıs ar	ıd maintena	nnce		
				_			<u></u>		
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,	<b>✓</b>				
3		nalyzer and sensor sig g protection circuitry		through	<b>✓</b>	Met sensors	s only		
4		signal connections pro ntained?	otected from the	e weather and		Signs of wea	ar		
5	Are the	signal leads connected	l to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter	properly	<b>✓</b>				
7	Does the	instrument shelter h	ave a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument shelter temp	oerature control	lled?	<b>✓</b>	Both on			
9	Is the mo	et tower stable and gr	ounded?			<b>Stable</b>		Grounded 🗸	
10	Is the sa	mple tower stable and	l grounded?			<b>✓</b>		<b>✓</b>	
11	Tower c	omments?							
Pro	vide anv	additional explanatio	n (photograph (	or sketch if nece	essar	y) regardin	g conditions liste	ed above, or a	any other features,
		an-made, that may at						,	,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 WNC429 Technician | Eric Hebert Site Visit Date 08/21/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A No N/A Yes **V** Wind speed sensor **Data logger V** ✓ П Wind direction sensor **Data logger V** ✓ П Temperature sensor Strip chart recorder **V** П **V** Relative humidity sensor Computer **V V** Solar radiation sensor Modem **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 $\checkmark$ **V UPS Solar radiation translator** П $\checkmark$ **V** Tipping bucket rain gauge Lightning protection device ~ **V 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 V** Dataview **SSRF ✓ V V V Site Ops Manual** Jan 2006 **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 Are the Site Status Report Forms being completed and **V** current? Are the chain-of-custody forms properly used to document **V** 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:

Records of the routine checks performed by the state personnel are kept onsite in a logbook.

#### **Field Systems Data Form** WNC429 Technician Eric Hebert Site Visit Date 08/21/2015 Site ID Site operation procedures Trained during site installation Has the site operator attended a formal CASTNET training ✓ course? If yes, when and who instructed? Has the backup operator attended a formal CASTNET Trained by site operator 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 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? **OC Check Performed Compliant Frequency Multi-point Calibrations V V** Quarterly **Automatic Zero/Span Tests V** Manual Zero/Span Tests Every 2 weeks **Automatic Precision Level Tests V Manual Precision Level Test** Every 2 weeks **Analyzer Diagnostics Tests In-line Filter Replacement (at inlet)** In-line Filter Replacement (at analyze Sample Line Check for Dirt/Water **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 complete sample train including all filters? **✓** Logbook Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

F-02058-1500-S8-rev002

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 ozone analyzer is operated by the state of South Dakota. There is no means for introducing routine test gas at the sample inlet and all routine checks are performed at the back of the analyzer. Audit test gas was introduced through the sample inlet flooding the glass manifold.

### Field Systems Data Form F-02058-1500-S9-rev002 WNC429 Technician Eric Hebert Site Visit Date 08/21/2015 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 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 $\ lacksquare$ fashion? Gloves not used 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** ✓ 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 general observations section of the SSRF is still not completed. Gloves are not used when handling the filter pack.

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID

WNC429

Technician Eric Hebert

Site Visit Date 08/21/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Hewlett Packard	6560 b	5CB1520H5J	none
DAS	Environmental Sys Corp	8816	4159	missing
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18B	070000013426	none
Flow Rate	Mykrolis	FC280SAV-4S	AW901295	02270
Infrastructure	Infrastructure	none	none	none
Met tower	unknown	unknown	none	none
MFC power supply	Tylan	RO-32	FP902017	02176
Modem	US Robotics	56k fax modem	unknown	none
Ozone	ThermoElectron Inc	49i A3NAA	0615817056	none
Ozone Standard	ThermoElectron Inc	49i PSA2AB	0807328333	none
Sample Tower	Aluma Tower	В	none	none
Shelter Temperature	RM Young	41342	018819	none
Shield (2 meter)	RM Young	43532	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	14264	none
Zero air pump	ThermoElectron Inc	111	111-78387-388	none

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
PRK	X134-Sandy	Grenville-09/03/2015				
1	9/3/2015	Computer	Dell	07021	Inspiron 15	2884848822
2	9/3/2015	DAS	Campbell	000411	CR3000	2509
3	9/3/2015	Elevation	Elevation	None	1	None
4	9/3/2015	Filter pack flow pump	Thomas	03633	107CAB18	049400004507
5	9/3/2015	Flow Rate	Apex	000656	AXMC105LPMDPCV	illegible
6	9/3/2015	Infrastructure	Infrastructure	none	none	none
7	9/3/2015	Modem	Raven	06460	H4223-C	0808334384
8	9/3/2015	Ozone	ThermoElectron Inc	000690	49i A1NAA	1030244800
9	9/3/2015	Ozone Standard	ThermoElectron Inc	000432	49i A3NAA	CM08200008
10	9/3/2015	Sample Tower	Aluma Tower	03518	A	none
11	9/3/2015	Shelter Temperature	Campbell	none	107-L	unknown
12	9/3/2015	Siting Criteria	Siting Criteria	None	1	None
13	9/3/2015	Temperature	RM Young	06306	41342VC	12545
14	9/3/2015	UPS	APC	06744	RS900	unknown
15	9/3/2015	Zero air pump	Werther International	06905	C 70/4	000821907

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2509 PRK134 Sandy Grenville 09/03/2015 DAS Primary Das Date: 9 /3 /2015 **Audit Date** 9 /3 /2015 Datel **Parameter** DAS Mfg 15:27:00 15:27:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 246 Das Day: 246 **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** 1/22/2015 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 0.2998 V V 0.0001 7 0.5000 0.4996 0.4996 V V 0.00007 0.7000 V V 0.0000 0.6996 0.6996 7 V V 0.9000 0.8994 0.8994 0.00007 1.0000 0.9993 0.9993 V V 0.0000

## Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Teo	chnician	Site Visit D	ate Paran	neter	Owner ID
Apex	illegible		PRK134	Sa	ndy Grenville	09/03/2015	Flow R	ate	000656
					Mfg	BIOS	P	Parameter Flow Rate	
					Serial Number	103471 <b>Tfe</b>		fer Desc. ne	xus
					Tfer ID	01420			
					Slope		96664 Inte	ercept	0.03078
					Cert Date	2/5	5/2015 Co	rrCoff	0.99996
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. Blo	OS cell
					Tfer ID	01410			
					Slope	0.9	96664 <b>Int</b> e	ercept	0.03078
					Cert Date	2/5		rrCoff	0.99996
DAS 1:		DAS 2:			Cal Factor Z		-0.0		
A Avg % Diff: 1.53%	A Max % Di 1.96%	A Avg %	6Dif A Max	3 % Di	Cal Factor F		0.9	.5	
					Rotometer R				
Desc.	Test type	1	n Input Corr_	MfcDisp.		-	•		l PctDifference
primary	pump off	0.000	0.000	0.00	0.000	-0.01	1/m	1/m	
primary	leak check	0.000	0.000	0.02	0.000	0.00	1/m	1/m	1.0.60/
primary	test pt 1	1.505	1.530	1.51	1.510	1.50	1/m	1/m	-1.96%
primary	test pt 2	1.503	1.520	1.51	1.500	1.50	1/m	1/m	-1.32%
primary  Sensor Compo	test pt 3  onent Leak Tes	1.502	1.520	1.50 Conditio	1.500	1.50	l/m	l/m pass	-1.32%
•				_					
	onent Tubing C			Conditio	Good	Statu		pass	
Sensor Compo	onent Filter Pos	sition		Conditio	n Good		Status	pass	
Sensor Compo	nent 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	nent Filter Dis	tance		Conditio	n 4.1 cm		Status	pass	
Sensor Component Filter Depth		Conditio	2.5 cm		Status	pass			
Sensor Component Filter Azimuth		Conditio	n 90 deg		Status	pass			
		Conditio			Chatra	pass			

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technicia	1	Site Vis	sit Date	Parame	ter	Owner ID
ThermoElectron Inc 1	030244800	PRK134	Sandy Gre	enville	09/03/2	2015	Ozone		000690
Intercept 0.6	9199 Slope: 68477 Intercept 99993 CorrCoff	0.00000 0.00000	Serial	Number	Thermo 041960 01112	Electron I		rameter C	ozone Ozone primary stan
DAS 1: A Avg % Diff: A Ma 0.8%	DAS 2: x % Di	6Dif A Max 9	Slope Cert D	ate		0.99384 6/25/2015		•	-0.40946 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	S	ite	Site	Unit	PctD	ifference
primary	1	0.00	0.41	1.	33	ppb			
primary	2	30.03	30.62		.98	ppb			1.18%
primary	3	50.02	50.74		.08	ppb			0.67%
primary primary	5	80.05 110.05	80.95 111.14	+	1.50	ppb			-0.93% 0.32%
		110.03			1.30	ppb	GL 4	200	0.3270
Sensor Component	Sample Train		Condition Good				Status	pass	
<b>Sensor Component</b>	Inlet Filter Conditio	n	<b>Condition</b> Clea	n			Status	pass	
<b>Sensor Component</b>	Battery Backup		<b>Condition</b> Fund	tioning			Status	pass	
Sensor Component	Offset		<b>Condition</b> -0.4				Status	pass	
Sensor Component	Span		Condition 1.02	)			Status	pass	
Sensor Component	Zero Voltage		<b>Condition</b> N/A				Status	pass	
Sensor Component	Fullscale Voltage		<b>Condition</b> N/A				Status	pass	
Sensor Component	Cell A Freq.		Condition 115.	9 kHz			Status	pass	
Sensor Component	Cell A Noise		Condition 0.7 p	pb			Status	pass	
Sensor Component	Cell A Flow		Condition 0.71	lpm			Status	pass	
Sensor Component			Condition 704				Status		
Sensor Component			Condition 39.4				Status		
Sensor Component			Condition 99.9				Status		
Sensor Component			Condition 0.7 p				Status		
Sensor Component			Condition 0.69				Status		
Sensor Component			Condition	•			Status		
Sensor Component			Condition				Status		
Sensor Component			Condition Not t	ested			Status		
_				Joigu					
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 12545 PRK134 09/03/2015 Temperature 06306 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID** -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.22 0.46 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.14 0.20 0.000 0.1 C -0.08 C -0.11 Temp Mid Range 25.30 25.28 0.000 25.2 primary 49.97 0.000 49.4 C -0.46 primary Temp High Range 49.86 Condition Clean Status pass Sensor Component | Shield Sensor Component Blower Status pass **Condition** N/A 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
Campbell	unknown	PRK134	Sandy Grenville	09/03/2015	Shelter Temperature	none
DAS 1:	DAS 2:		Mfg	Extech	Parameter She	lter Temperatur
Abs Avg Err 0.30	s Max Er Abs Avg	Err Abs Max Er	Serial Number	H232734	Tfer Desc. RTI	)
			Tfer ID	01227		
			Slope	1.0034	3 Intercept	-0.06409
			Cert Date	1/30/201	5 CorrCoff	1.00000

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	28.01	27.98	0.000	28.0	C	0.06
primary	Temp Mid Range	26.78	26.75	0.000	26.7	С	-0.09
primary	Temp Mid Range	24.29	24.27	0.000	25.0	C	0.76

## **Infrastructure Data For**

Site ID PRK134 Technician Sandy Grenville Site Visit Date 09/03/2015

Shelter Make	Shelter Model	Shelter Size	
Ekto	8810 (s/n 2116-11)	640 cuft	

<b>Sensor Component</b>	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	Fair	Status	pass
Sensor Component	Signal Cable	Condition	Fair	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: DasComments

The tower guy wires are rusted and should be replaced. The sample tower is damaged at the hinge point and bent. Both of these items were observed and reported during the previous two audit visits.

## 2 Parameter: SitingCriteriaCom

Clover and Barley have been planted for hay within 20m of the site starting in 2008.

## 3 Parameter: ShelterCleanNotes

The shelter is clean, neat, and well organized. The counter top has been repaired since the previous audit visit.

## 4 Parameter: MetSensorComme

The temperature sensor has been moved to a naturally aspirated shield mounted to the sample tower.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 09/03/2015 PRK134 Technician Sandy Grenville Site ID Perkinstown **USGS Map EPA** Site Sponsor (agency) Map Scale Private **Operating Group Map Date** 55-119-9991 AQS# R.M. Young **Meteorological Type** Ozone, PM2.5 **Air Pollutant Analyzer QAPP** Latitude 45.2066 dry, wet **QAPP** Longitude -90.5972 **Deposition Measurement** woodland - mixed 472 Land Use **QAPP Elevation Meters** gently rolling 1.6 **Terrain QAPP Declination** Yes 2/22/2006 Conforms to MLM **OAPP Declination Date** 45.206525 Site Telephone **Audit Latitude** W 10776 CTH M -90.597209 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 462 Taylor -1.3 County **Audit Declination** Medford, WI City, State **Present** Fire Extinguisher 54451 new in 2015 Zip Code Central **Time Zone First Aid Kit 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 (s/n 2116-11) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is clean, neat, and well organized. The counter top has been repaired since the Shelter Clean previous audit visit.

From Medford continue north on 13 approximately 4.5 miles and turn left (west) onto county route M. Continue

the site will be visible behind the landowners house on the right.

approximately 13 miles. Before reaching Perkinstown, and just after crossing a small creek and two sharp curves,

**✓** Notes

Site OK

**Driving Directions** 

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID PRK134 Technician Sandy Grenville Site Visit Date 09/03/2015

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		✓
Secondary road, lightly traveled	200 m		✓
Feedlot operations	500 m		✓
Intensive agricultural ops (including aerial spraying)	500 m		✓
Limited agricultural operations	200 m	20 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 Comment** 

Clover and Barley have been planted for hay within 20m of the site starting in 2008.

### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 09/03/2015 Site ID PRK134 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? Moved to sample tower 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 facing north?

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

The temperature sensor has been moved to a naturally aspirated shield mounted to the sample tower.

11 Is it inclined approximately 30 degrees?

Fi	eld Systems Data Form		F-02058-1500-S4-rev002
Site	PRK134 Technician Sandy Grenville		Site Visit Date 09/03/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	<b>✓</b>	
3	Are the shields for the temperature and RH sensors clean?	✓	
4	Are the aspirated motors working?	<b>✓</b>	N/A
5	Is the solar radiation sensor's lens clean and free of scratches?	<b>✓</b>	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?	<b>✓</b>	N/A
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	✓	N/A
	ride any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	sary)	regarding conditions listed above, or any other features,

## Field Systems Data Form F-02058-1500-S5-rev002 PRK134 Technician Sandy Grenville Site Visit Date 09/03/2015 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 15 meters Describe dry dep sample tube. 3/8 teflon by 15 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	PRK134	Technician	Sandy Grenville		Site Visit	t <b>Date</b> 09/03/201	15	
	DAS, se	nsor translators, and p	peripheral equi	pment operatio	ns ar	nd maintenar	<u>nce</u>		
1		OAS instruments appe intained?	ar to be in good	d condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operation	al? (printers,	<b>✓</b>				
3		nalyzer and sensor sig g protection circuitry?		through	<b>✓</b>	Met sensors	only		
4		signal connections pro intained?	tected from the	e weather and	<b>✓</b>				
5	Are the	signal leads connected	to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translatoed?	rs, and shelter	properly	<b>✓</b>				
7	Does the	e instrument shelter ha	ive a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument shelter temp	erature contro	lled?	<b>✓</b>				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	grounded?			<u> </u>			
11	Tower c	omments?							

The tower guy wires are rusted and should be replaced. The sample tower is damaged at the hinge point and bent. Both of these items were observed and reported during the previous two audit visits.

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

#### **Field Systems Data Form** F-02058-1500-S7-rev002 PRK134 Technician Sandy Grenville Site Visit Date 09/03/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes 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 V 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 **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 ✓ SSRF ✓ V ✓ Site Ops Manual** Feb 2001 **V HASP** Nov2011 **✓ Field Ops Manual** July 1990 **Calibration Reports** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ 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,

### **Field Systems Data Form** F-02058-1500-S8-rev002 Site ID PRK134 Technician Sandy Grenville Site Visit Date 09/03/2015 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 П 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 Channels up during ozone diagnostics 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 Compliant** Frequency $\checkmark$ **V** N/A **Multipoint Calibrations V V** N/A **Visual Inspections** ~ N/A Translator Zero/Span Tests (climatronics) **✓ V** N/A **Manual Rain Gauge Test V V** N/A **Confirm Reasonableness of Current Values V ✓** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? OC Check Performed Frequency Compliant

Q o oncon 1 oncon mou	11040000	J	Compilation
<b>Multi-point Calibrations</b>	Semiannua	ally	$\checkmark$
Automatic Zero/Span Tests	Daily	·	$\checkmark$
Manual Zero/Span Tests	✓ As needed		$\checkmark$
<b>Automatic Precision Level Tests</b>	<b>✓</b> Daily		$\checkmark$
<b>Manual Precision Level Test</b>	✓ As needed		$\checkmark$
<b>Analyzer Diagnostics Tests</b>	✓ Weekly		$\checkmark$
In-line Filter Replacement (at inlet)	✓ Every 2 we	eeks	$\checkmark$
In-line Filter Replacement (at analyze	✓ N/A		$\checkmark$
Sample Line Check for Dirt/Water	Weekly		$\checkmark$
Zero Air Desiccant Check	Weekly		$\checkmark$
<ol> <li>Do multi-point calibration gases go throws ample train including all filters?</li> <li>Do automatic and manual z/s/p gasses go complete sample train including all filters</li> <li>Are the automatic and manual z/s/p checked? If yes, how?</li> </ol>	o through the	SSRF, logbook, call-in	

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

FI	eld Systems Data Form		F-02058-1500-89-rev002				
Site	PRK134 Tec	hnician Sandy Grenville		Site Visit Date	09/03/2015		
	Site operation procedures						
1	Is the filter pack being changed every	y Tuesday as scheduled?	<b>V</b>	Filter changed mori	nings		
2	Are the Site Status Report Forms becorrectly?	ing completed and filed	<b>✓</b>				
3	Are data downloads and backups be scheduled?	ng performed as		No longer required			
4	Are general observations being made	e and recorded? How?	<b>✓</b>	SSRF, logbook			
5	Are site supplies on-hand and replen fashion?	ished in a timely	<b>✓</b>				
6	Are sample flow rates recorded? How	v?	<b>✓</b>	SSRF, logbook, call	-in		
7	Are samples sent to the lab on a regulation?	lar schedule in a timely	<b>✓</b>				
8	Are filters protected from contamina and shipping? How?	tion during handling	✓	Clean gloves on and off			
9	Are the site conditions reported reguloperations manager or staff?	larly to the field	✓				
QC	Check Performed	Frequency			Compliant		
N	<b>Multi-point MFC Calibrations</b>	<b>✓</b> Semiannually			✓		
F	low System Leak Checks	Weekly			✓		
F	ilter Pack Inspection						
F	low Rate Setting Checks	Weekly			✓		
7	<b>Visual Check of Flow Rate Rotometer</b>			$\checkmark$			
I	n-line Filter Inspection/Replacement			<b>✓</b>			
S	ample Line Check for Dirt/Water	Weekly			$\checkmark$		
	ide 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

PRK134

Technician Sandy Grenville

Site Visit Date 09/03/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	Inspiron 15	2884848822	07021
DAS	Campbell	CR3000	2509	000411
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	049400004507	03633
Flow Rate	Apex	AXMC105LPMDPC	illegible	000656
Infrastructure	Infrastructure	none	none	none
Modem	Raven	H4223-C	0808334384	06460
Ozone	ThermoElectron Inc	49i A1NAA	1030244800	000690
Ozone Standard	ThermoElectron Inc	49i A3NAA	CM08200008	000432
Sample Tower	Aluma Tower	A	none	03518
Shelter Temperature	Campbell	107-L	unknown	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	12545	06306
UPS	APC	RS900	unknown	06744
Zero air pump	Werther International	C 70/4	000821907	06905

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
VIN	140-Sandy	Grenville-09/07/2015				
1	9/7/2015	Computer	Dell	07040	Inspiron 15	6K2MC12
2	9/7/2015	DAS	Campbell	000358	CR3000	2136
3	9/7/2015	Elevation	Elevation	None	1	None
4	9/7/2015	Filter pack flow pump	Thomas	04920	107CAB18	060300019956
5	9/7/2015	Flow Rate	Apex	000657	AXMC105LPMDPCV	54772
6	9/7/2015	Infrastructure	Infrastructure	none	none	none
7	9/7/2015	Modem	Raven	06461	V4221-V	0808338875
8	9/7/2015	Ozone	ThermoElectron Inc	000630	49i A1NAA	1009241798
9	9/7/2015	Ozone Standard	ThermoElectron Inc	000513	49i A3NAA	0922236889
10	9/7/2015	Sample Tower	Aluma Tower	000137	В	none
11	9/7/2015	Shelter Temperature	Campbell	none	107-L	none
12	9/7/2015	Siting Criteria	Siting Criteria	None	1	None
13	9/7/2015	Temperature	RM Young	04449	41342VC	4547
14	9/7/2015	Zero air pump	Werther International	06906	C 70/4	000821908

### **DAS Data Form DAS Time Max Error:** 0.02 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2136 VIN140 Sandy Grenville 09/07/2015 DAS Primary Das Date: 9 /7 /2015 **Audit Date** 9 /7 /2015 Datel **Parameter** DAS Mfg 12:58:00 12:58:01 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** Das Day: 250 **Audit Day** 250 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** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0001 0.0001 V V 7 0.1000 0.0999 0.1000 0.0001 7 0.3000 0.2998 0.2998 V V 0.00007 0.5000 0.4997 0.4997 V V 0.00007 0.7000 V V 0.0000 0.6996 0.6996 7 V V 0.9000 0.8994 0.8995 0.0001 7 1.0000 0.9993 0.9994 V V 0.0001

