2015 National Atmospheric Deposition Program Site Survey Program Annual Report

Prepared for:

U.S. Environmental Protection Agency
Office of Atmospheric Programs

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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
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
QAPP	Quality Assurance Project Plan
QC	Quality Control
QR	quality rating
SOP	Standard Operating Procedures
USGS	United States Geological Service
WAAS	Wide Area Augmentation System

Executive Summary

Under US EPA contract number EPW12019, Support for Conducting Systems and Performance Audits of CASTNET and NADP Monitoring Stations, Environmental, Engineering & Measurement Services, Inc. (EEMS) has implemented an 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). The AMoN and AMNet networks are relatively recent additions to the NADP and surveys of those sites are limited to the siting criteria when collocated with an existing NADP wet-deposition network or a CASTNET site as part of this contract. 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 atmospheric deposition 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 any findings that should be recorded.

Site surveys afford the necessary checks and balances for site operations and serve to independently validate data provided by the sites in the network.

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

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 network. 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 provides a higher level of confidence in the data reported by the NADP.

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 activities strengthen the reliability and overall quality of the data the agency uses for policy decisions and for measures of accountability.

NADP site surveys are accomplished by visiting each site, checking the operation of the site instrumentation, performing maintenance as needed, observing the site operator while performing the routine site activities, providing technical and training support, and reporting the results. 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 100 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 creating the site file. The necessary materials and standards for each site survey are checked and shipped if necessary. The site operators 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 http://nadp.isws.illinois.edu/.
- 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, field analytical technique (AIRMoN), calibrations, cleaning, maintenance, recordkeeping, reporting, and material storage. Confirming that the current versions of NADP manuals and documentation are accesible.
- Quantitatively assessing the accuracy of the NADP instrumentation responses to QA standards. These include standard weights for raingage tests and mass determinations, and analytical standards for pH and conductivity meter tests (AIRMoN sites only).
- Recording all data on the hard copy forms provided in the site file. Printing additional forms from the database if required in order to record all data. Comparing the observations to the pre-populated values, 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 SOP specific to the network.

5. Transferring observations from survey forms to survey database. Enter the survey information obtained in the steps above into the survey database and review 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 included in the site file with the appropriate document control number.

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.

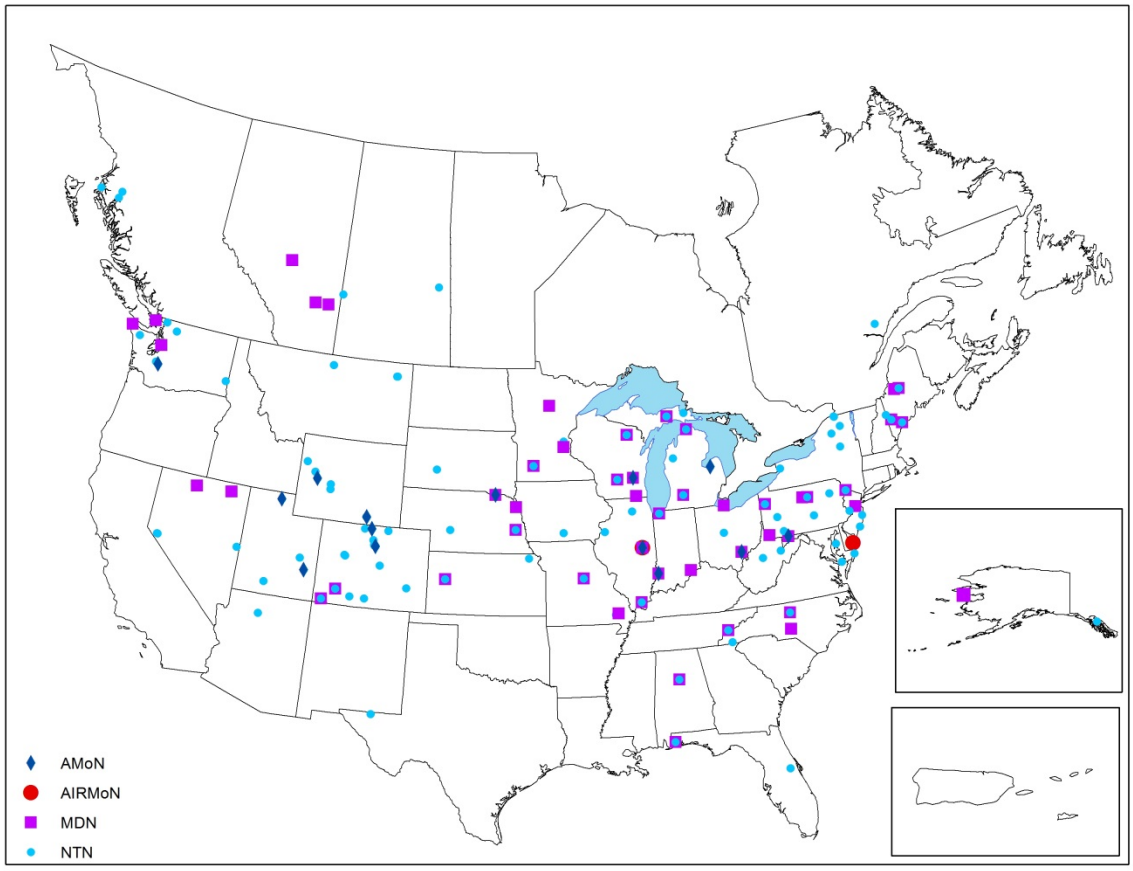
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed from January through December of 2015.

A total of 145 NADP collectors (this number includes co-located sites) were surveyed during the period covered by this report at 118 distinct locations[1]. These include 46 MDN sites, 96 NTN sites, and three AIRMoN sites (two of the AIRMoN sites were collocated). Figure 2-1 is a map of the locations of the sites visited during 2015. AMoN sites are also included in the map, however only the siting criterial 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 found.

Figure 2-1. Site Survey Locations in 2015



Source – NADP Program Office

[1] 11IL-AIRMoN operated and funded by the CAL as part of the bag sampling validation, and 99WA-NTN, operated by the USGS QA Program, are included in the total number of collectors surveyed. Though 11IL-AIRMoN shares the raingage with the other collectors at the site, 99WA-NTN operates its own raingage.

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. Of the 119 precipitation gages surveyed (co-located sites usually use the same gage), 19 were Belfort mechanical raingages. Due to the age of the Belfort raingages, some were found to have some operational issues. Most problems were minor and were corrected during the site survey. Survey data continues to indicate that the raingages require attention and it is likely that the mechanical raingages have reached, or in some cases exceeded, their useful life-expectancy. Replacing Belfort raingages with electronic raingages has led to improved network operation. Efforts should continue to replace all Belfort raingages with electronic raingages. Altogether 100 electronic raingages were surveyed, with only a few minor problems observed.

Of the 145 collectors (sites) surveyed, 52 sites operated N-CON collectors. The 93 remaining collectors were AeroChem Metrics (ACM) type, manufactured by either AeroChem Metrics or Loda Electronics Company.

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

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 them 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 2015 and the equipment found at the sites is shown in Table 2.1.

Table 2-1. Sites Surveyed from January through December 2015 and Equipment Found

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AB13	Henry Kroeger	MDN	7/13/2015	ACM-type	ETI	N/A
AB14	Genesee	MDN	8/7/2015	ACM-type	ETI	Tipping Bucket
AK02	Juneau	NTN	7/18/2015	ACM-type	ETI	N/A
AK04	Nome	MDN	7/14/2015	N-CON	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AL19	Birmingham	MDN/NTN	2/24/2015	N-CON	ETI	Tipping Bucket
AZ03	Grand Canyon National Park-Hopi Point	NTN	4/21/2015	ACM-type	ETI	Tipping Bucket
BC16	Saturnia Island	MDN	7/28/2015	N-CON	ETI	Other
BC22	Haul Road Station	NTN	7/22/2015	N-CON	OTT	N/A
BC23	Lakelse Lake	NTN	7/22/2015	N-CON	OTT	N/A
BC24	Port Edward	NTN	7/21/2015	N-CON	OTT	N/A
CO00	Alamosa	NTN	4/20/2015	N-CON	OTT	N/A
CO01	Los Animas Fish Hatchery	NTN	4/19/2015	N-CON	OTT	N/A
CO02	Niwot Saddle	NTN	7/21/2015	ACM-type	Belfort	N/A
CO08	Four Mile Park	NTN	7/1/2015	ACM-type	ETI	N/A
CO09	Kawaneechee Medow	NTN	7/23/2015	ACM-type	ETI	N/A
CO21	Manitou	NTN	7/20/2015	ACM-type	Belfort	N/A
CO22	Pawnee	NTN	8/1/2015	ACM-type	Belfort	Stick
CO90	Niwot Ridge - Southeast	NTN	7/21/2015	ACM-type	Belfort	ETI
CO91	Wolf Creek Pass	NTN	4/20/2015	ACM-type	OTT	N/A
CO92	Sunlight Peak	NTN	7/1/2015	ACM-type	ETI	N/A
CO94	Sugarloaf	NTN	7/22/2015	ACM-type	ETI	N/A
CO96	Molas Pass	MDN/NTN	4/27/2015	N-CON/ ACM-type	ETI	N/A
CO98	Rocky Mountain NP-Loch Vale	NTN	7/7/2015	ACM-type	ETI	ETI
CO99	Mesa Verde National Park-Chapin Mesa	MDN/NTN	4/21/2015	ACM-type/ N-CON	ETI	N/A
DE02	Lewes	AIRMoN	11/23/2015	ACM-type	ETI	Stick

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
FL32	Orlando	NTN	2/17/2015	ACM-type	Belfort	Other
FL96	Pensacola	MDN/NTN	2/9/2015	N-CON	ETI	N/A
IA23	McNay Research Center	NTN	5/3/2015	N-CON	OTT	N/A
11IL/IL11	Bondville	AIRMoN	9/15/2015	ACM-type	OTT	OTT
IL11	Bondville	MDN/NTN	9/15/2015	ACM-type	OTT	Stick / OTT
IL18	Shabbona	NTN	9/11/2015	ACM-type	Belfort	OTT
IL63	Dixon Springs Agricultural Center	MDN/NTN	9/6/2015	ACM-type	OTT	Belfort
IL78	Monmouth	NTN	9/10/2015	N-CON	OTT	OTT
IN21	Clifty Falls State Park	MDN	8/25/2015	ACM-type	OTT	Stick
IN22	Southwest Purdue Agriculture Center	MDN	9/17/2015	ACM-type	OTT	N/A
IN34	Indiana Dunes National Lakeshore	MDN/NTN	9/8/2015	ACM-type	OTT	Stick
KS32	Lake Scott State Park	MDN/NTN	8/24/2105	N-CON	OTT	Stick
KS97	Kickapoo Tribe	NTN	9/24/2015	ACM-type	ETI	N/A
MD08	Piney Reservoir	MDN/NTN	11/24/2015	ACM-type	ETI	N/A
MD13	UM Wye Center	NTN	11/16/2015	ACM-type	ETI	Belfort
MD15	Smith Island	NTN	11/17/2015	ACM-type	Belfort	N/A
MD18	Assateague Island National Seashore-Woodcock	NTN	11/23/2015	ACM-type	ETI	N/A
ME02	Bridgton	MDN/NTN	10/15/2015	ACM-type	ETI	N/A
ME08	Gilead	NTN	10/16/2015	N-CON	ETI	N/A
ME09	Greenville Station	MDN/NTN	10/14/2015	ACM-type	ETI	N/A
ME96	Casco Bay - Wolfe's Neck Farm	MDN/NTN	10/13/2015	ACM-type	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
MI09	Douglas Lake	MDN/NTN	8/29/2015	ACM-type	ETI	Belfort
MI26	Kellogg Biological Station	MDN/NTN	6/2/2015	ACM-type	ETI	N/A
MI48	Seney National Wildlife Reguge - Headquarters	MDN/NTN	8/29/2015	ACM-type	ETI	N/A
MI51	Unionville	NTN	8/27/2015	ACM-type	ETI	Tipping Bucket
MI53	Wellston	NTN	8/28/2015	ACM-type	ETI	N/A
MI98	Raco	NTN	8/31/2015	ACM-type	ETI	N/A
MN01	Cedar Creek State Park	NTN	9/9/2015	N-CON	ETI	N/A
MN06	Leech Lake	MDN	9/11/2015	ACM-type	Belfort	Tipping Bucket
MN27	Lamberton	MDN/NTN	9/18/2015	ACM-type	ETI	N/A
MN98	Blaine	MDN	9/9/2015	ACM-type	ETI	Stick
MT96	Poplar River	NTN	8/4/2015	ACM-type	Belfort	N/A
MT98	Havre-Northern Agriculture Research Center	NTN	7/27/2015	N-CON	OTT	N/A
NC17	University Research Farm	MDN/NTN	12/1/2015	N-CON	ETI	Tipping Bucket
NC25	Coweeta	NTN	3/20/2015	ACM-type	Belfort	Stick
NC26	Candor	MDN	12/1/2015	N-CON	ETI	N/A
NE15	Mead	MDN/NTN	5/1/2015	N-CON	ETI	Tipping Bucket
NE25	Winnebago	MDN	5/1/2015	N-CON	ETI	Tipping Bucket
NE98	Santee	MDN	4/30/2015	N-CON	ETI	Tipping Bucket
NE99	North Platte Agricultural Experiment Station	NTN	4/29/2015	N-CON	OTT	N/A
NJ00	Edwin B. Forsythe National Wildlife Refuge	NTN	11/12/2015	ACM-type	ETI	N/A
NJ30	New Brunswick	MDN	11/9/2015	ACM-type	OTT	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
NJ39	Cattus Island	NTN	11/10/2015	ACM-type	ETI	N/A
NJ99	Washington Crossing	NTN	11/18/2015	ACM-type	Belfort	N/A
NV02	Lesperance Ranch	MDN	5/5/2015	ACM-type	Belfort	N/A
NV03	Smith Valley	NTN	5/4/2015	ACM-type	OTT	Belfort
NV05	Great Basin National Park – Lehman Cavern	NTN	5/8/2015	ACM-type	ETI	N/A
NV99	Gibb's Ranch	MDN	5/6/2015	ACM-type	Belfort	N/A
NY22	Akwesane Mohawk – Fort Covington	NTN	10/19/2015	ACM-type	ETI	N/A
NY28	Piseco Lake	NTN	10/21/2015	N-CON	ETI	N/A
NY59	Wanakena	NTN	10/20/2015	N-CON	ETI	N/A
NY92	Amherst	NTN	9/29/2015	N-CON	ETI	N/A
NY93	Paul Smith's	NTN	10/19/2015	N-CON	ETI	N/A
OH02	Athens Super Site	MDN	6/5/2015	ACM-type	ETI	Tipping Bucket
OH17	Kessler Farm Field Laboratory	NTN	6/1/2015	ACM-type	ETI	N/A
OH52	South Bass Island	MDN	8/26/2015	ACM-type	Belfort	N/A
PA02	Crooked Creek Lake	NTN	10/26/2015	ACM-type	Belfort	Stick
PA18	Young Woman's Creek	MDN	10/27/2015	N-CON	OTT	Stick
PA21	Goddard State Park	MDN/NTN	10/25/2015	N-CON/ ACM-type	Belfort	Stick
PA37	Waynesburg	MDN	11/20/2015	N-CON	OTT	N/A
PA52	Little Pine State Park	MDN/NTN	10/30/2015	N-CON	OTT	Stick
PA71	Little Buffalo State Park	NTN	10/26/2015	N-CON	OTT	Stick
PA72	Milford	MDN/NTN	10/29/2015	N-CON	OTT	Stick

