

2024 National Atmospheric Deposition Program Site Audit Program Annual Report

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**U.S. Environmental Protection Agency
Office of Atmospheric Protection
Clean Air and Power Division**

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Table of Contents

1.0	Introduction / Background	1-1
2.0	Status of Sites Audited	2-1
2.1	SITES AUDITED	2-1
2.2	GENERAL STATUS OF SITES AUDITED AND EQUIPMENT ENCOUNTERED	2-1
3.0	Specific Problems Encountered and Frequency	3-1
3.1	FINDINGS MOST LIKELY TO IMPACT DATA QUALITY.....	3-1
3.1.1	<i>Adherence to Protocol</i>	3-1
3.1.2	<i>Equipment Operation</i>	3-4
3.1.3	<i>Collector Compliance with Siting Criteria Rules and Guidelines</i>	3-7
3.1.4	<i>Rain Gauge Compliance with Siting Criteria Rules and Guidelines</i>	3-13
3.2	AUDIT RESULTS FOR SITES WITH MULTIPLE AUDIT VISITS.....	3-14
3.3	FINDINGS RELATED TO THE WIND SHIELD AT SITES AUDITED.....	3-16
4.0	Field Site Audit Results.....	4-1
4.1	ELECTRONIC RAIN GAUGE ACCURACY.....	4-1
4.2	ACM SENSOR HEATER TESTS.....	4-4
4.3	THIES SENSOR TESTS	4-7
4.4	N-CON MOTOR/LID-ARM SET SCREWS.....	4-7
5.0	Recommendations to the NADP Program Office	5-1
5.1	SITING CRITERIA	5-1
5.2	DOCUMENTATION AND TRAINING	5-2
5.3	EQUIPMENT AND PROCEDURES	5-2
5.3.1	<i>ACM Type Collector</i>	5-2
5.3.2	<i>ACM Collectors in General</i>	5-3
5.3.3	<i>N-CON MDN Heaters</i>	5-3
5.3.4	<i>N-CON NTN Bucket Collector</i>	5-3
5.3.5	<i>Electronic Rain Gauge</i>	5-4
5.3.6	<i>Data Download and Transmission</i>	5-4
6.0	Results of Field Laboratory and Procedure Assessment.....	6-1
6.1	SAMPLE WEIGHING	6-1
6.2	MDN SAMPLE HANDLING.....	6-2
7.0	Data Quality Information	7-1
7.1	QUALITY ASSURANCE PROJECT PLAN	7-1
7.2	FIELD TEAM TRAINING AND INTERNAL QA AUDITS	7-1
7.3	TRAINING CLASS ATTENDANCE AND WEBINAR PARTICIPATION	7-2
7.4	DUPLICATE DATA ENTRY	7-2
7.5	IDENTIFIABLE AREAS OF IMPROVEMENT TO THE AUDIT PROGRAM	7-2
7.5.1	<i>Site Audit Questionnaire</i>	7-3
7.6	AUDIT EQUIPMENT CERTIFICATION	7-3

Table of Tables

Table 2-1 Sites Audited in 2024 and Equipment Found	2-2
Table 2-2 Types and Numbers of Collectors Found at Sites Audited in 2024	2-6
Table 2-3 Types and Numbers of Rain Gauges Found at Sites Audited in 2024	2-6
Table 2-4 AMoN Sites Visited in 2024.....	2-7
Table 3-1 Protocol	3-3
Table 3-2 Operation and Status of Gauges	3-4
Table 3-3 Operation and Status of Collectors	3-5
Table 3-4 Action Performed During Audit	3-6
Table 3-5 Collector Siting Criteria Rules.....	3-9
Table 3-6 Collector Siting Criteria Guidelines	3-10
Table 3-7 Number of Sites Meeting Siting Criteria	3-12
Table 3-8 Rain Gauge Rules and Guidelines	3-13
Table 3-9 Comparison of Non-Compliant Assessments for Sites Audited More Than Once	3-15
Table 3-10 Status of Audited Sites Requiring Rain Gauge Shields.....	3-17
Table 6-1 Average Percent Difference for Site Scales.....	6-1

Table of Figures

Figure 1-1 Organization Chart of the NADP Site Audit Program	1-2
Figure 2-1 Site Audit Locations in 2024	2-1
Figure 3-1 NADP Siting Criteria.....	3-8
Figure 4-1 Electronic Rain Gauge Accuracy	4-1
Figure 4-2 Full Range Average Increase in Bucket Depth	4-3
Figure 4-3 Experimental OTT Gauge Test	4-4
Figure 4-4 Inactivated ACM Sensor Temperature	4-5
Figure 4-5 Activated ACM Sensor Temperature Increase and Elapsed Time	4-6
Figure 4-6 Number of Sensors per 10 Degree Increment	4-7
Figure 4-7 Percentage of N-CON and ACM-Type Collectors Requiring Lid Adjustments	4-9

List of Appendices

Appendix A	All (2025) Audit Assessments
Appendix B	List of Site Funding Sponsoring Agencies
Appendix C	Transfer Standard Instrument Certifications

List of Acronyms and Abbreviations

ACM	Aerochem Metrics
AIRMoN	Atmospheric Integrated Research Monitoring Network
AMNet	Atmospheric Mercury Network
AMoN	Ammonia Monitoring Network
CAL	Central Analytical Laboratory
CASTNET	Clean Air Status and Trends Network
DC	direct current
DVM	Digital multi-meters
EEMS	Environmental, Engineering & Measurement Services, Inc.
EPA	U.S. Environmental Protection Agency
FORF	Field Observation Report Form
FSSD	Field Site Audit Database
HAL	Hg (Mercury) Analytical Laboratory
MDN	Mercury Deposition Network
NADP	National Atmospheric Deposition Program
NAL	NADP Analytical Laboratory
NIST	National Institute of Standards and Technology
NOS	Network Operations Subcommittee
NTN	National Trends Network
PDA	Personal Digital Assistant
PO	Program Office
QA	Quality Assurance
QAAG	Quality Assurance Advisory Group
QAPP	Quality Assurance Project Plan
QC	Quality Control
QR	quality rating
RTD	Resistive Temperature Detector
SOP	Standard Operating Procedures
USGS	United States Geological Service
WAAS	Wide Area Augmentation System
WSLH	Wisconsin State Laboratory of Hygiene

Executive Summary

Under US EPA contract number GS-10F-075AA, Support for Conducting Systems and Performance Audits of CASTNET and NADP Monitoring Stations, Environmental, Engineering & Measurement Services, Inc. (EEMS) has executed an annual independent evaluation and assessment site audit program for the purpose of enhancing the quality assurance of the networks of the National Atmospheric Deposition Program (NADP). The NADP is a cooperative, multi-agency organization, which measures precipitation chemistry and estimates atmospheric wet deposition for various pollutant ions and atmospheric concentrations of ammonia and mercury. The NADP networks are: the National Trends Network (NTN), the Mercury Deposition Network (MDN), the Atmospheric Mercury Network (AMNet), and the Ammonia Monitoring Network (AMoN). Audits of AMoN sites are limited to siting criteria data collection when sites are collocated with an existing NADP wet-deposition network or a Clean Air Status and Trends Network (CASTNET) site as part of this contract. No information is collected for AMNet sites. EPA has provided long-standing support for the operation of NADP monitoring sites, and recurring funding for the chemical analysis and coordination for several wet deposition sites, in addition to the support for the audit and quality assurance programs of the NADP networks.

To understand the impact of emissions reductions on the environment, scientists and policy makers use data collected from long-term national monitoring networks such as the CASTNET and the NADP to quantify changes in pollutant deposition. These networks are complementary in many ways and provide information on a variety of indicators necessary for tracking temporal and spatial trends in regional air quality and atmospheric deposition.

Work performed under this contract includes the audit of sites associated with the NADP. Site audits include:

- Maintenance, evaluation, and quality assurance assessment of site instruments.
- Evaluation of site operator proficiency and technique.
- Reinforcement of NADP protocols and training.
- Photograph catalog to include all the equipment related to the site along with siting conditions and any findings that should be recorded.

Independent audits provide accountability for the program and help ensure sites are being operated consistently following the NADP Quality Assurance Project Plan (QAPP). The reported audit results are used to validate data provided by the individual sites.

The results of those audits performed during the reporting period are presented in this report.

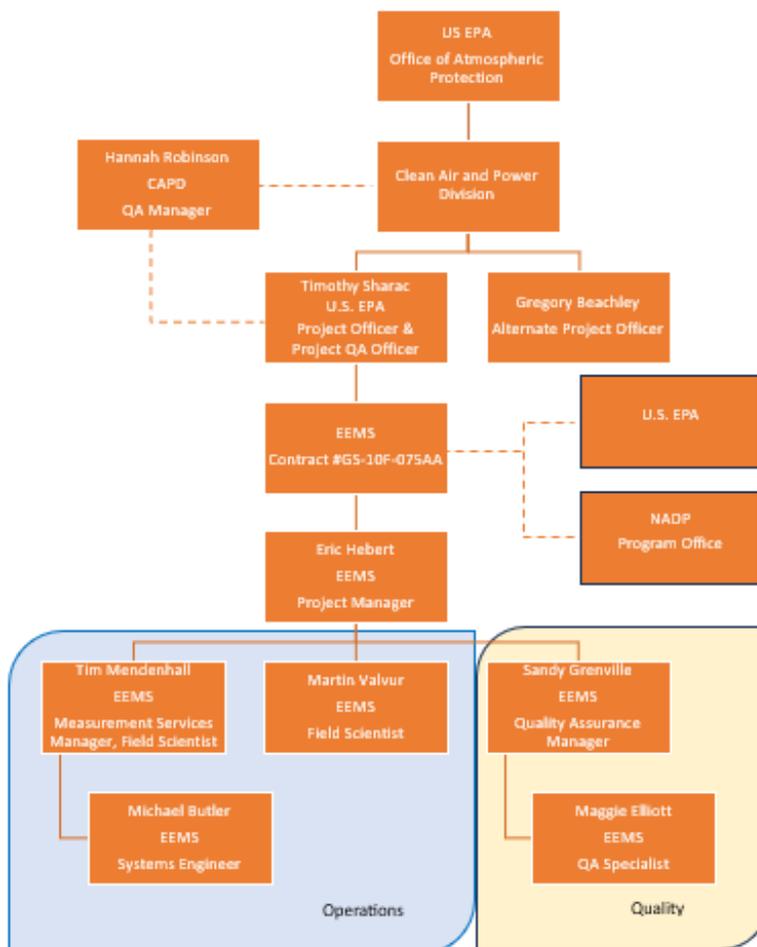
1.0 Introduction / Background

The NADP Site Audit Program is an independent and unbiased Quality Assurance (QA) program of systems and performance audits to assess and document the conditions and operations of the collective sites of the NADP. The conditions and operations pertain to the siting, sample collection and handling, equipment operation and maintenance, recordkeeping, reporting, and field laboratory procedures.

Ongoing QA programs are an essential part of, and add credence to, any long-term monitoring program. The external evaluations provided by this program verify, and support the established procedures and criteria of the NADP and its networks, and ensures they are maintained. The site audit program affords a higher level of confidence in the data reported by the NADP by verifying that each site operator is following the field Standard Operating Procedures (SOP). The audit program complements the QA/QC procedures followed by the Program Office (PO) and the NADP Analytical Laboratory (NAL).

Quality assurance and quality control (QC) activities for these networks improve overall data quality and ensure field measurements remain accurate and precise. Stringent QA and QC are essential for obtaining unbiased and representative atmospheric deposition measurements, and for maintaining the integrity of the sample during collection, handling, and analysis. These QA and QC activities strengthen the reliability and overall quality of the data that the agency uses for policy decisions and for measures of accountability. Figure 1-1 shows the 2024/2025 organization chart for the NADP Site Audit Program.

Figure 1-1 Organization Chart of the NADP Site Audit Program



Audits of the NADP sites are performed under contract GF-10F-075AA. Eric Hebert fulfills the role of Project Manager which includes contract issues, reports, and database administrator, Sandy Grenville, as the QA Manager, is responsible for reviewing all the data gathered in the field. Eric Hebert, as the Audit Team Leader, is responsible for the scheduling as well as directing the Audit Team Members in the performance of the site audits. Martin Valvur and Tim Mendenhall are the field technicians that perform the audits along with Eric Hebert. Both the Project Manager and Audit Team Leader maintain close contact with the NADP PO, and Network Operations Subcommittee (NOS) and participate in Quality Assurance Advisory Group (QAAG) meetings.

NADP site audits are accomplished by visiting approximately 25% of the total precipitation (or wet deposition) NADP sites each year. The operation of the site instrumentation is checked, maintenance is performed as needed, the site operator is observed while performing the routine site activities, technical and training support are provided, and the results are reported during each audit. More details of the activities are provided in the following key tasks.

- a. Scheduling sites to be audited. This task is coordinated with the EPA Project Officer, the NADP Program Office, network liaison, site operators, supervisors, and sponsors. Approximately 90 NADP sites (co-located are considered separate sites) are usually scheduled for audits during each contract period. The schedule is developed based on the elapsed time since the previous site audit (priority given to longest time since previous audit), inclusion of sites that have not been audited, and consideration for efficient and cost-effective travel.
- b. Preparing for field site audits. During audit preparation, available site data are compiled and reviewed. A current year site file is created. The necessary materials and standards for each site audit are checked and shipped if necessary. The operators of the sites scheduled for audits are contacted to finalize the audit arrangements.
- c. Performing site audits. During each site audit a comprehensive qualitative and quantitative assessment is performed. The site assessment consists of:
 - Verifying site contact information.
 - Verifying the NADP collector location using a WAAS GPS.
 - Qualitatively evaluating the site regarding the current NADP siting criteria that can be found at:
https://nadp.slh.wisc.edu/wp-content/uploads/2022/01/NADP-2010_Site_Selection_and_Installation_Manual_v1.pdf
 - Qualitatively assessing the site surroundings regarding obstructions which could impact data collection and quality. Documenting the site surroundings with at least 8 digital photographs taken in the cardinal directions of N, NE, E, SE, S, SW, W, and NW. The photographs should be taken within 5 -10 meters of the NADP collector with the direction referenced.
 - Qualitatively assessing the instruments and equipment with regard to function, maintenance, and condition. Documenting equipment malfunctions and signs of wear on the audit forms and with photographs as necessary.
 - Qualitatively evaluating the site personnel regarding the methods and procedures used for sample handling, calibrations, cleaning, maintenance, recordkeeping, reporting, and material storage. Confirming that the site operator has access to current versions of NADP manuals and documentation currently found on line.
 - Quantitatively assessing the accuracy of the NADP instrumentation responses to QA standards. These include standard weights for rain gauge tests and mass determinations.
 - Recording all data on standardized hard copy forms. Printing additional forms from the database, if required, in order to record all data. Comparing the observations to the pre-populated values from the previous audit, verifying and correcting any discrepancies, and confirming with the site personnel as needed.
- d. Performing minor repairs, maintenance, adjustments, and guidance. With the consent of the site personnel and the approval of the appropriate liaison:
 - Perform any necessary minor repair, maintenance, adjustment, and calibration to restore proper function in accordance with the Network Operations Subcommittee (NOS)

- procedures. These tasks can include items such as leveling and stabilizing the instrument, correcting the collector orientation, and correcting event recorder wiring.
- Record all actions on the appropriate audit form.
 - Provide technical assistance, instruction, and training regarding the maintenance of the site and equipment, sample collection and handling, and site operation procedures, consistent with the NADP Quality Assurance Project Plan (QAPP), and standard operating procedures (SOP) specific to the network.
- e. Transferring observations from audit forms to audit database. Entering the audit information obtained in the steps above into the audit database and reviewing for significant differences using the automated verification feature, and entry/exit rules.
- f. Conducting an exit interview with the site personnel. This task includes the preparation and delivery of an exit/spot report summarizing any equipment deficiencies or failures, audit results, activities, adjustments, and any aspects that are, or could potentially affect data quality. The report is provided to the site operator, supervisor, NADP QA Manager, and the EPA Project Officer. The report is then archived in perpetuity in the site file on the EEMS server.
- g. Providing a quarterly data set (final site audit report) in the form of tables. This final data set includes all the information gathered during the site audits conducted in the previous three months. The data for each site consists of:
- Audit results that have been subjected to duplicate entry and internal QA review.
 - Digital photographs.
 - Any additional pertinent supporting information.

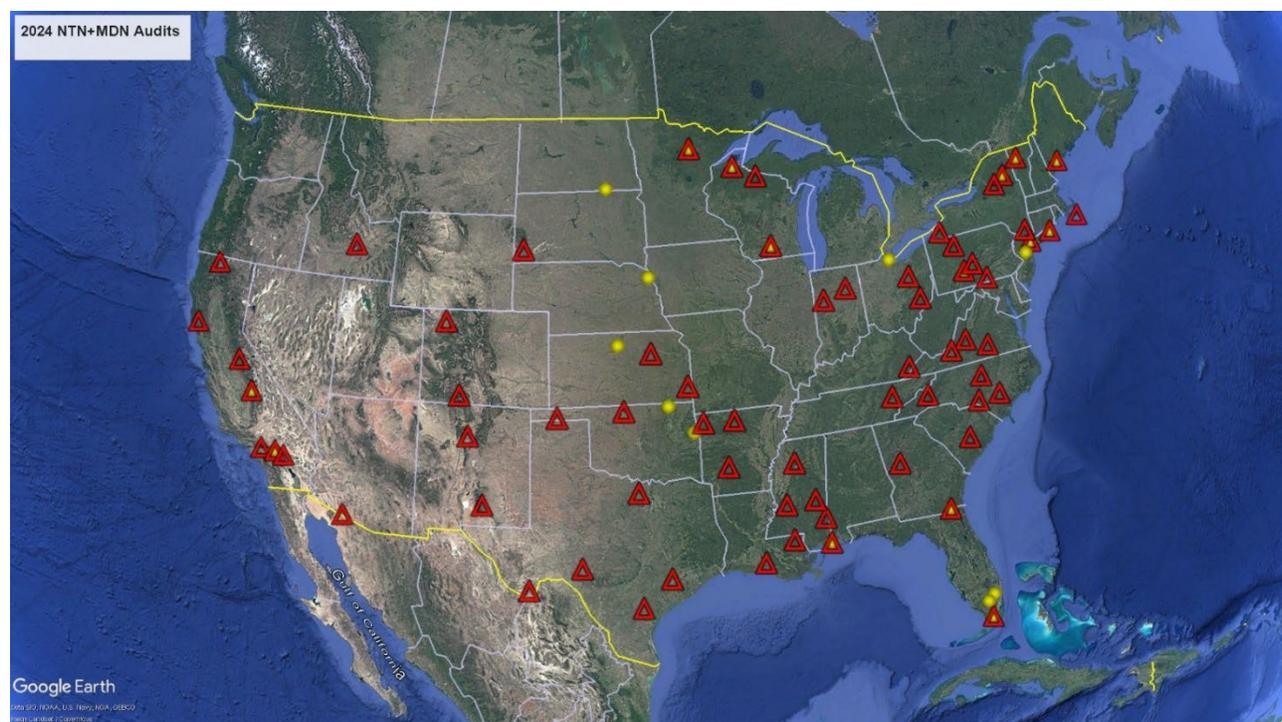
2.0 Status of Sites Audited

2.1 Sites Audited

This annual report includes site audits performed from January through December of 2024.

A total of 90 NADP collectors (this number includes co-located sites) were audited during the period covered by this report at 75 distinct locations. These include 23 MDN sites and 67 NTN sites. Figure 2-1 is a map of the sites visited during 2024. Table 2-1 is a list of the sites audited and includes the network, site name, audit date, and equipment.

Figure 2-1 Site Audit Locations in 2024



Legend: Red Triangle NTN site, Yellow Dot MDN Site

2.2 General Status of Sites Audited and Equipment Encountered

Overall, the sites audited during this reporting period were found in good condition and collecting data that meet NADP quality objectives. All of the 75 precipitation rain gauges audited (co-located sites usually use the same rain gauge) were electronic rain gauges, either ETI NOAH IV (40 rain gauges), or the OTT PLUVIO (35 rain gauges).

Of the 90 collectors audited, 46 sites operated N-CON collectors. The 44 remaining collectors were AeroChem Metrics (ACM) type, manufactured by either AeroChemetrics or Loda Electronics Company.

Seventeen locations visited operate backup rain gauges of various types. Only assessments related to siting criteria of the backup rain gauges are evaluated during audits, not the rain gauge accuracy.

The qualitative evaluation of the site personnel with respect to their ability to follow NADP protocols and operate the site instrumentation, found the overwhelming majority of site operators to be capable, knowledgeable, and committed to maintaining quality throughout the sample and data collection process. They demonstrated both enthusiasm and conscientiousness concerning the operation of their sites by their willingness to receive instruction from the audit team regarding improvements to their sample handling technique and equipment maintenance.

Specific audit findings that impact, or could impact data quality, are discussed in Section 3.0 . The list of sites audited during 2024 and the equipment found at the sites is shown in Table 2-1.