## Flow Data Form

Mfg	Serial Nun	nber Ta	Site	Teo	chnician	Site Visit D	ate Paran	neter	Owner ID		
Apex	54772		VIN140	Sa	ndy Grenville	09/07/2015	Flow R	Rate	000657		
					Mfg	BIOS	P	arameter Flo	ow Rate		
					Serial Number	103471	T	fer Desc. ne	xus		
					Tfer ID	01420					
					Slope	0.9	96664 Int	ercept	0.03078		
					Cert Date	2/5	5/2015 <b>Co</b>	rrCoff	0.99996		
					Mfg	BIOS	P	arameter Flo	ow Rate		
					Serial Number	103424	Т	fer Desc. Blo	er Desc. BIOS cell		
					Tfer ID	01410					
					Slope	0.9	96664 <b>Int</b>	ercept	0.03078		
					Cert Date	2/5	5/2015 <b>Co</b> i	rrCoff	0.99996		
DAS 1:		DAS 2:		L	Cal Factor Z	ero	-0.0	72			
A Avg % Diff:	A Max % Di	A Avg %	Dif A Max	% Di	Cal Factor E		0.0				
1.54%	1.97%			7021	Rotometer R		1.5				
Desc.	Test type	Input 1/n	n Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	I PctDifference		
primary	pump off	0.000	0.000	0.00	0.000	-0.02	1/m	1/m			
primary	leak check	0.000	0.000	0.03	0.020	0.01	1/m	1/m			
primary	test pt 1	1.499	1.520	1.50	1.500	1.50	1/m	1/m	-1.32%		
primary	test pt 2	1.497	1.520	1.50	1.500	1.49	1/m	1/m	-1.97%		
primary	test pt 3	1.499	1.520	1.50	1.500	1.50	1/m	1/m	-1.32%		
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	onent Rotomete	er Conditio	on	Conditio	n Clean and dry		Status	pass			
Sensor Compe	onent Moisture	Present		Conditio	n No moisture pr	resent	Status	pass			
Sensor Compo	onent Filter Dis	tance		Conditio	2.0 cm		Status	pass			
Sensor Compo	onent Filter Dep	pth		Conditio	2.0 cm		Status Status				
Sensor Compo	onent Filter Azi	muth		Conditio	n 300 deg						
	onent System N	Memo		Conditio	n		Status	pass			

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technicia	an	Site Visit Dat	e Parame	eter Owner ID	)
ThermoElectron Inc 1	009241798	VIN140	Sandy G	renville	09/07/2015	Ozone	000630	
Intercept 0.3	Slope: 19413 Intercept 19992 CorrCoff	0.00000 0.00000 0.00000	Serial	Number	ThermoElectro 0419606966 01112		rameter ozone er Desc. Ozone primary s	stan
DAS 1: A Avg % Diff: A Ma 1.0%	DAS 2: x % Di	6Dif A Max	% Di Cert 1		6/25/2		•	
UseDescription	ConcGroup	Tfer Raw	Tfer Corr			Site Unit	PctDifference	
primary	1	0.02	0.43		35 ppb		0.2504	
primary	3	29.79 50.06	30.38 50.78		.30 ppb		-0.26% -0.53%	
primary	4	80.25	81.15	_	.51 ppb .50 ppb		-0.80%	
primary	5	111.50	112.60		).10 ppb		-2.22%	
Sensor Component	Sample Train		Condition Goo	od		Status	pass	
Sensor Component	Inlet Filter Condition	n	Condition Cle	an		Status	pass	
Sensor Component	Battery Backup		Condition N/A			Status	pass	
Sensor Component	Offset		Condition 0.30	0		Status	pass	
Sensor Component	Span		Condition 1.0	15		Status	pass	
Sensor Component	Zero Voltage		Condition N/A			Status	pass	
Sensor Component	Fullscale Voltage		Condition N/A			Status	pass	
Sensor Component	Cell A Freq.		Condition 94.1 kHz			Status	pass	
Sensor Component	Cell A Noise		<b>Condition</b> 0.7	ppb	Status P		pass	
Sensor Component	Cell A Flow		Condition 1.4	1 lpm		Status	pass	
Sensor Component	Cell A Pressure		Condition 723	s.5 mmHg		Status	pass	
Sensor Component	Cell A Tmp.		Condition 39.0	ОС		Status	pass	
Sensor Component	Cell B Freq.		<b>Condition</b> 101	.9 kHz		Status	pass	
Sensor Component	Cell B Noise		<b>Condition</b> 0.4	ppb		Status	pass	
Sensor Component	Cell B Flow		Condition 0.74	4 lpm		Status	pass	
Sensor Component	Cell B Pressure		Condition			Status	pass	
Sensor Component	Cell B Tmp.		Condition			Status	pass	
Sensor Component	Line Loss		<b>Condition</b> Not	tested		Status	pass	
Sensor Component	System Memo		Condition Sec	comments	3	Status	pass	

### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young 4547 VIN140 09/07/2015 Temperature 04449 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 Tfer ID -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.07 0.11 Test type OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. InputTmpRaw InputTmpCorr. primary Temp Low Range 0.63 0.69 0.000 0.7 C -0.03 25.3 C Temp Mid Range 25.36 25.34 0.000 -0.08 primary 0.000 C -0.11 primary Temp High Range 48.33 48.23 48.1 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**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	31.08	31.04	0.000	29.8	С	-1.25
primary	Temp Mid Range	27.74	27.71	0.000	27.3	С	-0.43
primary	Temp Mid Range	28.28	28.25	0.000	27.6	С	-0.62

### **Infrastructure Data For**

Si	te ID	VIN140	Technician	Sandy Grenville	Site Visit Date	09/07/2015	
	Shelter Ma	ake	Shelter Model	She	lter Size		
	Ekto		8810 (s/n 2116-	-1) 640	cuft		

<b>Sensor Component</b>	Sample Tower Type	Condition	Type B	Status	pass
<b>Sensor Component</b>	Conduit	Condition	N/A	Status	pass
Sensor Component	Met Tower	Condition	N/A	Status	pass
<b>Sensor Component</b>	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
<b>Sensor Component</b>	Shelter Condition	Condition	Fair	Status	pass
<b>Sensor Component</b>	Shelter Door	Condition	Good	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Floor	Condition	Fair	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
<b>Sensor Component</b>	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	l Problem
Ozone	VIN140	Sandy Grenville	09/07/2015	Cell A Flow	ThermoElectron	3454		

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

## **Field Systems Comments**

1 Parameter: SitingCriteriaCom

The site is in an agricultural research center with farm activities adjacent to the site. A train track is approximately 200 meters to the north.

2 Parameter: ShelterCleanNotes

The shelter is in good condition and well maintained, however rot is beginning to form at the bottom of the walls.

3 Parameter: MetSensorComme

The temperature sensor has been mounted on the sample tower.

4 Parameter: MetOpMaintCom

The temperature sensor in now mounted in a naturally aspirated shield.

### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 09/07/2015 VIN140 Technician Sandy Grenville Site ID Fritchton **USGS Map EPA** Site Sponsor (agency) Map Scale Purdue University **Operating Group Map Date** 18-083-9991 AQS# Climatronics **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude 38.7406 dry, wet **QAPP** Longitude -87.4844 **Deposition Measurement** 134 Land Use agriculture **QAPP Elevation Meters** flat 4.25 **Terrain QAPP Declination** Yes 2/23/2006 Conforms to MLM **OAPP Declination Date** 38.740792 Site Telephone **Audit Latitude** Southwest Purdue Agricultural Center -87.484923 Site Address 1 **Audit Longitude** 4669 North Purdue Road Site Address 2 **Audit Elevation** 136 Knox -2.7 County **Audit Declination** Vincennes, IN City, State **Present** Fire Extinguisher 47591 New in 2015 Zip Code Central Time Zone **First Aid Kit ✓ 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 (s/n 2116-1) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is in good condition and well maintained, however rot is beginning to form at the bottom Shelter Clean of the walls.

From Vincennes go approximately 3 miles north on route 41. Turn left at the sign for the Southwest Purdue

Agricultural Center. The site is just over the hill on the dirt road to the right.

**✓** Notes

Site OK

**Driving Directions** 

## Field Systems Data Form

F-02058-1500-S2-rev002

Site ID VIN140 Technician Sandy Grenville Site Visit Date 09/07/2015

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	200 m	
Limited agricultural operations	200 m	10 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 Comment** 

The site is in an agricultural research center with farm activities adjacent to the site. A train track is approximately 200 meters to the north.

Fie	eld Systems Data Form	F-02058-1500-S3-rev				
Site	VIN140 Technician Sandy Grenville		Site Visit Date 09/07/2015			
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)					
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?	<b>✓</b>				
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)	<b>✓</b>				
6	Is the solar radiation sensor plumb?	<b>✓</b>	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?	<b>✓</b>	N/A			
11	Is it inclined approximately 30 degrees?	<b>V</b>	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:

The temperature sensor has been mounted on the sample tower.

Fi	eld S	Systems Data Fo	rm		F-02058-1500-S4-rev002					
Site	e <b>ID</b>	VIN140	Technician	Sandy Grenville		Site Visit Date 09/07/2015				
1		l the meterological sensor		intact, in good	<b>✓</b>					
2		all the meteorological sens	sors operational	online, and	<b>✓</b>					
3	Are t	he shields for the tempera	ature and RH se	ensors clean?	<b>✓</b>					
4	Are t	he aspirated motors work	cing?		<b>✓</b>	N/A				
5	Is the	e solar radiation sensor's liches?	lens clean and fi	ree of	<b>✓</b>	N/A				
6	Is the	e surface wetness sensor g	rid clean and u	ndamaged?	<b>✓</b>	N/A				
7		he sensor signal and pow		in good	<b>✓</b>	N/A				
8		he sensor signal and power the elements and well ma		tions protected	<b>✓</b>	N/A				
		y additional explanation man-made, that may affe			ary)	) regarding conditions listed above, or any other features,				
The 1	temper	ature sensor in now mounte	ed in a naturally a	aspirated shield.						

## Field Systems Data Form F-02058-1500-S5-rev002 VIN140 Technician Sandy Grenville Site Visit Date 09/07/2015 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 18 meters Describe dry dep sample tube. 3/8 teflon by 18 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	VIN140	Technician	Sandy Grenville		Site Vis	it Date 09/07/201	5	
	DAS se	nsor translators, and	nerinheral equi	nment operation	าร ๑า	nd maintena	nce		
				_		<u>la mamiena</u>	<del>arcc</del>		
1	Do the I well ma	OAS instruments appeintained?	ear to be in good	l condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operation	al? (printers,	✓				
3		nalyzer and sensor sig g protection circuitry	_	through	<b>✓</b>	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 translated?	ors, and shelter	properly	<b>✓</b>				
7	Does the	e instrument shelter h	ave a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument shelter temp	perature contro	lled?	<b>✓</b>				
9	Is the m	et tower stable and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower stable and	d grounded?			<b>✓</b>		<b>✓</b>	
11	Tower o	omments?					emoved, new samp		alled
		additional explanationan-made, that may a				y) regardin	g conditions listed	l above, or a	nny other features,
nat	urai or n	ian-maue, that may a	nect the monito	rmg parameters	•				

#### **Field Systems Data Form** F-02058-1500-S7-rev002 VIN140 Technician Sandy Grenville Site Visit Date 09/07/2015 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** 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 ~ **✓** 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 V SSRF ✓ V ✓ V Site Ops Manual** Feb 2014 **V V HASP** Feb 2014 **✓ Field Ops Manual V** Oct 2001 **Calibration Reports** 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,

### **Field Systems Data Form** F-02058-1500-S8-rev002 VIN140 Technician Sandy Grenville Site Visit Date 09/07/2015 Site ID Site operation procedures Trained by the previous site operator 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? **Compliant QC Check Performed** 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 V** 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**

1 Do multi-point calibration gases go through the complete sample train including all filters?

2 Do automatic and manual z/s/p gasses go through the complete sample train including all filters?

3 Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

	Unknown
<b>/</b>	

SSRF, logbook, call-in

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:

Fi	eld Sy	stems Data Form				F-02058-1500-S9-rev002				
Site	e ID	VIN140 Tec	hnicia	n Sandy Grenville	)	Site Visit Date	09/07/2015			
	Site ope	ration procedures								
1	Is the fi	lter pack being changed ever	y Tues	sday as scheduled	<b>?</b> ✓	Filter changed mori	nings			
2	Are the correctl	Site Status Report Forms be y?	ing coi	mpleted and filed	<b>✓</b>					
3	Are data	a downloads and backups be ed?	ing pe	rformed as		No longer required				
4	Are gen	eral observations being made	e and 1	recorded? How?	✓	SSRF, logbook				
5	Are site fashion	supplies on-hand and replen	ished i	in a timely	<b>✓</b>					
6	Are san	nple flow rates recorded? Ho	w?		<b>✓</b>	SSRF, logbook, call-in				
7	Are san	nples sent to the lab on a regu	ılar scl	hedule in a timely	<b>V</b>					
8		ers protected from contamina oping? How?	tion d	uring handling	✓	One set of gloves only				
9		site conditions reported regu ons manager or staff?	larly t	to the field	✓					
QC	Check P	erformed	Fı	requency			Compliant			
N	Multi-poi	nt MFC Calibrations	<b>✓</b> Se	emiannually			✓			
I	Flow Syst	em Leak Checks	<b>✓</b> W	eekly			✓			
I	ilter Pac	k Inspection								
I	Flow Rate Setting Checks Weekly						✓			
1	Visual Check of Flow Rate Rotometer ✓ Weekly						✓			
I	In-line Filter Inspection/Replacement Semiannually					✓				
5	Sample Line Check for Dirt/Water  Weekly						✓			
		ndditional explanation (photo nn-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

VIN140 Site ID

Technician Sandy Grenville

Site Visit Date 09/07/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	Inspiron 15	6K2MC12	07040
DAS	Campbell	CR3000	2136	000358
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	060300019956	04920
Flow Rate	Apex	AXMC105LPMDPC	54772	000657
Infrastructure	Infrastructure	none	none	none
Modem	Raven	V4221-V	0808338875	06461
Ozone	ThermoElectron Inc	49i A1NAA	1009241798	000630
Ozone Standard	ThermoElectron Inc	49i A3NAA	0922236889	000513
Sample Tower	Aluma Tower	В	none	000137
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	4547	04449
Zero air pump	Werther International	C 70/4	000821908	06906

# Site Inventory by Site Visit

Site \	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
VOY	413-Eric H	lebert-09/08/2015				
1	9/8/2015	DAS	Environmental Sys Corp	none	8816	4059
2	9/8/2015	Elevation	Elevation	None	1	None
3	9/8/2015	Filter pack flow pump	Thomas	none	107CAB18	120000014367
4	9/8/2015	flow rate	Tylan	none	FC280SAV	AW9806012
5	9/8/2015	Infrastructure	Infrastructure	none	none	none
6	9/8/2015	MFC power supply	Tylan	none	RO-32	FP9806001
7	9/8/2015	Ozone	ThermoElectron Inc	90730	49C	49C-70522-366
8	9/8/2015	Ozone Standard	ThermoElectron Inc	90569	49C	49C-59260-322
9	9/8/2015	Printer	Hewlett Packard	none	842C	unknown
10	9/8/2015	Sample Tower	Aluma Tower	none	В	AT-51159-11-G
11	9/8/2015	Shelter Temperature	ARS	none	none	none
12	9/8/2015	Siting Criteria	Siting Criteria	None	1	None
13	9/8/2015	Temperature	Climatronics	none	100093	04767
14	9/8/2015	Temperature Translator	Climatronics	01341	100088-2	229
15	9/8/2015	Zero air pump	Twin Tower Engineering	90719	TT70/E4	526294

#### **DAS Data Form** 1.72 **DAS Time Max Error: Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg **Environmental Sys** 4059 VOY413 Eric Hebert 09/08/2015 DAS Primary Das Date: 9 /8 /2015 **Audit Date** 9 /8 /2015 Datel Parameter DAS Mfg 10:59:17 11:01:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 4000392 **Serial Number** Das Day: 251 **Audit Day** 251 Tfer ID 01321 **Low Channel: High Channel: Avg Diff: Avg Diff: Max Diff: Max Diff:** 1.00000 0.00000 **Slope Intercept** 0.0001 0.0001 0.0001 0.0001 1/22/2015 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 86590148 Tfer Desc. DVM 01310 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output **DAS** Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0000 0.0000 V V 2 0.1000 0.1000 0.1000 0.00002 0.3000 0.3000 0.3000 V V 0.0000 2 0.5000 0.5000 0.5001 V V 0.0001 2 0.7000 V V 0.0001 0.7000 0.7001 V V 2 0.9000 0.9000 0.9001 0.0001 2 V V 1.0000 1.0000 1.0001 0.0001

## Flow Data Form

<b>Ifg</b>		ımber Ta		Tecl	hnician		Date Paran	neter	Owner ID
ylan	AW9806	012	VOY413	Eric	Hebert	09/08/2015	flow ra	te	none
Mfg	Tylan			I	Mfg	BIOS	P	arameter Flo	ow Rate
SN/Owner ID	FP9806001	none			Serial Number	131818	T	fer Desc. Bl	OS 220-H
Parameter	MFC power s	upply		-	Γfer ID	01417			
	IVII O power s	арріу					-		2 22 7
					Slope	1.	00316 Int	ercept	-0.0054
				•	Cert Date	1/7	7/2015 <b>Co</b>	rrCoff	1.0000
DAS 1:		DAS 2:			Cal Factor Z	ero	0.13	34	
A Avg % Diff:	A Max % Di	A Avg %l	Dif A Max	% <b>Di</b>	Cal Factor F	ull Scale	6.63	33	
5.01%	8.26%	<b>D</b>			Rotometer R	eading:		3	
Desc.	Test type	Input 1/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignal	I PctDifference
primary	pump off	0.000	0.000	-0.14	-0.104	0.02	l/m	l/m	
primary	leak check	0.000	0.000	0.14	-0.104	0.03	l/m	1/m	
primary	test pt 1	3.118	3.110	2.61	2.604	3.00	l/m	1/m	-3.54%
primary	test pt 2	3.102	3.100	2.61	2.604	3.00	l/m	1/m	-3.23%
primary	test pt 3	3.279	3.270	2.61	2.604	3.00	l/m	1/m	-8.26%
Sensor Comp	onent Leak T	est		Condition	1		Status	pass	
Sensor Comp	onent Tubing	Condition		Condition	Good		Status	pass	
Sensor Comp	onent Filter P	osition		Condition	Good		Status	pass	
Sensor Comp	onent Rotom	eter Condition	<u> </u>	Condition	Clean and dry		Status	pass	
Sensor Compo	onent Moistu	e Present		Condition	No moisture p	Status	pass		
Sensor Compo	onent Filter D	istance		Condition	6.0 cm		Status	pass	
Sensor Compo	onent Filter D	epth		Condition	1.5 cm	Status	pass		
Sensor Comp	onent Filter A	zimuth		Condition	270 deg		Status	pass	
	onent System	Memo		Condition			Status	pass	

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Techni	ician	Site Visit Date	Parame	eter Owner ID
ThermoElectron Inc 4	19C-70522-366	VOY413	Eric He	ebert	09/08/2015	Ozone	90730
Intercept 1.7	99793 Slope: 79471 Intercept 00000 CorrCoff	0.00000 0.00000	Ser	g rial Number er ID	ThermoElectro 0517112167 01113		ozone Ozone primary stan
DAS 1: A Avg % Diff: A Ma 3.4%	DAS 2: x % Di	6Dif A Max 9		pe rt Date	1.005		-
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	r Si	te S	ite Unit	PctDifference
primary	1	-0.17	-0.15	1.:	59 ppb		
primary	2	27.16	27.01	28.	1.1		6.22%
primary	3	48.91	48.64	50.			3.87%
primary primary	5	78.81 109.20	78.37 108.59	79.	1.1		2.07%
-		109.20	_		0.10 ppb	G4 4	
Sensor Component	Sample Train		Condition			Status	pass
<b>Sensor Component</b>	Inlet Filter Conditio	n	Condition	Clean		Status	pass
<b>Sensor Component</b>	Battery Backup		<b>Condition</b>	I/A		Status	pass
<b>Sensor Component</b>	Offset		Condition -	0.8		Status	pass
Sensor Component	Span		Condition 0	).988		Status	pass
Sensor Component	Zero Voltage		Condition -	0.0006		Status	pass
Sensor Component	Fullscale Voltage		Condition 1	.0018		Status	pass
Sensor Component	Cell A Freq.		Condition 6	66.7 kHz		Status	pass
Sensor Component	Cell A Noise		Condition 0	).6 ppb		Status	pass
Sensor Component	Cell A Flow		Condition 0	).69 lpm		Status	pass
Sensor Component			Condition 7			Status	
Sensor Component			Condition 3			Status	
Sensor Component	Cell B Freq.		Condition 7			Status	pass
Sensor Component	Cell B Noise		Condition 0			Status	
Sensor Component			Condition 0			Status	
Sensor Component			Condition	•		Status	
Sensor Component			Condition			Status	
Sensor Component			Condition N	Not tested		Status	
_			_				
Sensor Component	System Memo		Condition			Status	pass

#### **Temperature Data Form Technician** Site Visit Date Parameter **Owner ID** Mfg Serial Number Ta Site 04767 VOY413 Eric Hebert 09/08/2015 Temperature Climatronics none Mfg Extech Parameter Temperature Climatronics Mfg Tfer Desc. RTD H232679 **Serial Number** 01341 **SN/Owner ID** 229 01228 Tfer ID **Parameter** Temperature Translator **Slope** 1.00564 **Intercept** -0.21981 **DAS 1: DAS 2:** 1/30/2015 1.00000 **Cert Date** CorrCoff Abs Avg Err **Abs Max Er Abs Avg Err** Abs Max Er 0.20 0.35 UseDesc. InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference Test type primary Temp Low Range -0.16 0.06 0.000 0.2 $\mathbf{C}$ 0.16 Temp Mid Range 23.54 23.63 0.000 23.7 C 0.1 primary Temp High Range 43.7 C primary 43.35 43.33 0.000 0.35 Sensor Component | Shield Status pass **Condition** Moderately clean Sensor Component Blower **Condition** Functioning Status pass Sensor Component Blower Status Switch **Condition** N/A Status pass Sensor Component | System Memo Status pass **Condition** See comments

# **Shelter Temperature Data For**

Mfg	Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
ARS	none	VOY413	Eric Hebert	09/08/2015	Shelter Temperature	none
DAS 1: Abs Avg Err 0.63	DAS 2: S Max Er O.88	Err Abs Max Er	Mfg Serial Number Tfer ID	Extech H232679 01228	Parameter Shee	
			Slope Cert Date	1.0056		1.00000

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	22.58	22.67	0.000	23.6	C	0.88
primary	Temp Mid Range	23.62	23.71	0.000	24.2	С	0.5
primary	Temp Mid Range	24.13	24.21	0.000	24.7	С	0.52

### **Infrastructure Data For**

Si	te ID	VOY413	Technician	Eric Hebert	Site Visit Date	09/08/2015	ı
	Shelter Ma	ake	Shelter Model	Sho	elter Size		
	Ekto	1 100,100 1000-1000 1000-1000-1000	8810 (s/n 2880-	2) 640	) cuft		

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

## **Field Systems Comments**

1 Parameter: DocumentationCo

Correctly completing the general observations section of the SSRF on the day of filter installation was discussed with the operator.

2 Parameter: SitingCriteriaCom

The site is located at the top of a hill in a forest. There are trees surrounding the site which are below the tower height.

3 Parameter: ShelterCleanNotes

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

4 Parameter: PollAnalyzerCom

There are no trees violating the 22.5 degree cone above the ozone sample inlet. However, there is a communication tower which is above the 22.5 degree threshold.