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
PA83	Laurel Hill State Park	NTN	11/24/2015	ACM-type	Belfort	Tipping Bucket
PA98	Frances Slocum State Park	NTN	10/30/2015	ACM-type	Belfort	Stick
SD08	Cottonwood	NTN	8/6/2015	N-CON	OTT	N/A
SK20	Cactus Lake	NTN	7/14/2015	N-CON	ETI	N/A
SK21	Hudson Bay	NTN	7/16/2015	N-CON	ETI	Stick
TN11	Great Smoky Mountains National Park-Elkmont	MDN/NTN	11/3/2015	ACM-type	ETI	Belfort
TX22	Guadalupe Mnt. NP	NTN	4/15/2015	ACM-type	ETI	N/A
UT01	Logan	NTN	4/23/2015	N-CON	OTT	Stick
UT09	Canyonlands National Park-Island in the Sky	NTN	4/22/2015	ACM-type	ETI	N/A
UT98	Green River	NTN	4/22/2015	N-CON	OTT	N/A
UT99	Bryce Canyon National Park-Repeater Hill	NTN	4/25/2015	ACM-type	ETI	Other
WA03	Makah National Fish Hatchery	MDN	6/2/2015	ACM-type	Belfort	N/A
WA14	Olympic National Park-HOH Ranger Station	NTN	6/2/2015	ACM-type	ETI	Other
WA18	Seattle/NOAA	MDN	6/4/2015	ACM-type	ETI	Stick
WA19	North Cascades National Park-Marblemount Ranger Station	NTN	6/4/2015	N-CON	OTT	Other
WA21	La Grande	NTN	6/1/2015	ACM-type	ETI	N/A
WA24	Palouse Conservation Farm	NTN	6/8/2015	N-CON	OTT	Belfort
99WA/WA99	Mount Rainier National Park-Tahoma Washington	NTN	6/3/2015	N-CON/ ACM-type	ETI/ ETI	ETI/ ETI
WI07	Horicon Marsh	MDN	9/2/2015	N-CON	ETI	N/A
WI10	Potawatomi	MDN/NTN	9/1/2015	ACM-type	ETI	Belfort
WI31	Devil's Lake	MDN/NTN	9/2/2015	N-CON	ETI	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
WI99	Lake Geneva	MDN	9/12/2015	N-CON	ETI	Stick
WV05	Cedar Creek State Park	NTN	11/22/2015	ACM-type	ETI	N/A
WV18	Parsons	NTN	11/21/2015	ACM-type	ETI	Stick
WY00	Snowy Range	NTN	7/24/2015	ACM-type	ETI	N/A
WY02	Sinks Canyon	NTN	7/31/2015	ACM-type	ETI	Other
WY06	Pinedale	NTN	8/11/2015	ACM-type	NO	Tipping Bucket
WY94	Grand Tetons National Park	NTN	7/29/2015	N-CON	ETI	Tipping Bucket
WY95	Brooklyn Lake	NTN	7/24/2015	ACM-type	ETI	Other
WY97	South Pass City	NTN	7/31/2015	ACM-type	ETI	N/A
WY98	Gypsum Creek	NTN	7/30/2015	ACM-type	ETI	N/A

A total of 17 AMoN sites were included in the site surveys, and they are listed in Table 2-2. The 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 2015

Site ID	Survey Date	Site Name
CO98	7/7/2015	Rocky Mountain NP-Loch Vale
IL11	9/15/2015	Bondville
IN22	9/17/2015	Southwest Purdue Agriculture Center
KS97	9/24/2015	Kickapoo Tribe
MD08	11/24/2015	Piney Reservoir
MI51	8/27/2015	Unionville
NC25	3/20/2015	Coweeta
NC26	12/1/2015	Candor

Site ID	Survey Date	Site Name
NE98	4/30/2015	Santee
UT01	4/23/2015	Logan
UT09	4/22/2015	Canyonlands National Park-Island in the Sky
WA99	6/3/2015	Mount Rainier National Park-Tahoma Washington
WI07	9/2/2015	Horicon Marsh
WV05	11/22/2015	Cedar Creek State Park
WY06	8/11/2015	Pindale
WY94	7/29/2015	Grand Tetons National Park
WY95	7/24/2015	Brooklyn Lake

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 gage), status of supplies, site operator's performance, and other general information relating to the site. Once the evaluations (questionnaire) are completed, the information is entered into a relational database 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. Table 3.1 provides the maximum and minimum number of checks performed by network.

Table 3-1. Number of Items in Survey Questionnaire by Network and Equipment

Network	Equipment Present	Number of Fields Checked in Questionnaire
NTN	ACM, Belfort and backup gage	239
	N-CON, electronic raingage (no backup gage)	152
MDN	ACM, Belfort and backup gage	242
	N-CON, electronic raingage (no backup gage)	153
AIRMoN	ACM, electronic raingage and backup gage	213

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 3-2 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 3-2. Collector, Raingage and Siting Meeting Criteria

	Surveyed	Meeting all Assessments[2]	Percent Meeting all Assessment
Collectors	145	123	85%
Number of NTN ACM – type	66	56	85%
Number of MDN ACM – type	27	22	81%
Number of MDN N-CON	19	16	84%
Number of NTN N-CON	33	29	88%
Raingages	119	96	81%
Belfort Raingages	19	11	58%
Electronic Raingages	100	85	85%
Siting Criteria	145	17	12%
NTN Sites Meeting All Siting Criteria	96	12	13%
MDN Sites Meeting All Siting Criteria	46	5	11%
AIRMoN Sites Meeting All Siting Criteria	3	0	0%

All sites 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 impossible. As indicated in Table 3-2 this results in a low percentage of sites meeting all 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 since this would require multiple visits for every site in the program. However, summarizing this information allows any high number of

[2] Meeting all assessments "as found".

observed assessment failures to be quickly and easily identified. 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 3-3. Percent of Non-compliant Findings

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant
Sample Handling			
Is sampling media quality maintained?	145	3	2.1
Are samples stored and shipped properly	3	0	0.0
Siting Criteria Assessments			
Is the orifice of the collector +/- .3 m of raingage (elevation)	144	9	6.3
30 degree rule for buildings met (raingage)	120	0	0
No objects > 1 m height inside 5 m radius (raingage)	120	50	42
No fences > 1 m height inside 2 m radius (raingage)	120	13	11
No vegetation height > 0.6 m within 5 m radius (raingage)	120	27	23
Collector and sensor oriented properly	145	15	10
45 degree rule met (collector)	145	20	14
30 degree rule for trees met (collector)	145	43	30
30 degree rule for buildings met (collector)	145	0	0
No objects > 1 m height within 5 m radius (collector)	145	45	31
No fences > 1 m height inside 5 m radius (collector)	145	21	14
No vegetation height > 0.6 m within 5 m radius (collector)	145	33	23
No treated lumber inside 5 m radius (collector)	145	59	41
No galvanized metal inside 5 m radius collector (MDN)	46	12	26
No pastures and ag. activity within 20 m radius	145	19	13
No herbicides and fertilizers used within 20 m radius	145	11	7.6
Roads meet NADP siting criteria	145	5	3.4
Waterways meet NADP siting criteria	145	1	0.7
Airports meet NADP siting criteria	145	1	0.7
Animal operations meet NADP siting criteria (NTN and AIRMoN)	99	0	0.0
Combustion sources meet NADP siting criteria (MDN only)	46	0	0.0
Parking lots and maintenance areas meet NADP siting criteria	145	6	4.1
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	145	0	0.0
Metalworking operations meet NADP siting criteria (MDN only)	46	0	0.0

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant
ACM-type Collector Assessments			
Dry side bucket is clean (NTN and AIRMoN)	66	10	15
Dry side bag installed correctly (MDN)	27	0	0.0
Does lid seal properly	93	1	1.1
Lid liner in good condition	93	1	1.1
Fan in good condition (MDN)	27	3	11
Cooling fan thermostat in good condition (MDN)	27	0	0.0
Heater in good condition (MDN)	27	0	0.0
Heater thermostat in good condition (MDN)	27	0	0.0
Has flush wall filter mount been installed (MDN)	23	0	0.0
Filter in good condition (MDN)	23	0	0.0
Max / min thermometer within acceptable limits (MDN)	27	0	0.0
ACM sensor operates properly	93	4	4.3
Motor-box operates within acceptable limits	93	2	2.2
N-CON Collector Assessments			
N-CON fan in good condition (MDN)	19	1	5.3
N-CON cooling fan thermostat in good condition (MDN)	19	1	5.3
N-CON heater in good condition (MDN)	19	0	0.0
N-CON heater thermostat in good condition (MDN)	19	0	0.0
N-CON max / min thermometer in acceptable limits (MDN)	19	1	5.3
N-CON sensor respond to a 5 passes	52	0	0.0
N-CON lid seals properly	52	2	3.8
N-CON lid liner in good condition	52	2	3.8
Belfort Raingage Assessments			
Was the 'as found' turn-over set properly	19	8	42.1
Electronic Raingage Assessments			
Raingage operates properly (electronic gage)	101	2	2.0
Does datalogger receive event signals form all collectors (electronic gage)	98	8	8.6
Does optical sensor respond to "blocking" of light beam (ETI)	66	4	6.1
Does optical sensor respond to mist of water (ETI)	62	6	9.7

Tables B-1 through B-5 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 within the 5 meter radius of the raingage and/or collector, and 30 degree tree guidance violations for collectors followed by treated lumber near the collector. The other most prevalent issues are the calibration and turn-over adjustment of the Belfort gage.

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 would be shorter, in the middle of the growing season it would be taller. Therefore this assessment is not very useful for trend evaluation. It is also worthwhile to consider some recent 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"):

- NC26-MDN was operational once again, with new equipment and farther from the CASTNET shelter.
- WA21-NTN was relocated and the new location is about 3000 feet from the previous location.

The sites included in Table 3-4 were surveyed by EEMS for the first time during this reporting period:

Table 3-4. Sites Surveyed by EEMS for the First Time

Site ID	Network	Site Name
AK04	MDN	Nome
AL19	MDN/NTN	Birmingham
BC16	MDN	Saturna Island
BC22	NTN	Haul Road Station
BC23	NTN	Lakelse Lake
BC24	NTN	Port Edward
CO09	NTN	Kawaneechee Meadow
FL96	MDN/NTN	Pensacola
IL63	MDN	Dixon Springs Agricultural Center
IN22	MDN	Southwest Purdue Agriculture Center
KS97	NTN	Kickapoo Tribe
MI09	MDN	Douglas Lake
MI26	MDN	Kellogg Biological Station
MN06	MDN	Leech Lake
NC17	MDN/NTN	University Research Farm
NE98	MDN	Santee
NJ39	NTN	Cattus Island
NY28	NTN	Piesco Lake
NY59	NTN	Wanakena
NY92	NTN	Amherst
NY93	NTN	Paul Smith's
OH52	MDN	South Bass Island
PA18	MDN	Young Woman's Creek
PA52	NTN	Little Pine State Park
SK21	NTN	Hudson Bay
WI07	MDN	Horicon Marsh
WI31	NTN	Devil's Lake

3.2 Survey Results for Sites with Second or Third Survey Visits

One hundred and thirteen (113) of the 145 sites surveyed in 2015 had been previously visited by EEMS. Most of these sites have been visited three times. 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 3-5. The percentages presented in

this table are based on the 113 sites that were previously surveyed, and do not include those sites where a network was added recently and had not previously been surveyed. For those sites with more than two surveys, only the last two visits were considered (i.e., survey conducted in 2015 and 2012, but not the survey conducted in 2009).

Table 3-5. Percent of Non-compliant Items for Sites Surveyed More than Once

Siting and Performance Checks	% Non-compliant During 2015	% Non- compliant During Previous Survey
Is sampling media quality maintained?	1.8%	0.0%
Is the orifice of the collector +/- .3 m of raingage (elevation)	4.4%	8.0%
No objects > 1 m height inside 5 m radius (raingage)	37%	36%
No fences > 1 m height inside 2 m radius (raingage)	8.0%	6.0%
No vegetation height > 0.6 m within 5 m radius (raingage)	24%	18%
If raingage wind shield present, is it installed correctly?	18%	16%
Collector and sensor oriented properly	6.2%	5.3%
45 degree rule met (collector)	13%	12%
30 degree rule for trees met (collector)	33%	31%
No objects > 1 m height within 5 m radius (collector)	27%	26%
No fences > 1 m height inside 5 m radius (collector)	12%	13%
No vegetation height > 0.6 m within 5 m radius (collector)	25%	20%
No treated lumber inside 5 m radius (collector)	40%	17%
No galvanized metal inside 5 m radius collector (MDN)	22%	9.4%
No pastures and ag. activity within 20 m radius	16%	16%
No herbicides and fertilizers used within 20 m radius	7.1%	6.2%
Roads meet NADP siting criteria	1.8%	0.9%
Airports meet NADP siting criteria	0.9%	0.9%
Parking lots and maintenance areas meet NADP siting criteria	2.7%	6.2%
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	0.0%	0.9%

Siting and Performance Checks	**% Non-compliant During 2015**	**% Non- compliant During Previous Survey**
Dry side bucket is clean	11%	1.4%
Does lid seal properly	1.2%	2.1%
Lid liner in good condition	1.2%	2.1%
Fan in good condition	10%	0.0%
Heater in good condition	0.0%	0.0%
Has flush wall filter mount been installed	10%	13%
Filter in good condition	19%	8.3%
Max / min thermometer in acceptable limits	0.0%	13%
ACM sensor operates properly	3.6%	4.3%
Motorbox operates within acceptable limits	2.4%	1.1%
N-CON lid seals properly	6.7%	0.0%
N-CON lid liner in good condition	6.7%	0.0%
N-CON cooling fan thermostat in good condition	9.1%	0.0%
N-CON max / min thermometer in acceptable limits	9.1%	0.0%
Was the 'as found' turn over set properly (Belfort gage)	41%	65%
Raingage operates properly (electronic gage)	2.5%	2.7%
Does datalogger receive event signals form all collectors (electronic gage)	9.0%	2.9%
Does optical sensor respond to "blocking" of light beam (electronic gage)	7.5%	4.2%
Does optical sensor respond to mist of water (electronic gage)	2.0%	4.1%

Table 3-5 suggests that an overall improvement to siting criteria and performance checks was not observed for sites that were re-visited in 2015.

