2018 National Atmospheric Deposition Program Site Survey Program Annual Report

Prepared for:

U.S. Environmental Protection Agency
Office of Atmospheric Programs

Prepared by:

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Contract Nos.: GS-10F-075AA Order No. EP-G17H-00554 & EP-W-18-005

September 2019

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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 numbers GS-10F-075AA Order No. EP-G17H-00554 and EPW-18-0005, 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 Atmospheric Integrated Research Monitoring Network (AIRMoN), 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 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 Clean Air Status and Trends Network (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 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. One of the most notable items to report during this reporting period is the transition of the NADP PO and CAL from the Illinois State Water Survey (ISWS) to the Wisconsin State Laboratory of Hygiene (WSLH). Needless to say a transition of this magnitude was a major undertaking. EEMS is happy to report that network operations were not negatively impacted during this transition. EEMS assisted with the transition by answering operator questions, providing reminders to operators about the changes during the surveys.

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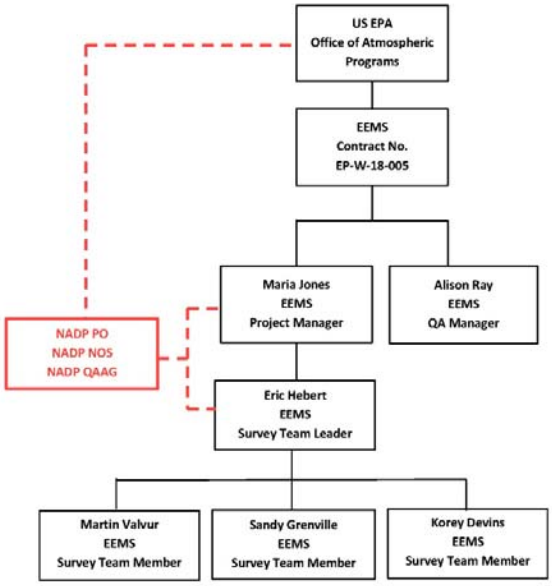
1.0 Introduction / Background

The National Atmospheric Deposition Program (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 SOPs. The survey program compliments the QA/QC procedures followed by the PO and the 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 current 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 sites 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 NOS and participate in 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 liaisons, site operators, supervisors, and sponsors. Approximately 80 NADP sites (co-located are not considered separate sites) are 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/siteops/lib/other/NADP-2010_Site_Selection_and_Installation_Manual_V_3.0.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 current versions of NADP manuals and documentation are accessible.
- 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.

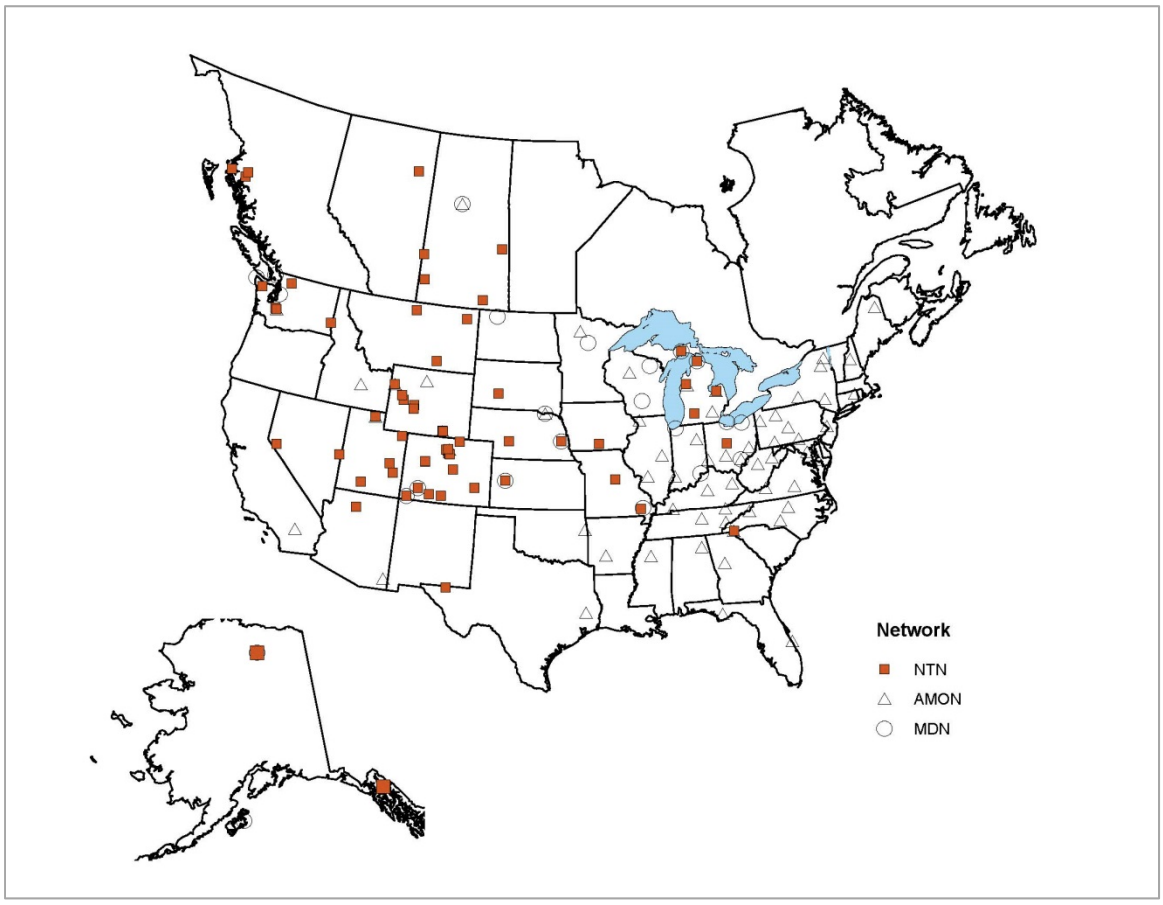
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed from January through December of 2018.

A total of 86 NADP collectors (this number includes co-located sites) were surveyed during the period covered by this report at 78 distinct locations. These include 23 MDN sites and 63 NTN sites. Figure 2-1 is a map of the sites visited during 2018. AMoN sites are also included in the map, however only adherence to the siting criteria is checked for these samplers. 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 2018



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. Most of the 77 precipitation raingages

surveyed (co-located sites usually use the same raingage) were electronic raingages, either ETI NOAH IV (48 raingages), or the OTT PLUVIO (22 raingages). Only seven Belfort mechanical raingages were surveyed and all were found to be operating reasonably well. One site, OH52, South Bass Island, did not have a raingage.

Of the 86 collectors (sites) surveyed, 34 sites operated N-CON collectors. The 52 remaining collectors were AeroChem Metrics (ACM) type, manufactured by either AeroChemetrics or Loda Electronics Company.

Twenty-six locations visited operate backup raingages of various types. Only assessments related to siting criteria of the backup raingages are evaluated during surveys, not the performance.

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 2018 and the equipment found at the sites is shown in Table 2.1.

Table 2-1. Sites Surveyed from January through December 2018 and Equipment Found

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AB32	Fort Mackay	NTN	9/7/2018	N-CON	OTT	N/A
AK02	Juneau	NTN	10/12/2018	ACM	ETI	N/A
AK96	Toolik Field Station	NTN	10/8/2018	N-CON	ETI	N/A
AK96	Toolik Field Station	MDN	10/8/2018	N-CON	ETI	N/A
AK98	Kodiak	MDN	10/13/2018	ACM	ETI	N/A
AZ03	Grand Canyon NP - Hopi Point	NTN	4/17/2018	ACM	ETI	Tipping Bucket
BC16	Saturna Island	MDN	6/27/2018	N-CON	ETI	Other
BC22	Haul Road Station	NTN	10/15/2018	N-CON	OTT	N/A
BC23	Lakelse Lake	NTN	10/15/2018	N-CON	OTT	N/A
BC24	Port Edward	NTN	10/16/2018	N-CON	OTT	N/A
CO00	Alamosa	NTN	11/15/2018	N-CON	OTT	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
CO01	Las Animas Fish Hatchery	NTN	11/13/2018	N-CON	OTT	N/A
CO02	Niwot Saddle	NTN	7/31/2018	ACM	Belfort	N/A
CO08	Four Mile Park	NTN	8/10/2018	ACM	ETI	N/A
CO09	Kawaneechee Meadow	NTN	5/31/2018	ACM	ETI	N/A
CO21	Manitou	NTN	11/14/2018	ACM	Belfort	N/A
CO22	Pawnee	NTN	5/1/2018	ACM	Belfort	N/A
CO90	Niwot Ridge-Southeast	NTN	5/22/2018	ACM	ETI	Belfort
CO91	Wolf Creek Pass	NTN	8/8/2018	ACM	OTT	N/A
CO92	Sunlight Peak	NTN	8/10/2018	ACM	ETI	N/A
CO94	Sugarloaf	NTN	5/22/2018	ACM	ETI	N/A
CO96	Molas Pass	MDN	8/9/2018	N-CON	ETI	N/A
CO96	Molas Pass	NTN	8/9/2018	ACM	ETI	N/A
CO98	Rocky Mountain NP - Loch Vale	NTN	8/14/2018	ACM	ETI	Noah Iv
CO99	Mesa Verde NP-Chapin Mesa	MDN	8/7/2018	ACM	ETI	N/A
CO99	Mesa Verde NP - Chapin Mesa	NTN	8/7/2018	N-CON	ETI	N/A
IA23	McNay Research Center	NTN	5/9/2018	N-CON	OTT	N/A
IN21	Clifty Falls State Park	MDN	12/5/2018	ACM	OTT	Stick
IN34	Indiana Dunes National Lakeshore	MDN	10/26/2018	ACM	OTT	Stick
KS32	Lake Scott State Park	MDN	5/7/2018	N-CON	OTT	Stick
KS32	Lake Scott State Park	NTN	5/7/2018	N-CON	OTT	Stick
MI09	Douglas Lake	MDN	9/14/2018	ACM	ETI	Belfort
MI09	Douglas Lake	NTN	9/14/2018	ACM	ETI	Belfort
MI26	Kellogg Biological Station	NTN	9/11/2018	ACM	ETI	N/A
MI48	Seney National Wildlife Refuge-Headquarters	MDN/NTN	9/15/2018	ACM	ETI	N/A
MI51	Unionville	NTN	9/12/2018	ACM	ETI	N/A
MI53	Wellston	NTN	9/11/2018	ACM	ETI	N/A
MN06	Leech Lake	MDN	10/24/2018	ACM	Belfort	Tipping Bucket
MO03	Ashland Wildlife Area	NTN	6/18/2018	N-CON	OTT	Tipping Bucket

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
MO05	University Forest	NTN	6/19/2018	N-CON	OTT	N/A
MO46	Mingo National Wildlife Refuge	MDN	6/19/2018	ACM	ETI	N/A
MT00	Little Bighorn Battlefield NM	NTN	9/11/2018	ACM	ETI	N/A
MT96	Poplar River	NTN	7/17/2018	ACM	Belfort	N/A
MT98	Havre - Northern Agricultural Research Center	NTN	7/18/2018	N-CON	OTT	N/A
NC25	Coweeta	NTN	12/6/2018	ACM	Belfort	Stick
ND01	Lostwood National Wildlife Refuge	MDN	7/16/2018	N-CON	ETI	Tipping Bucket
NE15	Mead	MDN	5/10/2018	N-CON ACM	ETI	Tipping Bucket
NE98	Santee	MDN	10/26/2018	N-CON	ETI	N/A
NE99	North Platte Agricultural Experiment Station	NTN	5/11/2018	N-CON	OTT	N/A
NV03	Smith Valley	NTN	6/20/2018	ACM	OTT	N/A
NV05	Great Basin National Park-Lehman Caves	NTN	3/27/2018	ACM	ETI	N/A
OH02	Athens Super Site	MDN	11/12/2018	ACM	ETI	N/A
OH16[1]	Northeast Ohio Regional Sewer District (NEORSD)	MDN	11/13/2018	N-CON	OTT	N/A
OH17	Kessler Farm Field Laboratory	NTN	11/14/2018	ACM	ETI	N/A
OH52	South Bass Island	MDN	11/13/2018	ACM	No gage present	N/A
SD08	Cottonwood	NTN	11/5/2018	N-CON	OTT	N/A
SK20	Cactus Lake	NTN	9/10/2018	N-CON	ETI	N/A
SK21	Hudson Bay	NTN	9/5/2018	N-CON	ETI	Other
SK27[1]	Pinehouse	MDN	9/6/2018	N-CON	ETI	Other
SK30[1]	Weyburn	NTN	9/4/2018	N-CON	ETI	N/A
SK31[1]	Fox Valley	NTN	9/9/2018	N-CON	ETI	N/A
TX22	Guadalupe Mountain National Park	NTN	4/24/2018	ACM	ETI	N/A
UT01	Logan	NTN	5/15/2018	N-CON	OTT	Stick
UT09	Canyonlands National Park-Island In The Sky	NTN	4/3/2018	ACM	ETI	N/A
UT95[1]	East Mckee	NTN	5/16/2018	ACM	ETI	N/A
UT98	Green River	NTN	3/28/2018	N-CON	OTT	N/A

[1] These sites were visited by EEMS in 2018 for the first time.