5 Parameter: MetSensorComme

The recorded temperature is currently being measured at approximately 2.5 meters above the ground and not at 10 meters as previously measured. Current temperature data are no longer comparable with previously measured data.

### Field Systems Data Form F-02058-1500-S1-rev002 VOY413 Technician Eric Hebert Site Visit Date 09/08/2015 Site ID Ash River NE **USGS Map NPS** Site Sponsor (agency) Map Scale NPS **Operating Group Map Date** 27-137-0034 AQS# Climatronics **Meteorological Type** Ozone, IMPROVE **Air Pollutant Analyzer QAPP** Latitude 48.4128 dry, wet **QAPP** Longitude -92.8292 **Deposition Measurement** woodland - mixed 429 Land Use **QAPP Elevation Meters Terrain** rolling **QAPP Declination** Marginally Conforms to MLM **OAPP Declination Date** 48.412518 **Site Telephone Audit Latitude** CR 129 -92.829225 Site Address 1 **Audit Longitude** Ash River Visitor Center Rd. Site Address 2 **Audit Elevation** 427 St. Louis 0.5 County **Audit Declination** Orr, MN City, State **Present** Fire Extinguisher 55771 Zip Code Central **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 (s/n 2880-2) Ekto **Shelter Size** 640 cuft **✓** Notes The shelter is clean, neat, and well organized. The shelter is in good condition. Shelter Clean **✓** Notes Site OK From Duluth take route 53 north towards International Falls. Approximately 20 miles south of International Falls and **Driving Directions** just north of Orr, turn right (east) on County Road 129. Continue approximately 9.5 miles and turn left toward the Ash

River Visitor Center. Continue approximately 1.5 miles and look for a closed gate on the right. The site is

approximately 1 mile up the trail from the road.

## **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID VOY413 Technician Eric Hebert Site Visit Date 09/08/2015

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	5 m	
Obstacles to wind	10 times obstacle height		✓

Siting Distances OK

**Siting Criteria Comment** 

The site is located at the top of a hill in a forest. There are trees surrounding the site which are below the tower height.

Field Systems Data Form				F-02058-1500-S3-rev002			
Site	e ID Vo	OY413	Technician Eric Hebe	ert	Site Visit Date	09/08/2015	
1 Are wind speed and direction sensors sited so as to avoid being influenced by obstructions?		oid 🗸	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)			on a	N/A		
3	Are the tow	ver and sensors plu	mb?	<b>✓</b>	N/A		
4			ointed north or positione ch as buildings, walls, et				
5	conditions? surface and	? (i.e. ground below	ors sited to avoid unnatu sensors should be natur Ridges, hollows, and ar led)	al			
6	Is the solar	radiation sensor pl	umb?	<b>✓</b>	N/A		
7	Is it sited to light?	o avoid shading, or	any artificial or reflected	d 🔽	N/A		
8	Is the rain	gauge plumb?		✓	N/A		
9	Is it sited to towers, etc		fects from buildings, tre	ees,	N/A		
10	Is the surfa facing nort		ited with the grid surfac	e	N/A		
11	Is it incline	ed approximately 3	degrees?	<b>✓</b>	N/A		
			n (photograph or sketch fect the monitoring para		y) regarding condi	tions listed above, or	any other features,

The recorded temperature is currently being measured at approximately 2.5 meters above the ground and not at 10 meters as previously measured. Current temperature data are no longer comparable with previously measured data.

Fic	eld Systems Data Form	F-02058-1500-S4-rev002
Site	ID VOY413 Technician Eric Hebert	Site Visit Date 09/08/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	d 🗸
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?	
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?	ed 🗸
	ide any additional explanation (photograph or sketch if necessed or man-made, that may affect the monitoring parameters:	essary) regarding conditions listed above, or any other features, es:

### Field Systems Data Form F-02058-1500-S5-rev002 VOY413 Technician | Eric Hebert Site Visit Date 09/08/2015 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? Trees within 5 meters 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 9 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:

There are no trees violating the 22.5 degree cone above the ozone sample inlet. However, there is a communication tower which is above the 22.5 degree threshold.

# Field Systems Data Form

F-02058-1500-S6-rev002

Site	e <b>ID</b>	VOY413	Technician	Eric Hebert		Site Vis	it Date 09/08/201	5	
	DAC go	ngon thoughtons, and	nouinhoual acui	nmant anamatian	• • • • •	.d maintana			
	DAS, se	nsor translators, and	<u>peripheral equi</u>	<u>pment operation</u>	<u>is ai</u>	<u>10 maintena</u>	ince		
1	Do the I well mai	OAS instruments appentained?	ear to be in good	l condition and	<b>✓</b>				
2		he components of the backup, etc)	DAS operation	al? (printers,	<b>✓</b>				
3		nalyzer and sensor sig		through	✓	Met sensors	only		
4		signal connections prontained?	otected from the	e weather and	<b>✓</b>				
5	Are the	signal leads connected	l to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde	DAS, sensor translated?	ors, and shelter j	properly	<b>✓</b>				
7	Does the	instrument shelter h	ave a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument shelter temp	oerature control	lled?	<b>✓</b>				
9	Is the m	et tower stable and gr	ounded?			<b>Stable</b>		Grounded	
10	Is the sa	mple tower stable and	d grounded?			<b>✓</b>		<b>✓</b>	
11	Tower c	omments?							
Pro	ovide any	additional explanatio	n (photograph o	or sketch if nece	ssar	y) regardin	g conditions listed	d above, or a	nny other features,
		nan-made, that may a						, -	

#### **Field Systems Data Form** F-02058-1500-S7-rev002 VOY413 Technician | Eric Hebert Site Visit Date 09/08/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? Yes No N/A Yes No N/A **V V** Wind speed sensor **Data logger V** ✓ П Wind direction sensor **Data logger V** ✓ П Temperature sensor Strip chart recorder ~ П **V** Relative humidity sensor Computer **V V** Solar radiation sensor Modem П **V** ~ **Printer** Surface wetness sensor **V V** П Wind sensor translator Zero air pump **V V Temperature translator** Filter flow pump **V Humidity sensor translator ~ Surge protector V V** П **UPS Solar radiation translator ✓ V** Tipping bucket rain gauge **Lightning protection device** ~ **V 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** Jan 2006 **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 section only 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? 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,

Correctly completing the general observations section of the SSRF on the day of filter installation was discussed with the operator.

#### **Field Systems Data Form** F-02058-1500-S8-rev002 VOY413 Technician | Eric Hebert Site Visit Date 09/08/2015 Site ID Site operation procedures Trained by previous operator 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 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? **Compliant QC Check Performed** Frequency **Multi-point Calibrations V V** Monthly and semiannually **V V Automatic Zero/Span Tests** Daily **V** Manual Zero/Span Tests **V ✓** Daily **Automatic Precision Level Tests 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 **V V** Weekly Sample Line Check for Dirt/Water **V V** Weekly **Zero Air Desiccant Check**

I	Do multi-point calibration gases go through the complete
	sample train including all filters?

- 2 Do automatic and manual z/s/p gasses go through the complete sample train including all filters?
- 3 Are the automatic and manual z/s/p checks monitored and reported? If yes, how?

	Unknown
<b>✓</b>	
<b>✓</b>	Dataview

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-S9-rev002				
Sit	e ID	VOY413 Te	chniciaı	n Eric Hebert		Site Visit Date	09/08/2015			
	Site ope	ration procedures								
1	Is the fil	ter pack being changed eve	ry Tues	day as scheduled	? <b>~</b>	Filter changed varie	ous times			
2	Are the correctl	Site Status Report Forms b	eing con	npleted and filed	<b>✓</b>					
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	<b>✓</b>					
6	Are sam	aple flow rates recorded? Ho	ow?		<b>✓</b>	SSRF				
7	Are sam	uples sent to the lab on a reg	ular sch	nedule in a timely	<b>✓</b>					
8		ers protected from contaminoping? How?	ation d	uring handling	✓	One set of gloves of	only			
9		site conditions reported reg ons manager or staff?	ularly to	o the field						
QC	Check P	erformed	Fr	equency			Compliant			
I	Multi-poi	nt MFC Calibrations	<b>✓</b> Se	miannually			✓			
]	Flow Syste	em Leak Checks	<b>✓</b> We	eekly			✓			
]	Filter Pac	k Inspection								
]	Flow Rate	<b>Setting Checks</b>	<b>✓</b> We				✓			
1	Visual Ch	eck of Flow Rate Rotometer					<b>✓</b>			
]	In-line Fil	ter Inspection/Replacement		needed			<b>▽</b>			
	Sample Li	ne Check for Dirt/Water	<b>✓</b> We	eekly			$\checkmark$			
		dditional explanation (phot n-made, that may affect the				y) regarding condit	ions listed above, or any other features,			

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID

VOY413

Technician Eric Hebert

Site Visit Date 09/08/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
DAS	Environmental Sys Corp	8816	4059	none
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	120000014367	none
flow rate	Tylan	FC280SAV	AW9806012	none
Infrastructure	Infrastructure	none	none	none
MFC power supply	Tylan	RO-32	FP9806001	none
Ozone	ThermoElectron Inc	49C	49C-70522-366	90730
Ozone Standard	ThermoElectron Inc	49C	49C-59260-322	90569
Printer	Hewlett Packard	842C	unknown	none
Sample Tower	Aluma Tower	В	AT-51159-11-G	none
Shelter Temperature	ARS	none	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	Climatronics	100093	04767	none
Temperature Translator	Climatronics	100088-2	229	01341
Zero air pump	Twin Tower Engineering	TT70/E4	526294	90719

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
STK	138-Sandy	Grenville-09/11/2015				
1	9/11/2015	Computer	Dell	000248	D520	unknown
2	9/11/2015	DAS	Campbell	000349	CR3000	2128
3	9/11/2015	Elevation	Elevation	None	1	None
4	9/11/2015	Filter pack flow pump	Thomas	04923	107CAB18	060300019959
5	9/11/2015	Flow Rate	Apex	000661	AXMC105LPMDPCV	illegible
6	9/11/2015	Infrastructure	Infrastructure	none	none	none
7	9/11/2015	Modem	Raven	06603	H4223-C	0844356279
8	9/11/2015	Ozone	ThermoElectron Inc	000743	49i A1NAA	1105347321
9	9/11/2015	Ozone Standard	ThermoElectron Inc	000687	49i A3NAA	1030244809
10	9/11/2015	Sample Tower	Aluma Tower	03554	Α	none
11	9/11/2015	Shelter Temperature	Campbell	none	107-L	unknown
12	9/11/2015	Siting Criteria	Siting Criteria	None	1	None
13	9/11/2015	Temperature	RM Young	06407	41342VC	14040
14	9/11/2015	Zero air pump	Werther International	06915	C 70/4	000829162

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2128 STK138 Sandy Grenville 09/11/2015 DAS Primary Das Date: 9 /11/2015 **Audit Date** 9 /11/2015 Datel **Parameter** DAS Mfg 14:17:00 14:17:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** 254 Das Day: 254 **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** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0001 0.0001 V V 7 0.1000 0.0999 0.1000 0.0001 7 0.3000 0.2998 0.2998 V V 0.0000 7 0.5000 0.4997 0.4996 V V -0.0001 7 0.7000 V V 0.0000 0.6996 0.6996 7 V V 0.9000 0.8995 0.8994 -0.0001 7 1.0000 0.9993 0.9993 V V 0.0000

# Flow Data Form

Mfg	Serial Nur	nber Ta	Site	Tec	chnician	nician Site Visit Date		eter	Owner ID
\pex	illegible		STK138	Sa	ndy Grenville	09/11/2015	Flow R	ate	000661
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103471	Т	fer Desc. nex	cus
					Tfer ID	01420			
					Slope	0.	96664 Inte	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Co</b>	rCoff	0.99996
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. BIC	)S cell
					Tfer ID	01410			
					Slope	0.	96664 Inte	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Co</b>	rCoff	0.99996
DAS 1:		DAS 2:		L	Cal Factor Z	ero	-0.0	)2	
A Avg % Diff:	A Max % Di	A Avg %	Dif A Max	« % Di	Cal Factor F		1.0		
0.22%	0.67%				Rotometer R			0	
Desc.	Test type	Input 1/n	Input Corr_	MfcDisp.	OutputSignal		InputUnit	OutputSignall	PctDifference
primary	pump off	0.000	0.000	0.00	0.000	-0.01	1/m	l/m	
primary	leak check	0.000	0.000	0.08	0.080	0.06	1/m	1/m	
primary	test pt 1	1.485	1.500	1.47	1.470	1.51	1/m	l/m	0.67%
primary	test pt 2	1.489	1.510	1.47	1.470	1.51	1/m	l/m	0.00%
primary	test pt 3	1.491	1.510	1.47	1.470	1.51	1/m	l/m	0.00%
Sensor Comp	onent Leak Tes	st		Conditio	n		Status	pass	
Sensor Comp	onent Tubing C	Condition		Conditio	n Good		Status	pass	
Sensor Comp	onent Filter Po	sition		Conditio	n Good		Status	pass	
Sensor Comp	onent Rotomet	er Conditio	n	Conditio	n Clean and dry		Status	pass	
Sensor Comp	onent Moisture	Present		Conditio	No moisture p	resent	Status	pass	
Sensor Comp	onent Filter Dis	tance		Conditio	4.0 cm		Status	pass	
Sensor Comp	onent Filter De	pth		Conditio	1.5 cm		Status	pass	
Sensor Comp	onent Filter Az	muth		Conditio	270 deg		Status	pass	
	onent System I	Mama		Conditio			Status	pass	

# **Ozone Data Form**

Mfg S	erial Number Ta	Site	Te	chnician		Site V	isit Date	Parame	eter	Owner ID
ThermoElectron Inc 1	105347321	STK138	Sa	andy Grenv	ille	09/11/	2015	Ozone		000743
Intercept 0.3	99668 Slope: 88943 Intercept 99998 CorrCoff	0.00000	D	Mfg Serial Nu Tfer ID	mber	Therm 041960	oElectron 06966		rameter er Desc.	ozone Ozone primary star
DAS 1: A Avg % Diff: A Ma 0.7%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert Date	<u>.</u>		0.9938 6/25/201		•	-0.40946 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer	Corr	S	ite	Sit	e Unit	PctD	Difference
primary	1	0.00	0.4			68	ppb			
primary	2	29.83	30.			.10	ppb			2.24%
primary primary	3 4	50.04 80.03	50. 80.			.80	ppb ppb			-0.16%
primary	5	110.03	111			1.30	ppb			0.16%
Sensor Component	Sample Train		Condition	on Good				Status	pass	
Sensor Component		on		on Clean				Status	pass	
Sensor Component	Battery Backup		Condition	on N/A				Status	pass	
Sensor Component	Offset		Conditio	on -0.50				Status	pass	
Sensor Component	Span		Conditio	on 0.997				Status	pass	
<b>Sensor Component</b>	Zero Voltage		Condition	on N/A				Status	pass	
<b>Sensor Component</b>	Fullscale Voltage		Condition	on N/A				Status	pass	
<b>Sensor Component</b>	Cell A Freq.		Condition	on 97.1 kH	Z			Status	pass	
<b>Sensor Component</b>	Cell A Noise		Condition	on 0.5 ppb				Status	pass	
<b>Sensor Component</b>	Cell A Flow		Conditio	on 0.61 lpn	n			Status	pass	
<b>Sensor Component</b>	Cell A Pressure		Condition	on 712 mm	ıНg			Status	pass	
<b>Sensor Component</b>	Cell A Tmp.		Condition	on 36.5 C				Status	pass	
Sensor Component	Cell B Freq.		Condition	on 91.4 kH	Z			Status	pass	
Sensor Component	Cell B Noise		Condition	on 0.5 ppb				Status	pass	
Sensor Component	Cell B Flow		Conditio	on 0.53 lpn	n			Status	pass	
Sensor Component	Cell B Pressure		Condition	on				Status	pass	
<b>Sensor Component</b>	Cell B Tmp.		Condition	on				Status	pass	
Sensor Component	Line Loss		Condition	on Not test	ed			Status	pass	
<b>Sensor Component</b>	System Memo		Condition	on				Status	pass	

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville RM Young 14040 STK138 09/11/2015 Temperature 06407 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID** -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.20 0.28 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.70 0.76 0.000 0.9 $\mathbf{C}$ 0.12 25.96 25.8 C -0.21 Temp Mid Range 25.98 0.000 primary 0.000 C -0.28 primary Temp High Range 48.67 48.57 48.3 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**



UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	26.84	26.81	0.000	26.7	C	-0.11
primary	Temp Mid Range	26.65	26.62	0.000	26.7	C	0.06
primary	Temp Mid Range	27.70	27.67	0.000	27.6	С	-0.03

### **Infrastructure Data For**

Site ID STK138 Technician Sandy Grenville Site Visit Date 09/11/2015

Shelter Make	Shelter Model	Shelter Size
Ekto	8810 (s/n 2149-21)	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	Good	Status	pass
Sensor Component	Shelter Roof	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Floor	Condition	Fair	Status	pass
<b>Sensor Component</b>	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: SiteOpsProcedures

The ozone sample train is leak tested every 2 weeks.

2 Parameter: SitingCriteriaCom

The site is located in a hay field on a cattle farm. Clover is planted within 20 meters and will be used as pasture this fall.

3 Parameter: ShelterCleanNotes

The shelter is somewhat dirty and cluttered. There are signs of leaks on the walls and floor rot.

4 Parameter: MetSensorComme

The temperature sensor is now mounted in a naturally aspirated shield on the sample tower.

5 Parameter: MetOpMaintCom

The met tower is no longer in use.

Field Systems Da	ata Form	]	F-02058-1500-S1-rev002		
Site ID STK138	Technician Sandy Grenville	Site Visit Date 09/1	1/2015		
		HGGG M	Kent		
Site Sponsor (agency)	EPA	USGS Map	rent		
<b>Operating Group</b>	Private	Map Scale			
AQS#	17-085-9991	Map Date			
Meteorological Type	R.M. Young				
Air Pollutant Analyzer	Ozone	QAPP Latitude	42.2872		
<b>Deposition Measurement</b>	dry	<b>QAPP</b> Longitude	-89.9998		
Land Use	agricultural	<b>QAPP Elevation Meters</b>	274		
Terrain	rolling	<b>QAPP Declination</b>	1.3		
Conforms to MLM	Yes	<b>QAPP Declination Date</b>	2/22/2006		
Site Telephone		Audit Latitude	42.287216		
Site Address 1	10939 E. Parker Road	Audit Longitude	-89.99995		
Site Address 2		<b>Audit Elevation</b>	281		
County	Jo Daviess	<b>Audit Declination</b>	-1.3		
City, State	Stockton, IL	Present			
Zip Code	61085	Fire Extinguisher 🔽	new in 2015		
Time Zone	Central	First Aid Kit			
<b>Primary Operator</b>		Safety Glasses			
Primary Op. Phone #		Safety Hard Hat			
Primary Op. E-mail		Climbing Belt			
<b>Backup Operator</b>		Security Fence			
Backup Op. Phone #		Secure Shelter			
Backup Op. E-mail		Stable Entry Step 🗹			
<b>Shelter Working Room</b> ✓	Make Ekto M	odel 8810 (s/n 2149-21)	Shelter Size 640 cuft		
Shelter Clean	Notes The shelter is somewhat dirty a	and cluttered. There are signs	of leaks on the walls and floor rot.		
Site OK	Notes				
	Stockton go south on 78 (Main Street) for nue straight onto a dirt road. There will be				
Conti	nue through that intersection, the site will liles bearing to the left on dirt roads to the	be visible in the distance on a l	hill-side to the left. Continue another		

# Field Systems Data Form

F-02058-1500-S2-rev002

Site ID STK138 Technician Sandy Grenville Site Visit Date 09/11/2015

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		✓
Limited agricultural operations	200 m	20 m	
Large parking lot	200 m		<b>✓</b>
Small parking lot	100 m		<b>~</b>
Tree line	50 m		<b>✓</b>
Obstacles to wind	10 times obstacle height		<b>V</b>

Siting Distances OK

**Siting Criteria Comment** 

The site is located in a hay field on a cattle farm. Clover is planted within 20 meters and will be used as pasture this fall.

### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 09/11/2015 Site ID STK138 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 Moved to sample tower 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 facing north?

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

The temperature sensor is now mounted in a naturally aspirated shield on the sample tower.

11 Is it inclined approximately 30 degrees?

Fic	eld Systems Data Form		F-02058-1500-S4-rev002
Site	ID STK138 Technician Sandy Grenville		Site Visit Date 09/11/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	<b>✓</b>	
3	Are the shields for the temperature and RH sensors clean?	<b>✓</b>	
4	Are the aspirated motors working?	<b>✓</b>	N/A
5	Is the solar radiation sensor's lens clean and free of scratches?	<b>✓</b>	N/A
6	Is the surface wetness sensor grid clean and undamaged?	<b>✓</b>	N/A
7	Are the sensor signal and power cables intact, in good condition, and well maintained?	<b>✓</b>	N/A
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	<b>✓</b>	N/A
	ide any additional explanation (photograph or sketch if necess ral or man-made, that may affect the monitoring parameters:	sary	) regarding conditions listed above, or any other features,
	net tower is no longer in use.		

### Field Systems Data Form F-02058-1500-S5-rev002 STK138 Technician Sandy Grenville Site Visit Date 09/11/2015 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 18 meters Describe dry dep sample tube. 3/8 teflon by 18 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	STK138	Technician	Sandy Grenville		Site Visi	it Date 09/11/201	5	
	DAS, se	ensor translators, and	l peripheral equi	oment operation	ıs ar	ıd maintena	nce		
1	Do the	DAS instruments applintained?		_	<b>✓</b>				
2		the components of th	e DAS operation	al? (printers,	<b>✓</b>				
3		analyzer and sensor s ng protection circuitr		through	<b>✓</b>	Met sensors	only		
4		signal connections p intained?	rotected from the	e weather and	✓				
5	Are the	signal leads connect	ed to the correct l	DAS channel?	✓				
6	Are the ground	DAS, sensor transla	tors, and shelter <b>j</b>	properly	<b>✓</b>				
7	Does th	e instrument shelter	have a stable pow	ver source?	<b>✓</b>				
8	Is the ir	nstrument shelter ten	nperature control	led?	<b>✓</b>				
9	Is the m	net tower stable and ş	grounded?			<b>Stable</b>		Grounded	
10	Is the sa	ample tower stable a	nd grounded?			<b>✓</b>		<b>✓</b>	
11	Tower	comments?						V	
		additional explanat				y) regarding	g conditions listee	d above, or a	ny other features,
nat	urai or n	nan-made, that may	anect the monitor	ring parameters	s: 				

#### **Field Systems Data Form** F-02058-1500-S7-rev002 STK138 Technician Sandy Grenville Site Visit Date 09/11/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes No N/A Yes **✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger V V** П Temperature sensor Strip chart recorder **✓ V** Relative humidity sensor Computer **V** Solar radiation sensor **V** Modem П **V 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 ✓** $\checkmark$ **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 ✓ SSRF ✓ V ✓ V Site Ops Manual** Oct 2010 **V V HASP** Oct 2010 **✓ Field Ops Manual** July 1990 **Calibration Reports** 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,

#### **Field Systems Data Form** F-02058-1500-S8-rev002 STK138 Technician Sandy Grenville Site Visit Date 09/11/2015 Site ID Site operation procedures Trained on site during installation 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** 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 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? **OC 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 V** 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** Weekly **Zero Air Desiccant Check** 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,

**✓** 

**✓** 

SSRF, call-in

The ozone sample train is leak tested every 2 weeks.

reported? If yes, how?

complete sample train including all filters?