However there are two items (treated lumber and galvanized metal) that 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.

Closer investigation of the other results in Table 3-5 reveals that many of these changes relate to the installation of new equipment at some of these sites. Eleven N-CON collectors were installed at the sites considered here between the two surveys and six Belfort raingages were replaced with electronic raingages. This resulted in changes to the observed siting criteria following the changes to the site equipment. In addition to equipment changes, review of photos of the sites which reported a violation in the 45 degree rule for collectors in the most recent survey indicate that vegetation growth may have contributed to the increase in this percentage.

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 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 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 may be unlikely.

In general, review of data from repeat survey visits indicate that there may be a slight trend toward site operation improvement, but whether it is significant in terms of sample quality improvement is difficult to determine since all parameters do not have the same impact on actual sample quality. It can be seen from repeat site survey visits that some site operators and supervisors make an effort to improve site conditions with respect to siting criteria. The NADP PO may want to consider some type of recognition for those operators and supervisors.

3.3 Findings Related to the Wind Shield at Sites Surveyed

Data provided by the NADP PO indicate that raingages located at elevations greater than 1000 meters are encouraged to have a wind shield installed, as well as at sites where more than 20 percent of the annual precipitation is frozen. Table 3-6 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. Sixty three of the 74 raingages identified as meeting the criteria for windshield in 2015 were found to have shields installed. During the survey performed in 2013, AZ03 had an Alter-type shield which was removed between the two surveys. At WY06 mounting the shield to the ground and not the gage base was discussed with the site operator.

Table 3-6. Status of Surveyed Sites Requiring Raingage Shields

Site ID	Network	Condition in 2015	Previous Survey
AB13	MDN	Installed	Installed
AB14	MDN	Installed	Installed
AK02	NTN	Installed	Installed
AK04	MDN	Not present	--
AZ03	NTN	Not present	Installed
BC22	NTN	Installed	--
BC23	NTN	Installed	--
BC24	NTN	Installed	--
CO00	NTN	Installed	Installed
CO01	NTN	Installed	Installed
CO02	NTN	Installed	Installed
CO08	NTN	Installed	Installed
CO09	NTN	Installed	--
CO21	NTN	Not present	Not present
CO22	NTN	Installed	Installed
CO90	NTN	Installed	Installed
CO91	NTN	Installed	Installed
CO92	NTN	Installed	Installed
CO94	NTN	Installed	Installed
MN27	MDN/NTN	Installed	Installed
MN98	MDN	Installed	Installed
MT96	NTN	Not present	Not present
MT98	NTN	Not present	Not present
NE15	MDN/NTN	Installed	Installed
NE98	MDN	Installed	--
NE99	NTN	Not present	Not present
NV02	MDN	Not present	Not present
NV03	NTN	Installed	Installed
NV05	NTN	Installed	Installed
NV99	MDN	Not present	Not present
NY22	NTN	Installed	Installed
NY28	NTN	Installed	--
NY59	NTN	Installed	--
NY92	NTN	Installed	--
NY93	NTN	Installed	--
PA52	MDN/NTN	Not present	Not present
SD08	NTN	Installed	Installed
SK20	NTN	Installed	Installed

Site ID	Network	Condition in 2015	Previous Survey
CO96	MDN/NTN	Installed	Installed
CO98	NTN	Installed	Installed
CO99	MDN/NTN	Installed	Installed
IN34	MDN/NTN	Installed	Installed
KS32	MDN/NTN	Installed	Installed
KS97	NTN	Installed	--
MD08	MDN/NTN	Installed	Installed
ME02	MDN/NTN	Installed	Installed
ME08	NTN	Installed	Installed
ME09	MDN/NTN	Installed	Installed
ME96	MDN/NTN	Installed	Installed
MI09	MDN/NTN	Installed	Installed
MI26	MDN/NTN	Installed	Installed
MI48	MDN/NTN	Installed	Installed
MI51	NTN	Installed	Installed
MI53	NTN	Installed	Installed
MI98	NTN	Installed	Installed
MN01	NTN	Installed	Not present

Site ID	Network	Condition in 2015	Previous Survey
SK21	NTN	Installed	--
UT01	NTN	Installed	Installed
UT09	NTN	Not present	Not present
UT98	NTN	Not present	Not present
UT99	NTN	Installed	Installed
WA24	NTN	Installed	Installed
WI07	MDN	Installed	--
WI10	MDN/NTN	Installed	Installed
WI31	MDN/NTN	Installed	Installed
WI99	MDN	Installed	Installed
WV18	NTN	Installed	Installed
WY00	NTN	Installed	Installed
WY02	NTN	Installed	Installed
WY06	NTN	Improperly installed	Installed
WY94	NTN	Installed	Installed
WY95	NTN	Installed	Installed
WY97	NTN	Installed	Installed
WY98	NTN	Installed	Installed

-- Indicates site not previously surveyed by EEMS.

4.0 Field Site Survey Results

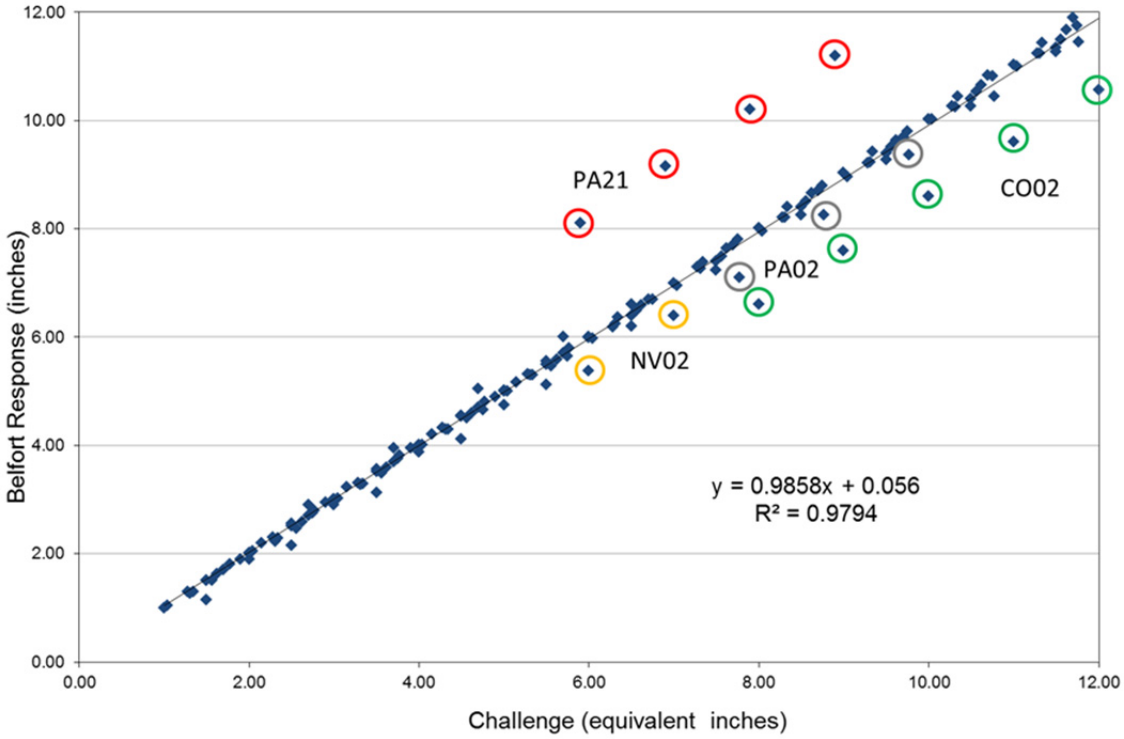
This section summarizes the quantifiable survey data relating to raingage accuracy tests and ACM collector sensor heater performance.

4.1 Belfort Raingage Accuracy

Figure 4-1 presents the "as found" Belfort raingage accuracy results for the Belfort raingages[3] encountered during the period covered by this report. At co-located sites the same raingage measures precipitation data for more than one network (i.e. MDN and NTN). Data presented here represent precipitation data as a whole, and is not related to any one network of NADP.

Overall program-wide Belfort raingage accuracy was found to be very good. A relatively few number of sites were not performing well and are easily identifiable in Figure 4-1.

Figure 4-1. As Found Belfort Accuracy - Eighteen Raingages



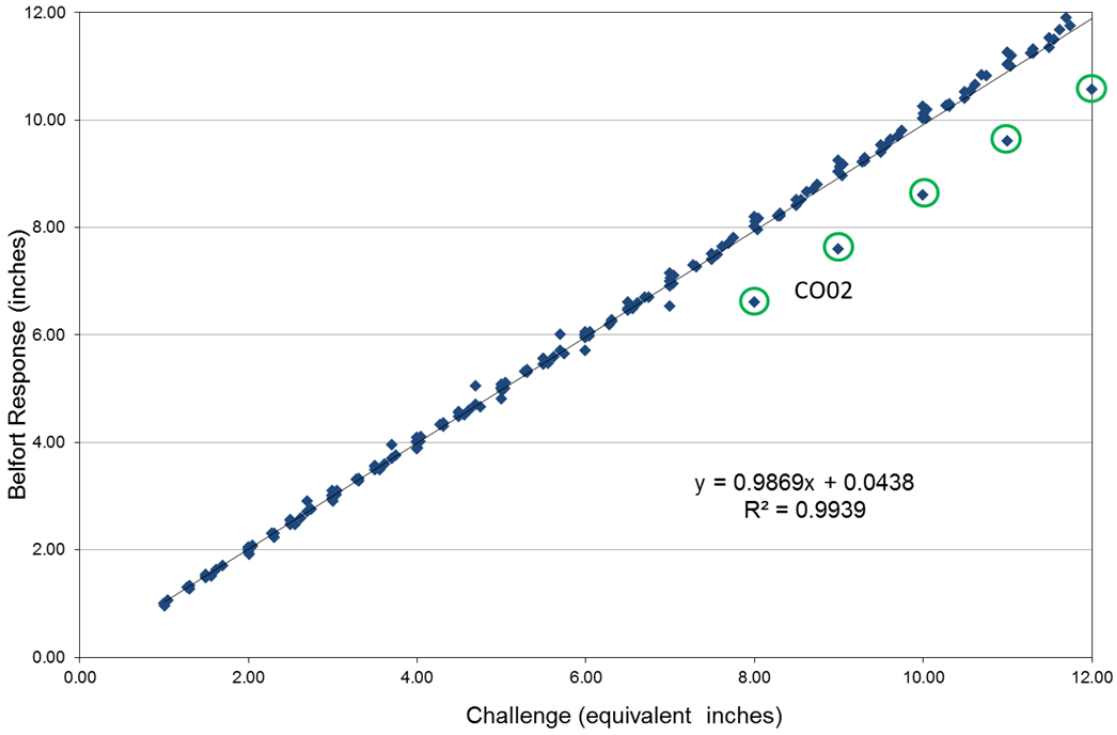
Of the four raingages highlighted in Figure 4-1, the raingages at PA21, PA02 and NV02 were adjusted which improved the overall performance of the raingages as can be seen in Figure 4-2.

[3] The accuracy of the Belfort raingage at FL32 could not be evaluated "as found", thus the 18 raingages instead of the 19 Belfort raingages encountered during the 2015 surveys.

The raingage at CO02 was not adjusted. This is a very windy site and for this reason the zero is set at one inch to prevent the pen from getting stuck under the drum. The raingage responded well to the first five inches of rain. The recommendation made by the survey team member is to replace the raingage.

Figure 4-2 presents the "as left" Belfort raingage accuracy results for all raingages encountered following any adjustments or improvements to the operation. Adjustments include leveling, cleaning, adjusting linkage, and calibration. Of the nineteen Belfort raingages encountered, eight raingages required some type of adjustment. There is a noticeable decrease in accuracy observed in points above six inches in Figure 4-1. This is mostly attributed to improper raingage turnover which is discussed in Section 6.0 of this report.