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
UT99	Bryce Canyon National Park-Repeater Hill	NTN	4/4/2018	ACM	ETI	Belfort
WA03	Makah National Fish Hatchery	MDN	6/29/2018	ACM	Belfort	Other
WA14	Olympic National Park-Hoh Ranger Station	NTN	6/30/2018	ACM	ETI	Other
WA18	Seattle/NOAA	MDN	6/26/2018	ACM	ETI	Stick
WA19	North Cascades National Park-Marblemount Ranger Station	NTN	6/28/2018	N-CON	OTT	Other
WA21	La Grande	NTN	6/25/2018	ACM	ETI	N/A
WA24	Palouse Conservation Farm	NTN	7/2/2018	N-CON	OTT	Stick
WA99	Rainier National Park-Tahoma Washington	NTN	6/25/2018	ACM	ETI	N/A
WI10	Potawatomi	MDN/NTN	9/17/2018	ACM	ETI	N/A
WI31	Devil's Lake	MDN	9/18/2018	N-CON	ETI	N/A
WY00	Snowy Range	NTN	8/28/2018	ACM	ETI	N/A
WY02	Sinks Canyon	NTN	7/26/2018	ACM	ETI	Other
WY06	Pinedale	NTN	7/24/2018	ACM	ETI	Tipping Bucket
WY94	Grand Tetons National Park	NTN	7/23/2018	N-CON	ETI	Tipping Bucket
WY95	Brooklyn Lake	NTN	8/28/2018	ACM	ETI	Other
WY97	South Pass City	NTN	9/28/2018	ACM	ETI	N/A
WY98	Gypsum Creek	NTN	7/24/2018	ACM	ETI	N/A

A total of 62 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 2018

Site ID	Station Name	Date Last Visited
AL99	Sand Mountain Research & Extension Center	5/11/2018
AR03	Caddo Valley	6/16/2018
AZ98	Chiricahua	4/19/2018
CA67	Joshua Tree National Park-Black Rock	4/5/2018
CO88	Rocky Mountain National Park - Longs Peak	8/20/2018
CT15	Abington	11/8/2018
FL19	Indian River	4/10/2018

Site ID	Station Name	Date Last Visited
FL23	Sumatra	4/28/2018
GA41	Georgia Station	5/10/2018
ID03	Craters of the Moon National Monument	9/27/2018
IL11	Bondville	11/11/2018
IL37	Stockton	10/20/2018
IL46	Alhambra	10/19/2018
IN20	Roush Lake	10/27/2018
IN22	Southwest Purdue Agriculture Center	10/18/2018
KY03	Mackville	8/3/2018
KY29	Crockett	8/2/2018
KY98	Cadiz	6/23/2018
MD06	Blackwater NWR	11/16/2018
MD99	Beltsville	11/20/2018
ME93	Ashland	10/4/2018
MI51	Unionville	9/12/2018
MI52	Ann Arbor	9/13/2018
MI95	Hoxeyville	9/11/2018
MN02	Red Lake	10/22/2018
MS30	Coffeeville	6/15/2018
NC02	Cranberry	11/15/2018
NC25	Coweeta	12/6/2018
NC26	Candor	12/5/2018
NC30	Duke Forest	12/5/2018
NE98	Santee	10/26/2018
NH02	Hubbard Brook	10/8/2018
NJ98	Washington Crossing	12/1/2018
NY20	Huntington Wildlife	10/1/2018
NY67	Ithaca	9/25/2018
NY91	Claryville	11/7/2018
NY98	Whiteface Mountain	11/4/2018
OH02	Athens Super Site	11/12/2018
OH09	Oxford	10/28/2018
OH54	Deer Creek State Park	11/14/2018
OH99	Quaker City	12/4/2018

Site ID	Station Name	Date Last Visited
OK99	Stilwell	6/17/2018
PA00	Arendtsville	8/18/2018
PA29	Kane Experimental Forest	8/21/2018
PA56	M. K. Goddard	8/20/2018
PA96	Penn State - Fairbrook Park	8/22/2018
PA97	Laurel Hill	11/10/2018
SK27	Pinehouse	9/6/2018
TN01	Great Smoky Mountains NP - Look Rock	11/14/2018
TN04	Speedwell	5/13/2018
TN07	Edgar Evins	5/12/2018
TX41	Alabama-Coushatta	4/26/2018
UT01	Logan	5/15/2018
VA13	Horton's Station	7/31/2018
VA24	Prince Edward	7/30/2018
WA99	Mount Rainier National Park-Tahoma Woods	6/25/2018
WI35	Perkinstown	9/17/2018
WV05	Cedar Creek State Park	8/1/2018
WV18	Parsons	8/1/2018
WY93	Basin - Big Horn	6/4/2018
WY94	Grand Tetons National Park	7/23/2018
WY95	Brooklyn Lake	8/28/2018

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. The number of checks ranges from 148 checks for an NTN site operating an N-CON collector, electronic raingage and no backup raingage to 239 checks for an NTN site operating an ACM-type collector, along with a Belfort raingage and a backup raingage.

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 Siting Meeting Criteria (updated with 2018 data)

	Surveyed	Meeting all Assessments[2]	Percent Meeting all Assessment
Collectors	86	74	86%
Number of NTN ACM – type	39	34	87%
Number of MDN ACM – type	13	8	62%
Number of NTN N-CON	24	9	38%
Number of MDN N-CON	10	7	70%
Raingages	77	54	70%
Belfort Raingages	7	4	57%
Electronic Raingages	70	50	71%
Siting Criteria	86	13	15%
NTN Sites Meeting All Siting Criteria	63	9	14%
MDN Sites Meeting All Siting Criteria	23	4	17%

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.

Due to the high goals set by the NADP for siting criteria elements, achievement is difficult for most sites. Adhering to the strict interpretation of all the siting criteria rules and guidelines for every site in the networks is unlikely. As indicated in Table 3-2 this results in a low percentage of sites meeting all of the siting criteria requirements.

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 3-4 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.

[2] Meeting all assessments "as found".

Items with a non-compliant percentage greater than 20% are identified in Table 3-4 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[3]	Found Non-Compliant	Percent (%) Non-Compliant
Sample Handling			
Is sampling media quality maintained?	86	0	0
Siting Criteria Assessments			
Is the orifice of the collector +/- .3 m of raingage (elevation)?	85	7	8.2
30 degree rule for buildings met (raingage)	85	0	0.0
No objects > 1 m height inside 5 m radius (raingage)	85	31	36.5
No fences > 1 m height inside 2 m radius (raingage)	85	6	7.1
No vegetation height > 0.6 m within 5 m radius (raingage)	85	20	23.5
Collector and sensor oriented properly	86	4	4.7
45 degree rule met (collector)	86	10	11.6
30 degree rule for trees met (collector)	86	21	24.4
30 degree rule for buildings met (collector)	86	0	0.0
No objects > 1 m height within 5 m radius (collector)	86	23	26.7
No fences > 1 m height inside 5 m radius (collector)	86	15	17.4
No vegetation height > 0.6 m within 5 m radius (collector)	86	18	20.9
No treated lumber inside 5 m radius (collector)	86	26	30.2
No galvanized metal inside 5 m radius collector (MDN)	23	5	21.7
No pastures and ag. activity within 20 m radius	86	12	14.0
No herbicides and fertilizers used within 20 m radius	86	3	3.5
Roads meet NADP siting criteria	86	2	2.3
Waterways meet NADP siting criteria	86	0	0.0
Airports meet NADP siting criteria	86	0	0.0
Animal operations meet NADP siting criteria (NTN and AIRMoN)	63	0	0.0
Combustion sources meet NADP siting criteria (MDN only)	23	0	0.0

[3] 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 3-2. For example: 23 MDN sites were surveyed, so the siting criteria assessment specific to MDN sites is 23. Of the 23 MDN sites, 13 operate an ACM-type collector and 10 operate an N-CON collector.

Siting and Performance Checks	**Number of Assessments[3]**	**Found Non-Compliant**	**Percent (%) Non-Compliant**
Parking lots and maintenance areas meet NADP siting criteria	86	2	2.3
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	86	0	0.0
Metalworking operations meet NADP siting criteria (MDN only)	23	0	0.0
ACM-type Collector Assessments			
Dry side bucket is clean (NTN and AIRMoN)	51	2	3.9
Dry side bag installed correctly (MDN)	13	0	0.0
Does lid seal properly	52	1	1.9
Lid liner in good condition	52	3	5.8
Fan in good condition (MDN)	13	1	7.7
Cooling fan thermostat in good condition (MDN)	13	0	0.0
Heater in good condition (MDN)	13	0	0.0
Heater thermostat in good condition (MDN)	13	1	7.7
Has flush wall filter mount been installed (MDN)	13	2	15.4
Filter in good condition (MDN)	13	2	15.4
Max / min thermometer within acceptable limits (MDN)	13	0	0.0
ACM sensor operates properly	52	1	1.9
Motor-box operates within acceptable limits	52	0	0.0
N-CON Collector Assessments			
N-CON fan in good condition (MDN)	10	1	10.0
N-CON cooling fan thermostat in good condition (MDN)	10	1	10.0
N-CON heater in good condition (MDN)	9	0	0.0
N-CON heater thermostat in good condition (MDN)	10	1	10.0
N-CON max / min thermometer in acceptable limits (MDN)	34	1	10.0
N-CON sensor respond to a 5 passes	10	0	0.0
N-CON lid seals properly	34	16	47
N-CON lid liner in good condition	34	0	0.0
Belfort Raingage Assessments			
Was the 'as found' turn-over set properly	7	3	42.9
Electronic Raingage Assessments			
Raingage operates properly (electronic gage)	70	1	1.4
Does datalogger receive event signals form all collectors (electronic gage)	70	7	10.0
Does optical sensor respond to "blocking" of light beam (ETI)	46	12	26.1
Does optical sensor respond to mist of water (ETI)	47	9	19.1

Tables B-1 through B-4 in Appendix B present EEMS's 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 most impact data quality. 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 raingage and collector than the siting criteria allows. Though the presence of treated lumber has the most deficiencies, since this criterion is vague in the sense that it is not quantified during the survey, the interpretation of the results is not straight forward. This is also the case with galvanized metal near the MDN collector.

Three assessments shown to have a high number of sites out of compliance are related to vegetation. These include the height of the vegetation near the raingage and collector and the height of nearby trees. As expected the number of trees violating the 30 degree guideline increased as the trees grew between survey visits.

The other two vegetation assessments are the height of the vegetation near the raingage and near the collector. This assessment is 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.

Two sites surveyed have experienced 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"):

- MO05-NTN: The site has been moved approximately 2 miles since the previous site survey.
- WY02-NTN: A horse stable and corrals have been added since the previous site survey. The corrals are 18 meters away from the collector at the nearest point.

3.2 Sample Handling Issues

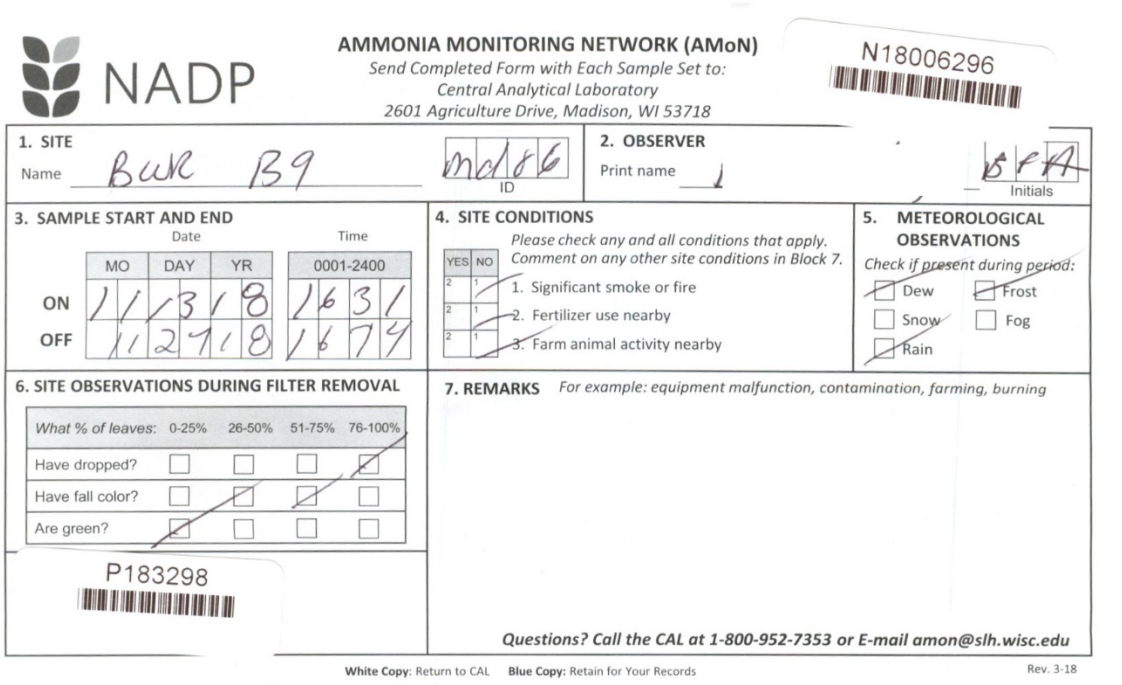
A problem related to sample handling was observed at one site in the AMoN network which warrants discussion. Site MD06-AMoN was visited for an unrelated task, and it was observed that the AMoN sample had fallen from the sampling enclosure as shown in Figure 3-1.