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

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

### Field Systems Data Form F-02058-1500-S9-rev002 STK138 Technician Sandy Grenville Site Visit Date 09/11/2015 Site ID Site operation procedures Is the filter pack being changed every Tuesday as scheduled? ✓ Filter changed various times Are the Site Status Report Forms being completed and filed correctly? No longer required Are data downloads and backups being performed as scheduled? SSRF, logbook Are general observations being made and recorded? How? **V** Are site supplies on-hand and replenished in a timely fashion? SSRF, call-in Are sample flow rates recorded? How? Are samples sent to the lab on a regular schedule in a timely fashion? **✓** Clean gloves on and off 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** ✓ Semiannually **V 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,

# Field Systems Data Form

## F-02058-1500-S10-rev002

Site ID

STK138

Technician Sandy Grenville

Site Visit Date 09/11/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D520	unknown	000248
DAS	Campbell	CR3000	2128	000349
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	060300019959	04923
Flow Rate	Apex	AXMC105LPMDPC	illegible	000661
Infrastructure	Infrastructure	none	none	none
Modem	Raven	H4223-C	0844356279	06603
Ozone	ThermoElectron Inc	49i A1NAA	1105347321	000743
Ozone Standard	ThermoElectron Inc	49i A3NAA	1030244809	000687
Sample Tower	Aluma Tower	A	none	03554
Shelter Temperature	Campbell	107-L	unknown	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342VC	14040	06407
Zero air pump	Werther International	C 70/4	000829162	06915

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
BVL	130-Eric H	ebert-09/14/2015				
1	9/14/2015	со	Teledyne	000760	T300U	87
2	9/14/2015	Computer	Dell	07073	Inspiron 15	B94MC12
3	9/14/2015	DAS	Campbell	000424	CR3000	2539
4	9/14/2015	Elevation	Elevation	None	1	None
5	9/14/2015	Filter pack flow pump	Thomas	06019	107CAB18	050400022576
6	9/14/2015	Flow Rate	Apex	000595	AXMC105LPMDPCV	illegible
7	9/14/2015	Infrastructure	Infrastructure	none	none	none
8	9/14/2015	Met tower	Climatronics	02738	14 inch taper	none
9	9/14/2015	Modem	Raven	06610	H4223-C	0844355827
10	9/14/2015	Noy	Teledyne	000805	T200U	110
11	9/14/2015	Ozone	ThermoElectron Inc	000625	49i A1NAA	1009241797
12	9/14/2015	Ozone Standard	ThermoElectron Inc	000512	49i A3NAA	0922236890
13	9/14/2015	Precipitation	Climatronics	810899	100508-2	illegible
14	9/14/2015	Relative Humidity	Vaisala	06820	HMP50UAB1A1A	E4920060
15	9/14/2015	Sample Tower	Aluma Tower	000182	В	unknown
16	9/14/2015	Shelter Temperature	Campbell	none	107-L	unknown
17	9/14/2015	Shield (10 meter)	RM Young	06206	Aspirated 43408	none
18	9/14/2015	Shield (2 meter)	RM Young	06635	Aspirated 43408	none
19	9/14/2015	Siting Criteria	Siting Criteria	None	1	None
20	9/14/2015	SO2	Teledyne	000765	T100U	79
21	9/14/2015	Solar Radiation	Licor	04566	LI-200	PY10653
22	9/14/2015	Solar Radiation Translator	RM Young	04340	70101-X	none
23	9/14/2015	Temperature	RM Young	04690	41342	6704
24	9/14/2015	Temperature2meter	RM Young	06404	41342	14037
25	9/14/2015	Wind Direction	RM Young	04695	AQ05103-5	49437wdr
26	9/14/2015	Wind Speed	RM Young	04695	AQ05103-5	49437wsp
27	9/14/2015	Zero air pump	Teledyne	000759	701H	576

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2539 BVL130 Eric Hebert 09/14/2015 DAS Primary Das Date: 9 /14/2015 **Audit Date** 9 /14/2015 Mfg Datel Parameter DAS 9:00:00 9:00:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 4000392 **Serial Number** Das Day: 257 **Audit Day** 257 Tfer ID 01321 **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 1/22/2015 1.00000 **Cert Date** CorrCoff Fluke **Parameter** DAS Mfg **Serial Number** 86590148 Tfer Desc. DVM 01310 Tfer ID 1.00000 0.00000 **Slope Intercept** 1/22/2015 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 0.1000 0.1000 0.00007 0.3000 0.3000 0.3000 V V 0.0000 7 0.5000 0.5000 0.5000 V V 0.00007 0.7000 V V 0.0000 0.7000 0.7000 7 V V 0.9000 0.9000 0.9000 0.00007 V V 1.0000 1.0000 1.0000 0.0000

# Flow Data Form

Ifg	Ser	ial Numb	er Ta S	ite	Tecl	hnician	Site Visit L	Date Paran	neter	Owner ID	
pex	ille	gible	E	3VL130	Eric	Hebert	09/14/2015	Flow F	Rate	000595	
					1	Mfg	BIOS	I	Parameter Flo	w Rate	
						Serial Number	131818	7	fer Desc. BIC	S 220-H	
					r	Γfer ID	01417				
						Slope	1	00316 <b>Int</b>	ercept	-0.0054	
						_			_		
						Cert Date	1/7	7/2015 <b>Co</b>	rrCoff	1.0000	
OAS 1:		D	AS 2:			Cal Factor Z	ero		0		
Avg % Diff:	A Max	% Di A	Avg %E	oif A Max	% <b>Di</b>	Cal Factor F	ull Scale		0		
0.22%		0.67%				Rotometer R	eading:	1.	45		
Desc.	Test	type I	nput l/m	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignall	PctDifference	
primary	pump o		0.000	0.000	-0.01	0.000	-0.03	l/m	l/m		
<u> </u>	leak che		0.000	0.000	0.00	0.000	-0.02	1/m	l/m		
	test pt 1		1.495	1.500	1.58	0.000	1.50	l/m	l/m	0.00%	
	test pt 2		1.499	1.500	1.58	0.000	1.49	l/m	l/m	-0.67%	
primary	test pt 3	3	1.501	1.500	1.58	0.000	1.50	1/m	l/m	0.00%	
Sensor Compo	onent	eak Test			Condition	1		Statu	pass		
Sensor Compo	onent T	ubing Con	ndition		Condition	Good		Statu	pass		
Sensor Compo	onent F	ilter Position	on		Condition	Good		Statu	pass		
Sensor Compo	onent R	otometer (	Condition		Condition	Clean and dry		Statu	pass		
Sensor Compo	onent M	loisture Pr	resent		Condition	No moisture pr	resent	Statu	pass		
Sensor Compo	onent F	ilter Distar	nce		Condition	3.3 cm		Statu	Status pass		
Sensor Compo	onent F	ilter Depth	1		Condition	2.5 cm		Statu	pass		
Sensor Compo	onent F	ilter Azimu	uth		Condition	180 deg		Statu	pass		
Sensor Component System Memo			Condition				pass				

## **Ozone Data Form**

Sensor Component Cell B Tmp.

Mfg Se	Serial Number Ta Site			nician	Site Visit	Date I	Parame	eter	Owner ID
ThermoElectron Inc 1	009241797	BVL130	Eric	Hebert	09/14/20	15	Ozone		000625
Intercept 0.4	cept 0.42831 Intercept 0.00000				ThermoE 05171121			rameter	ozone Ozone primary star
DAS 1: A Avg % Diff: A Max 1.5%	DAS 2: x % Di	% Di S N S	Ter ID lope Cert Date Ifg erial Number Ter ID			Corr	Coff rameter	-0.01252 1.00000 ozone Ozone primary star	
			S	lope Cert Date		1.00952 1/7/2015	1	•	-0.24284 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer Co	orr S	ite	Site	Unit	Pctl	Difference
primary	1	0.00	0.01	0	0.61 ppb				
primary	2	28.74	28.59	1.1		_			-1.22%
primary	3	53.81	53.52		52.61 ppb				-1.70%
primary	4	84.82	84.35		83.30 ppb				-1.24%
primary	5	115.49	114.8		12.80 ppb				-1.78%
<b>Sensor Component</b>	Sample Train		Condition	Good			Status	pass	
<b>Sensor Component</b>	Inlet Filter Conditio	n	Condition	Clean			Status	pass	
<b>Sensor Component</b>	Battery Backup		Condition	ondition N/A			Status	pass	
Sensor Component	Offset		Condition	tion -0.40			Status	pass	
<b>Sensor Component</b>	Span		Condition	ion 1.012			Status	pass	
Sensor Component	Zero Voltage		Condition	N/A			Status	pass	
Sensor Component	Fullscale Voltage		Condition	N/A			Status	pass	
Sensor Component	Cell A Freq.		Condition	ition 81.4 kHz				pass	
Sensor Component	Cell A Noise		Condition	0.4 ppb			Status	pass	
Sensor Component	Cell A Flow		Condition	0.79 lpm			Status	pass	
Sensor Component	Cell A Pressure		Condition	on 719.4 mmHg			Status	pass	
Sensor Component	Cell A Tmp.		Condition	on 34.2 C			Status	pass	
Sensor Component	Cell B Freq.		Condition	84.9 kHz			Status	pass	
Sensor Component	Cell B Noise		Condition	0.6 ppb			Status	pass	
Sensor Component	Cell B Flow		Condition	0.74 lpm			Status	pass	
Sensor Component	Cell B Pressure		Condition				Status	pass	

Condition

Status pass

<b>Sensor Component</b>	Line Loss	<b>Condition</b> Not tested	Status	pass
<b>Sensor Component</b>	System Memo	Condition	Status	pass

#### **Wind Speed Data Form** Mfg Serial Number Ta **Technician** Site Visit Date Parameter Owner ID BVL130 Wind Speed 04695 RM Young Eric Hebert 09/14/2015 49437wsp Parameter wind speed Mfg RM Young Tfer Desc. wind speed motor (I **Serial Number** 01261 Tfer ID 1.00000 0.00000 **Slope Intercept** 68622 Prop or Cups SN 0.4 **to** 0.5 **Prop or Cups Torque Cert Date** 12/22/2014 **CorrCoff** 1.00000 **Prop Correction Fact** 0.0512 RM Young Parameter wind speed Mfg Tfer Desc. wind speed motor (h **Serial Number** 01262 Tfer ID 1.00000 0.00000 **Slope Intercept** 12/22/2014 1.00000 **Cert Date** CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 0.05 0.00% Abs Avg Err 0.20 0.00% Abs Max Er UseDescription: Input RPM Out V Diff/ % Diff Diff WsM Input Device Input m/s DAS m/s primary none 0 0.20 0.0 0.0 -0.2001262 200 1.02 0.0 1.0 0.00 primary primary 01262 400 2.05 0.0 2.1 0.00 4.10 0.0 4.1 0.00 01262 800 primary 6.1 primary 01262 1200 6.14 0.0 0.00% 12.29 0.0 12.3 0.00% primary 01262 2400 01262 4000 20.48 0.0 20.5 0.00% primary primary 01262 9400 48.13 0.0 48.1 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 **Condition** Good **Status** pass

**Condition** Plumb

**Condition** 

**Status** pass

Status pass

Sensor Component | Sensor Plumb

**Sensor Component** System Memo

# **Wind Direction Data Form**

Mfg	S	erial Num	ber Ta	Site		Tec	hnician		Site Visit Date Param		eter Owner ID		)	
RM Young	4	19437wdr		BVL1	30	Erio	ric Hebert		09/14/2015 Wind Di		irection 04695			
Vane SN: N/A C. A. Align. deg. true						Mfg Serial Nun Tfer ID Slope	aber	RM Young 01264	1.00000	Ti		wind direction wind direction wind direction wind direction with the wind direction with the wind direction will be with the will be will be with the will be will be with the will be with the will be will be will be with the will be will be will be with the will be		
VaneTorque _	12	to	25			4	Cert Date		1/	16/2015	Cor	rCoff	1.000	000
							Mfg		Ushikata		Pa	arameter	wind direction	
							Serial Nun	aber	191832		Tí	fer Desc. t	ransit	
							Tfer ID		01272					
							Slope		,	1.00000	Inte	rcept	0.000	000
							Cert Date		2/	19/2015	Cor	rCoff	1.000	000
	DAS 1 Orient		Linearity	y: 1.3	DAS 2: Orientat	ion Li	nearity:							
UseDescription	n	TferID	In	put Ra	w Line	arity C	output V	Outr	out Deg.	Differer	nce	Change	Error	
primary		01264		0		/	0.000		354	21110101	6	44	-1	
primary		01264		45		/	0.000		41		4	47	2	
primary		01264		90	•		0.000		88		2	47	2	
primary		01264		135			0.000		133		2	45	0	
primary		01264		180			0.000		179		1	46	1	
primary		01264		225			0.000		224		1	45	0	
primary		01264		270			0.000		268		2	44	-1	
primary		01264		315			0.000		310		5	42	-3	
primary		01272		94			0.000		88		6		6	
primary		01272		184			0.000		175		9		9	
primary		01272		239	L		0.000		232		7		7	
primary		01272 01272		274 313			0.000		272 306		7		7	
primary				313		G 1141			300				1	
Sensor Comp						Condition  Condition						pass		]
Sensor Comp					<u> </u>	Condition						pass		
Sensor Comp						Condition						pass		
Sensor Comp	onent	Torque				Condition	Good			S	Status	pass		
Sensor Comp						Condition				S	Status	pass		
Sensor Component System Memo			Condition	lition See comments			S	Status	pass					

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg RM Young 6704 BVL130 Eric Hebert 09/14/2015 Temperature 04690 Mfg Extech Parameter Temperature Tfer Desc. RTD H232679 **Serial Number** 01228 **Tfer ID** -0.21981 **Slope** 1.00564 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.17 0.26 UseDesc. Test type InputTmpRaw InputTmpCorr. OutputTmpSignal | OutputSignalEng | OSE Unit | Difference primary Temp Low Range -0.04 0.18 0.000 0.18 $\mathbf{C}$ C Temp Mid Range 29.06 29.12 0.000 28.87 -0.25 primary C primary Temp High Range 46.12 46.08 0.000 45.82 -0.26 Sensor Component | Shield **Status** pass **Condition** Moderately clean Sensor Component Blower **Condition** Functioning **Status** pass Status pass Sensor Component Blower Status Switch **Condition** N/A Sensor Component | System Memo Status pass Condition

#### 2 Meter Temperature Data For Calc. Difference Serial Number Ta **Technician** Site Visit Date Parameter Mfg Site **Owner ID** BVL130 06404 RM Young 14037 Eric Hebert 09/14/2015 Temperature2meter Parameter Temperature Mfg Extech H232679 Tfer Desc. RTD **Serial Number** 01228 Tfer ID **Slope** 1.00564 **Intercept** -0.21981 **DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.16 0.2 UseDescription Test type InputTmpRaw InputTmpCorrected | OutputTmpSignal | OutputSignalEng | OSE Unit Difference primary Temp Low Rang -0.040.18 0.000 0.30 C 0.12 Temp Mid Rang 29.06 29.12 0.000 28.92 C -0.2 primary primary Temp High Rang 46.12 46.08 0.000 45.93 C -0.15 Sensor Component Properly Sited **Condition** Properly sited **Status** pass Sensor Component | Shield Condition | Moderately clean **Status** pass Status pass Sensor Component Blower **Condition** Functioning Sensor Component Blower Status Switch Status pass **Condition** N/A Sensor Component | System Memo **Condition** See comments Status pass

#### **Solar Radiation Data Form** Serial Number Ta **Technician** Site Visit Date Parameter Owner ID Mfg PY10653 BVL130 Eric Hebert Solar Radiation Licor 09/14/2015 04566 Mfg **Eppley** Parameter solar radiation RM Young Mfg Tfer Desc. SR transfer translat 10765 **Serial Number** 04340 **SN/Owner ID** none 01246 Tfer ID **Parameter** Solar Radiation Translator **DAS 1: DAS 2:** % Diff of Avg %Diff of Max %Diff of Avg %Diff of Max Parameter solar radiation Mfg **Eppley** Tfer Desc. SR transfer sensor **Serial Number** 34341F3 Tfer ID 01245 1.00000 0.00000 **Slope Intercept Cert Date** 1/16/2015 CorrCoff 1.00000 4.3% 0.0% 2.6% 0.0% UseDescription Measure Date MeasureTime Tfer Raw Tfer Corr DAS w/m2 PctDifference primary 9/16/2015 10:00 665 668 0.5% 11:00 2.4% 9/16/2015 764 782 primary 9/16/2015 12:00 810 845 4.3% primary 799 4.0% primary 9/16/2015 13:00 831 9/16/2015 14:00 766 776 1.3% primary Condition Clean Sensor Component | Sensor Clean Status pass Sensor Component | Sensor Level Condition 1/2 bubble off level **Status** pass Sensor Component | Properly Sited Status Pass **Condition** Properly sited Sensor Component | System Memo Status pass Condition

#### **Humidity Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Vaisala BVL130 Eric Hebert Relative Humidity 06820 E4920060 09/14/2015 Mfg Rotronic Parameter Relative Humidity Tfer Desc. Hygroclip 124432 **Serial Number** 01225 **Tfer ID** 4.53330 **Slope** 0.91000 **Intercept Cert Date** 1/21/2015 0.99800 CorrCoff **DAS 1: DAS 2:** Low Range **High Range** Low Range **High Range** 5.3 **Abs Avg Err** 7.2 **Abs Max Er** UseDesc. Test type Device Input RH GTL Raw RH Corr. **DAS Volts** DAS %RH Difference RH Low Range Hygroclip 0.0 0.000 primary 32.8 32.8 29.1 -3.7 52.9 0.0 0.000 -4.9 primary RH Low Range Hygroclip 52.9 48.0 primary RH High Range Hygroclip 75.3 0.0 75.3 0.000 68.1 -7.2 Condition Clean Status pass Sensor Component | RH Filter 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

# **Precipitation Data Form**

Mfg	S	erial N	Number Ta	Site	ŗ	Technician S		Site	Visit Date	Paramete	r	Owner ID		
Climatronics	i	llegible	)	BVL130		Eric	Hebert		09/1	14/2015	Precipitation		810899	
						I	Mfg PMP			)	Parameter Precipitation			
<b>DAS 1:</b>			<b>DAS 2:</b>			5	Serial Nun	ıber	EW-	06134-50	Tfer	Desc. 25	0ml graduate	
A Avg % Diff				Dif A N	/Iax % Di	7	Tfer ID		0125	50				
5.0% 6.0%					5				1.0000	0 Interce	ept	0.00000		
						(	Cert Date			9/5/200	O5 CorrC	off	1.00000	
UseDesc.	Test t	type	TferVolume	Iteration	TimePerTi	ip	Eq.Ht	DAS	eng	Eq.HtUnit	OSE Unit	TferUnit	s PctDifference	
primary	tip chec	ck	10 manual	1	2 sec		0.10	0.1		in	in	ml		
primary	test 1		231.5	1	12 sec	_	0.50	0.5		in	in	ml	4.0%	
primary	test 2		231.5	2	8 sec		0.50	0.4	17	in	in	ml	-6.0%	
Sensor Com	ponent	Prope	erly Sited		Condi	ition	See comments				Status pass			
Sensor Com	ponent	Gaug	e Drain Scree	n	Condi	ition	Not installed				Status Fail			
Sensor Com	ponent	Funne	el Clean		Condi	ition	Clean				Status pass			
Sensor Com	ponent	Condi	ition		Condi	ition	Good				Status pass			
Sensor Com	ponent	Gaug	e Screen		Condi	ition	Installed				Status pa	ass		
Sensor Component Gauge Clean			Condi	ition	Clean				Status pass					
Sensor Component Level			Condi	ition	ion Level				Status pass					
Sensor Component Sensor Heater				Condi	ition	Functioning				Status pass				
Sensor Com	ponent	Syste	m Memo		Condi	ition	See com	ments			Status pass			

## **Surface Wetness Data Form**

Mfg	Serial Number Ta	Site	Te	chnician	Site Visit Date	Parameter	Owner ID
RM Young	none	BVL130	Er	ric Hebert	09/14/2015	Surface Wetness	03652
				Mfg	Ohmite	Parameter sur	face wetness
				Serial Number	296-1200	Tfer Desc. dec	cade box
				Tfer ID	01210		

### **✓** Manual Test Pass

UseDescription	Test Type	Tfer kOhms	OutputSignal	DAS eng	OutputSignalEngUni	TferUnits	OutputSignalUnit
primary	wet	N/A	0.000	1.01	V	N/A	V
primary	dry	N/A	0.000	0.01	V	N/A	V

<b>Sensor Component</b>	Properly Sited	Condition See comments	Status Fail
<b>Sensor Component</b>	Grid Clean	Condition Clean	Status pass
<b>Sensor Component</b>	Grid Angle	Condition About 30 deg	Status pass
<b>Sensor Component</b>	Grid Orientation	<b>Condition</b> North	Status pass
<b>Sensor Component</b>	Grid Condition	Condition Fair	Status pass
Sensor Component	Grid Type	Condition Grid with holes	Status pass
Sensor Component	System Memo	Condition See comments	Status pass

# **Shelter Temperature Data For**

Mfg	Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
Campbell	unknown	unknown BVL130 E		09/14/2015	Shelter Temperature	none
DAS 1: Abs Avg Err  0.26	DAS 2: S Max Er O.55	Err Abs Max Er	Mfg Serial Number Tfer ID	Extech H232679 01228	Parameter Shell Tfer Desc. RTD	
			Slope Cert Date	1.0056		-0.21981 1.00000

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	26.60	26.67	0.000	26.5	C	-0.13
primary	Temp Mid Range	27.22	27.29	0.000	27.2	С	-0.1
primary	Temp Mid Range	26.27	26.34	0.000	26.9	С	0.55

### **Infrastructure Data For**

Site ID	BVL130	Technician	Eric Hebert	Site Visit Date	09/14/2015
---------	--------	------------	-------------	-----------------	------------

Shelter Make	Shelter Model	Shelter Size	
Ekto	8810 (s/n 2140-1)	640 cuft	

<b>Sensor Component</b>	Sample Tower Type	Condition	Type B	Status	pass
Sensor Component	Conduit	Condition	N/A	Status	pass
<b>Sensor Component</b>	Met Tower	Condition	Fair	Status	pass
Sensor Component	Moisture Trap	Condition	Installed	Status	pass
<b>Sensor Component</b>	Power Cables	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Temp Control	Condition	Functioning	Status	pass
Sensor Component	Rotometer	Condition	Installed	Status	pass
<b>Sensor Component</b>	Sample Tower	Condition	Good	Status	pass
Sensor Component	Shelter Condition	Condition	Good	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.	Hazar	d Problem
Precipitation Objects violate the 45 d	BVL130 egree rule for the	Eric Hebert e tipping bucket rain	09/14/2015 n gage.	Properly Sited	Climatronics	3422		
Surface Wetness Additional details can b	BVL130 se found in the ha	Eric Hebert ardcopy of the site a	09/14/2015 audit report.	Properly Sited	RM Young	4098		✓
Temperature2meter The forced-air shield is which could cause pren		-	09/14/2015 i. It is functioning	System Memo	RM Young orientation allows	4091 s precipitation to	enter the b	<b>✓</b> lower area

## **Field Systems Comments**

1 Parameter: SiteOpsProcedures

Ozone and NCORE sample line filters are replaced, and the sample lines are leaked tested, every 2 weeks.