Figure 4-2. As Left Belfort Accuracy - Nineteen Raingages



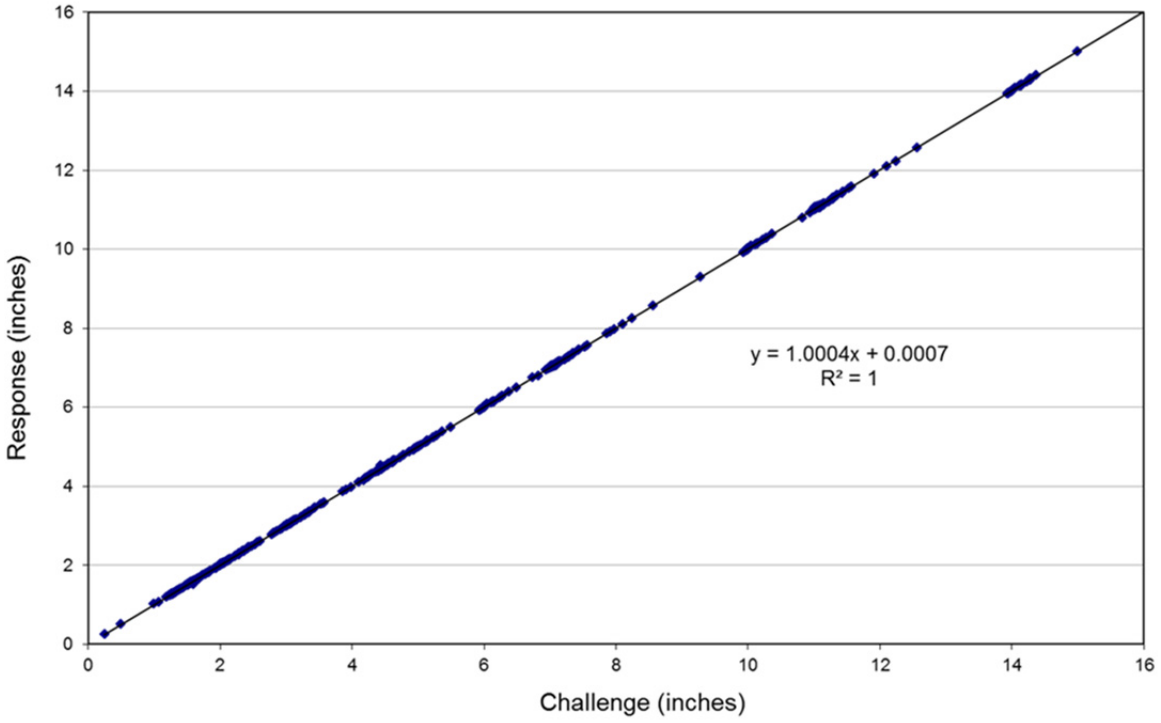
4.2 Electronic Raingage Accuracy

The results of the accuracy tests for the 99 electronic raingages[4] challenged during the period covered by this report are presented in Figure 4-3.

[4] The raingage at site PA52 was not operational during the site survey, so only data from the 99 of the 100 electronic gages were plotted.

As demonstrated the raingages report the weight of the standards added very accurately for the entire span. No problems with the electronic raingages were encountered. The only notable problem with the electronic raingage operation is related to the Personal Digital Assistant (PDA) and the required interfacing software. This is discussed further in Section 5.0.

Figure 4-3. As Found Electronic Raingage Accuracy - 99 Raingages



4.3 Sensor Heater Tests

The ACM type collectors used throughout the networks of the NADP utilize a contact grid 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 4-4. The results indicate that most sensor heaters were functioning properly. The sensors for CO99-MDN, CO96-NTN, and ME02-NTN exhibited a temperature that is unusually high for the ambient conditions. It is possible that the sensor had been activated prior to the test or the sensor was not shaded for a long enough period of time prior to the test. The data were reviewed, but no comments were provided by the survey team member. The sensor at NY22-NTN was found faulty and a replacement was requested.

Figure 4-4. Inactivated Sensor Temperature

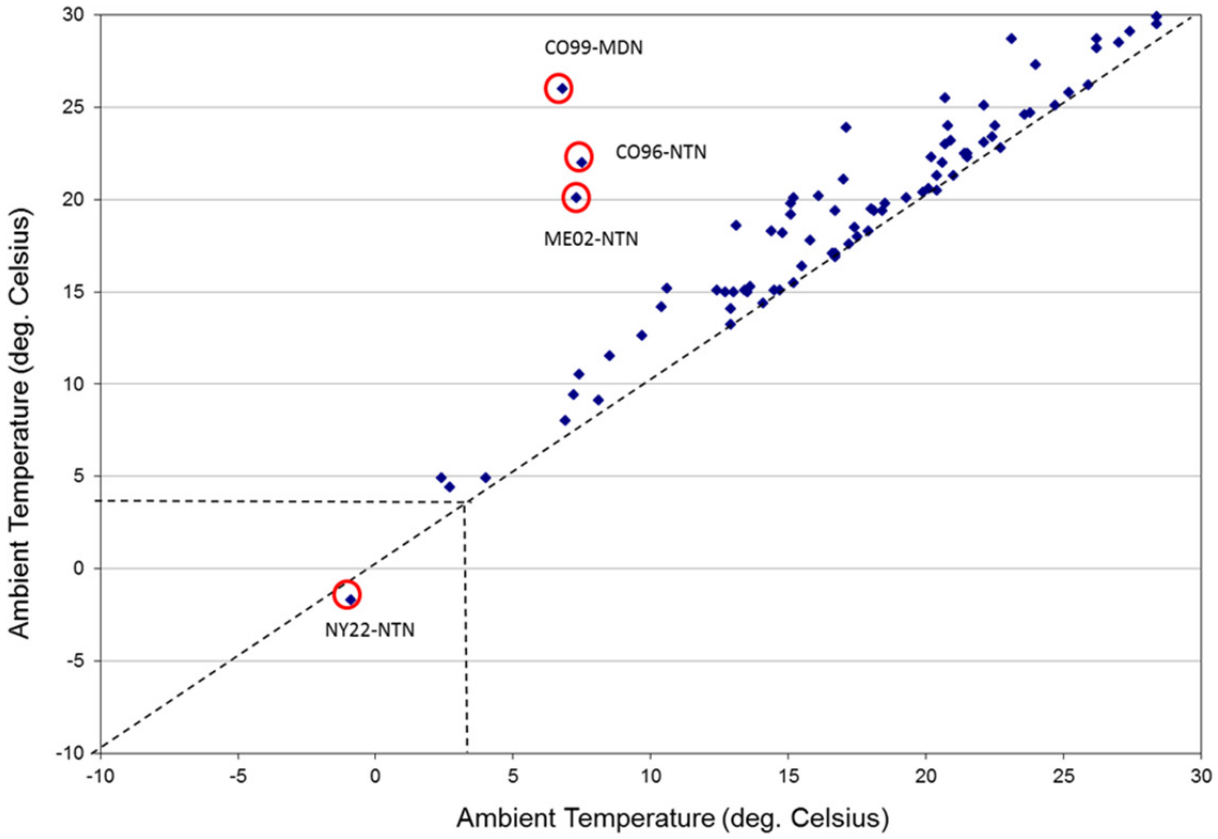
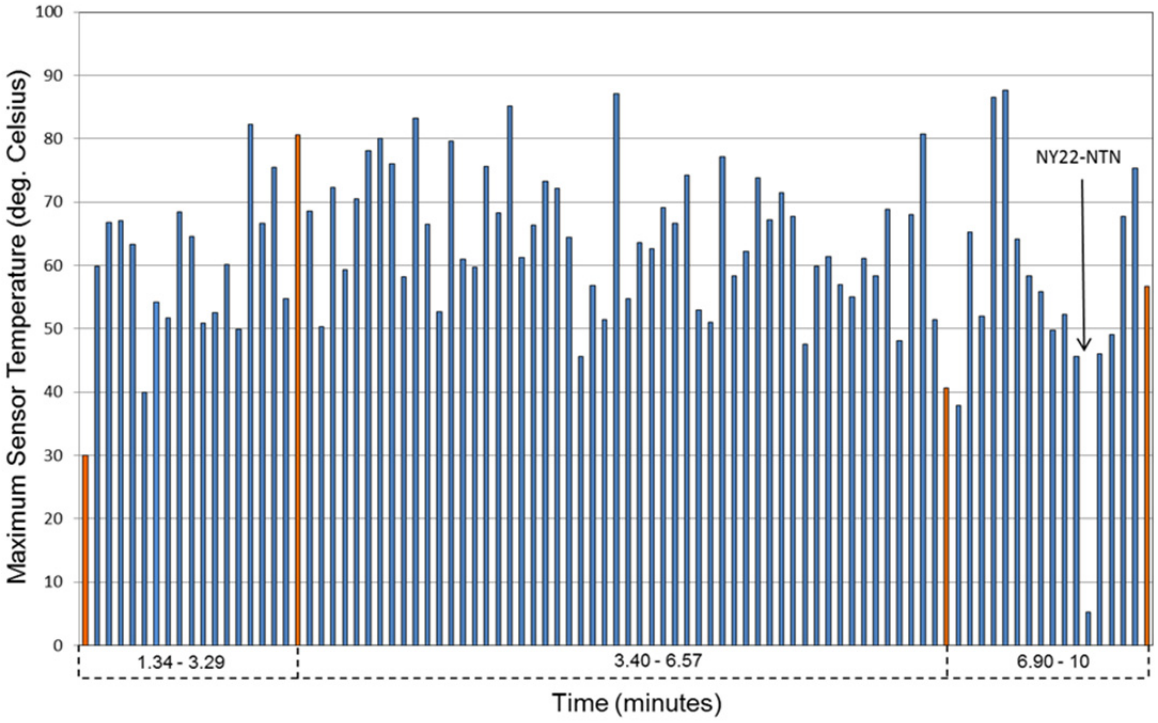


Figure 4-5 presents the maximum temperature reached by each sensor when activated, and the time required for each sensor to reach that temperature. There is some variability between sensors for maximum temperature, but nearly all sensors are between 60˚C and 80˚C within 10 minutes of activation. A few sensors did not reach 50˚C, however that could be due to low ambient temperature or high wind speed during the test.

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



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

Table 4-1. Number of Activated Sensors for Each Temperature Range

Temperature Range	Number of Sensors
< 30.0 °C	1
30.0° to 40.0 °C	3
40.1° to 50.0 °C	9
50.1° to 60.0 °C	27
60.1° to 70.0 °C	28
70.1° to 80.0 °C	14
80.1° to 90.0 °C	9
> 90.1° C	0

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.

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.

Additional criteria regarding pressure treated wood within 5 meters and galvanized metal within 5 meters (MDN) should also be investigated to determine effect on sample quality. If it is determined that there is a negative impact from these materials being present within the 5 meter radius of the collector, the criteria should establish an amount of the material (surface area estimate) that can be used as a threshold to flag collectors that are above the criteria. Or it may be beneficial to evaluate the possibility for splash from the surface of the material to enter the sample train. The current criteria are "any materials" which could be interpreted as the heads of nails, or the pipe that the collector is mounted on and clearly those items are not likely to impact data quality.

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

The networks continue to benefit from the recent implementation of the online training sessions offered by both the CAL and the HAL. It was also observed during the site surveys that site operators were generally aware of schedule and agenda of the webinars. Although EEMS does not track attendance of the online training sessions, it may be beneficial to identify site operators and supervisors who have not participated in any webinars during each year and encourage those individuals to participate.

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 site is provided here: http://nadp.isws.illinois.edu/. This process should continue and be a high priority for the CAL, HAL and PO. This 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. The NADP website is a valuable tool for providing both data and documentation for data users, but it is sometimes not utilized by site operation personnel. Links to site operator procedures, tools, and training material should be available and more easily identified through the NADP PO website (http://nadp.isws.illinois.edu.)

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 Belfort Raingage

Nineteen Belfort raingages were surveyed during this reporting period. As indicated in Section 4.1, most were found to be operating very well. The same few problems that have been observed in previous years were still evident but limited due to the relatively small number of raingages encountered. Those problems continue to be related to routine maintenance of the raingages, especially improper pen turnover. However, this may not substantially impact data quality since operation of the raingage for the first 6" of the gage output is generally unaffected. However as

noted in previous reports, the turnover issue could be still be problematic depending on the amount of antifreeze being used for winterization of the gage.

5.2.2 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).

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.

5.2.3 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 the opinion of EEMS that the sealed surface of the second chimney presents a splash surface that likely affects sample catch and sample quality. It is suggested that all MDN collectors have the original “approved” configuration restored, or some alternative (repair or procedure) that can be approved as a modification to the collector.

5.2.4 N-CON MDN Heaters

New instruments and equipment used by NADP have been added over the years following extensive testing and approval by the subcommittees and the Executive Committee. 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. Site survey data have been collected that indicate most N-CON MDN collectors have heated chimneys. Several sites in Pennsylvania and other cold climate states (MT, ME) have been added to the NADP recently that could benefit from the addition of heated chimneys. It is recommended that climate be considered, and that MDN sites are prioritized to receive the heater upgrade. Additional survey data will be collected to include whether or not the heaters are passive, or have been modified to include the circulating fan.

5.2.5 N-CON NTN Single 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 DC operation.

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

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.

5.2.6 Electronic Raingage and PDA

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.

PDA and Thumb Drives

EEMS is aware that software development and testing requires time. Also the introduction of new electronic devices sometimes renders the older devices obsolete including PDA. 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 phone 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.

The efforts to standardize and improve the PDA operation should continue even though new raingage installations have required new methods of data collection and transfer. Since the PDAs have been used for a significant period at numerous stations, it is suggested that the PDA documentation include detailed references to the various versions of both hardware and software.

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 website where station precipitation data are posted is an excellent tool, but is not widely used by the site operators who are often busy when they return from the field and are no longer focused on the operation of the equipment. It is suggested that the website tool continue to be developed with some automatic data screening functions that can help to alert personnel at the CAL and site operators of potential equipment problems since the ability to interrogate equipment operation is limited at site without PDA communication.

The data logger date and time are routinely checked and documented at sites with electronic raingages. Beginning in 2016 EEMS will be setting the clocks in the data loggers to GMT when the time is observed to be greater than one minute from GMT.

5.2.7 General Maintenance

Several sites were observed to have equipment that was in need of general housekeeping maintenance. Most cases included the infestation of pests. It has been observed that since the installation of electronic raingages, most site operators don't open the gage. It is suggested that at least twice per year the raingage be opened and cleaned to help prevent damage that might be caused by pests making homes in the raingages. This could be performed when the raingage is winterized and again in the spring.