Figure 3-1. MD06 AMoN Sample

The site survey team did not inform the site operator nor the site liaison of the finding in order to further investigate and identify any systematic procedural issues. The sample was left where it was on the ground and the information was presented to the NOS during the spring meeting.

Subsequent follow-up revealed that the site operator made no indication that the sample collected during that period should be invalid for any reason. The Field Observation Report Form (FORF) included in Figure 3-2, indicates that the sample was a routine and normal collection.

Figure 3-2. MD06 AMoN FORF



NADP

AMMONIA MONITORING NETWORK (AMoN)
Send Completed Form with Each Sample Set to:
Central Analytical Laboratory
2601 Agriculture Drive, Madison, WI 53718

N18006296

1. SITE Name: BWR B9 — ID: MD06
2. OBSERVER Print name: — Initials: BFA
3. SAMPLE START AND END

	Date MO	Date DAY	Date YR	Time 0001-2400
ON	11	13	18	1631
OFF	12	9	18	1654

4. SITE CONDITIONS — *Please check any and all conditions that apply. Comment on any other site conditions in Block 7.*

YES	NO	
2	1	1. Significant smoke or fire
2	1	2. Fertilizer use nearby
2	1	3. Farm animal activity nearby

5. METEOROLOGICAL OBSERVATIONS — *Check if present during period:*
Dew, Frost, Snow, Fog, Rain

6. SITE OBSERVATIONS DURING FILTER REMOVAL

What % of leaves:	0-25%	26-50%	51-75%	76-100%
Have dropped?				
Have fall color?				
Are green?				

P183298

7. REMARKS *For example: equipment malfunction, contamination, farming, burning*

Questions? Call the CAL at 1-800-952-7353 or E-mail amon@slh.wisc.edu

White Copy: Return to CAL **Blue Copy:** Retain for Your Records Rev. 3-18

This indicates that additional training and dissemination of proper procedures may be required. It is worthwhile noting that the sample was flagged as "invalid" by the laboratory with notes that include "Major field sampling issue" and "Delayed sample processing" as shown in Figure 3-3.

Figure 3-3. MD06 AMoN Data

NADPID	SITEID	REPLICATE	EXTRACTVOL	NH4	CONC	QR	NOTES	CHNGDATE
N18006200	MD06	A	9.98	0.336	0.67	A		2/28/2019 22:10
N18006296	MD06	A	10.01	0.22	0.44	A		4/2/2019 15:14
N18006296	MD06	B	10.03	0.229	0.46	A		4/2/2019 15:14
N18006296	MD06	C			-9	C	ayf	4/2/2019 15:14
N18006296	MD06	T	10.02	0.01	0.02	A		4/2/2019 15:14
N18006385	MD06	A	9.98	0.52	1.03	A		12/19/2018 17:03

There are still some questions that should be answered regarding this issue.

1. Why did the laboratory flag the sample?
2. If they suspected that the sample fell on the ground was that information provided to the site liaison?
3. Was there follow-up with the site operator to inform them of the proper procedures?
4. Should FORF documentation regarding sample contamination be modified to include "sample fell from enclosure?"

5. Should FORF documentation regarding sample contamination for all networks be evaluated and distributed to site operators via a special communication?

EEMS intends to continue discussions with the NOS to ensure that if any changes to procedures to avoid such issues are required they are addressed.

3.3 Survey Results for Sites with Multiple Survey Visits

Six sites, AB32, OH16-MDN, SK27-MDN, SK30-NTN, SK31-NTN and UT95-NTN, were surveyed by EEMS in 2018 for the first time. All other sites surveyed in 2018 had been previously visited by EEMS, most of them in 2015, with a few exceptions: AK98 and MT00 were last surveyed in 2013, and ND01 in 2008. Most of these sites have been visited at least four times by EEMS. 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 3-4. For those sites with more than two surveys, only the last two visits were considered (i.e., survey conducted in 2018 and 2015, but not the survey conducted in 2012).

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

Siting and Performance Checks	% Non-compliant During 2018	% Non- compliant During Previous Survey
Is sampling media quality maintained?	0%	0%
Is the orifice of the collector +/- .3 m of raingage (elevation)	6.5%	7.8%
No objects > 1 m height inside 5 m radius (raingage)	35.1%	33.8%
No fences > 1 m height inside 2 m radius (raingage)	7.8%	13.0%
No vegetation height > 0.6 m within 5 m radius (raingage)	23.4%	24.7%
Collector and sensor oriented properly	2. 6%	9.0%
45 degree rule met (collector)	12.8%	11.5%
30 degree rule for trees met (collector)	26.9%	30.8%
No objects > 1 m height within 5 m radius (collector)	25.6%	25.6%
No fences > 1 m height inside 5 m radius (collector)	16.7%	18.0%
No vegetation height > 0.6 m within 5 m radius (collector)	21.8%	23.1%
No treated lumber inside 5 m radius (collector)	45.0%	50.0%
No galvanized metal inside 5 m radius collector (MDN)	25.0%	25.0%
No pastures and ag. activity within 20 m radius	14.1%	12.8%
No herbicides and fertilizers used within 20 m radius	3.85%	1.8%
Roads meet NADP siting criteria	2. 6%	2.6%
Airports meet NADP siting criteria	0.0%	0%

Siting and Performance Checks	% Non-compliant During 2018	% Non- compliant During Previous Survey
Parking lots and maintenance areas meet NADP siting criteria	2.6%	2.6%
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	0%	0%
Dry side bucket is clean	2.7%	5.6%
Does lid seal properly	1.9%	0%
Lid liner in good condition	5.9%	0%
Fan in good condition	7.7%	14.3%
Heater in good condition	0%	0%
Has flush wall filter mount been installed	15.4%	21.4%
Filter in good condition	0%	0%
Max / min thermometer in acceptable limits	0%	0%
ACM sensor operates properly	2.0%	3.9%
Motorbox operates within acceptable limits	0%	1.9%
N-CON lid seals properly	0%	7.7%
N-CON lid liner in good condition	0%	3.9%
N-CON cooling fan thermostat in good condition	0%	16.7%
N-CON max / min thermometer in acceptable limits	14.3%	0%
Was the 'as found' turn over set properly (Belfort gage)	42.9%	50.0 %
Raingage operates properly (electronic gage)	1.5%	1.5%
Does datalogger receive event signals form all collectors (electronic gage)	5.7%	9.0%
Does optical sensor respond to "blocking" of light beam (electronic gage)	26.0%	8.0%
Does optical sensor respond to mist of water (electronic gage)	15.0%	18.0%

As mentioned previously the two items (treated lumber and galvanized metal) require further discussion. Interpretation of the intent of these two assessments is somewhat subjective and has been applied differently during multiple surveys by different survey teams. There have been cases where the survey team member determined that the presence of the material was not significant. Other evaluations were performed with strict adherence to the criteria, noting the presence of any material regardless of the age of the treated wood or surface area of the material. It seems that the presence of treated lumber and galvanized metal within five meters of the collector can be open to interpretation, and, therefore, the intent of the assessment should be investigated and defined to make the survey data less subjective. Evaluations of these and other assessments are discussed in Section 5.0 of this report.

Some of the results in Table 3-4 may be related to installation of new equipment at some of these sites. ND01-MDN is now operating an electronic gage and an N-CON collector, and CO90-NTN

is also operating an electronic gage. It is evident that the ETI NOAH IV electronic gages are having more problems with the optical sensor which is discussed in Section 5.2.5.

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.

3.4 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 3-5 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. Forty three of the 77 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 2018	Previous Survey
AB32	NTN	Installed	N/A
AK02	NTN	Installed	Installed
AK96	MDN/NTN	Installed	N/A
BC16	MDN	Installed	Not Present
BC22	NTN	Installed	Installed
BC23	NTN	Installed	Installed
BC24	NTN	Installed	Installed
CO00	NTN	Installed	Installed

Site ID	Network	Condition in 2018	Previous Survey
MI53	NTN	Installed	Installed
MT98	NTN	Not Present	Not Present
NE15	MDN/NTN	Installed	Installed
NE98	MDN	Installed	Installed
NV03	NTN	Installed	Installed
OH02	MDN	Installed	Installed
SD08	NTN	Installed	Installed
SK20	NTN	Installed	Installed

Site ID	Network	Condition in 2018	Previous Survey
CO01	NTN	Installed	Installed
CO02	NTN	Installed	Installed
CO08	NTN	Installed	Installed
CO09	NTN	Installed	Installed
CO22	NTN	Installed	Installed
CO90	NTN	Installed	Installed
CO91	NTN	Installed	Installed
CO92	NTN	Installed	Installed
CO94	NTN	Installed	Installed
CO96	MDN/NTN	Installed	Installed
CO98	NTN	Installed	Installed
CO99	MDN/NTN	Installed	Installed
IN21	MDN	Installed	Installed
IN34	MDN	Installed	Installed
KS32	MDN/NTN	Installed	Installed
MI09	MDN/NTN	Installed	Installed
MI26	NTN	Installed	Installed
MI48	MDN/NTN	Installed	Installed
MI51	NTN	Installed	Installed

Site ID	Network	Condition in 2018	Previous Survey
SK21	NTN	Installed	Installed
SK27	MDN	Installed	N/A
SK30	NTN	Installed	N/A
SK31	NTN	Installed	N/A
UT01	NTN	Installed	Installed
UT95	NTN	Not Present	N/A
UT99	NTN	Installed	Installed
WA24	NTN	Installed	Installed
WA99	NTN	Installed	Installed
WI10	MDN/NTN	Installed	Installed
WI31	MDN	Installed	Installed
WY00	NTN	Installed	Installed
WY02	NTN	Installed	Installed
WY06	NTN	Installed	Not Present
WY94	NTN	Installed	Installed
WY95	NTN	Installed	Installed
WY97	NTN	Installed	Installed
WY98	NTN	Installed	Installed

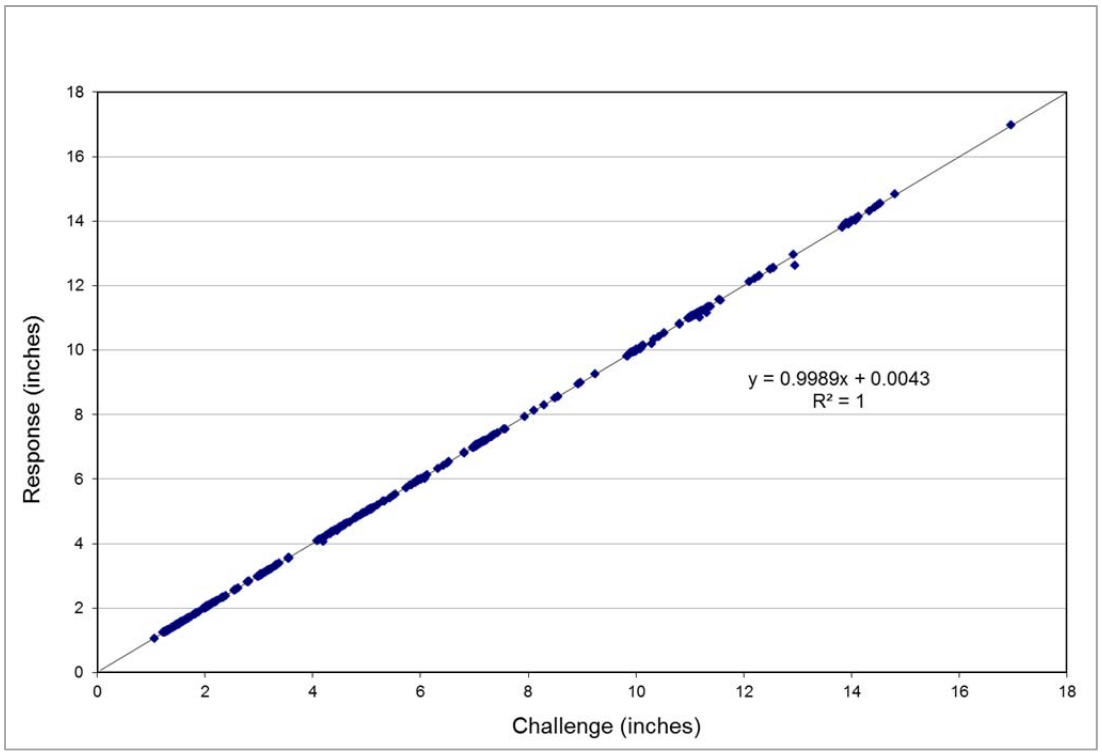
4.0 Field Site Survey Results

This section summarizes the quantifiable survey data relating to raingage accuracy tests and ACM collector sensor heater performance. Seventy seven raingages[4] were surveyed during this reporting period, most of which were electronic raingages. With only seven Belfort mechanical raingages surveyed, this report does not include a sub-section dedicated to the performance of Belfort mechanical raingages.