2 Parameter: SitingCriteriaCom

The site is located in an agricultural and atmospheric research center. There are crops within 50 meters.

3 Parameter: ShelterCleanNotes

The shelter is somewhat cluttered and mice are present.

4 Parameter: MetSensorComme

The tipping bucket rain gage is mounted near the meteorological tower and in violation of the 45 degree rule. The surface wetness sensor is covered by tall grass.

5 Parameter: MetOpMaintCom

The meteorological sensors have been replaced with RM Young sensors since the previous audit. It appears as though the wind direction alignment was set to +3 degrees magnetic declination and not -3 degrees at the time of the replacement.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 09/14/2015 BVL130 Technician Eric Hebert Site ID Bondville **USGS Map EPA** Site Sponsor (agency) Map Scale ISWS **Operating Group Map Date** 17-019-1001 AQS# Climatronics **Meteorological Type** Ozone, IMPROVE 40.0520 **Air Pollutant Analyzer QAPP** Latitude dry, wet, Hg **QAPP** Longitude -88.3725 **Deposition Measurement** 212 Land Use agricultural **QAPP Elevation Meters** flat -2.1 **Terrain QAPP Declination** Yes 9/16/2005 Conforms to MLM **OAPP Declination Date** (217) 863-2602 40.052021 **Site Telephone Audit Latitude** Bondville Road Research Station **Audit Longitude** -88.372481 Site Address 1 Site Address 2 **Audit Elevation** 213 -2.9 Champaign County **Audit Declination** Seymour, IL City, State **Present** Fire Extinguisher 61875 No inspection date Zip Code Central **First Aid Kit** Time Zone **Primary Operator Safety Glasses** Safety Hard Hat Primary Op. Phone # **V Climbing Belt** Primary Op. E-mail **Security Fence Backup Operator V Secure Shelter** Backup Op. Phone # Stable Entry Step Backup Op. E-mail Shelter Working Room ✓ Make Model 8810 (s/n 2140-1) Ekto **Shelter Size** 640 cuft **✓** Notes Shelter Clean The shelter is somewhat cluttered and mice are present. **✓** Notes Site OK From Champaign take I-57 south to exit 229, route CR 18. Go west on CR 18 approximately 2.5 miles and turn right

(north) on CR 500E. Continue approximately 1.7 miles to the Bondville Road Research Center on the left. The site

**Driving Directions** 

is visible in the field on the right.

## Field Systems Data Form

F-02058-1500-S2-rev002

Site ID BVL130 Technician Eric Hebert Site Visit Date 09/14/2015

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	50 m	
Large parking lot	200 m		✓
Small parking lot	100 m		ightharpoons
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		<b>~</b>

Siting Distances OK ✓

**Siting Criteria Comment** 

The site is located in an agricultural and atmospheric research center. There are crops within 50 meters.

	ld Systems								
Site	ID BVL130		Technician	Eric Hebert		Site Visit Date	09/14/2015		
	Are wind speed ar being influenced b			as to avoid	<b>✓</b>				
	Are wind sensors (i.e. wind sensors horizontally exten tower into the pre	should be m ded boom >	ounted atop the 2x the max diar	tower or on a	<b>✓</b>				
3	Are the tower and	sensors plu	mb?		<b>✓</b>				
	Are the temperatu				<b>✓</b>				
	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)				<b>✓</b>				
6	Is the solar radiat	ion sensor p	lumb?		<b>✓</b>	1/2 bubble off level			
	Is it sited to avoid light?	shading, or	any artificial or	reflected	<b>✓</b>				
8	Is the rain gauge <b>j</b>	olumb?			<b>✓</b>				
	Is it sited to avoid towers, etc?	sheltering e	ffects from buil	dings, trees,		Violation of 45 deg	ree rule		
	Is the surface wet facing north?	ness sensor s	sited with the gr	id surface	<b>✓</b>				
11	Is it inclined appr	oximately 3	0 degrees?		<b>✓</b>				
	vide any additiona iral or man-made,					y) regarding condi	tions listed abo	ove, or a	any other features,

The tipping bucket rain gage is mounted near the meteorological tower and in violation of the 45 degree rule. The surface wetness sensor is covered by tall grass.

Fie	eld Sy	ystems Dat	ta Form			F-02058-1500-S4-rev002
Site	ID	BVL130	Technician	Eric Hebert		Site Visit Date 09/14/2015
		the meterological	l sensors appear to be intained?	intact, in good	✓	
		the meteorologic	cal sensors operationa	l online, and	<b>✓</b>	
3	Are the	e shields for the t	temperature and RH s	ensors clean?	<b>✓</b>	
4	Are the	e aspirated moto	rs working?		<b>✓</b>	
	Is the s		ensor's lens clean and f	free of	<b>✓</b>	
6	Is the s	urface wetness s	ensor grid clean and u	indamaged?	<b>✓</b>	
		e sensor signal ar on, and well mai	nd power cables intact intained?	, in good	<b>✓</b>	
			nd power cable connec well maintained?	tions protected	<b>✓</b>	
a <b>tur</b> ne n	ral or m	an-made, that m	nay affect the monitori	ng parameters: RM Young senso	rs sinc	regarding conditions listed above, or any other features, ce the previous audit. It appears as though the wind direction
gnn	nent wa	s set to +3 degree	es magnetic declination	and not -3 degre	es at t	the time of the replacement.

### Field Systems Data Form F-02058-1500-S5-rev002 BVL130 Technician | Eric Hebert Site Visit Date 09/14/2015 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, SO2, and CO 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	BVL130	Technician	Eric Hebert		Site Vis	it Date 09/14/201	5		
	DAC a	ensor translators, and	norinhoral aqui	nment energies	nc 01	nd maintana	200			
	DAS, S	ensor translators, and	peripheral equi	oment operation	is ai	<u>10 mamtena</u>	ince			
1		DAS instruments appaintained?	ear to be in good	condition and	<b>✓</b>					
2		the components of the n, backup, etc)	e DAS operation	al? (printers,	<b>✓</b>					
3		analyzer and sensor sing protection circuitry		through	<b>✓</b>	Met sensors	only			
4		e signal connections pr aintained?	otected from the	e weather and	<b>✓</b>					
5	Are the	e signal leads connecte	d to the correct	DAS channel?	<b>✓</b>					
6	Are the	e DAS, sensor translated?	ors, and shelter	properly	<b>✓</b>					
7	Does tl	he instrument shelter h	nave a stable pov	ver source?	<b>✓</b>					
8	Is the i	nstrument shelter tem	perature control	led?	<b>✓</b>					
9	Is the 1	net tower stable and g	rounded?			Stable 🗸		<b>Grounded</b>		
10	Is the s	sample tower stable an	d grounded?			<b>✓</b>		<b>✓</b>		
11	Tower	comments?								
	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-S7-rev002 BVL130 Technician | Eric Hebert Site Visit Date 09/14/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No Yes N/A No N/A Yes **V** Wind speed sensor **Data logger V** ✓ Wind direction sensor П **Data logger V** ✓ П Temperature sensor Strip chart recorder **✓ V** П Relative humidity sensor Computer **V V** Solar radiation sensor Modem **~** П **~ Printer** Surface wetness sensor **✓ V** Wind sensor translator Zero air pump **V** Filter flow pump **Temperature translator V V ~ Humidity sensor translator Surge protector** $\checkmark$ **V UPS Solar radiation translator** П **✓ 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 SSRF ✓ V ✓ V Site Ops Manual** Nov 2014 **V HASP V** Nov 2014 **V Field Ops Manual V Calibration Reports V ✓** Ozone z/s/p Control Charts Preventive maintenance schedul Is the station log properly completed during every site visit? ✓ 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

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

current?

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

#### **Field Systems Data Form** F-02058-1500-S8-rev002 BVL130 Technician Eric Hebert Site Visit Date 09/14/2015 Site ID Site operation procedures at ESE in 1986 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** Daily **Visual Inspections V** N/A **Translator Zero/Span Tests (climatronics) ✓ V** Weekly **Manual Rain Gauge Test V V** Weekly **Confirm Reasonableness of Current Values V V** Weekly **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **Compliant OC Check Performed** 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 V** 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** 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:

✓

SSRF, call-in

Ozone and NCORE sample line filters are replaced, and the sample lines are leaked tested, every 2 weeks.

complete sample train including all filters?

reported? If yes, how?

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

Fi	eld Sy	stems Data Form	l		F-02058-1500-S9-rev00					
Site	e ID	BVL130 Te	echnician Eric Hebert		Site Visit Date	09/14/2015				
	Site ope	eration procedures								
1	Is the fi	lter pack being changed ever	ry Tuesday as scheduled	l? ✓	Filter changed mori	nings				
2	Are the	Site Status Report Forms boy?	eing completed and filed	<b>!</b>						
3	Are dat	a downloads and backups beed?	eing performed as		No longer required					
4	Are gen	eral observations being mad	de and recorded? How?	✓	SSRF					
5	Are site	supplies on-hand and replea	nished in a timely	<b>✓</b>						
6	Are san	nple flow rates recorded? Ho	ow?	<b>✓</b>	SSRF, call-in					
7	Are san	nples sent to the lab on a reg ?	gular schedule in a timely	<b>y</b>						
8		ers protected from contamin pping? How?	nation during handling	✓	Clean gloves on an	d off				
9		site conditions reported regions manager or staff?	gularly to the field	✓						
QC	Check P	erformed	Frequency			Compliant				
N	Multi-poi	nt MFC Calibrations	✓ Semiannually			✓				
I	Flow Syst	em Leak Checks	✓ Weekly			✓				
I	Filter Pac	k Inspection								
I	Flow Rate Setting Checks Weekly					✓				
1	Visual Check of Flow Rate Rotometer ✓ Weekly					✓				
I	In-line Filter Inspection/Replacement   Semiannually					✓				
5	Sample L	ine Check for Dirt/Water	Weekly			✓				
		ndditional explanation (photo an-made, that may affect the			y) regarding conditi	ons listed above, or	any other features,			

## Field Systems Data Form

### F-02058-1500-S10-rev002

Site ID

BVL130

Technician Eric Hebert

Site Visit Date 09/14/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
CO	Teledyne	T300U	87	000760
Computer	Dell	Inspiron 15	B94MC12	07073
DAS	Campbell	CR3000	2539	000424
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CAB18	050400022576	06019
Flow Rate	Apex	AXMC105LPMDPC	illegible	000595
Infrastructure	Infrastructure	none	none	none
Met tower	Climatronics	14 inch taper	none	02738
Modem	Raven	H4223-C	0844355827	06610
Noy	Teledyne	T200U	110	000805
Ozone	ThermoElectron Inc	49i A1NAA	1009241797	000625
Ozone Standard	ThermoElectron Inc	49i A3NAA	0922236890	000512
Precipitation	Climatronics	100508-2	illegible	810899
Relative Humidity	Vaisala	HMP50UAB1A1A	E4920060	06820
Sample Tower	Aluma Tower	В	unknown	000182
Shelter Temperature	Campbell	107-L	unknown	none
Shield (10 meter)	RM Young	Aspirated 43408	none	06206
Shield (2 meter)	RM Young	Aspirated 43408	none	06635
Siting Criteria	Siting Criteria	1	None	None
SO2	Teledyne	T100U	79	000765
Solar Radiation	Licor	LI-200	PY10653	04566
Solar Radiation Translator	RM Young	70101-X	none	04340
Surface Wetness	RM Young	58101	none	03652
Temperature	RM Young	41342	6704	04690
Temperature2meter	RM Young	41342	14037	06404
Wind Direction	RM Young	AQ05103-5	49437wdr	04695
Wind Speed	RM Young	AQ05103-5	49437wsp	04695
Zero air pump	Teledyne	701H	576	000759

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
ALI	H157-Sandy	Grenville-09/16/2015				
1	9/16/2015	Computer	Dell	000299	D520	unknown
2	9/16/2015	DAS	Campbell	000405	CR3000	2522
3	9/16/2015	Elevation	Elevation	None	1	None
4	9/16/2015	Filter pack flow pump	Thomas	06285	107CA18	0990007057
5	9/16/2015	Flow Rate	Apex	000647	AXMC105LPMDPCV	54749
6	9/16/2015	Infrastructure	Infrastructure	none	none	none
7	9/16/2015	Modem	Raven	06605	H4222-C	0844355805
8	9/16/2015	Ozone	ThermoElectron Inc	000683	49i A1NAA	1030244798
9	9/16/2015	Ozone Standard	ThermoElectron Inc	000440	49i A3NAA	CM08200016
10	9/16/2015	Sample Tower	Aluma Tower	illegible	В	none
11	9/16/2015	Shelter Temperature	Campbell	none	107-L	none
12	9/16/2015	Siting Criteria	Siting Criteria	None	1	None
13	9/16/2015	Temperature	RM Young	04942	41342	8894
14	9/16/2015	Zero air pump	Werther International	06910	C 70/4	000829160

#### **DAS Data Form DAS Time Max Error:** 0 **Serial Number** Site **Technician** Site Visit Date Parameter Use Desc. Mfg Campbell 2522 ALH157 Sandy Grenville 09/16/2015 DAS Primary Das Date: 9 /16/2015 **Audit Date** 9 /16/2015 Datel **Parameter** DAS Mfg 15:06:00 15:06:00 Das Time: **Audit Time** Tfer Desc. Source generator (D 15510194 **Serial Number** Das Day: 259 **Audit Day** 259 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** 1/22/2015 1.00000 **Cert Date** CorrCoff Channel Input **DVM** Output DAS Output InputUnit OutputUnit Difference 0.0000 0.0000 0.0001 0.0001 V V 7 0.1000 0.0999 0.0999 0.00007 0.3000 0.2998 0.2998 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 Nur	nber Ta	Site	Tec	chnician	Site Visit Date Paran		ameter Owner	
Apex	54749		ALH157	Sa	ndy Grenville	09/16/2015	Flow R	ate	000647
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103471	Т	fer Desc. nex	cus
					Tfer ID	01420			
					Slope	0.9	96664 Inte	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Cor</b>	rCoff	0.99996
					Mfg	BIOS	P	arameter Flo	w Rate
					Serial Number	103424	Т	fer Desc. BIC	OS cell
					Tfer ID	01410			
					Slope	0.9	96664 Inte	ercept	0.03078
					Cert Date	2/5	5/2015 <b>Cor</b>	rCoff	0.99996
DAS 1:		DAS 2:		L	Cal Factor Z	ero	-0.0	)1	
A Avg % Diff:	A Max % Di	A Avg %	Dif A Max	x % Di	Cal Factor F	ull Scale		1	
1.53%	1.96%				Rotometer R		1.	.5	
Desc.	Test type	Input 1/n	Input Corr_	MfcDisp.	OutputSignal	Output S E	InputUnit	OutputSignall	PctDifference
primary	pump off	0.000	0.000	0.00	0.000	-0.01	l/m	1/m	
primary	leak check	0.000	0.000	0.03	0.150	0.11	1/m	1/m	
primary	test pt 1	1.507	1.530	1.50	1.500	1.50	l/m	1/m	-1.96%
primary	test pt 2	1.503	1.520	1.50	1.500	1.50	l/m	1/m	-1.32%
primary	test pt 3	1.504	1.520	1.50	1.500	1.50	l/m	1/m	-1.32%
Sensor Comp	onent Leak Tes	st		Conditio	n		Status	pass	
Sensor Comp	onent Tubing C	Condition		Conditio	n Good		Status	pass	
Sensor Comp	onent Filter Po	sition		Conditio	n Good		Status	pass	
Sensor Comp	onent	er Conditio	n	Conditio	n Clean and dry		Status	pass	
Sensor Comp	onent Moisture	Present		Conditio	n No moisture pr	resent	Status	pass	
Sensor Comp	onent Filter Dis	tance		Conditio	n 1.5 cm		Status	pass	
Sensor Comp	onent Filter De	pth		Conditio	1.5 cm		Status	pass	
Sensor Comp	onent Filter Azi	muth		Conditio	<b>n</b> 360 deg		Status	pass	
	onent System I	1		Conditio			Status	nacc	

## **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technic	cian	Site Visit Date	Parame	eter Owner ID
ThermoElectron Inc 1	030244798	ALH157	Sandy	Grenville	09/16/2015	Ozone	000683
Intercept -0.4	9259 Slope: 12179 Intercept 19992 CorrCoff	0.00000 0.00000	Seri	g ial Number r ID	ThermoElectron 0419606966 01112		rameter ozone er Desc. Ozone primary stan
DAS 1: A Avg % Diff: A Ma 1.7%	DAS 2: x % Di	6Dif A Max 9		pe t Date	0.993 6/25/20		
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	Si	te Si	te Unit	PctDifference
primary	1	0.02	0.43	0.3	25 ppb		
primary	2	30.02	30.61	29.	1.1		-2.06%
primary	3	49.98	50.70	49.	1.1		-3.14%
primary primary	5	80.28 110.07	81.18 111.16	80.	1.1		-0.47% -1.22%
		110.07			7.80 ррв	G4 4	
Sensor Component	Sample Train		Condition G			Status	pass
<b>Sensor Component</b>	Inlet Filter Conditio	n	<b>Condition</b> C	lean		Status	pass
<b>Sensor Component</b>	Battery Backup		<b>Condition</b> N	/A		Status	pass
Sensor Component	Offset		Condition -0	).1		Status	pass
Sensor Component	Span		Condition 0.	.989		Status	pass
Sensor Component	Zero Voltage		<b>Condition</b> N	/A		Status	pass
Sensor Component	Fullscale Voltage		<b>Condition</b> N	/A		Status	pass
Sensor Component	Cell A Freq.		Condition 93	3.6 kHz		Status	pass
Sensor Component	Cell A Noise		Condition 0.	.6 ppb		Status	pass
Sensor Component	Cell A Flow		Condition 0.	.70 lpm		Status	pass
Sensor Component			Condition 72			Status	
Sensor Component			Condition 38	8.4 C		Status	
Sensor Component	Cell B Freq.		Condition 89			Status	
Sensor Component			Condition 0.			Status	
Sensor Component			Condition 1.			Status	
Sensor Component			Condition			Status	
Sensor Component			Condition			Status	
Sensor Component			Condition N	ot tested		Status	
_			Condition S				
Sensor Component	System wemo		Condition	ee comments		Status	μαοδ

#### **Temperature Data Form** Serial Number Ta Site **Technician** Site Visit Date Parameter **Owner ID** Mfg Sandy Grenville 09/16/2015 RM Young 8894 ALH157 Temperature 04942 Mfg Extech Parameter Temperature Tfer Desc. RTD H232734 **Serial Number** 01227 **Tfer ID** -0.06409 **Slope** 1.00343 **Intercept DAS 1: DAS 2:** 1/30/2015 1.00000 Abs Avg Err Abs Max Er Abs Avg Err Abs Max Er **Cert Date** CorrCoff 0.12 0.21 OutputTmpSignal | OutputSignalEng | OSE Unit | Difference UseDesc. Test type InputTmpRaw InputTmpCorr. primary Temp Low Range 0.07 0.13 0.000 0.3 C 0.21 C Temp Mid Range 24.85 24.83 0.000 24.9 0.03 primary 0.000 48.7 C primary Temp High Range 48.88 48.78 -0.11 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**

Mfg	Serial Number Ta	Site	Technician	Site Visit Date	Parameter	Owner ID
Campbell	none	ALH157	Sandy Grenville	09/16/2015	Shelter Temperature	none
DAS 1:	DAS 2:		Mfg	Extech	Parameter She	Iter Temperatur
Abs Avg Err Ab			Serial Number	H232734	Tfer Desc. RTD	)
	0.11		Tfer ID	01227		
			Slope	1.0034	3 Intercept	-0.06409
			Cert Date	1/30/201	5 CorrCoff	1.00000

UseDesc.	Test type	InputTmpRaw	InputTmpCorr.	OutputTmpSignal	OutputSignalEng	OSE Unit	Difference
primary	Temp Mid Range	27.88	27.85	0.000	28.0	C	0.17
primary	Temp Mid Range	28.25	28.22	0.000	28.6	С	0.38
primary	Temp Mid Range	26.61	26.58	0.000	27.4	С	0.77

### **Infrastructure Data For**

Si	te ID	ALH157	Technician	Sandy Grenville	Site Visit Date	09/16/2015	
	Shelter Ma	ake	Shelter Model	She	lter Size		
	Ekto		8810 (2149-7)	640	cuft		
						ALC: UNIVERSITY OF THE PARTY OF	

Sensor Component	Sample Tower Type	Condition	Type B	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
<b>Sensor Component</b>	Power Cables	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Temp Control	Condition	Functioning	Status	pass
<b>Sensor Component</b>	Rotometer	Condition	Installed	Status	pass
<b>Sensor Component</b>	Sample Tower	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Condition	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Door	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Roof	Condition	Good	Status	pass
<b>Sensor Component</b>	Shelter Floor	Condition	Good	Status	pass
Sensor Component	Signal Cable	Condition	Good	Status	pass
<b>Sensor Component</b>	Tubing Type	Condition	3/8 teflon	Status	pass
<b>Sensor Component</b>	Sample Train	Condition	Good	Status	pass

## **Site Visit Comments**

Parameter	Site	Technician	S.V. Date	Component	Mfg	Serial No.	Hazard	Problem
Ozone	ALH157	Sandy Grenville	09/16/2015	Cell B Flow	ThermoElectron	4106		

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

# **Field Systems Comments**

1 Parameter: SitingCriteriaCom

The site is located in a corn field on a privately operated farm.

