2022 National Atmospheric Deposition Program Site Survey Program Annual Report

Prepared for:
Contract No. EP-W-18-005

U.S. Environmental Protection Agency
Office of Air and Radiation
Clean Air Markets Division

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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 Survey Database
HAL	Hg (Mercury) Analytical Laboratory
MDN	Mercury Deposition Network
NADP	National Atmospheric Deposition Program
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 EPW-18-005, 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 survey 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). Surveys 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 survey 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 survey of sites associated with the NADP. Site surveys 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 surveys provide accountability for the program and help ensure sites are being operated consistently following the NADP Quality Assurance Project Plan (QAPP). The reported survey results are used to validate data provided by the individual sites.

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

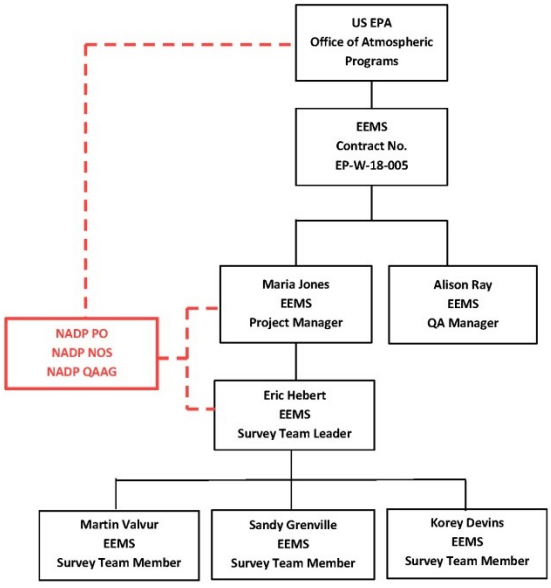
1.0 Introduction / Background

The NADP Site Survey Program is an independent and unbiased Quality Assurance (QA) program of systems and performance surveys 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 survey 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 survey program complements the QA/QC procedures followed by the Program Office (PO) and the Central Analytical Laboratory (CAL).

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 2022 organization chart for the NADP Site Survey Program.

Figure 1-1. Organization Chart of the NADP Site Survey Program



Surveys of the NADP sites are performed under contract EP-W-18-005. Maria Jones fulfills the role of Project Manager which includes contract issues, reports, and database administrator. Alison Ray, as the QA Manager, is responsible for reviewing all the data gathered in the field. Eric Hebert, as the Survey Team Leader, is responsible for the scheduling as well as directing the Survey Team Members in the performance of the site surveys. Martin Valvur, Sandy Grenville and Korey Devins are the field technicians that perform the surveys along with Eric Hebert. Both the Project Manager and Survey 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 surveys 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 survey. More details of the activities are provided in the following key tasks.

1. Scheduling sites to be surveyed. 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 surveys during each contract period. The schedule is developed based on the elapsed time since the previous site survey (priority given to longest time since previous survey), inclusion of sites that have not been surveyed, and consideration for efficient and cost-effective travel.

2. Preparing for field site surveys. During survey preparation, available site data are compiled and reviewed. A current year site file is created. The necessary materials and standards for each site survey are checked and shipped if necessary. The operators of the sites scheduled for surveys are contacted to finalize the survey arrangements.

3. Performing site surveys. During each site survey 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 survey 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 raingage 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 survey, verifying and correcting any discrepancies, and confirming with the site personnel as needed.

4. 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 survey 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.

5. Transferring observations from survey forms to survey database. Entering the survey information obtained in the steps above into the survey database and reviewing for significant differences using the automated verification feature, and entry/exit rules.

6. 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, survey 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.

7. Providing a quarterly data set (final site survey report) in the form of tables. This final data set includes all the information gathered during the site surveys conducted in the previous three months. The data for each site consists of:
   - Survey results that have been subjected to duplicate entry and internal QA review.
   - Digital photographs.
   - Scanned raingage chart (if applicable).
   - Any additional pertinent supporting information.

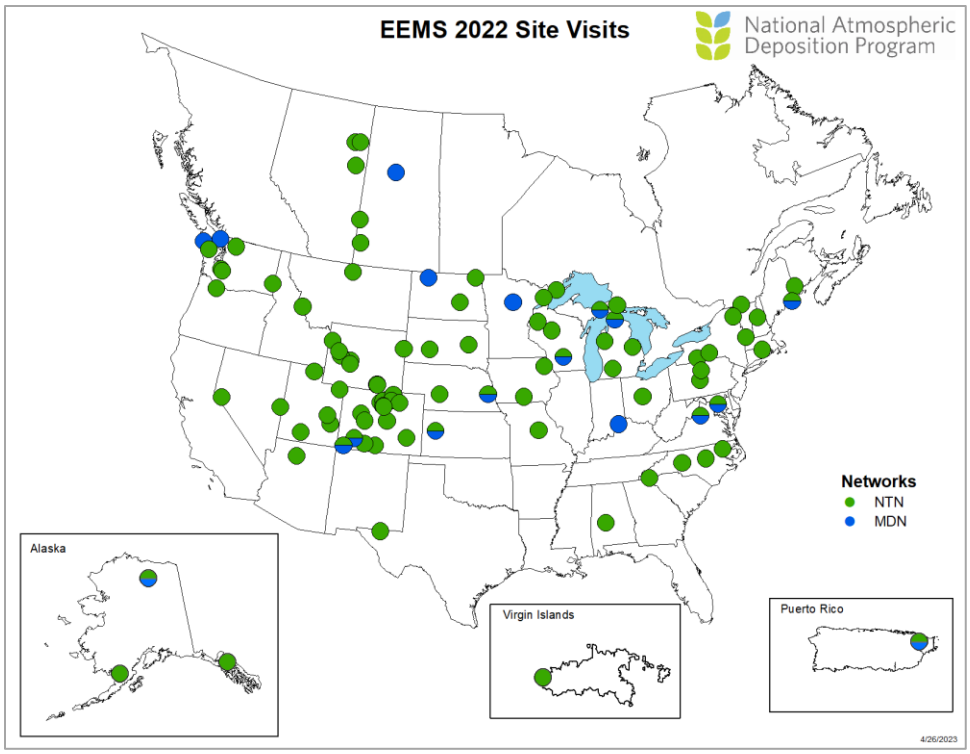
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed from January through December of 2022.

A total of 113 NADP collectors (this number includes co-located sites) were surveyed during the period covered by this report at 101 distinct locations. These include 21 MDN sites and 92 NTN sites. Figure 2-1 is a map of the sites visited during 2022. Table 2-1 is a list of the sites surveyed and includes the network, site name, survey date, and equipment.

Figure 2-1. Site Survey Locations in 2022



2.2 General Status of Sites Surveyed and Equipment Encountered

Overall, the sites surveyed during this reporting period were found in good condition and collecting data that meet NADP quality objectives. All of the 101 precipitation raingages surveyed (co-located sites usually use the same raingage) were electronic raingages, either ETI NOAH IV (65 raingages), or the OTT PLUVIO (36 raingages).

Of the 113 collectors surveyed, 49 sites operated N-CON collectors. The 64 remaining collectors were AeroChem Metrics (ACM) type, manufactured by either AeroChemetrics or Loda Electronics Company.

Thirty-four locations visited operate backup raingages of various types. Only assessments related to siting criteria of the backup raingages are evaluated during surveys, not the raingage 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 survey team regarding improvements to their sample handling technique and equipment maintenance.

Specific survey findings that impact, or could impact data quality, are discussed in Section 3.0. The list of sites surveyed during 2022 and the equipment found at the sites is shown in Table 2-1.

Table 2-1. Sites Surveyed from January through December 2022 and Equipment Found

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AB32	Fort Mackay	NTN	8/9/2022	N-CON	OTT	N/A
AB34	Stony Mountain	NTN	8/8/2022	N-CON	OTT	N/A
AB36	Wapasu	NTN	8/9/2022	N-CON	OTT	N/A
AK02	Juneau	NTN	10/5/2022	ACM	ETI	N/A
AK96	Toolik Field Station	MDN/NTN	10/6/2022	N-CON	ETI	N/A
AK97	Katmai National Park - King Salmon	NTN	10/4/2022	N-CON	ETI	N/A
AL10	Marion Junction	NTN	3/22/2022	ACM	OTT	N/A
AZ03	Grand Canyon National Park -Hopi Point	NTN	4/20/2022	ACM	ETI	Tipping Bucket
BC16	Saturna Island	MDN	6/28/2022	N-CON	ETI	Other
CAN5	Frelighsburg	NTN	7/25/2022	N-CON	ETI	N/A
CO00	Alamosa	NTN	7/14/2022	N-CON	OTT	N/A
CO01	Las Animas Fish Hatchery	NTN	7/13/2022	N-CON	OTT	N/A
CO02	Niwot Saddle	NTN	7/19/2022	ACM	Belfort	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
CO08	Four Mile Park	NTN	7/27/2022	ACM	ETI	N/A
CO09	Kawaneechee Meadow	NTN	7/20/2022	ACM	ETI	N/A
CO10	Gothic	NTN	7/15/2022	ACM	ETI	N/A
CO19	Rocky Mountain National Park	NTN	7/5/2022	ACM	ETI	N/A
CO21	Manitou	NTN	7/12/2022	ACM	ETI	N/A
CO22	Pawnee	NTN	3/29/2022	ACM	ETI	N/A
CO81	Missile Site Park	NTN	3/8/2022	N-CON	ETI	Tipping Bucket
CO82	Orchard	NTN	3/8/2022	N-CON	ETI	Tipping Bucket
CO90	Niwot Ridge-Southeast	NTN	7/19/2022	ACM	ETI	Other
CO91	Wolf Creek Pass	NTN	9/6/2022	ACM	OTT	N/A
CO94	Sugarloaf	NTN	3/30/2022	ACM	ETI	N/A
CO96	Molas Pass	MDN/NTN	7/26/2022	N-CON ACM	ETI	N/A
CO99	Mesa Verde National Park Chapin Mesa	MDN/NTN	5/6/2022	ACM N-CON	ETI	N/A
CT15	Abington	NTN	11/28/2022	ACM	ETI	N/A
IA08	Big Springs Fish Hatchery	NTN	9/27/2022	N-CON	OTT	N/A
IA23	Mcnay Research Center	NTN	9/26/2022	N-CON	OTT	N/A
IN21	Clifty Falls State Park	MDN	12/22/2022	ACM	OTT	Stick
KS32	Lake Scott State Park	MDN/NTN	11/2/2022	N-CON	OTT	Stick
MD99	Beltsville	MDN/NTN	11/30/2022	ACM	ETI	Tipping Bucket
ME94	Indian Township	NTN	8/5/2022	ACM	ETI	Other
ME98	Acadia National Park Mcfarland Hill	MDN/NTN	8/4/2022	ACM - NCON	ETI	Tipping Bucket
MI09	Douglas Lake	MDN/NTN	10/30/2022	ACM	ETI	N/A
MI26	Kellogg Biological Station	NTN	12/21/2022	ACM	ETI	N/A
MI48	Seney National Wildlife Refuge-Headquarters	MDN/NTN	10/29/2022	ACM	ETI	N/A
MI51	Unionville	NTN	10/6/2022	ACM	ETI	N/A
MI53	Wellston	NTN	10/31/2022	ACM	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
MI94	Riverside	NTN	10/11/2022	ACM	ETI	N/A
MN06	Leech Lake	MDN	9/25/2022	ACM	OTT	N/A
MN08	Hovland	NTN	10/27/2022	ACM	ETI	N/A
MN99	Wolf Ridge	NTN	10/28/2022	N-CON	ETI	N/A
MO03	Ashland Wildlife Area	NTN	10/14/2022	N-CON	OTT	Tipping Bucket
MT00	Little Bighorn Battlefield National Monument	NTN	4/4/2022	ACM	ETI	N/A
MT97	Lost Trail Pass	NTN	8/1/2022	ACM	OTT	N/A
MT98	Havre - Northern Agricultural Research Center	NTN	8/3/2022	N-CON	OTT	N/A
NC03	Lewiston	NTN	12/12/2022	ACM	OTT	Stick
NC25	Coweeta	NTN	12/29/2022	ACM	ETI	Stick
NC34	Piendmont Research Station	NTN	12/11/2022	ACM	OTT	Stick
NC41	Finley Farm	NTN	12/11/2022	ACM	OTT	N/A
ND01	Lostwood National Wildlife Refuge	MDN	10/25/2022	N-CON	ETI	Tipping Bucket
ND08	Icelandic State Park	NTN	10/27/2022	N-CON	OTT	N/A
ND11	Woodworth	NTN	10/26/2022	N-CON	OTT	N/A
NE15	Mead	MDN/NTN	11/3/2022	N-CON ACM	ETI	N/A
NE98	Santee	MDN	11/4/2022	N-CON	ETI	N/A
NE99	North Platte Agricultural Experiment Station	NTN	4/8/2022	N-CON	OTT	N/A
NH02	Hubbard Brook	NTN	8/9/2022	ACM	ETI	N/A
NV03	Smith Valley	NTN	12/5/2022	ACM	OTT	N/A
NV05	Great Basin National Park Lehman Caves	NTN	11/29/2022	ACM	ETI	N/A
NY01	Alfred	NTN	8/17/2022	N-CON	OTT	N/A
NY67	Ithaca	NTN	8/16/2022	ACM	ETI	Stick
NY98	Whiteface Mountain	NTN	7/26/2022	N-CON	OTT	Ott
OH16	Northeast Ohio Regional Sewer District	MDN	6/3/2022	N-CON	OTT	N/A
OH17	Delaware	NTN	6/2/2022	ACM	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
ON07	Egbert	MDN	8/2/2022	N-CON	ETI	Ott
PA15	Penn State	NTN	6/7/2022	ACM	ETI	Belfort
PA18	Young Woman's Creek	NTN	6/6/2022	N-CON	OTT	N/A
PR20	El Verde	MDN/NTN	2/15/2022	N-CON ACM	ETI	N/A
SD08	Cottonwood	NTN	4/7/2022	N-CON	OTT	N/A
SD99	Huron Well Field	NTN	9/29/2022	N-CON	OTT	Stick
SK20	Cactus Lake	NTN	8/4/2022	N-CON	ETI	N/A
SK27	Pinehouse	MDN	8/5/2022	N-CON	OTT	Other
SK31	Fox Valley	NTN	8/3/2022	N-CON	ETI	N/A
TX22	Guadalupe Mountains National Park Frijole Ranger Station	NTN	3/4/2022	ACM	ETI	N/A
UT01	Logan	NTN	5/4/2022	N-CON	OTT	Other
UT09	Canyonlands National Park Island In The Sky	NTN	5/5/2022	ACM	ETI	N/A
UT95	East Mckee	NTN	5/3/2022	ACM	ETI	N/A
UT98	Green River	NTN	3/24/2022	N-CON	OTT	N/A
UT99	Bryce Canyon National Park Repeater Hill	NTN	9/9/2022	ACM	ETI	N/A
VA28	Shenandoah National Park Big Meadows	MDN/NTN	8/26/2022	ACM N-CON	ETI	Tipping Bucket
VI01	Virgin Islands National Park Lind Point	NTN	2/17/2022	ACM	ETI	N/A
VT01	Bennington	NTN	8/9/2022	N-CON	OTT	N/A
WA03	Makah National Fish Hatchery	MDN	6/24/2022	ACM	ETI	Other
WA14	Olympic National Park Hoh Ranger Station	NTN	6/22/2022	ACM	ETI	Other
WA19	North Cascades National Park Marblemount Ranger Station	NTN	6/29/2022	N-CON	OTT	Other
WA21	La Grande	NTN	6/21/2022	ACM	ETI	N/A
WA24	Palouse Conservation Farm	NTN	10/17/2022	N-CON	OTT	Stick
WA98	Columbia River Gorge	NTN	6/20/2022	ACM	ETI	N/A
WA99	Mount Rainier National Park Tahoma Woods	NTN	6/21/2022	ACM	ETI	N/A
WI31	Devil's Lake	MDN/NTN	9/13/2022	N-CON	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
WI35	Perkinstown	NTN	9/14/2022	ACM	ETI	N/A
WI37	Spooner	NTN	9/30/2022	N-CON	ETI	N/A
WY00	Snowy Range	NTN	8/23/2022	ACM	ETI	N/A
WY02	Sinks Canyon	NTN	5/20/2022	ACM	ETI	Other
WY06	Pinedale	NTN	5/17/2022	ACM	ETI	Tipping Bucket
WY94	Grand Tetons National Park	NTN	5/18/2022	N-CON	ETI	Tipping Bucket
WY95	Brooklyn Lake	NTN	8/9/2022	ACM	ETI	N/A
WY97	South Pass City	NTN	5/20/2022	ACM	ETI	N/A
WY98	Gypsum Creek	NTN	5/17/2022	ACM	ETI	N/A
WY99	Newcastle	NTN	4/6/2022	ACM	ETI	N/A

A total of 51 AMoN sites were included in the site surveys, and they are listed in Table 2-2. The sampler mounting height is measured and photographs (directional and overview) are taken of the sampler during the AMoN site survey.

Table 2-2. AMoN Sites Visited in 2022

Site ID	Station Name	Date Visited
AK96	Toolik Field Station	10/7/2022
AL99	Sand Mountain Exp Station	12/5/2022
AR03	Caddo Valley	12/15/2022
AZ98	Chiricahua	4/21/2022
CA67	Joshua Tree NP - Black Rock	9/13/2022
CO88	Rocky Mountain NP Long's Peak	7/16/2022
CT15	Abington	11/28/2022
FL19	Indian River	4/19/2022
FL23	Sumatra	4/20/2022
GA41	Georgia Station	12/6/2022

Site ID	Station Name	Date Visited
ID07	Nez Perce	10/19/2022
IL11	Bondville	9/11/2022
IL37	Stockton	10/1/2022
IL46	Alhambra	9/10/2022
KY03	Mackville	11/9/2022
KY29	Crockett	12/4/2022
MD99	Beltsville	12/2/2022
MI51	Unionville	10/6/2022
MI95	Hoxeyville	10/5/2022
MN02	Red Lake	10/29/2022
MS30	Coffeeville	2/28/2022
NC06	Beaufort	12/27/2022
NC25	Coweeta	12/29/2022
NC26	Candor	12/22/2022
NE98	Santee	11/4/2022
NJ99	Washington Crossing	7/15/2022
NY67	Ithaca	8/16/2022
NY91	Claryville	7/20/2022
NY98	Whiteface Mountain	7/26/2022
OH09	Oxford	6/1/2022
OH99	Quaker City	11/26/2022
OK00	Stilwell	12/13/2022
PA00	Arendtsville	4/28/2022
PA29	Kane Experimental Forest	6/4/2022
PA56	M K Goddard St Pk	6/6/2022
PA96	Penn State – Fairbrook Park	6/5/2022

Site ID	Station Name	Date Visited
PR20	El Verde	2/15/2022
SK27	Pinehouse	8/5/2022
TN04	Speedwell	11/20/2022
TN07	Edgar Evans St Pk	11/19/2022
TX41	Alabama Coushatta	3/1/2022
TX43	Cañónceta	3/6/2022
VA13	Blue Grass Trail	12/3/2022
VA24	Prince Edward	7/12/2022
WA04	Confederated Tribes of the Umatilla Indian	10/18/2022
WI35	Perkinstown	9/14/2022
WV18	Parsons	7/14/2022
WY06	Pinedale	5/17/2022
WY93	Basin – Big Horn	4/3/2022
WY94	Grand Tetons National Park	5/18/2022
WY95	Brooklyn Lake	8/9/2022

3.0 Specific Problems Encountered and Frequency

Each site survey consists of evaluating the existing conditions relating to NADP siting criteria, performance and condition of the equipment (collector and primary raingage), 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 surveyor and summary reports are created. The number of checks performed during a survey will vary depending on the network and the type of equipment present at the site.

3.1 Findings 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 in terms of relative importance as:

- Sample handling
- Collector operation
- Compliance with siting criteria rules and guidelines, and
- Raingage performance.

Table 3-1 presents the number of collectors, raingages and sites that meet the assessment criteria, chosen from these categories that are deemed likely to impact data quality.

Table 3-1. Collector, Raingage, and Site Meeting Criteria

	Surveyed	Meeting all Assessments[1]	Percent Meeting all Assessment
Collectors	113	59	52.2
Number of NTN ACM – type	55	30	54.5
Number of MDN ACM – type	9	9	100.0
Number of NTN N-CON	37	13	35.1
Number of MDN N-CON	12	7	58.3
Raingages	101	62	61.4
Belfort Raingages	1	0	0.0
Electronic Raingages	100	62	62.0
Siting Criteria (only rules considered)			
Raingage Specific	101	39	38.6
Collector Specific	113	96	85.0
Other Siting Criteria			

[1] Meeting all assessments "as found".

	Surveyed	Meeting all Assessments[1]	Percent Meeting all Assessment
MDN Sites	92	79	85.9
NTN Sites	21	19	90.5
Siting Criteria (rules and guidelines considered)			
Raingage Specific	101	30	29.7
Collector Specific	113	26	23.0
Other Siting Criteria			
NTN Siting Criteria	92	62	67.4
MDN Siting Criteria	21	8	38.1

All site operators were found to maintain sample media quality; however, gloves were not consistently used by all operators. The proper protocol regarding glove use was stressed during the survey visits.

In the past, EEMS has used both rules and guidelines as requirements for sites to comply with, and has made no distinctions between the two, given that both rules and guidelines are part of the site survey questionnaire. This approach was used when preparing the Annual Reports with the consequence that very few sites met all the siting criteria. Beginning with the 2021 NADP Annual Report, Table 3-1 now includes the siting criteria taking into account only rules as well as a combination of rules and guidelines.

For this 2022 NADP Annual Report, EEMS is taking into account the fact that some of the siting criteria rules have been downgraded to guidelines since it was established that the impact these rules have in data quality are not statistically significant. The following siting criteria rules are considered guidelines going forward:

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

As can be observed in Table 3-1, with these three changes, and only considering siting criteria rules, the percentage of collectors meeting all the siting criteria assessments has increased from 23% to 85% .

