
2013 National Atmospheric Deposition Program Site Survey Program Annual Report

Prepared for:

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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 EPW12019¹, 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 maintaining 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:

- Evaluation of site operator proficiency and technique.
- Reinforcement of NADP protocols and training.
- Maintenance, evaluation, and quality assurance assessment of site instruments.
- Photograph catalogue 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 Previous to 6/14/2012, surveys of NADP Monitoring Stations was performed under contract EPW07061

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 ensure 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.

Essentially, NADP site surveys are accomplished by visiting each site, observing the site operator while performing the routine site activities, providing technical and training support, checking the operation of the site instrumentation, performing routine repairs and maintenance, 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 sites 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 (longest time between visits first), 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 analysis (AIRMoN), calibrations, cleaning, maintenance, recordkeeping, reporting, and material storage. Reviewing on-site documentation (raingage charts, logs, forms) for legibility, accuracy and completeness. Confirming that the current versions of NADP manuals/documentation are present.
 - 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 leveling and stabilizing the instrument, and correcting the orientation. 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.

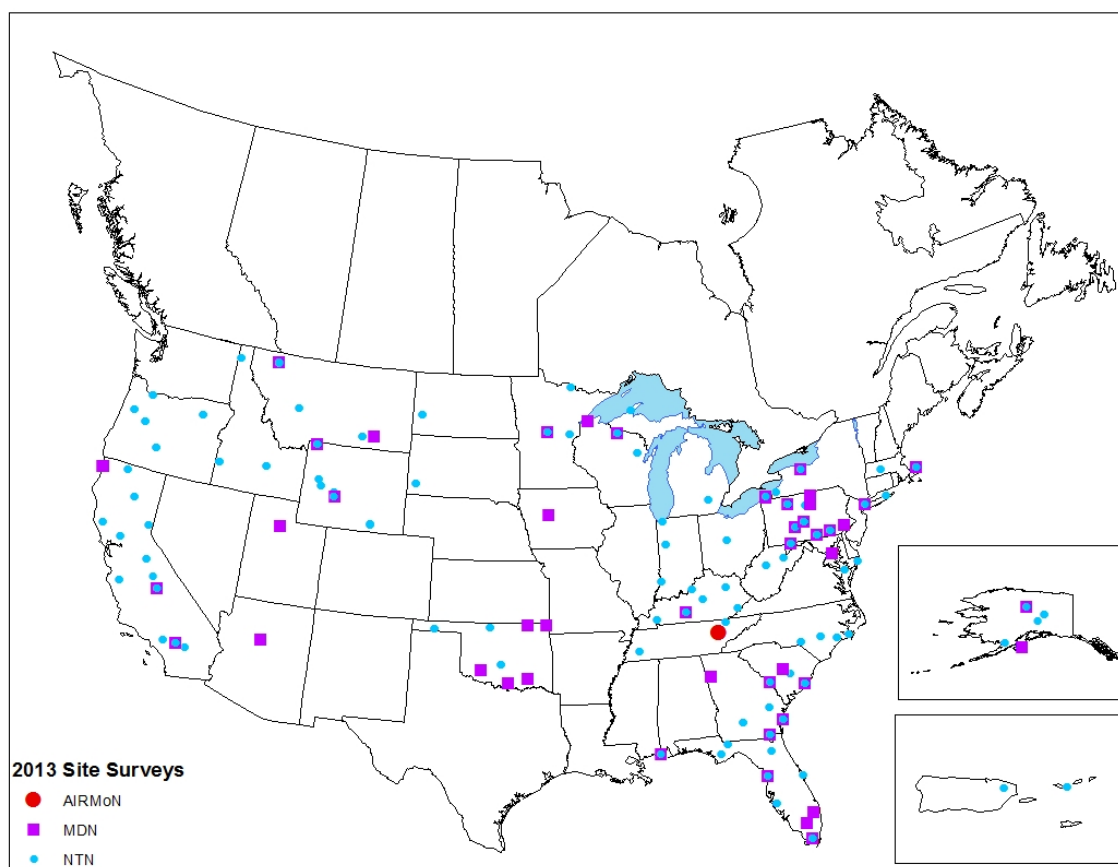
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed from January through December of 2013.