2 Parameter: MetSensorComme

Met tower removed, temperature mounted in naturally aspirated shield on sample tower.

#### **Field Systems Data Form** F-02058-1500-S1-rev002 Site Visit Date 09/16/2015 ALH157 Technician Sandy Grenville Site ID **Pocahontas USGS Map EPA** Site Sponsor (agency) Map Scale private **Operating Group Map Date** 17-119-9991 AQS# Climatronics **Meteorological Type Air Pollutant Analyzer** Ozone **QAPP** Latitude 38.8690 -89.6229 dry, wet **QAPP** Longitude **Deposition Measurement** 164 Land Use agricultural **QAPP Elevation Meters** flat 0.9 **Terrain QAPP Declination** 1/28/2004 Yes Conforms to MLM **OAPP Declination Date** 38.869001 **Site Telephone Audit Latitude** Fairview Road -89.622815 Site Address 1 **Audit Longitude** Site Address 2 **Audit Elevation** 164 Madison -1.1 County **Audit Declination** Pocahontas, IL City, State **Present** Fire Extinguisher 62275 new in 2015 Zip Code Central **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 (2149-7) Ekto **Shelter Size** 640 cuft **✓** Notes Shelter Clean **✓** Notes Site OK From I-70 take exit 36 (Pokey Road) north to the intersection of route 140. Turn left (west) on route 140 and continue **Driving Directions** approximately 1.5 miles. Turn left (south) onto CR 5. At the first intersection turn right (west) onto Meffert road. After the road turns left 90 degrees, turn at the first farm on the left. The site is approximately 1/2 mile on the dirt

road under the power lines.

## **Field Systems Data Form**

F-02058-1500-S2-rev002

Site ID ALH157 Technician Sandy Grenville Site Visit Date 09/16/2015

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	20 m	
Limited agricultural operations	200 m		✓
Large parking lot	200 m		✓
Small parking lot	100 m		ightharpoons
Tree line	50 m		✓
Obstacles to wind	10 times obstacle height		

Siting Distances OK **☑** 

**Siting Criteria Comment** 

The site is located in a corn field on a privately operated farm.

#### **Field Systems Data Form** F-02058-1500-S3-rev002 Site Visit Date 09/16/2015 ALH157 Site ID 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) **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? **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 facing north?

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

Met tower removed, temperature mounted in naturally aspirated shield on sample tower.

11 Is it inclined approximately 30 degrees?

Fic	eld Systems Data Form		F-02058-1500-S4-rev002
Site	ID ALH157 Technician Sandy Grenville		Site Visit Date 09/16/2015
1	Do all the meterological sensors appear to be intact, in good condition, and well maintained?	<b>✓</b>	
2	Are all the meteorological sensors operational online, and reporting data?	✓	
3	Are the shields for the temperature and RH sensors clean?	<b>✓</b>	
4	Are the aspirated motors working?	<b>✓</b>	N/A
5	Is the solar radiation sensor's lens clean and free of scratches?	<b>✓</b>	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?	✓	N/A
8	Are the sensor signal and power cable connections protected from the elements and well maintained?	<b>✓</b>	N/A
	de any additional explanation (photograph or sketch if necessal 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 ALH157 Technician Sandy Grenville Site Visit Date 09/16/2015 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 15 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	ALH157		Technician	Sandy Grenville		Site Visi	og/16/201	5	
	DAS so	ngon tuongle	store and r	aninhanal agui	pment operation	ng or	nd maintana	200		
	DAS, SC	<u> 11801 (1 a1181a</u>	itors, and j	<u>Jerrpherar equi</u>	pment operation		iu mamiena	<u>nce</u>		
1		DAS instrunintained?	nents appe	ar to be in good	l condition and	<b>✓</b>				
2		the compone , backup, etc		DAS operation	al? (printers,	<b>✓</b>				
3		analyzer and g protection		gnal leads pass	through	<b>✓</b>	Met sensors	only		
4		signal conn intained?	ections pro	tected from the	e weather and	<b>✓</b>				
5	Are the	signal leads	connected	to the correct	DAS channel?	<b>✓</b>				
6	Are the grounde		r translato	rs, and shelter	properly	<b>✓</b>				
7	Does the	e instrumen	t shelter ha	ave a stable pov	ver source?	<b>✓</b>				
8	Is the in	strument sh	elter temp	erature contro	lled?	<b>✓</b>				
9	Is the m	et tower sta	ble and gr	ounded?			Stable		Grounded	
10	Is the sa	mple tower	stable and	grounded?			✓		<b>✓</b>	
11	Tower o	comments?					Met tower re	moved		
					or sketch if nece ring parameter		y) regarding	g conditions liste	d above, or a	any other features,

#### **Field Systems Data Form** F-02058-1500-S7-rev002 ALH157 Technician Sandy Grenville Site Visit Date 09/16/2015 Site ID **Documentation** Does the site have the required instrument and equipment manuals? No N/A Yes No N/A Yes **✓** Wind speed sensor **Data logger V** Wind direction sensor **V Data logger V V** П 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 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 ✓** 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 V SSRF ✓ V ✓ V Site Ops Manual** Oct 2001 **V HASP V** Feb 2014 **✓ Field Ops Manual V** July 1990 **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 ALH157 Technician Sandy Grenville Site Visit Date 09/16/2015 Site ID Site operation procedures 1987 at ESE in FL 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 Compliant Frequency V ✓** N/A **Multipoint Calibrations ✓ 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 ✓** N/A **Test Surface Wetness Response** Are regular operational QA/QC checks performed on the ozone analyzer? **QC Check Performed Frequency Compliant Multi-point Calibrations V V** Semiannually Automotic Zono/Cnon Tost Daily

Automatic Zero/Span Tests	Daily		•					
Manual Zero/Span Tests			✓					
<b>Automatic Precision Level Tests</b>	<b>✓</b> Daily		$\checkmark$					
<b>Manual Precision Level Test</b>			✓					
<b>Analyzer Diagnostics Tests</b>	✓ Weekly		✓					
<b>In-line Filter Replacement (at inlet)</b>	✓ Every 2 weeks	;	✓					
In-line Filter Replacement (at analyze	□ N/A		✓					
Sample Line Check for Dirt/Water	✓ Weekly		✓					
Zero Air Desiccant Check								
1 Do multi-point calibration gases go through the complete sample train including all filters?								
2 Do automatic and manual z/s/p gasses g complete sample train including all filte	rs?							
3 Are the automatic and manual z/s/p che reported? If yes, how?	cks monitored and	SSRF, call-in						

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:

Fi	eld Sy	ystems Data Form				F-02058-1	500-S9-rev002	
Sit	e ID	ALH157 Tec	chnician Sandy Grenville		Site Visit Date	09/16/2015		
	Site op	eration procedures						
1	Is the f	ilter pack being changed ever	y Tuesday as scheduled?	<b>V</b>	Filter changed morin	nings		
2	Are the	e Site Status Report Forms boly?	eing completed and filed	<b>✓</b>				
3	Are da schedu	ta downloads and backups be led?	eing performed as		No longer required			
4	Are ge	neral observations being mad	e and recorded? How?	<b>✓</b>	SSRF			
5	5 Are site supplies on-hand and replenished in a timely fashion?			<b>✓</b>				
6	6 Are sample flow rates recorded? How?			<b>~</b>	SSRF, logbook, call-in			
7	7 Are samples sent to the lab on a regular schedule in a timely fashion?			<b>✓</b>				
8 Are filters protected from contamination during handling and shipping? How?			<b>✓</b>	Clean gloves on and	d off			
9 Are the site conditions reported regularly to the field operations manager or staff?			<b>✓</b>					
QC	Check I	erformed	Frequency			Compliant		
I	Multi-po	int MFC Calibrations	✓ Semiannually			✓		
I	Flow Sys	tem Leak Checks	✓ Weekly			✓		
I	Filter Pa	ck Inspection						
I	Flow Rate Setting Checks Weekly					✓		
7	Visual Check of Flow Rate Rotometer ✓ Weekly					$\checkmark$		
I	In-line Filter Inspection/Replacement					$\checkmark$		
5	Sample Line Check for Dirt/Water   ✓ Weekly					$\checkmark$		
		additional explanation (photo an-made, that may affect the		sary	y) regarding condition	ons listed above, or a	any other features,	

## Field Systems Data Form

### F-02058-1500-S10-rev002

Site ID

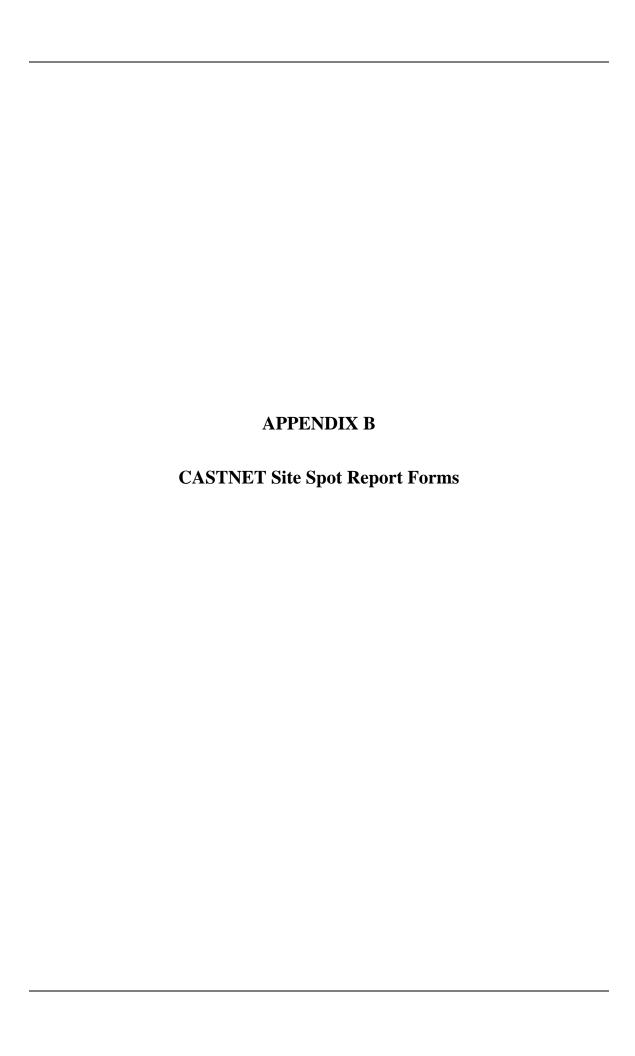
ALH157

Technician Sandy Grenville

Site Visit Date 09/16/2015

**Site Visit Sensors** 

Parameter	Manufacturer	Model	S/N	Client ID
Computer	Dell	D520	unknown	000299
DAS	Campbell	CR3000	2522	000405
Elevation	Elevation	1	None	None
Filter pack flow pump	Thomas	107CA18	0990007057	06285
Flow Rate	Apex	AXMC105LPMDPC	54749	000647
Infrastructure	Infrastructure	none	none	none
Modem	Raven	H4222-C	0844355805	06605
Ozone	ThermoElectron Inc	49i A1NAA	1030244798	000683
Ozone Standard	ThermoElectron Inc	49i A3NAA	CM08200016	000440
Sample Tower	Aluma Tower	В	none	illegible
Shelter Temperature	Campbell	107-L	none	none
Siting Criteria	Siting Criteria	1	None	None
Temperature	RM Young	41342	8894	04942
Zero air pump	Werther International	C 70/4	000829160	06910



**Data Compiled:** 10/1/2015 4:33:12 PM

SiteVisitDate	Site	Technician
09/16/2015	ALH157	Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	3	0.12	c	P
2	Temperature max error	P	4	0.5	3	0.21	c	P
3	Ozone Slope	P	0	1.1	4	0.99259	unitless	P
4	Ozone Intercept	P	0	5	4	-0.42179	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99992	unitless	P
6	Ozone % difference avg	P	7	10	4	1.7	%	P
7	Ozone % difference max	P	7	10	4	3.1	%	P
8	Flow Rate average % difference	P	10	5	3	1.53	%	P
9	Flow Rate max % difference	P	10	5	3	1.96	%	P
10	DAS Time maximum error	P	0	5	1	0.00	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0000	V	P
12	Shelter Temperature average error	P	5	1	12	0.44	c	P
13	Shelter Temperature max error	P	5	1	12	0.77	c	P

### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

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

### **Field Systems Comments**

1 Parameter: SitingCriteriaCom

The site is located in a corn field on a privately operated farm.

2 Parameter: MetSensorComme

Met tower removed, temperature mounted in naturally aspirated shield on sample tower.

Data Compiled:

8/17/2015 6:45:22 PM

SiteVisitDate Site Technician

08/14/2015 BAS601 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Wind Speed average error below 5m/s in m/s	P	3	0.5	8	0.01	m/s	P
2	Wind Speed max error below 5m/s in m/s	P	3	0.5	8	0.05	m/s	P
3	Wind Speed average % difference above 5 m/s	P	3	5	8	0.5	%	P
4	Wind Speed max % difference above 5 m/s	P	3	5	8	1.2	%	P
5	Wind Speed Torque average error	P	3	0.5	1	0.00	g-cm	P
6	Wind Speed Torque max error	P	3	0.5	1	0.0	g-cm	P
7	Wind Direction Input Deg True average error (de	P	2	5	4	1.2	degrees	P
8	Wind Direction Input Deg True max error (deg)	P	2	5	4	2	degrees	P
9	Temperature average error	P	4	0.5	6	0.79	c	Fail
10	Temperature max error	P	4	0.5	6	1.56	c	Fail
11	Relative Humidity average above 85%	P	6	10	2	3.8	%	P
12	Relative Humidity max above 85%	P	6	10	2	3.8	%	P
13	Relative Humidity average below 85%	P	6	10	4	8.5	%	P
14	Relative Humidity max below 85%	P	6	10	4	14.5	%	Fail
15	Solar Radiation % diff of avg	P	9	10	12	0.61	%	P
16	Solar Radiation % diff of max STD value	P	9	10	12	1.4	%	P
17	Precipitation average % difference	P	1	10	2	7.0	%	P
18	Precipitation max % difference	P	1	10	2	7.0	%	P
19	Ozone Slope	P	0	1.1	4	0.97563	unitless	P
20	Ozone Intercept	P	0	5	4	-0.03096	ppb	P
21	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
22	Ozone % difference avg	P	7	10	4	2.6	%	P
23	Ozone % difference max	P	7	10	4	3.0	%	P
24	Flow Rate average % difference	P	10	5	3	2.13	%	P
25	Flow Rate max % difference	P	10	5	3	3.01	%	P
26	DAS Time maximum error	P	0	5	1	3.17	min	P
27	DAS Voltage average error	P	4	0.003	3	0.0000	V	P
28	Shelter Temperature average error	P	5	1	4	1.41	c	Fail
29	Shelter Temperature max error	P	5	1	4	2.23	c	Fail

08/14/2015

BAS601

Eric Hebert

#### **Field Performance Comments**

1 Parameter: DAS SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

2 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.

3 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.

4 Parameter: Relative Humidity SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The proper completion of the filter chain-of-custody form was discussed with the site operator. There are no clean spare filter caps or Ziploc filter bags on site as was the case during the previous site audit visit. The bag and caps for the received filter are being used to send the removed filter back to the lab. The importance of keeping the shipping material with each filter was discussed with the operator.

2 Parameter: SiteOpsProcedures

The ozone inlet filter is replaced and the system is leak tested each month.

3 Parameter: DocumentationCo

The use of the filter pack chain-of-custody was discussed with the site operator.

4 Parameter: ShelterCleanNotes

The shelter houses the ozone, DAS, and MFC only.

5 Parameter: MetSensorComme

Some objects violate the 45 degree rule for the tipping bucket rain gage. The Temperature shield is mounted on the south side of the tower tripod at 2 meters.

6 Parameter: MetOpMaintCom

The site utilizes a combination sensor for humidity and temperature. It was audited without submersion in a water bath. The temperature sensor is now mounted at approximately 2 meters from the ground. Current recorded temperature at this site is not comparable to previously measured temperature data. The accuracy of the DAS was not tested due to no available channels for the test equipment.

Data Compiled:

8/21/2015 7:39:37 PM

SiteVisitDate Site Technician

08/19/2015 BUF603 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.01	m/s	P
2	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.05	m/s	P
3	Wind Speed average $\%$ difference above 5 m/s	P	3	5	4	0.8	%	P
4	Wind Speed max % difference above 5 m/s	P	3	5	4	2.2	%	P
5	Wind Speed Torque average error	P	3	0.5	1	0.00	g-cm	P
6	Wind Speed Torque max error	P	3	0.5	1	0.0	g-cm	P
7	Wind Direction Input Deg True average error (de	P	2	5	4	1.8	degrees	P
8	Wind Direction Input Deg True max error (deg)	P	2	5	4	4	degrees	P
9	Temperature average error	P	4	0.5	3	0.23	c	P
10	Temperature max error	P	4	0.5	3	0.39	c	P
11	Relative Humidity average above 85%	P	6	10	1	2.4	%	P
12	Relative Humidity max above 85%	P	6	10	1	2.4	%	P
13	Relative Humidity average below 85%	P	6	10	2	1.8	%	P
14	Relative Humidity max below 85%	P	6	10	2	2.6	%	P
15	Solar Radiation % diff of avg	P	9	10	5	1.32	%	P
16	Solar Radiation % diff of max STD value	P	9	10	5	1.3	%	P
17	Precipitation average % difference	P	1	10	2	5.2	%	P
18	Precipitation max % difference	P	1	10	2	9.0	%	P
19	Flow Rate average % difference	P	10	5	3	0.89	%	P
20	Flow Rate max % difference	P	10	5	3	1.19	%	P
21	DAS Time maximum error	P	0	5	1	2.33	min	P
22	DAS Voltage average error	P	4	0.003	2	0.0000	V	P

08/19/2015

BUF603

Eric Hebert

#### **Field Performance Comments**

1 Parameter: Flow Rate SensorComponent: System Memo CommentCode 202

The filter attachment plate is mounted too high in the enclosure resulting in the filter being recessed in the enclosure and not exposed in the standard geometric orientation.

### **Field Systems Comments**

1 Parameter: DasComments

The NEMA enclosure has a cooling fan.

2 Parameter: DocumentationCo

A disc with the current QAPP has been received and is kept at the site operator's office.

3 Parameter: ShelterCleanNotes

NEMA enclosure, 120 VAC power

4 Parameter: PollAnalyzerCom

The dry deposition filter pack enclosure is not the standard "pot" size that is used at the other CASTNET sites. The diameter of the enclosure is much smaller and the filter is mounted much deeper inside the opening. The geometry of the filter pack and enclosure is likely to impact particle collection efficiency.

5 Parameter: MetSensorComme

The temperature and RH are measured using a combined sensor which cannot be immersed making a temperature audit difficult. The temperature and RH are measured at 2.5 meters above the ground.

**Data Compiled:** 9/20/2015 11:01:33 PM

SiteVisitDate	Site	Technician

09/14/2015 BVL130 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature2meter average error	P	5	0.5	3	0.16	c	P
2	Temperature2meter max error	P	5	0.5	3	0.20	c	P
3	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.05	m/s	P
4	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.20	m/s	P
5	Wind Speed average % difference above 5 m/s	P	3	5	4	0.0	%	P
6	Wind Speed max % difference above 5 m/s	P	3	5	4	0.0	%	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	5	6.2	degrees	Fail
10	Wind Direction Input Deg True max error (deg)	P	2	5	5	9	degrees	Fail
11	Wind Direction Linearity average error (deg)	P	2	5	8	1.2	degrees	P
12	Wind Direction Linearity max error (deg)	P	2	5	8	3	degrees	P
13	Wind Direction Torque average error	P	2	20	1	18	g-cm	P
14	Wind Direction Torque max error	P	2	20	1	25	g-cm	Fail
15	Temperature average error	P	4	0.5	3	0.17	c	P
16	Temperature max error	P	4	0.5	3	0.26	c	P
17	Relative Humidity average below 85%	P	6	10	3	5.2	%	P
18	Relative Humidity max below 85%	P	6	10	3	7.2	%	P
19	Solar Radiation % diff of avg	P	9	10	20	2.58	%	P
20	Solar Radiation % diff of max STD value	P	9	10	20	4.3	%	P
21	Precipitation average % difference	P	1	10	2	5.0	%	P
22	Precipitation max % difference	P	1	10	2	6.0	%	P
23	Ozone Slope	P	0	1.1	4	0.97902	unitless	P
24	Ozone Intercept	P	0	5	4	0.42831	ppb	P
25	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
26	Ozone % difference avg	P	7	10	4	1.5	%	P
27	Ozone % difference max	P	7	10	4	1.8	%	P
28	Flow Rate average % difference	P	10	5	2	0.22	%	P
29	Flow Rate max % difference	P	10	5	2	0.67	%	P
30	DAS Time maximum error	P	0	5	1	0.00	min	P
31	DAS Voltage average error	P	7	0.003	42	0.0000	V	P
32	Surface Wetness Response	P	12	0.5	1	1.01		P
33	Shelter Temperature average error	P	5	1	12	0.26	c	P
34	Shelter Temperature max error	P	5	1	12	0.55	c	P

09/14/2015

BVL130

Eric Hebert

#### **Field Performance Comments**

1 Parameter: Precipitation SensorComponent: Properly Sited CommentCode 193

Objects violate the 45 degree rule for the tipping bucket rain gage.

2 Parameter: Surface Wetness SensorComponent: Properly Sited CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

3 Parameter: Temperature2mete SensorComponent: System Memo CommentCode 32

The forced-air shield is mounted on the tower up-side down. It is functioning properly but the orientation allows precipitation to enter the blower area which could cause premature failure of the blower.

#### **Field Systems Comments**

1 Parameter: SiteOpsProcedures

Ozone and NCORE sample line filters are replaced, and the sample lines are leaked tested, every 2 weeks.

2 Parameter: SitingCriteriaCom

The site is located in an agricultural and atmospheric research center. There are crops within 50 meters.

3 Parameter: ShelterCleanNotes

The shelter is somewhat cluttered and mice are present.

4 Parameter: MetSensorComme

The tipping bucket rain gage is mounted near the meteorological tower and in violation of the 45 degree rule. The surface wetness sensor is covered by tall grass.

5 Parameter: MetOpMaintCom

The meteorological sensors have been replaced with RM Young sensors since the previous audit. It appears as though the wind direction alignment was set to +3 degrees magnetic declination and not -3 degrees at the time of the replacement.