Table 3-2 presents the siting criteria assessments indicating whether a given assessment is a rule (R) or a guideline (G) and includes these three changes recently introduced.

EEMS applied the same methods used historically to assess siting criteria. It is EEMS' understanding that accurately completing the site survey questionnaire is the method to obtain a

good description of the condition of a site. Making this information available in a searchable database allows users to extract desired data, and answer potential questions.
Modifications to the site survey questionnaire will be implemented 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. For instance, EEMS believes that it is important when describing a site that the amount of vegetation surrounding the equipment be reported as accurately as possible. YES/NO answers to these types of questions are not helpful; the presence of one small tree near the equipment receives the same weight as would a cluster of large trees.

Appendix A contains the complete list of current survey assessments that EEMS considers could directly impact data quality. The remainder of this section and the following tables focus on the survey data that describes only the assessments that did ***not*** meet NADP criteria during this reporting period.

Table 3-2 presents the non-compliant survey data for the different sites. 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 survey performance. However, summarizing this information allows any elevated number of observed assessment failures to be quickly and easily identified. Items with a non-compliant percentage greater than 20% are identified in Table 3-2 and discussed in more detail in other sections of this report.

Table 3-2. Percent of Non-compliant Findings

	Siting and Performance Checks	Number of Assessments[2]	Found Non-Compliant	Percent (%) Non-Compliant
Sample Handling				
Is sampling media quality maintained?		108	0	0.0
Siting Criteria Assessments				
R	Is the orifice of the collector +/- .3 m of raingage (elevation)?	113	15	13.3
R	45 degree rule met (raingage)	113	13	11.5
G	30 degree guideline for trees met (raingage)	101	30	29.7
R	30 degree rule for buildings met (raingage)	101	0	0
R	No objects > 1 m height inside 5 m radius (raingage)	101	34	33.7
G	No fences > 1 m height inside 2 m radius (raingage)	101	8	7.9
R	No vegetation height > 0.6 m within 5 m radius (raingage)	101	33	32.7

[2] The number of assessments varies depending on the number of observations made. The breakdown of the number of assessments for each check is presented in Table 3-1.

	Siting and Performance Checks	Number of Assessments[2]	Found Non-Compliant	Percent (%) Non-Compliant
R	Collector oriented properly	113	12	10.6
R	45 degree rule met (collector)	113	11	9.7
G	30 degree guideline for trees met (collector)	113	35	31.0
R	30 degree rule for buildings met (collector)	113	0	0
G	No objects > 1 m height within 5 m radius (collector)	113	35	31.0
R	No fences > 1 m height inside 5 m radius (collector)	113	17	15.0
G	No vegetation height > 0.6 m within 5 m radius (collector)	113	34	30.1
G	No treated lumber inside 5 m radius (collector)	113	25	22.1
G	No galvanized metal inside 5 m radius collector (MDN)	21	14	66.7
R	No pastures and ag. activity within 20 m radius	113	12	10.6
G	No herbicides and fertilizers used within 20 m radius	113	5	4.4
R	Roads meet NADP siting criteria	113	3	2.7
R	Waterways meet NADP siting criteria	113	0	0.0
R	Airports meet NADP siting criteria	113	0	0.0
R	Animal operations meet NADP siting criteria (NTN)	92	0	0.0
R	Combustion sources meet NADP siting criteria	21	0	0.0
G	Parking lots and maintenance areas meet NADP siting criteria	113	5	4.4
G	Storage areas (fertilizers, road salt, manure, etc.) meet NADP siting criteria	113	0	0.0
G	Metalworking operations meet NADP siting criteria (MDN only)	21	0	0.0
ACM-type Collector Assessments				
Dry side bucket is clean (NTN)		55	8	14.6
Dry side bag installed correctly (MDN)		9	0	0.0
Does lid seal properly		64	2	3.1
Lid liner in good condition		64	3	4.7
Fan in good condition (MDN)		9	0	0
Cooling fan thermostat in good condition (MDN)		9	0	0.0
Heater in good condition (MDN)		9	0	0.0
Heater thermostat in good condition (MDN)		9	0	0.0
Has flush wall filter mount been installed (MDN)		9	1	11.1
Filter in good condition (MDN)		9	0	0.0
Max / min thermometer within acceptable limits (MDN)		9	0	0.0
ACM sensor operates properly		64	3	4.7
Motor-box operates within acceptable limits		64	1	1.6

Siting and Performance Checks	Number of Assessments[2]	Found Non-Compliant	Percent (%) Non-Compliant
N-CON Collector Assessments			
N-CON fan in good condition (MDN)	11	4	36.4
N-CON cooling fan thermostat in good condition (MDN)	12	1	8.3
N-CON heater in good condition (MDN)	12	0	0.0
N-CON heater thermostat in good condition (MDN)	12	0	0.0
N-CON max / min thermometer in acceptable limits (MDN)	12	1	8.3
N-CON sensor respond to 5 passes of the hand	49	4	8.2
N-CON lid seals properly	49	3	6.1
N-CON lid liner in good condition	49	2	4.1
N-CON arms and motorbox do not require tightening	49	27	55.1
Electronic Raingage Assessments			
Raingage operates properly (electronic gage)	101	7	6.9
Does datalogger receive event signals form all collectors (electronic gage)	101	6	5.9
Does optical sensor respond to "blocking" of light beam (ETI)	65	10	15.4
Does optical sensor respond to mist of water (ETI)	65	9	13.9

Tables B-1 through B-4 in Appendix B present EEMS' findings regarding the assessments of siting criteria, raingage and collector condition, and site operator proficiency (assessed as sampling media quality maintained) which are considered to be the areas that may impact data quality the most. As described in survey Task #3, the assessment of site operator proficiency includes the qualitative evaluation of the site personnel regarding the methods and procedures used for sample handling, recordkeeping, reporting, equipment cleaning, maintenance, and material storage.

The data indicate that most of the non-compliant findings are related to objects being closer to the collector than the siting criteria allows.

Other assessments shown to have a high number of sites out of compliance are related to vegetation. These assessments are expected to vary depending on the season in which the survey 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 raingage 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 will be incorporated for future assessments and reporting.

Four sites surveyed have experienced some changes since the last visit (i.e., to the question "No significant changes to local site conditions within 500 meters of the collector since previous survey", the response was "NO"):

- CO02-NTN: A Pluvio Raingage was installed in October of 2021.
- CO10-NTN: The towers and platforms from the US DOE ARM "SAIL" atmospheric research project were installed to the west of the site, within 500 m of the collector.
- UT99-NTN: A new cell tower has been installed to the SE approximately 25 m from the collector and 30 m from the rain gauge. The tower violates the 45-degree rule for both.
- WY06-NTN: An N-CON collector (chimney type), apparently not part of the NADP, was installed at the site on a wood platform. The electronic raingage is now installed on a wooden platform as well.

3.2 Survey Results for Sites with Multiple Survey Visits

Of the 113 sites surveyed in 2022, 107 had been previously visited by EEMS. The majority of the sites were surveyed in 2017 and 2018, with 33 and 69 sites respectively. In 2016 four sites were surveyed and only one site in 2019. Most of these sites have been visited four or five times by EEMS.

Six sites were surveyed in 2022 for the first time. Newly visited sites were AB34-NTN, AB36-NTN, CO81-NTN, CO82 NTN, MI94 NTN and NY67 (Used to be an AIRMON site). Tables presenting the survey assessments for successive visits can be found in Appendix C. Comparisons of the percent non-compliant results for successive surveys are presented in Table 3-3. For those sites with more than two surveys, only the last two visits were considered (i.e., survey conducted in 2022 and 2017 or 2018 for most sites).

Table 3-3. Percent of Non-compliant Items for Sites Surveyed more than Once

Siting and Performance Checks	% Non-compliant During 2022	% Non-compliant During Previous Survey
Is sampling media quality maintained?	0.0%	0.0%
R - Is the orifice of the collector +/- .3 m of raingage (elevation)?	13.3%	9.3%
R - 45 degree rule met (raingage)	11.9%	15.8%
G - 30 degree guideline for trees met (raingage)	29.7%	32.6%
R - 30 degree rule for buildings met (raingage)	0.0%	0.0%

Siting and Performance Checks	% Non-compliant During 2022	% Non-compliant During Previous Survey
G - No objects > 1 m height inside 5 m radius (raingage)[3]	33.7%	37.9%
R - No fences > 1 m height inside 2 m radius (raingage)	7.9%	5.3%
G - No vegetation height > 0.6 m within 5 m radius (raingage)	32.7%	26.3%
R - Collector and sensor oriented properly	10.6%	8.4%
R - 45 degree rule met (collector)	9.7%	13.1%
G - 30 degree guideline for trees met (collector)	31.0%	31.8%
R - 30 degree rule for buildings met (collector)	0.0%	0.0%
G - No objects > 1 m height within 5 m radius (collector)	31.0%	29.9%
R - No fences > 1 m height inside 5 m radius (collector)	15.0%	15.9%
G - No vegetation height > 0.6 m within 5 m radius (collector)	30.1%	22.4%
G - No treated lumber inside 5 m radius (collector)	22.1%	22.4%
G - No galvanized metal inside 5 m radius collector (MDN)	33.3%	19.0%
R - No pastures and ag. activity within 20 m radius	10.6%	11.2%
G - No herbicides and fertilizers used within 20 m radius	4.4%	3.7%
R - Roads meet NADP siting criteria	2.7%	0.9%
R - Waterways meet NADP siting criteria	0.0%	0.0%
R - Airports meet NADP siting criteria	0.0%	0.0%
R - Animal operations meet NADP siting criteria (NTN)	0.0%	0.0%
R - Combustion sources meet NADP siting criteria (MDN only)	0.0%	0.0%
G - Parking lots and maintenance areas meet NADP siting criteria	4.4%	0.0%
G - Storage areas (fertilizers, road salt, manure, etc.) meet NADP siting criteria	0.0%	0.0%
G - Metalworking operations meet NADP siting criteria (MDN only)	0.0%	0.0%
ACM-type Collector Assessments		
Dry side bucket is clean (NTN)	14.5%	10.9%
Dry side bag installed correctly (MDN)	0.0%	0.0%
Does lid seal properly	3.1%	1.5%
Lid liner in good condition	4.7%	6.2%
Fan in good condition (MDN)	0.0%	0.0%
Cooling fan thermostat in good condition (MDN)	0.0%	0.0%

[3] "No objects > 1 m height inside 5 m radius (raingage)" and "No vegetation height > 0.6 m within 5 m radius (raingage)" were downgraded from RULE to GUIDELINE in October 2023.

Siting and Performance Checks	% Non-compliant During 2022	% Non-compliant During Previous Survey
Heater in good condition (MDN)	0.0%	0.0%
Heater thermostat in good condition (MDN)	0.0%	0.0%
Has flush wall filter mount been installed (MDN)	0.0%	22.2%
Filter in good condition (MDN)	0.0%	0.0%
Max / min thermometer within acceptable limits (MDN)	0.0%	0.0%
ACM sensor operates properly	4.7%	3.1%
Motor-box operates within acceptable limits	1.6%	0.0%
N-CON Collector Assessments		
N-CON fan in good condition (MDN)	36.4%	8.3%
N-CON cooling fan thermostat in good condition (MDN)	8.3%	0.0%
N-CON heater in good condition (MDN)	0.0%	0.0%
N-CON heater thermostat in good condition (MDN)	0.0%	8.3%
N-CON max / min thermometer in acceptable limits (MDN)	8.3%	8.3%
N-CON sensor responds to 5 passes of the hand	8.2%	0.0%
N-CON lid seals properly	4.1%	2.4%
N-CON lid liner in good condition	4.1%	2.4%
Arms and motorbox do not require tightening	55.1%	N/A
Electronic Raingage Assessments		
Raingage operates properly (electronic gage)	6.9%	1.1%
Does datalogger receive event signals form all collectors (electronic gage)	5.9%	6.7%
Does optical sensor respond to "blocking" of light beam (ETI)	15.4%	17.5%
Does optical sensor respond to mist of water (ETI)	13.8%	14.0%

Table 3-3 shows a new item added to the questionnaire N-CON questionnaire in 2019 to properly record which N-CON collectors required the arms and motorbox to be tightened. During 2022, 55.1% of all N-CON collectors required adjustments. In 2016 and 2017, though the problem with the N-CON collector was being addressed in the field and some recommendations were made, the number of collectors with a loose lid were not being recorded. Surveyors assumed that if the lid was resting on the bucket or chimney of the collector this meant a good seal. No consideration was made to whether it was possible the lid could move under windy conditions and have a poor seal. It was in 2018 that instructions were given to surveyors to indicate a poor lid seal if the collector required arm adjustments.

Though Table 3-3 may show a slight decline regarding failures with the optical sensor of the ETI raingage, these raingages have been showing an increase in wear and corrosion around the connections for the sensors.

Comparing data from one survey 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 gauge of network operation might be tracking the increase or decrease in sample quality codes as assigned by the laboratories responsible for evaluating and analyzing the samples. It can be assumed that as all site survey findings are addressed (siting criteria, equipment maintenance, operator procedures, etc.) there will be a quantifiable effect e.g., 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. Since most of the items found out of compliance are related to siting criteria, significant improvements in data quality may not be realized, but changes in the surrounding area including industrial or agricultural sources, obstructions, or vegetation may impact overall trend in the data.

3.3 Findings Related to the Wind Shield at Sites Surveyed

Data provided by the NADP PO indicate that raingages located at elevations greater than 1000 meters are encouraged to have a wind shield installed, as well as at sites where more than 20 percent of the annual precipitation is frozen. Table 3-4 presents the assessments of wind shields at the sites surveyed during the period covered by this annual report, and whether a shield was present at the time of the previous survey. Eighty-five of the 101 raingages surveyed during the reporting period covered by this report were identified as potentially required to have a wind shield.

Table 3-4. Status of Surveyed Sites Requiring Raingage Shields

Site ID	Network	Condition in 2022	Previous Survey
AB32	NTN	Installed	Installed
AB34	NTN	Installed	New Site
AB36	NTN	Installed	New Site
AK02	NTN	Installed	Installed
AK96	MDN/NTN	Installed	Installed
AK97	NTN	Installed	Installed
BC16	MDN	Installed	Installed
CAN5	NTN	Installed	Not Present
CO00	NTN	Installed	Installed

Site ID	Network	Condition in 2022	Previous Survey
MT98	NTN	Not Present	Not Present
ND01	MDN	Not Present	Not Present
ND08	NTN	Installed	Not Present
ND11	NTN	Not Present	Not Present
NE15	MDN/NTN	Installed	Installed
NE98	MDN	Installed	Installed
NE99	NTN	Not Present	Not Present
NH02	NTN	Installed	Installed
NV03	NTN	Installed	Installed

Site ID	Network	Condition in 2022	Previous Survey
CO01	NTN	Installed	Installed
CO02	MDN/NTN	Installed	Installed
CO08	MDN/NTN	Installed	Installed
CO09	MDN/NTN	Installed	Installed
CO10	NTN	Installed	Installed
CO19	NTN	Installed	Installed
CO21	NTN	Installed	Not Present
CO22	NTN	Installed	Installed
CO81	NTN	Installed	New Site
CO82	NTN	Installed	New Site
CO90	NTN	Installed	Installed
CO91	NTN	Installed	Installed
CO94	NTN	Installed	Installed
CO96	MDN/NTN	Installed	Installed
CO99	MDN	Installed	Installed
CT15	NTN	Installed	Installed
IA08	NTN	Installed	Installed
IN21	NTN	Installed	Installed
KS32	MDN/NTN	Installed	Installed
ME94	NTN	Installed	Installed
ME98	MDN	Installed	Installed
MI09	MDN/NTN	Installed	Installed
MI26	NTN	Installed	Installed
MI48	MDN/NTN	Installed	Installed
MI51	NTN	Installed	Installed
MI53	NTN	Installed	Installed
MI94	NTN	Installed	New Site
MN06	MDN	Installed	Not Present
MN08	NTN	Installed	Installed
MN99	NTN	Installed	Installed
MT97	NTN	Installed	Installed

Site ID	Network	Condition in 2022	Previous Survey
NV05	NTN	Installed	Installed
NY01	NTN	Not Present	Not Present
NY67	NTN	Installed	New Site
NY98	NTN	Installed	Not Present
ON07	MDN	Installed	Installed
PA15	NTN	Not Present	Not Present
PA18	NTN	Not Present	Not Present
SD08	NTN	Installed	Installed
SD99	NTN	Installed	Installed
SK20	NTN	Installed	Installed
SK27	MDN	Installed	Installed
SK31	NTN	Installed	Installed
UT01	NTN	Installed	Installed
UT09	NTN	Not Present	Not Present
UT95	NTN	Not Present	Not Present
UT98	NTN	Not Present	Not Present
UT99	NTN	Installed	Installed
VT01	NTN	Installed	Installed
WA24	NTN	Installed	Installed
WI31	MDN/NTN	Installed	Installed
WI35	NTN	Installed	Installed
WI37	NTN	Installed	Installed
WY00	NTN	Installed	Installed
WY02	NTN	Installed	Installed
WY06	NTN	Installed	Installed
WY94	NTN	Installed	Installed
WY95	NTN	Installed	Installed
WY97	NTN	Installed	Installed
WY98	NTN	Installed	Installed
WY99	NTN	Installed	Installed

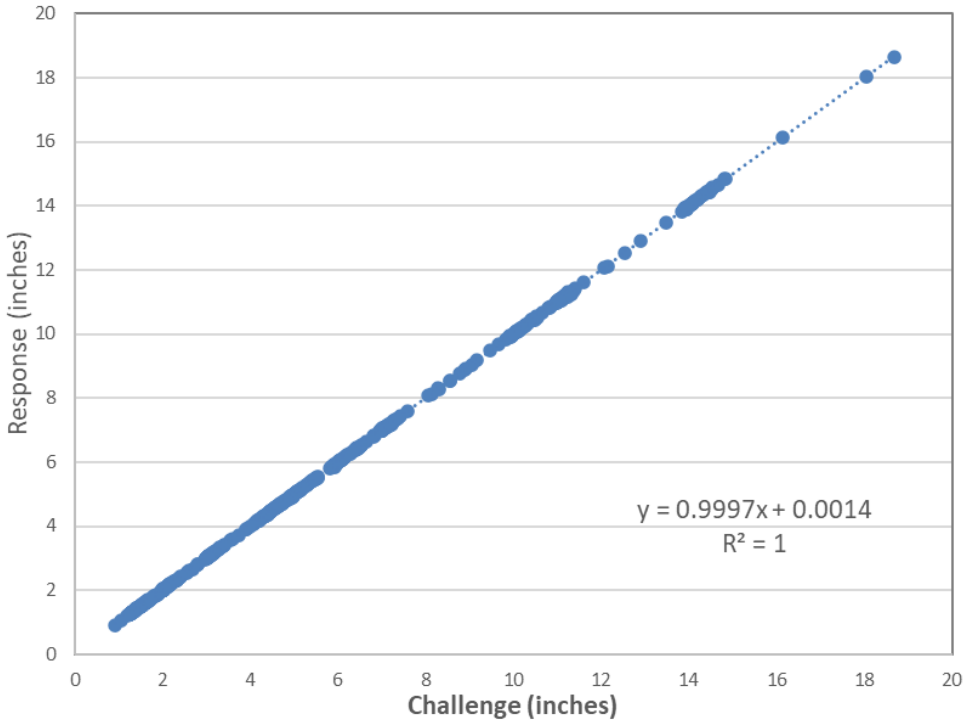
4.0 Field Site Survey Results

This section summarizes the quantifiable survey data relating to raingage accuracy tests and ACM collector sensor heater performance. One-Hundred and one raingages were surveyed during this reporting period, all of which were electronic raingages. Of the 101 gages tested, 98 were found to be operating within NADP acceptance limits, and 3 were found to be outside acceptance limits of 0.10-inch difference from standard. Accuracy details are provided in the following subsections.

4.1 Electronic Raingage Accuracy

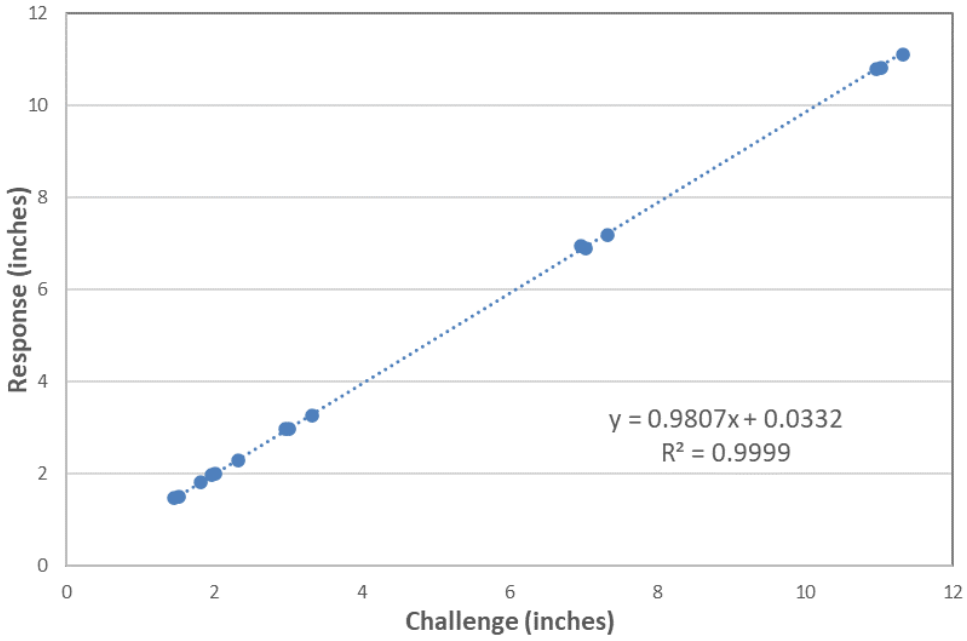
The results of the accuracy tests for the 98 gages that were found to be within acceptance limits are presented in Figure 4-1. As demonstrated by the graph, the raingages report the weight of the standards added very accurately for the entire span. Other issues encountered are discussed in Section 5.0. Electronic Raingage Accuracy – 98 Raingages

Figure 4-1. Electronic Raingage Accuracy - 98 Raingages



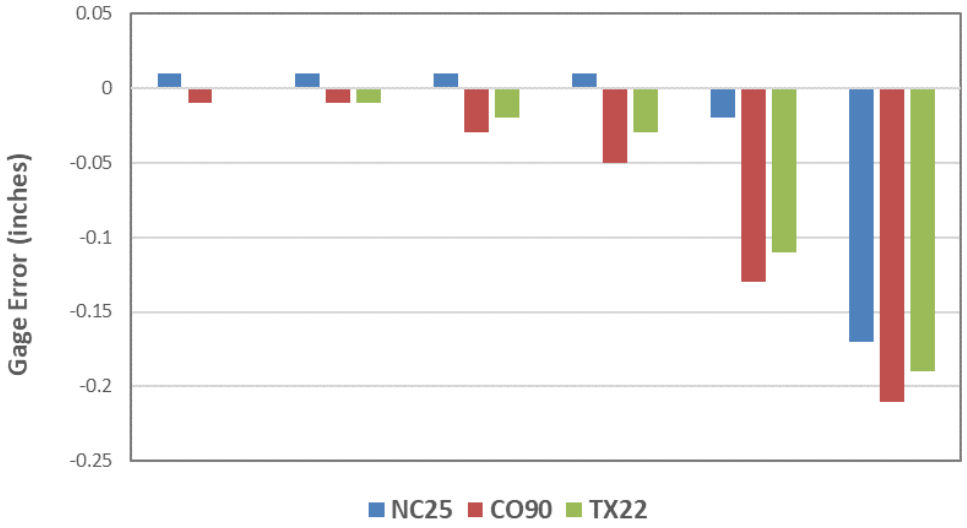
The results of the accuracy tests for the 3 gages that were found to be outside acceptance limits are presented in Figure 4-2.