4.1 Electronic Raingage Accuracy

The results of the accuracy tests for the 70 electronic raingages challenged during the period covered by this report 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. No problems with the electronic raingages were encountered regarding the accuracy. Other issues encountered are discussed in Section 5.0.

Figure 4-1. Electronic Raingage Accuracy – 70 Raingages



[4] OH52-NTN is operating without a raingage

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 the time the collector is open with no precipitation occurring. 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 4-2. The results indicate that all the sensor heaters were functioning properly. The fact that the sensor for MT00 is slightly below the line (actual difference in temperature 0.6 ^{o}C) could be due to the ambient temperature being taken later during the survey, or the thermocouple was not left long enough in contact with the sensor plate.

Figure 4-2. Inactivated ACM Sensor Temperature

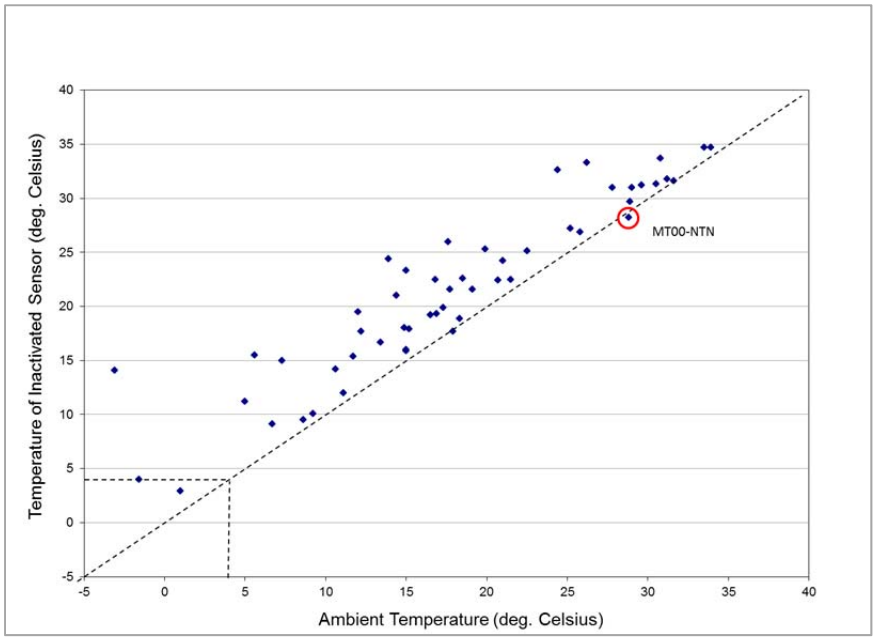
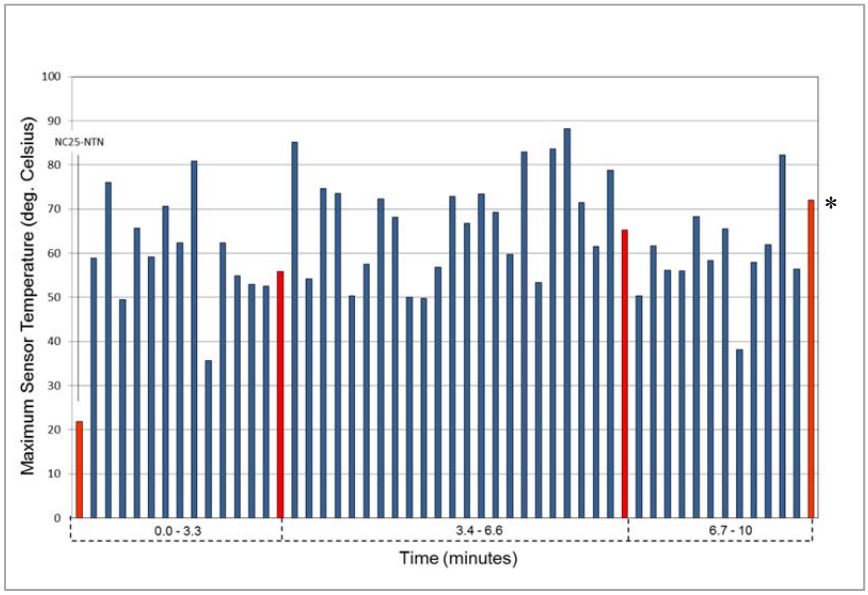


Figure 4-3 presents the maximum temperature reached by each sensor when activated, and the time required for each sensor to reach that temperature. There is some variability between sensors for maximum temperature, but most sensors are between 50˚C and 70˚C within 10 minutes of activation. A few sensors did not reach 50˚C, but most were reported to be functioning properly. The fact that the 50˚C mark was not reached may be due to windy and cool conditions at the sites. The sensor at NC25-NTN was found to be not functioning properly and was reported to the site operator.

Figure 4-3. Activated ACM Sensor Temperature Increase and Elapsed Time



* Red lines in the graph indicate the 10 minutes divided into thirds to make it stand out that most of the sensors reach the maximum temperature between 3.4 and 6.6 minutes.

Further evaluation of the data presented in Figure 4-3 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 °C	1
30.0° to 40.0 °C	2
40.1° to 50.0 °C	2
50.1° to 60.0 °C	19
60.1° to 70.0 °C	12
70.1° to 80.0 °C	10

Time to Maximum Temperature	Number of Sensors
< 3 min	11
3.0 – 4.0 min	7
4.1 – 5.0 min	6
5.1 – 6.0 min	5
6.1 – 7.0 min	8
7.1 – 8.0 min	5

Temperature Range	Number of Sensors
80.1° to 90.0 °C	6
> 90.1° C	0

Time to Maximum Temperature	Number of Sensors
8.1 – 9.0 min	1
> 9.1 min	7

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 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. 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 2018 exhibited any cracks.

4.4 N-CON Motor/Lid-Arm Set Screws

EEMS is continuing to tighten all set screws and lid arm bolts and apply Loctite. 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 2018, 34 N-CON collectors were surveyed. Out of the 34 collectors, 16 required the set screws and lid arms bolts to be adjusted[5] and tightened. Given that N-CON collectors are now being surveyed once every four years, emphasis should be placed on ensuring site operators are aware of this problem, and that they have proper written instructions and tools to perform the necessary adjustments.

When collectors are found in this condition, they present a potential impact to data quality. When lid arms are found to be loose, the collectors are normally flagged as having a "poor lid seal". Proper lid seal is a direct indicator of data quality and therefore loose lid arms are an indicator of compromised data quality. Data collected since the introduction of N-CON single bucket collectors to the NTN network beginning around 2011 indicate that a very large percentage of collectors had a poor lid seal. Figure 4-5 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.

[5] Only one MDN collector required adjustment.

It can also be seen in Figure 4-4 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 4-4. N-CON Collectors Surveyed and Adjusted per Survey Year

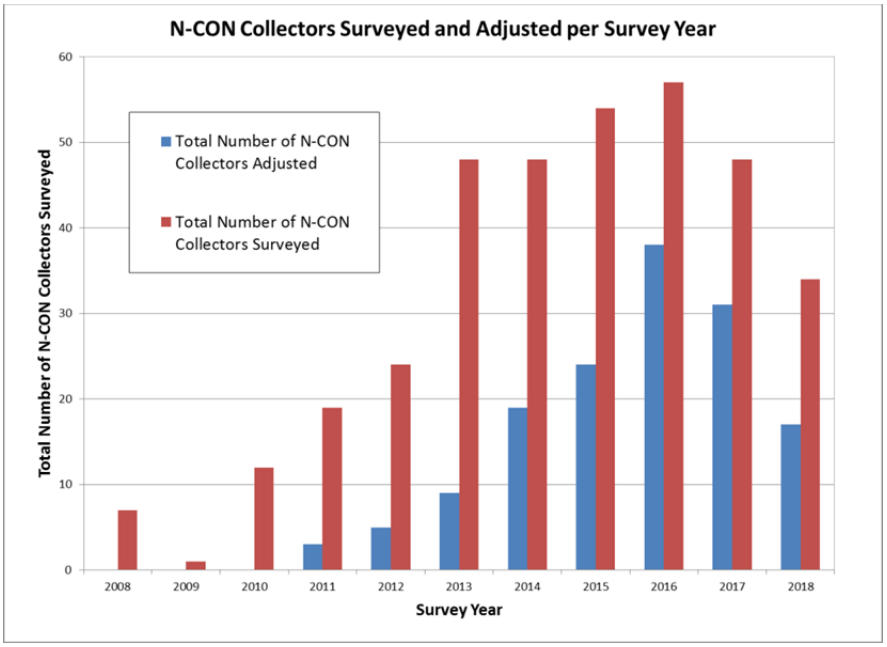
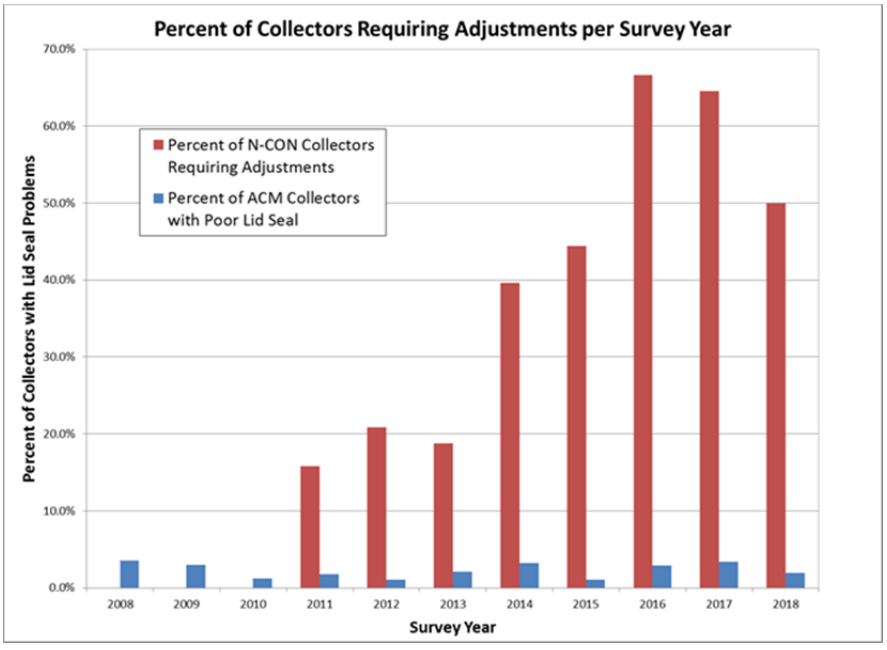


Figure 4-5. Percentage of N-CON and ACM-type Collectors Requiring Lid Adjustments



There is a recommended upgrade to the NTN N-CON collector that was installed at site WI36 a few years ago. The upgrade is a plastic spacer 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. The PO may want to follow up with the site operator at this site to determine whether this is a possible solution. Site WI36 was surveyed in 2016, so it will be at least 2020 when this site is due for a survey.

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 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.

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 ISWS CAL to the WSLH CAL 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. A link to the manuals and training information (support tab) has been added to the home page of the NADP website: https://nadp.slh.wisc.edu/. 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 currently underway to attempt to both qualify and quantify the operation of all types of approved sensors (optical and mechanical).

Probably 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.

After 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.

All the collectors surveyed had been modified to accept “tall” and “short” buckets.

5.2.5 Electronic Raingage

The introduction of the electronic raingages into the network is a great improvement. All site operators that are operating electronic raingages reported that they are happy with the improvement. However, it has been observed that ETI NOAH IV raingages have excessive corrosion around the connections for the sensors and batteries. As part of continuing

improvements being implemented in the field, all connectors are being cleaned and dielectric grease is being applied.

As part of the survey for the electronic gages, the time is adjusted to GMT. Of the 70 electronic gages surveyed, the time was adjusted on 58 gages, seven gages did not require adjustment and five gages were left unadjusted, presumably because the sites prefer to remain with their local time. Of the 48 ETI NOAH IV gages surveyed, 12 had problems with the optical sensor (not all gages had the optical sensor tested, see Table 3-2). As discussed during the fall meeting in Albany, NY, the possibility of being able to replace the optical sensor in the field should be considered. If this is not feasible, the possibility of testing the optical sensors by themselves could also be useful, since there may instances in which the sensors are working properly, but the electronic circuit board is defective. This was also addressed during the fall meeting.