07/24/2015

**Data Compiled:** 9/1/2015 9:00:10 PM

CNT169

SiteVisitDate Site Technician

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	3	0.12	c	P
2	Temperature max error	P	4	0.5	3	0.21	c	P
3	Ozone Slope	P	0	1.1	4	0.93852	unitless	P
4	Ozone Intercept	P	0	5	4	-0.03683	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99986	unitless	P
6	Ozone % difference avg	P	7	10	4	6.4	%	P
7	Ozone % difference max	P	7	10	4	8.3	%	P
8	Flow Rate average % difference	P	10	5	2	1.32	%	P
9	Flow Rate max % difference	P	10	5	2	1.64	%	P
10	DAS Time maximum error	P	0	5	1	0.02	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0001	V	P
12	Shelter Temperature average error	P	5	1	12	0.30	c	P
13	Shelter Temperature max error	P	5	1	12	0.36	c	P

### **Field Systems Comments**

1 Parameter: SiteOpsProcedures

The ozone inlet filter is changed once each month and the ozone sample line is leak tested every two weeks.

Sandy Grenville

2 Parameter: ShelterCleanNotes

The shelter is dirty. Some floor tiles are old and broken

Data Compiled:

10/7/2015 9:06:17 PM

SiteVisitDate	Site	Technician	_
07/16/2015	DEN417	Eric Hebert	
Line Audited	d Parameter	DAS Ch. # C	Criteria +/- Counts QaRes

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.98063	unitless	P
2	Ozone Intercept	P	0	5	4	0.41240	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
4	Ozone % difference avg	P	7	10	4	1.1	%	P
5	Ozone % difference max	P	7	10	4	1.7	%	P

**Data Compiled:** 9/1/2015 10:15:10 PM

SiteVisitDate Site Technician

07/28/2015 GLR468 Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	6	0.20	c	P
2	Temperature max error	P	4	0.5	6	0.29	c	P
3	Ozone Slope	P	0	1.1	4	0.96744	unitless	P
4	Ozone Intercept	P	0	5	4	-0.47147	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99997	unitless	P
6	Ozone % difference avg	P	7	10	4	4.4	%	P
7	Ozone % difference max	P	7	10	4	5.9	%	P
8	Flow Rate average % difference	P	10	5	2	0.41	%	P
9	Flow Rate max % difference	P	10	5	2	0.47	%	P
10	DAS Time maximum error	P	0	5	1	0.00	min	P
11	DAS Voltage average error	P	7	0.003	49	0.0001	V	P
12	Shelter Temperature average error	P	5	1	12	0.53	c	P
13	Shelter Temperature max error	P	5	1	12	0.57	c	P

07/28/2015

GLR468

Sandy Grenville

#### **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: SiteOpsProcComm

The site operator is relatively new and would benefit from additional training.

2 Parameter: SiteOpsProcedures

The ozone inlet filter is being changed weekly while smoke from forest fires is present. The site operator was observed to leave the sample tower down with the dry deposition filter installed and the sample pump running for more than one hour.

3 Parameter: SitingCriteriaCom

The site is located in a small clearing within 100 meters of a horse stable. There is a plywood and aluminum processing plant within 20 km of the site.

4 Parameter: ShelterCleanNotes

The shelter is in good condition. Evidence of repairs to roof leaks attempted.

5 Parameter: MetSensorComme

The recorded temperature data at this site is now being measured at approximately 2 meters above the ground. Current temperature data are no longer comparable to previous temperature measurements at this site.

6 Parameter: MetOpMaintCom

The signal cables are showing signs of wear.

**Data Compiled:** 10/12/2015 9:22:15 PM

SiteVisitDate	Site	Technician
07/02/2015	GTH161	Alison Ray

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	12	0.32	c	P
2	Temperature max error	P	4	0.5	12	0.71	c	Fail
3	Ozone Slope	P	0	1.1	4	0.98457	unitless	P
4	Ozone Intercept	P	0	5	4	-0.91907	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99986	unitless	P
6	Ozone % difference avg	P	7	10	4	3.5	%	P
7	Ozone % difference max	P	7	10	4	4.8	%	P
8	Flow Rate average % difference	P	10	5	2	1.21	%	P
9	Flow Rate max % difference	P	10	5	2	1.32	%	P
10	DAS Time maximum error	P	0	5	1	0.03	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0002	V	P
12	Shelter Temperature average error	P	5	1	8	0.36	c	P
13	Shelter Temperature max error	P	5	1	8	0.36	c	P

### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

Due to the remote location of the site, it can take up to a week to return the filter sample to the lab after it is removed from the tower in the winter.

2 Parameter: ShelterCleanNotes

Some floor tiles are damaged.

3 Parameter: MetSensorComme

The temperature sensor has been moved to the sample tower and mounted in a naturally aspirated shield facing south and over the shelter roof. The met tower has been removed.

4 Parameter: MetOpMaintCom

The temperature signal cable is showing signs of wear.

Data Compiled:

10/1/2015 4:56:51 PM

SiteVisitDate	Site	Technician
08/28/2015	HOX148	Sandy Grenville
Lina Audita	d Parameter	DAS Ch # Critoria +/- Cou

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	1.00507	unitless	P
2	Ozone Intercept	P	0	5	4	0.44431	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
4	Ozone % difference avg	P	7	10	4	1.1	%	P
5	Ozone % difference max	P	7	10	4	1.3	%	P

Data Compiled:

8/21/2015 8:58:56 PM

SiteVisitDate Site Technician

08/20/2015 NEC602 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.00	m/s	P
2	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.01	m/s	P
3	Wind Speed average % difference above 5 m/s	P	3	5	4	0.5	%	P
4	Wind Speed max % difference above 5 m/s	P	3	5	4	1.2	%	P
5	Wind Speed Torque average error	P	3	0.5	1	0.00	g-cm	P
6	Wind Speed Torque max error	P	3	0.5	1	0.0	g-cm	P
7	Wind Direction Input Deg True average error (de	P	2	5	4	1.5	degrees	P
8	Wind Direction Input Deg True max error (deg)	P	2	5	4	3	degrees	P
9	Temperature average error	P	4	0.5	3	0.26	c	P
10	Temperature max error	P	4	0.5	3	0.37	c	P
11	Relative Humidity average above 85%	P	6	10	1	3.2	%	P
12	Relative Humidity max above 85%	P	6	10	1	3.2	%	P
13	Relative Humidity average below 85%	P	6	10	2	0.5	%	P
14	Relative Humidity max below 85%	P	6	10	2	1.0	%	P
15	Solar Radiation % diff of avg	P	9	10	10	9.34	%	P
16	Solar Radiation % diff of max STD value	P	9	10	10	10.00	%	P
17	Precipitation average % difference	P	1	10	2	3.6	%	P
18	Precipitation max % difference	P	1	10	2	3.6	%	P
19	Ozone Slope	P	0	1.1	4	0.97150	unitless	P
20	Ozone Intercept	P	0	5	4	-0.47079	ppb	P
21	Ozone correlation	P	0	0.995	4	1.00000	unitless	P
22	Ozone % difference avg	P	7	10	4	3.9	%	P
23	Ozone % difference max	P	7	10	4	5.1	%	P
24	Flow Rate average % difference	P	10	5	5	1.74	%	P
25	Flow Rate max % difference	P	10	5	5	3.49	%	P
26	DAS Time maximum error	P	0	5	1	2.58	min	P
27	DAS Voltage average error	P	4	0.003	3	0.0000	V	P
28	Shelter Temperature average error	P	5	1	6	0.29	c	P
29	Shelter Temperature max error	P	5	1	6	0.79	c	P

08/20/2015

NEC602

Eric Hebert

#### **Field Performance Comments**

1 Parameter: Flow Rate SensorComponent: System Memo CommentCode 180

An excessive amount of fluctuation in the signal recorded by the DAS for this variable was observed during the audit.

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

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

3 Parameter: Wind Direction SensorComponent: Vane Condition CommentCode 211

The wind direction vane is slightly bent and could be causing additional bias in wind direction measurements.

#### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator is doing a good job with filter change and filter handling.

2 Parameter: SiteOpsProcedures

The site operator is aware that the desiccant is in need of replacement. Some of the items on the SSRF were discussed and the site operator's questions were answered regarding the correct procedures.

3 Parameter: DocumentationCo

The site operator received a disc with the current QAPP which is kept at his office. The purpose and procedures for "upping" and "downing" channels was discussed during the audit.

4 Parameter: SitingCriteriaCom

The site is located approximately 2 km northeast of Newcastle WY which has a population of approximately 3500. There is an oil refinery in Newcastle. A heavily traveled road is approximately 100m west of the site.

5 Parameter: ShelterCleanNotes

The shelter houses the ozone, DAS, and MFC only.

6 Parameter: MetSensorComme

Some objects violate the 45 degree rule for the tipping bucket rain gage.

7 Parameter: MetOpMaintCom

Met One wind direction and wind speed sensors have been added to the tower with the Climatronics AIO all-in-one weather sensor for wind direction, wind speed, and temperature. The Met One sensors were audited.

A separate sensor for humidity and temperature was audited.

Data Compiled:

8/12/2015 1:08:49 PM

SiteVisitDate Site Technician

08/10/2015 PND165 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature2meter average error	P	5	0.5	3	0.35	c	P
2	Temperature2meter max error	P	5	0.5	3	0.67	c	Fail
3	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.05	m/s	P
4	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.20	m/s	P
5	Wind Speed average % difference above 5 m/s	P	3	5	4	0.0	%	P
6	Wind Speed max % difference above 5 m/s	P	3	5	4	0.0	%	P
7	Wind Speed Torque average error	P	3	0.5	1	0.25	g-cm	P
8	Wind Speed Torque max error	P	3	0.5	1	0.3	g-cm	P
9	Wind Direction Input Deg True average error (de	P	2	5	4	1.0	degrees	P
10	Wind Direction Input Deg True max error (deg)	P	2	5	4	2	degrees	P
11	Wind Direction Linearity average error (deg)	P	2	5	8	2.0	degrees	P
12	Wind Direction Linearity max error (deg)	P	2	5	8	4	degrees	P
13	Wind Direction Torque average error	P	2	20	1	8	g-cm	P
14	Wind Direction Torque max error	P	2	20	1	10	g-cm	P
15	Temperature average error	P	4	0.5	9	0.33	c	P
16	Temperature max error	P	4	0.5	9	0.53	c	Fail
17	Relative Humidity average above 85%	P	6	10	2	5.9	%	P
18	Relative Humidity max above 85%	P	6	10	2	5.9	%	P
19	Relative Humidity average below 85%	P	6	10	6	2.2	%	P
20	Relative Humidity max below 85%	P	6	10	6	3.3	%	P
21	Solar Radiation % diff of avg	P	9	10	8	1.18	%	P
22	Solar Radiation % diff of max STD value	P	9	10	8	1.2	%	P
23	Precipitation average % difference	P	1	10	2	3.0	%	P
24	Precipitation max % difference	P	1	10	2	6.0	%	P
25	Ozone Slope	P	0	1.1	4	0.98497	unitless	P
26	Ozone Intercept	P	0	5	4	0.16680	ppb	P
27	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
28	Ozone % difference avg	P	7	10	4	1.1	%	P
29	Ozone % difference max	P	7	10	4	1.5	%	P
30	Flow Rate average % difference	P	10	5	2	1.74	%	P
31	Flow Rate max % difference	P	10	5	2	1.95	%	P
32	DAS Time maximum error	P	0	5	1	0.00	min	P
33	DAS Voltage average error	P	7	0.003	42	0.0001	V	P

SiteVi	isitDate	Site	Technician						
08/10/2	2015	PND165	Eric Hebert		<del></del>				
34	Surface V	Wetness Response	P	12	0.5	1	1.01		P
35	Shelter T	emperature average error	P	5	1	12	0.81	c	P
36	Shelter T	'emperature max error	P	5	1	12	1.52	c	Fail

#### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: Cell A Flow CommentCode 99

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

2 Parameter: Surface Wetness SensorComponent: System Memo CommentCode 135

The surface wetness sensor did not respond to one drop of water placed in the center of the grid.

3 Parameter: Temperature SensorComponent: System Memo CommentCode 141

The temperature sensor is mounted directly above the shelter roof.

#### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator does not use gloves to handle the filter. He handles the filter by the stem and carries it upside down to reduce the chance of contamination from the shelter to the tower.

2 Parameter: DasComments

The site operator recently replaced the shelter air conditioner.

3 Parameter: SitingCriteriaCom

There is new construction at the entrance to the access road approximately 200 meters to the west of the site. The area is to be used as a staging and rock crushing site for the road improvement project scheduled to take place for the next two years.

4 Parameter: ShelterCleanNotes

The shelter is well maintained.

5 Parameter: MetSensorComme

The RH sensor is not mounted in a shield, but rather in a plastic funnel taped to the meteorological tower. Both the RH and temperature sensors are mounted above the shelter. The surface wetness sensor grid is in poor condition and only responded as wet after excessive amounts of water were applied to the entire surface of the grid.

**Data Compiled:** 10/1/2015 2:35:38 PM

SiteVisitDate	Site	Technician
09/03/2015	PRK134	Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	6	0.22	c	P
2	Temperature max error	P	4	0.5	6	0.46	c	P
3	Ozone Slope	P	0	1.1	4	0.99199	unitless	P
4	Ozone Intercept	P	0	5	4	0.68477	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99993	unitless	P
6	Ozone % difference avg	P	7	10	4	0.8	%	P
7	Ozone % difference max	P	7	10	4	1.2	%	P
8	Flow Rate average % difference	P	10	5	2	1.53	%	P
9	Flow Rate max % difference	P	10	5	2	1.96	%	P
10	DAS Time maximum error	P	0	5	1	0.00	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0000	V	P
12	Shelter Temperature average error	P	5	1	12	0.30	c	P
13	Shelter Temperature max error	P	5	1	12	0.76	c	P

### **Field Systems Comments**

1 Parameter: DasComments

The tower guy wires are rusted and should be replaced. The sample tower is damaged at the hinge point and bent. Both of these items were observed and reported during the previous two audit visits.

2 Parameter: SitingCriteriaCom

Clover and Barley have been planted for hay within 20m of the site starting in 2008.

3 Parameter: ShelterCleanNotes

The shelter is clean, neat, and well organized. The counter top has been repaired since the previous audit visit.

4 Parameter: MetSensorComme

The temperature sensor has been moved to a naturally aspirated shield mounted to the sample tower.

**Data Compiled:** 8/4/2015 9:59:47 PM

SiteVisitDate	Site	Technician

08/03/2015 ROM206 Eric Hebert

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	0.36	c	P
3	Ozone Slope	P	0	1.1	4	0.98937	unitless	P
4	Ozone Intercept	P	0	5	4	-0.58729	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
6	Ozone % difference avg	P	7	10	4	2.4	%	P
7	Ozone % difference max	P	7	10	4	3.8	%	P
8	Flow Rate average % difference	P	10	5	6	1.07	%	P
9	Flow Rate max % difference	P	10	5	6	1.35	%	P
10	DAS Time maximum error	P	0	5	1	0.00	min	P
11	DAS Voltage average error	P	7	0.003	14	0.0001	V	P
12	Shelter Temperature average error	P	5	1	8	0.27	c	P
13	Shelter Temperature max error	P	5	1	8	0.40	c	P

### **Field Systems Comments**

#### 1 Parameter: SiteOpsProcComm

It was suggested that the dry deposition filter not be installed and uncovered on the sample tower while the ozone inlet filter is replaced and other activities are performed with the tower down. The NOy analyzer has a blinking "fault" light and the message "system service" is displayed.

#### 2 Parameter: ShelterCleanNotes

The shelter is clean, neat, and well organized. There are signs of previous roof leaks, but they have been repaired. The floor and counter top have been replaced.

#### 3 Parameter: MetSensorComme

The temperature sensor has been removed from the met tower and mounted in a naturally aspirated shield on the sample tower, facing south and over the shelter roof.

Data Compiled:

8/4/2015 5:23:22 PM

SiteVisitDate Site Technician

08/04/2015 ROM406 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	6	0.29	c	P
2	Temperature max error	P	4	0.5	6	0.75	c	Fail
3	Ozone Slope	P	0	1.1	4	0.96560	unitless	P
4	Ozone Intercept	P	0	5	4	-0.10314	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99999	unitless	P
6	Ozone % difference avg	P	7	10	4	3.9	%	P
7	Ozone % difference max	P	7	10	4	5.0	%	P
8	Flow Rate average % difference	P	10	5	8	0.55	%	P
9	Flow Rate max % difference	P	10	5	8	0.66	%	P
10	DAS Time maximum error	P	0	5	1	0.37	min	P
11	DAS Voltage average error	P	2	0.003	49	0.0000	V	P
12	Shelter Temperature average error	P	5	1	3	1.79	c	Fail
13	Shelter Temperature max error	P	5	1	3	3.14	c	Fail

08/04/2015

ROM406

Eric Hebert

#### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

2 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

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

3 Parameter: Temperature SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator is doing a very good job performing the site duties and expressed an interest in trying to improve any deficiencies. The sample flow rate systems for both the dry deposition and ozone sample trains were explained during the audit at the request of the site operator. Although gloves are not used to handle the filter pack, the operator is careful to touch only the bag and caps and not the filter.

2 Parameter: DasComments

Only RH, temperature, and AMoN are mounted on the meteorological tower.

3 Parameter: SiteOpsProcedures

The ozone analyzer display is indicating a low flow alarm for cell B. The analyzer is functioning properly and the flow meter is likely suspect.

4 Parameter: ShelterCleanNotes

The shelter is clean, neat, organized, and well maintained.

5 Parameter: MetSensorComme

The recorded temperature is being measured at 2.5 meters above the ground (and < 1 foot above the AMoN enclosure) and not 10 meters. Current temperature measurements are no longer comparable to previous temperature measurements at this site.

Data Compiled:

10/1/2015 5:04:38 PM

SiteVisitDate	Site	Technician		
09/08/2015	SAL133	Sandy Grenville		

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	0.99968	unitless	P
2	Ozone Intercept	P	0	5	4	-0.17228	ppb	P
3	Ozone correlation	P	0	0.995	4	0.99994	unitless	P
4	Ozone % difference avg	P	7	10	4	0.4	%	P
5	Ozone % difference max	P	7	10	4	0.7	%	P

Data Compiled:

8/21/2015 7:44:46 PM

SiteVisitDate Site Technician

08/18/2015 SHE604 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Wind Speed average error below 5m/s in m/s	P	3	0.5	4	0.01	m/s	P
2	Wind Speed max error below 5m/s in m/s	P	3	0.5	4	0.05	m/s	P
3	Wind Speed average % difference above 5 m/s	P	3	5	4	1.0	%	P
4	Wind Speed max % difference above 5 m/s	P	3	5	4	2.2	%	P
5	Wind Speed Torque average error	P	3	0.5	1	0.00	g-cm	P
6	Wind Speed Torque max error	P	3	0.5	1	0.0	g-cm	P
7	Wind Direction Input Deg True average error (de	P	2	5	4	2.0	degrees	P
8	Wind Direction Input Deg True max error (deg)	P	2	5	4	3	degrees	P
9	Temperature average error	P	4	0.5	3	1.54	c	Fail
10	Temperature max error	P	4	0.5	3	3.28	c	Fail
11	Relative Humidity average below 85%	P	6	10	1	0.7	%	P
12	Relative Humidity max below 85%	P	6	10	1	0.7	%	P
13	Precipitation average % difference	P	1	10	1	9.8	%	P
14	Precipitation max % difference	P	1	10	1	9.8	%	P
15	Flow Rate average % difference	P	10	5	3	4.8	%	P
16	Flow Rate max % difference	P	10	5	3	5.09	%	Fail
17	DAS Time maximum error	P	0	5	1	0.50	min	P
18	DAS Voltage average error	P	4	0.003	2	0.0000	V	P

08/18/2015

SHE604

Eric Hebert

#### **Field Performance Comments**

1 Parameter: Flow Rate SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

2 Parameter: Temperature SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

#### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator uses the caps and bag from the received filter to seal and send back the removed filter. A spare set of caps and bag should be sent to the site. This was reported during the previous site audit.

2 Parameter: DasComments

The site power source is solar and wind with battery storage. The NEMA enclosure has a cooling fan.

3 Parameter: SiteOpsProcedures

observations of current meteorological measurements are recorded on a hardcopy checklist for ARS and not on the SSRF.

4 Parameter: DocumentationCo

The site operator received a disc with the 2013 QAPP, operating procedures, and HASP which is kept at his office.

5 Parameter: SitingCriteriaCom

The site is located in range land. There is an active rail line with coal trains within one kilometer of the site.

6 Parameter: ShelterCleanNotes

NEMA enclosure, solar power

7 Parameter: PollAnalyzerCom

The dry deposition filter pack enclosure is not the standard "pot" size as at the other CASTNET sites. The diameter is much smaller. It is not clear if this will impact particle collection efficiency.

**8 Parameter:** MetSensorComme

The site is a small footprint solar powered site that has been operating as part of the WARMS network for 10 years. Objects violate the 45 degree rule for the tipping bucket rain gage. Temperature and RH are measured with a combined sensor that cannot be immersed making a temperature audit difficult. The temperature and RH are being measured at 2.5 meters above the ground.

9 Parameter: MetOpMaintCom

Due to limited time at the site caused by approaching thunder storm, only ambient comparisons of temperature were performed using the EEMS RTD standard. One standard salt solution was used for the RH comparison. The accuracy of the DAS was not tested with a voltage source since there were no available test channels.

Data Compiled:

10/1/2015 3:54:03 PM

SiteVisitDate	Site	Technician
09/11/2015	STK138	Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	9	0.20	c	P
2	Temperature max error	P	4	0.5	9	0.28	c	P
3	Ozone Slope	P	0	1.1	4	0.99668	unitless	P
4	Ozone Intercept	P	0	5	4	0.38943	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99998	unitless	P
6	Ozone % difference avg	P	7	10	4	0.7	%	P
7	Ozone % difference max	P	7	10	4	2.2	%	P
8	Flow Rate average % difference	P	10	5	2	0.22	%	P
9	Flow Rate max % difference	P	10	5	2	0.67	%	P
10	DAS Time maximum error	P	0	5	1	0.00	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0001	V	P
12	Shelter Temperature average error	P	5	1	12	0.07	c	P
13	Shelter Temperature max error	P	5	1	12	0.11	c	P

09/11/2015

STK138

Sandy Grenville

### **Field Systems Comments**

1 Parameter: SiteOpsProcedures

The ozone sample train is leak tested every 2 weeks.

2 Parameter: SitingCriteriaCom

The site is located in a hay field on a cattle farm. Clover is planted within 20 meters and will be used as pasture this fall.