Figure 4-2. Electronic Raingage Accuracy – 3 Failing Raingages



As can be seen in Figure 4-2, even the gages that were found outside of acceptance limits are linear throughout the range tested. Figure 4-3 presents the actual difference between the challenge weight and the gage response. All three gages responded lower than expected at points above acceptance.

Figure 4-3. Actual Difference of the Three Failing Raingages



As discussed, and presented during the NADP Spring Meeting, EEMS is developing a raingage challenge that more closely represents the "real-world" operation of the raingage. The intent of the

new test is to better determine the accuracy of raingage data during normal precipitation events. Data obtained from the real-world test will be reported in the 2023 NADP Annual Report.

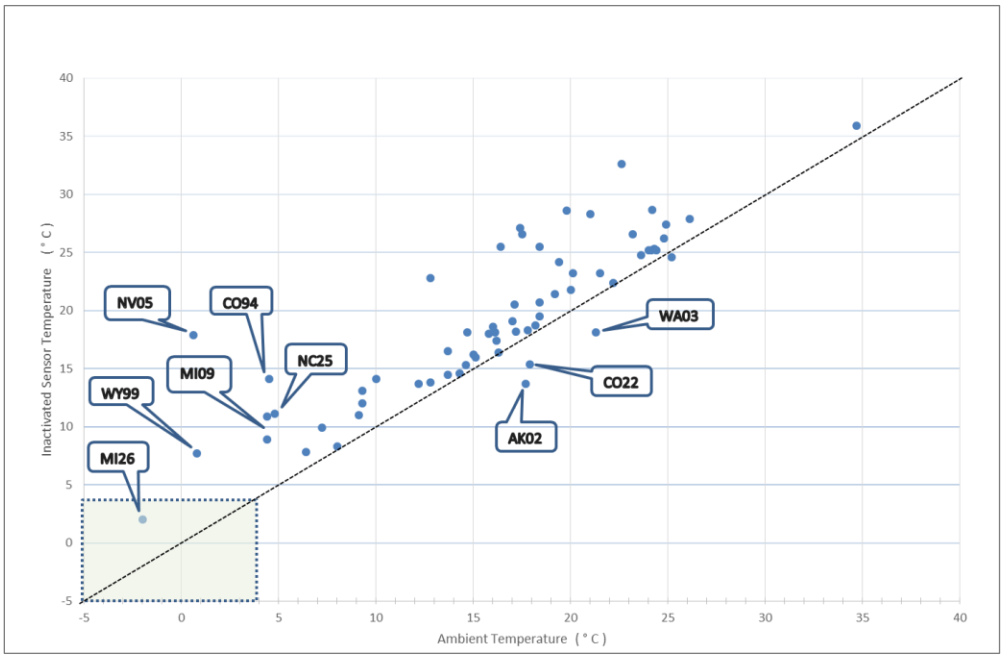
4.2 ACM Sensor Heater Tests

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

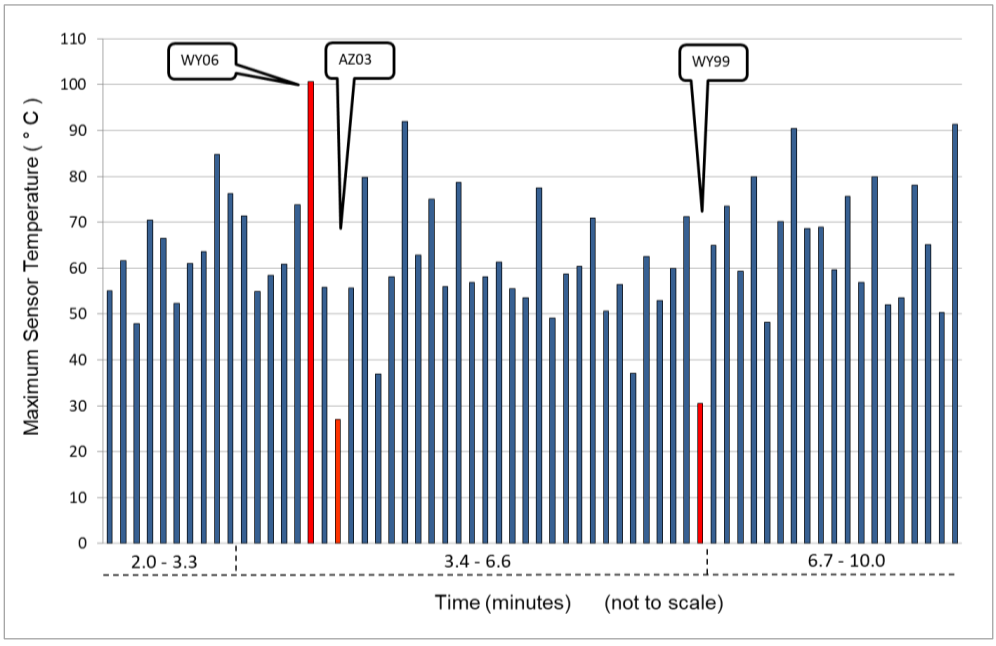


The results indicate that low temperature sensor heaters were functioning properly, and were keeping the sensors above freezing at low ambient temperatures. There appears to be more temperature variability of inactive sensors than in previous years. This may be due to the two temperature measurements being obtained at different times, allowing the sensors to cool or heat prior to measuring the inactive temperature. Also, the sensors may have been activated previous to the inactive measurement being obtained and not yet cooled to ambient temperature. An additional possibility could be related to the recent upgrade to the sensor components that was implemented in 2022. More data will be collected and evaluated in an effort to determine if observations are related to sensor design changes.

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.

A few sensors did not reach 40 °C, and the sensor at WY06 reached 100 °C. The sensor for WY06 was identified as not operating properly. The low temperature reached by the sensor at AZ03 may have been due to problems with the battery, and not the sensor itself. The ambient temperature at WY99 was close to 0 °C which may explain the low temperature reached.

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



Further evaluation of the data presented in Figure 4-5 is provided in Table 4-1, which includes the number of sensors that reached the maximum temperature within each 10-degree range above 30 degrees.

Table 4-1. ACM Activated Sensors for Each Temperature Range and Time Elapsed

Temperature Range	Number of Sensors
< 30.0 º C	1
30.0º to 40.0 º C	3
40.1º to 50.0 º C	3
50.1º to 60.0 º C	23
60.1º to 70.0 º C	13
70.1º to 80.0 º C	16
80.1º to 90.0 º C	1
> 90.1º C	4

Time to Maximum Temperature	Number of Sensors
< 3 min	6
3.0 – 4.0 min	14
4.1 – 5.0 min	15
5.1 – 6.0 min	9
6.1 – 7.0 min	7
7.1 – 8.0 min	6
8.1 – 9.0 min	5
> 9.1 min	2

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 surveys, (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 the hand 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. Sensitivity will be monitored closely during future surveys to determine if sensitivity is changing with sensor age.

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 2022 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 2022, 49 N-CON collectors were surveyed. Out of the 49 collectors, 26 required the set screws and lid arms bolts to be adjusted and tightened (6 MDN and 20 NTN collectors). Given that N-CON collectors are now being surveyed once every

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 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 and therefore loose lid arms may be an indicator of compromised data quality.

NOTE: To better determine whether the N-CON lid is easily lifted by a gust of wind, a small luggage scale could be used to quantify the force needed to lift the lid rather than relying on the auditor's observation.

Data collected since the introduction of N-CON single bucket collectors to the NTN network beginning around 2011 indicate that a significant percentage of collectors had a poor lid seal. It can also be seen in Figure 4-6 that the number of collectors that need adjustment correlates with the total number of collectors observed. Some of the collectors visited have been adjusted and tightened during repeat visits, meaning that the initial repair with Loctite did not last between survey visits. This indicates the design flaw in the lid arms is likely to continue to be a problem with the collector going forward.

Figure 4-6. N-CON Collectors Surveyed and Adjusted per Survey Year

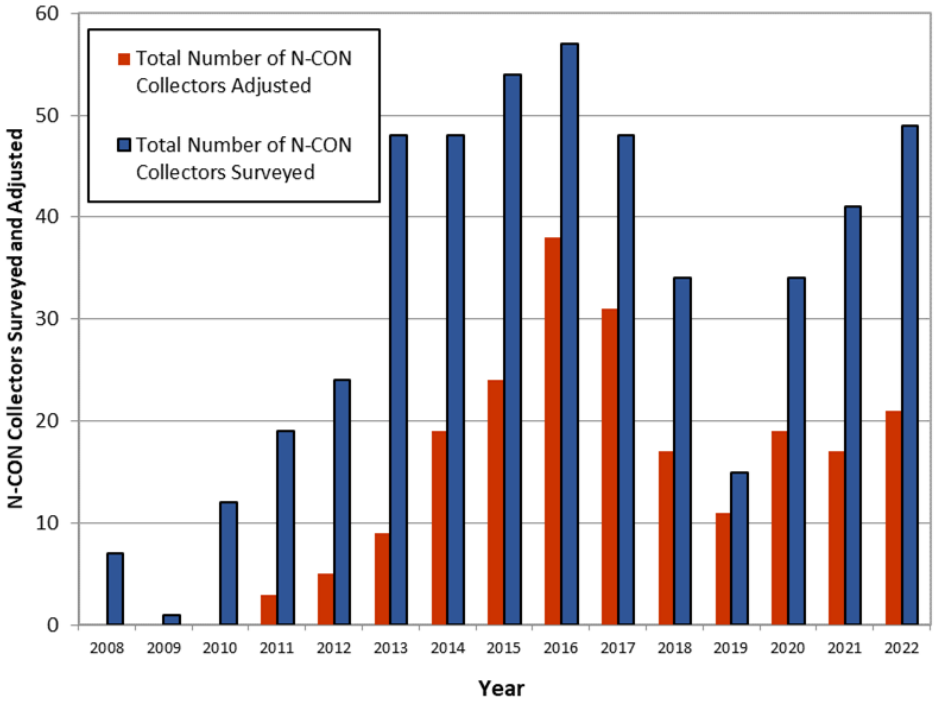
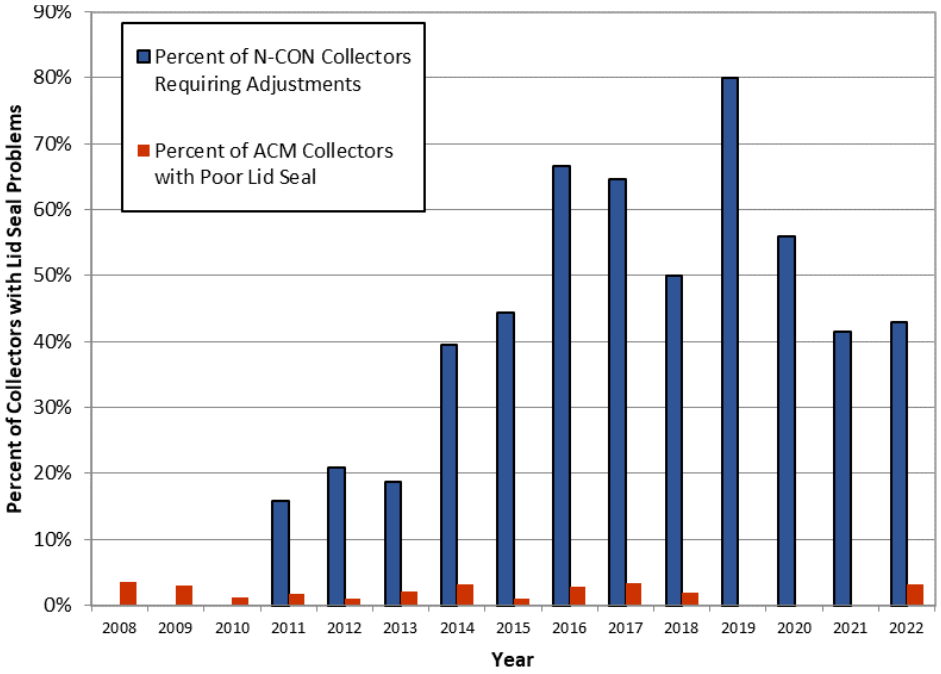


Figure 4-7 is a comparison of ACM-type collector lid seal compared to the percentage of N-CON collectors that required lid arm adjustments. It is clear that poor lid seal condition increased with the introduction of N-CON collectors to the network.

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 pemanent solution.

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.

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

It is 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 surveys. For example, it has been shown 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, that taller vegetation near the collector may actually improve collection efficiency and therefore could be considered to be positive and not a negative influence.

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

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 ground cover assessment could be refined to include the presence of any buildings within 30 meters and the square footage of ground covered by un-natural materials if those items are deemed to be significant to sample quality. By improving the information gathered during surveys more meaningful interpretation of deposition data can be performed.

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.

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.

5.1 Documentation

Training for all networks is an essential function for maintaining NADP data quality. With the transition from the HAL to the WSLH HAL the site operator training program is also in a transition

period. EEMS will continue to be informed of the changes and ensure site operators are made aware of available resources.

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.

Further improvements could be realized through interactive web-based forms. This could not only reduce some costs, but may engage the site operators and increase interest and participation in data and site evaluation.

5.2 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.

5.2.1 ACM Type Collector

Problems with the following items were frequently noted with the ACM type collectors during the surveys:

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.

Sensor Response Tests

In addition to comparison of raingage catch tests, comparisons of the various collector sensors operating in the network should be more thoroughly evaluated. Ideally any approved sensor should respond identically in terms of response to all types of precipitation events. Currently this is not the case. Testing is underway to attempt to both qualify and quantify the operation of all types of approved sensors (optical and mechanical).

Perhaps the most significant improvement that could be made to the network as a whole would be to replace the various types of precipitation sensors with a single uniform sensor for all types of collectors. It is suggested that, if possible, a single sensor, or combination of different types of sensors acting as one, be approved for use that can both trigger sample collection and indicate precipitation to be recorded by the electronic raingages.

5.2.2 MDN Collectors

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 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.

5.2.3 N-CON MDN Heaters

N-CON collectors for both MDN and NTN have been a welcome addition to the accepted list of approved NADP collectors. However, occasionally accepted equipment operation can be improved by additional modifications. The original N-CON collectors approved, purchased, and in operation for the MDN network fall into that category.

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 surveys indicate collectors have been modified to include the circulating fan.

5.2.4 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.

5.2.5 Electronic Raingage

After years of transitioning from Belfort to electronic raingages, during 2022 no Belfort gages were surveyed. Though electronic gages are an improvement, some of the ETI NOAH IV raingages that have been operating for several year, exhibit excessive corrosion around the connections for the sensors and the batteries, as well as corrosion of the shell screws. As part of the survey, all connectors are cleaned and dielectric grease is applied by the surveyor, and the screws are replaced as needed. So far, the OTT Pluvio electronic raingages have not exhibited problems.

5.2.6 Data Download and Transmission

Of the 101 raingages surveyed, six are still utilizing a PDA to download raingage data. The Campbell Scientific Firmware in the raingage 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 LoggerLink App can also be used by the site operator to interface with the raingage and download data.

Recent interface and download methods have utilized 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 CAL. Within minutes of this step, data are automatically posted, and are available on the CAL 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 raingage 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.

Beginning with the 2019 surveys, EEMS has implemented the collection and reporting of the information that is deemed relevant to better inform the NADP PO of the different data acquisition methods that are being used at each site.

6.0 Results of Field Laboratory and Procedure Assessments

The field site survey 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 surveys, 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 surveys should be identified as action items and require some follow-up from the CAL. This could include replacing the scale with a surplus instrument. Table 6-1 presents results for the scales surveyed 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 Type	Avg. % Diff.
AB32	Mettler MS12001L/03	0.03%
AB34	Mettler MS12001L/03	0.03%
AB36	Mettler MS12001L/03	0.03%
AK02	Digital Champ	-0.03%
AK96	Digital OHAUS Adventurer	0.04%
AK97	OHAUS - Solution balance	0.02%
AL10	Adam CKT16	0.01%
AZ03	Digital OHAUS Ranger 3000	-0.12%
CO00	Digital Adam CKT16	-0.02%
CO01	Digital EADAM CBK35A	-0.02%
CO02	OHAUS Valor 2000W	0.04%

Site Id	Scale Type	Avg.% Diff.
NC34	Unknown	0.04%
NC41	Unknown	0.08%
ND08	OHAUS Heavy Duty Solution Balance	0.00%
ND11	OHAUS Heavy Duty Solution Balance	0.04%
NE15	OHAUS Heavy Duty Solution Balance	0.00%
NE99	OHAUS Heavy Duty Solution Balance	-0.13%
NV03	Sartorius CPA4202S	0.03%
NV05	Sartorius CPA4202S	0.00%
NY01	Adam CKT8	0.02%
NY98	Sartorius Universal	-0.06%
OH17	Digital scale	-0.06%

Site Id	Scale Type	Avg. % Diff.
CO08	Digital - AND EK3000i	-0.04%
CO09	Transcell Technology Model TCS	-0.11%
CO10	OHAUS Heavy Duty Solution Balance	0.03%
CO19	OHAUS Heavy Duty Solution Balance	0.05%
CO21	OHAUS Heavy Duty Solution Balance	0.03%
CO22	Digital, Sartorius MCI LC4800P	-0.08%
CO81	Adam CKt16 (Digital)	-0.03%
CO82	Adam CKT16 (digital)	0.01%
CO90	OHAUS Valor 2000W	0.04%
CO91	OHAUS Pioneer	-0.07%
CO94	OHAUS Valor 2000W	0.33%
CO96	MYWEIGH WRK12K	-0.07%
CO99	Adam WBW 18A	-0.14%
CT15	OHAUS Heavy Duty Solution Balance	-0.08%
IA08	OHAUS Heavy Duty Solution Balance	0.08%
IA23	Unknown	0.00%
KS32	EA Adam CKT16	0.00%
MD99	NTN	-0.04%
ME94	OHAUS Triple Beam	0.01%
ME98	OHAUS Triple Beam	0.00%
MI26	Unknown	0.05%
MI48	Unknown	0.01%
MI51	OHAUS Triple Beam	0.12%
MI94	Adam CBK	0.07%
MN99	Unknown	0.00%
MO03	ADAM CBK 16alt	0.07%
MT00	OHAUS Heavy Duty Solution Balance	0.29%
MT97	OHAUS Heavy Duty Solution Balance	-0.04%
MT98	Mettler Toledo New Classic	0.03%
NC03	Unknown	-0.01%
NC25	Sartorius model Signum3	-0.03%

Site Id	Scale Type	Avg.% Diff.
PR20	OHAUS - Triple Beam	0.01%
SD08	OHAUS Heavy Duty Solution Balance	0.04%
SD99	OHAUS - Triple Beam	0.04%
SK20	Adam CPWplus-6	-0.03%
SK31	Adam CPWplus-6	0.10%
TX22	OHAUS Heavy Duty Solution Balance	0.00%
UT01	Digital Denver Instrument Si-6002	0.02%
UT09	OHAUS Heavy Duty Solution Balance	0.02%
UT95	Digital Adm CBK35a	0.04%
UT98	Digital Adam Model CBK35A	0.01%
UT99	Digital - OHAUS Adventurer Pro	-0.07%
VA28	Sartorius	-0.09%
VI01	OHAUS - Triple Beam	-1.27%
WA14	EEAdam CKT16 Digital	0.15%
WA19	OHAUS Heavy Duty Solution Balance	0.09%
WA21	OHAUS Heavy Duty Solution Balance	0.02%
WA24	OHAUS Heavy Duty Solution Balance	0.03%
WA98	Digital Sartorius Signum 1	-0.02%
WA99	Digital Eedam CKT16	0.06%
WI31	Triple-beam balance	0.01%
WI35	Triple-beam balance	-0.01%
WI37	Triple-beam balance	0.05%
WY00	Digital Sartorius Entris	-0.19%
WY02	OHAUS Heavy Duty Solution Balance	0.00%
WY06	OHAUS Heavy Duty Solution Balance	0.07%
WY94	Digital OHAUS ES Series	0.01%
WY95	Digital Sartorius Entris	-0.19%
WY97	Digital scale	0.02%
WY98	OHAUS Heavy Duty Solution Balance	0.07%
WY99	OHAUS Heavy Duty Solution Balance	0.13%

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 HAL. 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 surveys. 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 WSLH Hg laboratory.