PDA, Thumb Drives and Other Methods of Data Download

EEMS is aware that software development and testing requires time. Also the introduction of new electronic devices sometimes renders the older devices obsolete including PDAs. The areas of software development and documentation has been observed during the surveys that took place during this year continued to improve and effort should stay focused as continued changes occur going forward.

At sites where PDA devices are used, EEMS is assisting in transitioning the sites to being able to use an Android device to interface with the gage. The Campbell Scientific Firmware in the gage data logger is being updated and the Bluetooth dongle is being replaced. 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 gage and download data. During this reporting period the PO has made significant strides to replace the PDA with paired dongles and android devices. This has benefitted the network and has been welcomed by both the site operators and EEMS.

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.

The data logger date and time are routinely checked and documented at sites with electronic raingages. As part of this check, EEMS sets the clocks in the data loggers to GMT when the time is observed to be greater than one minute from GMT.

During 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.

5.2.1 Belfort Raingage

Seven Belfort raingages were surveyed during this reporting period. They were all found to be operating well and measuring rainfall accurately through the first six inches. Three of the raingages had improper pen turnover and this was corrected. This turnover issue may be problematic depending on the amount of antifreeze being used for winterization of the raingage.

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. AIRMoN sites still require pH and conductivity measurements. This section will focus on weighing and decanting the NTN samples[6], and sample handing 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	Average % Difference
AB32	Unknown	-0.01%
AK02	Ohaus Champ SQ	0.16%
AK96	Mettler Toledo XS10035	-0.39%
AZ03	Ohaus 1119D	-0.01%
BC22	Denver S-8001	-0.12%
BC23	Denver S-8001	-0.12%
BC24	Adam GBC35A	0.42%
CO00	Ohaus 1119D	-0.05%
CO01	Ohaus 1119D	-0.05%

Site Id	Scale Type	Average % Difference
MT98	Ohaus 1119D	-0.02%
NC25	Sartorius F61SKR-B	-0.06%
NE15	Ohaus 1119D	-0.10%
NE99	Ohaus 1119D	-0.16%
NV03	Ohaus 1119D	0.01%
NV05	Ohaus 1119D	-0.19%
OH17	Pitney B A570	0.04%
SD08	Ohaus 1119D	-0.08%
SK20	OXO	0.04%

[6] No AIRMoN sites were surveyed during the reporting period covered in this report.

Site Id	Scale Type	Average % Difference
CO02	Ohaus 1119D	0.06%
CO08	Ohaus 1119D	0.03%
CO09	Unknown	0.11%
CO21	Ohaus 1119D	-0.11%
CO22	Sartorius LC4800	-0.02%
CO90	Ohaus 1119D	0.04%
CO91	Ohaus 1119D	0.07%
CO92	Ohaus 1119D	0.03%
CO94	Ohaus 1119D	0.04%
CO96	Sartorius EA15DCE-1	0.10%
CO98	Sartorius CPA6202P	-0.02%
CO99	Uline H1653	0.04%
IA23	Ohaus 1119D	0.00%
KS32	Ohaus 1119D	-0.07%
MI09	Mettler PM 30	-0.02%
MI26	Mettler PE16	-0.01%
MI48	Ohaus 1119D	-0.10%
MI51	Ohaus 1119D	-0.12%
MI53	Ohaus 1119D	0.13%
MO03	Ohaus 1119D	-0.10%
MO05	Mantes 25A	0.45%
MT00	Ohaus 1119D	0.07%
MT96	Ohaus 1119D	0.03%

Site Id	Scale Type	Average % Difference
SK21	OXO	0.00%
SK30	Unknown	-0.02%
SK31	Unknown	0.26%
TX22	Ohaus 1119D	-0.04%
UT01	Sartorius EA15DCE	-0.01%
UT09	Ohaus 1119D	0.17%
UT95	Unknown	-0.04%
UT98	Ohaus 1119D	-0.03%
UT99	Ohaus 1119D	0.10%
WA14	Ohaus 1119D	0.06%
WA19	Ohaus 1119D	-0.14%
WA21	Ohaus 1119D	-0.05%
WA24	Ohaus 1119D	-0.01%
WA99	Ohaus 1119D	0.06%
WI10	Ohaus 1119D	-0.09%
WY00	DNVR Ins DI-8K	0.15%
WY02	Ohaus 1119D	-0.03%
WY06	Ohaus 1119D	-0.02%
WY94	Ohaus ES Series	-0.06%
WY95	DNVR Ins DI-8K	0.15%
WY97	Ohaus 1119D	-0.03%
WY98	Ohaus 1119D	-0.02%

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 are 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 December 2018.

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. This activity was performed in September of 2015.

EEMS' QA manager also observes the survey team members during a routine site survey, and provides a report to the project management. This was last performed in 2017.

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 (no webinars were offered in 2018).

EEMS understands that implementation of a training program is in flux since the PO and laboratories have transitioned to the WSLH. EEMS has always participated with the training programs as a means to stay current with procedures and changes to site equipment. It also allowed EEMS to provide the NADP PO with feedback and suggestions to improve the site operator training classes. EEMS intends to continue this practice in the future if the training program is reinstituted. EEMS intends to participate in the training webinars, when scheduling permits, to accomplish the same goals. 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 NADP QA Manager and to the EPA Project Officer. This is 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. 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 QA Manager 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 has been recently modified 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. 2018 Internal QA Results for Duplicate Entry Errors

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	13,744	13,744	27,488
Initial File Entry Errors	97		
Duplicate QA Entry Errors		88	
Percent Errors	0.71%	0.64%	
Total Entry Errors	185		
Total Percent Errors	0.67%		

The data indicates that of the 27,488 entries that are compared (does not include memo fields), the entry error rate is about 0.67%.

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	AIRMON
Is sampling media quality maintained?	✓	✓	✓
Are samples stored and shipped properly	N/A	N/A	✓
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 rule 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	✓	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 and AIRMoN)	✓	N/A	✓
Combustion sources meet NADP siting criteria (MDN only)	N/A	✓	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	✓	N/A
Dry side bucket is clean	✓	✓	✓
Does lid seal properly	✓	✓	✓
Lid liner in good condition	✓	✓	✓
Fan in good condition	N/A	✓	N/A
Cooling fan thermostat in good condition	N/A	✓	N/A

Field Entry	NTN	MDN	AIRMON
Heater in good condition	N/A	✓	N/A
Heater thermostat in good condition	N/A	✓	N/A
Has flush wall filter mount been installed	N/A	✓	N/A
Filter in good condition	N/A	✓	N/A
Max / min thermometer in acceptable limits	N/A	✓	N/A
ACM sensor operates properly	✓	✓	✓
Motorbox operates within acceptable limits	✓	✓	✓
N-CON fan in good condition	N/A	✓	N/A
N-CON cooling fan thermostat in good condition	N/A	✓	N/A
N-CON heater in good condition	N/A	✓	N/A
N-CON heater thermostat in good condition	N/A	✓	N/A
N-CON max / min thermometer in acceptable limits	N/A	✓	N/A
N-CON sensor responds to a 20-second mist of water	✓	✓	✓
N-CON lid seal in good condition	✓	✓	✓
N-CON lid liner in good condition	✓	✓	✓
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 to the particular network

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	AK98	CO99	IN21	IN34	MI09	MI48	MN06	MO46	OH02	OH52	WA03	WA18	WI10
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)													
No objects > 1 m height inside 5 m radius, rain gage	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											
Collector and sensor oriented properly													
45 degree rule met (collector)							X		X	X			
30 degree rule for trees met (collector)			X		X					X			
No objects > 1 m height within 5 m radius (collector)			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											
No treated lumber inside 5 m radius (collector)	X	X		X	X	X	X	X	X				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													
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								X					
Does lid seal properly								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													X
Has flush wall filter mount been installed							X			X			
Filter in good condition										--			
Max / min thermometer in acceptable limits													
ACM sensor operates properly													
Motorbox operates within acceptable limits													
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	--		--	--	--	X	--	--
Raingage operates properly (electronic gage)							--			U to T	--		
Does datalogger receive event signals form all collectors (electronic gage)				X			--			U to T	--		
Does optical sensor respond to "blocking" of light beam (electronic gage)			--	--			--			U to T	--		
Does optical sensor respond to mist of water (electronic gage)			--	--			--			U to T	--		

	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	SK27	WI31
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)		X				X				
No objects > 1 m height inside 5 m radius, rain gage				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	X									
45 degree rule met (collector)										
30 degree rule for trees met (collector)			X							X
No objects > 1 m height within 5 m radius (collector)				X						
No fences > 1 m height inside 5 m radius (collector)		X		X						
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)		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										
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)										
N-CON lid seal in good condition							X			
N-CON lid liner in good condition										
N-CON fan in good condition						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		X								
N-CON sensor responds to 5 passes of the hand							--			
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)	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 (page 1 of 3)

StationId	AK02	AZ03	CO02	CO08	CO09	CO21	CO22	CO90	CO91	CO92	CO94	CO96	CO98
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)			X		X				X				
No objects > 1 m height inside 5 m radius, rain gage	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		X										
45 degree rule met (collector)									X			X	
30 degree rule for trees met (collector)	X					X		X	X		X	X	
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									
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	
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													
Dry side bucket is clean													
Does lid seal properly													
Lid liner in good condition					X								
ACM sensor operates properly													
Motorbox operates within acceptable limits													
Was the 'as found' turn over set properly (Belfort gage)	--	--		--	--	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		--	--		--	X			
Does optical sensor respond to mist of water (electronic gage)	X		--	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 (page 2 of 3)

StationId	MI09	MI26	MI48	MI51	MI53	MT00	MT96	NC25	NE15	NV03	NV05	OH17	TX22
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)													
No objects > 1 m height inside 5 m radius, rain gage		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									
30 degree rule for trees met (collector)	X				X							X	
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			
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													
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					U to T		
Does lid seal properly													
Lid liner in good condition													
ACM sensor operates properly								X					
Motorbox operates within acceptable limits													
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	--	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	--	--		--			X
Does optical sensor respond to mist of water (electronic gage)		X				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 (page 3 of 3)

StationId	UT09	UT95	UT99	WA14	WA21	WA99	WI10	WY00	WY02	WY06	WY95	WY97	WY98
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)													
No objects > 1 m height inside 5 m radius, rain gage				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)			X	X	X							X	
No objects > 1 m height within 5 m radius (collector)				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			
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				X									
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria													
Dry side bucket is clean													
Does lid seal properly													
Lid liner in good condition			X				X						
ACM sensor operates properly													
Motorbox operates within acceptable limits													
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	--	--	--	--	--	--	--	--
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	U to T		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-4. Findings Most Likely to Impact Data Quality – NTN Sites with N-CON Collectors (page 1 of 2)

StationId	AB32	AK96	BC22	BC23	BC24	CO00	CO01	CO99	IA23	KS32	MO03	MO05
Is sampling media quality maintained?												
Is the orifice of the collector +/- .3 m of raingage (elevation)	X											
No objects > 1 m height inside 5 m radius, rain gage	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				
Collector and sensor oriented properly		X										
45 degree rule met (collector)			X									
30 degree rule for trees met (collector)				X							X	
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				
No treated lumber inside 5 m radius (collector)								X				
No pastures and ag. activity within 20 m radius									X			
Herbicides and fertilizers used within 20 m radius												
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												
N-CON lid seal in good condition	X							X	X	X	X	X
N-CON lid liner in good condition												
N-CON sensor responds to 5 passes of the hand												
Raingage operates properly (electronic gage)												
Does datalogger receive event signals form all collectors (electronic gage)	X										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 (page 2 of 2)

StationId	MT98	NE99	SD08	SK20	SK21	SK30	SK31	UT01	UT98	WA19	WA24	WY94
Is sampling media quality maintained?												
Is the orifice of the collector +/- .3 m of raingage (elevation)							X					
No objects > 1 m height inside 5 m radius, rain gage		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
Collector and sensor oriented properly												
45 degree rule met (collector)												
30 degree rule for trees met (collector)										X		
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		
No pastures and ag. activity within 20 m radius	X	X				X		X		X	X	
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											X	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria												
N-CON lid seal in good condition	X	X	X		X	X	X	X	X	X		
N-CON lid liner in good condition												
N-CON sensor responds to 5 passes of the hand												
Raingage operates properly (electronic gage)												
Does datalogger receive event signals form all collectors (electronic gage)				X			X					
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	X		X		--	--	--	--	MISSING
Does optical sensor respond to mist of water (electronic gage)	--	--	--					--	--	--	--	MISSING

	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 4)