3 Parameter: ShelterCleanNotes

The shelter is somewhat dirty and cluttered. There are signs of leaks on the walls and floor rot.

4 Parameter: MetSensorComme

The temperature sensor is now mounted in a naturally aspirated shield on the sample tower.

5 Parameter: MetOpMaintCom

The met tower is no longer in use.

Data Compiled:

9/1/2015 11:14:05 PM

SiteVisitDate Site Technician

08/04/2015 THR422 Sandy Grenville

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	12	0.15	c	P
2	Temperature max error	P	4	0.5	12	0.20	c	P
3	Ozone Slope	P	0	1.1	4	0.94939	unitless	P
4	Ozone Intercept	P	0	5	4	1.15039	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99994	unitless	P
6	Ozone % difference avg	P	7	10	4	2.8	%	P
7	Ozone % difference max	P	7	10	4	4.1	%	P
8	Flow Rate average % difference	P	10	5	8	2.32	%	P
9	Flow Rate max % difference	P	10	5	8	2.38	%	P
10	DAS Time maximum error	P	0	5	1	0.13	min	P
11	DAS Voltage average error	P	2	0.003	49	0.0002	V	P
12	Shelter Temperature average error	P	5	1	15	1.3	c	Fail
13	Shelter Temperature max error	P	5	1	15	1.49	c	Fail

08/04/2015

**THR422** 

Sandy Grenville

#### **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 ozone sample train does not have a means to introduce test gas at the sample inlet. Results of routine zero, span, precision, and any multipoint calibration checks are maintained by the state personnel who perform the tests.

2 Parameter: SitingCriteriaCom

The site is located 200 meters from an interstate rest area, and 300 meters from interstate 94. The rest area can have parked and idling vehicles for extended periods.

3 Parameter: ShelterCleanNotes

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

4 Parameter: PollAnalyzerCom

The ozone analyzer is operated by the state of North Dakota. The sample train contains a glass manifold. There is no means to introduce on-site generated test gas at the sample inlet. A through-the-probe audit was conducted using the EEMS system.

5 Parameter: MetSensorComme

The recorded temperature data is being measured at approximately 2 meters above the ground. The current temperature data are no longer comparable to previous temperature data at this site.

Data Compiled:

SiteVisitDate Site

10/1/2015 4:47:25 PM

08/27/2	2015 UVL124	Sandy Grenvill	e					
Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	1.00291	unitless	P
2	Ozone Intercept	р	0	5	4	0.21520	nnh	P

#### Ozone Intercept P 0 0.995 4 P 3 Ozone correlation 0.99998 unitless 4 Ozone % difference avg P 10 0.8 % 5 Ozone % difference max 10 1.3 % P

### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

**Technician** 

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

Data Compiled:

10/1/2015 3:55:20 PM

SiteVisitDate	Site	Technician
09/07/2015	VIN140	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	0.11	c	P
3	Ozone Slope	P	0	1.1	4	0.97984	unitless	P
4	Ozone Intercept	P	0	5	4	0.39413	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99992	unitless	P
6	Ozone % difference avg	P	7	10	4	1.0	%	P
7	Ozone % difference max	P	7	10	4	2.2	%	P
8	Flow Rate average % difference	P	10	5	3	1.54	%	P
9	Flow Rate max % difference	P	10	5	3	1.97	%	P
10	DAS Time maximum error	P	0	5	1	0.02	min	P
11	DAS Voltage average error	P	7	0.003	42	0.0001	V	P
12	Shelter Temperature average error	P	5	1	12	0.77	c	P
13	Shelter Temperature max error	P	5	1	12	1.25	c	Fail

09/07/2015

VIN140

Sandy Grenville

### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: Cell A Flow CommentCode 99

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

### **Field Systems Comments**

1 Parameter: SitingCriteriaCom

The site is in an agricultural research center with farm activities adjacent to the site. A train track is approximately 200 meters to the north.

2 Parameter: ShelterCleanNotes

The shelter is in good condition and well maintained, however rot is beginning to form at the bottom of the walls.

3 Parameter: MetSensorComme

The temperature sensor has been mounted on the sample tower.

4 Parameter: MetOpMaintCom

The temperature sensor in now mounted in a naturally aspirated shield.

Data Compiled: 9

9/13/2015 7:20:39 PM

SiteVisitDate Site Technician

09/08/2015 VOY413 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	3	0.20	c	P
2	Temperature max error	P	4	0.5	3	0.35	c	P
3	Ozone Slope	P	0	1.1	4	0.99793	unitless	P
4	Ozone Intercept	P	0	5	4	1.79471	ppb	P
5	Ozone correlation	P	0	0.995	4	1.00000	unitless	P
6	Ozone % difference avg	P	7	10	4	3.4	%	P
7	Ozone % difference max	P	7	10	4	6.2	%	P
8	Flow Rate average % difference	P	10	5	8	5.01	%	Fail
9	Flow Rate max % difference	P	10	5	8	8.26	%	Fail
10	DAS Time maximum error	P	0	5	1	1.72	min	P
11	DAS Voltage average error	P	2	0.003	35	0.0001	V	P
12	Shelter Temperature average error	P	5	1	15	0.63	c	P
13	Shelter Temperature max error	P	5	1	15	0.88	c	P

09/08/2015

VOY413

Eric Hebert

### **Field Systems Comments**

1 Parameter: DocumentationCo

Correctly completing the general observations section of the SSRF on the day of filter installation was discussed with the operator.

2 Parameter: SitingCriteriaCom

The site is located at the top of a hill in a forest. There are trees surrounding the site which are below the tower height.

3 Parameter: ShelterCleanNotes

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

4 Parameter: PollAnalyzerCom

There are no trees violating the 22.5 degree cone above the ozone sample inlet. However, there is a communication tower which is above the 22.5 degree threshold.

5 Parameter: MetSensorComme

The recorded temperature is currently being measured at approximately 2.5 meters above the ground and not at 10 meters as previously measured. Current temperature data are no longer comparable with previously measured data.

**Data Compiled:** 8/22/2015 11:06:58 AM

SiteVisitDate Site Technician

08/21/2015 WNC429 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	6	0.04	c	P
2	Temperature max error	P	4	0.5	6	0.04	c	P
3	Ozone Slope	P	0	1.1	4	0.96256	unitless	P
4	Ozone Intercept	P	0	5	4	-0.47649	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99996	unitless	P
6	Ozone % difference avg	P	7	10	4	4.7	%	P
7	Ozone % difference max	P	7	10	4	6.0	%	P
8	Flow Rate average % difference	P	10	5	2	0.56	%	P
9	Flow Rate max % difference	P	10	5	2	0.67	%	P
10	DAS Time maximum error	P	0	5	1	0.33	min	P
11	DAS Voltage average error	P	2	0.003	35	0.0002	V	P
12	Shelter Temperature average error	P	5	1	2	0.16	c	P
13	Shelter Temperature max error	P	5	1	2	0.20	c	P

08/21/2015

WNC429

Eric Hebert

#### **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.

2 Parameter: Ozone SensorComponent: System Memo CommentCode 97

The ozone sample train does not include a means to introduce the zero/span/precision test gas, or the multi-point test gas, to the complete sample train. The inlet filter at the analyzer is not conditioned as described in the station procedures.

3 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

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

4 Parameter: Ozone SensorComponent: Cell A Freq. CommentCode 99

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

5 Parameter: Temperature SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

#### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The general observations section of the SSRF is still not completed. Gloves are not used when handling the filter pack.

2 Parameter: SiteOpsProcedures

The ozone analyzer is operated by the state of South Dakota. There is no means for introducing routine test gas at the sample inlet and all routine checks are performed at the back of the analyzer. Audit test gas was introduced through the sample inlet flooding the glass manifold.

3 Parameter: DocumentationCo

Records of the routine checks performed by the state personnel are kept onsite in a logbook.

4 Parameter: ShelterCleanNotes

One shelter houses the gas analyzers and is in good condition and clean. The analyzer sample train is a glass manifold with an exhaust fan. The second shelter houses the flow system, met translator, and IMPROVE. It is older and not climate controlled.

5 Parameter: MetSensorComme

The recorded temperature is measured at approximately 2 meters above the ground. Previously measured temperature data are no longer comparable to the current temperature measurements.

6 Parameter: PollAnalyzerCom

The dry deposition filter is mounted low in the enclosure which changes the particle collection characteristics, and can allow precipitation to enter. The ozone sample train is a 3 meter glass manifold with a 1/4 inch Teflon tubing connection to the analyzer.

7 Parameter: MetOpMaintCom

The temperature sensor signal cable insulation is cracked and showing signs of extreme wear.

Data Compiled:

8/17/2015 4:04:59 PM

SiteVisitDate Site Technician

08/13/2015 YEL408 Eric Hebert

Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Temperature average error	P	4	0.5	12	0.13	c	P
2	Temperature max error	P	4	0.5	12	0.18	c	P
3	Ozone Slope	P	0	1.1	4	0.98473	unitless	P
4	Ozone Intercept	P	0	5	4	-0.90442	ppb	P
5	Ozone correlation	P	0	0.995	4	0.99995	unitless	P
6	Ozone % difference avg	P	7	10	4	3.7	%	P
7	Ozone % difference max	P	7	10	4	5.9	%	P
8	Flow Rate average % difference	P	10	5	3	0.44	%	P
9	Flow Rate max % difference	P	10	5	3	0.67	%	P
10	DAS Time maximum error	P	0	5	1	0.17	min	P
11	DAS Voltage average error	P	10	0.003	35	0.0000	V	P
12	DAS Voltage average error	P	2	0.003	35	0.0002	V	P
13	Shelter Temperature average error	P	5	1	15	1.26	c	Fail
14	Shelter Temperature max error	P	5	1	15	1.44	c	Fail

08/13/2015

YEL408

Eric Hebert

#### **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.

2 Parameter: Temperature SensorComponent: System Memo CommentCode 174

Additional details can be found in the hardcopy of the site audit report.

### **Field Systems Comments**

1 Parameter: SiteOpsProcComm

The site operator was not available during the site audit visit. Reported information was obtained from the site documentation.

2 Parameter: DasComments

The shelter heat is operating continuously. The air conditioning is cycling and able to overcome the additional heat and maintain the shelter temperature within specifications.

3 Parameter: SiteOpsProcedures

The ozone inlet filter is replaced and the system is leak tested every two weeks.

4 Parameter: SitingCriteriaCom

The site is located at the edge of a tree line. Trees as tall as the sample inlet are approximately 10 to 15 meters from the sample tower and cover the area from west to east on the north side of the site. Other trees have been cut and the forest has been thinned. There may be a few trees still in violation of the 22.5 degree rule to the north of the inlet. A new communication tower has been constructed since the previous site audit visit.

5 Parameter: ShelterCleanNotes

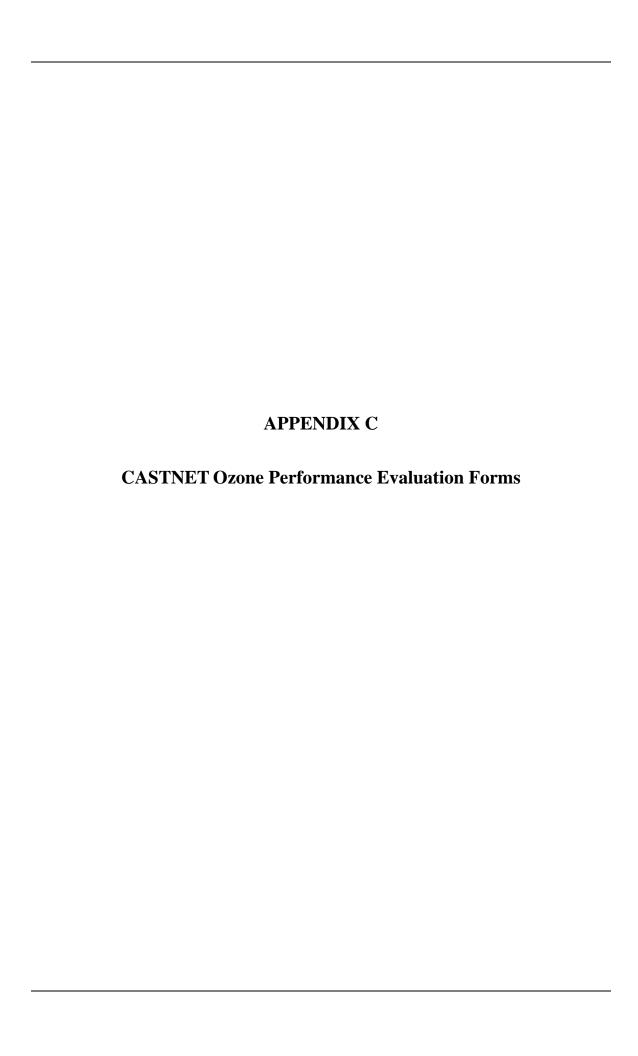
The shelter is organized and well maintained.

6 Parameter: PollAnalyzerCom

The desiccant canister is spent.

7 Parameter: MetOpMaintCom

The recorded temperature is now being measured at approximately 2 meters above the ground. Current temperature measurements are no longer comparable to previous temperature measurements at this site.



# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
DEN	1417-Eric H	Hebert-07/16/2015				
1	7/16/2015	DAS	Environmental Sys Corp	90600	8816	2274
2	7/16/2015	Ozone	ThermoElectron Inc	90778	49C	49C-77033-384
3	7/16/2015	Ozone Standard	ThermoElectron Inc	90831	49C	0520012325
4	7/16/2015	Zero air pump	Werther International	none	PC70/4	526281

### **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Tech	nnician	Site Visit Date	e Parame	eter Owner ID
ThermoElectron Inc 4	9C-77033-384	DEN417	Eric	Hebert	07/16/2015	Ozone	90778
Intercept 0.4	8063 Slope: 1240 Intercept 19999 CorrCoff	0.00000 0.00000 0.00000		Mfg Serial Number Ofer ID	ThermoElectro 0517112167 01113		ozone Ozone primary stan
DAS 1: A Avg % Diff: A Ma 1.1%	DAS 2: x % Di	6Dif A Max 9	% Di	Slope Cert Date	1.005		
UseDescription	ConcGroup	Tfer Raw	Tfer Co	orr Si	te S	ite Unit	PctDifference
primary	1	-0.08	-0.06	5 0.3	39 ppb		
primary	2	27.42	27.27		1.1		-0.22%
primary	3	49.04	48.77		1.1		-1.13%
primary primary	5	79.34 108.60	78.90 108.0		53 ppb 5.50 ppb		-1.74% -1.39%
-		108.00			зо рро	G, 4	
Sensor Component	Sample Train		Condition			Status	pass
<b>Sensor Component</b>	Inlet Filter Conditio	n	Condition	Clean		Status	pass
Sensor Component	Battery Backup		Condition	N/A		Status	pass
Sensor Component	Offset		Condition	ı		Status	pass
Sensor Component	Span		Condition	l		Status	pass
Sensor Component	Zero Voltage		Condition	ı		Status	pass
Sensor Component	Fullscale Voltage		Condition	ı		Status	pass
Sensor Component	Cell A Freq.		Condition	ı		Status	pass
Sensor Component	Cell A Noise		Condition	ı		Status	pass
Sensor Component	Cell A Flow		Condition	0.65 lpm		Status	pass
Sensor Component	Cell A Pressure		Condition	l		Status	pass
Sensor Component	Cell A Tmp.		Condition	ı		Status	pass
Sensor Component	Cell B Freq.		Condition	ı		Status	pass
Sensor Component	Cell B Noise		Condition	l		Status	pass
Sensor Component	Cell B Flow		Condition	0.68 lpm		Status	pass
Sensor Component	Cell B Pressure		Condition	l		Status	pass
Sensor Component	Cell B Tmp.		Condition	l		Status	pass
Sensor Component	Line Loss		Condition	Not tested		Status	pass
Sensor Component	System Memo		Condition	l		Status	pass

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
UVL	.124-Sandy	Grenville-08/27/2015				
1	8/27/2015	DAS	Campbell	000423	CR3000	2517
2	8/27/2015	Ozone	ThermoElectron Inc	000746	49i A1NAA	1105347315
3	8/27/2015	Ozone Standard	ThermoElectron Inc	000362	49i A3NAA	0726124686
4	8/27/2015	Zero air pump	Werther International	06936	C 70/4	000829169

Data Compiled:

SiteVisitDate Site

10/1/2015 4:47:25 PM

08/27/2	2015 UVL124	Sandy Grenvill	e					
Line	Audited Parameter	DAS	Ch. #	Criteria +/-	Counts	QaResult	Units	Pass/Fail
1	Ozone Slope	P	0	1.1	4	1.00291	unitless	P
2	Ozone Intercept	р	0	5	4	0.21520	nnh	P

#### Ozone Intercept P 0 0.995 4 P 3 Ozone correlation 0.99998 unitless 4 Ozone % difference avg P 10 0.8 % 5 Ozone % difference max 10 1.3 % P

### **Field Performance Comments**

1 Parameter: Ozone SensorComponent: Cell B Flow CommentCode 99

**Technician** 

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

# Site Inventory by Site Visit

Site	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number	
HOX148-Sandy Grenville-08/28/2015							
1	8/28/2015	DAS	Campbell	000426	CR3000	2533	
2	8/28/2015	Ozone	ThermoElectron Inc	000614	49i A1NAA	1009241794	
3	8/28/2015	Ozone Standard	ThermoElectron Inc	000448	49i A3NAA	CM08200024	
4	8/28/2015	Zero air pump	Werther International	06938	C 70/4	000829164	

### **Ozone Data Form**

Mfg S	erial Number Ta	Site	Technic	cian	Site Visit Date	Parame	eter Owner ID
ThermoElectron Inc 1	009241794	HOX148	Sandy	Grenville	08/28/2015	Ozone	000614
Intercept 0.4	Note: Slope: Intercept CorrCoff	0.00000 0.00000 0.00000	Ser	g ial Number r ID	ThermoElectrol 0419606966 01112		rameter ozone er Desc. Ozone primary stan
DAS 1: A Avg % Diff: A Ma 1.1%	DAS 2: x % Di	6Dif A Max 9	% Di		0.993 6/25/20		
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	Si	te Si	te Unit	PctDifference
primary	1	0.00	0.41	1.0	11		
primary	2	29.99	30.58	30.	11		1.28%
primary	3 4	50.01 80.00	50.73 80.90	51. 81.	1.1		1.24%
primary	5	110.00	111.09	112	11		1.09%
Sensor Component			Condition G		FF.	Status	
Sensor Component		ın.	Condition C			Status	
			_				
Sensor Component			<b>Condition</b> N			Status	
Sensor Component	Offset		Condition -0	0.50		Status	pass
<b>Sensor Component</b>	Span		<b>Condition</b> 1	.022		Status	pass
Sensor Component	Zero Voltage		<b>Condition</b> N	I/A		Status	pass
Sensor Component	Fullscale Voltage		<b>Condition</b> N	Condition N/A			pass
Sensor Component	Cell A Freq.		Condition 9	ndition 94.9 kHz			pass
Sensor Component	Cell A Noise		Condition 0	.9 ppb		Status	pass
Sensor Component	Cell A Flow		Condition 0	.73 lpm		Status	pass
Sensor Component			Condition 7			Status	
Sensor Component			Condition 3			Status	
Sensor Component			Condition 1			Status	
Sensor Component			Condition 0			Status	
Sensor Component			Condition 0			Status	
Sensor Component			Condition	···		Status	
•							
Sensor Component			Condition			Status	
Sensor Component	-		<b>Condition</b> N	lot tested		Status	
<b>Sensor Component</b>	System Memo		Condition			Status	pass

# Site Inventory by Site Visit

Site V	Visit Date	Parameter	Mfg	Owner ID	Model Number	Serial Number
SAL1	33-Sandy	Grenville-09/08/2015				
1	9/8/2015	DAS	Campbell	000351	CR3000	2129
2	9/8/2015	Ozone	ThermoElectron Inc	000741	49i A1NAA	1105347316
3	9/8/2015	Ozone Standard	ThermoElectron Inc	000370	49i A3NAA	0726124689
4	9/8/2015	Zero air pump	Werther International	06935	C 70/4	000829172

### **Ozone Data Form**

Mfg Se	erial Number Ta	Site	Technic	ian	Site Visit I	ate Paramo	eter Owner ID
ThermoElectron Inc 1	105347316	SAL133	Sandy G	Grenville	09/08/2015	Ozone	000741
Intercept -0.1	99968 Slope: 7228 Intercept 9994 CorrCoff	0.00000 0.00000 0.00000	Seria	al Number ID	ThermoElec 041960696 01112		rameter ozone  er Desc. Ozone primary stan
DAS 1: A Avg % Diff: A Ma: 0.4%	DAS 2: x % Di	6Dif A Max 9		e Date			-0.40946 rCoff 1.00000
UseDescription	ConcGroup	Tfer Raw	Tfer Corr	S	ite	Site Unit	PctDifference
primary	1	0.00	0.41	-0	.08 pp	b	
primary	2	30.03	30.62		.50 pp		-0.39%
primary	3	50.34	51.06		.06 pp		0.00%
primary primary	5	79.97 109.68	80.87 110.77		.30 pp ).00 pp		0.53%
		109.08			7.00 рр		
Sensor Component			Condition Go			Status	pass
<b>Sensor Component</b>	Inlet Filter Conditio	n	Condition Cle	ean		Status	pass
<b>Sensor Component</b>	Battery Backup		<b>Condition</b> N/A	A		Status	pass
Sensor Component	Offset		<b>Condition</b> 0.1	10		Status	pass
Sensor Component	Span		Condition 1.0	)20		Status	pass
Sensor Component	Zero Voltage		Condition N/A	A		Status	pass
Sensor Component	Fullscale Voltage		Condition N/A	A		Status	pass
Sensor Component	Cell A Freq.		Condition 10	8.7 kHz		Status	pass
Sensor Component	Cell A Noise		Condition 0.9	) ppb		Status	pass
<b>Sensor Component</b>	Cell A Flow		Condition 0.6	61 lpm		Status	pass
Sensor Component	Cell A Pressure		Condition 72	3 mmHg		Status	pass
Sensor Component	Cell A Tmp.		Condition 35	.7 C		Status	pass
Sensor Component	Cell B Freq.		Condition 95	.2 kHz		Status	pass
Sensor Component	Cell B Noise		Condition 0.6	S ppb		Status	pass
Sensor Component	Cell B Flow		Condition 0.5	56 lpm		Status	pass
Sensor Component	Cell B Pressure		Condition			Status	pass
Sensor Component	Cell B Tmp.		Condition			Status	pass
Sensor Component	Line Loss		Condition No.	t tested		Status	pass
Sensor Component	System Memo		Condition			Status	pass