7.0 Data Quality Information

Several procedures are in place to help ensure survey data quality. Foremost, a comprehensive QAPP was developed prior to collecting survey data. Field survey team training was provided to ensure consistency of methods. Duplicate entry of survey 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 survey data, recording data in the survey database, and reporting survey 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 Survey QAPP and associated SOPs can be updated. The project QAPP was revised in August 2021.

7.2 Field Team Training and Internal QA Audits

Initial survey team training took place while performing two surveys in Indiana in December 2007. Survey 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 survey teams meet and cooperatively complete a site survey. 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 survey at KY10 (MDN & NTN) was performed in February, 2023. This was very beneficial for the most recently hired survey member. The EEMS QA manager attended the survey and training activities.

Site operator questionnaires are provided to each site operator following a site survey. The information gathered is used to improve the site survey program. It is anticipated that refinement of the questionnaires, with input from the NADP PO and laboratories will take place in the near future with the goal of further improvements to the survey program.

Training Class Attendance and Webinar Participation

In order to keep up with changes to the NADP procedures and protocols, EEMS survey team members have attended past site operator training classes provided by the Mercury Analytical

Laboratory (HAL), Central Analytical Laboratory (CAL), and Program Office and participate in past webinars.

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 survey 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.

7.3 Duplicate Data Entry

A routine procedure utilized as part of the EEMS QA program for survey data, is duplicate data entry. Field personnel enter survey data results into the Field Site Survey Database (FSSD) after completing the survey. An initial spot report is generated using this raw data. After completing approximately three surveys, 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 survey results and reports. The photos taken during the site survey 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 each quarter.

7.4 Identifiable Areas of Improvement to the Survey Program

As with all programs, continuous efforts are underway within the survey 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.

7.4.1 Site Survey Questionnaire

Despite considerable effort on the part of both EEMS and the NADP PO, some of the questions contained in the Site Survey Questionnaire remain ambiguous. This has led to some survey field personnel interpreting some questions one way, while another team member might interpret the same question differently. Additionally, some survey questions are redundant or impossible to answer accurately during the field site survey. In the past, as cases were discovered during review of the survey reports, additional clarification was requested from the NADP PO regarding the intent of the question. This information was then shared with the survey team members to eliminate confusion and maintain consistency. The current version of the questionnaire was modified in 2019 with the addition of a number of fields as requested by the NADP PO.

Refinement and improvement to the information collected during a site survey will continue. It is expected that feedback regarding the survey 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.

7.4.2 Internal QA

This section summarizes the results of EEMS' internal QA processes.

Results of Duplicate Data Entry Process and Site File Review

When a discrepancy is identified by the EEMS QA Manager during review of the duplicate data entry, a code is assigned to the record to indicate if the error was the result of a typo by field personnel or QA personnel. If an error in the original entry is identified and not the result of a typo the record is also coded. The results of the QA coding are presented in Table 7-1. Discrepancies due to formatting issues are corrected, but are not considered errors.

Table 7-1. 2022 Internal QA Results for Duplicate Entry Errors

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	20,193	20,193	40,386
Initial File Entry Errors	207		
Duplicate QA Entry Errors		146	
Percent Errors	1.03%	0.72%	
Total Entry Errors	353		
Total Percent Errors	0. 87%		

The data indicates that of the 40,626 entries that are compared (does not include memo fields), the entry error rate is about 0.72%.

7.5 Survey Equipment Certification

The instruments used by the survey team are maintained and certified by the EEMS Survey Team Leader. Most undergo annual certification by various sources. Digital multi-meters (DVM) are certified 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 raingages 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 E.

APPENDIX A

Assessments Determined to Impact Data Quality

Assessments Determined to Impact Data Quality

Field Entry	NTN	MDN
Is sampling media quality maintained?	✓	✓
Is the orifice of the collector +/- .3 m of raingage (elevation)	✓	✓
30 degree rule for buildings met (raingage)	✓	✓
No objects > 1 m height inside 5 m radius (raingage)	✓	✓
No fences > 1 m height inside 2 m radius (raingage)	✓	✓
No vegetation height > 0.6 m within 5 m radius (raingage)	✓	✓
Does NADP require a raingage wind shield at this site	✓	✓
If raingage wind shield present, is it installed correctly	✓	✓
Collector and sensor oriented properly	✓	✓
45 degree rule met (collector)	✓	✓
30 degree guideline for trees met (collector)	✓	✓
30 degree rule for buildings met (collector)	✓	✓
No objects > 1 m height within 5 m radius (collector)	✓	✓
No fences > 1 m height inside 5 m radius (collector)	✓	✓
No vegetation height > 0.6 m within 5 m radius (collector)	✓	✓
No treated lumber inside 5 m radius (collector)	✓	✓
No galvanized metal inside 5 m radius collector (MDN)	N/A	✓
No pastures and ag. activity within 20 m radius	✓	✓
No herbicides and fertilizers used within 20 m radius	✓	✓
Roads meet NADP siting criteria	✓	✓
Waterways meet NADP siting criteria	✓	✓
Airports meet NADP siting criteria	✓	✓
Animal operations meet NADP siting criteria (NTN)	✓	N/A
Combustion sources meet NADP siting criteria (MDN only)	N/A	✓
Parking lots and maintenance areas meet NADP siting criteria	✓	✓
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	✓	✓
Metalworking operations meet NADP siting criteria (MDN only)	N/A	✓
Dry side bucket is clean	✓	✓
Does lid seal properly	✓	✓
Lid liner in good condition	✓	✓
Fan in good condition	N/A	✓

Field Entry	NTN	MDN
Cooling fan thermostat in good condition	N/A	✓
Heater in good condition	N/A	✓
Heater thermostat in good condition	N/A	✓
Has flush wall filter mount been installed	N/A	✓
Filter in good condition	N/A	✓
Max / min thermometer in acceptable limits	N/A	✓
ACM sensor operates properly	✓	✓
Motorbox operates within acceptable limits	✓	✓
N-CON fan in good condition	N/A	✓
N-CON cooling fan thermostat in good condition	N/A	✓
N-CON heater in good condition	N/A	✓
N-CON heater thermostat in good condition	N/A	✓
N-CON max / min thermometer in acceptable limits	N/A	✓
N-CON sensor responds to five passes of the hand	N/A	✓
N-CON lid seal in good condition	N/A	✓
N-CON lid liner in good condition	N/A	✓
Was the 'as found' turn over set properly (Belfort gage)	✓	✓
Raingage operates properly (electronic gage)	✓	✓
Does datalogger receive event signals form all collectors (electronic gage)	✓	✓
Does optical sensor respond to "blocking" of light beam (electronic gage)	✓	✓
Does optical sensor respond to mist of water (electronic gage)	✓	✓

N/A = Not applicable

APPENDIX B

Findings Most Likely to Impact Data Quality

Table B-1. Findings Most Likely to Impact Data Quality – MDN Sites with ACM-type Collectors

StationId	CO99	IN21	MD99	ME98	MI09	MI48	MN06	VA28	WA03
Is sampling media quality maintained?					U to T		U to T		
Is the orifice of the collector +/- .3 m of raingage (elevation)									
45 degree rule met (raingage)				X			X		
30 degree rule for trees met (raingage)		X						X	
30 degree rule for buildings met (raingage)									
No objects > 1 m height inside 5 m radius (raingage)		X	X				X		
No fences > 1 m height inside 2 m radius (raingage)							X		
No vegetation height > 0.6 m within 5 m radius (raingage)	X		X	X			X		
Collector and sensor oriented properly									
45 degree rule met (collector)				X			X	X	
30 degree rule for trees met (collector)		X			X			X	
30 degree rule for buildings met (collector)									
No objects > 1 m height within 5 m radius (collector)		X	X				X		
No fences > 1 m height inside 5 m radius (collector)							X		
No vegetation height > 0.6 m within 5 m radius (collector)	X		X	X			X		
No treated lumber inside 5 m radius (collector)	X		X		X	X	X		
No galvanized metal inside 5 m radius collector (MDN)							X		
No pastures and ag. activity within 20 m radius									
No herbicides and fertilizers used within 20 m radius									
Roads meet NADP siting criteria									
Waterways meet NADP siting criteria									
Airports meet NADP siting criteria									
Combustion sources meet NADP siting criteria (MDN only)									
Parking lots and maintenance areas meet NADP siting criteria									
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria									
Metalworking operations meet NADP siting criteria (MDN only)									
Dry side bucket is clean									
Dry side bag installed correctly									
Does lid seal properly		X							
Lid liner in good condition									
Fan in good condition									
Cooling fan thermostat in good condition									
Heater in good condition									
Heater thermostat in good condition									
Has flush wall filter mount been installed					X				
Filter in good condition							--	--	
Max / min thermometer in acceptable limits									
ACM sensor operates properly									
Motorbox operates within acceptable limits									
Raingage operates properly (electronic gage)									
Does datalogger receive event signals form all collectors (electronic gage)									
Does optical sensor respond to "blocking" of light beam (electronic gage)		--					--		--
Does optical sensor respond to mist of water (electronic gage)		--					--		--

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table B-2. Findings Most Likely to Impact Data Quality – MDN Sites with N-CON Collectors

StationId	AK96	BC16	CO96	KS32	ND01	NE15	NE98	OH16	ON07	PR20	SK27	WI31
Is sampling media quality maintained?												
Is the orifice of the collector +/- .3 m of raingage (elevation)	X	X										
45 degree rule met (raingage)												
30 degree rule for trees met (raingage)			X						X			X
30 degree rule for buildings met (raingage)												
No objects > 1 m height inside 5 m radius (raingage)	X			X			X	X		X	X	
No fences > 1 m height inside 2 m radius (raingage)												
No vegetation height > 0.6 m within 5 m radius (raingage)					X							
Collector and sensor oriented properly										X		
45 degree rule met (collector)												
30 degree rule for trees met (collector)			X						X			X
30 degree rule for buildings met (collector)												
No objects > 1 m height within 5 m radius (collector)	X			X			X			X	X	
No fences > 1 m height inside 5 m radius (collector)				X								
No vegetation height > 0.6 m within 5 m radius (collector)												
No treated lumber inside 5 m radius (collector)					X							
No galvanized metal inside 5 m radius collector (MDN)	X		X	X		X	X				X	
No pastures and ag. activity within 20 m radius						X						
No herbicides and fertilizers used within 20 m radius						X						
Roads meet NADP siting criteria								X				
Waterways meet NADP siting criteria												
Airports meet NADP siting criteria												
Combustion sources meet NADP siting criteria (MDN only)												
Parking lots and maintenance areas meet NADP siting criteria								X				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria												
Metalworking operations meet NADP siting criteria (MDN only)												
N-CON fan in good condition				X	U to T	X		X		X		
N-CON cooling fan thermostat in good condition					X							
N-CON heater in good condition												
N-CON heater thermostat in good condition												
N-CON max / min thermometer in acceptable limits		X										
N-CON lid seal in good condition						X						
N-CON lid liner in good condition												
N-CON sensor responds to a 20-second mist of water											X	
N-CON arms and motorbox do not require tightening	X		X	X	X	X	X					
Raingage operates properly (electronic gage)												
Does datalogger receive event signals form all collectors (electronic gage)												
Does optical sensor respond to "blocking" of light beam (electronic gage)				--			X	--		X	--	
Does optical sensor respond to mist of water (electronic gage)				--			X	--		X	--	

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table B-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collectors (1 of 3)

StationId	AK02	AL10	AZ03	CO02	CO08	CO09	CO10	CO19	CO21	CO22	CO90	CO91	CO94	CO96	CT15	MD99	ME94	MI09
Is sampling media quality maintained?																		U to T
Is the orifice of the collector +/- .3 m of raingage (elevation)						X	X	X				X						
45 degree rule met (raingage)																		
30 degree rule for trees met (raingage)					X				X		X	X	X	X				
30 degree rule for buildings met (raingage)																		
No objects > 1 m height inside 5 m radius (raingage)		X					X					X				X		
No fences > 1 m height inside 2 m radius (raingage)				X														
No vegetation height > 0.6 m within 5 m radius (raingage)			X			X					X	X	X			X		
Collector and sensor oriented properly	X			X			X	X										
45 degree rule met (collector)																		
30 degree rule for trees met (collector)	X				X				X		X	X	X	X				X
30 degree rule for buildings met (collector)																		
No objects > 1 m height within 5 m radius (collector)		X	X				X					X				X		
No fences > 1 m height inside 5 m radius (collector)				X	X													
No vegetation height > 0.6 m within 5 m radius (collector)			X		X	X					X	X	X			X		
No treated lumber inside 5 m radius (collector)	X	X			X						X		X	X		X	X	X
No pastures and ag. activity within 20 m radius		X								X								
No herbicides and fertilizers used within 20 m radius		X																
Roads meet NADP siting criteria																		
Waterways meet NADP siting criteria																		
Airports meet NADP siting criteria																		
Animal operations meet NADP site cirteria (NTN and AIRMoN)																		
Parking lots and maintenance areas meet NADP siting criteria																		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																		
Dry side bucket is clean																		
Does lid seal properly													X					
Lid liner in good condition						X												
ACM sensor operates properly			X															
Motorbox operates within acceptable limits																		
Raingage operates properly (electronic gage)											X							
Does datalogger receive event signals form all collectors (electronic gage)						X												
Does optical sensor respond to "blocking" of light beam (electronic gage)		--		--							X	--						
Does optical sensor respond to mist of water (electronic gage)		--		--							X	--						

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table B-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collectors (2 of 3)

StationId	MI26	MI48	MI51	MI53	MI94	MN08	MT00	MT97	NC03	NC25	NC34	NC41	NE15	NH02	NV03	NV05	NY67	OH17
Is sampling media quality maintained?				U to T														
Is the orifice of the collector +/- .3 m of raingage (elevation)					X	X				X								
45 degree rule met (raingage)			X						X	X				X				X
30 degree rule for trees met (raingage)				X		X		X	X		X			X				X
30 degree rule for buildings met (raingage)																		
No objects > 1 m height inside 5 m radius (raingage)	X		X	X	X	X				X					X			
No fences > 1 m height inside 2 m radius (raingage)					X													
No vegetation height > 0.6 m within 5 m radius (raingage)						X	X							X	X	X	X	
Collector and sensor oriented properly						X											X	
45 degree rule met (collector)									X					X				X
30 degree rule for trees met (collector)				X		X		X	X		X			X				X
30 degree rule for buildings met (collector)																		
No objects > 1 m height within 5 m radius (collector)	X			X		X				X								
No fences > 1 m height inside 5 m radius (collector)										X								
No vegetation height > 0.6 m within 5 m radius (collector)							X							X	X	X		
No treated lumber inside 5 m radius (collector)	X	X				X											X	
No pastures and ag. activity within 20 m radius													X					
No herbicides and fertilizers used within 20 m radius													X					
Roads meet NADP siting criteria					X													
Waterways meet NADP siting criteria																		
Airports meet NADP siting criteria																		
Animal operations meet NADP site cirteria (NTN and AIRMoN)																		
Parking lots and maintenance areas meet NADP siting criteria																		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																		
Dry side bucket is clean				X	X						X	X						
Does lid seal properly																		
Lid liner in good condition																		
ACM sensor operates properly																		
Motorbox operates within acceptable limits																		
Raingage operates properly (electronic gage)																		
Does datalogger receive event signals form all collectors (electronic gage)	X							X						X				
Does optical sensor respond to "blocking" of light beam (electronic gage)								--	--		--	--			--			
Does optical sensor respond to mist of water (electronic gage)								--	--		--	--			--			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table B-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collectors (3 of 3)

StationId	PA15	PR20	TX22	UT09	UT95	UT99	VI01	WA14	WA21	WA98	WA99	WI35	WY00	WY02	WY06	WY95	WY97	WY98	WY99
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)																			
45 degree rule met (raingage)						X	X		X										
30 degree rule for trees met (raingage)			X			X		X	X		X						X		X
30 degree rule for buildings met (raingage)																			
No objects > 1 m height inside 5 m radius (raingage)		X					X	X						X					X
No fences > 1 m height inside 2 m radius (raingage)								X											
No vegetation height > 0.6 m within 5 m radius (raingage)			X		X					X	X				X				
Collector and sensor oriented properly										X									
45 degree rule met (collector)						X	X					X							
30 degree rule for trees met (collector)						X		X	X		X						X		X
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)		X					X	X											X
No fences > 1 m height inside 5 m radius (collector)								X						X	X		X		
No vegetation height > 0.6 m within 5 m radius (collector)			X		X					X	X				X				
No treated lumber inside 5 m radius (collector)					X				X					X				X	
No pastures and ag. activity within 20 m radius															X			X	
No herbicides and fertilizers used within 20 m radius																			
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Animal operations meet NADP site cirteria (NTN and AIRMoN)																			
Parking lots and maintenance areas meet NADP siting criteria							X	X	X										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			
Dry side bucket is clean								X	X	X								X	
Does lid seal properly																			
Lid liner in good condition			X					X											
ACM sensor operates properly															X				
Motorbox operates within acceptable limits																			
Raingage operates properly (electronic gage)			X			X		X	X									X	
Does datalogger receive event signals form all collectors (electronic gage)																			
Does optical sensor respond to "blocking" of light beam (electronic gage)		X	X			X		X	X									X	
Does optical sensor respond to mist of water (electronic gage)		X	X			X		X	X									X	

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table B-4. Findings Most Likely to Impact Data Quality – NTN Sites with N-CON Collectors (1 of 2)

StationId	AB32	AB34	AB36	AK96	AK97	CAN5	CO00	CO01	CO81	CO82	CO99	IA08	IA23	KS32	ME98	MN99	MO03	MT98
Is sampling media quality maintained?						U to T												
Is the orifice of the collector +/- .3 m of raingage (elevation)	X	X	X	X	X													
45 degree rule met (raingage)		X													X			
30 degree rule for trees met (raingage)												X					X	
30 degree rule for buildings met (raingage)																		
No objects > 1 m height inside 5 m radius (raingage)	X	X		X	X							X		X				
No fences > 1 m height inside 2 m radius (raingage)	X	X																
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X				X	X				X		X		X			
Collector and sensor oriented properly	X								X	X								
45 degree rule met (collector)		X													X			
30 degree rule for trees met (collector)															X		X	
30 degree rule for buildings met (collector)																		
No objects > 1 m height within 5 m radius (collector)	X	X	X		X							X		X			X	
No fences > 1 m height inside 5 m radius (collector)	X	X			X							X		X				
No vegetation height > 0.6 m within 5 m radius (collector)	X	X				X	X				X		X		X			
No treated lumber inside 5 m radius (collector)											X					X		
No pastures and ag. activity within 20 m radius													X					
No herbicides and fertilizers used within 20 m radius																		
Roads meet NADP siting criteria																		
Waterways meet NADP siting criteria																		
Airports meet NADP siting criteria																		
Animal operations meet NADP site cirteria (NTN and AIRMoN)																		
Parking lots and maintenance areas meet NADP siting criteria																		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																		
N-CON lid seal in good condition													X					
N-CON lid liner in good condition																		
N-CON sensor responds to a 20-second mist of water								X										
N-CON arms and motorbox do not require tightening			X			X		X	X		X	X	X	X			X	X
Raingage operates properly (electronic gage)										X								
Does datalogger receive event signals form all collectors (electronic gage)																		X
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--				--	--		X		--	--	--			--	--
Does optical sensor respond to mist of water (electronic gage)	--	--	--				--	--		X		--	--	--			--	--

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table B-4. Findings Most Likely to Impact Data Quality – NTN Sites with N-CON Collectors (2 of 2)

StationId	ND08	ND11	NE99	NY01	NY98	PA18	SD08	SD99	SK20	SK31	UT01	UT98	VA28	VT01	WA19	WA24	WI31	WI37	WY94
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)										X									
45 degree rule met (raingage)														X					
30 degree rule for trees met (raingage)					X	X							X	X	X		X		
30 degree rule for buildings met (raingage)																			
No objects > 1 m height inside 5 m radius (raingage)	X		X		X					X	X			X		X			
No fences > 1 m height inside 2 m radius (raingage)										X				X					
No vegetation height > 0.6 m within 5 m radius (raingage)		X						X	X	X	X				X				X
Collector and sensor oriented properly													X						
45 degree rule met (collector)																			
30 degree rule for trees met (collector)					X	X							X	X	X		X		
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)	X	X	X		X					X	X			X					
No fences > 1 m height inside 5 m radius (collector)		X								X				X					
No vegetation height > 0.6 m within 5 m radius (collector)		X			X			X	X	X	X				X				
No treated lumber inside 5 m radius (collector)																			
No pastures and ag. activity within 20 m radius		X	X							X					X	X			
No herbicides and fertilizers used within 20 m radius										X						X			
Roads meet NADP siting criteria											X								
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Animal operations meet NADP site cirteria (NTN and AIRMoN)																			
Parking lots and maintenance areas meet NADP siting criteria																		X	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			
N-CON lid seal in good condition				X															
N-CON lid liner in good condition					X										X				
N-CON sensor responds to a 20-second mist of water									X				X						
N-CON arms and motorbox do not require tightening	X			X	X		X		X				X		X	X	X	X	X
Raingage operates properly (electronic gage)																			
Does datalogger receive event signals form all collectors (electronic gage)									X										
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--	--	--	--	--	X		--	--		--	--	--			
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--	--	--	--	--			--	--		--	--	--			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

APPENDIX C

Comparison between Surveys of Findings Most Likely to Impact Data Quality

Table C-1. NADP – MDN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (1 of 5)