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 and AIRMoN samples, results of the pH and conductivity measurements at AIRMoN sites, 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
AK02	Ohaus Champ SQ	0.10%
AZ03	Ohaus 1119D	0.03%
BC24	Adam Equipment GBC35A	-0.02%
CO01	Ohaus 1119D	-0.09%
CO08	Ohaus 1119D	-0.02%
CO21	Ohaus 1119D	-0.08%
CO90/CO94	Ohaus 1119D	-0.07%
CO92	Ohaus 1119D	0.02%
CO98	Sartorius CPA6202P	-0.02%
DE02	Unknown	-0.01%

Site Id	Scale Type	Average % Difference
AL19	Unknown	0.08%
BC22/BC23	Denver S-8001	-0.16%
CO00	Ohaus 1119D	-0.06%
CO02	Ohaus 1119D	-0.07%
CO09	Electronic	-0.08%
CO22	Sartorius LC4800	0.00%
CO91	Ohaus 1119D	-0.09%
CO96	Sartorius EA15DCE-1	0.33%
CO99	Uline H1653	0.10%
FL32	Sartorius EA-15-DCE-1	-0.01%

Site Id	Scale Type	Average % Difference
FL96	Ohaus Valor 5000	0.13%
IL11/11IL	Ohaus B5000	-0.04%
IL63	Ohaus 1119D	-0.06%
IN34	Ohaus 1119D	-0.07%
MD08	Unknown	0.03%
MD15	Ohaus IP15KS	0.07%
ME02	Ohaus 1119D	0.03%
ME09	Ohaus 1900	0.04%
MI09	Mettler PM 30	-0.01%
MI48	Ohaus 1119D	-0.04%
MI53	Ohaus 1119D	0.13%
MN01	And EK-12KA	0.03%
MT96	Ohaus 1119D	0.01%
NC17	Unknown	0.04%
NE15	Ohaus 1119D	-0.03%
NJ00	Acculab VA1600	0.07%
NV03	Ohaus 1119D	-0.02%
NY22	Ohaus I-10	-0.03%
NY59	Unknown	-0.09%
NY93	Unknown	0.00%
PA02*	Sartorius 1264 MP	0.01%
SD08	Ohaus 1119D	-0.08%
SK21	OXO Electronic	0.02%
TX22	Ohaus 1119D	-0.05%
UT09	Ohaus 1119D	-0.07%
UT99	Ohaus 1119D	0.10%
WA19	Ohaus 1119D	-0.12%
WA24	Ohaus 1119D	-0.08%
WI10	Ohaus 1119D	-0.12%
WV05	Ohaus 1119D	0.10%
WY00/WY95	DNVR Ins DI-8K	0.00%
WY06/WY98	Ohaus 1119D	-0.02%

Site Id	Scale Type	Average % Difference
IA23	Ohaus 1119D	-0.05%
IL18	Ohaus 1119D	-0.03%
IL78	Ohaus 1119D	-0.03%
KS32	Ohaus 1119D	0.03%
MD13	Mettler PM6100	-0.06%
MD18	Ohaus 1119D	-0.11%
ME08	Ohaus 1119D	-0.11%
ME96	Ohaus Voyager	0.00%
MI26	Mettler PE16	0.00%
MI51	Ohaus 1119D	-0.07%
MI98	Ohaus 1119D	0.03%
MN27	Sauter E/49-ED2	0.25%
MT98	Ohaus 1119D	-0.02%
NC25	Sartorius F61SKR-B	0.00%
NE99	Ohaus 1119D	-0.22%
NJ39/NJ99	Ohaus 1119D	-0.29%
NV05	Ohaus 1119D	-0.23%
NY28	Adam CBRIaH	-0.09%
NY92	Unknown	-0.10%
OH17	Pitney B A570	0.10%
PA72	Ohaus 1119D	-0.06%
SK20	OXO Electronic	-0.06%
TN11	Ohaus 1119D	-0.16%
UT01	Sartorius EA15DCE	0.01%
UT98	Ohaus 1119D	-0.14%
WA14	Ohaus 1119D	-0.06%
WA21	Ohaus 1119D	0.05%
WA99/99WA	Ohaus 1119D	-0.12%
WI31	Unknown	-0.02%
WV18	Mettler PM30	0.05%
WY02/WY97	Ohaus 1119D	0.03%
WY94	Unknown	-0.10%

* The scale used for PA02 is also used for PA21, PA52, PA71, PA83, and PA98

6.2 pH and Conductivity Measurements

This subsection presents the results of the field chemistry evaluations performed at the AIRMoN site surveyed during this reporting period.

In order to evaluate the pH and conductivity measurements performed in the field by the site operators, a sample of simulated rain was obtained from the PO. Prior to each AIRMoN site survey the NADP PO Quality Assurance Manager provided the survey team with in-house prepared simulated rain. The pH comparisons are presented in Table 6-2 and the conductivity comparisons are shown in Table 6-3.

The site operators of the AIRMoN sites surveyed demonstrate good technique while performing chemistry measurements. Probe and meter calibrations were performed prior to making the field measurements and sample temperature stabilization was maintained as well as possible.

Table 6-2. Difference in pH Readings between Target and Measured Values

Site Id	Network	pH Target Value	Response	Difference
11IL	AIRMoN	4.87 ± 0.09	4.85	0.02
DE02	AIRMoN	4.87 ± 0.09	4.72	0.15
IL11	AIRMoN	4.87 ± 0.09	4.85	0.02

Table 6-3. Difference in Conductivity Readings between Target and Measured Values

Site Id	Network	Conductivity Target Value	Response	Difference
11IL	AIRMoN	9.9 ± 0.6	8.8	1.1
DE02	AIRMoN	9.9 ± 0.6	10.7	-0.8
IL11	AIRMoN	9.9 ± 0.6	8.8	1.1

6.3 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 securing the sample bottle 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 recommended procedures were emphasized during the surveys. It is suggested that the recommended procedures, especially those observed to have been lax in the field, also be stressed during the MDN sample change-out webinars.

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.

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. This is usually accomplished at site IL11 since that site operates all NADP networks and allows the greatest exchange of information and methods among the team members. The location of site IL11 also allows the CAL and NADP PO to observe and participate with the exchange of information and techniques to ultimately improve the site survey methods. This activity was performed in September of 2015.

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

the webinars offered . This provides EEMS with a means to stay current with procedures and changes to site equipment. It also allows 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.

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. As cases are discovered during review of the survey reports, additional clarification is requested from the NADP QA Manager regarding the intent of the question. This information is then shared with the survey team members to eliminate confusion and maintain consistency. Subsequent versions of the questionnaire and database have been designed as described briefly in previous sections of this report. It is anticipated that changes to the questionnaire will be much easier to implement with the revised database.
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.

The data indicates that of the 48,672 entries that are compared (does not include memo fields), the entry error rate is about 0.5% with approximately the twice as many errors found in the field entry than in the office entry.

Table 7-1. 2015 Internal QA Results for Duplicate Entry Errors

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	26,589	26,589	53,178
Initial File Entry Errors	133		
Duplicate QA Entry Errors		59	
Percent Errors	0.50%	0.22%	
Total Entry Errors	192		
Total Percent Errors	0.36%		

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 D.

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 of treated lumber inside 5 m radius (collector)	✓	✓	✓
No of galvanized metal inside 5 m radius collector (MDN)	N/A	✓	N/A
No pastures and ag. activity within 20 m radius (NTN/AIRMoN)	✓	✓	✓
No herbicides and fertilizers used within 20 m radius (NTN AIRMoN)	✓	✓	✓
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 seals properly	✓	✓	✓
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)	✓	✓	✓
Does the stick measure within tolerances (.01") (NWS stick gage)	✓	✓	✓

N/A= Not applicable

APPENDIX B

Findings Most Likely to Impact Data Quality

Table B-1. Findings Most Likely to Impact Data Quality – MDN Sites with ACM-type Collector (page 1 of 2)

StationId	AB13	AB14	CO99	IL11	IL63	IN21	IN22	IN34	MD08	ME02	ME09	ME96	MI09	MI26
Is sampling media quality maintained?					X									
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)				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					X			
30 degree rule for buildings met (collector)														
No objects > 1 m height within 5 m radius (collector)				X	X	X								
No fences > 1 m height inside 5 m radius (collector)														
No vegetation height > 0.6 m within 5 m radius (collector)				X				X	X					
No treated lumber inside 5 m radius (collector)	X			X		X		X		X	X	X	X	
No galvanized metal inside 5 m radius collector (MDN)		X				X								
No pastures and ag. activity within 20 m radius		X			X							X		
No herbicides and fertilizers used within 20 m radius		X												
Roads meet NADP siting criteria														
Waterways meet NADP siting criteria														
Airports meet NADP siting criteria														
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														
Does lid seal properly														
Lid liner in good condition														
Fan in good condition			X							X				
Cooling fan thermostat in good condition														
Heater in good condition														
Heater thermostat in good condition														
Has flush wall filter mount been installed			X						X				X	X
Filter in good condition			--	--					--			--	--	--
Max / min thermometer in acceptable limits														
ACM sensor operates properly	X				X									
Motorbox operates within acceptable limits	X													
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)	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-1. Findings Most Likely to Impact Data Quality – MDN Sites with ACM-type Collector (page 2 of 2)

StationId	MI48	MN06	MN27	MN98	NJ30	NV02	NV99	OH02	OH52	TN11	WA03	WA18	WI10
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)									U to T				
30 degree rule for buildings met (raingage)													
No objects > 1 m height inside 5 m radius (raingage)		X			X							X	
No fences > 1 m height inside 2 m radius (raingage)							X						
No vegetation height > 0.6 m within 5 m radius (raingage)													
Does NADP require a raingage wind shield at this site?		X			X	X			X	X	X	X	
If raingage wind shield present, is it installed correctly?		--			--	--	--		--	--	--	--	
Collector and sensor oriented properly													
45 degree rule met (collector)		X						X	X	X			
30 degree rule for trees met (collector)									X	X			
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)		X											
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	X		X	X			X					X
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					X								
Waterways meet NADP siting criteria													
Airports meet NADP siting criteria				X									
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			--										
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													
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)		--				--	--		--		--		
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 B-2. Findings Most Likely to Impact Data Quality – MDN Sites with N-CON Type Collector (page 1 of 2)

StationId	AK04	AL19	BC16	CO96	FL96	KS32	NC17	NC26	NE15	NE25
Is sampling media quality maintained?										X
Is the orifice of the collector +/- .3 m of raingage (elevation)	X		X							
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)	X	X			X	X		X		X
No fences > 1 m height inside 2 m radius (raingage)	X				X					
No vegetation height > 0.6 m within 5 m radius (raingage)										
Collector and sensor oriented properly	X				X			X		
45 degree rule met (collector)	X									
30 degree rule for trees met (collector)				X						
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X	X	X		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	X			X					
No galvanized metal inside 5 m radius collector (MDN)	X	X	X	X	X	X				X
No pastures and ag. activity within 20 m radius									X	X
No herbicides and fertilizers used within 20 m radius					X					X
Roads meet NADP siting criteria					X					
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Combustion sources meet NADP siting criteria (MDN only)										
Parking lots and maintenance areas meet NADP siting criteria	X									
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Metalworking operations meet NADP siting criteria (MDN only)										
N-CON fan in good condition									X	
N-CON cooling fan thermostat in good condition						X				
N-CON heater in good condition										
N-CON heater thermostat in good condition										
N-CON max / min thermometer in acceptable limits										X
N-CON 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)		X		X						
Does optical sensor respond to "blocking" of light beam (electronic gage)		U to T			U to T	--				U to T
Does optical sensor respond to mist of water (electronic gage)		U to T			U to T	--	U to T	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 B-2. Findings Most Likely to Impact Data Quality – MDN Sites with N-CON Type Collector (page 2 of 2)

StationId	NE98	PA18	PA21	PA37	PA52	PA72	WI07	WI31	WI99
Is sampling media quality maintained?									
Is the orifice of the collector +/- .3 m of raingage (elevation)									
30 degree rule for buildings met (raingage)									
No objects > 1 m height inside 5 m radius (raingage)	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
Does NADP require a raingage wind shield at this site?		X	X	X	X	X			
If raingage wind shield present, is it installed correctly?		--	--	--	--	--			
Collector and sensor oriented properly								X	X
45 degree rule met (collector)		X	X			X			
30 degree rule for trees met (collector)		X	X	X		X		X	X
30 degree rule for buildings met (collector)									
No objects > 1 m height within 5 m radius (collector)	X				X				
No fences > 1 m height inside 5 m radius (collector)									
No vegetation height > 0.6 m within 5 m radius (collector)					X		X	X	X
No treated lumber inside 5 m radius (collector)							X	X	
No 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)									
N-CON fan in good condition									
N-CON cooling fan thermostat in good condition									
N-CON heater in good condition									
N-CON heater thermostat in good condition									
N-CON max / min thermometer in acceptable limits									
N-CON sensor responds to a 20-second mist of water									
N-CON lid seal in good condition									
N-CON lid liner in good condition									
Was the 'as found' turn over set properly (Belfort gage)	--	--	--	--	--	X	--	--	
Raingage operates properly (electronic gage)			--		X				
Does datalogger receive event signals form all collectors (electronic gage)			--						
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-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector (page 1 of 5)

StationId	AZ03	CO02	CO08	CO09	CO21	CO22	CO90	CO91	CO92	CO94	CO96	CO98	FL32
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)		X		X				X		X			X
30 degree rule for buildings met (raingage)													
No objects > 1 m height inside 5 m radius (raingage)		X						X		X			
No fences > 1 m height inside 2 m radius (raingage)		X	X										
No vegetation height > 0.6 m within 5 m radius (raingage)	X		X	X			X	X		X		X	
Collector and sensor oriented properly		X									X		
45 degree rule met (collector)								X			X		
30 degree rule for trees met (collector)			X		X		X	X		X	X	X	
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)	X	X						X		X			
No fences > 1 m height inside 5 m radius (collector)		X	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													
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)													
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													
ACM sensor operates properly					X								
Motorbox operates within acceptable limits					X								
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		--
Does optical sensor respond to "blocking" of light beam (electronic gage)		--	X		--	--	--	--	X				--
Does optical sensor respond to mist of water (electronic gage)		--	X	U to T	--	--	--	--	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 Collector (page 2 of 5)

StationId	IL11	IL18	IL63	IN34	KS97	MD08	MD13	MD15	MD18	ME02	ME09	ME96	MI09
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)									X				
30 degree rule for buildings met (raingage)													
No objects > 1 m height inside 5 m radius (raingage)	X		X			X	X		X		X		
No fences > 1 m height inside 2 m radius (raingage)							X						
No vegetation height > 0.6 m within 5 m radius (raingage)	X			X		X		X					
Does NADP require a raingage wind shield at this site?	X	X	X				X	X	X				
If raingage wind shield present, is it installed correctly?	--	--	--				--	--	--				
Collector and sensor oriented properly													
45 degree rule met (collector)											X		
30 degree rule for trees met (collector)					X						X		X
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)	X		X			X	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		
No treated lumber inside 5 m radius (collector)	X			X	X	X	X	X	X	X	X	X	
No pastures and ag. activity within 20 m radius		X	X									X	
No herbicides and fertilizers used within 20 m radius		X			X		X		X				
Roads meet NADP siting criteria													
Waterways meet NADP siting criteria													
Airports meet NADP siting criteria													
Animal operations meet NADP siting criteria (NTN and AIRMoN)													
Parking lots and maintenance areas meet NADP siting criteria													
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria													
Dry side bucket is clean										X		X	
Does lid seal properly													
Lid liner in good condition													
ACM sensor operates properly													
Motorbox operates within acceptable limits													
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)	X	--						--					
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--				--					
Does optical sensor respond to mist of water (electronic gage)	--	--	--	--				--					