Table 2-1 Sites Audited in 2024 and Equipment Found

Site ID	Site Name	Network	Audit Date	Collector Type	Raingage Type	Backup Raingage Type
AR03	Caddo Valley	NTN	8/15/2024	N-CON	OTT P2	None
AR16	Buffalo National River-Buffalo Point	NTN	6/25/2024	ACM	ETI NOAH	None
AR27	Fayetteville	NTN	6/26/2024	N-CON	OTT P2	Tipping Bucket
AZ06	Organ Pipe Cactus National Monument	NTN	5/17/2024	ACM	ETI NOAH	Tipping Bucket
CA42	Tanbark Flat	NTN	5/21/2024	ACM	ETI NOAH	None
CA45	Hopland	NTN	4/22/2024	N-CON	OTT P2	Tipping Bucket
CA67	Joshua Tree National Park-Black Rock	NTN	5/20/2024	N-CON	ETI NOAH	Tipping Bucket
CA75	Sequoia National Park-Giant Forest	MDN	5/23/2024	ACM	ETI NOAH	None
		NTN		N-CON		
CA76	Montague	NTN	4/23/2024	N-CON	OTT P2	None
CA94	Converse Flats	MDN	5/22/2024	ACM	ETI NOAH	None
		NTN				
CA99	Yosemite National Park-Hodgdon Meadow	NTN	4/18/2024	N-CON	ETI NOAH	Tipping Bucket
CO15	Sand Spring	NTN	7/16/2024	ACM	ETI NOAH	Tipping Bucket
CO91	Wolf Creek Pass	NTN	7/31/2024	ACM	OTT P2	None

Site ID	Site Name	Network	Audit Date	Collector Type	Raingage Type	Backup Raingage Type
FL11	Everglades National Park-Research Center	MDN	7/29/2024	ACM	ETI NOAH	Tipping Bucket
		NTN				
FL95	Everglades - South Palm Beach County	MDN	7/30/2024	ACM	ETI NOAH	None
FL97	Everglades-Western Broward County	MDN	7/30/2024	ACM	ETI NOAH	Tipping Bucket
GA09	Okefenokee National Wildlife Refuge	MDN	2/20/2024	ACM	ETI NOAH	Stick
		NTN				
GA41	Georgia Station	NTN	7/25/2024	ACM	ETI NOAH	Tipping Bucket
GA99	Chula	NTN	5/22/2024	N-CON	OTT P2	Tipping Bucket
ID03	Craters of the Moon National Monument	NTN	5/1/2024	ACM	ETI NOAH	Tipping Bucket
IN20	Roush Lake	NTN	11/15/2024	N-CON	OTT P1	Other
IN41	Agronomy Center for Research and Extension	NTN	11/14/2024	ACM	OTT P1	Other
KS07	Farlington Fish Hatchery	NTN	6/27/2024	N-CON	OTT P2	Tipping Bucket
KS24	Glen Elder State Park	MDN	6/29/2024	N-CON	ETI NOAH	Tipping Bucket
KS31	Konza Prairie	NTN	6/28/2024	ACM	OTT P2	Stick
KY22	Lilley Cornett Woods	NTN	11/24/2024	N-CON	OTT P2	Stick
LA12	Iberia Research Station	NTN	8/9/2024	ACM	ETI NOAH	None
LA30	Southeast Research Station	NTN	3/22/2024	ACM	OTT P2	None
MA14	Nantucket	NTN	9/3/2024	N-CON	ETI NOAH	None
ME96	Casco Bay-Wolfe's Neck Farm	MDN	8/22/2024	ACM	ETI NOAH	Stick
		NTN				Tipping Bucket
MN16	Marcell Experimental Forest	MDN	9/6/2024	ACM	ETI NOAH	Stick
		NTN				
MS10	Clinton	NTN	7/22/2024	N-CON	OTT P2	None
MS12	Grand Bay NERR	MDN	2/23/2024	ACM	OTT P2	None
		NTN				
MS30	Coffeeville	NTN	7/23/2024	N-CON	OTT P2	None

Site ID	Site Name	Network	Audit Date	Collector Type	Raingage Type	Backup Raingage Type
MS98	Chunky	NTN	7/21/2024	ACM	OTT P2-L	None
NC30	Duke Forest	NTN	12/17/2024	N-CON	OTT P2	None
NC35	Clinton Crops Research Station	NTN	12/18/2024	ACM	OTT P2	None
NC36	Jordan Creek	NTN	12/16/2024	ACM	OTT P2	None
NC45	Mt. Mitchell	NTN	9/24/2024	ACM	ETI NOAH	Stick
NE25	Winnebago	MDN	7/11/2024	N-CON	ETI NOAH	Stick
NJ30	New Brunswick	MDN	7/25/2024	ACM	ETI NOAH	None
NM07	Bandelier National Monument	NTN	8/20/2024	ACM	ETI NOAH	None
NM08	Mayhill	NTN	8/19/2024	N-CON	OTT P2	None
NY06	Bronx	MDN	5/3/2024	N-CON	ETI NOAH	Other
		NTN				
NY10	Chautauqua	NTN	4/11/2024	N-CON	OTT P2	None
NY20	Huntington Wildlife	MDN	8/8/2024	ACM	OTT P2	None
		NTN		N-CON		
NY94	Nick's Lake	NTN	8/16/2024	N-CON	OTT P2	None
NY96	Cedar Beach-Southold	MDN	7/25/2024	N-CON	ETI NOAH	Tipping Bucket
		NTN				Other
NY99	West Point	NTN	7/26/2024	N-CON	ETI NOAH	None
OH49	Caldwell	NTN	8/20/2024	N-CON	OTT P2	ETI
OH52	South Bass Island	MDN	11/16/2024	ACM	OTT P2-L	ETI
OH71	Wooster	NTN	8/19/2024	N-CON	OTT P2	None
OK00	Salt Plains National Wildlife Refuge	NTN	12/4/2024	N-CON	OTT P2	OTT
OK29	Goodwell Research Station	NTN	12/2/2024	ACM	OTT P2	OTT
OK31	Copan	MDN	12/4/2024	N-CON	ETI NOAH	OTT
OK99	Stilwell	MDN	12/5/2024	N-CON	ETI NOAH	OTT
PA00	Arendtsville	NTN	8/30/2024	ACM	ETI NOAH	None

Site ID	Site Name	Network	Audit Date	Collector Type	Raingage Type	Backup Raingage Type
PA13	Allegheny Portage Railroad National Historic Site	MDN	4/10/2024	N-CON	OTT P2	None
		NTN				
PA29	Kane Experimental Forest	NTN	8/28/2024	ACM	ETI NOAH	None
PA42	Leading Ridge	NTN	8/29/2024	N-CON	OTT P2	None
SC06	Santee National Wildlife Refuge	NTN	9/23/2024	ACM	OTT P2	None
SD04	Wind Cave National Park-Elk Mountain	NTN	7/9/2024	ACM	OTT P2-L	Tipping Bucket
TN00	UT Forest Research Station	NTN	10/9/2024	ACM	ETI NOAH	None
TX03	Beeville	NTN	2/28/2025	N-CON	OTT P2	None
TX04	Big Bend National Park - K-Bar	NTN	8/7/2024	ACM	ETI NOAH	None
TX10	Attwater Prairie Chicken	NTN	2/27/2025	N-CON	OTT P2	Tipping Bucket
TX16	Sonora	NTN	8/8/2024	ACM	ETI NOAH	None
TX56	L.B.J. National Grasslands	NTN	8/16/2024	N-CON	OTT P2	Tipping Bucket
VA13	Blue Grass Trail	NTN	11/22/2024	ACM	ETI NOAH	Tipping Bucket
VA24	Prince Edward	NTN	7/2/2024	ACM	ETI NOAH	Tipping Bucket
VA99	Natural Bridge Station	NTN	11/21/2024	N-CON	ETI NOAH	None
VT99	Underhill	MDN	7/11/2024	N-CON	ETI NOAH	
		NTN				
WI06	UW Arboretum	MDN	8/30/2024	N-CON	ETI NOAH	Stick
		NTN				
WI36	Trout Lake	MDN	9/3/2024	N-CON	ETI NOAH	Tipping Bucket
		NTN				
WI92	Chequamegon	MDN	9/4/2024	N-CON	ETI NOAH	Tipping Bucket
		NTN				

Table 2-2 includes the types, and number of each type, of collector for each precipitation network audited in 2024.

Table 2-2 Types and Numbers of Collectors Found at Sites Audited in 2024

Type of Collector	Number of Collectors
MDN	
ACM	12
N-CON	11
NTN	
ACM	32
N-CON	35
Total Number of Collectors Audited	90

Each site location operates a primary rain gauge used to record precipitation amount in order to calculate wet deposition. Table 2-3 includes the type, and number of each type, of rain gauge audited at the 75 site locations in 2024.

Table 2-3 Types and Numbers of Rain Gauges Found at Sites Audited in 2024

Type of Rain Gauge	Number of Gauges
ETI-NOAH IV	40
PLUVIO OTT P1	2
PLUVIO OTT P2	29
PLUVIO OTT P2-L	4
Total Number of Rain Gauges Audited	75

If an AMoN site is operating at location visited for an audit of a different network (NTN, MDN, CASTNET) the AMoN site is also audited. A total of 46 AMoN sites were included in the site audits in 2024, and they are listed in Table 2-4 AMoN Sites Visited in 2024. The sampler mounting height is measured and photographs (directional and overview) are taken of the sampler during the AMoN site audit.

Table 2-4 AMoN Sites Visited in 2024

Site ID	Station Name	Date Visited
AL99	Sand Mountain Research & Extension Center	5/21/2024
AR03	Caddo Valley	8/15/2024
AZ98	Chiricahua	5/16/2024
CA67	Joshua Tree National Park-Black Rock	5/20/2024
FL11	Everglades National Park-Research Center	7/29/2024
GA41	Georgia Station	7/25/2024
IL11	Bondville	11/13/2024
IL37	Stockton	11/11/2024
KS31	Konza Prairie	6/28/2024
KY03	Mackville	5/5/2024
KY29	Crockett	11/23/2024
MD99	Beltsville	5/31/2024
MI95	Hoxeyville	7/7/2024
MN02	Red Lake	9/6/2024
MS30	Coffeeville	7/23/2024
NC06	Beaufort	12/19/2024
NC25	Coweeta	12/9/2024
NC26	Candor	12/8/2024
NC30	Duke Forest	12/17/2024
NC35	Clinton Crops Research Station	12/18/2024
NC98	Duke Forest Flux Tower	12/17/2024
NE97	Santee B	7/10/2024
NJ98	Washington Crossing CASTNET	11/19/2024
NY67	Ithaca	11/17/2024
NY91	Claryville	11/18/2024
NY94	Nick's Lake	8/16/2024

Site ID	Station Name	Date Visited
NY96	Cedar Beach-Southold	7/25/2024
OH09	Oxford	8/18/2024
OH99	Quaker City	8/20/2024
OK99	Stilwell	12/5/2024
PA00	Arendtsville	8/30/2024
PA29	Kane Experimental Forest	8/28/2024
PA56	M. K. Goddard	8/27/2024
PA97	Laurel Hill	8/31/2024
TN01	Great Smoky Mountains NP - Look Rock	10/8/2024
TN04	Speedwell	11/24/2024
TN07	Edgar Evins	10/20/2024
UT09	Canyonlands National Park-Island in the Sky	11/1/2024
VA13	Blue Grass Trail	11/22/2024
VA24	Prince Edward	7/2/2024
WI06	UW Arboretum	8/30/2024
WI35	Perkinstown	9/2/2024
WV18	Parsons	8/21/2024
WY06	Pinedale	6/25/2024
WY93	Basin - Big Horn	6/25/2024
WY94	Grand Tetons National Park	6/26/2024

3.0 Specific Problems Encountered and Frequency

Each site audit consists of evaluating the existing conditions relating to NADP siting criteria, performance and condition of the equipment (collector and primary rain gauge), status of supplies, site operator's performance, and other general information relating to the site. Once the evaluations are completed and recorded on a standardized questionnaire, the information is entered into a relational database by the field auditor and summary reports are created. The number of checks performed during an audit will vary depending on the network and the type of equipment present at the site. Database modifications including the addition/removal of specific assessments occurred during 2024. Therefore, some assessments were not evaluated at site audits performed in the first quarter, but were included during site audits later in the year.

3.1 Findings Most Likely to Impact Data Quality

The evaluations considered by EEMS to have the most impact on data quality can be categorized by four elements and are listed below in order of relative importance.

- Sample handling and adherence to protocol
- Equipment operation
- Compliance with siting criteria rules and guidelines
- Rain gauge performance.

Each category is discussed in more detail in the following sections.

3.1.1 Adherence to Protocol

This category includes the site operator tasks and site checks designed to protect sample integrity. Each assessment is listed below with a brief description and explanation (if not obvious) as to why the condition would impact data quality:

1. Can precipitation data quality be impacted by irrigation systems
2. Can sample be contaminated by irrigation systems
3. Does NADP require a rain gauge wind shield at this site
 - a. Wind shields installed for gauges at sites that receive a significant amount of precipitation in the form of snow increase the efficiency of the collection and measurement.
4. Does operator check sensor heater before/after collector opening
 - a. Proper operation of the collector sensor heater increases the efficiency of the sample collection and decreases the risk of contamination from dry deposition.
5. Does site conduct field chemistry using excess NADP sample
 - a. Sites are permitted to use the sample for purposes other than NADP analyses, however the sample must be obtained from the excess remaining in the bucket after the NADP sample bottle is filled. The assessment is meant to inform and enforce that requirement.
6. Gauge oriented correctly (ETI sensors N/S Ott2 Bubble Level S)
 - a. Proper orientation of the rain gauge decreases the risk of false precipitation measurements and increases the efficiency of the gauge.

7. Good weighing practices
 - a. This assessment evaluates the site operator's weighing technique used to quantify the volume of the NTN sample.
8. If rain gauge wind shield present, is it isolated from the gauge
 - a. Proper installation of a gauge wind shield decreases the risk of false precipitation being recorded by the gauge, and noise in the precipitation data due to vibration of the shield.
9. If rain gauge wind shield present, is it within 2 inches of orifice
 - a. Proper installation of the shield requires that the height of the extended shield vanes be within two inches of the gauge orifice height.
10. Is catch chamber level
11. Is DI water used supplied by NADP Analytical Lab
 - a. The deionized water used to clean the MDN collector should be supplied by the NAL, or another high-quality laboratory, and not off the grocery store shelf.
12. Is equipment stable
13. Is equipment within 1/2 bubble of level
14. Is quantity of liquid in dry side assessed and reported
 - a. This protocol is intended to quantify any precipitation that may have been missed during an event in order to better evaluate the collector efficiency.
15. Is sampler housing in good condition
 - a. This is an AMoN assessment that evaluates the sampler housing. The housing protects the sampler from precipitation and decreases the risk of contamination.
16. Is the dry side bucket clean
 - a. Maintaining a clean dry-side bucket decreases the risk of sample contamination from dry-side transfer to the lid liner, and then to the sample.
17. Is the dry side bucket, or bag, changed
 - a. Same reasoning as number 16.
18. Is the lid liner in good condition
 - a. Maintaining the lid liner in good condition helps to seal the sample bucket and decreases the risk of contamination from dry exposure. A torn or deteriorated lid liner can also cause sample contamination.
19. Training needed during visit
 - a. This assessment is intended to inform the end user if the operator was adhering to all the protocols included in the site assessment, and if procedures and protocols were reviewed and emphasized during the site audit.

Table 3-1 presents the tasks and checks performed and the number that were found to be compliant and non-compliant (separated by network) during the site audits. The percentage of the total noncompliant assessments for each is also included in the table.

Table 3-1 Protocol

ASSESSMENT	NO			YES			Total assessments	% non-compliant
	AMoN	MDN	NTN	AMoN	MDN	NTN		
1. Can precipitation data quality be impacted by irrigation systems		23	66			1	90	1.1%
2. Can sample be contaminated by irrigation systems	46	23	66			1	136	0.7%
3. Does NADP require a rain gauge wind shield at this site		11	36	12		31		---
4. Does operator check sensor heater before/after collector opening		2	5	9		27	43	16.3%
5. Does site conduct field chemistry using excess NADP sample			66			1		---
6. Gauge oriented correctly (ETI sensors N/S Ott2 Bubble Level S)		3	20	19		45	75	26.7%
7. Good weighing practices						65		0%
8. If rain gauge wind shield present, is it isolated from the gauge		4	5	5		17	31	16.1%
9. If rain gauge wind shield present, is it within 2 inches of orifice		6	15	3		7		---
10. Is catch chamber level		1	7	22		60	75	9.3%
11. Is DI water used supplied by NADP Analytical Lab		9		12			21	42.9%
12. Is equipment stable		1	1	45		133	180	1.1%
13. Is equipment within 1/2 bubble of level		2	17	44		117	180	10.6%
14. Is quantity of liquid in dry side assessed and reported		7	26	5		2	40	82.5%
15. Is sampler housing in good condition	3			42			45	7.1%
16. Is the dry side bucket clean			9	12		22	43	20.9%
17. Is the dry side bucket, or bag, changed			13	12		17	42	31.0%
18. Is the lid liner in good condition			8	20		48	76	10.5%
19. Training needed during visit		20	48	3		19	90	24.4%

Some additional discussion of the results of assessments are included here addressed by the assessment number:

Assessment 1. The site that was evaluated as susceptible to possible impact from irrigation systems is AR27, which is located adjacent to a turf farm on a college agriculture research facility.

Assessment 3. This assessment was not evaluated for compliance, only the number of sites that are deemed to require wind shields by the NADP PO are included in the table. Compliance with shield requirements is included in Table 3-10.

Assessment 5. Use of the sample for other purposes is optional for any NTN site as long as proper protocol is observed. The site that is using the sample in addition to the NADP analyses is ME96, and they are compliant with NADP protocol.

Assessments 6 and 8. The total number of assessments has been adjusted to account for co-located sites since a single gauge applies to both collectors.

Assessment 9. It appears as though the evaluation of this assessment was not properly applied during many of the site audits. The criterion refers to the height of the shield compared to the height of the collector, and it may have been misinterpreted as the distance from, and not height.

Assessment 11. If the source of the DI water used at the sites is of equal or better quality than that provided by the NAL, then sites are compliant. The list of sites that provide their own DI water is: CA75, FL11, FL95, FL97, ME96, OH52, KS24, PA13, and WI92.

Assessment 14. Many site operators are not estimating the quantity of water in the dry-side bucket if there is water present. Most operators were not aware that this should be done. It was suggested to the operators during audits that they should perform this function.

Assessment 19. Approximately 24% of the operators were provided with training regarding any protocols that were deemed as needing improvement during the audits.

3.1.2 Equipment Operation

This category includes assessments of the mechanical and electrical operation of the collectors and gauges. The status of some variables is also reported, although they may not have direct bearing on operation of the equipment. The results are reported separately for gauges and collectors. Table 3-2 presents the number of gauges that were found to be compliant and non-compliant during the site audit, and Table 3-3 presents similar information for the collectors tested. The percentage of the total non-compliant assessments for each is also included in the tables. Brief additional discussion of some of the assessments is provided following each table.

Table 3-2 Operation and Status of Gauges

ASSESSMENT	No	Yes	Total assessments	% non-compliant
1. Are catch chamber leveling screws secured with locking nuts	1	37	38	2.6%
2. Are round circuit board jumper settings correct (on-on-on-off)		38	38	0%
3. DAS battery in good condition	8	62	70	11.4%
4. DAS battery pass load test	8	62	70	11.4%
5. Does optical sensor respond to "blocking" of light beam	14	24	38	36.8%
6. Does optical sensor respond to mist of water	14	24	38	36.8%
7. Does rain gauge operate properly	6	64		---
8. Is catch chamber in good condition		75	75	0%
9. Is orifice round		75	75	0%
10. Order replacement DAS external battery	68	5	73	N/A
11. Are shell screws new style with large heads	30	8	38	78.9%

Assessment 7. Six rain gauges were flagged during the audits as “not operating properly”. Those gauges were KS24, LA12, NM07, OK31, WI06, and WI36. This assessment was applied incorrectly by field staff. The intent of the assessment is to evaluate the weighing function of the gauges. A gauge is functioning properly if it is weighing precipitation accurately. All six of these gauges were weighing properly. However, in some instances the field staff reported a gauge as not functioning properly if one of the components of the gauge was found to be not functioning. This was most prevalent with ETI optical sensors which is observed in the data with approximately 37% not functioning. Proper reporting of this assessment has been discussed with field and QA staff and has been resolved going forward.

Assessment 11. This assessment is a maintenance issue and does not impact operation of the gauge.

Table 3-3 Operation and Status of Collectors

ASSESSMENT	No	Yes	Total assessments	% non-compliant
1. ACM cooling filter in good condition	4	10	14	28.6%
2. Activated sensor temperature between 40 and 90 deg C	1	43	44	2.3%
3. Battery in good condition	2	5	7	28.6%
4. Battery passes load test	3	4	7	42.9%
5. Cooling fan in good condition	6	17	23	26.1%
6. Cooling fan thermostat in good condition	2	21	23	8.7%
7. Correct counter weight (based on whether snow roof present or not)		32	32	0%
8. Does lid seal properly	2	74	76	2.6%
9. Does operator have a test switch for Theis sensor	28	15	43	65.1%
10. Does sensor respond to one drop of water		44	44	0%
11. Does the lid cycle with 2 weights without tripping clutch	1	43	44	2.3%
12. Does the sensor open and close the collector		90	90	0%
13. Heated base in winter	4	8	12	33.3%
14. Heater in good condition		20	20	0%
15. Heater thermostat in good condition		20	20	0%
16. If backup battery is installed, does collector cycle under battery power	3	23	26	11.5%
17. Inactivated sensor temperature near ambient or above if required		44	44	0%
18. Is lid open event recorded by the data logger	7	58	65	10.8%
19. Is lid-arm swing properly adjusted for collector type	3	43	46	6.5%
20. Is the chimney heated	10	13	23	43.5%
21. Is the drive arm straight		44	44	0%
22. Min/max thermometer reading within +/- 5 deg C of std		23	23	0%
23. Order replacement equipment battery	5	1		N/A
24. Replacement ACM motor box requested	44			N/A

ASSESSMENT	No	Yes	Total assessments	% non-compliant
25. Replacement sensor requested	86	4	90	4.4%
26. Were the correct fuses found	4	64	68	5.9%
27. Arm boots in good condition	4	8	12	33.3%
28. Blue clip in good condition	1	22	23	4.3%
29. Chimney cap in good condition		12	12	0%
30. Graduated cylinder in good condition		13	13	0%
31. Is graduated cylinder on-site	10	13	23	43.5%
32. Is there caulk around chimney	2	10	12	16.7%
33. Lab jack in good condition	1	22	23	4.3%
34. Overflow bucket in good condition		16	16	0%

Nearly all collector assessments reported to have a high percentage of non-compliant evaluations are related to status or maintenance of the collector. The operational assessments related to the sensors, motor boxes, lid seals, and event recorder are all within reasonable acceptance limits.