StationId	AK96		BC16			CO96				CO99					IN21				
Year	2022	2018	2022	2018	2015	2022	2018	2015	2012	2022	2018	2015	2012	2008	2022	2018	2015	2011	2008
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)	X		X	X	X								X						
45 degree rule met (raingage)							X	X									X		
30 degree rule for trees met (raingage)																			
30 degree rule for buildings met (raingage)						X	X	X	X						X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)	X														X	X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)																			
No vegetation height > 0.6 m within 5 m radius (raingage)										X	X		X						
Collector and sensor oriented properly		X																	
45 degree rule met (collector)																			
30 degree rule for trees met (collector)						X	X	X	X						X	X	X	X	X
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)	X				X										X	X	X		
No fences > 1 m height inside 5 m radius (collector)				X	X														
No vegetation height > 0.6 m within 5 m radius (collector)										X	X								
No treated lumber inside 5 m radius (collector)										X	X		X	X			X		
No galvanized metal inside 5 m radius collector (MDN)	X			X	X	X	X	X									X		X
No pastures and ag. activity within 20 m radius													--	--					--
No herbicides and fertilizers used within 20 m radius														--					
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Combustion sources meet NADP siting criteria (MDN only)																			
Parking lots and maintenance areas meet NADP siting criteria																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria														--					
Metalworking operations meet NADP siting criteria (MDN only)																			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-1. NADP – MDN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (2 of 5)

StationId	KS32					MD99					ME98					MI09		
Year	2022	2018	2015	2012	2010	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015
Is sampling media quality maintained?																U to T		
Is the orifice of the collector +/- .3 m of raingage (elevation)																		
45 degree rule met (raingage)											X	X	X	X				
30 degree rule for trees met (raingage)																		
30 degree rule for buildings met (raingage)														X	X			
No objects > 1 m height inside 5 m radius (raingage)	X	X	X	X		X	X	X	X	X				X				
No fences > 1 m height inside 2 m radius (raingage)				X														
No vegetation height > 0.6 m within 5 m radius (raingage)					X	X			X		X	X	X	X	X			
Collector and sensor oriented properly																		
45 degree rule met (collector)											X	X	X	X	X			
30 degree rule for trees met (collector)																X	X	
30 degree rule for buildings met (collector)																		
No objects > 1 m height within 5 m radius (collector)	X	X				X	X	X	X	X								
No fences > 1 m height inside 5 m radius (collector)	X	X	X	X														
No vegetation height > 0.6 m within 5 m radius (collector)					X	X		X	X	X	X	X	X	X	X			
No treated lumber inside 5 m radius (collector)						X	X	X	X	X						X	X	X
No galvanized metal inside 5 m radius collector (MDN)	X	X	X		X													
No pastures and ag. activity within 20 m radius																		
No herbicides and fertilizers used within 20 m radius																		
Roads meet NADP siting criteria																		
Waterways meet NADP siting criteria																		
Airports meet NADP siting criteria																		
Combustion sources meet NADP siting criteria (MDN only)																		
Parking lots and maintenance areas meet NADP siting criteria																		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																		
Metalworking operations meet NADP siting criteria (MDN only)																		

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-1. NADP – MDN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (3 of 5)

StationId	MI48					MN06			ND01			NE15					NE98		
Year	2022	2018	2015	2012	2009	2022	2018	2015	2022	2018	2008	2022	2018	2015	2012	2008	2022	2018	2015
Is sampling media quality maintained?						U to T													
Is the orifice of the collector +/- .3 m of raingage (elevation)													X						
45 degree rule met (raingage)						X	X	X											
30 degree rule for trees met (raingage)																			
30 degree rule for buildings met (raingage)																			
No objects > 1 m height inside 5 m radius (raingage)				X		X	X	X									X		X
No fences > 1 m height inside 2 m radius (raingage)						X	X												
No vegetation height > 0.6 m within 5 m radius (raingage)						X			X										
Collector and sensor oriented properly																			
45 degree rule met (collector)						X	X	X											
30 degree rule for trees met (collector)																			
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)						X	X	X									X		X
No fences > 1 m height inside 5 m radius (collector)						X	X	X											
No vegetation height > 0.6 m within 5 m radius (collector)						X													
No treated lumber inside 5 m radius (collector)	X	X	X	X	X	X	X	X	X		X								
No galvanized metal inside 5 m radius collector (MDN)						X	X	X				X					X		
No pastures and ag. activity within 20 m radius												X	X	X	X				
No herbicides and fertilizers used within 20 m radius												X	X		X				
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Combustion sources meet NADP siting criteria (MDN only)																			
Parking lots and maintenance areas meet NADP siting criteria																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			
Metalworking operations meet NADP siting criteria (MDN only)																			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-1. NADP – MDN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (4 of 5)

StationId	OH16		ON07					PR20		SK27		VA28					WA03			
Year	2022	2018	2022	2017	2014	2011	2008	2022	2016	2022	2018	2022	2017	2014	2011	2009	2022	2018	2015	2012
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
45 degree rule met (raingage)																				
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)			X	X	X	X			X			X	X	X	X	X				
No objects > 1 m height inside 5 m radius (raingage)	X	X					X	X	X	X								X		
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)									X											
Collector and sensor oriented properly								X	X											
45 degree rule met (collector)												X								
30 degree rule for trees met (collector)			X									X	X	X	X	X				
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)							X	X	X	X										
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)									X											
No treated lumber inside 5 m radius (collector)							X													
No galvanized metal inside 5 m radius collector (MDN)							X			X										
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria	X																			
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Combustion sources meet NADP siting criteria (MDN only)																				
Parking lots and maintenance areas meet NADP siting criteria	X																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				
Metalworking operations meet NADP siting criteria (MDN only)																				

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-1. NADP – MDN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (5 of 5)

StationId	WI31				
Year	2022	2018	2015	2012	2009
Is sampling media quality maintained?					
Is the orifice of the collector +/- .3 m of raingage (elevation)					
45 degree rule met (raingage)		X	X	X	
30 degree rule for trees met (raingage)					
30 degree rule for buildings met (raingage)	X	X	X	X	
No objects > 1 m height inside 5 m radius (raingage)					
No fences > 1 m height inside 2 m radius (raingage)					
No vegetation height > 0.6 m within 5 m radius (raingage)					
Collector and sensor oriented properly			X		
45 degree rule met (collector)					
30 degree rule for trees met (collector)	X	X	X	X	
30 degree rule for buildings met (collector)					
No objects > 1 m height within 5 m radius (collector)					
No fences > 1 m height inside 5 m radius (collector)					
No vegetation height > 0.6 m within 5 m radius (collector)			X		
No treated lumber inside 5 m radius (collector)			X	X	X
No galvanized metal inside 5 m radius collector (MDN)					
No pastures and ag. activity within 20 m radius					
No herbicides and fertilizers used within 20 m radius					
Roads meet NADP siting criteria					
Waterways meet NADP siting criteria					
Airports meet NADP siting criteria					
Combustion sources meet NADP siting criteria (MDN only)					
Parking lots and maintenance areas meet NADP siting criteria					
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria					
Metalworking operations meet NADP siting criteria (MDN only)					

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (1 of 21)

StationId	AB32		AK02					AK96		AK97			AL10					AZ03				
Year	2022	2018	2022	2018	2015	2012	2010	2022	2018	2022	2016	2013	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008
Is sampling media quality maintained?																						
Is the orifice of the collector +/- .3 m of raingage (elevation)	X	X						X		X	X	X										
45 degree rule met (raingage)																						
30 degree rule for trees met (raingage)																						
30 degree rule for buildings met (raingage)					X	X	X															
No objects > 1 m height inside 5 m radius (raingage)	X	X		X				X		X	X		X	X	X	X	X					
No fences > 1 m height inside 2 m radius (raingage)	X														X							
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X																X	X	X	X	X
Collector and sensor oriented properly	X		X	X		X	X		X													
45 degree rule met (collector)																						
30 degree rule for trees met (collector)			X	X	X	X	X															
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)	X	X		X						X	X		X	X	X	X		X	X	X	X	X
No fences > 1 m height inside 5 m radius (collector)	X	X								X					X							
No vegetation height > 0.6 m within 5 m radius (collector)	X																	X	X	X	X	X
No treated lumber inside 5 m radius (collector)			X	X	X	X	X				X		X	X	X							
No pastures and ag. activity within 20 m radius													X	X	X	X	X					
No herbicides and fertilizers used within 20 m radius													X	X								
Roads meet NADP siting criteria																						
Waterways meet NADP siting criteria																						
Airports meet NADP siting criteria																						
Animal operations meet NADP site cirteria (NTN and AIRMoN)																	X					
Parking lots and maintenance areas meet NADP siting criteria																						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																						

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (2 of 21)

StationId	CAN5					CO00					CO01					CO02				
Year	2022	2017	2014	2011	2008	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008	2022	2018	2015	2012	2009
Is sampling media quality maintained?	U to T																			
Is the orifice of the collector +/- .3 m of raingage (elevation)														X			X	X	X	X
45 degree rule met (raingage)															X					
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)															X					
No objects > 1 m height inside 5 m radius (raingage)																	X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)								X								X	X	X	X	X
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X			X														
Collector and sensor oriented properly																X	X	X	X	X
45 degree rule met (collector)															X					
30 degree rule for trees met (collector)															X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)							X											X	X	
No fences > 1 m height inside 5 m radius (collector)																X	X	X	X	X
No vegetation height > 0.6 m within 5 m radius (collector)	X	X				X														
No treated lumber inside 5 m radius (collector)																				
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (3 of 21)

StationId	CO08					CO09			CO10					CO19					CO21				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2022	2017	2014	2011	2008	2022	2017	2014	2012	2009	2022	2018	2015	2012	2009
Is sampling media quality maintained?																							
Is the orifice of the collector +/- .3 m of raingage (elevation)						X	X	X	X	X	X	X		X									
45 degree rule met (raingage)		X			X																		
30 degree rule for trees met (raingage)																							
30 degree rule for buildings met (raingage)	X	X			X													X	X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)					X				X	X	X	X	X										
No fences > 1 m height inside 2 m radius (raingage)			X								X							X					
No vegetation height > 0.6 m within 5 m radius (raingage)		X	X	X	X	X		X															
Collector and sensor oriented properly									X	X	X	X	X	X									
45 degree rule met (collector)																							
30 degree rule for trees met (collector)	X		X	X	X													X	X	X	X	X	X
30 degree rule for buildings met (collector)																							
No objects > 1 m height within 5 m radius (collector)				X	X				X	X	X	X	X										
No fences > 1 m height inside 5 m radius (collector)	X	X	X	X						X	X												
No vegetation height > 0.6 m within 5 m radius (collector)	X	X	X	X	X	X		X															
No treated lumber inside 5 m radius (collector)	X	X	X																				
No pastures and ag. activity within 20 m radius				X	X																		
No herbicides and fertilizers used within 20 m radius																							
Roads meet NADP siting criteria																							
Waterways meet NADP siting criteria																							
Airports meet NADP siting criteria																							
Animal operations meet NADP site cirteria (NTN and AIRMoN)																							
Parking lots and maintenance areas meet NADP siting criteria																							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (4 of 21)

StationId	CO22					CO90					CO91					CO94				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008	2022	2018	2015	2012	2009
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)											X	X	X	X	X			X	X	X
45 degree rule met (raingage)		X										X								
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)						X	X	X	X	X	X	X	X			X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)							X				X	X	X		X		X	X	X	
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)					X	X	X	X	X	X	X	X	X			X	X	X	X	X
Collector and sensor oriented properly														X						
45 degree rule met (collector)												X	X	X						
30 degree rule for trees met (collector)						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)											X	X	X	X	X		X	X		
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
No treated lumber inside 5 m radius (collector)						X	X	X								X				
No pastures and ag. activity within 20 m radius	X	X		X	X															
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (5 of 21)

StationId	CO96					CO99					CT15					IA08				
Year	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008	2022	2017	2014	2012	2009
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)									X											
45 degree rule met (raingage)		X	X		X							X	X							
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)	X	X	X	X	X											X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)												X	X	X	X	X	X		X	X
No fences > 1 m height inside 2 m radius (raingage)																		X	X	X
No vegetation height > 0.6 m within 5 m radius (raingage)						X	X		X			X		X						
Collector and sensor oriented properly			X												X					
45 degree rule met (collector)		X	X		X							X	X						X	
30 degree rule for trees met (collector)	X	X	X	X	X												X	X	X	X
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)														X	X	X	X		X	X
No fences > 1 m height inside 5 m radius (collector)																X	X	X	X	X
No vegetation height > 0.6 m within 5 m radius (collector)						X	X					X		X						
No treated lumber inside 5 m radius (collector)	X	X	X			X	X		X	X										
No pastures and ag. activity within 20 m radius														X	X					
No herbicides and fertilizers used within 20 m radius														X	X					
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (6 of 21)

StationId	IA23					KS32						MD99					ME94		
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2010	2008	2022	2017	2014	2011	2008	2022	2017	2014
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)																			
45 degree rule met (raingage)																			
30 degree rule for trees met (raingage)																			
30 degree rule for buildings met (raingage)																			
No objects > 1 m height inside 5 m radius (raingage)						X	X	X	X		X	X	X	X	X	X		X	X
No fences > 1 m height inside 2 m radius (raingage)									X										
No vegetation height > 0.6 m within 5 m radius (raingage)	X									X		X			X				
Collector and sensor oriented properly																		X	X
45 degree rule met (collector)																			
30 degree rule for trees met (collector)																			
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)						X	X					X			X	X		X	X
No fences > 1 m height inside 5 m radius (collector)						X	X	X	X										
No vegetation height > 0.6 m within 5 m radius (collector)	X									X		X		X	X	X			
No treated lumber inside 5 m radius (collector)												X	X	X	X	X	X	X	X
No pastures and ag. activity within 20 m radius	X	X	X	X	X														
No herbicides and fertilizers used within 20 m radius																			
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Animal operations meet NADP site cirteria (NTN and AIRMoN)					X														
Parking lots and maintenance areas meet NADP siting criteria																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (7 of 21)

StationId	ME98					MI09					MI26					MI48				
Year	2022	2017	2014	2011	2008	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009
Is sampling media quality maintained?						U to T														
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
45 degree rule met (raingage)	X	X	X	X																
30 degree rule for trees met (raingage)																				--
30 degree rule for buildings met (raingage)				X	X															
No objects > 1 m height inside 5 m radius (raingage)				X							X	X	X	X	X				X	
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X	X	X							X								
Collector and sensor oriented properly																				
45 degree rule met (collector)	X	X	X	X	X															
30 degree rule for trees met (collector)	X					X	X	X	X											
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)											X	X	X	X	X					
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)	X	X	X	X	X															
No treated lumber inside 5 m radius (collector)						X					X	X	X	X		X	X	X	X	X
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (8 of 21)

StationId	MI51					MI53					MN08					MN99				
Year	2022	2018	2015	2012	2010	2022	2018	2015	2012	2010	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008
Is sampling media quality maintained?						U to T														
Is the orifice of the collector +/- .3 m of raingage (elevation)											X	X								
45 degree rule met (raingage)	X	X	X	X	X															
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)						X	X	X	X	X	X	X	X	X	X					
No objects > 1 m height inside 5 m radius (raingage)	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)										X	X	X								
Collector and sensor oriented properly											X	X	X	X	X					
45 degree rule met (collector)		X																		
30 degree rule for trees met (collector)						X	X	X	X	X	X	X	X	X	X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)						X	X	X	X	X	X	X	X	X						X
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)					X					X										
No treated lumber inside 5 m radius (collector)											X	X	X			X	X	X		
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria									X	X										

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (9 of 21)

StationId	MO03					MT00					MT97					MT98				
Year	2022	2018	2015	2012	2010	2022	2018	2013	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)					X															
45 degree rule met (raingage)																				
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)	X	X	X	X	X						X	X	X	X	X					
No objects > 1 m height inside 5 m radius (raingage)															X					
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)						X	X	X	X											
Collector and sensor oriented properly																				
45 degree rule met (collector)			X	X																
30 degree rule for trees met (collector)	X	X	X	X	X						X	X	X	X	X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)	X	X													X					
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)						X	X	X	X											
No treated lumber inside 5 m radius (collector)														X	X					
No pastures and ag. activity within 20 m radius																	X			
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (10 of 21)

StationId	NC03					NC25					NC34					NC41				
Year	2022	2017	2014	2012	2009	2022	2018	2015	2012	2008	2022	2017	2014	2012	2008	2022	2017	2014	2012	2009
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)						X														
45 degree rule met (raingage)	X					X				X				X	X					
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)	X	X	X	X	X						X	X		X	X					
No objects > 1 m height inside 5 m radius (raingage)						X	X	X	X	X										
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)																				
Collector and sensor oriented properly																				
45 degree rule met (collector)	X													X	X					
30 degree rule for trees met (collector)	X	X	X	X	X						X	X		X	X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)						X	X	X	X	X										
No fences > 1 m height inside 5 m radius (collector)						X	X	X	X	X										
No vegetation height > 0.6 m within 5 m radius (collector)																				
No treated lumber inside 5 m radius (collector)										X										
No pastures and ag. activity within 20 m radius																			X	X
No herbicides and fertilizers used within 20 m radius																			X	
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (11 of 21)

StationId	ND08					ND11					NE15					NE99				
Year	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
45 degree rule met (raingage)																				
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)																				
No objects > 1 m height inside 5 m radius (raingage)	X	X	X					X								X	X	X	X	
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)						X				X										
Collector and sensor oriented properly			X																	
45 degree rule met (collector)																				
30 degree rule for trees met (collector)																				
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)	X	X	X			X	X	X								X	X	X	X	
No fences > 1 m height inside 5 m radius (collector)						X	X													
No vegetation height > 0.6 m within 5 m radius (collector)						X				X										
No treated lumber inside 5 m radius (collector)																				
No pastures and ag. activity within 20 m radius						X				X	X	X	X	X		X	X			
No herbicides and fertilizers used within 20 m radius											X	X		X						
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria		X	X																	

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (12 of 21)

StationId	NH02					NV03					NV05					NY01				
Year	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008
Is sampling media quality maintained?									U to T											
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
45 degree rule met (raingage)	X	X																		
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)	X	X	X	X	X															
No objects > 1 m height inside 5 m radius (raingage)						X	X		X	X										
No fences > 1 m height inside 2 m radius (raingage)								X												
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X	X		X	X				X	X	X	X	X					
Collector and sensor oriented properly																				
45 degree rule met (collector)	X	X																		
30 degree rule for trees met (collector)	X	X	X	X	X															
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)																				
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)	X					X	X				X	X		X	X					
No treated lumber inside 5 m radius (collector)			X		X		X													
No pastures and ag. activity within 20 m radius								X		X										
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (13 of 21)

StationId	NY98					OH17					PA15					PA18					
Year	2022	2017	2014	2011	2008	2022	2018	2015	2013	2010	2022	2017	2014	2011	2008	2022	2017	2014	2013	2010	2008
Is sampling media quality maintained?																					
Is the orifice of the collector +/- .3 m of raingage (elevation)																					
45 degree rule met (raingage)				X		X															
30 degree rule for trees met (raingage)																					
30 degree rule for buildings met (raingage)	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)	X			X	X					X											
No fences > 1 m height inside 2 m radius (raingage)																					
No vegetation height > 0.6 m within 5 m radius (raingage)																					
Collector and sensor oriented properly																					
45 degree rule met (collector)				X	X	X															
30 degree rule for trees met (collector)	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X
30 degree rule for buildings met (collector)																					
No objects > 1 m height within 5 m radius (collector)	X	X	X	X	X																
No fences > 1 m height inside 5 m radius (collector)																					
No vegetation height > 0.6 m within 5 m radius (collector)	X																				
No treated lumber inside 5 m radius (collector)			X	X																	
No pastures and ag. activity within 20 m radius																					
No herbicides and fertilizers used within 20 m radius																					
Roads meet NADP siting criteria																					
Waterways meet NADP siting criteria																					
Airports meet NADP siting criteria																					
Animal operations meet NADP site cirteria (NTN and AIRMoN)																					
Parking lots and maintenance areas meet NADP siting criteria																					
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																					

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (14 of 21)

StationId	PR20				SD08					SD99					SK20				SK31	
Year	2022	2016	2013	2010	2022	2018	2015	2012	2009	2022	2017	2014	2011	2008	2022	2018	2015	2012	2022	2018
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																			X	X
45 degree rule met (raingage)																				
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)		X																		
No objects > 1 m height inside 5 m radius (raingage)	X	X	X	X				X			X								X	X
No fences > 1 m height inside 2 m radius (raingage)																			X	
No vegetation height > 0.6 m within 5 m radius (raingage)		X	X							X					X	X	X	X	X	
Collector and sensor oriented properly												X						X		
45 degree rule met (collector)																				
30 degree rule for trees met (collector)		X																		
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)	X	X	X	X				X											X	X
No fences > 1 m height inside 5 m radius (collector)																			X	X
No vegetation height > 0.6 m within 5 m radius (collector)		X	X							X					X	X	X	X	X	
No treated lumber inside 5 m radius (collector)																	X			
No pastures and ag. activity within 20 m radius							X	X	X										X	
No herbicides and fertilizers used within 20 m radius																			X	
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria																				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (15 of 21)

StationId	TX22					UT01					UT09					UT95		UT98				
Year	2022	2018	2015	2011	2008	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2018	2022	2018	2015	2012	2008
Is sampling media quality maintained?																						
Is the orifice of the collector +/- .3 m of raingage (elevation)																						
45 degree rule met (raingage)															X							
30 degree rule for trees met (raingage)																						
30 degree rule for buildings met (raingage)	X	X																				
No objects > 1 m height inside 5 m radius (raingage)		X		X	X	X	X								X					X	X	
No fences > 1 m height inside 2 m radius (raingage)																						
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X			X			X						X	X						
Collector and sensor oriented properly			X																	X		
45 degree rule met (collector)															X							
30 degree rule for trees met (collector)																						
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)		X		X	X	X									X							X
No fences > 1 m height inside 5 m radius (collector)																					X	X
No vegetation height > 0.6 m within 5 m radius (collector)	X	X				X			X						X	X						
No treated lumber inside 5 m radius (collector)																X	X					
No pastures and ag. activity within 20 m radius							X	X	X													
No herbicides and fertilizers used within 20 m radius																						
Roads meet NADP siting criteria						X	X															
Waterways meet NADP siting criteria																						
Airports meet NADP siting criteria																						
Animal operations meet NADP site cirteria (NTN and AIRMoN)																						
Parking lots and maintenance areas meet NADP siting criteria																						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																						