A total of 143 NADP collectors² (this number includes co-located sites) were surveyed during the period covered by this report at 118 distinct locations. These include 45 MDN sites, 97 NTN sites, and one AIRMoN site. Figure 2-1 is a map of the locations of the sites visited during 2013. Table 2-1 is a list of the sites surveyed and includes the network, site name, survey date, and equipment found.

Figure 2-1. Wet-deposition Site Survey Locations in 2013



Source – NADP Program Office

² Contract EP-W-12-019 includes the survey of the siting criteria of AMoN sites. A total of eight AMoN sites were assessed but are not identified in Figure 2-1.

2.2 General Status of Sites Surveyed

Overall the sites surveyed during the reporting period were found in good condition and collecting data that meet NADP quality objectives. Of the 118 precipitation gages surveyed (co-located sites usually use the same gage), 14 were Belfort mechanical raingages. Due to the age of the Belfort gages, most 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 gages require attention and it is likely that the mechanical gages have reached, or in some cases exceeded, their useful life-expectancy. Replacing Belfort gages with electronic gages has led to improved network operation. Efforts should continue to replace all Belfort gages with electronic gages. Altogether 103 electronic gages were surveyed, with only a few minor problems observed with those gages. A NWS stick gage was used at the AIRMoN site surveyed.

Of the 143 collectors (sites) surveyed, 48 sites operated N-CON collectors. The 95 remaining collectors were AerocChem Metrics (ACM) type and manufactured by either AeroChem Metrics or Loda Electronics Company.

Fifty five locations visited operate various types of backup gages. The site survey only takes into account the siting criteria of the backup gage and not the performance of the gage itself.

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.

2.3 Equipment Encountered During the Site Surveys

The list of sites surveyed during 2013 and the equipment found at the sites is shown in Table 2.1.

Table 2-1. Wet-deposition Sites Surveyed from January through December 2013 and Equipment Found

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AK01	Poker Creek	NTN	6/14/2013	ACM-type	Electronic	N/A
AK03	Denali N.P - Mt. McKinley	NTN	6/15/2013	ACM-type	Electronic	Belfort

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AK06	Gates of the Arctic N.P. - Bettles	MDN NTN	6/14/2013	ACM-type	Electronic	N/A
AK97	Katmai N.P. - King Salmon	NTN	6/9/2013	ACM-type	Electronic	N/A
AK98	Kodiak	MDN	6/11/2013	ACM-type	Electronic	N/A
AZ02	Sycamore Canyon	MDN	4/3/2013	ACM-type	Electronic	N/A
CA20	Yurok Tribe-Requa	MDN	5/9/2013	ACM-type	Belfort	N/A
CA28	Kings River Experimental Watershed	NTN	7/9/2013	ACM-type	Electronic	N/A
CA42	Tanbark Flat	NTN	4/10/2013	ACM-type	Belfort	Belfort
CA45	Hopland	NTN	5/6/2013	N-CON	Electronic	N/A
CA50	Sagehen Creek	NTN	4/28/2013	N-CON	Electronic	Other
CA66	Pinnacles N.P. - Bear Valley	NTN	4/11/2013	ACM-type	Belfort	Tipping Bucket
CA67	Joshua Tree N.P. - Black Rock	NTN	4/8/2013	ACM-type	Electronic	Tipping Bucket
CA75	Sequoia N.P. - Giant Forest	MDN NTN	5/3/2013	ACM-type	Electronic	Tipping Bucket
CA76	Montague	NTN	5/10/2013	N-CON	Electronic	N/A
CA88	Davis	NTN	4/30/2013	N-CON	Electronic	Tipping Bucket
CA94	Converse Flats	MDN NTN	4/9/2013	ACM-type	Electronic	N/A
CA96	Lassen Volcanic N.P. - Manzanita Lake	NTN	5/7/2013	ACM-type	Electronic	Tipping Bucket
CA99	Yosemite N. P. - Hogdon Meadow	NTN	5/1/2013	ACM-type	Electronic	Tipping Bucket
FL03	Bradford Forest	NTN	2/4/2013	ACM-type	Belfort	Stick
FL05	Chassahowitzka National Wildlife Refuge	MDN NTN	2/5/2013	ACM-type	Electronic	N/A
FL11	Everglades N.P. – Research Center	MDN NTN	2/20/2013	ACM-type	Electronic	Tipping Bucket
FL14	Quincy	NTN	2/12/2013	N-CON	Electronic	Stick
FL23	Sumatra	NTN	2/17/2013	ACM-type	Electronic	Tipping Bucket
FL34	Everglades Nutrient Removal Project	MDN	2/19/2013	ACM-type	Electronic	OTT
FL41	Verna Well Field	NTN	2/18/2013	N-CON	Electronic	Stick