Many of the assessments require action on the part of the Field Scientist if the evaluation is found to be out of acceptable criteria. These include both operational and maintenance assessments, for gauges and collectors. Table 3-4 includes the actions performed during audits to correct deficiencies.

Table 3-4 Action Performed During Audit

ACTION	No	Yes
1. DAS watchdog errors reset	24	4
2. Do the lid arms need adjustment and tightening	22	24
3. If catch chamber not level, was it leveled	4	3
4. If chimney caulk is not present or in poor condition, was it caulked	3	2
5. If equipment is not level, was it leveled	16	5
6. If equipment was is not stable, was it stabilized	2	
7. If gauge not oriented properly, was orientation corrected	1	20
8. If gauge orientation not corrected was insulation installed	1	
9. If lid open event not recorded was it corrected	2	6
10. If motor box spacer not present, was one installed	11	13
11. If not oriented properly, was orientation corrected	5	3
12. If shell screws original style were they replaced and anti-seize applied	3	26
13. Trouble ticket opened for any malfunctioning equipment	59	103
14. Was arm assembly lubricated	1	31
15. Was current program downloaded	20	55
16. Was DAS program updated	29	46
17. Was OS updated	32	43
18. Were all fuse problems corrected during audit		9
19. Were data downloaded from logger	27	48

Brief discussions regarding some of the actions are included below.

Assessment 2. As during past audits, approximately 50% of the N-CON collectors needed lid arm adjustments in order to improve lid seals.

Assessment 5 and 6. Leveling and stabilizing collectors and gauges is difficult to accomplish during audit visits. These activities often require tools and materials that are not part of the routine audit supplies. When these conditions are encountered during audits, it is reported and suggested to the operator for follow-up action.

Assessment 13. If during an audit an action was performed, the NADP PO is informed using an online tool developed by the Program Office. The tool allows information to be shared by Program Office personnel in order to assist with quality assurance and validation of NADP data. Likewise, if a condition exists at a site that needs further action by the Program Office, the condition is reported using the tool.

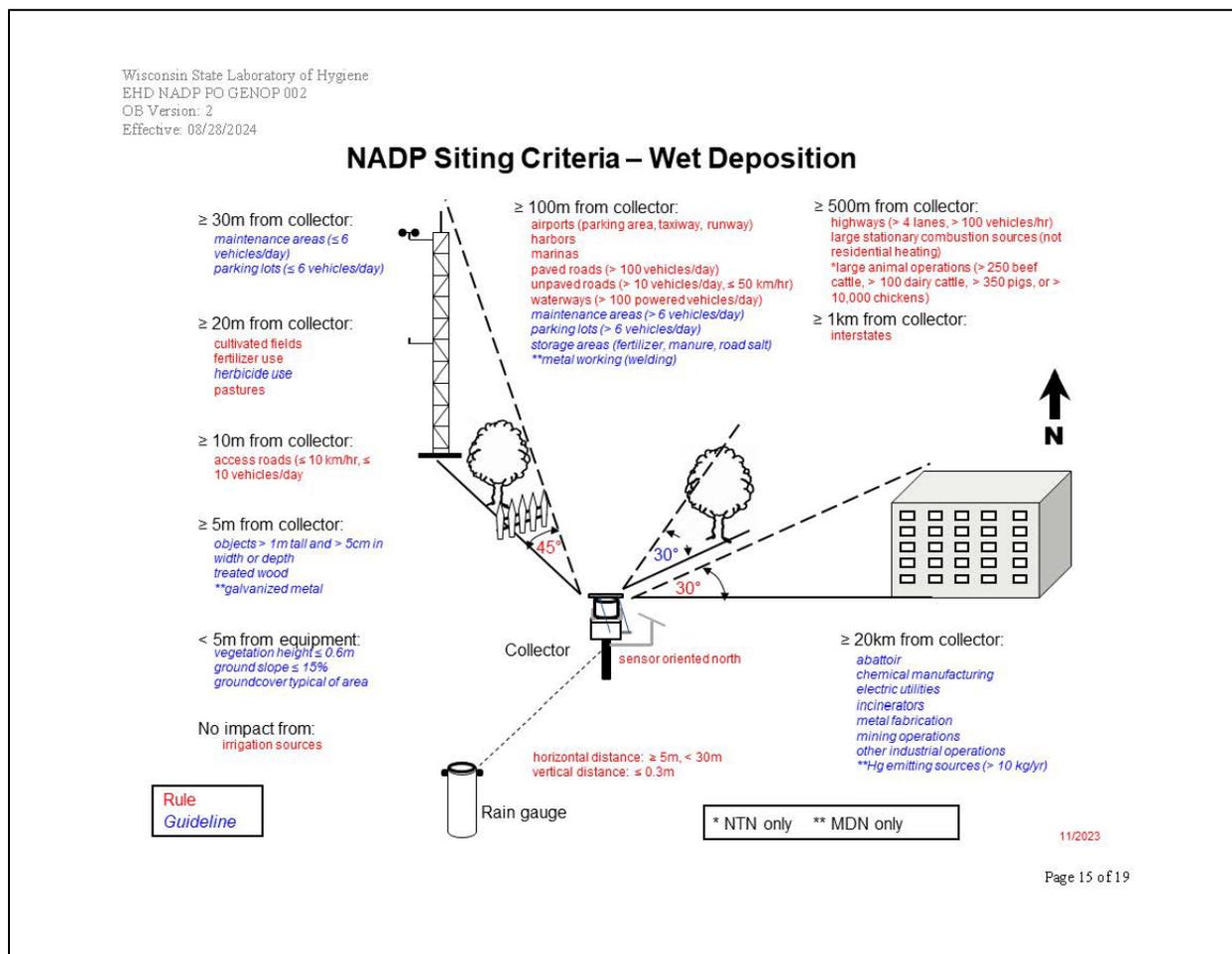
3.1.3 Collector Compliance with Siting Criteria Rules and Guidelines

EEMS considers siting criteria as a critical criteria that could directly impact data quality. There are long established NADP criteria for both siting rules and guidelines. In the past, EEMS made no distinctions between rules and guidelines for compliance, given that both rules and guidelines are part of the site audit questionnaire. This approach was used when preparing past Annual Reports with the consequence that very few sites met all siting criteria.

Additional modifications to the site audit questionnaire were implemented in 2024, to generate a more precise description of a site, allowing certain information to be less generic and more quantitative as well as qualitative when possible. Appendix A contains the complete list (2024 list) of the current audit assessments of siting criteria.

Beginning with this 2024 Annual Report, the following tables present the rules and guidelines separately and in reference to collector type and network specifically. Siting rules and guidelines were obtained from the NADP Site Selection and Installation Manual and presented in Figure 3-1.

Figure 3-1 NADP Siting Criteria



For this 2024 NADP Annual Report, EEMS is considering the fact that some of the siting criteria rules have been redesignated as guidelines since it was established their impact to data quality are not statistically significant. The following are considered guidelines going forward:

- Objects greater than one meter in height within a five-meter radius from the collector
- Vegetation greater than 0.6 meters in height within a five-meter radius from the collector
- Use of herbicides within a 20 meters radius from the collector

Table 3-5 presents the siting criteria rules, and the number of each type of collector that is compliant, and non-compliant with the rule. The percentage of the total non-compliant assessments for each type of collector is also included in the table.

Table 3-5 Collector Siting Criteria Rules

RULE			
ACM MDN Collector			
	Number Pass	Number Fail	% Non- Compliant
Access roads within a 10m radius of collector	8	4	33%
Airports, (taxiways, runways, parking) within 100m of collector	12		
Buildings within a 30-degree cone of the orifice	12		
Fertilizers used, or cultivated fields, within 20m of collector	12		
Highways (>4 lanes and >100 vehicles/hr) within 500m	12		
Interstate highways within 1 km of the site	10	2	17%
Large stationary combustion sources within 500m	12		
Marinas/waterways >100 vessels/day within 100m	12		
Objects within a 45-degree cone of the orifice	9	3	25%
Orifice of the collector ± 0.3 m of the rain gauge orifice (elevation)	12		
Paved roads (>100 vehicles/day) within 100m of collector	11		
Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector	11		
N-CON MDN Collector			
	Number Pass	Number Fail	% Non- Compliant
Access roads within a 10m radius of collector	11		
Airports, (taxiways, runways, parking) within 100m of collector	11		
Buildings within a 30-degree cone of the orifice	10	1	9%
Fertilizers used, or cultivated fields, within 20m of collector	11		
Highways (>4 lanes and >100 vehicles/hr) within 500m	10	1	9%
Interstate highways within 1 km of the site	11		
Large stationary combustion sources within 500m	11		
Marinas/waterways >100 vessels/day within 100m	11		
Objects within a 45-degree cone of the orifice	10	1	9%
Orifice of the collector ± 0.3 m of the rain gauge orifice (elevation)	11		
Paved roads (>100 vehicles/day) within 100m of collector	10	1	9%
Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector	11		
ACM NTN Collector			
	Number Pass	Number Fail	% Non- Compliant
(>250 beef cattle, >100 dairy cattle, >350 pigs, >10k chickens) within 500m	31	1	3%
Access roads within a 10m radius of collector	28	4	13%
Airports, (taxiways, runways, parking) within 100m of collector	32		
Buildings within a 30-degree cone of the orifice	32		
Fertilizers used, or cultivated fields, within 20m of collector	29	3	9%
Highways (>4 lanes and >100 vehicles/hr) within 500m	31	1	3%
Interstate highways within 1 km of the site	30	2	6%
Large stationary combustion sources within 500m	32		
Marinas/waterways >100 vessels/day within 100m	32		

ACM NTN Collector	Number Pass	Number Fail	% Non- Compliant
Objects within a 45-degree cone of the orifice	29	3	9%
Orifice of the collector $\pm 0.3\text{m}$ of the rain gauge orifice (elevation)	28	4	13%
Paved roads (>100 vehicles/day) within 100m of collector	31		
Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector	30	1	3%

N-CON NTN Collector	Number Pass	Number Fail	% Non- Compliant
(>250 beef cattle, >100 dairy cattle, >350 pigs, >10k chickens) within 500m	35		
Access roads within a 10m radius of collector	34	1	3%
Airports, (taxiways, runways, parking) within 100m of collector	35		
Buildings within a 30-degree cone of the orifice	34	1	3%
Fertilizers used, or cultivated fields, within 20m of collector	34	1	3%
Highways (>4 lanes and >100 vehicles/hr) within 500m	33	2	6%
Interstate highways within 1 km of the site	34		
Large stationary combustion sources within 500m	35		
Marinas/waterways >100 vessels/day within 100m	35		
Objects within a 45-degree cone of the orifice	25	10	29%
Orifice of the collector $\pm 0.3\text{m}$ of the rain gauge orifice (elevation)	32	3	9%
Paved roads (>100 vehicles/day) within 100m of collector	32	3	9%
Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector	33	2	6%

Table 3-6 presents the siting criteria guidelines, and the number of each type of collector that is compliant, and noncompliant with the guideline. The percentage of the total noncompliant assessments for each type of collector is also included in the table.

Table 3-6 Collector Siting Criteria Guidelines

GUIDELINE

ACM MDN Collector	Number Pass	Number Fail	% Non- Compliant
Galvanized metal within 5m radius of the MDN collector	9	3	25%
Herbicides used within 20m of collector	11	1	8%
Metalworking operations within 100m of collector	12		
Objects > 1 m tall and > 5 cm within 5m of orifice	8	4	33%
Orifice at least 1m above vegetation height within 5m radius	10	2	17%
Parking lots or maintenance areas (>6 cars/day) within 100m of collector	9	3	25%
Storage areas (fertilizers, road salt, manure) within 100m of collector	12		
Treated lumber within 5m radius of the collector	10	2	17%
Trees within a 30-degree cone of the orifice	6	6	50%

N-CON MDN Collector	Number Pass	Number Fail	% Non- Compliant
Galvanized metal within 5m radius of the MDN collector	4	7	58%
Herbicides used within 20m of collector	10	1	8%
Metalworking operations within 100m of collector	11		
Objects > 1 m tall and > 5 cm within 5m of orifice	7	4	36%
Orifice at least 1m above vegetation height within 5m radius	10	1	9%
Parking lots or maintenance areas (>6 cars/day) within 100m of collector	8	3	27%
Storage areas (fertilizers, road salt, manure) within 100m of collector	11		
Treated lumber within 5m radius of the collector	9	2	18%
Trees within a 30-degree cone of the orifice	7	4	36%

ACM NTN Collector	Number Pass	Number Fail	% Non- Compliant
Herbicides used within 20m of collector	26	6	19%
Objects > 1 m tall and > 5 cm within 5m of orifice	24	8	25%
Orifice at least 1m above vegetation height within 5m radius	26	6	19%
Parking lots or maintenance areas (>6 cars/day) within 100m of collector	29	3	9%
Storage areas (fertilizers, road salt, manure) within 100m of collector	31	1	3%
Treated lumber within 5m radius of the collector	29	3	9%
Trees within a 30-degree cone of the orifice	25	7	22%

N-CON NTN Collector	Number Pass	Number Fail	% Non- Compliant
Herbicides used within 20m of collector	30	5	14%
Objects > 1 m tall and > 5 cm within 5m of orifice	28	7	20%
Orifice at least 1m above vegetation height within 5m radius	29	6	17%
Parking lots or maintenance areas (>6 cars/day) within 100m of collector	32	3	9%
Storage areas (fertilizers, road salt, manure) within 100m of collector	34	1	3%
Treated lumber within 5m radius of the collector	28	7	20%
Trees within a 30-degree cone of the orifice	18	17	49%

Table 3-7 includes the number of collectors that meet all of the individual siting criteria for both rules and guidelines. The percentage of non-compliant collectors is also included in the table.

Table 3-7 Number of Sites Meeting Siting Criteria

RULE

	Collectors Pass	Collectors Fail	% Non- Compliant
Access roads within a 10m radius of collector	81	9	10.0%
Airports, (taxiways, runways, parking) within 100m of collector	90	0	0.0%
Buildings within a 30-degree cone of the orifice	88	2	2.2%
Fertilizers used, or cultivated fields, within 20m of collector	86	4	4.4%
Highways (>4 lanes and >100 vehicles/hr) within 500m	86	4	4.4%
Interstate highways within 1 km of the site	85	4	4.5%
Large stationary combustion sources within 500m	90	0	0.0%
Marinas/waterways >100 vessels/day within 100m	90	0	0.0%
Objects within a 45-degree cone of the orifice	73	17	18.9%
Orifice of the collector \pm 0.3m of the rain gauge orifice (elevation)	83	7	7.8%
Paved roads (>100 vehicles/day) within 100m of collector	84	4	4.5%
Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector	85	3	3.4%
(>250 beef cattle, >100 dairy cattle, >350 pigs, >10k chickens) within 500m (NTN only)	66	1	1.5%

GUIDELINE

	Collectors Pass	Collectors Fail	% Non- Compliant
Galvanized metal within 5m radius of the MDN collector	10	13	56.5%
Herbicides used within 20m of collector	77	13	14.4%
Metalworking operations within 100m of collector (MDN only)	23	0	0.0%
Objects > 1 m tall and > 5 cm within 5m of orifice	67	23	25.6%
Orifice at least 1m above vegetation height within 5m radius	75	15	16.7%
Parking lots or maintenance areas (>6 cars/day) within 100m of collector	78	12	13.3%
Storage areas (fertilizers, road salt, manure) within 100m of collector	88	2	2.2%
Treated lumber within 5m radius of the collector	76	14	15.6%
Trees within a 30-degree cone of the orifice	56	34	37.8%

As can be observed in Table 3-1, at least 90% of the sites meet all siting criteria rules with the exception of objects within 45 degrees of the collector opening, with that criterion being approximately 81% compliant.

Compliance with siting guidelines is not as good with most non-compliant observations related to the 30-degree guideline and galvanized metal within 5 meters of MDN collectors.

3.1.4 Rain Gauge Compliance with Siting Criteria Rules and Guidelines

Table 3-5 presents the siting criteria rules and guidelines, and the number of gauges that are compliant, and non-compliant with the criteria. The percentage of the total non-compliant assessments for each criterion is also included in the table.

Table 3-8 Rain Gauge Rules and Guidelines

RULE			
	Number Pass	Number Fail	% Non- Compliant
Buildings within a 30-degree cone of the orifice	72	3	4.2%
Objects within a 45-degree cone of the orifice	57	18	31.6%

GUIDELINE			
	Number Pass	Number Fail	% Non- Compliant
Objects > 1 m tall and > 5 cm within 5m of orifice	57	18	31.6%
Orifice at least 1m above vegetation height within 5m radius	60	15	25.0%
Trees within a 30-degree cone of the orifice	47	28	59.6%

Similar to the collector data, the rain gauge data indicate that most of the non-compliant findings are related to the ‘45-degree rule’, ‘guidelines for trees within 30-degrees’, and ‘objects within 5m of the orifice’.

Non-compliance with the ‘Orifice at least 1m above vegetation height within 5m radius’ guideline was slightly elevated at 25.0%. This assessment is expected to vary depending on the season in which the audit was conducted. Early and late in the year the vegetation will be shorter, in the middle of the growing season it will be taller. Therefore, this assessment is not very useful for trend evaluation. It is also worthwhile to consider some work presented in the Open-File Report 2011-1170 by the USGS titled *Four Studies on Effects of Environmental Factors on the Quality of National Atmospheric Deposition Program Measurements* where it is shown that taller vegetation near the collector and rain gauge may increase collection efficiency. Vegetation height was considered in detail during the re-evaluation of siting criteria rules during the 2022 fall meeting. Changes to the siting criteria have been incorporated for assessments and reporting.

EEMS cannot report with any level of confidence that siting or operation for the entire NADP has improved or declined during the period of site audit performance. However, summarizing this information allows any elevated number of observed assessment failures to be quickly and easily identified as can be seen in the preceding tables.

Nine sites audited in 2024 have experienced some changes since the last visit (i.e., to the question “Any significant changes to local site conditions within 500 meters of the collector since previous audit”, the response was “YES”): Additional comments regarding those changes to siting are included below:

AR03 – NCON NTN: The site was moved approximately 50 m to the east into the CASTNET site enclosure. Trees to the south, west, and north violate the 30-degree guideline for trees.

CO91 – ACM NTN: The location of the site has been moved since the last site visit in 09/2022 due to the ski area installing a new chair lift. The solar panels (4) are within 5m of the collector. Additionally, a winch to raise equipment from the ground to the platform is within 2m of the collector opening. When the site was moved the trees violating the 30-degree rule for trees were cut down.

IN41 – ACM NTN: The university research facility has undergone expansion including the construction of new buildings, parking lots, and increased traffic.

NE25 – NCON MDN: Approximately 160 meters SSE of the site a building was taken down. To the east about 60 meters, an open lot was re-graded and hydro-seeded (January 2024). To the west approximately 30 meters tree debris and old planter boxes were cleaned up. The electrical outlets are mounted on a post greater than 1 meter tall and greater than 5 cm in diameter within 1 meter of the collector, however the post is approximately 60 cm shorter than the collector.

NJ30 – ACM MDN: Trees were cut down and mulched since previous audit.

NY06 – NCON NTN/MDN: Construction on roof started 3 months ago and is unfinished at time of audit.

OH71 – NCON NTN: The collector is leaning badly due to frost heave. Trees within 5 meters have grown and are violating 45-degree and vegetation rules within 5 meters. If the NWS equipment is no longer in operation, moving the NADP equipment to that location would meet criteria and the mounting pipe could be properly installed and leveled.

OK00 – NCON NTN: Site was moved since last audit.

VA24 – ACM NTN: The pine forest surrounding the site has grown significantly and is now violating the 45-degree rule for all equipment. The forest service has harvested the pine trees in years past, and it is suggested that the site operator contact the forest service to see if the trees can be harvested again soon.

3.2 Audit Results for Sites with Multiple Audit Visits

Of the 90 collectors audited in 2024, eighty-six had been previously visited by EEMS. Most of the previous audits were conducted in 2020 and 2021. Four collectors were audited in 2024 for the first time. The newly

visited sites were MS98-NTN, NC30-NTN, WI92-MDN and NTN. Comparisons of the percentage of non-compliant results for successive audits are presented in Table 3-5.

Due to the expanded and modified site audit questionnaire, some assessments recorded in previous years cannot be compared to the audits performed in 2024. Likewise, assessments implemented in 2024 cannot be compared to previous years since that data were not recorded. Table 3-9 includes current data that is still comparable to data recorded in previous years.

Table 3-9 Comparison of Non-Compliant Assessments for Sites Audited More Than Once

Siting Rules and Performance Checks	% Non-compliant During 2024	% Non-compliant During Previous Audit Report
Is the orifice of the collector +/- .3 m of rain gauge (elevation)	7.8%	6.6%
45-degree rule met (collector)	18.9%	21.1%
30-degree rule for buildings met (collector)	2.2%	4.0%
No fertilizers used within 20 m radius	4.4%	5.3%
Animal operations meet NADP siting criteria (NTN)	1.5%	1.3%
Collector Assessments		
Dry side bucket is clean	20.9%	17.0%
Does lid seal properly	2.6%	1.4%
Lid liner in good condition	10.5%	1.4%
Fan in good condition (MDN)	26.1%	33.3%
Cooling fan thermostat in good condition (MDN)	8.7%	0.0%
N-CON Arms and motor box needing adjustment	52.2%	44.7%
Electronic Rain gauge Assessments		
Does datalogger receive event signals form all collectors (electronic gage)	10.8%	16.8%
Does optical sensor respond to "blocking" of light beam (ETI)	36.8%	22.4%
Does optical sensor respond to mist of water (ETI)	36.8%	16.6%

As can be seen from the data presented in Table 3-9, there does not seem to be a significant change or trend to compliance with most assessments over time. There was a slight increase of non-compliance with some maintenance and operational issues, notably:

- N-CON collector arm adjustments
- MDN cooling fan thermostat operation
- ETI optical sensor malfunctions
- Collector lid liner condition

When possible, the operation and maintenance items were addressed during the audit visit as described in Table 3-4. Most of the increases to non-compliant assessments may indicate a decline in site operator maintenance of equipment and/or compliance with protocol. New site operators may not have received official training until the site audit. The increase in malfunctioning ETI optical sensors may indicate that the age of many gauges has reached a point that they require extensive maintenance.