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (16 of 21)

StationId	UT99					VA28					VI01				VT01				
Year	2022	2018	2015	2012	2008	2022	2017	2014	2011	2009	2022	2016	2013	2010	2022	2017	2014	2011	2008
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)					X														
45 degree rule met (raingage)	X										X	X	X	X	X	X			
30 degree rule for trees met (raingage)																			
30 degree rule for buildings met (raingage)	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)			X								X	X	X	X	X	X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)															X	X	X	X	X
No vegetation height > 0.6 m within 5 m radius (raingage)												X		X		X		X	
Collector and sensor oriented properly						X													
45 degree rule met (collector)	X	X	X								X	X	X	X		X			
30 degree rule for trees met (collector)	X	X	X	X	X	X	X	X	X						X	X	X	X	X
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)			X								X	X	X	X	X	X	X	X	X
No fences > 1 m height inside 5 m radius (collector)															X	X	X	X	X
No vegetation height > 0.6 m within 5 m radius (collector)												X		X		X	X	X	
No treated lumber inside 5 m radius (collector)																			
No pastures and ag. activity within 20 m radius																			
No herbicides and fertilizers used within 20 m radius																			X
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Animal operations meet NADP site cirteria (NTN and AIRMoN)																			
Parking lots and maintenance areas meet NADP siting criteria											X	X	X	X					
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (17 of 21)

StationId	WA14					WA19					WA21					WA24				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)														X					X	
45 degree rule met (raingage)		X	X	X	X						X	X	X	X	X					
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)	X	X	X	X	X	X	X	X		X	X	X	X	X	X					
No objects > 1 m height inside 5 m radius (raingage)	X	X	X	X	X										X	X	X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)	X	X	X		X															
No vegetation height > 0.6 m within 5 m radius (raingage)				X		X	X	X	X					X	X					
Collector and sensor oriented properly																				
45 degree rule met (collector)		X		X	X			X						X	X					
30 degree rule for trees met (collector)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)	X	X	X	X	X					X					X					
No fences > 1 m height inside 5 m radius (collector)	X	X	X	X	X				X	X										
No vegetation height > 0.6 m within 5 m radius (collector)				X		X	X	X						X	X					
No treated lumber inside 5 m radius (collector)							X	X	X		X	X	X							
No pastures and ag. activity within 20 m radius						X	X	X	X	X						X	X	X	X	
No herbicides and fertilizers used within 20 m radius																X	X	X	X	
Roads meet NADP siting criteria			X																	
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria	X	X	X	X							X						X	X	X	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (18 of 21)

StationId	WA98					WA99					WI31			WI35				
Year	2022	2017	2013	2011	2008	2022	2018	2015	2012	2009	2022	2019	2015	2022	2017	2014	2011	2008
Is sampling media quality maintained?					X													
Is the orifice of the collector +/- .3 m of raingage (elevation)					X													
45 degree rule met (raingage)												X	X		X	X	X	X
30 degree rule for trees met (raingage)																		
30 degree rule for buildings met (raingage)						X		X			X	X	X					
No objects > 1 m height inside 5 m radius (raingage)								X	X	X							X	X
No fences > 1 m height inside 2 m radius (raingage)																		
No vegetation height > 0.6 m within 5 m radius (raingage)	X					X		X										
Collector and sensor oriented properly	X	X	X		X													
45 degree rule met (collector)														X	X	X	X	X
30 degree rule for trees met (collector)						X		X			X	X	X					
30 degree rule for buildings met (collector)																		
No objects > 1 m height within 5 m radius (collector)								X	X	X							X	X
No fences > 1 m height inside 5 m radius (collector)																		
No vegetation height > 0.6 m within 5 m radius (collector)	X			X		X		X										
No treated lumber inside 5 m radius (collector)																		
No pastures and ag. activity within 20 m radius																		
No herbicides and fertilizers used within 20 m radius																		
Roads meet NADP siting criteria																		
Waterways meet NADP siting criteria																		
Airports meet NADP siting criteria																		
Animal operations meet NADP site cirteria (NTN and AIRMoN)																		
Parking lots and maintenance areas meet NADP siting criteria																		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																		

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (19 of 21)

StationId	WI37					WY00					WY02					WY06				
Year	2022	2017	2014	2011	2008	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)										X										
45 degree rule met (raingage)				X	X															
30 degree rule for trees met (raingage)																				
30 degree rule for buildings met (raingage)		X	X	X	X															
No objects > 1 m height inside 5 m radius (raingage)											X	X	X	X				X	X	
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)												X	X			X	X	X		
Collector and sensor oriented properly																				
45 degree rule met (collector)				X	X															
30 degree rule for trees met (collector)		X	X	X	X															
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)																		X	X	
No fences > 1 m height inside 5 m radius (collector)											X	X	X	X		X	X			
No vegetation height > 0.6 m within 5 m radius (collector)												X	X			X	X	X	X	
No treated lumber inside 5 m radius (collector)											X	X	X	X	X					
No pastures and ag. activity within 20 m radius												X	X	X		X	X	X	X	X
No herbicides and fertilizers used within 20 m radius																				
Roads meet NADP siting criteria																				
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP site cirteria (NTN and AIRMoN)																				
Parking lots and maintenance areas meet NADP siting criteria	X																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																				

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (20 of 21)

StationId	WY94				WY95					WY97					WY98				
Year	2022	2018	2015	2012	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009
Is sampling media quality maintained?																			
Is the orifice of the collector +/- .3 m of raingage (elevation)																			
45 degree rule met (raingage)			X																
30 degree rule for trees met (raingage)																			
30 degree rule for buildings met (raingage)										X	X		X	X					
No objects > 1 m height inside 5 m radius (raingage)				X															
No fences > 1 m height inside 2 m radius (raingage)			X	X							X	X		X					
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X																
Collector and sensor oriented properly																			
45 degree rule met (collector)											X								
30 degree rule for trees met (collector)										X	X	X	X						
30 degree rule for buildings met (collector)																			
No objects > 1 m height within 5 m radius (collector)				X									X						
No fences > 1 m height inside 5 m radius (collector)			X	X						X	X			X					
No vegetation height > 0.6 m within 5 m radius (collector)		X	X																
No treated lumber inside 5 m radius (collector)			X												X	X	X	X	
No pastures and ag. activity within 20 m radius															X			X	
No herbicides and fertilizers used within 20 m radius																			
Roads meet NADP siting criteria																			
Waterways meet NADP siting criteria																			
Airports meet NADP siting criteria																			
Animal operations meet NADP site cirteria (NTN and AIRMoN)																			
Parking lots and maintenance areas meet NADP siting criteria																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-2. NADP – NTN – Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (21 of 21)

StationId	WY99				
Year	2022	2017	2014	2011	2008
Is sampling media quality maintained?					
Is the orifice of the collector +/- .3 m of raingage (elevation)					
45 degree rule met (raingage)					
30 degree rule for trees met (raingage)					
30 degree rule for buildings met (raingage)	X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)	X		X	X	
No fences > 1 m height inside 2 m radius (raingage)					
No vegetation height > 0.6 m within 5 m radius (raingage)			X		
Collector and sensor oriented properly					
45 degree rule met (collector)					
30 degree rule for trees met (collector)	X	X		X	
30 degree rule for buildings met (collector)					
No objects > 1 m height within 5 m radius (collector)	X		X	X	
No fences > 1 m height inside 5 m radius (collector)					
No vegetation height > 0.6 m within 5 m radius (collector)			X		
No treated lumber inside 5 m radius (collector)					
No pastures and ag. activity within 20 m radius					
No herbicides and fertilizers used within 20 m radius					
Roads meet NADP siting criteria					
Waterways meet NADP siting criteria					
Airports meet NADP siting criteria					
Animal operations meet NADP site cirteria (NTN and AIRMoN)					
Parking lots and maintenance areas meet NADP siting criteria					
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria					

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-3. NADP – MDN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (1 of 4)

StationId	AK96		BC16			CO96				CO99					IN21					KS32				
Year	2022	2018	2022	2018	2015	2022	2018	2015	2012	2022	2018	2015	2012	2008	2022	2018	2015	2011	2008	2022	2018	2015	2012	2010
Dry side bucket is clean	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Does lid seal properly	--	--	--	--	--	--	--	--	--						X			X		--	--	--	--	--
Lid liner in good condition	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Fan in good condition	--	--	--	--	--	--	--	--	--			X								--	--	--	--	--
Cooling fan thermostat in good condition	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Heater in good condition	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Heater thermostat in good condition	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Has flush wall filter mount been installed	--	--	--	--	--	--	--	--	--			X								--	--	--	--	--
Filter in good condition	--	--	--	--	--	--	--	--	--			--							U to T	--	--	--	--	--
Max / min thermometer in acceptable limits	--	--	--	--	--	--	--	--	--											--	--	--	--	--
Dry side bag installed correctly	--	--	--	--	--	--	--	--	--											--	--	--	--	--
ACM sensor operates properly	--	--	--	--	--	--	--	--	--										X	--	--	--	--	--
Motorbox operates within acceptable limits	--	--	--	--	--	--	--	--	--											--	--	--	--	--
N-CON lid seal in good condition										--	--	--	--	--	--	--	--	--	--					
N-CON lid liner in good condition										--	--	--	--	--	--	--	--	--	--					
N-CON fan in good condition										--	--	--	--	--	--	--	--	--	--	X				
N-CON cooling fan thermostat in good condition										--	--	--	--	--	--	--	--	--	--			X		
N-CON heater in good condition										--	--	--	--	--	--	--	--	--	--					U to T
N-CON heater thermostat in good condition										--	--	--	--	--	--	--	--	--	--					U to T
N-CON max / min thermometer in acceptable limits			X	X						--	--	--	--	--	--	--	--	--	--					
N-CON sensor responds to a 20-second mist of water										--	--	--	--	--	--	--	--	--	--					
N-CON arms and motorbox do not require tightening	X	**		**	**	X	**	**	**	--	**	**	**	**	--	**	**	**	**	X	**	**	**	**
Raingage operates properly (e-gage)														--				X	--					--
Does datalogger receive event signals form all collectors (e-gage)								X						--					--					--
Does optical sensor respond to "blocking" of light beam (e-gage)		X												--	--	--	--	--	--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)		X												--	--	--	--	--	--	--	--	--	--	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-3. NADP – MDN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (2 of 4)

StationId	MD99					ME98					MI09			MI48					MN06			ND01		
Year	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2022	2018	2015	2012	2009	2022	2018	2015	2022	2018	2008
Dry side bucket is clean																						--	--	
Does lid seal properly																						--	--	
Lid liner in good condition																						--	--	
Fan in good condition			X																		X	--	--	
Cooling fan thermostat in good condition																						--	--	
Heater in good condition																						--	--	
Heater thermostat in good condition																						--	--	
Has flush wall filter mount been installed													X							X		--	--	
Filter in good condition			U to T	U to T	U to T						--		--						--			--	--	
Max / min thermometer in acceptable limits																						--	--	
Dry side bag installed correctly																						--	--	
ACM sensor operates properly																						--	--	
Motorbox operates within acceptable limits																						--	--	
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON fan in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	U to T		--
N-CON cooling fan thermostat in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X		--
N-CON heater in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON heater thermostat in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON max / min thermometer in acceptable limits	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON sensor responds to a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	--	**	**	**	**	--	**	**	--	**	**	**	**	--	**	**	X	**	**
Raingage operates properly (e-gage)																		--		--	--			--
Does datalogger receive event signals form all collectors (e-gage)																		--		--	--		X	--
Does optical sensor respond to "blocking" of light beam (e-gage)										U to T						U to T		--	--	--	--			--
Does optical sensor respond to mist of water (e-gage)										U to T						U to T		--	--	--	--			--

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-3. NADP – MDN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (3 of 4)

StationId	NE15					NE98			OH16		ON07					PR20		SK27		VA28				
Year	2022	2018	2015	2012	2008	2022	2018	2015	2022	2018	2022	2017	2014	2011	2008	2022	2016	2022	2018	2022	2017	2014	2011	2009
Dry side bucket is clean	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Does lid seal properly	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Fan in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Cooling fan thermostat in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Heater in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Heater thermostat in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Has flush wall filter mount been installed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--		X			X
Filter in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	U to T	U to T	--
Max / min thermometer in acceptable limits	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Dry side bag installed correctly	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
ACM sensor operates properly	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
Motorbox operates within acceptable limits	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--					
N-CON lid seal in good condition	X														--					--	--	--	--	--
N-CON lid liner in good condition															--					--	--	--	--	--
N-CON fan in good condition	X	X	X						X						--	X				--	--	--	--	--
N-CON cooling fan thermostat in good condition															--					--	--	--	--	--
N-CON heater in good condition		U to T													--					--	--	--	--	--
N-CON heater thermostat in good condition		X													--					--	--	--	--	--
N-CON max / min thermometer in acceptable limits															--					--	--	--	--	--
N-CON sensor responds to a 20-second mist of water							--								--			X		--	--	--	--	--
N-CON arms and motorbox do not require tightening	X	**	**	**	**	X	**	**		**		**	**	**	**		**		**	--	**	**	**	**
Raingage operates properly (e-gage)					U to T										--									
Does datalogger receive event signals form all collectors (e-gage)					U to T										--									
Does optical sensor respond to "blocking" of light beam (e-gage)					U to T	X		U to T	--	--					--	X		--						
Does optical sensor respond to mist of water (e-gage)					U to T	X		U to T	--	--					--	X		--						

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-3. NADP – MDN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (4 of 4)

StationId	WA03				WI31				
Year	2022	2018	2015	2012	2022	2018	2015	2012	2009
Dry side bucket is clean					--	--	--		
Does lid seal properly					--	--	--		
Lid liner in good condition					--	--	--		
Fan in good condition					--	--	--		
Cooling fan thermostat in good condition					--	--	--		
Heater in good condition					--	--	--		
Heater thermostat in good condition					--	--	--		
Has flush wall filter mount been installed					--	--	--		
Filter in good condition					--	--	--		
Max / min thermometer in acceptable limits					--	--	--	X	
Dry side bag installed correctly					--	--	--		
ACM sensor operates properly					--	--	--		
Motorbox operates within acceptable limits					--	--	--		
N-CON lid seal in good condition	--	--	--	--				--	--
N-CON lid liner in good condition	--	--	--	--				--	--
N-CON fan in good condition	--	--	--	--				--	--
N-CON cooling fan thermostat in good condition	--	--	--	--				--	--
N-CON heater in good condition	--	--	--	--				--	--
N-CON heater thermostat in good condition	--	--	--	--				--	--
N-CON max / min thermometer in acceptable limits	--	--	--	--				--	--
N-CON sensor responds to a 20-second mist of water	--	--	--	--				--	--
N-CON arms and motorbox do not require tightening	--	**	**	**		**	**	**	**
Raingage operates properly (e-gage)		--	--	--					
Does datalogger receive event signals form all collectors (e-gage)		--	--	--					
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--					
Does optical sensor respond to mist of water (e-gage)	--	--	--	--					

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 1 of 16)

StationId	AB32		AK02					AK96		AK97			AL10					AZ03					CAN5				
Year	2022	2018	2022	2018	2015	2012	2010	2022	2018	2022	2016	2013	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008
Dry side bucket is clean	--	--			X			--	--	--	X												--	--	--	--	
Does lid seal properly	--	--						--	--	--		X		X									--	--	--	--	X
Lid liner in good condition	--	--						--	--	--				X									--	--	--	--	
ACM sensor operates properly	--	--					U to T	--	--	--								X					--	--	--	--	
Motorbox operates within acceptable limits	--	--					X	--	--	--													--	--	--	--	
N-CON lid seal in good condition			--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--			X		--
N-CON lid liner in good condition			--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--					--
N-CON sensor responds to five passes of the hand			--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--					--
N-CON arms and motorbox do not require tightening		**	--	**	**	**	**		**		**	**	--	**	**	**	**	--	**	**	**	**	X	**	**	**	**
Raingage operates properly (e-gage)																--	--					U to T				X	--
Does datalogger receive event signals form all collectors (e-gage)		X					U to T									--	--										--
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--		X					X				--	--	--	--	--										--
Does optical sensor respond to mist of water (e-gage)	--	--		X					X		U to T		--	--	--	--	--										--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 2 of 16)

StationId	CO00					CO01					CO02					CO08					CO09			CO10				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2022	2017	2014	2011	2008
Dry side bucket is clean	--	--	--			--	--	--																				
Does lid seal properly	--	--	--			--	--	--																				
Lid liner in good condition	--	--	--			--	--	--													X	X			X			
ACM sensor operates properly	--	--	--			--	--	--						U to T														
Motorbox operates within acceptable limits	--	--	--			--	--	--																				
N-CON lid seal in good condition				--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition				--	--				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand		--		--	--	X	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening		**	**	**	**	X	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	--	**	**	**	**
Raingage operates properly (e-gage)					--					--		--	--	--	--					--								--
Does datalogger receive event signals form all collectors (e-gage)				U to T	--			U to T		--		--	--	--	--					--	X					X		--
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		X	X		--							U to T	--
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		X	X		--			U to T				U to T	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 3 of 16)

StationId	CO19					CO21					CO22					CO90					CO91				
Year	2022	2017	2014	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008
Dry side bucket is clean																									
Does lid seal properly																									
Lid liner in good condition																									
ACM sensor operates properly								X																	
Motorbox operates within acceptable limits								X																	
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)							--	--	--	--		--	--	--	--	X		--	--	--					--
Does datalogger receive event signals form all collectors (e-gage)							--	--	--	--		--	--	--	--			--	--	--					--
Does optical sensor respond to "blocking" of light beam (e-gage)							--	--	--	--		--	--	--	--	X		--	--	--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)					U to T		--	--	--	--		--	--	--	--	X		--	--	--	--	--	--	--	--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 4 of 16)

StationId	CO94					CO96					CO99					CT15					IA08				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008	2022	2017	2014	2012	2009
Dry side bucket is clean											--	--	--	X							--	--	--	--	
Does lid seal properly	X										--	--	--							U to T	--	--	--	--	
Lid liner in good condition											--	--	--								--	--	--	--	
ACM sensor operates properly											--	--	--							U to T	--	--	--	--	
Motorbox operates within acceptable limits											--	--	--							X	--	--	--	--	
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--				--	--	--	--	--	--	--					--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--				--	--	--	--	--	--	--					--
N-CON sensor responds to five passes of the hand	--	--	--	--	--	--	--	--	--	--				--	--	--	--	--	--	--					--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	--	**	**	**	**	X	**	**	**	**	--	**	**	**	**	X	**	**	**	**
Raingage operates properly (e-gage)										--					--					--					--
Does datalogger receive event signals form all collectors (e-gage)								X		--					--					--					--
Does optical sensor respond to "blocking" of light beam (e-gage)										--					--					--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)										--					--					--	--	--	--	--	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 5 of 16)

StationId	IA23					KS32						MD99					ME94			ME98				
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2010	2008	2022	2017	2014	2011	2008	2022	2017	2014	2022	2017	2014	2011	2008
Dry side bucket is clean	--	--	--	--	X	--	--	--	--							X				--				
Does lid seal properly	--	--	--	--		--	--	--	--											--				
Lid liner in good condition	--	--	--	--		--	--	--	--											--				
ACM sensor operates properly	--	--	--	--	X	--	--	--	--											--				
Motorbox operates within acceptable limits	--	--	--	--		--	--	--	--											--				
N-CON lid seal in good condition	X				--			X		--	--	--	--	--	--	--	--	--	--		--	--	--	--
N-CON lid liner in good condition					--					--	--	--	--	--	--	--	--	--	--		--	--	--	--
N-CON sensor responds to five passes of the hand					--					--	--	--	--	--	--	--	--	--	--		--	--	--	--
N-CON arms and motorbox do not require tightening	X	**	**	**	**	X	**	**	**	**	**	--	**	**	**	**	--	**	**		**	**	**	**
Raingage operates properly (e-gage)					--					--	--													
Does datalogger receive event signals form all collectors (e-gage)					--					--	--													
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--	--	--	--	--	--	--								X					U to T
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--	--	--	--	--	--	--								X					U to T

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 6 of 16)

StationId	MI09					MI26					MI48					MI51						MI53			
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2010	2022	2018	2015	2012	2010
Dry side bucket is clean													--								X				
Does lid seal properly																									
Lid liner in good condition																									
ACM sensor operates properly								X							X										
Motorbox operates within acceptable limits																									
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)								X		X					--										
Does datalogger receive event signals form all collectors (e-gage)						X				X					--										
Does optical sensor respond to "blocking" of light beam (e-gage)							X	U to T					U to T		--										
Does optical sensor respond to mist of water (e-gage)							X	U to T					U to T		--										

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 7 of 16)

StationId	MN08					MN99					MO03					MT00					MT97				
Year	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2012	2010	2022	2018	2013	2011	2008	2022	2017	2014	2011	2008
Dry side bucket is clean						--	--				--	--	--	--			X		U to T						
Does lid seal properly						--	--				--	--	--	--											
Lid liner in good condition						--	--				--	--	--	--											
ACM sensor operates properly						--	--				--	--	--	--	X									X	
Motorbox operates within acceptable limits						--	--				--	--	--	--											
N-CON lid seal in good condition	--	--	--	--	--			--	--	--					--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--			--	--	--					--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--			--	--	--					--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**		**	**	**	**	X	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)			--	--	--				--	--					--					--					--
Does datalogger receive event signals form all collectors (e-gage)			--	--	--				--	--		X			--					--	X				--
Does optical sensor respond to "blocking" of light beam (e-gage)			--	--	--			U to T	--	--	--	--	--	--	--		X			--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)			--	--	--			U to T	--	--	--	--	--	--	--		X			--	--	--	--	--	--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 8 of 16)