StationId	AK98		BC16		BC22		CO96			CO99			
Year	2013	2018	2015	2018	2015	2018	2012	2015	2018	2008	2012	2015	2018
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)	X		X	X							X		
No objects > 1 m height inside 5 m radius, rain gage	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
Collector and sensor oriented properly													
45 degree rule met (collector)					X	X							
30 degree rule for trees met (collector)							X	X	X				
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
No treated lumber inside 5 m radius (collector)		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										--	--		
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													
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 4)

StationId	IN21				IN34			KS32				MI09		MI48			
Year	2008	2011	2015	2018	2009	2015	2018	2010	2012	2015	2018	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)																	
No objects > 1 m height inside 5 m radius, rain gage	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									
Collector and sensor oriented properly																	
45 degree rule met (collector)																	
30 degree rule for trees met (collector)	X	X	X	X									X				
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						
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	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	--																
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 4)

StationId	MN06		MO46				ND01		NE15				NE98		OH02		
Year	2015	2018	2010	2012	2015	2018	2008	2018	2008	2012	2015	2018	2015	2018	2008	2015	2018
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)			X									X					
No objects > 1 m height inside 5 m radius, rain gage	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												
Collector and sensor oriented properly																	
45 degree rule met (collector)	X	X													X	X	X
30 degree rule for trees 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															
No vegetation height > 0.6 m within 5 m radius (collector)																	
No treated lumber inside 5 m radius (collector)	X	X	X	X	X	X	X									X	X
No galvanized metal inside 5 m radius collector (MDN)	X	X															
No pastures and ag. activity within 20 m radius										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																	
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 (4 of 4)

StationId	OH52		SK27	WA03			WA18				WI10				WI31			
Year	2015	2018	2018	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?																		
Is the orifice of the collector +/- .3 m of raingage (elevation)	U to T										X							
No objects > 1 m height inside 5 m radius, rain gage						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																	X	
45 degree rule met (collector)	X	X																
30 degree rule for trees met (collector)	X	X														X	X	X
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	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 (Page 1 of 14)

StationId	AK02				AZ03				BC22		BC23		BC24	
Year	2010	2012	2015	2018	2008	2012	2015	2018	2015	2018	2015	2018	2015	2018
Is sampling media quality maintained?														
Is the orifice of the collector +/- .3 m of raingage (elevation)														
No objects > 1 m height inside 5 m radius, rain gage				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				
Collector and sensor oriented properly	X	X		X									X	
45 degree rule met (collector)									X	X				
30 degree rule for trees met (collector)	X	X	X	X							X	X		
No objects > 1 m height within 5 m radius (collector)				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	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														
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 (Page 2 of 14)

StationId	CO00				CO01				CO02				CO08				CO09	
Year	2009	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2015	2018
Is sampling media quality maintained?																		
Is the orifice of the collector +/- .3 m of raingage (elevation)						X			X	X	X	X					X	X
No objects > 1 m height inside 5 m radius, rain gage									X	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	X	
Collector and sensor oriented properly									X	X	X	X						
45 degree rule met (collector)					X													
30 degree rule for trees met (collector)					X								X	X	X			
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	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		
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 (Page 3 of 14)

StationId	CO21				CO22				CO90				CO91			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2008	2012	2015	2018
Is sampling media quality maintained?																
Is the orifice of the collector +/- .3 m of raingage (elevation)													X	X	X	X
No objects > 1 m height inside 5 m radius, rain gage												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		
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
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				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	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 (Page 4 of 14)

StationId	CO92				CO94				CO96				CO98			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?																
Is the orifice of the collector +/- .3 m of raingage (elevation)					X	X	X						X			
No objects > 1 m height inside 5 m radius, rain gage						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	X				
30 degree rule for trees met (collector)					X	X	X	X	X	X	X	X	X		X	
No objects > 1 m height within 5 m radius (collector)							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	
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																
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 (Page 5 of 14)

StationId	CO99				IA23				KS32					MI09			
Year	2008	2012	2015	2018	2009	2012	2015	2018	2008	2010	2012	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)		X															
No objects > 1 m height inside 5 m radius, rain gage									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							
Collector and sensor oriented properly	X				X	X	X	X									
45 degree rule met (collector)																	
30 degree rule for trees met (collector)															X	X	X
No objects > 1 m height within 5 m radius (collector)													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							
No treated lumber inside 5 m radius (collector)	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)					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 (Page 6 of 14)

StationId	MI26				MI48				MI51				MI53			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2010	2012	2015	2018	2010	2012	2015	2018
Is sampling media quality maintained?																
Is the orifice of the collector +/- .3 m of raingage (elevation)																
No objects > 1 m height inside 5 m radius, rain gage	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			
Collector and sensor oriented properly																
45 degree rule met (collector)												X				
30 degree rule for trees met (collector)													X	X	X	X
No objects > 1 m height within 5 m radius (collector)	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	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 (Page 7 of 14)

StationId	MO03				MO05				MT00				MT96			
Year	2010	2012	2015	2018	2010	2012	2015	2018	2008	2011	2013	2018	2008	2012	2015	2018
Is sampling media quality maintained?														U to T		
Is the orifice of the collector +/- .3 m of raingage (elevation)	X					X										
No objects > 1 m height inside 5 m radius, rain gage					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																
45 degree rule met (collector)		X	X													
30 degree rule for trees met (collector)	X	X	X	X	X	X	X									
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									
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																
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 (Page 8 of 14)

StationId	MT98				NC25				NE15				NE99			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018
Is sampling media quality maintained?																
Is the orifice of the collector +/- .3 m of raingage (elevation)																
No objects > 1 m height inside 5 m radius, rain gage					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)																
Collector and sensor oriented properly																
45 degree rule met (collector)																
30 degree rule for trees 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)																
No treated lumber inside 5 m radius (collector)					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)																
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 (Page 9 of 14)

StationId	NV03				NV05				OH17				SD08			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2010	2013	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?		U to T														
Is the orifice of the collector +/- .3 m of raingage (elevation)																
No objects > 1 m height inside 5 m radius, rain gage	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																
45 degree rule met (collector)																
30 degree rule for trees met (collector)									X	X	X	X				
No objects > 1 m height within 5 m radius (collector)														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												
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)																
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 (Page 10 of 14)

StationId	SK20			SK21		TX22				UT01				UT09			
Year	2012	2015	2018	2015	2018	2008	2011	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)																	
No objects > 1 m height inside 5 m radius, rain gage				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			
Collector and sensor oriented properly	X			X				X									
45 degree rule met (collector)														X			
30 degree rule for trees 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													
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												
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				
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 (Page 11 of 14)

StationId	UT98				UT99				WA14				WA19				WA21			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)					X													X		
No objects > 1 m height inside 5 m radius, rain gage		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	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	X	X
No objects > 1 m height within 5 m radius (collector)	X						X		X	X	X	X	X				X			
No fences > 1 m height inside 5 m radius (collector)	X	X							X	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)														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																				
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								
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 (Page 12 of 14)

StationId	WA24				WA99				WI10				WY00			
Year	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2013	2015	2018
Is sampling media quality maintained?																
Is the orifice of the collector +/- .3 m of raingage (elevation)		X							X				X			
No objects > 1 m height inside 5 m radius, rain gage	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																
45 degree rule met (collector)																
30 degree rule for trees met (collector)							X									
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					
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		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		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 (Page 13 of 14)

StationId	WY02				WY06				WY94		
Year	2009	2013	2015	2018	2009	2013	2015	2018	2012	2015	2018
Is sampling media quality maintained?											
Is the orifice of the collector +/- .3 m of raingage (elevation)											
No objects > 1 m height inside 5 m radius, rain gage		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
Collector and sensor oriented properly											
45 degree rule met (collector)											
30 degree rule for trees 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	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	
No pastures and ag. activity within 20 m radius		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											
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 (Page 14 of 14)

StationId	WY95				WY97				WY98			
Year	2009	2013	2015	2018	2009	2013	2015	2018	2009	2013	2015	2018
Is sampling media quality maintained?												
Is the orifice of the collector +/- .3 m of raingage (elevation)												
No objects > 1 m height inside 5 m radius, rain gage												
No fences > 1 m height inside 2 m radius (raingage)					X		X	X				
No vegetation height > 0.6 m within 5 m radius (raingage)												
Collector and sensor oriented properly												
45 degree rule met (collector)								X				
30 degree rule for trees met (collector)						X	X	X				
No objects > 1 m height within 5 m radius (collector)						X						
No fences > 1 m height inside 5 m radius (collector)					X			X				
No vegetation height > 0.6 m within 5 m radius (collector)												
No treated lumber inside 5 m radius (collector)										X	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-3. NADP – MDN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (1 of 4)

StationId	AK96		AK98		BC16		BC22		CO96			CO99			
Year	2018	2018	2013	2018	2015	2018	2015	2018	2012	2015	2018	2008	2012	2015	2018
Dry side bucket is clean	--	--			--	--	--	--	--	--	--				
Does lid seal properly	--	--			--	--	--	--	--	--	--				
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		--	--	--	--	--	--	--			X	
Filter in good condition	--	--	--		--	--	--	--	--	--	--			--	
Max / min thermometer in acceptable limits	--	--			--	--	--	--	--	--	--				
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		--	--	--			--	--				--	--	--	--
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		--	--	--		X	--	--				--	--	--	--
N-CON sensor responds to a 5 passes of the hand			--	--				--				--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	--	--	--	--	--	--	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	X	U to T				--	--				--			
Does optical sensor respond to mist of water (electronic gage)	X	X	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 (2 of 4)

StationId	IN21				IN34			KS32				MI09		MI48			
Year	2008	2011	2015	2018	2009	2015	2018	2010	2012	2015	2018	2015	2018	2009	2012	2015	2018
Dry side bucket is clean								--	--	--	--						
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	U to T							--	--	--	--	--					
Max / min thermometer in acceptable limits								--	--	--	--						
ACM sensor operates properly	X				X			--	--	--	--						
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	--	--	--	--	--	--	--					--	--	--	--	--	--
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	--	--	--	--	--	--	--					--	--	--	--	--	--
N-CON sensor responds to a 5 passes of the hand	--	--	--	--	--	--	--					--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	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)	--	--	--	--	--	--	--	--	--	--	--			--		U to T	
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--	--	--	--	--	--	--	--			--		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	MN06		MO46				ND01		NE15				NE98		OH02		
Year	2015	2018	2010	2012	2015	2018	2008	2018	2008	2012	2015	2018	2015	2018	2008	2015	2018
Dry side bucket is clean					X	X		--	--	--	--	--	--	--			
Does lid seal properly						X		--	--	--	--	--	--	--			
Lid liner in good condition								--	--	--	--	--	--	--			
Fan in good condition	X		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						--	--	--	--	--	--	--			
Filter in good condition			X					--	--	--	--	--	--	--			
Max / min thermometer in acceptable limits								--	--	--	--	--	--	--			
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	--	--	--	--	--	--	--								--	--	--
N-CON fan in good condition	--	--	--	--	--	--	--				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 5 passes of the hand	--	--	--	--	--	--	--							--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	X			--	--	--	X	--	--	--	--	--	--	--	X	--	--
Raingage operates properly (electronic gage)	--	--	--				--		U to T						--		
Does datalogger receive event signals form all collectors (electronic gage)	--	--	--				--	X	U to T						--		
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--	--		--		U to T				U to T		--		
Does optical sensor respond to mist of water (electronic 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 (4 of 4)

StationId	OH52		WA03			WA18				WI10				WI31			
Year	2015	2018	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018
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													X			--	--
Has flush wall filter mount been installed		X														--	--
Filter in good condition		--														--	--
Max / min thermometer in acceptable limits															X	--	--
ACM sensor operates properly																--	--
Motorbox operates within acceptable limits										X						--	--
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 5 passes of the hand	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Was the 'as found' turn over set properly (Belfort gage)		--	X	X	X	X	--	--	--	--	--	--	--	--	--	--	--
Raingage operates properly (electronic gage)	--	U to T	--	--	--	--											
Does datalogger receive event signals form all collectors (electronic gage)	--	U to T	--	--	--	--		X									
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	U to T	--	--	--	--											
Does optical sensor respond to mist of water (electronic gage)	--	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 1 of 7)

Station ID	AK02				AZ03				BC22		BC23		BC24	
Year	2010	2012	2015	2018	2008	2012	2015	2018	2015	2018	2015	2018	2015	2018
Dry side bucket is clean			X						--	--	--	--	--	--
Does lid seal properly									--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	X		X		X	
N-CON lid liner in good condition	--	--	--	--	--	--	--	--						
N-CON sensor responds to a 20-second mist of water	--	--	--	--	--	--	--	--		--		--		--
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--		--	--	--	--	--	--	--	--	--
Raingage operates properly (electronic gage)					U to T									
Does datalogger receive event signals form all collectors (electronic gage)	U to T													
Does optical sensor respond to "blocking" of light beam (electronic gage)				X					--	--	--	--	--	--
Does optical sensor respond to mist of water (electronic gage)				X					--	--	--	--	--	--