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
FL97	Everglades-Western Broward County	MDN	2/19/2013	ACM-type	Electronic	OTT
FL99	Kennedy Space Center	NTN	3/21/2013	ACM-type	Belfort	N/A
GA09	Okefenokee National Wildlife Refuge	MDN NTN	11/19/2013	ACM-type	Electronic	Stick
GA20	Claxton	NTN	3/19/2013	ACM-type	Electronic	N/A
GA33	Sapelo Island	MDN NTN	12/3/2013	N-CON ACM-type	Electronic	N/A
GA40	Yorkville	MDN	12/11/2013	N-CON	Electronic	Tipping Bucket
GA99	Chula	NTN	11/25/2013	N-CON	Electronic	Stick
ID02	Priest River Experimental Forest	NTN	7/22/2013	ACM-type	Electronic	N/A
ID03	Craters of the Moon National Monument	NTN	7/23/2013	ACM-type	Electronic	N/A
ID11	Reynolds Creek	NTN	7/15/2013	N-CON	Electronic	N/A
IN22	Southwest Purdue Agriculture Center	NTN	8/23/2013	N-CON	Electronic	N/A
IN34	Indiana Dunes National Lakeshore	NTN	4/23/2013	ACM-type	Electronic	Stick
IN41	Agronomy Center for Research and Extension	NTN	9/16/2013	ACM-type	Belfort	N/A
KY03	Mackville	NTN	3/7/2013	N-CON	Electronic	Tipping Bucket
KY10	Mammoth Cave N. P. - Houchin Meadow	MDN NTN	3/1/2013	ACM-type	Electronic	Tipping Bucket
KY19	Seneca Park	NTN	3/6/2013	ACM-type	Electronic	N/A
KY22	Lilley Cornett Woods	NTN	3/8/2013	N-CON	Electronic	Belfort
KY35	Clark State Fish Hatchery	NTN	5/7/2013	N-CON	Electronic	Stick
KY99	Mulberry Flat	NTN	3/5/2013	ACM-type	Electronic	N/A
MA01	North Atlantic Coastal Lab	MDN NTN	5/21/2013	ACM-type	Electronic	N/A
MA08	Quabbin Reservoir	NTN	5/22/2013	ACM-type	Electronic	N/A
MD00	Smithsonian Environmental Research Center	MDN	12/2/2013	ACM-type	Electronic	Tipping Bucket
MD08	Piney Reservoir	MDN NTN	5/10/2013	ACM-type	Electronic	N/A
MD15	Smith Island	NTN	5/28/2013	ACM-type	Belfort	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Rainguage Type	Backup Rainguage Type
MD18	Assateague Island National Seashore-Woodcock	NTN	5/24/2013	ACM-type	Electronic	N/A
MI52	Ann Arbor	NTN	9/16/2013	ACM-type	Electronic	Tipping Bucket
MI99	Chassell	NTN	8/29/2013	ACM-type	Belfort	Other
MN23	Camp Ripley	MDN NTN	8/22/2013	ACM-type N-CON	Electronic	Belfort
MN28	Grindstone Lake	NTN	8/26/2013	ACM-type	Belfort	N/A
MN32	Voyageurs N.P. - Sullivan Bay	NTN	9/5/2013	ACM-type	Electronic	N/A
MS12	GRAND BAY NERR	MDN NTN	2/12/2013	ACM-type	Electronic	N/A
MT00	Little Bighorn Battlefield N.M.	NTN	7/22/2013	ACM-type	Electronic	N/A
MT05	Glacier N. P. - Fire Weather Station	MDN NTN	7/18/2013	ACM-type	Electronic	Tipping Bucket
MT07	Clancy	NTN	6/5/2013	N-CON	Electronic	N/A
MT95	Badger Peak	MDN	6/3/2013	N-CON	Electronic	N/A
NC06	Beaufort	NTN	11/5/2013	ACM-type	Electronic	Tipping Bucket
NC29	Hofmann Forest	NTN	7/11/2013	ACM-type	Electronic	N/A
NC35	Clinton Crops Research Station	NTN	7/11/2013	ACM-type	Electronic	N/A
NC36	Jordan Creek	NTN	7/10/2013	ACM-type	Electronic	Belfort
ND00	Theodore Roosevelt N. P. - Painted Canyon	NTN	9/9/2013	ACM-type	Electronic	Tipping Bucket
NY06	Bronx	MDN NTN	10/3/2013	N-CON	Electronic	Stick
NY10	Chautauqua	NTN	9/19/2013	N-CON	Electronic	N/A
NY43	Rochester	MDN NTN	10/15/2013	N-CON	Electronic	Tipping Bucket
NY96	Cedar Beach, Southold	NTN	5/23/2013	ACM-type	Electronic	N/A
OH17	Delware	NTN	5/8/2013	ACM-type	Electronic	N/A
OK00	Salt Plains National Wildlife Refuge	NTN	11/7/2013	N-CON	Electronic	N/A
OK01	McGee Creek	MDN	11/4/2013	N-CON	Electronic	N/A
OK04	Lake Murray	MDN	11/4/2013	N-CON	Electronic	N/A