Comparing data from one audit to another indicates that the number of compliant parameters increases at some sites and decreases at other sites. Therefore, it is difficult to determine whether there has been an overall improvement to the network operation. A better assessment of network operation might be tracking the increase or decrease in sample quality codes as assigned by the laboratory responsible for evaluating and analyzing the samples. It can be assumed that as all site audit findings are addressed (siting criteria, equipment maintenance, operator procedures, etc.) there will be a quantifiable effect on sample quality.

Furthermore, not all of these performance checks have the same impact on the quality of the sample. Allowing vegetation to grow may impact sample quality less than not maintaining a clean dry-side bucket. Cleanliness and handling of the sample media and dry side materials should be an area of focus and emphasis during operator training. Overall sample lab cleanliness and operator processing procedures most likely have the greatest influence on sample quality, rather than changes in the surrounding area, including industrial or agricultural sources, obstructions, or vegetation. However, since there are items found out of compliance related to siting criteria, some improvements in data quality may be realized by improvements to siting.

3.3 Findings Related to the Wind Shield at Sites Audited

Data provided by the NADP PO indicate that rain gauges located at elevations greater than 1000 meters are encouraged to have a windshield installed, as well as at sites where more than 20 percent of the annual precipitation is frozen. Table 3-610 presents the assessments of wind shields at the sites audited during the reporting period, and whether a shield was present at the time of the previous audit. Thirty-two of the 75 rain gauges audited during the period covered by this report were identified as potentially required to have a wind shield.

Table 3-10 Status of Audited Sites Requiring Rain Gauge Shields

Site ID	Network	Condition in 2024	Previous Audit	Site ID	Network	Condition in 2024	Previous Audit
AR16	NTN	Installed	Installed	NY96	NTN/MDN	Not Present	Not Present
AR27	NTN	Not Present	Not Present	NY99	NTN	Installed	Installed
CA75	NTN/MDN	Installed	Installed	OH49	NTN	Not Present	Not Present
CA76	NTN	Installed	Installed	OH71	NTN	Installed	Installed
CA99	NTN	Installed	Installed	OK29	NTN	Installed	Installed
CO15	NTN	Installed	Installed	PA00	NTN	Not Present	Not Present
CO91	NTN	Installed	Installed	PA13	NTN/MDN	Not Present	Not Present
ME96	NTN/MDN	Installed	Installed	PA29	NTN	Installed	Installed
MN16	NTN/MDN	Installed	Installed	PA42	NTN	Not Present	Not Present
NC45	NTN	Not Present	Not Present	SD04	NTN	Not Present	Not Present
NJ30	MDN	Not Present	Not Present	TX04	NTN	Installed	Installed
NM08	NTN	Installed	Installed	VA13	NTN	Installed	Installed
NY06	NTN/MDN	Installed	Installed	VT99	NTN/MDN	Installed	Installed
NY10	NTN	Not Present	Not Present	WI06	NTN/MDN	Installed	Installed
NY20	NTN/MDN	Installed	Installed	WI36	NTN/MDN	Installed	Installed
NY94	NTN	Installed	Installed	WI92	NTN	Installed	Installed

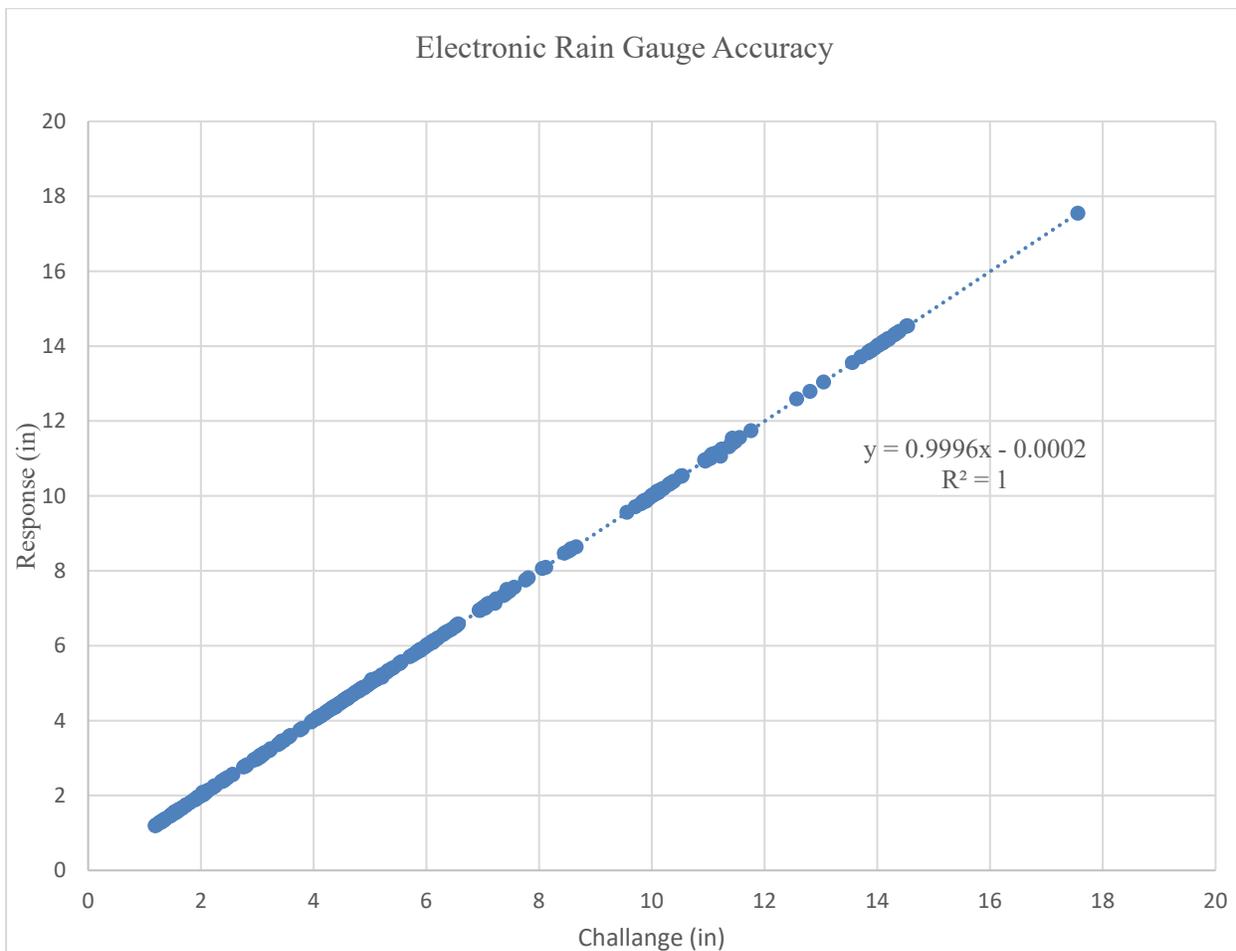
4.0 Field Site Audit Results

This section summarizes the quantifiable audit data relating to rain gauge accuracy tests and ACM collector sensor heater performance. Seventy-five (75) rain gauges were audited during this reporting period, all of which were electronic rain gauges. All were found to be operating within NADP acceptance limits. Accuracy details are provided in the following subsections.

4.1 Electronic Rain Gauge Accuracy

The results of the accuracy tests for the 75 gauges are presented in Figure 4-1. As demonstrated by the graph, the rain gauges report the weight of the standards added very accurately for the entire span. Other issues encountered are discussed in Section 5.0.

Figure 4-1 Electronic Rain Gauge Accuracy

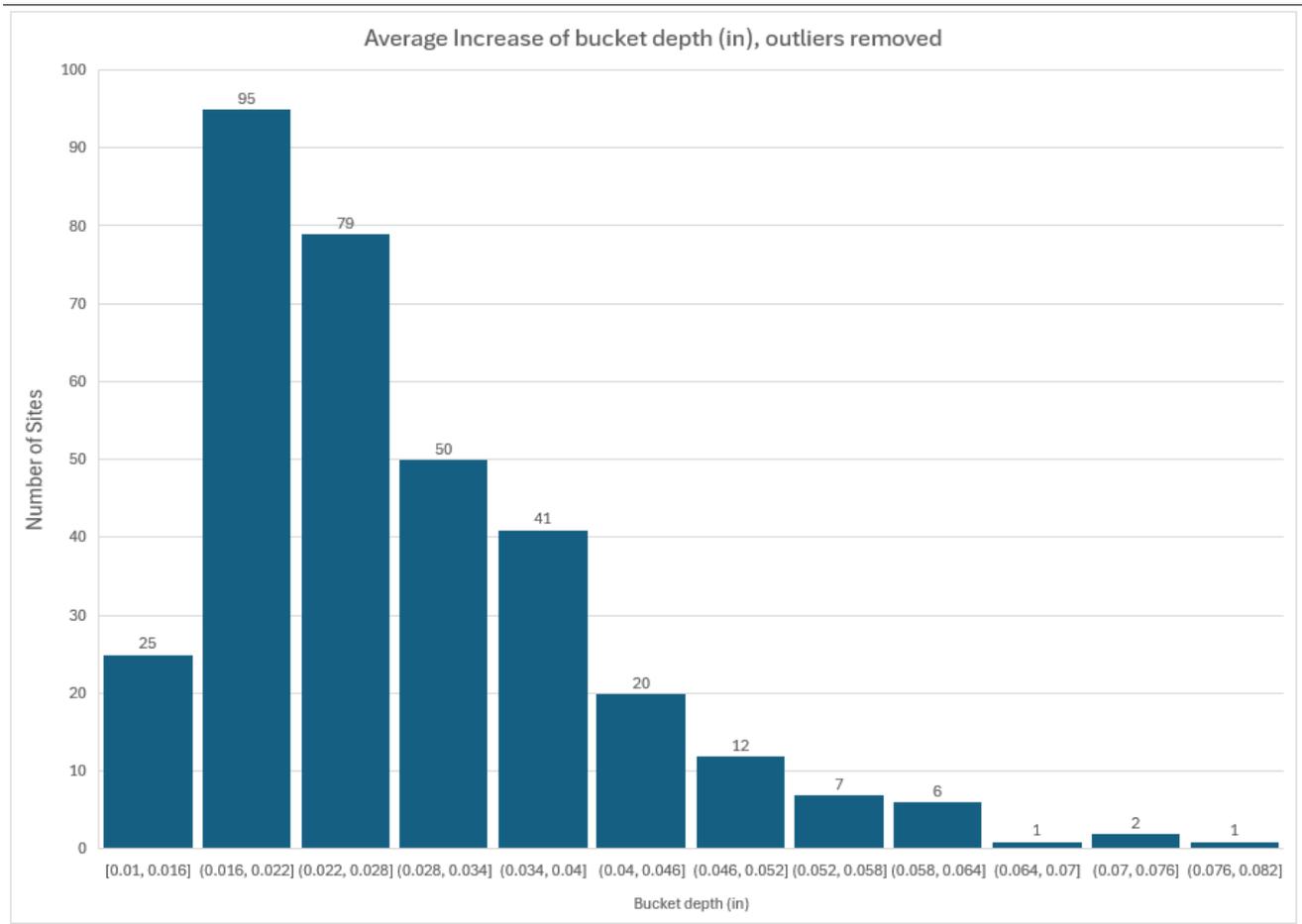


As discussed, and presented during the NADP Spring Meeting, EEMS is developing a rain gauge challenge that more closely represents the “real-world” operation of the rain gauge. The intent of the new test is to better determine the accuracy of rain gauge data during normal precipitation events. Current challenges to the gauges begin at 0.25 inches and increase to 10 inches.

Figure 4-2 presents data provided by the Program Office that include a full range report of all rain gauge increase data completed for the years 2018-2024. This data is aggregated data including daily, monthly, and annual increase data for each site in the NADP database. As such all calculations are based off of the means of 15-minute data typically produced by OTT Pluvio precipitation devices. In this test we looked at the skewed normal distribution in Figure 4-1 and found that the median of this data is 0.026 inches, with a standard deviation of 0.015 inches.

The current smallest weight challenge is more than twice the amount of the maximum weight recorded during routine 15-minute resolution events. Additionally, it is very rare that a site would receive 10 inches of precipitation in a single week. The new challenges are expected to cover at least three tests in the ranges presented in Figure 4-2, and 80% of the gauge full range.

Figure 4-2 Full Range Average Increase in Bucket Depth

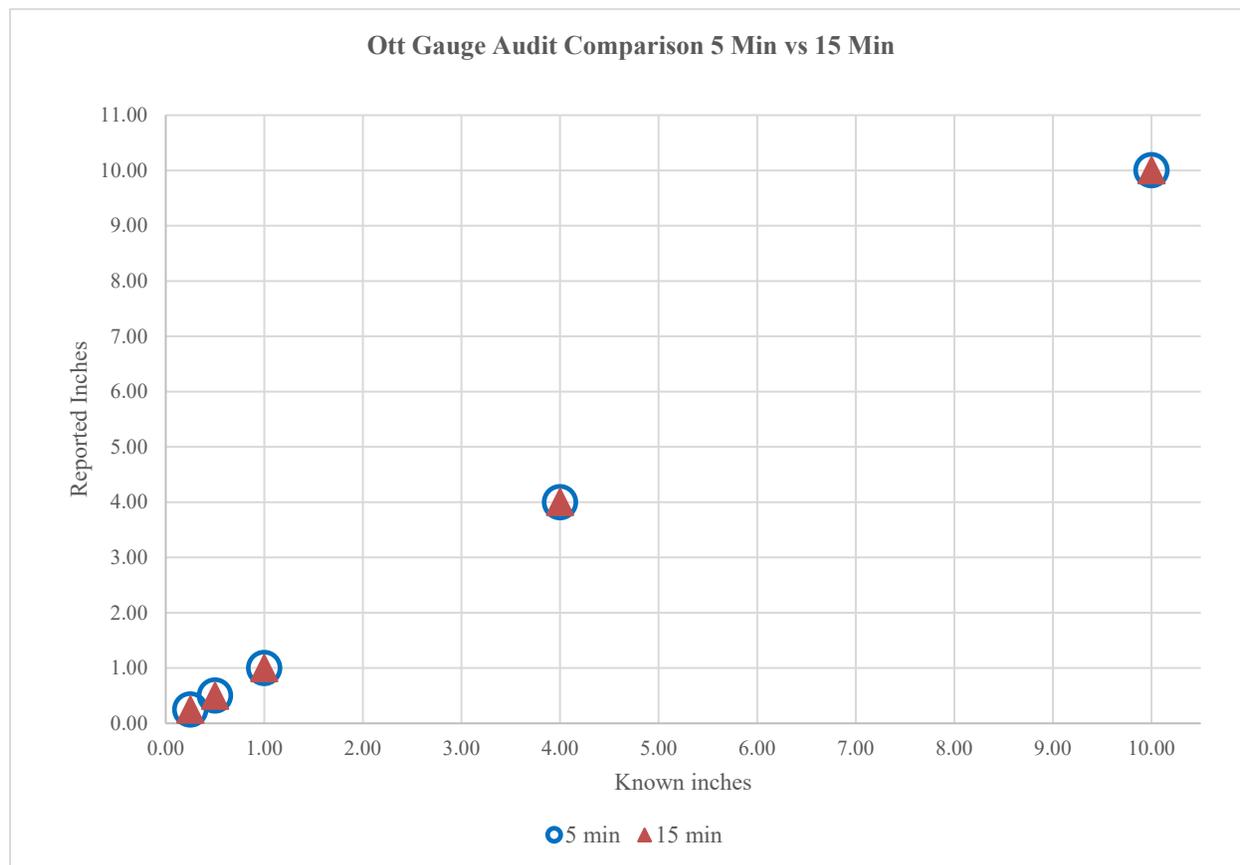


Some additional testing using the proposed new challenge weights was performed in order to determine if the OTT gauge stability time could also be decreased. The NADP precipitation data resolution is 15-minutes. ETI gauges produce a real-time value that can be used for audit purposes, however the current data logger program employed for OTT gauges require waiting the entire 15 minutes before a value can be viewed for audit purposes. EEMS has performed some testing to determine if the response of OTT gauges at intervals less than reported 15-minute interval can be used for audit purposes.

We found that based on the distribution shown in Figure 4-1 that audit weights that would most accurately imitate “real-world” challenges are 10.2, 25.5, 51.0, 102, 1012, and 3045 (grams); which corresponds to 0.01, 0.025, 0.05, 0.1, 1.0, and 3.0 inches of increase respectively.

Figure 4-2 indicates the response of these experimental variables to be accurate both when audit weights are placed at the beginning of the 15-minute period (waiting for the entire 15 minutes to view the value), and when weights are placed at 10 minutes remaining during a 15-minute period (5 minutes until data reading).

Figure 4-3 Experimental OTT Gauge Test



The results of these tests indicate that both the weight used and the time of the challenge can be reduced for audit tests of the OTT gauges. EEMS is preparing to perform additional tests and hopefully will be implementing new procedures for audits in 2026.

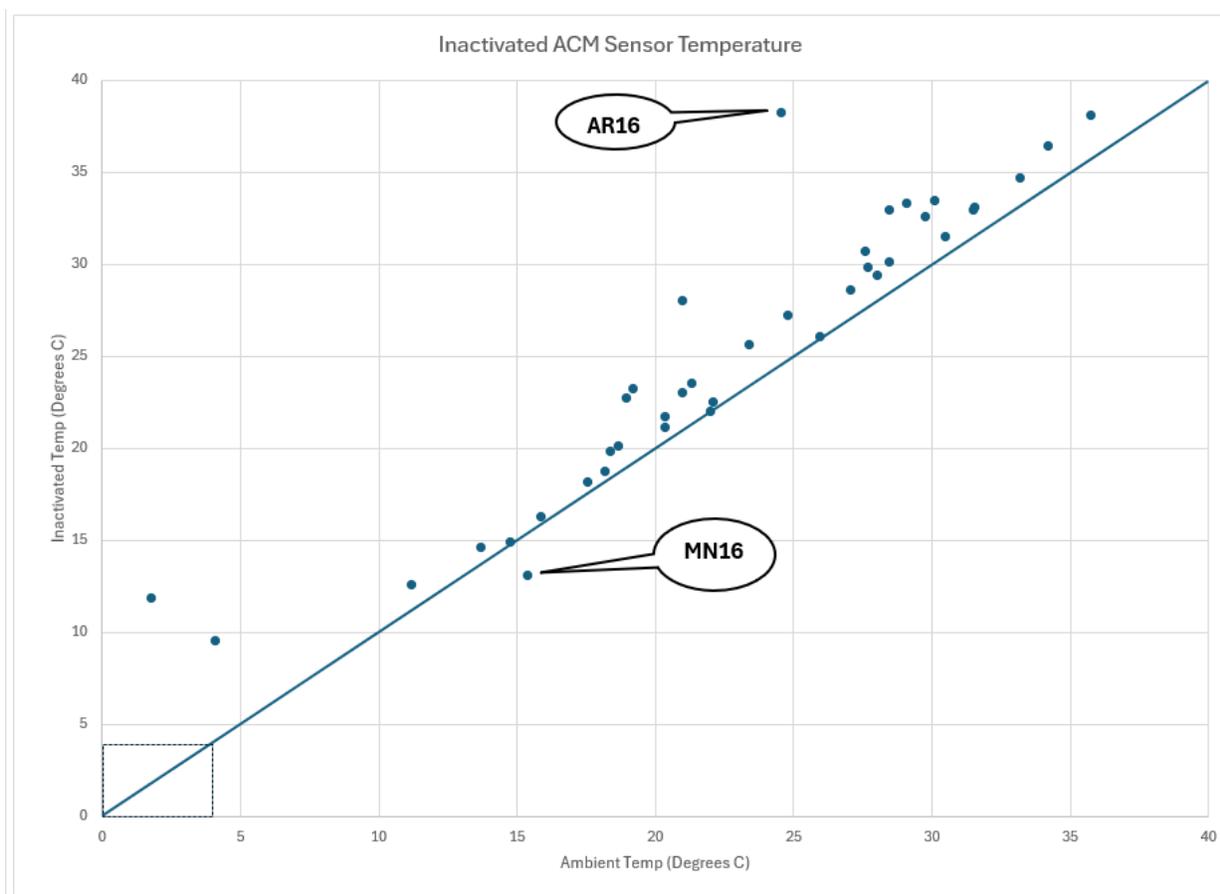
4.2 ACM Sensor Heater Tests

The ACM type collectors used throughout the networks of the NADP utilize a contact grid sensor. Two types of sensors are operated, one with 7 grids, and one with 11 grids which allows for smaller size precipitation to activate the sensor. When precipitation bridges the gap between the grid and the sensor plate the sensor is “activated” and the collector opens. In order to optimize that operation, the sensor is heated at a low level when the ambient temperature is below approximately 4°C during dry conditions. This provides sufficient heat to melt frozen precipitation and bridge the gap quickly when a snow or ice event occurs. The manufacturer states that when the ambient temperature is above 4°C and the conditions are dry, the sensor is not heated.