Station ID	CO00				CO01				CO02				CO08				CO09	
Year	2009	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2015	2018
Dry side bucket is clean			--	--			--	--										
Does lid seal properly			--	--			--	--										
Lid liner in good condition			--	--			--	--										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 a 20-second mist of water	--	--		--	--	--		--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	X	--	--	--		--	--	--	X	X	X		X	--	--	--	--	--
Raingage operates properly (electronic gage)	--				--				--	--	--	--	--					
Does datalogger receive event signals form all collectors (electronic gage)	--	U to T			--		U to T		--	--	--	--	--					
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	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 2 of 7)

StationId	CO21				CO22				CO90				CO91			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2008	2012	2015	2018
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 a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)				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)	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--

StationId	CO92				CO94				CO96				CO98			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018
Dry side bucket is clean	X															
Does lid seal properly																
Lid liner in good condition																
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 a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)		--	--	--	--	--	--	--	X	--	--	--	X	--	--	--
Raingage operates properly (electronic gage)	--								--							
Does datalogger receive event signals form all collectors (electronic gage)	--								--		X		X			
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 C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 3 of 7)

StationId	CO99				IA23				KS32					MI09			
Year	2008	2012	2015	2018	2009	2012	2015	2018	2008	2010	2012	2015	2018	2009	2012	2015	2018
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	X		--	--	--	--
N-CON lid liner in good condition	--	--			--				--	--				--	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--			--				--	--				--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	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)	--				--	--	--	--	--	--	--	--	--				
Does optical sensor respond to mist of water (electronic gage)	--				--	--	--	--	--	--	--	--	--				

StationId	MI26				MI48				MI51				MI53			
Year	2009	2012	2015	2018	2009	2012	2015	2018	2010	2012	2015	2018	2010	2012	2015	2018
Dry side bucket is clean							--									
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 a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--
Raingage operates properly (electronic gage)	X		X		--											
Does datalogger receive event signals form all collectors (electronic gage)	X				--											
Does optical sensor respond to "blocking" of light beam (electronic gage)			U to T	X	--		U to T									
Does optical sensor respond to mist of water (electronic gage)			U to T	X	--		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 4 of 7)

StationId	MO03				MO05				MT00				MT96			
Year	2010	2012	2015	2018	2010	2012	2015	2018	2008	2011	2013	2018	2008	2012	2015	2018
Dry side bucket is clean		--	--	--			--	--		U to T		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	--			X	--	--		X	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--				--	--			--	--	--	--	--	--	--	--
N-CON sensor responds to a 20-second mist of water	--				--	--			--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	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)	--	--	--	--	--	--	--	--	--			X	--	--	--	--

StationId	MT98				NC25				NE15				NE99			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018
Dry side bucket is clean	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 a 20-second mist of water	--				--	--	--	--	--	--	--	--	--			
Was the 'as found' turn over set properly (Belfort gage)		--	--	--	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)	--	--	--	--	--	--	--	--	--				--	--	--	--
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 C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (Page 5 of 7)

StationId	NV03				NV05				OH17				SD08			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2010	2013	2015	2018	2009	2012	2015	2018
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	--	--	--	--	--	--	--	--	--	--	--	--	--			
N-CON sensor responds to a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--	--			--
Was the 'as found' turn over set properly (Belfort gage)		--	--	--	X	--	--	--	--	--	--	--		--	--	--
Raingage operates properly (electronic gage)	--				--								--			
Does datalogger receive event signals form all collectors (electronic gage)	--	U to T			--								--			
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--	--								--	--	--	--
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--	--								--	--	--	--

StationId	SK20			SK21		TX22				UT01				UT09			
Year	2012	2015	2018	2015	2018	2008	2011	2015	2018	2008	2012	2015	2018	2008	2012	2015	2018
Dry side bucket is clean	--	--	--	--	--						--	--	--			X	
Does lid seal properly	--	--	--	--	--						--	--	--				
Lid liner in good condition	--	--	--	--	--	--					--	--	--				
ACM sensor operates properly	--	--	--	--	--						--	--	--				
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 a 20-second mist of water						--	--	--	--	--				--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	X	--	--	--		--	--	--	X	--	--	--
Raingage operates properly (electronic gage)	X					--				--				--			
Does datalogger receive event signals form all collectors (electronic gage)		X	X			--				--				--			
Does optical sensor respond to "blocking" of light beam (electronic gage)	U to T	X	X			--			X	--	--	--	--	--			
Does optical sensor respond to mist of water (electronic gage)	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 6 of 7)

StationId	UT98				UT99				WA14				WA19				WA21			
Year	2008	2012	2015	2018	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018
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			--	--											--	--	X			
N-CON lid seal in good condition	--	--			--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--
N-CON lid liner in good condition	--	--	X		--	--	--	--	--	--	--	--	--	--			--	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--			--	--	--	--	--	--	--	--	--	--			--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)		--	--	--	X	--	--	--	--	--	--	--		--	--	--	--	--	--	--
Raingage operates properly (electronic gage)	--				--			X		U to T			--							
Does datalogger receive event signals form all collectors (electronic gage)	--	U to T			--	X							--	X	X		U to T			
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--	--			X		U to T		U to T	--	--	--	--		X		
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--	--			X		U to T	X		--	--	--	--		X		

StationId	WA24				WA99				WI10				WY00			
Year	2008	2012	2015	2018	2009	2012	2015	2018	2009	2012	2015	2018	2009	2013	2015	2018
Dry side bucket is clean			--	--												
Does lid seal properly			--	--												
Lid liner in good condition			--	--								X				
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	--	--			--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--			--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	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)	--	--	--	--			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 7 of 7)

StationId	WY02				WY06				WY94		
Year	2009	2013	2015	2018	2009	2013	2015	2018	2012	2015	2018
Dry side bucket is clean									--	--	--
Does lid seal properly									--	--	--
Lid liner in good condition									--	--	--
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 a 20-second mist of water	--	--	--	--	--	--	--	--			
Was the 'as found' turn over set properly (Belfort gage)	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			MISSING
Does optical sensor respond to mist of water (electronic gage)	--				--		X	X			MISSING

StationId	WY95				WY97				WY98			
Year	2009	2013	2015	2018	2009	2013	2015	2018	2009	2013	2015	2018
Dry side bucket is clean												
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 a 20-second mist of water	--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--		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)					--	--			--			
Does optical sensor respond to mist of water (electronic gage)					--	--	U to T		--			

	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	FUNDING AGENCY	OPERATING AGENCY
AB32	NTN	Wood Buffalo Environmental Association	Wood Buffalo Environmental Association
AK02	NTN	University of Alaska Southeast/USFS	USFS-Pacific Northwest Research Station
AK96	MDN	University of Alaska Fairbanks	University of Alaska Fairbanks
AK96	NTN	University of Alaska Fairbanks	University of Alaska Fairbanks
AK98	MDN	State of Alaska Dept of Environmental Conservation	State of Alaska Dept of Environmental Conservation
AZ03	NTN	NPS-ARD	NPS-Grand Canyon NP
BC16	MDN	Environment Canada	Environment Canada
BC22	NTN	Rio Tinto	Rio Tinto
BC23	NTN	Rio Tinto	Rio Tinto
BC24	NTN	Prince Rupert Port Authority	Prince Rupert Port Authority
CO00	NTN	USGS	USGS
CO01	NTN	USGS	USGS
CO02	NTN	NSF/INSTAAR-Univ of Colorado	INSTAAR-Univ of Colorado
CO08	NTN	EPA-Clean Air Markets	EPA-Clean Air Markets/USFS-White River NF
CO09	NTN	U.S. Bureau of Land Management	Rocky Mountain National Park
CO21	NTN	USFS	USFS-RMRS
CO22	NTN	CO DPHE	Shortgrass Steppe LTER/SAES-CO State Univ
CO90	NTN	NSF/INSTAAR-Univ of Colorado	INSTAAR-Univ of Colorado
CO91	NTN	USFS	USFS-San Juan NF
CO92	NTN	EPA-Clean Air Markets	EPA-Clean Air Markets/USFS-White River NF
CO94	NTN	EPA-Clean Air Markets	EPA-Clean Air Markets/Univ of Colorado-MRS
CO96	MDN	U.S. Bureau of Land Management	San Juan National Forest
CO96	NTN	USFS	USFS-San Juan NF

SITE ID	NETWORK	FUNDING AGENCY	OPERATING AGENCY
CO98	NTN	USGS-BRD	Colorado State Univ
CO99	MDN	NPS-ARD	NPS-Mesa Verde National Park
CO99	NTN	USGS	NPS
IA23	NTN	USGS	USGS/Iowa State Univ
IN21	MDN	Lake Michigan Air Directors Consortium	LADCO
IN34	MDN	Lake Michigan Air Directors Consortium	Indiana Dunes National Lakeshore
KS32	MDN	Kansas Department of Health and Environment	Kansas Department of Health and Environment
KS32	NTN	USGS	USGS/Kansas State Park & Resource Authority
MI09	MDN	Lake Michigan Air Directors Consortium	University of Michigan
MI09	NTN	SAES-Michigan State Univ	Univ of Michigan-Biological Station
MI26	NTN	SAES-Michigan State Univ	Michigan State Univ
MI48	MDN	U.S. Fish and Wildlife Service-Air Quality Branch	LADCO
MI48	NTN	USFWS-AQB	USFWS-AQB/USFWS-Seney NWR
MI51	NTN	EPA-Clean Air Markets	EPA-Clean Air Markets
MI53	NTN	USFS	USFS-NCFES
MN06	MDN	Leech Lake Band of Ojibwe	Leech Lake Band of Ojibwe
MO03	NTN	USGS	Univ of Missouri
MO05	NTN	USGS	Univ of Missouri
MO46	MDN	USFWS	USFWS
MT00	NTN	USGS	USGS/NPS
MT96	NTN	EPA/Fort Peck Tribes	Fort Peck Tribes
MT98	NTN	USGS	USGS/SAES-Montana State Univ-NARC
NC25	NTN	USFS	USFS-SFES

SITE ID	NETWORK	FUNDING AGENCY	OPERATING AGENCY
ND01	MDN	U.S. Fish and Wildlife Service	U.S. Fish and Wildlife Service
NE15	MDN	Nebraska Department of Envrionmental Quality	University of Nebraska - Lincoln
NE15	NTN	SAES-Univ of Nebraska	Univ of Nebraska
NE98	MDN	Santee Sioux Nation of Nebraska	Santee Sioux Nation of Nebraska
NE99	NTN	USGS	USGS
NV03	NTN	USGS	USGS
NV05	NTN	NPS-ARD	NPS-Great Basin NP
OH02	MDN	U.S. EPA/Ohio University	Ohio University
OH16	MDN	Not available	Northeast Ohio Regioal Sewer District
OH17	NTN	USFS	USFS
OH52	MDN	Lake Michigan Air Directors Consortium	Ohio University
SD08	NTN	USGS	South Dakota State Univ
SK20	NTN	Saskatchewan Ministry of Environment	Saskatchewan Ministry of Environment
SK21	NTN	Saskatchewan Ministry of Environment	Saskatchewan Ministry of Environment
SK27	MDN	Environment Canada	Environment Canada
SK30	NTN	Saskatchewan Ministry of Environment	Saskatchewan Ministry of Environment
SK31	NTN	Saskatchewan Ministry of Environment	Saskatchewan Ministry of Environment
TX22	NTN	USGS	NPS-Guadalupe Mountains NP
UT01	NTN	USGS	Utah Climate Center
UT09	NTN	NPS-ARD	NPS-Canyonlands NP
UT95	NTN	U.S. Forest Service	U.S. Forest Service
UT98	NTN	USGS	USGS/Green River HS
UT99	NTN	NPS-ARD	NPS-Bryce Canyon NP

SITE ID	NETWORK	FUNDING AGENCY	OPERATING AGENCY
WA03	MDN	Washington State Department of Ecology	Makah National Fish Hatchery
WA14	NTN	NPS-ARD	NPS-Olympic NP
WA18	MDN	Illinois State Water Survey, Frontier Geosciences	Frontier Geosciences, Inc.
WA19	NTN	USGS	NPS-North Cascades NP
WA21	NTN	EPA-Clean Air Markets	Univ of WA-Pack Forest/EPA
WA24	NTN	USGS	USGS/USDA
WA99	NTN	NPS-ARD	NPS-Mount Rainier NP
WI10	MDN	Forest County Patawatomi Community/USEPA	Forest County Patawatomi Community
WI10	NTN	Forest County Potawatomi Community	Forest County Potawatomi Community/EPA
WI31	MDN	Wisconsin Department of Natural Resources	Wisconsin Department of Natural Resources
WY00	NTN	USFS	USFS-RMRS
WY02	NTN	BLM	BLM
WY06	NTN	BLM	BLM
WY94	NTN	Wyoming Department of Environmental Quality	Grand Teton National Park
WY95	NTN	USFS	USFS-RMRS
WY97	NTN	USFS-Rocky Mountain Region	USFS-Shoshone NF
WY98	NTN	Bridger-Teton NF	Pinedale Ranger District

APPENDIX E

Transfer Standard Instrument Certifications

Certificate Number
A2721736
Issue Date: 01/24/18

Certificate of Calibration

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: EEMS 01229

Description:	DIGITAL STIK THERMOMETER	Calibration Date:	01/24/2018
Manufacturer:	FLUKE	Calibration Due:	01/24/2019
Model Number:	1551A EX	Procedure:	FLUKE 1551A EX,52A EX Rev: 11/1/2010
Serial Number:	3275143	Temperature:	71 F
Technician:	STEVE TORRES	Humidity:	38 % RH
		As Found Condition:	**IN TOLERANCE**
		Calibration Results:	**IN TOLERANCE**

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

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 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 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.