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
OK06	Wichita Mountains NWR	MDN	11/5/2013	N-CON	Electronic	N/A
OK17	Kessler Farm Field Laboratory	NTN	11/9/2013	ACM-type	Belfort	N/A
OK22	Miami	MDN	3/4/2013	N-CON	Electronic	N/A
OK29	Goodwell Research Station	NTN	11/6/2013	ACM-type	Electronic	Stick
OK31	Copan	MDN	11/8/2013	N-CON	Electronic	N/A
OR09	Silver Lake Ranger Station	NTN	7/16/2013	N-CON	Electronic	N/A
OR10	H. J. Andrews Experimental Forest	NTN	7/17/2013	ACM-type	Belfort	N/A
OR18	Starkey Experimental Forest	NTN	7/18/2013	N-CON	Electronic	N/A
OR97	Hyslop Farm	NTN	7/17/2013	ACM-type	Electronic	N/A
PA00	Arendtsville	MDN NTN	11/7/2013	ACM-type	Electronic	Tipping Bucket
PA13	Allegheny Portage Railroad National Historic Site	MDN NTN	9/24/2013	N-CON	Electronic	Stick
PA18	Young Woman's Creek	NTN	9/21/2013	N-CON	Electronic	Stick
PA29	Kane Experimental Forest	MDN NTN	9/19/2013	N-CON ACM-type	Electronic	N/A
PA30	Erie	MDN NTN	9/18/2013	N-CON	Electronic	Stick
PA42	Leading Ridge	MDN NTN	9/24/2013	N-CON	Electronic	Stick
PA47	Millersville	MDN NTN	9/23/2013	N-CON	Electronic	Stick
PA52	Little Pine State Park	MDN	9/22/2013	N-CON	Electronic	Stick
PA60	Valley Forge	MDN	9/23/2013	N-CON	Electronic	Stick
PA90	Hills Creek State Park	MDN	9/20/2013	N-CON	Electronic	Stick
PR20	El Verde	NTN	2/12/2013	ACM-type	Electronic	Tipping Bucket
SC03	Savannah River	MDN NTN	4/2/2013	N-CON	Electronic	Other
SC05	Cape Romain National Wildlife Refuge	MDN NTN	7/12/2013	ACM-type	Electronic	N/A
SC06	Santee National Wildlife Refuge	NTN	7/9/2013	ACM-type	Electronic	N/A
SC19	Congaree Swamp	MDN	7/9/2013	ACM-type	Electronic	Other