StationId	MT98					NC03					NC25					NC34					NC41				
Year	2022	2018	2015	2012	2008	2022	2017	2014	2012	2009	2022	2018	2015	2012	2008	2022	2017	2014	2012	2008	2022	2017	2014	2012	2009
Dry side bucket is clean	--	--	--	--	X		X			X						X	X	X		X	X				X
Does lid seal properly	--	--	--	--																					
Lid liner in good condition	--	--	--	--	X																				
ACM sensor operates properly	--	--	--	--								X													
Motorbox operates within acceptable limits	--	--	--	--																					
N-CON lid seal in good condition					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	X	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)					--				--	--		--	--	--	--				--	--				--	--
Does datalogger receive event signals form all collectors (e-gage)	X				--				--	--		--	--	--	--				--	--				--	--
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 9 of 16)

StationId	ND08					ND11					NE15					NE99					NH02				
Year	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008
Dry side bucket is clean	--	--	--			--	--	--								--	--	--	--			X			
Does lid seal properly	--	--	--			--	--	--								--	--	--	--						
Lid liner in good condition	--	--	--			--	--	--								--	--	--	--						
ACM sensor operates properly	--	--	--			--	--	--								--	--	--	--						
Motorbox operates within acceptable limits	--	--	--			--	--	--		X						--	--	--	--						
N-CON lid seal in good condition				--	--			X	--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON lid liner in good condition		X		--	--			U to T	--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON sensor responds to five passes of the hand				--	--				--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	X	**	**	**	**		**	**	**	**	--	**	**	**	**		**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)				--	--				U to T	--					--					--					--
Does datalogger receive event signals form all collectors (e-gage)				--	--				U to T	--					--					--	X				--
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--	--	--	--	--	--					--	--	--	--	--	--					--
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--	--	--	--	--	--					--	--	--	--	--	--					--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 10 of 16)

StationId	NV03					NV05					NY01					NY98					OH17				
Year	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2013	2010
Dry side bucket is clean							U to T		U to T		--	--	--	--		--	--	--	--						
Does lid seal properly					X						--	--	--	--		--	--	--	--						
Lid liner in good condition											--	--	--	--		--	--	--	--						
ACM sensor operates properly											--	--	--	--		--	--	--	--						X
Motorbox operates within acceptable limits											--	--	--	--		--	--	--	--						
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	X				--					--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--					--	X				--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--	--	--	--	--	--					--					--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	--	**	**	**	**	X	**	**	**	**	X	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)					--					--					--					--					
Does datalogger receive event signals form all collectors (e-gage)				U to T	--					--					--					--					
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--					--	--	--	--	--	--	--	--	--	--	--					
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--					--	--	--	--	--	--	--	--	--	--	--					

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 11 of 16)

StationId	PA15					PA18					PR20					SD08					SD99				
Year	2022	2017	2014	2011	2008	2022	2017	2014	2013	2010	2008	2022	2016	2013	2010	2022	2018	2015	2012	2009	2022	2017	2014	2011	2008
Dry side bucket is clean					X	--	--	--	--	X						--	--	--	--		--	--	--		
Does lid seal properly						--	--	--	--							--	--	--	--		--	--	--		
Lid liner in good condition						--	--	--	--							--	--	--	--		--	--	--		
ACM sensor operates properly						--	--	--	--				X	X		--	--	--	--		--	--	--		
Motorbox operates within acceptable limits						--	--	--	--							--	--	--	--		--	--	--		
N-CON lid seal in good condition	--	--	--	--	--					--	--	--	--	--	--					--				--	--
N-CON lid liner in good condition	--	--	--	--	--					--	--	--	--	--	--					--				--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--					--	--	--	--	--	--		--			--				--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**		**	**	**	**	**	--	**	**	**	X	**	**	**	**		**	**	**	**
Raingage operates properly (e-gage)				--	--					--	--				--					--					--
Does datalogger receive event signals form all collectors (e-gage)				--	--					--	--				--					--					--
Does optical sensor respond to "blocking" of light beam (e-gage)			U to T	--	--	--	--	--	--	--	--	X			--	--	--	--	--	--	--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)			U to T	--	--	--	--	--	--	--	--	X		X	--	--	--	--	--	--	--	--	--	--	--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 12 of 16)

StationId	SK20				SK31		TX22					UT01					UT09					UT95		UT98				
Year	2022	2018	2015	2012	2022	2018	2022	2018	2015	2011	2008	2022	2018	2015	2012	2008	2022	2018	2015	2012	2008	2022	2018	2022	2018	2015	2012	2008
Dry side bucket is clean	--	--	--	--	--	--						--	--	--	--				X					--	--	--	X	
Does lid seal properly	--	--	--	--	--	--						--	--	--	--									--	--	--		
Lid liner in good condition	--	--	--	--	--	--	X				--	--	--	--	--									--	--	--		
ACM sensor operates properly	--	--	--	--	--	--						--	--	--	--									--	--	--		
Motorbox operates within acceptable limits	--	--	--	--	--	--						--	--	--	--									--	--	--		
N-CON lid seal in good condition							--	--	--	--	--					--	--	--	--	--	--	--	--				--	--
N-CON lid liner in good condition							--	--	--	--	--					--	--	--	--	--	--	--	--			X	--	--
N-CON sensor responds to five passes of the hand	X						--	--	--	--	--					--	--	--	--	--	--	--	--				--	--
N-CON arms and motorbox do not require tightening	X	**	**	**		**	--	**	**	**	**		**	**	**	**	--	**	**	**	**	--	**		**	**	**	**
Raingage operates properly (e-gage)				X			X				--					--					--							--
Does datalogger receive event signals form all collectors (e-gage)	X	X	X			X					--					--					--		X				U to T	--
Does optical sensor respond to "blocking" of light beam (e-gage)	X	X	X	U to T			X	X			--	--	--	--	--	--					--			--	--	--	--	--
Does optical sensor respond to mist of water (e-gage)			X	U to T			X	X			--	--	--	--	--	--					--			--	--	--	--	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 13 of 16)

StationId	UT99					VA28					VI01					VT01				WA14				
Year	2022	2018	2015	2012	2008	2022	2017	2014	2011	2009	2022	2016	2013	2010	2022	2017	2014	2011	2008	2022	2018	2015	2012	2009
Dry side bucket is clean						--						X	X		--	--	--	--		X				X
Does lid seal properly						--									--	--	--	--						
Lid liner in good condition		X				--									--	--	--	--		X				
ACM sensor operates properly						--				U to T					--	--	--	--						
Motorbox operates within acceptable limits						--				X					--	--	--	--						
N-CON lid seal in good condition	--	--	--	--	--		--	--	--	--	--	--	--	--			X		--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--		--	--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--	X	--	--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	X	**	**	**	**	--	**	**	**		**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)	X	X			--														--	X			U to T	
Does datalogger receive event signals form all collectors (e-gage)				X	--														--					
Does optical sensor respond to "blocking" of light beam (e-gage)	X	X			--										--	--	--	--	--	X	U to T		U to T	
Does optical sensor respond to mist of water (e-gage)	X	X			--										--	--	--	--	--	X		X	U to T	

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 14 of 16)

StationId	WA19					WA21					WA24					WA98					WA99					WI31		
Year	2022	2018	2015	2012	2009	2022	2018	2015	2012	2009	2022	2018	2015	2012	2008	2022	2017	2013	2011	2008	2022	2018	2015	2012	2009	2022	2019	2015
Dry side bucket is clean	--	--	--			X					--	--	--			X				X						--	--	--
Does lid seal properly	--	--	--								--	--	--													--	--	--
Lid liner in good condition	--	--	--								--	--	--													--	--	--
ACM sensor operates properly	--	--	--								--	--	--													--	--	--
Motorbox operates within acceptable limits	--	--	--							X	--	--	--												X	--	--	--
N-CON lid seal in good condition			X	--	--	--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--		X	
N-CON lid liner in good condition	X			--	--	--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--			
N-CON sensor responds to five passes of the hand				--	--	--	--	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--			
N-CON arms and motorbox do not require tightening	X	**	**	**	**	--	**	**	**	**	X	**	**	**	**	--	**	**	**	**	--	**	**	**	**	X	X	**
Raingage operates properly (e-gage)					--	X									--					--								
Does datalogger receive event signals form all collectors (e-gage)			X	X	--					U to T			X		--					--								
Does optical sensor respond to "blocking" of light beam (e-gage)	--	--	--	--	--	X			X		--	--	--	--	--			U to T		--		X						
Does optical sensor respond to mist of water (e-gage)	--	--	--	--	--	X			X		--	--	--	--	--			U to T		--			X					

	Indicates found compliant
X	**Indicates found non-compliant**
--	**Indicates "Not Applicable"**
U to T	**Indicates "Unable to Test"**

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 15 of 16)

StationId	WI35					WI37					WY00					WY02					WY06				
Year	2022	2017	2014	2011	2008	2022	2017	2014	2011	2008	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009
Dry side bucket is clean						--	--																		
Does lid seal properly						--	--																		
Lid liner in good condition						--	--																		
ACM sensor operates properly						--	--														X				
Motorbox operates within acceptable limits						--	--																		
N-CON lid seal in good condition	--	--	--	--	--			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand	--	--	--	--	--			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	--	**	**	**	**	X	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)					--			--	--	--										--					--
Does datalogger receive event signals form all collectors (e-gage)					--			--	--	--										--					--
Does optical sensor respond to "blocking" of light beam (e-gage)					--			--	--	--										--		X	X		--
Does optical sensor respond to mist of water (e-gage)					--			--	--	--										--		X	X		--

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 16 of 16)

StationId	WY94				WY95					WY97					WY98					WY99				
Year	2022	2018	2015	2012	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009	2022	2018	2015	2013	2009	2022	2017	2014	2011	2008
Dry side bucket is clean	--	--	--	--											X									
Does lid seal properly	--	--	--	--																				
Lid liner in good condition	--	--	--	--										X										
ACM sensor operates properly	--	--	--	--																				
Motorbox operates within acceptable limits	--	--	--	--																				
N-CON lid seal in good condition					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to five passes of the hand					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-CON arms and motorbox do not require tightening	X	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**	--	**	**	**	**
Raingage operates properly (e-gage)													--	--	X				--				--	--
Does datalogger receive event signals form all collectors (e-gage)													--	--					--				--	--
Does optical sensor respond to "blocking" of light beam (e-gage)		U to T											--	--	X				--				--	--
Does optical sensor respond to mist of water (e-gage)		U to T										U to T	--	--	X				--				--	--

	Indicates found compliant
X	Indicates found non-compliant
--	Indicates "Not Applicable"
U to T	Indicates "Unable to Test"

APPENDIX D

List of Site Funding and Sponsoring Agencies

Site ID	Network	Operating/Funding Agency
AB32	NTN	Wood Buffalo Environmental Association
AB34	NTN	Wood Buffalo Environmental Association
AB36	NTN	Wood Buffalo Environmental Association
AK02	NTN	USDA-FS-Fed 7
AK96	AMoN	BLM - NIFA
AK96	MDN	University of Alaska-Fairbanks
AK96	NTN	University of Alaska-Fairbanks
AK97	NTN	National Park Service - NIFA
AL10	NTN	USGS - NIFA
AL99	AMoN	Wood - EPA
AR03	AMoN	Wood - EPA
AZ03	NTN	National Park Service - NIFA
AZ98	AMoN	National Park Service - NIFA
BC16	MDN	Environment Canada
CA67	AMoN	National Park Service - NIFA
CAN5	NTN	USGS - NIFA
CO00	NTN	USGS - NIFA
CO01	NTN	USGS - NIFA
CO02	NTN	University of Colorado
CO08	NTN	Wood - EPA
CO09	NTN	BLM - NIFA
CO09	NTN	National Park Service - NIFA
CO10	NTN	Wood - EPA
CO19	NTN	National Park Service - NIFA
CO21	NTN	USDA-FS-Fed 7
CO22	NTN	Colorado Department of Public Health and Environment
CO88	AMoN	National Park Service - NIFA
CO90	NTN	University of Colorado
CO91	NTN	USDA-FS-Fed 7
CO94	NTN	Wood - EPA
CO96	MDN	BLM - NIFA
CO96	NTN	USDA-FS-Fed 7
CO99	MDN	National Park Service - NIFA
CO99	NTN	USGS - NIFA
CT15	AMoN	Wood - EPA
CT15	NTN	Wood - EPA
FL19	AMoN	Wood - EPA
FL23	AMoN	Wood - EPA
GA41	AMoN	Wood - EPA
IA08	NTN	USGS - NIFA

Site ID	Network	Operating/Funding Agency
IA23	NTN	USGS - NIFA
ID07	AMoN	Wood - EPA
IL11	AMoN	Wood - EPA
IL37	AMoN	Wood - EPA
IL46	AMoN	Wood - EPA
IN21	MDN	Lake Michigan Air Directors Consortium (LADCO)
KS32	MDN	Kansas Department of Health & Environment
KS32	NTN	USGS - NIFA
KY03	AMoN	Wood - EPA
KY29	AMoN	Wood - EPA
MD99	AMoN	Maryland Department of Natural Resources
MD99	MDN	Maryland Department of Natural Resources
MD99	NTN	Maryland Department of Natural Resources
ME94	NTN	Passamaquoady Tribe
ME98	MDN	Maine Department of Environmental Protection
ME98	MDN	U.S. Forest Service-Acadia National Park
ME98	NTN	National Park Service - NIFA
MI09	MDN	Lake Michigan Air Directors Consortium (LADCO)
MI09	NTN	Michigan State University
MI26	NTN	Michigan State University
MI48	MDN	U.S. Fish and Wildlife Service
MI48	NTN	U.S. Fish and Wildlife Service
MI51	AMoN	Wood - EPA
MI51	NTN	Wood - EPA
MI53	NTN	USDA-FS-Fed 7
MI95	AMoN	Wood - EPA
MN02	AMoN	Wood - EPA
MN06	MDN	Leech Lake Band of Ojibwe
MN08	NTN	Minnesota Pollution Control Agency
MN99	NTN	Minnesota Pollution Control Agency
MO03	NTN	USGS - NIFA
MS30	AMoN	Wood - EPA
MT00	NTN	USGS - NIFA
MT97	NTN	USDA-FS-Fed 7
MT98	NTN	USGS - NIFA
NC03	NTN	North Carolina State University
NC06	AMoN	Wood - EPA
NC25	AMoN	Wood - EPA
NC25	NTN	USDA - Forest Service - NIFA
NC26	AMoN	Wood - EPA

Site ID	Network	Operating/Funding Agency
NC34	NTN	North Carolina State University
NC41	NTN	North Carolina State University
ND01	MDN	U.S. Fish and Wildlife Service
ND08	NTN	USGS - NIFA
ND11	NTN	USGS - NIFA
NE15	MDN	Nebraska Department of Environmental Quality
NE15	NTN	University of Nebraska–Lincoln
NE98	AMoN	Wood - EPA
NE98	MDN	Santee Sioux Nation of Nebraska
NE99	NTN	USGS - NIFA
NH02	NTN	USDA - Forest Service - NIFA
NV03	NTN	USGS - NIFA
NV05	NTN	National Park Service - NIFA
NY01	NTN	USGS - NIFA
NY67	AMoN	Wood - EPA
NY67	NTN	NOAA - NIFA
NY91	AMoN	Wood - EPA
NY98	AMoN	Wood - EPA
NY98	NTN	USGS - NIFA
OH09	AMoN	Wood - EPA
OH16	MDN	Northeast Ohio Regional Sewer District (NEORSD)
OH17	NTN	USDA - Forest Service - NIFA
OH99	AMoN	Wood - EPA
ON07	MDN	Environment Canada
PA00	AMoN	Wood - EPA
PA15	NTN	NOAA - NIFA
PA18	NTN	USGS - NIFA
PA29	AMoN	Wood - EPA
PA56	AMoN	Wood - EPA
PA96	AMoN	Wood - EPA
PR20	AMoN	USDA - Forest Service - NIFA
PR20	MDN	USGS - NIFA
PR20	NTN	USDA - Forest Service - NIFA
SD08	NTN	USGS - NIFA
SD99	NTN	USGS - NIFA
SK20	NTN	Saskatchewan Ministry of Environment
SK27	AMoN	Environment Canada
SK27	MDN	Environment Canada
SK31	NTN	Saskatchewan Ministry of Environment
TN04	AMoN	Wood - EPA

Site ID	Network	Operating/Funding Agency
TN07	AMoN	Wood - EPA
TX22	NTN	USGS - NIFA
TX41	AMoN	Wood - EPA
TX43	AMoN	Wood - EPA
UT01	NTN	USGS - NIFA
UT09	NTN	National Park Service - NIFA
UT95	NTN	USDA - Forest Service - NIFA
UT98	NTN	USGS - NIFA
UT99	NTN	National Park Service - NIFA
VA13	AMoN	Wood - EPA
VA24	AMoN	Wood - EPA
VA28	MDN	National Park Service - NIFA
VA28	NTN	National Park Service - NIFA
VI01	NTN	National Park Service - NIFA
VT01	NTN	USGS - NIFA
WA03	MDN	National Park Service - NIFA
WA14	NTN	National Park Service - NIFA
WA19	NTN	USGS - NIFA
WA21	NTN	Wood - EPA
WA24	NTN	USGS - NIFA
WA98	NTN	USDA-Forest Service-Columbia River Gorge
WA99	NTN	National Park Service - NIFA
WI31	MDN	Wisconsin Department of Natural Resources
WI31	NTN	Wisconsin Department of Natural Resources
WI35	AMoN	Wood - EPA
WI35	NTN	Wood - EPA
WI37	NTN	USDA - Forest Service - NIFA
WV18	AMoN	Wood - EPA
WY00	NTN	USDA - Forest Service - NIFA
WY02	NTN	BLM - NIFA
WY06	AMoN	Wood - EPA
WY06	NTN	BLM - NIFA
WY93	AMoN	Air Resource Specialists, Inc.
WY94	AMoN	National Park Service - NIFA
WY94	NTN	Wyoming Department of Environmental Quality
WY95	AMoN	Wood - EPA
WY95	NTN	USDA - Forest Service - NIFA
WY97	NTN	U.S. Forest Service-Shoshone National Forest
WY98	NTN	U.S. Forest Service-Bridger-Teton National Forest
WY99	NTN	BLM - NIFA

APPENDIX E

Transfer Standard Instrument Certifications

Date

2/10/2022 - - **Calibration and verification of three RTD meters with most recent certification of EEMS RTD**

TMI Cert data -- 1/12/2022

	TMI STD	EEMS RTD 01229	diff	corrected
Cert #	A4398585			
	-25.00	-25.00	0.000	-24.993
	0.00	-0.02	0.020	-0.008
	100.00	99.97	0.030	100.001
	150.00	149.96	0.040	150.001

RTD 01229

2022 correction: slope= 0.99980763

intercept= -0.0116794

corr= 1.0000000

2/10/2022

At EEMS raw	**Date 2/10/2022** RTD 01229 corrected	**RTD 01230 / 01231** EEMS AER raw	corrected	**RTD 01227 / 1** EEMS van3 raw	corrected	**RTD 01228 / 3** EEMS van1 raw	corrected
0.00	0.01	0.03	-0.02	0.10	-0.05	0.10	0.02
11.48	11.49	11.53	11.50	11.80	11.43	11.70	11.58
20.07	20.09	20.11	20.10	20.50	20.05	20.40	20.18
29.92	29.94	29.94	29.95	30.40	29.95	30.40	29.96
40.13	40.15	40.14	40.17	40.70	40.15	40.70	40.14
50.80	50.82	50.74	50.79	51.44	50.79	51.50	50.82
25.11	25.13	25.13	25.13	25.52	25.12	25.51	25.13
	slope =	**0.998117**		**1.009828**		**1.011797**	
	intercept =	**0.046929**		**0.155481**		**0.084099**	
	correlation =	**1.0000**		**1.0000**		**1.0000**	

Date

2/25/2022 - - **Calibration and certification of fluke Thermocouples**

TMI Cert data -- 1/12/2022

	STD	EEMS RTD	diff	corrected
cert # =	A3953580	01229		
	-25.00	-25.00	0.000	-24.99
	0.00	-0.02	0.020	-0.01
	100.00	99.97	0.030	100.00
	150.00	149.96	0.040	150.00
			0.000	0.01
			0.000	0.01

01229

2022correction: slope= 0.99980763

intercept= -0.0116794

1.0000000

Eric Hebert 2/25/2022

At EEMS	**Date 2/25/2022**	fluke =	01311		01312		01310	
	RTD		EEMS van3		EEMS van 2		EEMS van 1	
	01229	thermo =	01236		01237		01238	
raw	corrected		raw	corrected	raw	corrected	raw	corrected
0.06	0.07		0.0	0.07	0.4	0.03	-0.4	0.17
87.06	87.09		87.0	87.11	87.6	87.04	87.0	87.13
93.32	93.35		93.2	93.31	93.9	93.32	93.2	93.30
10.75	10.76		10.7	10.77	11.2	10.80	10.2	10.72
25.89	25.91		25.8	25.88	26.3	25.87	25.4	25.84
77.27	77.30		77.2	77.31	77.9	77.36	77.2	77.38
47.95	47.97		47.9	47.99	48.5	48.02	47.6	47.93
	0.01			0.07		-0.37		0.57
		Thermocouple offset =	-0.3		0.6		0.0	
POST CALIBRATION CHECK								
	0.01			0.07		-0.37		0.57
		slope =	**0.9995**		**1.002191**		**1.00509**	
		intercept =	**-0.06805**		**0.3717246**		**-0.57001**	
		correlation =	**1.0000**		**1.0000**		**1.0000**	

Certificate Number
A4398583
Issue Date: 01/12/22

Certificate of Calibration

Van 2

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 36209
352-262-0802

P.O. Number:

ID Number: EEMS 01226

Description: DIGITAL STIK THERMOMETER
Manufacturer: FLUKE
Model Number: 1551A EX
Serial Number: 2085085
Technician: STEVE TORRES

On-Site Calibration: ☐
Comments: TAR is 2 to 1

Calibration Date: 01/12/2022
Calibration Due: 01/12/2023
Procedure: FLUKE 1551A EX,52A EX
Rev: 11/1/2010
Temperature: 71 °F
Humidity: 40 % 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.