When the sensor is activated, the sensor is heated at a high level to evaporate the precipitation from the grid surface quickly when the event ends. The intent is to minimize exposure to dry deposition that can occur when the collector is open with no precipitation. The nominal temperature range of an activated sensor is approximately 60°C within 10 minutes of activation.

The inactive sensor temperature tests are conducted using a thermocouple with the sensor shaded immediately after measuring the ambient temperature with the same device. The thin thermocouple is placed directly on the sensor plate between the sensor grids without making contact with the grid. The test results are presented in Figure 4-4.

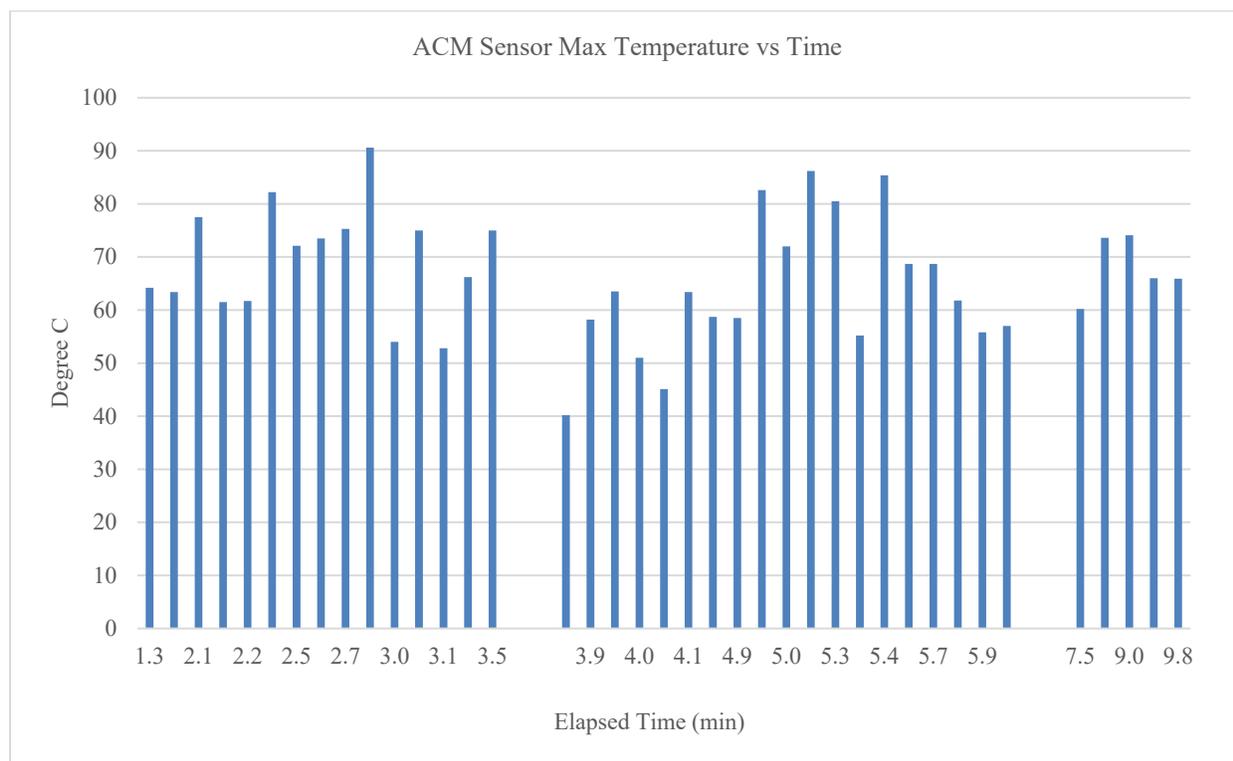
Figure 4-4 Inactivated ACM Sensor Temperature



The results indicate that low temperature sensor heaters were functioning properly and were keeping the sensors above freezing at low ambient temperatures. Temperature measurements of the ambient and inactive sensor at MN16 and AR16 may have been measured at different times, resulting in poor comparison.

Figure 4-5 presents the maximum temperature reached by each sensor when activated, and the time required for each sensor to reach that temperature. There is some variability between sensors for maximum temperature, but most sensors are between 50°C and 80°C within 10 minutes of activation.

Figure 4-5 Activated ACM Sensor Temperature Increase and Elapsed Time

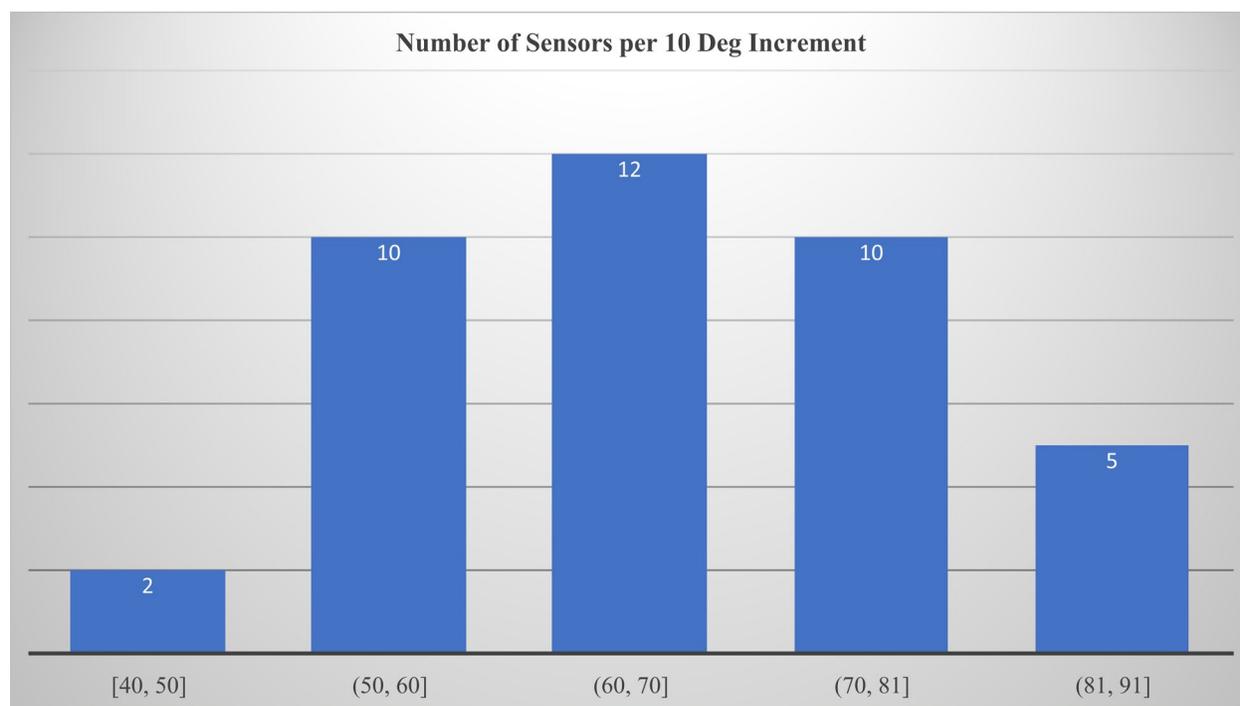


Approximately 40% of the sensors reached maximum temperature within 3.5 minutes, another approximately 50% reached maximum temperature before seven minutes, with the rest taking greater than 7 minutes to reach maximum temperature.

The same data is presented in Figure 4-6 with the maximum temperature reached divided into 10-degree bins across the X axis, and the number of sensors shown in each bin regardless of the time required to reach the maximum. This figure shows that most sensors are near the target temperature of 60-degree C.

The 2024 audit data for grid sensor heaters indicate that operation has improved from previous years. This is most likely the result of upgraded sensor components which are currently being used when rebuilding sensors at the Program Office.

Figure 4-6 Number of Sensors per 10 Degree Increment



Sensor test data indicate that the ACM heated grid sensors in the network are functioning as expected throughout the network. Based on the evaluations performed on the sensors during the site audits, (checks on the temperature of the plate and one water drop sensitivity test), it cannot be determined whether or not there is any difference in the performance of the 7-grid and the 11-grid sensor.

4.3 Thies Sensor Tests

The N-CON collectors in the networks use an open-path sensor manufactured by Thies to detect precipitation and activate the collector. Thies sensors are evaluated by counting the number of passes of a pen through the open-path required to activate the collector. The NADP has prescribed that the sensor sensitivity be set to 5 passes through the sensor. A few sensors responded after only 3 passes through the sensor.

Other sensor evaluations include inspection of the sensor housing to ensure there are no cracks that would allow moisture to enter the sensor. None of the sensors inspected during 2024 were reported to exhibit any cracks.

4.4 N-CON Motor/Lid-Arm Set Screws

EEMS continues to tighten lid arm setscrews and apply Loctite when necessary. During this process the lids are adjusted to seal properly and the site operator is instructed as to how to evaluate the collector to

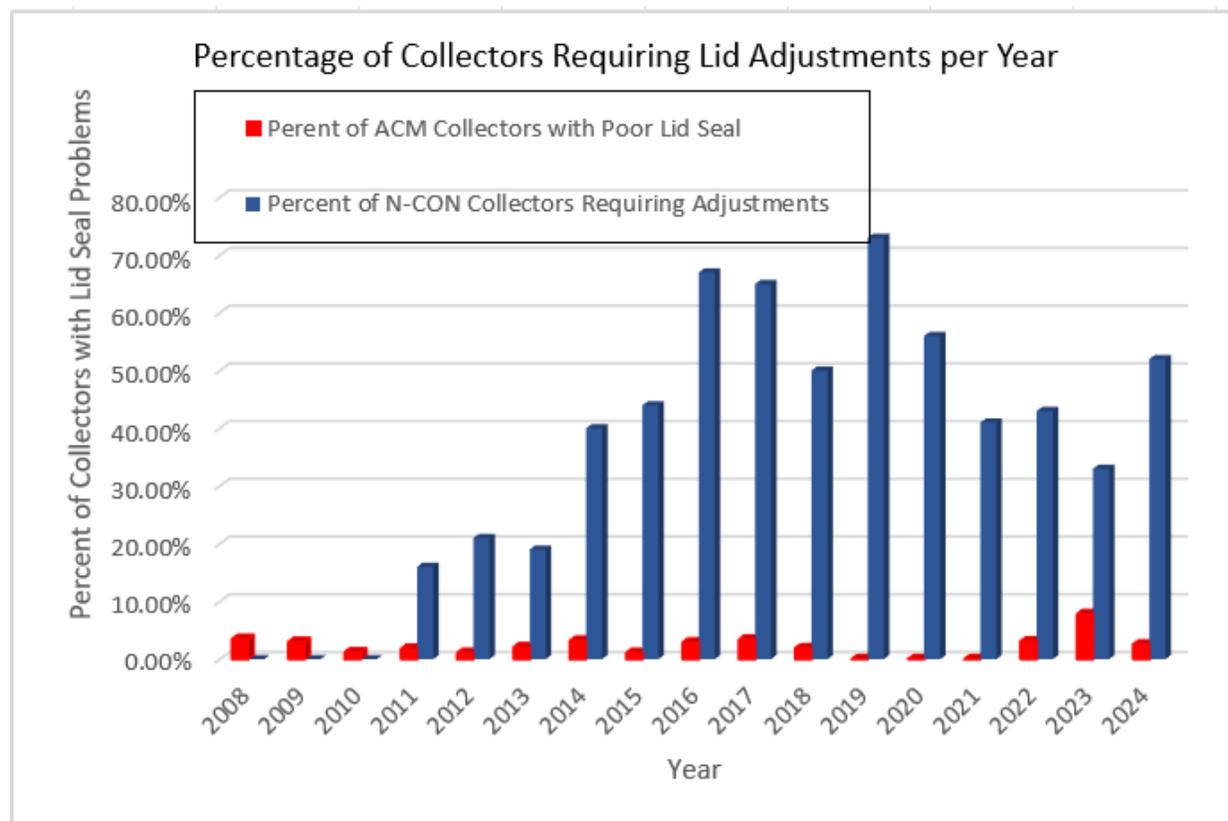
maintain proper adjustment. During 2024, forty-six N-CON collectors were audited. Out of the 46 collectors, 24 required the set screws and lid arms bolts to be adjusted and tightened. Given that N-CON collectors are now being audited once every three to four years, emphasis should be placed to ensure site operators are aware of this problem, and that they have proper written instructions and tools to perform the necessary adjustments.

In order to answer the question of whether or not the lid seals properly, EEMS tests how easy it is to lift the lid a little by gently pushing the lid upward with a finger. If the lid is easily lifted, showing as a small gap between the lid seal and the bucket/chimney, similar to what a gust of wind would cause, then the collector would be flagged as having a “poor lid seal”. However, there are instances when, although the arms may need adjusting, the lid remains tightly in place, and no gap appears when trying to lift the lid. In such case the collector would not be flagged as having a “poor lid seal”. Proper lid seal is a direct indicator of data quality. Loose lid arms may be an indicator of compromised data quality.

Some of the collectors visited have been adjusted and tightened during repeat visits, meaning that the initial repair with Loctite did not last between audit visits. This indicates the design flaw in the lid arms is likely to continue to be a problem with the collector going forward.

Figure 4-7 is a comparison of ACM-type collector lid seal compared to the percentage of N-CON collectors that required lid arm adjustments (not necessarily N-CON collectors that have poor lid seals) over the years. Generally, when the lid arms are adjusted, the lid seal is improved.

Figure 4-7 Percentage of N-CON and ACM-Type Collectors Requiring Lid Adjustments



EEMS continues to install the upgrade plastic spacer, or closed-cell foam, that is placed on the collector motor (inside the collector housing) and holds the motor more securely against the lid of the collector housing. The intention is to limit the movement of the motor when the collector is opening/closing which should in turn help to keep the sets screws from loosening.

Sites with spacers installed still sometimes require adjustment of the arms. The upgrade may increase the length of time between adjustments, but it is not a permanent solution. While there was an increase to collectors requiring arm adjustments, the 2024 data indicate that there has been an improvement in N-CON lid seals for the same sites visited. This could be due to the combination of previous tightening and the adding spacers to the motor box.

5.0 Recommendations to the NADP Program Office

The following subsections provide recommendations that, in the opinion of EEMS, would help to improve the operation of the sites and quality of data collected by the NADP.

5.1 Siting Criteria

Following the fall 2022 joint meeting in Knoxville, the NADP revised the siting criteria. EEMS has made the changes and improvements to the site audit procedures to document and report the conditions as they relate to the revised siting criteria.

As was the case in previous years, most of the assessments that were found to be non-compliant are related to siting criteria. Particularly:

- 30-degree guideline for trees
- 45-degree rule for objects
- guideline for vegetation taller than 0.6 meters
- the guideline for objects taller than 1 meter, within 5 meters of the collector or rain gauge.

The latter two were designated as guidelines rather than rules in 2022.

It has previously been suggested that the list of assessments that are critical to the operation of the sites and data quality continue to be refined. In addition, research that has been conducted by the USGS and others that relate siting criteria to sample quality should be used to determine if assessments can be removed or added to the site audits.

Although qualitative information is important, further refinement of the assessments should include more quantitative information that might be more useful and valuable. For example, the effect of trees within a 30-degree cone of the collector on data quality should be further investigated, as it directly effects the laboratory results. If it is found that the effect of the trees truly has an adverse effect on data validity, more proactive efforts should be implemented to remove, or mitigate, the number or height of trees within the 30-degree, or 45-degree cone.

In a USGS Open-File Report “*Four Studies on Effects of Environmental Factors on the Quality of National Atmospheric Deposition Program Measurements*” by Gregory Wetherbee et al, it was suggested that taller vegetation near the collector may actually improve collection efficiency and therefore could be considered to be positive and not a negative influence.

While the 45-degree rule criterion for older sites may be less attainable, at least economically, efforts should be made to accomplish this goal when installing new sites or relocating sites.

Further discussions by the Quality Assurance Advisory Group (QAAG) have addressed some of these issues. It is expected that future reports will address those decisions and refinements. Once this is accomplished and a smaller list of items that are significant to site operation and data quality is identified, more detailed tracking of site conditions and improvements may lead to trends in data as to specific improvements at individual sites.

5.2 Documentation and Training

Training for all networks is an essential function for maintaining NADP data quality. EEMS will continue to be informed of the changes and ensure site operators are made aware of available resources on the NADP website.

It is important to continue to modify and update site operation reference documentation and distribute that documentation to the operators, supervisors, and data users. EEMS is aware that this process has been ongoing at the NADP PO and updated manuals and procedures are made available on the NADP website as they are completed and approved. Links to the manuals and training information (support tab) has been added to the home page of the NADP website:

- <https://nadp.slh.wisc.edu/siteops/#ntn>
- <https://nadp.slh.wisc.edu/siteops/#mdn>

This process should continue and will continue to improve the field training for new site operators. This is an improvement over the distribution of hardcopy documents that have been produced in the past.

Recent ongoing discussions have included the use of Optical Character Recognition (OCR) software to process data forms from the site operators. As with interactive web-based forms, the potential exists to not only reduce some costs, but decrease data entry errors.

5.3 Equipment and Procedures

The following subsections pertain to problems observed with equipment and suggestions for improvement to equipment and procedures used to collect NADP data.

5.3.1 ACM Type Collector

Based on the 2024 audit data, it cannot be stated that ACM Type Collector function has improved. EEMS continues to promote better site operator awareness and participation, or improved maintenance efforts during the site audits.

Sensor Temperature

Improvement was observed regarding site operators testing the sensor heater before activating the motor box (see Section 4.0). EEMS continues to review the proper operation of the sensors with the site operators and stresses the importance of testing the sensors each week. As previously discussed, the sensor heater operation has also improved due to upgraded components. It is unknown if improved sensor operation has led to improved sample quality at ACM collector sites, but it would be an interesting area for investigation.

Sensor Response Tests

All of the ACM sensor assessments were in compliance. The program office has updated the components used when rebuilding and repairing sensors which seems to have also improved sensor operation.

5.3.2 ACM Collectors in General

During this reporting period a significant number of assessments fell below criteria:

- lid seal
- dry side bucket cleaned or changed
- flush wall filter mount
- dry side bag installed correctly

Instructions are given to site operators during every site audit regarding ongoing and annual maintenance procedures. A large number of incidents where the site operator required training was noted in the audit reports for 2024. Therefore, these data are expected to improve.

As reported previously, it was observed that there is some lack of consistency regarding sealing of the unused MDN sample train chimney. The collectors were originally approved and provided with a plastic funnel and hose to allow precipitation to pass through the chimney and out the bottom of the collector. Some of the older collectors have been in the field long enough that the funnel or hose, or both have deteriorated causing leaks into the collector housing. Most site operators have corrected the leaks using various materials to seal the opening of the chimney.

It is suggested that the second chimney funnel and drain hose be added to the requested supplies section of the field data form so operators can request approved materials for the repair of their collectors.

5.3.3 N-CON MDN Heaters

Once operation of the heated N-CON collector for MDN began, it was determined that improved operation could be achieved by modifying the passive heater to include a fan to actively circulate the air inside the collector and chimney. Photos of collectors taken during audits indicate collectors have been modified to include the circulating fan.

All of the heaters assessed during this reporting period were in compliance.

5.3.4 N-CON NTN Bucket Collector

Generally, the N-CON collectors function well and are easy to operate and are an improvement to the network. The problems documented during the previous reporting period are well known and are being addressed. They include:

- Motor/lid-arm adapters that become loose and need adjustment either after shipping or operation of the collector.
- High power consumption and not well suited for direct current (DC) operation.

During this reporting period, 24 NCON lid-arm adjustments were required, a substantial regression to the previous audit visits at the same sites (52.27% vs 44.73% previously). Through continued education of site

operators to perform the adjustments, and the addition of motor box spacers; it is anticipated that the frequency of non-compliance will decline.

Additionally, solar power improvements have been implemented over the last four years which may have led to the practical application of NCON collectors at solar powered sites.

5.3.5 Electronic Rain Gauge

After years of transitioning from Belfort to electronic rain gauges, during 2024 no Belfort gages were audited. Though electronic gages are an improvement, some of the ETI NOAH IV rain gauges that have been operating for several years exhibit excessive corrosion around the connections for the sensors and the batteries, as well as corrosion of the shell screws. As part of the audit, all connectors are cleaned and dielectric grease is applied by the auditor. The screws and batteries are replaced as needed. So far, the OTT Pluvio electronic rain gauges have not exhibited problems.

In general, improvements need to be made in regard to the incidence of ETI optical sensor failures. In 2024, the number of sensor failures to “blocking of light beam” was 37.50%, and failures to “responding to mist” was also 37.50% (vs. previous audits, 22.45 % and 16.67%, respectively). Sometimes cleaning the optical sensors of debris/spider webs, etc., has resolved the issue. However, a lack of replacement shell cover availability has been an ongoing problem.

5.3.6 Data Download and Transmission

Of the 75 rain gauges audited in 2024, two operators are still utilizing a PDA to download rain gauge data. They are CO15 and TX16.

The Campbell Scientific Firmware in the rain gauge data logger was updated at most sites, and the Bluetooth dongle was replaced. With this modification the PDA can still be used, but an Android phone loaded with the Campbell Scientific Logger Link App is most often used by the site operator to interface with the rain gauge and download data. Forty-four of the seventy-five site rain gauges utilize the Logger Link App.

Fourteen rain gauge dataloggers utilized the SC115 devices, similar to USB thumb drives that connect directly to the logger serial port and data are transferred to the device automatically. The thumb drive is then transported to an internet connected computer where the data files are uploaded to the PO. Within minutes of this step, data are automatically posted and are available on the PO website for site operators to view.

This process works very well. The only disadvantage noted is the lack of the ability to observe any of the rain gauge or collector parameters while at the site. Site operators are not able to troubleshoot the equipment and determine if adjustments or repairs are needed to correct any operational problems.

Fifteen rain gauge dataloggers use telemetry to transmit near real-time data.