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

Table B-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector (page 3 of 5)

StationId	MI26	MI48	MI51	MI53	MI98	MN27	MT96	NC25	NE15	NJ00	NJ39	NJ99	NV03
Is sampling media quality maintained?													
Is the orifice of the collector +/- .3 m of raingage (elevation)													
30 degree rule for buildings met (raingage)													
No objects > 1 m height inside 5 m radius (raingage)	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			
Does NADP require a raingage wind shield at this site?							X	X		X	X	X	
If raingage wind shield present, is it installed correctly?							--	--		--	--	--	
Collector and sensor oriented properly											X		
45 degree rule met (collector)													
30 degree rule for trees met (collector)				X								X	
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)	X			X		X		X			X	X	
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		
No pastures and ag. activity within 20 m radius									X				X
No herbicides and fertilizers used within 20 m radius						X							
Roads meet NADP siting criteria													
Waterways meet NADP siting criteria											X		
Airports meet NADP siting criteria													
Animal operations meet NADP siting criteria (NTN and AIRMoN)													
Parking lots and maintenance areas meet NADP siting criteria											X	X	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria													
Dry side bucket is clean		--			X	X					X		
Does lid seal properly						X							
Lid liner in good condition					X								
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)	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	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 B-3. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector (page 4 of 5)

StationId	NV05	NY22	OH17	PA02	PA21	PA83	PA98	TN11	TX22	UT09	UT99	WA14	WA21
Is sampling media quality maintained?						X							
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)				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				
Does NADP require a raingage wind shield at this site?	X		X	X	X	X	X	X	X	X		X	X
If raingage wind shield present, is it installed correctly?			--	--	--	--	--	--	--	--		--	--
Collector and sensor oriented properly									X				
45 degree rule met (collector)				X	X	X		X			X		
30 degree rule for trees met (collector)			X	X	X	X		X			X	X	X
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)				X	X	X					X	X	
No fences > 1 m height inside 5 m radius (collector)												X	
No vegetation height > 0.6 m within 5 m radius (collector)				X									
No treated lumber inside 5 m radius (collector)				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	
Waterways meet NADP siting criteria													
Airports meet NADP siting criteria													
Animal operations meet NADP siting criteria (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						X				X			
Does lid seal properly													
Lid liner in good condition													
ACM sensor operates properly													
Motorbox operates within acceptable limits													
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)				--	--	--	--					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 Collector (page 5 of 5)

StationId	WA99	WI10	WV05	WV18	WY00	WY02	WY06	WY95	WY97	WY98
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)										
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)	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			
Does NADP require a raingage wind shield at this site?	X		X							
If raingage wind shield present, is it installed correctly?			--				X			
Collector and sensor oriented properly										
45 degree rule met (collector)			X							
30 degree rule for trees met (collector)	X		X						X	
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X						X			
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			
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)										
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										
ACM sensor operates properly										
Motorbox operates within acceptable limits										
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)							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 B-4. Findings Most Likely to Impact Data Quality – NTN with N-CON Collector (1 of 3)

StationId	99WA	AL19	BC22	BC23	BC24	CO00	CO01	CO99	FL96	IA23	IL78
Is sampling media quality maintained?											
Is the orifice of the collector +/- .3 m of raingage (elevation)											
30 degree rule for buildings met (raingage)											
No objects > 1 m height inside 5 m radius (raingage)		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										
Collector and sensor oriented properly					X				X		
45 degree rule met (collector)			X								
30 degree rule for trees met (collector)	X			X							
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)		X	X	X					X		
No fences > 1 m height inside 5 m radius (collector)					X				X		
No vegetation height > 0.6 m within 5 m radius (collector)	X		X								
No treated lumber inside 5 m radius (collector)		X							X		
No pastures and ag. activity within 20 m radius										X	
No herbicides and fertilizers used within 20 m radius									X		
Roads meet NADP siting criteria			X						X		
Waterways meet NADP siting criteria											
Airports meet NADP siting criteria											
Animal operations meet NADP siting criteria (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 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)		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 B-4. Findings Most Likely to Impact Data Quality – NTN with N-CON Collector (2 of 3)

StationId	KS32	ME08	MN01	MT98	NC17	NE99	NY28	NY59	NY92	NY93	PA52
Is sampling media quality maintained?											
Is the orifice of the collector +/- .3 m of raingage (elevation)											
30 degree rule for buildings met (raingage)											
No objects > 1 m height inside 5 m radius (raingage)	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							X			X	
45 degree rule met (collector)											
30 degree rule for trees met (collector)		X									
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)						X	X	X	X	X	X
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	
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)											
Parking lots and maintenance areas meet NADP siting criteria									X		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria											
N-CON sensor responds to a 20-second mist of water											
N-CON lid seal in good condition	X										
N-CON lid liner in good condition											
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)											
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"

Table B-4. Findings Most Likely to Impact Data Quality – NTN with N-CON Collector (3 of 3)

StationId	PA71	PA72	SD08	SK20	SK21	UT01	UT98	WA19	WA24	WI31	WY94
Is sampling media quality maintained?											
Is the orifice of the collector +/- .3 m of raingage (elevation)											
30 degree rule for buildings met (raingage)											
No objects > 1 m height inside 5 m radius (raingage)		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					X		X				
45 degree rule met (collector)		X						X			
30 degree rule for trees met (collector)	X	X						X		X	
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)		X			X						
No fences > 1 m height inside 5 m radius (collector)					X						X
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 pastures and ag. activity within 20 m radius	X		X			X		X	X		
No herbicides and fertilizers used within 20 m radius									X		
Roads meet NADP siting criteria											
Waterways meet NADP siting criteria											
Airports meet NADP siting criteria											
Animal operations meet NADP siting criteria (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 sensor responds to a 20-second mist of water											
N-CON lid seal in good condition								X			
N-CON lid liner in good condition		X					X				
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)				X				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"

StationId	11IL	DE02	IL11
Is sampling media quality maintained?			
Are samples stored and shipped properly?			
Is the orifice of the collector +/- .3 m of raingage (elevation)	X		
30 degree rule for buildings met (raingage)			
No objects > 1 m height inside 5 m radius (raingage)	X	X	X
No fences > 1 m height inside 2 m radius (raingage)			
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X	X
Collector and sensor oriented properly			
45 degree rule met (collector)			
30 degree rule for trees met (collector)		X	
30 degree rule for buildings met (collector)			
No objects > 1 m height within 5 m radius (collector)		X	X
No fences > 1 m height inside 5 m radius (collector)			
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
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			
Animal operations meet NADP siting criteria (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			
ACM sensor operates properly			
Motorbox operates within acceptable limits			
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)	X		X
Does optical sensor respond to "blocking" of light beam (electronic gage)	--		--
Does optical sensor respond to mist of water (electronic gage)	--		--

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

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 (page 1 of 4)

StationId	AB13			AB14			CO96		CO99			IL11			IN21			IN34		KS32			MD08			ME02		
Year	2009	2012	2015	2009	2012	2015	2012	2015	2008	2012	2015	2009	2012	2015	2008	2011	2015	2009	2015	2010	2012	2015	2008	2013	2015	2009	2012	2015
Is sampling media quality maintained?																												
Is the orifice of the collector +/- .3 m of raingage (elevation)	X									X																		
30 degree rule for buildings met (raingage)																												
No objects > 1 m height inside 5 m radius (raingage)	X												X	X	X	X	X				X	X		X	X			
No fences > 1 m height inside 2 m radius (raingage)																					X							
No vegetation height > 0.6 m within 5 m radius (raingage)			X							X		X	X	X					X	X			X	X	X		X	
Collector and sensor oriented properly																												
45 degree rule met (collector)																												
30 degree rule for buildings 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			X											
No fences > 1 m height inside 5 m radius (collector)																					X	X						
No vegetation height > 0.6 m within 5 m radius (collector)												X	X	X					X	X			X	X	X		X	
No treated lumber inside 5 m radius (collector)		X	X						X	X				X			X		X									X
No galvanized metal inside 5 m radius collector (MDN)					X	X		X							X		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)																												

	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 (page 2 of 4)

StationId	ME09			ME96			MI48			MN27			MN98		NC26		NE15			NE25		NJ30			NV02		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2010	2015	2008	2015	2008	2012	2015	2012	2015	2009	2012	2015	2008	2012	2015
Is sampling media quality maintained?																					X						
Is the orifice of the collector +/- .3 m of raingage (elevation)																									X		
30 degree rule for buildings met (raingage)										--																	
No objects > 1 m height inside 5 m radius (raingage)	X	X	X					X					X		X	X				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							
Collector and sensor oriented properly																X											
45 degree rule met (collector)																											
30 degree rule for buildings met (collector)																											
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	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	X				X	X						X			X	X			
No galvanized metal inside 5 m radius collector (MDN)													X	X							X		X	X			
No pastures and ag. activity within 20 m radius				X	X	X									--			X	X	X	X				--	X	
No herbicides and fertilizers used within 20 m radius												X			--			X		X	X				--		
Roads meet NADP siting criteria																				X				X			
Waterways meet NADP siting criteria																											
Airports meet NADP siting criteria													X	X													
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 (page 3 of 4)

StationId	NV99			OH02		PA21		PA37		PA52			PA72			TN11			WA03		WA18			WI10		
Year	2008	2012	2015	2008	2015	2012	2015	2012	2015	2010	2013	2015	2009	2012	2015	2009	2012	2015	2012	2015	2009	2012	2015	2009	2012	2015
Is sampling media quality maintained?																										
Is the orifice of the collector +/- .3 m of raingage (elevation)																								X		
30 degree rule for buildings met (raingage)																										
No objects > 1 m height inside 5 m radius (raingage)	X	X				X	X			X	X	X	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																								
Collector and sensor oriented properly																										
45 degree rule met (collector)	X	X		X	X	X	X						X	X	X	X	X	X								
30 degree rule for buildings met (collector)																										
30 degree rule for trees met (collector)						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													
No fences > 1 m height inside 5 m radius (collector)	X	X	X																							
No vegetation height > 0.6 m within 5 m radius (collector)		X								X	X	X														
No treated lumber inside 5 m radius (collector)					X																					X
No galvanized metal inside 5 m radius collector (MDN)																										
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						X		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 (page 4 of 4)

StationId	WI31			WI99		
Year	2009	2012	2015	2009	2012	2015
Is sampling media quality maintained?						
Is the orifice of the collector +/- .3 m of raingage (elevation)						
30 degree rule for buildings met (raingage)						
No objects > 1 m height inside 5 m radius (raingage)					X	X
No fences > 1 m height inside 2 m radius (raingage)						
No vegetation height > 0.6 m within 5 m radius (raingage)						X
Collector and sensor oriented properly			X			X
45 degree rule met (collector)						
30 degree rule for buildings met (collector)						
30 degree rule for trees met (collector)		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			X
No treated lumber inside 5 m radius (collector)	X	X	X			
No galvanized metal inside 5 m radius collector (MDN)						
No pastures and ag. activity within 20 m radius						
No herbicides and fertilizers used within 20 m radius						
Roads meet NADP siting criteria						
Waterways meet NADP siting criteria						
Airports meet NADP siting criteria						
Combustion sources meet NADP siting criteria (MDN only)						
Parking lots and maintenance areas meet NADP siting criteria						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria						
Metalworking operations meet NADP siting criteria (MDN only)						

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

Table C-2. NADP – NTN - Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 1 of 9)

StationId	AK02			AZ03			CO00			CO01			CO02			CO08			CO21			CO22			CO90		
Year	2010	2012	2015	2008	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015
Is sampling media quality maintained?																											
Is the orifice of the collector +/- .3 m of raingage (elevation)											X		X	X	X												
30 degree rule for buildings met (raingage)																											
No objects > 1 m height inside 5 m radius (raingage)													X	X	X	X											
No fences > 1 m height inside 2 m radius (raingage)									X				X	X	X			X									
No vegetation height > 0.6 m within 5 m radius (raingage)				X	X	X										X	X	X				X			X	X	X
Collector and sensor oriented properly	X	X											X	X	X												
45 degree rule met (collector)										X																	
30 degree rule for buildings met (collector)																											
30 degree rule for trees met (collector)	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										
No fences > 1 m height inside 5 m radius (collector)													X	X	X		X	X									
No vegetation height > 0.6 m within 5 m radius (collector)				X	X	X										X	X	X				X			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																											
Waterways meet NADP siting criteria																											
Airports meet NADP siting criteria																											
Animal operations meet NADP siting criteria (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 9)

StationId	CO91			CO92			CO94			CO96			CO98			CO99			FL32			IA23			IL11		
Year	2008	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015
Is sampling media quality maintained?																											
Is the orifice of the collector +/- .3 m of raingage (elevation)	X	X	X				X	X	X				X				X				X						
30 degree rule for buildings met (raingage)																											
No objects > 1 m height inside 5 m radius (raingage)	X		X					X	X										X	X					X	X	X
No fences > 1 m height inside 2 m radius (raingage)																											
No vegetation height > 0.6 m within 5 m radius (raingage)			X				X	X	X						X		X								X	X	X
Collector and sensor oriented properly		X										X								X							
45 degree rule met (collector)		X	X							X		X															
30 degree rule for buildings met (collector)																											
30 degree rule for trees met (collector)	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
No fences > 1 m height inside 5 m radius (collector)																											
No vegetation height > 0.6 m within 5 m radius (collector)		X	X				X	X	X				X	X	X										X		X
No treated lumber inside 5 m radius (collector)						X						X				X	X		X	X	X						X
No pastures and ag. activity within 20 m radius				X																		X	X	X			
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)																						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 3 of 9)

StationId	IL18			IL63			IL78			IN34			KS32				MD08			MD13			MD15			MD18		
Year	2009	2012	2015	2010	2012	2015	2009	2012	2015	2009	2013	2015	2008	2010	2012	2015	2008	2013	2015	2010	2012	2015	2010	2013	2015	2010	2013	2015
Is sampling media quality maintained?																												
Is the orifice of the collector +/- .3 m of raingage (elevation)																				X						X	X	X
30 degree rule for buildings met (raingage)																												
No objects > 1 m height inside 5 m radius (raingage)						X							X		X	X	X	X	X			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 buildings 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						
No fences > 1 m height inside 5 m radius (collector)															X	X						X						
No vegetation height > 0.6 m within 5 m radius (collector)												X		X			X	X	X					X	X			
No treated lumber inside 5 m radius (collector)												X							X	X		X		X	X			X
No pastures and ag. activity within 20 m radius	X	X	X	X	X	X																						
No herbicides and fertilizers used within 20 m radius	X		X				X															X					X	X
Roads meet NADP siting criteria																												
Waterways meet NADP siting criteria																												
Airports meet NADP siting criteria																												
Animal operations meet NADP siting criteria (NTN and AIRMoN)																												
Parking lots and maintenance areas meet NADP siting criteria																				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 4 of 9)