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.

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
660TL18010015	ADDITEL CORPORATION	ADT875PC-155	5/20/2021	5/20/2022
71512	FLUKE	5616-12	12/22/2021	12/22/2022
A88072	FLUKE/HART	1502A	9/27/2021	2/7/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Certificate Number
A4398583
Issue Date: 01/12/22

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Unit	ADJ/FAIL
Temperature Accuracy	-25.00	-25.05	-24.95	-25.00	-25.00	°C	
Temperature Accuracy	0.00	-0.05	0.05	-0.03	-0.03	°C	
Temperature Accuracy	100.00	99.95	100.05	99.97	99.97	°C	
Temperature Accuracy	150.00	149.95	150.05	149.96	149.96	°C	

Van 2

EEMS # 01226

$m = 0.9998$

$b = -0.0157$

$r^2 = 1.0000$

1/31/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Date

4/22/2022 - - Calibration and verification of three RTD meters with most recent certification of EEMS RTD

EEMS Cert data -- 2/102022

	TMI STD	EEMS RTD 01228	diff	corrected
Cert #			0.000	-0.083
			0.000	-0.083
			0.000	-0.083
			0.000	-0.083

RTD 01228

2022 correction: slope= 1.011797

intercept= 0.084099

corr= #DIV/0!

2/10/2022

			RTD 01230 / 01231		RTD 01227 / 1		RTD 01228 / 3	
At EEMS	**Date 4/22/2022**		EEMS AER		EEMS van3		EEMS van1	
	RTD 01228							
raw	corrected		raw	corrected	raw	corrected	raw	corrected
0.28	0.19			#DIV/0!	0.37	0.20		#DIV/0!
				#DIV/0!				#DIV/0!
24.33	23.96			#DIV/0!	24.54	23.97		#DIV/0!
36.84	36.33			#DIV/0!	37.08	36.30		#DIV/0!
45.47	44.86			#DIV/0!	45.78	44.86		#DIV/0!
50.37	49.70			#DIV/0!	50.72	49.72		#DIV/0!
29.67	29.24			#DIV/0!	29.89	29.23		#DIV/0!
		slope =	**#DIV/0!**		**1.0168176**		**#DIV/0!**	
		intercept =	**#DIV/0!**		**0.16656524**		**#DIV/0!**	
		correlation =	**#DIV/0!**		**1.0000**		**#DIV/0!**	

Certificate Number
A4398585
te: 01/12/22

Certificate of Calibration

Van 2

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 36209
352-262-0802

P.O. Number:

ID Number: EEMS 01229

Description: DIGITAL STIK THERMOMETER
Manufacturer: FLUKE
Model Number: 1551A EX
Serial Number: 3275143
Technician: STEVE TORRES

On-Site Calibration: ☐
Comments: TAR is 2 to 1

Calibration Date: 01/12/2022
Calibration Due: 01/12/2023
Procedure: FLUKE 1551A EX,52A EX
Rev: 11/1/2010
Temperature: 71 °F
Humidity: 40 % 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.

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.

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
660TL18010015	ADDITEL CORPORATION	ADT875PC-155	5/20/2021	5/20/2022
71512	FLUKE	5616-12	12/22/2021	12/22/2022
A88072	FLUKE/HART	1502A	9/27/2021	2/7/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Certificate Number
A4398585
Issue Date: 01/12/22

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Unit	ADJ/FAIL
Temperature Accuracy	-25.00	-25.05	-24.95	-25.00	-25.00	°C	
Temperature Accuracy	0.00	-0.05	0.05	-0.02	-0.02	°C	
Temperature Accuracy	100.00	99.95	100.05	99.97	99.97	°C	
Temperature Accuracy	150.00	149.95	150.05	149.96	149.96	°C	

Vau2

FEMS # 01229

$m = 0.9998$

$b = -0.01168$

$r^2 = 1.0000$

1/31/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

EEMS # 01265
Van 2

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

Calibration Data Record			Temperature: 70° Humidity: 39%
Customer Name	EE&MS	Item Name	USHIKATA
Manufacturer		Model	S-25
Serial Number	190037	Calibration Date	2-17-22
Calibration Frequency		Job Card Number	S-25769
Customer Reference Number		Date of Certification	2-17-22

Measurement Standards

Theodolite Wild T-3 S/N 18801 Calibration 01/7/2022 Due 01/7/2023 NIST Number 736/229329-83 738/223398

Optical Wedge K&E 71-7020 S/N 5167 Calibration: 01/16/2019 Due 01/16/2024, NIST Number 731/244084-89 731/221617

Initial Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☐ Pass ☐ Fail	0	+/- 30	
Needle		45	+/- 30	
Pivot Sharpness	☐ Pass ☐ Fail	90	+/- 30	
Straightness (+/-15 Minutes)	☐ Pass ☐ Fail	135	+/- 30	
Balance	☐ Pass ☐ Fail	180	+/- 30	
Lifter Function	☐ Pass ☐ Fail	225	+/- 30	
Azimuth Ring		270	+/- 30	
Control Knob Function	☐ Pass ☐ Fail	315	+/- 30	
Pinion Gear	☐ Pass ☐ Fail			
Graduation Clarity	☐ Pass ☐ Fail			
Graduation less than 1 minute in any position	☐ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☐ Pass ☐ Fail			
Physical Condition	☐ Pass ☐ Fail			

Pass/Repair/Replace

Pass	N/A	Replace	Repair	
☐	☐	☐	☐	Needle ☐ Sharpen ☐ Magnetize
☐	☐	☐	☐	Cap with Jewel
☐	☐	☐	☐	Pivot ☐ Sharpen
☐	☐	☐	☐	Level ☐ Remount
☐	☐	☐	☐	North Sight
☐	☐	☐	☐	North Sight Block
☐	☐	☐	☐	South Sight
☐	☐	☐	☐	South Sight Block
☐	☐	☐	☐	Vane Spring
☐	☐	☐	☐	Drive
☐	☐	☐	☐	Control Knob Assembly
☐	☐	☐	☐	Cover Glass
☐	☐	☐	☐	Cover Glass Gasket
☐	☐	☐	☐	Clamp Screw
☐	☐	☐	☐	Pinion Gear
☐	☐	☐	☐	Compass Ring

Final Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☑ Pass ☐ Fail	0	+/- 30	<30
Needle		45	+/- 30	<30
Pivot Sharpness	☑ Pass ☐ Fail	90	+/- 30	<30
Straightness (+/-15 Minutes)	☑ Pass ☐ Fail	135	+/- 30	<30
Balance	☑ Pass ☐ Fail	180	+/- 30	<30
Lifter Function	☑ Pass ☐ Fail	225	+/- 30	<30
Azimuth Ring		270	+/- 30	<30
Control Knob Function	☑ Pass ☐ Fail	315	+/- 30	<30
Pinion Gear	☑ Pass ☐ Fail			
Graduation Clarity	☑ Pass ☐ Fail			
Graduation less than 1 minute in any position	☑ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☑ Pass ☐ Fail			
Physical Condition	☑ Pass ☐ Fail			

Certification

Joseph Paolozzi — Repair Technician

John Noga, Quality Assurance — John Noga

EEMS # 01269

AER

Page 1 of 1

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

Calibration Data Record

Customer Information			Instrument Information		Inspection Information	
Customer Name	EE & MS		Item Name	COMPASS	Calibration Frequency	1 YR.
Date Received			Instrument Type	01269	Date of Calibration	3-28-22
Job Card Number		S-25843	Manufacturer	BRUNTON	Recall Date	3-23
Cust. Ref. Number			Model		Temperature	70°
Sales Order Number			Serial Number	506461269O	Humidity	39%

Measurement Standards

Theodolite Wild T-3 S/N 18801, Calibration: 01/7/2022 Due: 01/7/2023, NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-7020 S/N 5167, Calibration: 01/16/2019 Due: 01/16/2024, NIST Number 731/244084-89 731/221617

Calibration Data

Tech.	Item Checked	Tolerance	Initial Reading	Final Reading
	NEEDLE			
	STRAIGHTNESS			
	AT NORTH		ACCEPTABLE	ACCEPTABLE
	NEEDLE			
	STRAIGHTNESS			
	INDEXED AT 180°		ACCEPTABLE	ACCEPTABLE
	FUNCTION		ACCEPTABLE	ACCEPTABLE
	PHYSICAL			
	CONDITION		ACCEPTABLE	ACCEPTABLE

Technician's Signature Joseph Paolozzi Date 3-28-22

Q/A Signature John Yoga Date 3-28-22

EEMS # 01272

Van 1

Page 1 of 1

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

Calibration Data Record			Temperature: 70°	Humidity: 42%
Customer Name	EEMS	Item Name	OSHIKATA	
Manufacturer		Model	S-25	
Serial Number	199578	Calibration Date	3-28-22	
Calibration Frequency		Job Card Number	S-25842	
Customer Reference Number		Date of Certification	3-28-22	

Measurement Standards

Theodolite Wild T-3 S/N 18801 Calibration 01/7/2022 Due 01/7/2023 NIST Number 738/229329-83 738/223398

Optical Wedge K&E 71-7020 S/N 5167 Calibration: 01/16/2019 Due 01/16/2024, NIST Number 731/244084-89 731/221617

Initial Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☐ Pass ☐ Fail	0	+/- 30	
Needle		45	+/- 30	
Pivot Sharpness	☐ Pass ☐ Fail	90	+/- 30	
Straightness (+/-15 Minutes)	☐ Pass ☐ Fail	135	+/- 30	
Balance	☐ Pass ☐ Fail	180	+/- 30	
Lifter Function	☐ Pass ☐ Fail	225	+/- 30	
Azimuth Ring		270	+/- 30	
Control Knob Function	☐ Pass ☐ Fail	315	+/- 30	
Pinion Gear	☐ Pass ☐ Fail			
Graduation Clarity	☐ Pass ☐ Fail			
Graduation less than 1 minute in any position	☐ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☐ Pass ☐ Fail			
Physical Condition	☐ Pass ☐ Fail			

Pass/Repair/Replace

Pass	N/A	Replace	Repair	
☐	☐	☐	☐	Needle ☐ Sharpen ☐ Magnetize
☐	☐	☐	☐	Cap with Jewel
☐	☐	☐	☐	Pivot ☐ Sharpen
☐	☐	☐	☐	Level ☐ Remount
☐	☐	☐	☐	North Sight
☐	☐	☐	☐	North Sight Block
☐	☐	☐	☐	South Sight
☐	☐	☐	☐	South Sight Block
☐	☐	☐	☐	Vane Spring
☐	☐	☐	☐	Drive
☐	☐	☐	☐	Control Knob Assembly
☐	☐	☐	☐	Cover Glass
☐	☐	☐	☐	Cover Glass Gasket
☐	☐	☐	☐	Clamp Screw
☐	☐	☐	☐	Pinion Gear
☐	☐	☐	☐	Compass Ring

Final Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☑ Pass ☐ Fail	0	+/- 30	<30
Needle		45	+/- 30	<30
Pivot Sharpness	☑ Pass ☐ Fail	90	+/- 30	<30
Straightness (+/-15 Minutes)	☑ Pass ☐ Fail	135	+/- 30	<30
Balance	☑ Pass ☐ Fail	180	+/- 30	<30
Lifter Function	☑ Pass ☐ Fail	225	+/- 30	<30
Azimuth Ring		270	+/- 30	<30
Control Knob Function	☑ Pass ☐ Fail	315	+/- 30	<30
Pinion Gear	☑ Pass ☐ Fail			
Graduation Clarity	☑ Pass ☐ Fail			
Graduation less than 1 minute in any position	☑ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☑ Pass ☐ Fail			
Physical Condition	☑ Pass ☐ Fail			

Certification

Joseph Paologyi
Repair Technician

John Noga, Quality Assurance
John Noga

Certificate Number
A4397913
Issue Date: 01/12/22

Certificate of Calibration

Van 1

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 36209
352-262-0802

P.O. Number:

ID Number: 01310

Description: DIGITAL MULTIMETER
Manufacturer: FLUKE
Model Number: 187
Serial Number: 86590148
Technician: STEVE TORRES
On-Site Calibration: ☐
Comments:

Calibration Date: 01/12/2022
Calibration Due: 01/12/2023
Procedure: METCAL FLUKE 187 Rev: 6/30/2020
Temperature: 71 °F
Humidity: 40 % 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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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.

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	11/30/2021	11/30/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, 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
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.60	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.70	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.86	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.97	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	BL3-0	Audit		1000.3	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-1	Audit		824.0	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-2	Audit		823.2	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-3	Audit		824.9	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-4	Audit		823.6	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-5	Audit		823.6	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-6	Audit			SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-7	Audit		823.4	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-8	Audit		824.5	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-9	Audit		824.0	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-10	Audit		820.7	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-11	Audit		823.8	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL3-12	Audit		823.0	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL1-a	Audit		207.35	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL1-b	Audit		207.06	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL1-c	Audit		206.95	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	BL1-d	Audit		207.35	SEG	ETI/Belfort Set #3 - VAN 3
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.60	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.70	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.86	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.98	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenvill Date: 2/1/2022

Reviewer Signature: _____ Date: _____

BL2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.62	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.73	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.84	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.92	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.97	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	BL2-0	Audit		999.4	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-1	Audit		822.7	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-2	Audit		820.1	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-3	Audit		824.0	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-4	Audit		824.6	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-5	Audit		822.9	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-6	Audit		823.6	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-7	Audit		822.9	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-8	Audit		822.9	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-9	Audit		823.2	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-10	Audit		823.3	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-11	Audit		823.1	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-12	Audit		823.7	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-a	Audit			SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-b	Audit		205.60	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-c	Audit		206.10	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	BL2-d	Audit		206.28	SEG	ETI/Belfort Set #2 - VAN2
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.60	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.70	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.86	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature Sandy Grenvill Date: 2/1/202

Reviewer Signature _____ Date: _____

BL4 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.57	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.70	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.84	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.97	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	BL4-0	Audit		1033.9	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-1	Audit		824.6	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-2	Audit		823.3	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-3	Audit		824.3	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-4	Audit		824.4	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-5	Audit		822.9	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-6	Audit		824.6	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-7	Audit		823.7	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-8	Audit		824.0	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-9	Audit		824.8	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-10	Audit		823.3	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-11	Audit		823.7	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-12	Audit		823.8	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-a	Audit		207.35	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-b	Audit		207.33	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-c	Audit		207.49	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	BL4-d	Audit		207.57	SEG	ETI/Belfort Set #4 - VAN1
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.56	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.70	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.82	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.92	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 2/1/2022

Reviewer Signature: _____ Date: _____

P2OTT1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.58	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.72	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.84	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.93	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.97	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	P2OTT1-1	Audit		1017.4	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-2	Audit		1017.7	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-3	Audit		1017.0	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-4	Audit		1017.8	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-5	Audit		1016.4	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-6	Audit		1016.7	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-7	Audit		1017.3	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-8	Audit		1016.1	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-9	Audit		1017.5	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-a	Audit		255.16	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-b	Audit		254.98	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-c	Audit		255.05	SEG	Ott P2 Set #1 - VAN 3
2/1/2022	8028481064	P2OTT1-d	Audit		255.35	SEG	Ott P2 Set #1 - VAN 3
					\		
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.57	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.70	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.84	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.97	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature Sandy Grenvill Date: 2/1/202

Reviewer Signature Date:

P2OTT2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.60	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.70	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.86	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.98	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	P2OTT2-1	Audit		1016.1	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-2	Audit		1016.8	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-3	Audit		1016.7	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-4	Audit		1016.6	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-5	Audit		1016.6	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-6	Audit		1017.2	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-7	Audit		1016.8	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-8	Audit		1015.2	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-9	Audit		1016.1	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-a	Audit		254.14	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-b	Audit		254.14	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-c	Audit		254.29	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	P2OTT2-d	Audit		254.21	SEG	Ott P2 Set #2 - VAN 2
2/1/2022	8028481064	26677	Bal Post	0.00	-0.02	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.58	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.70	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.83	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.91	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.96	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	-0.02	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 2/1/2022

Reviewer Signature: _____ Date: _____

P2OTT3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1500.00	1499.56	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	1000.00	999.70	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	500.00	499.82	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	200.00	199.92	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
2/1/2022	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
2/1/2022	8028481064	P2OTT3-1	Audit		193.79	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-2	Audit		193.75	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-3	Audit		193.75	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-4	Audit		193.75	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-5	Audit		193.75	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-6	Audit		193.08	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-7	Audit		193.80	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-8	Audit		193.59	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-9	Audit		193.10	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-10	Audit		193.74	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-a	Audit		254.70	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-b	Audit		255.12	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-c	Audit		255.46	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	P2OTT3-d	Audit		255.35	SEG	Ott P2 Set #3- VAN 1
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1500.00	1499.57	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	1000.00	999.72	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	500.00	499.83	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	200.00	199.91	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
2/1/2022	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 2/1/2022

Reviewer Signature: _____ Date: _____

Certificate Number
A4434376
Issue Date: 02/08/22

Certificate of Calibration

Var 3

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 36209
352-262-0802

P.O. Number:

ID Number: EEMS 01311

Description:	DIGITAL MULTIMETER	Calibration Date:	02/08/2022
Manufacturer:	FLUKE	Calibration Due:	02/08/2023
Model Number:	287	Procedure:	METCAL FLUKE 287 Rev: 6/15/2015
Serial Number:	95740135	Temperature:	71 °F
Technician:	STEVE TORRES	Humidity:	42 % RH
On-Site Calibration: ☐		**As Found Condition:**	**IN TOLERANCE**
Comments:		**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.

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.

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	11/30/2021	11/30/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Certificate Number
A4397928
Issue Date: 01/12/22

Certificate of Calibration

Van 2

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES, INC.
4577 E NW 6TH STREET
GAINESVILLE, FL 36209
352-262-0802

P.O. Number:

ID Number: EEMS 01312

Description:	DIGITAL MULTIMETER	Calibration Date:	01/12/2022
Manufacturer:	FLUKE	Calibration Due:	01/12/2023
Model Number:	287	Procedure:	METCAL FLUKE 287 Rev: 6/15/2015
Serial Number:	95740243	Temperature:	71 °F
Technician:	STEVE TORRES	Humidity:	40 % RH
On-Site Calibration: ☐		**As Found Condition:**	**IN TOLERANCE**
Comments:		**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.

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.

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	11/30/2021	11/30/2022

TMI Technical Maintenance, Inc.
12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637
Phone: 813-978-3054 Fax 813-978-3758
www.tmicalibration.com

ANSI/NCSL Z540-1-1994

Van 3

No EEMS #

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

Calibration Data Record			Temperature: 70°	Humidity: 39%
Customer Name	EEMS	Item Name	USIK KATA	
Manufacturer		Model	S-15	
Serial Number	191892	Calibration Date	2-17-22	
Calibration Frequency		Job Card Number	S-25770	
Customer Reference Number		Date of Certification	2-17-22	

Measurement Standards

Theodolite Wild T-3 S/N 18801 Calibration 01/7/2022 Due 01/7/2023 NIST Number 736/229329-83 738/223398

Optical Weore K&E 71-7020 S/N 5167 Calibration: 01/16/2019 Due 01/16/2024. NIST Number 731/244084-89 731/221617

Initial Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☐ Pass ☐ Fail	0	+/- 30	
Needle		45	+/- 30	
Pivot Sharpness	☐ Pass ☐ Fail	90	+/- 30	
Straightness (+/-15 Minutes)	☐ Pass ☐ Fail	135	+/- 30	
Balance	☐ Pass ☐ Fail	180	+/- 30	
Lifter Function	☐ Pass ☐ Fail	225	+/- 30	
Azimuth Ring		270	+/- 30	
Control Knob Function	☐ Pass ☐ Fail	315	+/- 30	
Pinion Gear	☐ Pass ☐ Fail			
Graduation Clarity	☐ Pass ☐ Fail			
Graduation less than 1 minute in any position	☐ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☐ Pass ☐ Fail			
Physical Condition	☐ Pass ☐ Fail			

Past Repair/Replace

Pass	N/A	Replace	Repair	
☐	☐	☐	☐	Needle ☐ Sharpen ☐ Magnetize
☐	☐	☐	☐	Cap with Jewel
☐	☐	☐	☐	Pivot ☐ Sharpen
☐	☐	☐	☐	Level ☐ Remount
☐	☐	☐	☐	North Sight
☐	☐	☐	☐	North Sight Block
☐	☐	☐	☐	South Sight
☐	☐	☐	☐	South Sight Block
☐	☐	☐	☐	Vane Spring
☐	☐	☐	☐	Drive
☐	☐	☐	☐	Control Knob Assembly
☐	☐	☐	☐	Cover Glass
☐	☐	☐	☐	Cover Glass Gasket
☐	☐	☐	☐	Clamp Screw
☐	☐	☐	☐	Pinion Gear
☐	☐	☐	☐	Compass Ring

Final Report

Vanes		Direction (Degree)	Tolerance (Minute)	Compass Needle Error (Minute)
Pivot in line with Circle/Sights	☑ Pass ☐ Fail	0	+/- 30	< 30
Needle		45	+/- 30	< 30
Pivot Sharpness	☑ Pass ☐ Fail	90	+/- 30	< 30
Straightness (+/-15 Minutes)	☑ Pass ☐ Fail	135	+/- 30	< 30
Balance	☑ Pass ☐ Fail	180	+/- 30	< 30
Lifter Function	☑ Pass ☐ Fail	225	+/- 30	< 30
Azimuth Ring		270	+/- 30	< 30
Control Knob Function	☑ Pass ☐ Fail	315	+/- 30	< 30
Pinion Gear	☑ Pass ☐ Fail			
Graduation Clarity	☑ Pass ☐ Fail			
Graduation less than 1 minute in any position	☑ Pass ☐ Fail			
Level Bubble				
Bubble in Level	☑ Pass ☐ Fail			
Physical Condition	☑ Pass ☐ Fail			

Certification

Joseph Pavlogiannis — Repair Technician

John Noga, Quality Assurance — John Noga