6.0 Results of Field Laboratory and Procedure Assessment

The field site audit results have been presented and discussed in other sections of this report. Current field laboratory procedures are limited to sample weighing and decanting at NTN sites. This section will focus on weighing and decanting the NTN samples, and sample handling at MDN sites.

All site operators were observed to be proficient with sample weighing and decanting procedures. During the audits, training procedures were reinforced regarding not mixing the sample prior to decanting. One suggestion that may be of value would be to move the field lab as close to the sample site as possible to help eliminate sample loss or mixing while transporting the sample to the lab. This is most practical at sites co-located with CASTNET sites since there is usually space available for the lab equipment.

6.1 Sample Weighing

Although very accurate and easy to use, electronic scales require routine and regular maintenance. This is usually provided by a service contractor that visits the lab and certifies the scale. Scales that are determined to be functioning poorly during the site audits should be identified as action items and require some follow-up from the NAL. This could include replacing the scale with a surplus instrument. Table 6-1 presents results for the scales audited when challenged with four standard Belfort weights (from approximately 830g to 3400g). An average error of 0.5% or more was used as the accuracy tolerance.

Table 6-1 Average Percent Difference for Site Scales

Site ID	Scale Manufacturer	Scale Model	AVG % Diff	Site ID	Scale Manufacturer	Scale Model	AVG % Diff
PA13	Adam	CKT8	0.02%	NY20	Adam	CBK 16AH	0.08%
NY10	Adam	CKT 16	0.09%	LA12	Sartorius for less than 3000g and OHAUS for over 3000 g	Basic	0.00%
CA99	AE Adam	PGL20001	0.08%	AR03	OHAUS	Heavy Duty Solution Balance	0.07%
CA45	AE Adam	CKT 16	0.07%	TX56	Sartorius	AG Gottingen	0.33%
CA76	Ohaus	Heavy Duty Solution Balance	0.10%	NY94	Adam	CBK16aH	0.01%
ID03	Ohaus	Heavy duty solution balance	0.11%	NM08	OHAUS	Heavy Duty Solution Balance	0.05%
NY06	Adam	CBK 16aH	0.02%	OH71	Mettler	PC4400	0.06%
AZ06	Ohaus	Heavy Duty Solution Balance	0.01%	OH49	Adam	CKT16	0.08%
CA67	AE Adam	CBK35A	0.07%	NM07	OHAUS	CD-33	0.12%
CA42	Sciencetech	SG550	0.03%	ME96	Ohaus	Voyager	0.02%
CA94	Ohaus	Adventurer Pro (digital)	0.03%	PA29	Ohaus	triple beam	0.08%

Site ID	Scale Manufacturer	Scale Model	AVG % Diff
GA99	Unknown	Unknown	Unknown
CA75	AE Adam	CKT 8H	0.06%
AR16	Ohaus	Valor 2000	0.03%
AR27	Tree	HRB6001	0.02%
KS07	Ohaus	Heavy Duty Solution Balance	0.01%
KS31	Ohaus	Ranger Count 3000	0.04%
VA24	Adam	CKT 8H	0.03%
SD04	Sartorius	EA150CE-10UR	0.26%
VT99	Adam	CKT16	0.11%
CO15	Ohaus	Heavy Duty Solution Balance	0.09%
MS98	Adam	CKT8	0.04%
MS10	unknown	unknown	0.41%
MS30	Ohaus	Triple beam	0.01%
NY96	Ohaus	unknown	0.001%
GA41	Ohaus	I-10	0.04%
NY99	Mettler Toledo	PB5001	0.03%
FL11	Adam	CBK 70a	0.01%
CO91	OHAUS	Pioneer	0.06%
TX04	Electronic Weighing	XY20MB	0.03%
TX16	OHAUS	Heavy Duty Solution Balance	0.02%

Site ID	Scale Manufacturer	Scale Model	AVG % Diff
PA42	Denver Instruments	SI-8001	0.07%
WI06	OHAUS	Adventurer	0.04%
PA00	Ohaus	Triple-beam	0.05%
WI36	OHAUS	Heavy Duty Solution Balance	0.09%
MA14	Dymo	unknown	0.02%
WI92	OHAUS	Heavy Duty Solution Balance	0.01%
MN16	OHAUS	Explorer Pro	0.03%
SC06	unknown	unknown	Unknown
NC45	Ohaus	Triple beam	0.04%
TN00	Ohaus	3000	0.09%
IN41	Ohaus	Tripple Beam	0.06%
IN20	Adam	CCT 4	0.03%
VA99	Sartorius	unknown	0.01%
VA13	Ohaus	Tripple Beam	0.09%
KY22	VWR	unknown	0.05%
OK29	AWS	AWS-13	0.05%
OK00	OHAUS	Heavy Duty Solution Balance	0.01%
NC36	Taylor	3851-9	0.39%
NC30	Ohaus	Adventurer	0.03%
NC35	Ohaus	Triple beam	0.05%

6.2 MDN Sample Handling

Although all site operators observed while exchanging MDN sample trains were careful to maintain sample quality and avoid contamination, some did not use gloves, or change gloves as often during the procedure as recommended by the NAL. Other observations of the procedures include:

- Not capping or securing the sample prior to removing the used sample train
- Not prioritizing the sample and sample bottle contamination above the used sample train cleanliness
- Not maintaining the new sample bottle lid on the bottle until placement in the sampler

The SOP procedures were emphasized during the audits. It is suggested that the SOP procedures, especially those observed to have been lax in the field, also be stressed during the MDN sample change-out webinars or any new training programs implemented by the NAL.

7.0 Data Quality Information

Several procedures are in place to help ensure audit data quality. Foremost, a comprehensive QAPP was developed prior to collecting audit data. Field audit team training was provided to ensure consistency of methods. Duplicate entry of audit data is implemented to help detect and correct typographic errors. Ongoing review of results for accuracy and consistency is provided by the EEMS' QA Manager, who is not involved with the field data collection.

7.1 Quality Assurance Project Plan

Improvement to procedures for collecting audit data, recording data in the audit database, and reporting audit results is an ongoing process. As improvements are identified, suggested changes are submitted for approval by the EPA Project Officer, and the NADP QA Manager. Once the suggested changes are approved the Site Audit QAPP and associated SOPs can be updated. The project QAPP was revised in August 2021, and more recently in April 2024. The QAPP was submitted to the EPA Project Officer in April of 2024. EPA is currently reviewing the Site Audit QAPP and will provide comments to improve the QAPP and to satisfy the CIO 2105 QAPP requirements.

7.2 Field Team Training and Internal QA Audits

Initial audit team training took place while performing two audits in Indiana in December 2007. Audit team members routinely share experiences through regular communication which helps to clarify questions that may arise the first time a problem is encountered. This is an ongoing process that will continue, thereby expanding the knowledge base of the team and maintaining consistency of methods.

Whenever possible, all audit teams meet and cooperatively complete a site audit. In the past this was accomplished at site IL11 since that site operates all NADP networks and allows the greatest exchange of information and methods among the team members. The most recent cooperative site audit at GA09 (MDN & NTN) was performed in February, 2024. This was very beneficial for the most recently hired audit member. The EEMS QA manager attended the audit and training activities. The next cooperative site audit is scheduled for March 2026 and will be conducted at MO46 (MDN & NTN).

Customer Satisfaction Surveys are provided to each site operator following a site audit. The information gathered is used to improve the site audit program. A refinement of the questionnaires, with input from the NADP PO and laboratories was implemented this year with the goal of further improvements to the audit program. Planned enhancements are to eliminate paper copies, include more pertinent questions, and to provide a link for the site operator to submit the survey electronically. By use of the electronic copy, any problems at the site following the audit can be relayed to and addressed by the auditor himself. This enhancement is valuable in maintaining data quality and collection, as well as providing an ongoing record of the site auditors' performance. Common mistakes will be revealed and can be incorporated into training materials.

7.3 Training Class Attendance and Webinar Participation

In order to keep up with changes to the NADP procedures and protocols, EEMS audit team members have attended past site operator training classes provided by the former, Mercury Analytical Laboratory (HAL), Central Analytical Laboratory (CAL), and Program Office and participate in past webinars. The laboratories have been combined to form the NAL.

EEMS understands that implementation of a training program is in flux since the PO and laboratories transitioned to the WSLH. The training program allowed the audit team members to stay current with procedures and changes to site equipment. It has also allowed EEMS to provide the NADP PO with feedback and suggestions to improve the site operator training classes. EEMS intends to participate in future training webinars, when scheduling permits, to remain up to date with any changes. EEMS personnel also attend NADP/NOS and participate in QAAG to stay current on any changes and provide feedback on any proposed changes having QA impacts at sites.

7.4 Duplicate Data Entry

A routine procedure utilized as part of the EEMS QA program for audit data, is duplicate data entry. Field personnel enter audit data results into the Field Site Audit Database (FSSD) after completing the audit. An initial spot report is generated using this raw data. After completing approximately three audits, the database is sent electronically to the EEMS office. The original hardcopy field forms are sent to the EEMS office via FedEx.

Upon receipt of the field forms, a second set of data tables are populated independently using the original hardcopy forms. The QA Manager then compares the two sets of tables. Discrepancies are identified and investigated to determine the intended entry. In some cases, this requires contacting the field personnel to verify or confirm a result. If necessary, after the QA process and acceptance by the QA Manager, a revised spot report is generated from the set of tables populated at the office. This preserves the original set of tables populated in the field, and provides review, tracking, and edit documentation for the audit results and reports. The photos taken during the site audit are scrutinized during the QA process to ensure that the data recorded is in agreement with the photos.

Once data have been approved by the QA Manager, appropriate tables are generated and sent to the EPA Project Officer. This procedure is performed monthly

7.5 Identifiable Areas of Improvement to the Audit Program

As with all programs, continuous efforts are underway within the audit program to provide improvements to techniques and procedures in an attempt to deliver useful and meaningful information to the EPA and NADP PO. Those efforts have been described in the previous sections. As a direct result, the improvements summarized in the following subsections are being implemented.

7.5.1 Site Audit Questionnaire

Despite considerable effort on the part of both EEMS and the NADP PO, some of the questions contained in the Site Audit Questionnaire remain ambiguous. This has led to some audit field personnel interpreting some questions one way, while another team member might interpret the same question differently. Additionally, some audit questions are redundant or impossible to answer accurately during the field site audit. In the past, as cases were discovered during review of the audit reports, additional clarification was requested from the NADP PO regarding the intent of the question. This information was then shared with the audit team members to eliminate confusion and maintain consistency.

Another, substantial, revision of the Site Audit Questionnaire was developed and approved by the NADP PO at the end of the year. It includes more questions and those that are more pertinent and straight forward, less ambiguous. Additionally, the field forms are generated from the electronic questionnaire and so therefore can be very site specific as well as equipment type specific. This should improve data management/QA substantially in the areas of double entry, compilation data review and data submission.

Refinement and improvement to the information collected during a site audit will continue. It is expected that feedback regarding the audit data will be provided on an annual basis from the NADP PO and other data users so that EEMS can continue to collect data that are meaningful and useful to the NADP.

7.6 Audit Equipment Certification

The instruments used by the audit team are maintained and certified by the EEMS Audit Team Leader. Most undergo annual certification by various sources and are National Institute of Standards and Technology (NIST) traceable by a third party. The DVMs are used to measure temperature with a thermocouple input which is certified with a NIST-traceable Resistive Temperature Detector (RTD).

The weights used to challenge the weighing rain gauges and site scales are certified annually on a NIST-traceable electronic scale at the EEMS facility in Gainesville, FL.

The compass used to determine the azimuth of objects near the collector is certified as NIST-traceable annually by a third party.

All certification documentation is provided in Appendix C.

APPENDIX A

All Siting Criteria Assessments

ACM MDN Collector	ACM NTN Collector	Precip Network	ETI NOAHIV Precip	Field Lab	N-Con NTN Collector	N-Con MDN Collector	OTT P1 precip	OTT P2 precip	Site Info	AMON	Backup Gauge	Site Supplies	criteria rules	criteria guideline	New Question
TRUE	TRUE														Ambient temperature (deg C)
TRUE	TRUE														Temperature of sensor inactivated (deg C)
TRUE	TRUE														Inactivated sensor temperature near ambient or above if required
TRUE	TRUE														Max temperature of activated sensor within 10 minutes (deg C)
TRUE	TRUE														Time (mm:ss) to maximum temperature (≤10 minutes)
TRUE	TRUE														Activated sensor temperature between 40 and 90 deg C
TRUE	TRUE														Does operator check sensor heater before/after collector opening
									TRUE						SiteID
									TRUE						Station Name
									TRUE						Audit start date/time
									TRUE						Audit end date/time
									TRUE						Operator's name
									TRUE						Operator's telephone number
									TRUE						Operator's telephone extension
									TRUE						Operator's email
									TRUE						Operator's cell phone number
									TRUE						Supervisor's name
									TRUE						Supervisor's telephone number
									TRUE						Supervisor's telephone extension
									TRUE						Supervisor's fax number
									TRUE						Supervisor's email
															Site Sponsor
									TRUE						EEMS field team leader

									TRUE							Precipitation during visit
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE								Power supply (other than DAS battery) AC, DC, or Both
									TRUE							Indicate solar output capacity (Watts)
									TRUE							Is the solar panel operating properly
									TRUE							Are electrical connections in good condition
									TRUE							Are collectors and gauge on the same electrical circuit
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE								Equipment connected to a GFI circuit
									TRUE							Gas monitoring - SOx / NOx / CO / O3 / etc
									TRUE							IMPROVE
									TRUE							CASTNET
									TRUE							PM-1.0, PM-2.5, PM-10, TSP
									TRUE							SURFRAD
									TRUE							CRN (Climate Reference Network)
									TRUE							NWS (National Weather Service)
									TRUE							NEON (National Ecological Observatory Network)
									TRUE							UV-b
									TRUE							Other weather monitoring
									TRUE							Specify other weather monitoring program
									TRUE							Other environmental program
									TRUE							Other environmental data collected (not listed here) within 1km
									TRUE							Precipitation collector manufacturer
									TRUE							Rain gauge manufacturer and model
									TRUE							Site type
									TRUE							Survey team assessment of designated site type

									TRUE						Does NADP require a rain gauge wind shield at this site
									TRUE		TRUE				If rain gauge wind shield present, is it isolated from the gauge
									TRUE		TRUE				If rain gauge wind shield present, is it within 2 inches of orifice
									TRUE		TRUE				Rain gauge wind shield type
TRUE	TRUE														Is there a snow roof installed on the collector
TRUE	TRUE														If collector snow roof present, is it present year round
TRUE	TRUE				TRUE	TRUE									Collector GPS latitude - decimal degrees
TRUE	TRUE				TRUE	TRUE									Collector GPS longitude - decimal degrees
TRUE	TRUE				TRUE	TRUE									Collector GPS elevation (m)
TRUE	TRUE				TRUE	TRUE									Indicated GPS accuracy (m)
TRUE	TRUE				TRUE	TRUE									Any significant changes to site conditions within 500m since previous audit
TRUE	TRUE				TRUE	TRUE				TRUE		TRUE			Orifice of the collector $\pm 0.3m$ of the rain gauge orifice (elevation)
TRUE	TRUE				TRUE	TRUE						TRUE			<u>Sample exposure</u> direction as collector opens
TRUE	TRUE				TRUE	TRUE									If not oriented properly, was orientation corrected
			TRUE					TRUE					TRUE		Gauge oriented correctly (ETI sensors N/S Ott2 Bubble Level S)
			TRUE					TRUE							If gauge not oriented properly, was orientation corrected
								TRUE							If gauge orientation not corrected was insulation installed
								TRUE		TRUE			TRUE		Can precipitation data quality be impacted by irrigation systems
								TRUE	TRUE				TRUE		Can sample be contaminated by irrigation systems
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE			TRUE	Ground cover within 30m radius of equipment
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE			TRUE	Orifice at least 1m above vegetation height within 5m radius
TRUE						TRUE								TRUE	Galvanized metal within 5m radius of the MDN collector
TRUE	TRUE				TRUE	TRUE								TRUE	Treated lumber within 5m radius of the collector
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE			TRUE	Objects > 1 m tall and > 5 cm within 5m of orifice

TRUE	TRUE				TRUE	TRUE				TRUE			TRUE		Access roads within a 10m radius of collector
										TRUE				TRUE	Parking lots or maintenance areas (6 cars or less) within 10m of collector
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE		TRUE		Objects within a 45 degree cone of the orifice
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE			TRUE	Trees within a 30 degree cone of the orifice
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE		TRUE	TRUE		TRUE		Buildings within a 30 degree cone of the orifice
TRUE	TRUE				TRUE	TRUE								TRUE	Herbicides used within 20m of collector
TRUE	TRUE				TRUE	TRUE				TRUE			TRUE		Fertilizers used, or cultivated fields, within 20m of collector
										TRUE			TRUE		Unpaved roads (>10 vehicles/day at <50 km/hr) within 30m of collector
										TRUE				TRUE	Parking lots or maintenance areas (>6) within 30m of collector
TRUE	TRUE				TRUE	TRUE				TRUE			TRUE		Unpaved roads (>10 vehicles/day and <50 km/hr) within 100m of collector
TRUE	TRUE				TRUE	TRUE								TRUE	Parking lots or maintenance areas (>6 cars/day) within 100m of collector
TRUE	TRUE				TRUE	TRUE				TRUE			TRUE		Paved roads (>100 vehicles/day) within 100m of collector
										TRUE			TRUE		Small feedlot operations within 100m of orifice
TRUE	TRUE				TRUE	TRUE								TRUE	Storage areas (fertilizers, road salt, manure) within 100m of collector
										TRUE				TRUE	Fertilizers used, or cultivated fields, within 100m of collector
	TRUE				TRUE					TRUE			TRUE		(>250 beef cattle, >100 dairy cattle, >350 pigs, >10k chickens) within 500m
TRUE	TRUE				TRUE	TRUE				TRUE			TRUE		Airports, (taxiways, runways, parking) within 100m of collector
										TRUE			TRUE		Chemical manufacturing facilities within 100m
										TRUE			TRUE		Electric generating stations within 100m
										TRUE			TRUE		Landfills within 100m
TRUE	TRUE				TRUE	TRUE							TRUE		Marinas/waterways >100 vessels/day within 100m
										TRUE			TRUE		Marinas/waterways >100 vessels/day within 30m of collector
TRUE						TRUE								TRUE	Metalworking operations within 100m of collector
										TRUE			TRUE		Mining operations within 100m of the collector

			TRUE				TRUE	TRUE							As left DAS OS version
			TRUE				TRUE	TRUE							Was DAS program updated
			TRUE				TRUE	TRUE							As left DAS program name
			TRUE				TRUE	TRUE							PDA model
			TRUE				TRUE	TRUE							PDA program number
			TRUE												DAS program const_multiplier
			TRUE												DAS program const_Add
			TRUE												DAS program const_mvPerDeg
			TRUE				TRUE	TRUE							DAS program const logger s/n
			TRUE				TRUE	TRUE							Bluetooth Dongle type
			TRUE				TRUE	TRUE							Bluetooth PIN code set
			TRUE				TRUE	TRUE							Is Campbell I/O port available for SC115 or other device
			TRUE				TRUE	TRUE							Is Campbell RS232 port available for dongle or other device
			TRUE				TRUE	TRUE							Data download method
			TRUE				TRUE	TRUE							Telemetry transmitter model
			TRUE				TRUE	TRUE							DAS watchdog errors
			TRUE				TRUE	TRUE							DAS watchdog errors reset
			TRUE				TRUE	TRUE							DAS Lithium battery voltage
			TRUE				TRUE	TRUE							Is orifice round
			TRUE				TRUE	TRUE							Is catch chamber in good condition
			TRUE				TRUE	TRUE							Is catch chamber level
			TRUE				TRUE	TRUE							If catch chamber not level, was it leveled
			TRUE												Are catch chamber leveling screws secured with locking nuts
			TRUE												Are round circuit board jumper switch settings correct (on-on-on-on-off)

			TRUE												Are shell screws new style with large heads
			TRUE												If shell screws original style were they replaced and anti-seize applied
			TRUE				TRUE	TRUE							Is gauge, or gauge inlet heated
			TRUE				TRUE	TRUE							As found baseline reading
			TRUE				TRUE	TRUE							Equivalent height of 1st std weight
			TRUE				TRUE	TRUE							As found 1st std weight response
			TRUE				TRUE	TRUE							Equivalent height of 2nd std weight
			TRUE				TRUE	TRUE							As found 2nd std weight response
			TRUE				TRUE	TRUE							Equivalent height of 3rd std weight
			TRUE				TRUE	TRUE							As found 3rd std weight response
			TRUE				TRUE	TRUE							Equivalent height of 4th std weight
			TRUE				TRUE	TRUE							As found 4th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 5th std weight
			TRUE				TRUE	TRUE							As found 5th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 6th std weight
			TRUE				TRUE	TRUE							As found 6th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 7th std weight
			TRUE				TRUE	TRUE							As found 7th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 8th std weight
			TRUE				TRUE	TRUE							As found 8th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 9th std weight
			TRUE				TRUE	TRUE							As found 9th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 10th std weight
			TRUE				TRUE	TRUE							As found 10th std weight response