StationId	ME02			ME08			ME09			ME96			MI09			MI26			MI48			MI51			MI53		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2010	2012	2015	2010	2012	2015
Is sampling media quality maintained?																											
Is the orifice of the collector +/- .3 m of raingage (elevation)																											
30 degree rule for buildings met (raingage)																			--								
No objects > 1 m height inside 5 m radius (raingage)							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 buildings met (collector)																											
30 degree rule for trees met (collector)						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	X
No fences > 1 m height inside 5 m radius (collector)																											
No vegetation height > 0.6 m within 5 m radius (collector)		X							X													X			X		
No treated lumber inside 5 m radius (collector)			X		X	X		X	X			X					X	X	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																											
Waterways meet NADP siting criteria																											
Airports meet NADP siting criteria																											
Animal operations meet NADP siting criteria (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 5 of 9)

StationId	MI98			MN01			MN27			MT96			MT98			NC25			NE15			NE99			NJ00		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2009	2012	2015
Is sampling media quality maintained?											U to T																
Is the orifice of the collector +/- .3 m of raingage (elevation)																									X		
30 degree rule for buildings met (raingage)																											
No objects > 1 m height inside 5 m radius (raingage)																X	X	X					X	X			
No fences > 1 m height inside 2 m radius (raingage)																											
No vegetation height > 0.6 m within 5 m radius (raingage)				X							X	X															X
Collector and sensor oriented properly					X																						
45 degree rule met (collector)																											
30 degree rule for buildings met (collector)																											
30 degree rule for trees met (collector)				X																							
No objects > 1 m height within 5 m radius (collector)									X							X	X	X					X	X			
No fences > 1 m height inside 5 m radius (collector)																X	X	X									
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			X							X											
No pastures and ag. activity within 20 m radius																				X	X						
No herbicides and fertilizers used within 20 m radius									X											X							
Roads meet NADP siting criteria																											
Waterways meet NADP siting criteria																											
Airports meet NADP siting criteria																											
Animal operations meet NADP siting criteria (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 6 of 9)

StationId	NJ99			NV03			NV05			NY22			OH17			PA02		PA21		PA71		PA72			PA83	
Year	2009	2012	2015	2008	2012	2015	2008	2012	2015	2008	2011	2015	2010	2013	2015	2012	2015	2012	2015	2012	2015	2009	2012	2015	2012	2015
Is sampling media quality maintained?					U to T																					X
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)	X	X	X	X	X								X			X	X	X	X					X	X	X
No fences > 1 m height inside 2 m radius (raingage)						X																				
No vegetation height > 0.6 m within 5 m radius (raingage)							X	X	X																	
Collector and sensor oriented properly																										
45 degree rule met (collector)																X	X	X	X			X	X	X	X	X
30 degree rule for buildings met (collector)																						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	X	X	X	X
No fences > 1 m height inside 5 m radius (collector)	X	X	X																							
No vegetation height > 0.6 m within 5 m radius (collector)							X	X									X									
No treated lumber inside 5 m radius (collector)																	X									X
No pastures and ag. activity within 20 m radius				X		X				X											X					
No herbicides and fertilizers used within 20 m radius																		X								
Roads meet NADP siting criteria																										
Waterways meet NADP siting criteria																										
Airports meet NADP siting criteria																										
Animal operations meet NADP siting criteria (NTN and AIRMoN)																										
Parking lots and maintenance areas meet NADP siting criteria	X	X	X															X								
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																										

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

Table C-2. NADP – NTN - Siting Criteria and Sample Quality: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 7 of 9)

StationId	PA98		SD08			SK20		TN11			TX22			UT01			UT09			UT98			UT99		
Year	2012	2015	2009	2012	2015	2012	2015	2009	2012	2015	2008	2011	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015
Is sampling media quality maintained?																									
Is the orifice of the collector +/- .3 m of raingage (elevation)																							X		
30 degree rule for buildings met (raingage)																									
No objects > 1 m height inside 5 m radius (raingage)				X							X	X					X				X	X			X
No fences > 1 m height inside 2 m radius (raingage)																									
No vegetation height > 0.6 m within 5 m radius (raingage)						X	X						X		X		X								
Collector and sensor oriented properly						X							X									X			
45 degree rule met (collector)								X	X	X							X								X
30 degree rule for buildings met (collector)																									
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
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								
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 siting criteria (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 9)

StationId	WA14			WA19			WA21			WA24			WA99			WI10			WV05			WV18			WY00		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015
Is sampling media quality maintained?																				U to T							
Is the orifice of the collector +/- .3 m of raingage (elevation)								X			X					X									X		
30 degree rule for buildings met (raingage)																											
No objects > 1 m height inside 5 m radius (raingage)	X	X	X				X			X	X	X	X	X	X				X			X					
No fences > 1 m height inside 2 m radius (raingage)	X		X																			X	X				
No vegetation height > 0.6 m within 5 m radius (raingage)		X			X	X	X	X							X												
Collector and sensor oriented properly																											
45 degree rule met (collector)	X	X				X	X	X												X	X						
30 degree rule for buildings met (collector)																											
30 degree rule for trees met (collector)	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							X					
No fences > 1 m height inside 5 m radius (collector)	X	X	X	X	X																						
No vegetation height > 0.6 m within 5 m radius (collector)		X				X	X	X							X			X									
No treated lumber inside 5 m radius (collector)					X	X			X									X									
No pastures and ag. activity within 20 m radius				X	X	X					X	X															
No herbicides and fertilizers used within 20 m radius											X	X															
Roads meet NADP siting criteria			X																X								
Waterways meet NADP siting criteria																											
Airports meet NADP siting criteria																											
Animal operations meet NADP siting criteria (NTN and AIRMoN)																											
Parking lots and maintenance areas meet NADP siting criteria		X	X								X	X															
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																											

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

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

StationId	WY02			WY06			WY94		WY95			WY97			WY98		
Year	2009	2013	2015	2009	2013	2015	2012	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)																	
30 degree rule for buildings met (raingage)																	
No objects > 1 m height inside 5 m radius (raingage)		X	X		X	X	X										
No fences > 1 m height inside 2 m radius (raingage)							X	X				X		X			
No vegetation height > 0.6 m within 5 m radius (raingage)			X			X		X									
Collector and sensor oriented properly																	
45 degree rule met (collector)																	
30 degree rule for buildings met (collector)																	
30 degree rule for trees met (collector)													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				X					
No vegetation height > 0.6 m within 5 m radius (collector)			X		X	X		X									
No treated lumber inside 5 m radius (collector)	X	X	X					X								X	X
No pastures and ag. activity within 20 m radius		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 siting criteria (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 (page 1 of 4)

StationId	AB13			AB14			CO96		CO99			IL11			IN21			IN34		KS32			MD08			ME02		
Year	2009	2012	2015	2009	2012	2015	2012	2015	2008	2012	2015	2009	2012	2015	2008	2011	2015	2009	2015	2010	2012	2015	2008	2013	2015	2009	2012	2015
Dry side bucket is clean							--	--												--	--					X		
Does lid seal properly							--	--								X				--	--	--						
Lid liner in good condition							--	--												--	--	--						
Fan in good condition							--	--			X									--	--	--						X
Cooling fan thermostat in good condition							--	--												--	--	--						
Heater in good condition							--	--												--	--	--						
Heater thermostat in good condition							--	--												--	--	--						
Has flush wall filter mount been installed							--	--			X									--	--	--		X	X		X	
Filter in good condition							--	--			--		--	--	U to T					--	--	--		--	--			
Max / min thermometer in acceptable limits							--	--												--	--	--						
ACM sensor operates properly			X				--	--							X			X		--	--	--						
Motorbox operates within acceptable limits			X				--	--				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	--	--	--	--	--	--			--	--	--	--	--	--	--	--	--	--	--			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 20-second mist of water	--	--	--	--	--	--			--	--	--	--	--	--	--	--	--	--	--				--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	X	--	--	--	--	--	--	--	X	--	--	--	--	--	X	--	--	--	--	X	--	--	--	--	--	--	--	--
Raingage operates properly (electronic gage)									--						--	X				--								
Does datalogger receive event signals form all collectors (electronic gage)	X		U to T					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-3. NADP – MDN - Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 2 of 4)

StationId	ME09			ME96			MI48			MN27			MN98		NC26		NE15			NE25		NJ30			NV02		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2010	2015	2008	2015	2008	2012	2015	2012	2015	2009	2012	2015	2008	2012	2015
Dry side bucket is clean				X						--	X	--			X	--	--	--	--	--	--						
Does lid seal properly				X												--	--	--	--	--	--						
Lid liner in good condition				X											X	--	--	--	--	--	--		X				
Fan in good condition																--	--	--	--	--	--						
Cooling fan thermostat in good condition																--	--	--	--	--	--						
Heater in good condition																--	--	--	--	--	--						
Heater thermostat in good condition																--	--	--	--	--	--						
Has flush wall filter mount been installed					X											--	--	--	--	--	--						
Filter in good condition						--										--	--	--	--	--	--						
Max / min thermometer in acceptable limits																--	--	--	--	--	--		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 fan in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				X			--	--	--	--	--	--
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 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)							--			--					--		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)							--		U to T	--					--		U to T				U to T	--	--	--	--	--	--
Does optical sensor respond to mist of water (electronic gage)							--		U to T	--					--	U to T	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 (page 3 of 4)

StationId	NV99			OH02		PA21		PA37		PA52			PA72			TN11			WA03		WA18			WI10		
Year	2008	2012	2015	2008	2015	2012	2015	2012	2015	2010	2013	2015	2009	2012	2015	2009	2012	2015	2012	2015	2009	2012	2015	2009	2012	2015
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						--	--	--	--	--	--	--	U to T	--	--											
Heater thermostat in good condition						--	--	--	--	--	--	--		--	--											
Has flush wall filter mount been installed						--	--	--	--	--	--	--		--	--											
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 20-second mist of water	--	--	--	--	--	--							--			--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn over set properly (Belfort gage)	X	X		X	--	X	X	--	--	X	--	--	X	--	--	--	--	--	X	X	X	--	--	--	--	--
Raingage operates properly (electronic gage)	--	--	--	--		--	--			--		X	--						--	--	--					
Does datalogger receive event signals form all collectors (electronic gage)	--	--	--	--		--	--			--			--						--	--	--		X			
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--	--	--		--	--	--	--	--	--	--	--	--	--				--	--	--					
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-3. NADP – MDN - Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 4 of 4)

StationId	WI31			WI99		
Year	2009	2012	2015	2009	2012	2015
Dry side bucket is clean			--			--
Does lid seal properly			--			--
Lid liner in good condition			--			--
Fan in good condition			--			--
Cooling fan thermostat in good condition			--			--
Heater in good condition			--			--
Heater thermostat in good condition			--			--
Has flush wall filter mount been installed			--			--
Filter in good condition			--			--
Max / min thermometer in acceptable limits		X	--		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 fan in good condition	--	--		--	--	
N-CON cooling fan thermostat in good condition	--	--		--	--	
N-CON heater in good condition	--	--		--	--	
N-CON heater thermostat in good condition	--	--		--	--	
N-CON max / min thermometer in acceptable limits	--	--		--	--	
N-CON sensor responds to a 20-second mist of water	--	--		--	--	
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)				--		

	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 5)

StationId	AK02			AZ03			CO00			CO01			CO02			CO08			CO21			CO22		
Year	2010	2012	2015	2008	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015
Dry side bucket is clean			X						--			--												
Does lid seal properly									--			--												
Lid liner in good condition									--			--												
ACM sensor operates properly	U to T								--			--		U to T							X			
Motorbox operates within acceptable limits	X								--			--									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	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						--	U to T		--		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	--	--	--	--	--	--

StationId	CO90			CO91			CO92			CO94			CO96			CO98			CO99			FL32		
Year	2009	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015	2008	2012	2015	2009	2012	2015
Dry side bucket is clean							X													X	--		X	
Does lid seal properly																					--			
Lid liner in good condition																					--	X		
ACM sensor operates properly																					--			
Motorbox operates within acceptable limits																					--			
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--
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	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 2 of 5)

StationId	IA23			IL11			IL18			IL63			IL78			IN34			KS32				MD08		
Year	2009	2012	2015	2009	2012	2015	2009	2012	2015	2010	2012	2015	2009	2012	2015	2009	2013	2015	2008	2010	2012	2015	2008	2013	2015
Dry side bucket is clean	X	--	--												--						--				
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	--	--	--	--	--	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	MD15			MD18			ME02			ME08			ME09			ME96			MI09			MI26		
Year	2010	2013	2015	2010	2013	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015
Dry side bucket is clean									X		--	--				X		X						
Does lid seal properly											--	--												
Lid liner in good condition							X				--	--												
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)	X			--	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--
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					--	--													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 3 of 5)

StationId	MI48			MI51			MI53			MI98			MN01			MN27			MT96			MT98		
Year	2009	2012	2015	2010	2012	2015	2010	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2008	2012	2015
Dry side bucket is clean			--								X	X			--	X	X	X				X	--	
Does lid seal properly															--			X					--	--
Lid liner in good condition												X			--							X	--	--
ACM sensor operates properly	X													X	--		X			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		--	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)	--		U to T							--			--	--		--			--	--	--	--	--	--
Does optical sensor respond to mist of water (electronic gage)	--		U to T							--			--	--		--			--	--	--	--	--	--

StationId	NC25			NE15			NE99			NJ00			NJ99			NV03			NV05			NY22		
Year	2008	2012	2015	2008	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2008	2012	2015	2008	2012	2015	2008	2011	2015
Dry side bucket is clean								--	--				X							U to T		X		
Does lid seal properly								--	--							X								
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	--	--	--	--	--	X	X			--	--	X	--	--	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)	--	--	--	--			--	--	--				--	--	--	--	--	--	--			--		

	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 5)