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
899976	FLUKE	5618B-12	12/6/2016	2/21/2018
A11967	HART SCIENTIFIC	9140	3/30/2017	5/8/2018
A88072	FLUKE/HART	1502A	12/14/2017	3/20/2018
B7B759	HART SCIENTIFIC	9103	11/28/2017	11/28/2018

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
A2721736
Issue Date: 01/24/18

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Unit	ADJ/FAIL
Temperature Accuracy	-25.00	-25.05	-24.95	-25.04	-25.04	°C	
Temperature Accuracy	0.00	-0.05	0.05	0.01	0.01	°C	
Temperature Accuracy	100.00	99.95	100.05	99.96	99.96	°C	
Temperature Accuracy	150.00	149.95	150.05	149.96	149.96	°C	

FEMS # 01229

Slope = 0.9998626

Inter = -0.019771

r^2 = 1.00000

ED 2/2/2018

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

ANSI/NCSL Z540-1-1994

Date

2/14/2018 - - **Calibration and certification of fluke Thermocouples**

TMI Cert data -- 1/24/2018

	STD	EEMS RTD 01229	diff	corrected
cert # =	A2380069			
	-25.00	-25.04	0.040	-25.02
	0.00	0.01	-0.010	0.03
	100.00	99.96	0.040	99.99
	150.00	149.96	0.040	150.00
			0.000	0.02
			0.000	0.02

RTD 01229

2017 correction: slope= 0.9998626

intercept= -0.019771

1.0000000

Eric Hebert 2/14/2018

At EEMS	**Date 2/14/2018**	fluke =	01311	**offset -0.2**	01312	**offset -0.4**	01310	**offset 0.5**
RTD 01229			EEMS SEG		EEMS van 2		EEMS van 1	
		thermo =	01236		01237		01238	
raw	corrected		raw	corrected	raw	corrected	raw	corrected
0.06	0.08		0.1	0.16	0.1	0.15	0.1	0.18
92.40	92.43		92.7	92.52	92.8	92.58	93.0	92.55
78.00	78.03		78.2	78.06	78.2	78.02	78.4	78.03
62.30	62.33		62.4	62.30	62.4	62.27	62.6	62.32
50.79	50.82		50.8	50.73	50.8	50.70	50.9	50.69
43.88	43.91		43.9	43.84	43.9	43.82	44.0	43.83
29.02	29.04		29.0	28.98	29.1	29.06	29.1	29.01
15.14	15.16		15.2	15.22	15.2	15.21	15.2	15.19
		Thermocouple offset =	-0.2		-0.4		0.5	
POST CALIBRATION CHECK								
20.88	20.90		20.9	20.90	21.0	20.99	20.9	20.86
		slope =	**1.002544**		**1.002962**		**1.005725**	
		intercept =	**-0.05563**		**-0.050065**		**-0.07849**	
		correlation =	**1.0000**		**1.0000**		**1.0000**	

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

EEMS # 01265

Van 2

Calibration Data Record			Temperature: 68° Humidity: 34%
Customer Name	EE&MS	Item Name	USAKATA
Manufacturer		Model	5-25
Serial Number	190037	Calibration Date	3-5-18
Calibration Frequency		Job Card Number	S-24487
Customer Reference Number		Date of Certification	3-5-18

Measurement Standards

Theodolite Wild T-3 S/N 18801 Calibration 01/19/18 Due 01/19/19 NIST Number 738/229329-83 738/223398

Optical Wedge K&E 71-7020 S/N 5167 Calibration; 02/12/14 Due 2/12/19, 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 Paologgi	John Noga, Quality Assurance
Repair Technician	John Noga

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

Ucm 1

EEMS
#01272

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Ineffective if graduation ring is not set to 0 degrees.

Customer Name:	Environmental Engineering & Measurement Services, Inc.
Purchase Order #:	
Instrument:	Ushikata Tracon S-25 Compass
Serial Number:	199578
Quantity:	1
Calibration Due:	05/2018

John Noga, Quality Control

May 10, 2018

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 02/06/15 Due 02/06/16 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-7020 S/N 5167 Calibration 02/12/14 Due 02/12/19 731/244084-89 731/2216117

EEMS
~~# 01272~~

SEG

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

~~Van 1~~

Calibration Data Record			Temperature: 68° Humidity: 34%
Customer Name	EE & MS	Item Name	ISHIKATA
Manufacturer		Model	S-25
Serial Number	191832	Calibration Date	3-5-18
Calibration Frequency		Job Card Number	S-24488
Customer Reference Number		Date of Certification	3-5-18

Measurement Standards

Theodolite Wild T-3 S/N 18801 Calibration 01/19/18 Due 01/19/19 NIST Number 738/229329-83 738/223398

Optical Wedge K&E 71-7020 S/N 5167 Calibration; 02/12/14 Due 2/12/19, 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

Doc templates 2/wk-40-1360 survey compass calibration record

Certificate Number
A2721737
Issue Date: 01/24/18

Certificate of Calibration

EEMS#

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: 01310

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

Calibration Date: 01/24/2018
Calibration Due: 01/24/2019
Procedure: ~~METCAL~~ FLUKE 187 Rev: 6/15/2015
Temperature: 73 F
Humidity: 44 % 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 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 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.

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
3834901	FLUKE	5522A/SC1100	4/12/2017	4/12/2018

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
A2721741
Issue Date: 01/24/18

Certificate of Calibration

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: EEMS 01311

Description: DIGITAL MULTIMETER
Manufacturer: FLUKE
Model Number: 287
Serial Number: 95740135
Technician: JACOB BUDOVSKY
On-Site Calibration: ☐
Comments:

Calibration Date: 01/24/2018
Calibration Due: 01/24/2019
Procedure: METCAL FLUKE 287
Rev: 6/15/2015
Temperature: 73 F
Humidity: 44 % 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 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 and TMI's Quality Manual, QM-1.

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

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

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
3834901	FLUKE	5522A/SC1100	4/12/2017	4/12/2018

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
A2721757
Issue Date: 01/24/18

Certificate of Calibration

Customer: ENVIRONMENTAL ENGINEERING & MEASUREMENT SERVICES
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: EEMS 01312

Description: DIGITAL MULTIMETER
Manufacturer: FLUKE
Model Number: 287
Serial Number: 95740243
Technician: JACOB BUDOVSKY
On-Site Calibration: ☐
Comments:

Calibration Date: 01/24/2018
Calibration Due: 01/24/2019
Procedure: METCAL FLUKE 287
Rev: 6/15/2015
Temperature: 73 F
Humidity: 44 % 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 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 and TMI's Quality Manual, QM-1.

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

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

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
3834901	FLUKE	5522A/SC1100	4/12/2017	4/12/2018

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
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1500.00	1499.71	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1000.00	999.80	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	500.00	499.88	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	200.00	199.93	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	100.00	99.95	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	50.00	49.97	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	BL3-0	Audit		1000.6	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-1	Audit		824.1	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-2	Audit		823.2	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-3	Audit		825.1	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-4	Audit		823.6	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-5	Audit		823.7	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-6	Audit		823.0	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-7	Audit		823.5	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-8	Audit		824.6	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-9	Audit		824.0	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-10	Audit		820.7	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-11	Audit		823.8	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL3-12	Audit		823.0	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL1-a	Audit		207.41	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL1-b	Audit		207.21	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL1-c	Audit		207.06	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	BL1-d	Audit		207.47	SEG	ETI/Belfort Set #3 - VAN 3
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1500.00	1499.71	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1000.00	999.80	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	500.00	499.87	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	200.00	199.93	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/17/2019

Reviewer Signature: _____ Date: _____

BL2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/16/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	1500.00	1499.75	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	1000.00	999.81	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	500.00	499.86	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	100.00	99.97	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/16/2019	8028481064	BL2-0	Audit		999.5	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-1	Audit		822.8	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-2	Audit		820.1	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-3	Audit		824.1	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-4	Audit		824.7	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-5	Audit		823.0	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-6	Audit		823.7	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-7	Audit		823.1	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-8	Audit		823.0	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-9	Audit		823.3	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-10	Audit		823.4	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-11	Audit		823.2	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-12	Audit		823.8	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-a	Audit			SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-b	Audit		205.70	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-c	Audit		206.10	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	BL2-d	Audit		206.32	SEG	ETI/Belfort Set #2 - VAN2
1/16/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	1500.00	1499.79	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	1000.00	999.84	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	500.00	499.90	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	50.00	49.97	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/16/2019

Reviewer Signature: _____ Date: _____

BL4 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1500.00	1499.52	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1000.00	999.69	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	500.00	499.83	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	200.00	199.92	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	BL4-0	Audit		1034.1	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-1	Audit		824.7	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-2	Audit		823.5	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-3	Audit		824.4	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-4	Audit		824.5	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-5	Audit		823.0	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-6	Audit		824.7	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-7	Audit		823.8	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-8	Audit		824.2	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-9	Audit		824.9	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-10	Audit		823.5	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-11	Audit		823.8	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-12	Audit		823.9	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-a	Audit		207.38	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-b	Audit		207.37	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-c	Audit		207.52	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	BL4-d	Audit		207.59	SEG	ETI/Belfort Set #4 - VAN1
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1500.00	1499.71	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1000.00	999.80	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	500.00	499.88	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	200.00	199.96	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/17/2019

Reviewer Signature: _____ Date: _____

P2OTT1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1500.00	1499.73	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1000.00	999.81	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	500.00	499.89	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	P2OTT1-1	Audit		1017.6	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-2	Audit		1017.8	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-3	Audit		1017.1	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-4	Audit		1017.9	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-5	Audit		1016.6	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-6	Audit		1016.8	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-7	Audit		1017.5	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-8	Audit		1016.3	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-9	Audit		1017.7	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-a	Audit		255.30	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-b	Audit		255.15	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-c	Audit		255.21	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	P2OTT1-d	Audit		255.53	SEG	Ott P2 Set #1 - VAN 3
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1500.00	1499.71	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1000.00	999.80	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	500.00	499.88	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	200.00	199.93	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	100.00	99.95	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	50.00	49.97	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/17/2019

Reviewer Signature: _____ Date: _____

P2OTT2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/16/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	1500.00	1499.75	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	1000.00	999.81	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	500.00	499.86	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	200.00	199.94	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	100.00	99.97	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/16/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/16/2019	8028481064	P2OTT2-1	Audit		1016.6	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-2	Audit		1017.0	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-3	Audit		1017.2	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-4	Audit		1017.0	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-5	Audit		1017.1	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-6	Audit		1017.9	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-7	Audit		1017.1	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-8	Audit		1015.7	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-9	Audit		1016.4	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-a	Audit		254.23	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-b	Audit		254.18	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-c	Audit		254.42	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	P2OTT2-d	Audit		254.39	SEG	Ott P2 Set #2 - VAN 2
1/16/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	1500.00	1499.79	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	1000.00	999.84	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	500.00	499.90	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	100.00	99.97	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	50.00	49.97	SEG	Post Balance Check
1/16/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/16/2019

Reviewer Signature: _____ Date: _____

P2OTT3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1500.00	1499.71	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	1000.00	999.80	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	500.00	499.87	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	200.00	199.93	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	100.00	99.96	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	50.00	49.98	SEG	Initial Balance Check
1/17/2019	8028481064	26677	Bal Init	0.00	0.00	SEG	Initial Balance Check
1/17/2019	8028481064	P2OTT3-1	Audit		193.83	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-2	Audit		193.79	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-3	Audit		193.80	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-4	Audit		193.77	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-5	Audit		193.77	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-6	Audit		193.08	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-7	Audit		193.84	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-8	Audit		193.63	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-9	Audit		193.14	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-10	Audit		193.76	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-a	Audit		254.73	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-b	Audit		255.16	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-c	Audit		255.51	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	P2OTT3-d	Audit		255.37	SEG	Ott P2 Set #3- VAN 1
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1500.00	1499.71	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	1000.00	999.80	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	500.00	499.81	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	200.00	199.94	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	100.00	99.96	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	50.00	49.98	SEG	Post Balance Check
1/17/2019	8028481064	26677	Bal Post	0.00	0.00	SEG	Post Balance Check

Calibrator Signature: Sandy Grenville Date: 1/17/2019

Reviewer Signature: _____ Date: _____