			TRUE				TRUE	TRUE							Equivalent height of 11th std weight
			TRUE				TRUE	TRUE							As found 11th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 12th std weight
			TRUE				TRUE	TRUE							As found 12th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 13th std weight
			TRUE				TRUE	TRUE							As found 13th std weight response
			TRUE				TRUE	TRUE							Equivalent height of 14th std weight
			TRUE				TRUE	TRUE							As found 14th std weight response
			TRUE				TRUE	TRUE							Does logger receive event signals from all collectors
			TRUE												Does optical sensor respond to "blocking" of light beam
			TRUE												Does optical sensor respond to mist of water
			TRUE				TRUE	TRUE							Does rain gauge operate properly
TRUE	TRUE		TRUE		TRUE	TRUE	TRUE	TRUE							Trouble ticket opened for any malfunctioning equipment
			TRUE				TRUE	TRUE							DAS Battery capacity (amp-hr)
			TRUE				TRUE	TRUE							DAS battery voltage
			TRUE				TRUE	TRUE							DAS battery pass load test
			TRUE				TRUE	TRUE							DAS battery in good condition
			TRUE				TRUE	TRUE							Order replacement equipment battery
TRUE	TRUE														Sensor grid number
TRUE	TRUE														Does sensor respond to one drop of water
					TRUE	TRUE									number of passes of a pen required to activate the sensor
TRUE	TRUE				TRUE	TRUE									does the sensor open and close the collector
TRUE	TRUE				TRUE	TRUE									Replacement sensor requested
TRUE	TRUE														Voltage at motor box E.R. terminal (collector open)

TRUE	TRUE															Is quantity of liquid in dry side assessed and reported
TRUE	TRUE															Does lid seal properly
TRUE	TRUE															Is the lid liner in good condition
					TRUE	TRUE										Is lid-arm swing properly adjusted for collector type
TRUE						TRUE										Is DI water used supplied by NADP Analytical Lab
TRUE																Is there caulk around chimney
TRUE																If chimney caulk is not present or in poor condition, was it caulked
TRUE						TRUE										Blue clip in good condition
TRUE						TRUE										Spare blue clip on-site
TRUE						TRUE										Spare sample bottle cap on-site
TRUE						TRUE										Spare glassware on-site
TRUE						TRUE										Cooling fan in good condition
TRUE						TRUE										Cooling fan thermostat in good condition
TRUE						TRUE										Heater in good condition
TRUE						TRUE										Heater thermostat in good condition
TRUE						TRUE										Has ACM flush wall filter mount been installed
TRUE						TRUE										ACM cooling filter in good condition
TRUE						TRUE										Lab jack in good condition
TRUE						TRUE										Overflow bucket in good condition
TRUE						TRUE										Is graduated cylinder on-site
TRUE						TRUE										Graduated cylinder in good condition
TRUE						TRUE										Indicated temperature on min / max thermometer (deg C)
TRUE						TRUE										audit temperature reading (deg C)
TRUE						TRUE										min/max thermometer reading within +/- 5 deg C of std

TRUE						TRUE									Type of max / min thermometer
	TRUE			TRUE	TRUE										Does site conduct field chemistry using excess NADP sample
	TRUE			TRUE	TRUE										Is laboratory temperature controlled
	TRUE			TRUE	TRUE										Good weighing practices
	TRUE			TRUE	TRUE										Calibration Std. Wt. - one weight
	TRUE			TRUE	TRUE										As found scale response - one std. weight
	TRUE			TRUE	TRUE										Calibration Std. Wt. - two weights
	TRUE			TRUE	TRUE										As found scale response - two std. weights
	TRUE			TRUE	TRUE										Calibration Std. Wt. - three weights
	TRUE			TRUE	TRUE										As found scale response - three std. weights
	TRUE			TRUE	TRUE										Calibration Std. Wt. - four weights
	TRUE			TRUE	TRUE										As found scale response - four std. weights
	TRUE			TRUE	TRUE										Sample scale manufacturer
	TRUE			TRUE	TRUE										Sample scale model
									TRUE						Reviewed site forms and answered any operator questions
									TRUE						Training needed during visit
									TRUE						Training provided during visit, no additional training needed
									TRUE						Type of additional follow-up training suggested
									TRUE						Any used or spare collector or rain gauge components on hand
	TRUE				TRUE								TRUE		Number of unused 1-L sample bottles in bags, ready to be used
	TRUE				TRUE								TRUE		Number of small 1-L bottle boxes
	TRUE				TRUE								TRUE		Number of unused bucket lids in bags, ready to be used
	TRUE				TRUE								TRUE		Number of used bucket lids
TRUE						TRUE							TRUE		Number of MDN coolers

TRUE						TRUE						TRUE			Order deionized water
TRUE	TRUE				TRUE	TRUE						TRUE			Order blank field forms
TRUE	TRUE				TRUE	TRUE						TRUE			Order gloves
	TRUE				TRUE							TRUE			Order dry-week envelops
									TRUE						Reviewed NADP Website with operator

APPENDIX B

List of Site Funding and Sponsoring Agencies

network	siteID	orgName
MDN	06WI	Wisconsin State Laboratory of Hygiene
NTN	06WI	Wisconsin State Laboratory of Hygiene
MDN	AB14	Jacques Whitford Stantec Axys Limited
NTN	AB32	Wood Buffalo Environmental Association
NTN	AB34	Wood Buffalo Environmental Association
AMoN	AB35	Alberta Ministry of Environment and Parks
NTN	AK01	U.S. Forest Service
NTN	AK02	U.S. Forest Service
NTN	AK03	NPS-Air Resources Division
AMoN	AK96	U.S. Bureau of Land Management
MDN	AK96	University of Alaska Fairbanks
NTN	AK96	University of Alaska Fairbanks
NTN	AK97	NPS-Air Resources Division
NTN	AL10	U.S. Geological Survey
AMON	AL99	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	AL99	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	AR02	U.S. Geological Survey
AMON	AR03	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	AR03	U.S. Geological Survey
AMON	AR09	U.S. Department of Agriculture - Agricultural Research Service
AMON	AR15	U.S. Department of Agriculture - Agricultural Research Service
NTN	AR16	NPS-Air Resources Division
NTN	AR27	U.S. Geological Survey
NTN	AZ03	NPS-Air Resources Division
NTN	AZ06	NPS-Air Resources Division
NTN	AZ97	NPS-Air Resources Division
AMON	AZ98	NPS-Air Resources Division
NTN	AZ98	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	AZ99	U.S. Geological Survey
MDN	BC16	Environment Canada
NTN	BC22	Rio Tinto
NTN	BC23	Rio Tinto
NTN	BC24	Prince Rupert Port Authority
NTN	CA28	USFS - Pacific Southwest Research Station
NTN	CA42	U.S. Forest Service
AMON	CA44	NPS-Air Resources Division
NTN	CA45	U.S. Geological Survey
NTN	CA50	U.S. Geological Survey
NTN	CA66	NPS-Air Resources Division
AMON	CA67	NPS-Air Resources Division
NTN	CA67	NPS-Air Resources Division
MDN	CA75	NPS-Air Resources Division
NTN	CA75	NPS-Air Resources Division
NTN	CA76	U.S. Geological Survey
AMON	CA83	NPS-Air Resources Division
NTN	CA88	U.S. Geological Survey
MDN	CA94	U.S. Forest Service
NTN	CA94	U.S. Forest Service
NTN	CA96	NPS-Air Resources Division
NTN	CA99	NPS-Air Resources Division

NTN	CAN5	U.S. Geological Survey
NTN	CO00	U.S. Geological Survey
NTN	CO01	U.S. Geological Survey
NTN	CO02	INSTAAR-University of Colorado
NTN	CO02	National Science Foundation
NTN	CO06	City and County of Denver
NTN	CO08	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CO09	U.S. Bureau of Land Management
AMON	CO10	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CO10	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CO11	U.S. Geological Survey
AMON	CO13	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CO13	U.S. Geological Survey
NTN	CO15	U.S. Bureau of Land Management
NTN	CO19	NPS-Air Resources Division
NTN	CO21	U.S. Forest Service
NTN	CO22	Colorado Department of Public Health & Environment
NTN	CO22	NPS-Air Resources Division
NTN	CO84	U.S. Geological Survey
NTN	CO85	Colorado Department of Public Health & Environment
NTN	CO86	U.S. Fish and Wildlife Service
NTN	CO87	Colorado Department of Public Health & Environment
AMON	CO88	NPS-Air Resources Division
NTN	CO90	INSTAAR-University of Colorado
NTN	CO90	National Science Foundation
NTN	CO91	U.S. Forest Service
NTN	CO92	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CO93	U.S. Forest Service
NTN	CO94	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	CO96	U.S. Bureau of Land Management
NTN	CO96	U.S. Forest Service
MDN	CO97	U.S. Forest Service
NTN	CO97	U.S. Forest Service
AMON	CO98	NPS-Air Resources Division
NTN	CO98	U.S. Geological Survey - Biological Resources Division
NTN	CO98	Colorado State University
MDN	CO99	NPS-Air Resources Division
NTN	CO99	U.S. Geological Survey
AMON	CT15	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	CT15	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	FL00	University of Florida-State Agricultural Experiment Station
NTN	FL03	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	FL05	USFWS-Air Quality Branch
NTN	FL05	USFWS-Air Quality Branch
AMON	FL11	NPS-Air Resources Division
MDN	FL11	South Florida Water Management District
NTN	FL11	NPS-Air Resources Division
NTN	FL14	U.S. Geological Survey
AMON	FL19	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	FL23	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	FL23	U.S. Environmental Protection Agency - Clean Air and Power Division

NTN	FL41	U.S. Geological Survey
MDN	FL95	South Florida Water Management District
MDN	FL97	South Florida Water Management District
MDN	GA09	USFWS-Air Quality Branch
NTN	GA09	USFWS-Air Quality Branch
NTN	GA20	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	GA41	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	GA41	University of Georgia-State Agricultural Experiment Station
NTN	GA99	U.S. Geological Survey
NTN	IA08	U.S. Geological Survey
NTN	IA23	U.S. Geological Survey
NTN	ID02	U.S. Forest Service
AMON	ID03	NPS-Air Resources Division
NTN	ID03	NPS-Air Resources Division
AMON	ID07	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	ID11	U.S. Geological Survey
AMON	IL11	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	IL11	Lake Michigan Air Directors Consortium
MDN	IL11	Midwest Regional Climate Center
NTN	IL11	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	IL37	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	IL46	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	IL46	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	IL78	U.S. Geological Survey
AMON	IN20	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	IN20	U.S. Geological Survey
MDN	IN21	Lake Michigan Air Directors Consortium
AMON	IN22	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	IN22	Lake Michigan Air Directors Consortium
NTN	IN22	U.S. Geological Survey
MDN	IN34	Lake Michigan Air Directors Consortium
NTN	IN34	NPS-Air Resources Division
NTN	IN41	Purdue University-State Agricultural Experiment Station
AMON	IN99	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	KS03	Kansas Department of Health and Environment
MDN	KS03	Kansas Department of Health and Environment
MDN	KS05	Kansas Department of Health and Environment
NTN	KS07	U.S. Geological Survey
MDN	KS24	Kansas Department of Health and Environment
AMON	KS31	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	KS31	Kansas State University-State Agricultural Experiment Station
MDN	KS32	Kansas Department of Health and Environment
NTN	KS32	U.S. Geological Survey
AMON	KS97	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	KS97	Kickapoo Tribe
AMON	KY03	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	KY03	U.S. Geological Survey
MDN	KY10	NPS-Air Resources Division
NTN	KY10	NPS-Air Resources Division
NTN	KY19	U.S. Geological Survey
NTN	KY22	U.S. Geological Survey

AMON	KY29	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	KY35	U.S. Geological Survey
AMON	KY98	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	KY99	Murray State University
NTN	KY99	U.S. Forest Service
NTN	LA12	U.S. Geological Survey
NTN	LA30	U.S. Geological Survey
MDN	MA01	National Park Service-Cape Cod National Seashore
NTN	MA01	NPS-Air Resources Division
NTN	MA08	Northeast States for Coordinated Air Use Management
NTN	MA14	Nantucket Land Council, Inc.
NTN	MA22	Boston University
NTN	MA98	Boston University
MDN	MD00	Smithsonian Environmental Research Center
MDN	MD00	Maryland Department of Natural Resources
AMON	MD06	U.S. Environmental Protection Agency - Clean Air and Power Division
AMNet	MD08	State of Maryland
AMON	MD08	Maryland Department of Natural Resources
MDN	MD08	University of Maryland - Appalachian Laboratory
MDN	MD08	Maryland Department of Natural Resources
NTN	MD08	Maryland Department of Natural Resources
NTN	MD13	University of Maryland-State Agricultural Experiment Station
NTN	MD15	National Oceanic and Atmospheric Administration - Air Resources Laboratory
NTN	MD18	Maryland Department of Natural Resources
AMNet	MD98	U.S. Environmental Protection Agency
AMNet	MD98	National Oceanic and Atmospheric Administration
AMNet	MD99	U.S. Environmental Protection Agency
AMNet	MD99	National Oceanic and Atmospheric Administration
AMON	MD99	Maryland Department of Natural Resources
MDN	MD99	University of Maryland
MDN	MD99	Maryland Department of Natural Resources
NTN	MD99	Maryland Department of Natural Resources
MDN	ME00	EPA/Maine Dept. of Environmental Protection
NTN	ME00	U.S. Environmental Protection Agency
NTN	ME00	Maine Department of Environmental Protection
MDN	ME02	Maine Department of Environmental Protection
MDN	ME02	U.S. Environmental Protection Agency
NTN	ME02	U.S. Environmental Protection Agency
NTN	ME02	Maine Department of Environmental Protection
MDN	ME04	Maine Department of Environmental Protection
NTN	ME04	Maine Department of Environmental Protection
NTN	ME08	U.S. Geological Survey
MDN	ME09	U.S. Environmental Protection Agency
MDN	ME09	Maine Department of Environmental Protection
NTN	ME09	Maine Department of Environmental Protection
NTN	ME09	U.S. Environmental Protection Agency
AMON	ME93	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	ME94	Passamaquoddy Tribe
NTN	ME94	U.S. Environmental Protection Agency
MDN	ME96	Maine Department of Environmental Protection
MDN	ME96	U.S. Environmental Protection Agency

NTN	ME96	Maine Department of Environmental Protection
NTN	ME96	U.S. Environmental Protection Agency
MDN	ME98	Acadia National Park
MDN	ME98	U.S. Environmental Protection Agency
MDN	ME98	Maine Department of Environmental Protection
NTN	ME98	NPS-Air Resources Division
MDN	MI09	Lake Michigan Air Directors Consortium
NTN	MI09	Michigan State University-State Agricultural Experiment Station
NTN	MI26	Michigan State University-State Agricultural Experiment Station
MDN	MI48	USFWS-Air Quality Branch
NTN	MI48	USFWS-Air Quality Branch
AMON	MI51	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	MI51	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	MI52	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	MI52	Lake Michigan Air Directors Consortium
NTN	MI52	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	MI53	U.S. Forest Service
AMON	MI95	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	MI96	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	MI99	U.S. Forest Service
NTN	MN01	Minnesota Pollution Control Agency
AMON	MN02	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	MN06	Leech Lake Band of Ojibwe
NTN	MN08	Minnesota Pollution Control Agency
MDN	MN16	Minnesota Pollution Control Agency
MDN	MN16	Northern Research Station
NTN	MN16	U.S. Forest Service
AMON	MN18	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	MN18	Minnesota Pollution Control Agency
NTN	MN18	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	MN23	Minnesota Pollution Control Agency
NTN	MN23	U.S. Geological Survey
MDN	MN27	Minnesota Pollution Control Agency
NTN	MN27	Minnesota Pollution Control Agency
NTN	MN28	Minnesota Pollution Control Agency
NTN	MN32	NPS-Air Resources Division
NTN	MN99	Minnesota Pollution Control Agency
NTN	MO03	U.S. Geological Survey
NTN	MO05	U.S. Geological Survey
MDN	MO46	U.S. Fish and Wildlife Service
NTN	MS10	U.S. Geological Survey
AMNet	MS12	National Oceanic and Atmospheric Administration
MDN	MS12	Mississippi Department of Environmental Quality
MDN	MS12	National Oceanic and Atmospheric Administration - Air Resources Laboratory
NTN	MS12	National Oceanic and Atmospheric Administration - Air Resources Laboratory
NTN	MS19	National Oceanic and Atmospheric Administration - Air Resources Laboratory
AMON	MS30	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	MS30	U.S. Forest Service
NTN	MT00	U.S. Geological Survey
MDN	MT05	NPS-Air Resources Division
NTN	MT05	NPS-Air Resources Division

NTN	MT07	U.S. Geological Survey
MDN	MT95	Northern Cheyenne Tribe
NTN	MT96	Fort Peck Assiniboine & Sioux Tribes
NTN	MT97	U.S. Forest Service
NTN	MT98	U.S. Geological Survey
AMON	NC02	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NC03	North Carolina State University
AMON	NC06	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NC06	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	NC08	North Carolina Department of Environment and Natural Resources, Division of Air Quality
AMON	NC25	U.S. Environmental Protection Agency - Office of Research & Development
NTN	NC25	U.S. Forest Service
AMON	NC26	U.S. Environmental Protection Agency - Office of Research & Development
MDN	NC26	North Carolina Department of Environment and Natural Resources, Division of Air Quality
NTN	NC29	North Carolina State University
AMON	NC30	U.S. Environmental Protection Agency - Office of Research & Development
NTN	NC34	North Carolina State University
AMON	NC35	U.S. Environmental Protection Agency - Office of Research & Development
NTN	NC35	North Carolina State University
NTN	NC36	U.S. Geological Survey
NTN	NC41	North Carolina State University
NTN	NC45	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NC45	North Carolina State University
AMoN	NC98	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	ND00	NPS-Air Resources Division
MDN	ND01	U.S. Fish and Wildlife Service
NTN	ND08	U.S. Geological Survey
NTN	ND11	U.S. Geological Survey
AMON	NE09	National Park Service
MDN	NE15	Nebraska Department of Environmental Quality
NTN	NE15	University of Nebraska-State Agricultural Experiment Station
AMON	NE98	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	NE98	Santee Sioux Nation of Nebraska
MDN	NE98	U.S. Environmental Protection Agency
NTN	NE99	U.S. Geological Survey
MDN	NF19	Environment Canada
AMON	NH02	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NH02	U.S. Forest Service
NTN	NJ00	USFWS-Air Quality Branch
AMNet	NJ30	State of New Jersey
MDN	NJ30	New Jersey Department of Environmental Protection
NTN	NJ39	U.S. Environmental Protection Agency - Clean Air and Power Division
AMNet	NJ54	State of New Jersey
AMON	NJ98	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NJ99	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NM07	NPS-Air Resources Division
NTN	NM08	U.S. Geological Survey
AMON	NM98	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	NM99	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	NS01	Environment Canada
MDN	NS01	Environment Canada

NTN	NV03	U.S. Geological Survey
NTN	NV05	NPS-Air Resources Division
NTN	NY01	U.S. Geological Survey
AMNet	NY06	State of New York
MDN	NY06	New York State Department of Environmental Conservation
NTN	NY06	New York State Energy Research & Development Authority
NTN	NY08	Cornell University
NTN	NY10	U.S. Geological Survey
AMON	NY16	Cary Institute
AMNet	NY20	New York State Energy Research & Development Authority
AMON	NY20	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	NY20	U.S. Environmental Protection Agency
MDN	NY20	New York State Energy Research & Development Authority
NTN	NY20	New York State Energy Research & Development Authority
NTN	NY22	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY28	New York State Energy Research & Development Authority
MDN	NY43	New York State Energy Research & Development Authority
NTN	NY43	New York State Energy Research & Development Authority
NTN	NY52	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY59	New York State Energy Research & Development Authority
AMON	NY67	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY67	National Oceanic and Atmospheric Administration - Air Resources Laboratory
MDN	NY68	New York State Energy Research & Development Authority
NTN	NY68	U.S. Geological Survey
AMON	NY91	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY92	New York State Energy Research & Development Authority
NTN	NY93	New York State Energy Research & Development Authority
AMON	NY94	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY94	New York State Energy Research & Development Authority
MDN	NY96	New York State Energy Research & Development Authority
NTN	NY96	U.S. Environmental Protection Agency
NTN	NY96	County of Suffolk-Department of Health Services-Peconic Estuary Program
AMON	NY98	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	NY98	U.S. Geological Survey
NTN	NY99	U.S. Geological Survey
AMON	OH02	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	OH02	Lake Michigan Air Directors Consortium
AMON	OH09	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	OH09	U.S. Geological Survey
NTN	OH17	U.S. Forest Service
AMON	OH27	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	OH49	U.S. Geological Survey
AMNet	OH52	Lake Michigan Air Directors Consortium
MDN	OH52	Lake Michigan Air Directors Consortium
AMON	OH54	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	OH54	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	OH71	U.S. Geological Survey
AMON	OH99	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	OK00	U.S. Geological Survey
MDN	OK01	Oklahoma Department of Environmental Quality
MDN	OK04	Oklahoma Department of Environmental Quality

MDN	OK06	Oklahoma Department of Environmental Quality
NTN	OK17	National Oceanic and Atmospheric Administration - Air Resources Laboratory
NTN	OK29	U.S. Geological Survey
MDN	OK31	Oklahoma Department of Environmental Quality
AMON	OK98	U.S. Environmental Protection Agency
AMON	OK99	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	OK99	U.S. Environmental Protection Agency
MDN	OK99	Cherokee Nation
MDN	ON07	Environment Canada
NTN	OR09	U.S. Geological Survey
NTN	OR10	U.S. Forest Service
NTN	OR18	U.S. Geological Survey
NTN	OR97	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	PA00	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	PA00	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	PA13	NPS-Air Resources Division
NTN	PA13	NPS-Air Resources Division
NTN	PA13	Pennsylvania Department of Environmental Protection
NTN	PA13	Pennsylvania State University
NTN	PA15	Pennsylvania Game Commission
NTN	PA15	National Oceanic and Atmospheric Administration - Air Resources Laboratory
NTN	PA18	U.S. Geological Survey
AMON	PA29	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	PA29	U.S. Forest Service
MDN	PA30	Pennsylvania Department of Environmental Protection
MDN	PA30	Pennsylvania State University
NTN	PA30	Pennsylvania Department of Environmental Protection
NTN	PA30	Pennsylvania State University
NTN	PA42	Pennsylvania State University-State Agricultural Experiment Station-
AMON	PA56	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	PA72	U.S. Forest Service
AMON	PA96	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	PA97	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	PR20	U.S. Forest Service
MDN	PR20	U.S. Geological Survey
NTN	PR20	U.S. Forest Service
AMON	SC05	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	SC05	USFWS-Air Quality Branch
NTN	SC05	USFWS-Air Quality Branch
NTN	SC06	U.S. Geological Survey
MDN	SC19	South Carolina Department of Health and Environmental Control
NTN	SD04	NPS-Air Resources Division
NTN	SD08	U.S. Geological Survey
MDN	SD18	U.S. Environmental Protection Agency
MDN	SD18	Cheyenne River Sioux Tribe Environmental Protection Department
NTN	SD99	U.S. Geological Survey
NTN	SK20	Saskatchewan Ministry of Environment
NTN	SK21	Saskatchewan Ministry of Environment
MDN	SK27	Environment Canada
NTN	SK30	Saskatchewan Ministry of Environment
NTN	SK31	Saskatchewan Ministry of Environment