StationId	OH17			PA02		PA21		PA71		PA72			PA83		PA98		SD08			SK20		TN11		
Year	2010	2013	2015	2012	2015	2012	2015	2012	2015	2009	2012	2015	2012	2015	2012	2015	2009	2012	2015	2012	2015	2009	2012	2015
Dry side bucket is clean								--	--	X	--	--		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	--	--	--	--	--	--	--			--			--	--	--	--	--					--	--	--
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	X	X	X	--	--	X	--	--	X					--	--	--	--	--	--	--
Raingage operates properly (electronic gage)				--	--	--	--			--			--	--	--	--	--			X				
Does datalogger receive event signals form all collectors (electronic gage)				--	--	--	--			--			--	--	--	--	--				X			
Does optical sensor respond to "blocking" of light beam (electronic gage)				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	U to T	X			
Does optical sensor respond to mist of water (electronic gage)				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	U to T	X			

StationId	TX22			UT01			UT09			UT98			UT99			WA14			WA19			WA21		
Year	2008	2011	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2012	2015
Dry side bucket is clean					--	--			X		X	--				X					--			
Does lid seal properly					--	--						--									--			
Lid liner in good condition	--				--	--						--									--			
ACM sensor operates properly					--	--						--									--			
Motorbox operates within acceptable limits					--	--						--									--	X		
N-CON lid seal in good condition	--	--	--	--			--	--	--	--	--		--	--	--	--	--	--	--	--	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	--	--		--	--	X	--	--		--	--	X	--	--	--	--	--		--	--	--	--	--
Raingage operates properly (electronic gage)	--			--			--			--			--				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)	--			--	--	--	--			--	--	--	--				U to T		--	--	--		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 5 of 5)

StationId	WA24			WA99			WI10			WV05			WV18			WY00			WY02			WY06		
Year	2008	2012	2015	2009	2012	2015	2009	2012	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015
Dry side bucket is clean			--							X	X													
Does lid seal properly			--							X	X													
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	--	--	X	--	--	--	--	--	X	--	--		--	--
Raingage operates properly (electronic gage)	--									--			--						--			--		
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)	--	--	--							--			--						--			--		X
Does optical sensor respond to mist of water (electronic gage)	--	--	--			X				--			--						--			--		X

StationId	WY94		WY95			WY97			WY98		
Year	2012	2015	2009	2013	2015	2009	2013	2015	2009	2013	2015
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"

Table C-5. NADP – AIRMoN - Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	DE02			IL11		
Year	2009	2012	2015	2009	2012	2015
Is sampling media quality maintained?						
Are samples stored and shipped properly?						
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)			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)						
30 degree rule for buildings met (collector)						
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)						
No vegetation height > 0.6 m within 5 m radius (collector)	X		X	X		X
No treated lumber inside 5 m radius (collector)			X			X
No pastures and ag. activity within 20 m radius						
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)						
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						
ACM sensor operates properly						
Motorbox operates within acceptable limits						
Raingage operates properly (electronic gage)	--	--				
Does datalogger receive event signals form all collectors (electronic gage)	--	--				X
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"

APPENDIX D

Transfer Standard Instrument Certifications

Date

1/30/2015 - - **Calibration and verification of three thermocouples and fluke meters with most recent certification of EEMS RTD**

TMI Data -- 1/28/2015

	TMI STD	EEMS RTD 01230 / 01231	diff	corrected
cert date=	12/22/2014			
	0.028	-0.01	0.038	0.022
	9.985	9.95	0.035	9.987
	19.949	19.91	0.039	19.952
	29.918	29.88	0.038	29.926
	39.870	39.82	0.050	39.871
	49.854	49.79	0.064	49.846

RTD 01230/01231

2015 correction: slope= 0.99950102

intercept= -0.0315584

0.9999999

Eric Hebert 1/30/2015

At EEMS	**Date 1/30/2015** RTD 01230 / 01231 raw	corrected	fluke = 01311 EEMS SEG thermo = 01236 raw	corrected	01312 EEMS AER 01237 raw	corrected	01310 EEMS EOH 01238 raw	corrected
	0.05	0.08	0.2	0.14	0.2	0.15	0.2	0.18
	9.41	9.45	9.5	9.42	9.6	9.51	9.5	9.44
	19.05	19.09	19.2	19.10	19.2	19.07	19.2	19.09
	24.48	24.52	24.6	24.48	24.6	24.45	24.6	24.46
	30.26	30.31	30.4	30.27	30.4	30.22	30.4	30.23
	39.49	39.52	39.7	39.55	39.7	39.48	39.7	39.49
	47.31	47.34	47.5	47.33	47.6	44.30	47.6	47.35
	71.99	72.06	72.3	72.08	72.5	72.14	72.5	72.12
Thermocouple offset =			-0.1		-0.3		0.6	
POST CALIBRATION CHECK								
	25.36	25.40	25.6	25.48	25.7	25.54	25.5	25.36
		slope =	**1.002238**		**1.0044366**		**1.00501**	
		intercept =	**0.06093**		**0.0443271**		**0.01441**	
		correlation =	**1.0000**		**1.0000**		**1.0000**	

Certificate Number
A1802555
Issue Date: 01/22/15

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: 01310
EEMS #

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

Calibration Date: 1/22/2015
Calibration Due: ~~1/22/2016~~
Procedure: METCAL FLUKE 187
Rev: 8/30/2012
Temperature: 68 °F
Humidity: 42 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the National Institute of Standards and Technology, derived from natural physical constants, ratio measurements or compared to consensus standards. Unless otherwise noted, the method of calibration is direct comparison to a known standard.

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K=2. A TUR of 4:1 is routinely observed unless otherwise noted on the certificate. 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 and ANSI/NCSL Z540-1 by A2LA. ISO/IEC 17025 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. The instrument listed on this certificate has been calibrated to the requirements of ANSI/NCSL Z540-1.

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.

FRANK BAHMANN, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
7040208	FLUKE	5520A	4/9/2014	4/9/2015

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
A1802560
Issue Date: 01/22/15

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: 01311
FBMS #

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

Calibration Date: 1/22/2015
Calibration Due: 1/22/2016
Procedure: METCAL FLUKE 287
Rev: 8/30/2012
Temperature: 68 °F
Humidity: 42 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the National Institute of Standards and Technology, derived from natural physical constants, ratio measurements or compared to consensus standards. Unless otherwise noted, the method of calibration is direct comparison to a known standard.

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K=2. A TUR of 4:1 is routinely observed unless otherwise noted on the certificate. 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 and ANSI/NCSL Z540-1 by A2LA. ISO/IEC 17025 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. The instrument listed on this certificate has been calibrated to the requirements of ANSI/NCSL Z540-1.

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.

FRANK BAHMANN, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
7040208	FLUKE	5520A	4/9/2014	4/9/2015

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
A1802562
Issue Date: 01/22/15

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32605
FEDEX

P.O. Number:
ID Number: 01312
EEMS #

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

Calibration Date: 1/22/2015
Calibration Due: 1/22/2016
Procedure: METCAL FLUKE 287
Rev: 8/30/2012
Temperature: 68 °F
Humidity: 42 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the National Institute of Standards and Technology, derived from natural physical constants, ratio measurements or compared to consensus standards. Unless otherwise noted, the method of calibration is direct comparison to a known standard.

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K=2. A TUR of 4:1 is routinely observed unless otherwise noted on the certificate. 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 and ANSI/NCSL Z540-1 by A2LA. ISO/IEC 17025 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. The instrument listed on this certificate has been calibrated to the requirements of ANSI/NCSL Z540-1.

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.

FRANK BAHMANN, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
7040208	FLUKE	5520A	4/9/2014	4/9/2015

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

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	EE & MS # 01269
Purchase Order #:	
Instrument:	BRUNTON COMPASS
Serial Number:	5064612690
Quantity:	1
Calibration Due:	01/2016

John Noga, Quality Control

January 29, 2015

Measurement Standards:

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 05/08/14 Due 05/08/15 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/27/14 Due 02/27/19 731/244084-89

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	Environmental Engineering & Measurement Services, Inc.
Purchase Order #:	
Instrument:	Ushikata Tracon S-25 Compass
Serial Number:	190037 EEMS # 01265
Quantity:	1
Calibration Due:	2/2016

John Noga, Quality Control

February 19, 2015

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 02/12/14 Due 02/12/15 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/12/14 Due 02/12/19 731/244084-89 731/221617

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	Environmental Engineering & Measurement Services, Inc.
Purchase Order #:	
Instrument:	Ushikata Tracon S-25 Compass
Serial Number:	191832 EEMS # 01272
Quantity:	1
Calibration Due:	2/2016 on loan to SEG

John Noga

John Noga, Quality Control

February 19, 2015

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 02/12/14 Due 02/12/15 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/12/14 Due 02/12/19 731/244084-89 731/221617

BL1 And BL3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.84	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.87	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.94	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.97	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.99	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	BL3-0	Audit		1000.9	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-1	Audit		824.2	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-2	Audit		823.4	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-3	Audit		825.1	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-4	Audit		823.8	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-5	Audit		823.8	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-6	Audit		823.0	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-7	Audit		823.6	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-8	Audit		824.7	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-9	Audit		824.2	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-10	Audit		820.9	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-11	Audit		824.0	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL3-12	Audit		823.2	JPJ	ETI/Belfort Set #3 - SEG
1/28/2015	8028481064	BL1-a	Audit		207.52	JPJ	ETI/Belfort Set #1 - SEG
1/28/2015	8028481064	BL1-b	Audit		207.27	JPJ	ETI/Belfort Set #1 - SEG
1/28/2015	8028481064	BL1-c	Audit		207.20	JPJ	ETI/Belfort Set #1 - SEG
1/28/2015	8028481064	BL1-d	Audit		207.59	JPJ	ETI/Belfort Set #1 - SEG
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.83	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.88	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.90	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.95	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.97	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.99	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check

Calibrator Signature: _____ Date: 1/28/2015

Reviewer Signature: _____ Date: 1/29/2015

BL2 Weight / Balance Calibration Log

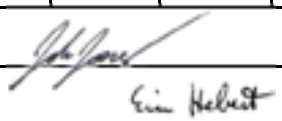
Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.82	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.89	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.95	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.98	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.98	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	BL2-0	Audit		999.8	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-1	Audit		823.0	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-2	Audit		820.3	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-3	Audit		824.3	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-4	Audit		824.9	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-5	Audit		823.2	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-6	Audit		823.9	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-7	Audit		823.3	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-8	Audit		823.3	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-9	Audit		823.4	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-10	Audit		823.6	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-11	Audit		823.4	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-12	Audit		824.0	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-a	Audit		206.81	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-b	Audit		205.77	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-c	Audit		206.26	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	BL2-d	Audit		206.48	JPJ	ETI/Belfort Set #2 - AER
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.93	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.92	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.93	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.96	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.96	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.98	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check

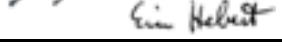
Calibrator Signature: _____ Date: 1/28/2015

Reviewer Signature: _____ Date: 1/29/2015

BL4 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.83	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.86	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.95	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.97	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.99	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	BL4-0	Audit		1034.2	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-1	Audit		824.8	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-2	Audit		823.5	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-3	Audit		824.5	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-4	Audit		824.6	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-5	Audit		823.2	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-6	Audit		824.8	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-7	Audit		823.9	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-8	Audit		824.4	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-9	Audit		825.0	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-10	Audit		823.5	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-11	Audit		823.9	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-12	Audit		824.0	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-a	Audit		206.84	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-b	Audit		205.77	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-c	Audit		206.30	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	BL4-d	Audit		206.48	JPJ	ETI/Belfort Set #4 - EOH
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.82	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.88	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.90	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.95	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.97	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.98	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check

Calibrator Signature:  Date: 1/28/2015

Reviewer Signature:  Date: 1/29/2015

P2OTT1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.84	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.89	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.94	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.97	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.99	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	P2OTT1-1	Audit		1017.9	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-2	Audit		1018.0	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-3	Audit		1017.4	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-4	Audit		1018.2	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-5	Audit		1016.8	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-6	Audit		1017.1	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-7	Audit		1017.7	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-8	Audit		1016.6	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-9	Audit		1018.0	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-a	Audit		255.37	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-b	Audit		255.22	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-c	Audit		255.29	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	P2OTT1-d	Audit		255.65	JPJ	Ott P2 Set #1 - SEG
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.84	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.87	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.90	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.94	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.07	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.98	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
	EOH note: post balance check at 100 grams is unusual						

Calibrator Signature: _____ Date: 1/28/2015

Reviewer Signature: _____ Date: 1/29/2015

P2OTT2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.83	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.87	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.94	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.98	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.99	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	P2OTT2-1	Audit		1016.7	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-2	Audit		1017.1	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-3	Audit		1017.2	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-4	Audit		1017.1	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-5	Audit		1017.1	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-6	Audit		1018.0	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-7	Audit		1017.2	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-8	Audit		1015.8	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-9	Audit		1016.5	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-a	Audit		254.25	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-b	Audit		254.24	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-c	Audit		254.47	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	P2OTT2-d	Audit		254.40	JPJ	Ott P2 Set #2 - AER
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.83	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.86	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.89	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.94	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.98	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.98	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check

Calibrator Signature: John Jones Date: 1/28/2015

Reviewer Signature: Erin Hebert Date: 1/29/2015

P2OTT3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1500.00	1499.83	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	1000.00	999.86	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	500.00	499.90	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	200.00	199.94	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	100.00	99.97	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	50.00	49.99	JPJ	Initial Balance Check
1/28/2015	8028481064	26677	Bal Init	0.00	0.00	JPJ	Initial Balance Check
1/28/2015	8028481064	P2OTT3-1	Audit		193.87	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-2	Audit		193.84	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-3	Audit		193.84	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-4	Audit		193.82	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-5	Audit		193.82	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-6	Audit		193.10	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-7	Audit		193.88	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-8	Audit		193.65	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-9	Audit		193.17	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-10	Audit		193.81	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-a	Audit		254.79	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-b	Audit		255.23	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-c	Audit		255.57	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	P2OTT3-d	Audit		255.43	JPJ	Ott P2 Set #3- EOH
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1500.00	1499.82	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	1000.00	999.87	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	500.00	499.89	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	200.00	199.94	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	100.00	99.97	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	50.00	49.99	JPJ	Post Balance Check
1/28/2015	8028481064	26677	Bal Post	0.00	0.00	JPJ	Post Balance Check

Calibrator Signature: _____ Date: 1/28/2015

Reviewer Signature: _____ Date: 1/29/2015