NTN	TN00	National Oceanic and Atmospheric Administration - Air Resources Laboratory
AMON	TN01	NPS-Air Resources Division
AMON	TN04	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	TN04	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	TN07	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	TN11	NPS-Air Resources Division
NTN	TN11	NPS-Air Resources Division
MDN	TN12	NPS-Air Resources Division
NTN	TN14	U.S. Geological Survey
AMNet	TW01	EPA Taiwan
NTN	TX02	U.S. Geological Survey
NTN	TX03	U.S. Geological Survey
NTN	TX04	NPS-Air Resources Division
NTN	TX10	U.S. Geological Survey
NTN	TX16	U.S. Geological Survey
NTN	TX22	U.S. Geological Survey
AMON	TX41	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	TX43	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	TX43	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	TX56	U.S. Geological Survey
AMON	UT01	Utah Department of Environmental Quality
NTN	UT01	U.S. Geological Survey
AMON	UT09	NPS-Air Resources Division
NTN	UT09	NPS-Air Resources Division
NTN	UT95	U.S. Forest Service
AMON	UT97	Utah Department of Environmental Quality
NTN	UT98	U.S. Geological Survey
NTN	UT99	NPS-Air Resources Division
NTN	VA00	U.S. Geological Survey
AMON	VA13	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	VA13	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	VA24	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	VA24	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	VA28	NPS-Air Resources Division
NTN	VA28	NPS-Air Resources Division
NTN	VA99	USFS - Air Program
NTN	VI01	NPS-Air Resources Division
NTN	VT01	U.S. Geological Survey
AMON	VT99	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	VT99	National Oceanic and Atmospheric Administration - Air Resources Laboratory
MDN	VT99	University of Vermont - Rubinstein School of Environment & Natural Resources
NTN	VT99	U.S. Geological Survey
MDN	WA03	NPS-Air Resources Division
NTN	WA14	NPS-Air Resources Division
NTN	WA19	U.S. Geological Survey
NTN	WA21	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WA24	U.S. Geological Survey
NTN	WA98	USFS - Pacific Northwest Region
AMON	WA99	NPS-Air Resources Division
NTN	WA99	NPS-Air Resources Division
AMoN	WI06	Wisconsin State Laboratory of Hygiene

NTN	WI06	Wisconsin State Laboratory of Hygiene
AMON	WI07	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	WI08	Wisconsin Department of Natural Resources
NTN	WI08	Wisconsin Department of Natural Resources
MDN	WI10	Forest County Potawatomi Community
MDN	WI10	U.S. Environmental Protection Agency
NTN	WI10	Forest County Potawatomi Community
NTN	WI19	Wisconsin Department of Natural Resources
MDN	WI31	Wisconsin Department of Natural Resources
NTN	WI31	Wisconsin Department of Natural Resources
AMON	WI35	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WI35	U.S. Environmental Protection Agency - Clean Air and Power Division
MDN	WI36	Wisconsin Department of Natural Resources
NTN	WI36	Wisconsin Department of Natural Resources
NTN	WI37	U.S. Forest Service
NTN	WV04	U.S. Geological Survey
AMON	WV05	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WV05	U.S. Environmental Protection Agency - Clean Air and Power Division
AMON	WV18	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WV18	U.S. Forest Service
NTN	WY00	U.S. Forest Service
NTN	WY02	U.S. Bureau of Land Management
AMON	WY06	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WY06	U.S. Bureau of Land Management
MDN	WY08	Wyoming Department of Environmental Quality
NTN	WY08	NPS-Air Resources Division
MDN	WY26	Wyoming Department of Environmental Quality
AMON	WY93	U.S. Bureau of Land Management
AMON	WY93	Air Resource Specialists
AMON	WY94	NPS-Air Resources Division
NTN	WY94	Wyoming Department of Environmental Quality
AMON	WY95	U.S. Environmental Protection Agency - Clean Air and Power Division
NTN	WY95	U.S. Forest Service
NTN	WY97	Bridger-Teton National Forest
NTN	WY98	Bridger-Teton National Forest
NTN	WY99	U.S. Bureau of Land Management

APPENDIX C

Transfer Standard Instrument Certifications

Certificate Of Calibration
Fluke Calibration, American Fork
Temperature Laboratory

Certificate Number: 4500039902	Date of Calibration: 14 Feb 2024
Status: As-Left: Pass	Date Due:
Manufacturer: Fluke Calibration	Temperature: 21 to 25 °C
Model: 1551	Relative Humidity: 20 to 55 %rh
Serial Number: 6339006	Pressure: 83.5 to 88.5 kPa
Options:	Issue Date: 15 Feb 2024
Description: STIK THERMOMETER	
Procedure: AFC1024: Rev 001	
Customer: NEW PRODUCT	

EEMS # 01055

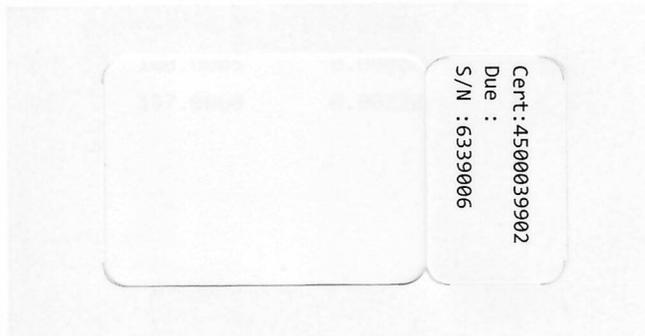
RMA/SO Number:
PO Number:

This calibration is traceable to the International System of Units (SI) through recognized national metrology institutes (NIST, NRC, PTB, NPL, etc.), radiometric techniques, or natural physical constants and is in conformance with ISO/IEC 17025:2017. Calibration certificates without identification of the authorizing person are not valid. This certificate applies to only the item identified and shall not be reproduced except in full, without the specific written approval by Fluke Corporation. The calibration interval (date due) is the responsibility of the end user.

This certificate of calibration may contain data that is not covered by the Scope of Accreditation. The unaccredited measurement points are indicated by the # symbol or confined to clearly marked sections.

Measurement uncertainties at the time of calibration are given where applicable. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement (GUM). The reported expanded uncertainty of measurement is stated as the combined standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 % and k=2.

Comments: This calibration certificate was reviewed and approved electronically.



Authorized By
Michael Coleman

Certificate Of Calibration
Fluke Calibration, American Fork
Temperature Laboratory

EEMS
01224

Certificate Number:	4500033758	Date of Calibration:	26 Sep 2023
Status:	As-Left: Pass	Date Due:	
Manufacturer:	Fluke Calibration	Temperature:	21 to 25 °C
Model:	1551	Relative Humidity:	20 to 55 %rh
Serial Number:	6196002	Pressure:	83.5 to 88.5 kPa
Options:		Issue Date:	26 Sep 2023
Description:	STIK THERMOMETER		
Procedure:	AFC1024: Rev 001		
Customer:	NEW PRODUCT		

m = 1.0
b = 0.0 *(Ed)*

This calibration is traceable to the International System of Units (SI) through recognized national metrology institutes (NIST, NRC, PTB, NPL, etc.), radiometric techniques, or natural physical constants and is in conformance with ISO/IEC 17025:2017. Calibration certificates without identification of the authorizing person are not valid. This certificate applies to only the item identified and shall not be reproduced except in full, without the specific written approval by Fluke Corporation. The calibration interval (date due) is the responsibility of the end user.

This certificate of calibration may contain data that is not covered by the Scope of Accreditation. The unaccredited measurement points are indicated by the # symbol or confined to clearly marked sections.

Measurement uncertainties at the time of calibration are given where applicable. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement (GUM). The reported expanded uncertainty of measurement is stated as the combined standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 % and k=2.

Comments: This calibration certificate was reviewed and approved electronically.



Cert # : 4500033758
 Cal Date: 26 Sep 2023
 Due Date:
 S/N : 6196002
 877.355.3225 www.flukecal.com



Authorized By
Michael Coleman



Warren-Knight Instrument Company

2045 Bennett Road
Philadelphia, PA 19116
Phone: 215-464-9300; Fax: 215-464-9303
Web: <http://www.warrenind.com>

Page 1 of 1

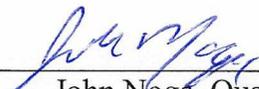
EE&MS# 01265

Van 2

CERTIFICATION OF CALIBRATION AND CONFORMANCE

We hereby certify that the equipment below has been manufactured and/or inspected by standards traceable to NIST. Calibration of the specified instrument has been performed in compliance with ANSI Z540-1 requirements. It is warranted that the equipment has been calibrated to be in full conformance with the drawings and specifications of the instrument. Calibration tests were performed on the material specified below and were in accordance with all applicable quality assurance requirements with data on file at our facility.

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	190037
Quantity:	1
Calibration Due:	02/2025


John Noga, Quality Control

February 22, 2024

Measurement Standards
Theodolite Wild T-3 S/N 18801 - Calibration 01/05/2024 - Due 01/05/2025 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-7020 S/N 5167 - Calibration 01/05/2024 - Due 01/05/2029 NBR 731/244084-89 731/2216117
Gage Block Set, SPI S/N 20899 Calibration 08/25/2023 Due 08/25/2024 Certificate of Calibration CAL.2303478-1-0



Warren-Knight Instrument Company

2045 Bennett Road
Philadelphia, PA 19116
Phone: 215-464-9300; Fax: 215-464-9303
Web: <http://www.warrenind.com>

Page 1 of 1
EEMS #
01269

CERTIFICATION OF CALIBRATION AND CONFORMANCE

AER

We hereby certify that the equipment below has been manufactured and/or inspected by standards traceable to NIST. Calibration of the specified instrument has been performed in compliance with ANSI Z540-1 requirements. It is warranted that the equipment has been calibrated to be in full conformance with the drawings and specifications of the instrument. Calibration tests were performed on the material specified below and were in accordance with all applicable quality assurance requirements with data on file at our facility.

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	Brunton Compass 01269
Serial Number:	5064612609
Quantity:	1
Calibration Due:	02/2025

John Noga
John Noga, Quality Control

February 22, 2024

Measurement Standards
Theodolite Wild T-3 S/N 18801 - Calibration 01/05/2024 - Due 01/05/2025 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-7020 S/N 5167 - Calibration 01/05/2024 - Due 01/05/2029 NBR 731/244084-89 731/2216117
Gage Block Set, SPI S/N 20899 Calibration 08/25/2023 Due 08/25/2024 Certificate of Calibration CAL2303478-1-0



Warren-Knight Instrument Company
 2045 Bennett Road
 Philadelphia, PA 19116
 Phone: 215-464-9300; Fax: 215-464-9303
 Web: <http://www.warrenind.com>

Page 1 of 1

EEMS # 01272

Var 3

CERTIFICATION OF CALIBRATION AND CONFORMANCE

We hereby certify that the equipment below has been manufactured and/or inspected by standards traceable to NIST. Calibration of the specified instrument has been performed in compliance with ANSI Z540-1 requirements. It is warranted that the equipment has been calibrated to be in full conformance with the drawings and specifications of the instrument. Calibration tests were performed on the material specified below and were in accordance with all applicable quality assurance requirements with data on file at our facility.

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	199578
Quantity:	1
Calibration Due:	02/2025


 John Noga, Quality Control

February 22, 2024

Measurement Standards
Theodolite Wild T-3 S/N 18801 - Calibration 01/05/2024 - Due 01/05/2025 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-7020 S/N 5167 - Calibration 01/05/2024 - Due 01/05/2029 NBR 731/244084-89 731/2216117
Gage Block Set, SPI S/N 20899 Calibration 08/25/2023 Due 08/25/2024 Certificate of Calibration CAL.2303478-1-0

Certificate Number
A5398658
Issue Date: 01/31/24

Certificate of Calibration

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 32609
352-262-0802

P.O. Number:

Fluke
Van 3

ID Number: EEMS 01311



Description: DIGITAL MULTIMETER
Manufacturer: FLUKE
Model Number: 287
Serial Number: 95740135
Technician: JAKE HYATT
On-Site Calibration:
Comments:

Calibration Date: 01/31/2024
Calibration Due: 01/31/2025
Procedure: METCAL FLUKE 287
Rev: 6/15/2015
Temperature: 73 °F
Humidity: 48 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement unless otherwise noted.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/ NCSL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration complies with all the requirements of ANSI/ NCSL Z540-1-1994 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

This certificate shall not be reproduced, except in full, without the written permission of Technical Maintenance, Inc.

Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

WALLY GYNN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
7040208	FLUKE	5520A	12/11/2023	12/11/2024



Technical Maintenance, Inc.

12530 TELECOM DR, TEMPLE TERRACE, FL 33637

Phone: 813-978-3054 Fax 813-978-3758

www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Certificate Number
A5398658
Issue Date: 01/31/24

Certificate of Calibration

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 32609
352-262-0802

P.O. Number:

Fluke
Van 3

ID Number: EEMS 01311



Description: DIGITAL MULTIMETER

Manufacturer: FLUKE

Model Number: 287

Serial Number: 95740135

Technician: JAKE HYATT

On-Site Calibration:

Comments:

Calibration Date: 01/31/2024
Calibration Due: 01/31/2025
Procedure: METCAL FLUKE 287
Rev: 6/15/2015
Temperature: 73 °F
Humidity: 48 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

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WALLY GYNN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
7040208	FLUKE	5520A	12/11/2023	12/11/2024



Technical Maintenance, Inc.

12530 TELECOM DR, TEMPLE TERRACE, FL 33637

Phone: 813-978-3054 Fax 813-978-3758

www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Certificate Number
A5398663
Issue Date: 01/31/24

Certificate of Calibration

Fluke

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.

4577 E NW 6TH STREET
GAINESVILLE, FL 32609
352-262-0802

P.O. Number:

Van 2

ID Number: EEMS 01312



Description: DIGITAL MULTIMETER

Manufacturer: FLUKE

Model Number: 287

Serial Number: 95740243

Technician: JAKE HYATT

On-Site Calibration:

Comments:

Calibration Date: 01/31/2024

Calibration Due: 01/31/2025

Procedure: METCAL FLUKE 287

Rev: 6/15/2015

Temperature: 73 °F

Humidity: 48 % RH

As Found Condition: IN TOLERANCE

Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement unless otherwise noted.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/ NCSL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration complies with all the requirements of ANSI/ NCSL Z540-1-1994 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

WALLY GYNN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

<u>Asset Number</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Date Calibrated</u>	<u>Cal Due</u>
7040208	FLUKE	5520A	12/11/2023	12/11/2024



Technical Maintenance, Inc.

12530 TELECOM DR, TEMPLE TERRACE, FL 33637

Phone: 813-978-3054 Fax 813-978-3758

www.tmicalibration.com

ANSI/NCSL Z540-1-1994

BL1 And BL3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1500.00	1499.37	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1000.00	999.59	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	500.00	499.79	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	200.00	199.91	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	BL3-0	Audit		1000.2	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-1	Audit		823.9	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-2	Audit		823.1	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-3	Audit		824.8	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-4	Audit		823.4	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-5	Audit		823.5	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-6	Audit		822.8	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-7	Audit		823.3	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-8	Audit		824.4	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-9	Audit		823.9	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-10	Audit		820.6	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-11	Audit		823.7	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL3-12	Audit		822.9	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL1-a	Audit		207.31	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL1-b	Audit		206.96	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL1-c	Audit		206.90	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	BL1-d	Audit		207.29	SEG	ETI/Belfort Set #3 - VAN 3
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1500.00	1499.35	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1000.00	999.56	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	500.00	499.77	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	200.00	199.89	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	100.00	99.93	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	50.00	49.95	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	0.00	-0.02	SEG	Post Balance Check

Calibrator Signature _____ Sandy Grenvill _____ Date: _____ 1/19/2024 _____

Reviewer Signature _____ Date: _____

BL2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1500.00	1499.36	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1000.00	999.57	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	500.00	499.79	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	200.00	199.92	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	100.00	99.97	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	BL2-0	Audit		999.1	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-1	Audit		822.5	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-2	Audit		819.9	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-3	Audit		823.8	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-4	Audit		824.4	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-5	Audit		822.8	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-6	Audit		823.4	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-7	Audit		822.8	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-8	Audit		822.7	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-9	Audit		822.9	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-10	Audit		823.1	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-11	Audit		822.8	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-12	Audit		823.5	SEG	ETI/Belfort Set #2 - VAN2
2/7/2023	8028481064	BL2-a	Audit			SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-b	Audit		205.45	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-c	Audit		205.98	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	BL2-d	Audit		206.17	SEG	ETI/Belfort Set #2 - VAN2
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1500.00	1499.36	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1000.00	999.56	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	500.00	499.78	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	200.00	199.90	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature Sandy Grenvill Date: 1/19/2024

Reviewer Signature _____ Date: _____

P2OTT1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1500.00	1499.37	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1000.00	999.58	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	500.00	499.77	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	200.00	199.89	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	100.00	99.95	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	50.00	49.97	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	P2OTT1-1	Audit		1017.2	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-2	Audit		1017.5	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-3	Audit		1016.7	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-4	Audit		1017.5	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-5	Audit		1016.2	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-6	Audit		1016.5	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-7	Audit		1017.1	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-8	Audit		1015.9	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-9	Audit		1017.3	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-a	Audit		255.10	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-b	Audit		254.91	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-c	Audit		254.96	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	P2OTT1-d	Audit		255.23	SEG	Ott P2 Set #1 - VAN 3
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1500.00	1499.38	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1000.00	999.61	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	500.00	499.79	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	200.00	199.90	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature _____ Sandy Grenvill _____

Date: _____ 1/19/2024 _____

Reviewer Signature _____

Date: _____

P2OTT2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1500.00	1499.36	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1000.00	999.56	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	500.00	499.78	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	200.00	199.90	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	P2OTT2-1	Audit		1015.5	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-2	Audit		1016.1	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-3	Audit		1016.1	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-4	Audit		1016.0	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-5	Audit		1015.9	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-6	Audit		1016.3	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-7	Audit		1016.3	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-8	Audit		1014.7	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-9	Audit		1015.7	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-a	Audit		254.03	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-b	Audit		254.16	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-c	Audit		254.02	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	P2OTT2-d	Audit		254.04	SEG	Ott P2 Set #2 - VAN 2
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1500.00	1499.37	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1000.00	999.59	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	500.00	499.79	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	200.00	199.91	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature Sandy Grenvill Date: 1/19/2024

Reviewer Signature _____ Date: _____

P2OTT3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1500.00	1499.39	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	1000.00	999.57	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	500.00	499.80	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	200.00	199.88	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	100.00	99.94	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	50.00	49.95	SEG	Initial Balance Check
1/19/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/19/2024	8028481064	P2OTT3-1	Audit		193.75	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-2	Audit		193.70	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-3	Audit		193.71	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-4	Audit		193.70	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-5	Audit		193.72	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-6	Audit		193.05	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-7	Audit		193.78	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-8	Audit		193.54	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-9	Audit		193.05	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-10	Audit		193.68	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-a	Audit		254.61	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-b	Audit		255.00	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-c	Audit		255.36	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	P2OTT3-d	Audit		255.27	SEG	Ott P2 Set #3- VAN 1
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1500.00	1499.36	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	1000.00	999.57	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	500.00	499.79	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	200.00	199.92	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/19/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: _____ Sandy Grenville _____ Date: _____ 1/19/2024 _____

Reviewer Signature: _____ Date: _____

P2OTT5 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
5/9/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	1500.00	1499.39	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	1000.00	999.57	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	500.00	499.80	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	200.00	199.88	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	100.00	99.94	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	50.00	49.95	SEG	Initial Balance Check
5/9/2024	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
5/9/2024	8028481064	P2OTT5-1	Audit		193.00	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-2	Audit		193.50	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-3	Audit		193.30	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-4	Audit		193.30	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-5	Audit		193.70	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-6	Audit		193.70	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-7	Audit		193.90	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-8	Audit		194.20	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-9	Audit		194.40	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-10	Audit			SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-a	Audit		255.10	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-b	Audit		255.70	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-c	Audit		254.80	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	P2OTT5-d	Audit		254.90	SEG	Ott P2 Set #5- VAN 1
5/9/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	1500.00	1499.36	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	1000.00	999.57	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	500.00	499.79	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	200.00	199.92	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
5/9/2024	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: _____ Sandy Grenville _____ Date: _____ 5/9/2024 _____
 Reviewer Signature: _____ Date: _____

Field Scientist Certification

Eric Hebert

Participated in

*The US Environmental Protection Agency's
“National Performance Audit Program (NPAP) and
PM_{2.5} Performance Evaluation Program (PEP)
Field Scientist Workshop”*

**Office of Air Quality Planning and Standards
Research Triangle Park, NC
Course Dates: March 4-7, 2024**

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Greg Noah

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Field Scientist Certification

Martin Valvur

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Field Scientist Certification

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