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
SD04	Wind Cave N. P. - Elk Mountain	NTN	9/11/2013	ACM-type	Belfort	Tipping Bucket
TN00	Walker Branch Watershed	AIRMoN	4/29/2013	ACM-type	Electronic	Stick
TN04	Speedwell	NTN	3/30/2013	ACM-type	Electronic	Tipping Bucket
TN14	Hatchie National Wildlife Refuge	NTN	3/29/2013	ACM-type	Electronic	N/A
UT97	Salt Lake City	MDN	7/2/2013	N-CON	Electronic	N/A
VI01	Virgin Islands N.P. - Lind Point	NTN	2/13/2013	ACM-type	Electronic	Belfort
WA98	Columbia River Gorge	NTN	6/17/2013	ACM-type	Electronic	N/A
WI08	Brule River	MDN	8/27/2013	N-CON	Electronic	N/A
WI25	Suring	NTN	9/3/2013	ACM-type	Belfort	N/A
WI36	Trout Lake	MDN NTN	8/28/2013	ACM-type	Electronic	Tipping Bucket
WV05	Cedar Creek State Park	NTN	4/20/2013	ACM-type	Electronic	Tipping Bucket
WV18	Parsons	NTN	4/19/2013	ACM-type	Electronic	Stick
WY00	Snowy Range	NTN	5/14/2013	ACM-type	Electronic	N/A
WY02	Sinks Canyon	NTN	5/15/2013	ACM-type	Electronic	Other
WY06	Pinedale	NTN	5/12/2013	ACM-type	Electronic	N/A
WY08	Yellowstone N.P. - Tower Falls	MDN NTN	6/4/2013	ACM-type	Electronic	Stick
WY26	Roundtop Mountain	MDN	5/16/2013	N-CON	Electronic	N/A
WY95	Brooklyn Lake	NTN	5/14/2013	ACM-type	Electronic	N/A
WY97	South Pass City	NTN	5/15/2013	ACM-type	Belfort	N/A
WY98	Gypsum Creek	NTN	5/13/2013	ACM-type	Electronic	N/A

Table 2-2. AMoN Sites Visited During 2013

Site ID	Survey Date	Site Name
SC05	7/12/2013	Cape Romain National Wildlife Refuge
UT97	7/5/2013	Salt Lake City
PA29	9/19/2013	Kane Experimental Forrest
NC06	11/5/2013	Beaufort
FL11	2/20/2013	Everglades National Park-Research Center
MD08	5/10/2013	Piney Reserve
KY03	3/7/2013	Mackville
CA67	4/8/2013	Joshua Tree National Park-Black Rock

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 complete the information is entered into a relational database and summary reports are created.

The number of checks performed during a typical survey will vary depending on the network and the type of equipment present at the site as indicated in Table 3.1 below.

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 gage and no backup gage	152
MDN	ACM, Belfort and backup gage	242
	N-CON, electronic gage and no backup gage	153
AIRMoN	ACM, NWS Stick Gage and backup gage	300

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 shows the number of collectors, raingages and sites meeting the criteria that are deemed likely to impact data quality.

Table 3-2. Collector, Raingages and Siting Meeting Criteria

	Surveyed	Meeting all Assessments	
Collectors	143	106	74%
Number of ACM – type	72	55	76%
Number of Modified ACM – type	23	11	48%
Number of MDN N-CON	22	21	95%
Number of NTN N-CON	26	19	73%
Raingages	118	91	77%
Belfort Gages	14	8	57%
Electronic Gages	103	83	81%
NWS Stick Gages	1	0	0%
Siting Criteria	143	23	16%
NTN Sites meeting all siting criteria	97	19	20%
MDN Sites meeting all siting criteria	45	4	9%
AIRMoN Sites meeting all siting criteria	1	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. Table 3-3 shows those criteria that were met at all sites surveyed shown by network.

Table 3-3. Survey Questionnaire Items Met at All Sites

NTN	Siting Criteria	30 degree rule for building met (raingage)
		30 degree rule for buildings met (collector)
		Airports meet NADP siting criteria
		Animal operations meet NADP siting criteria (NTN and AIRMoN)
ACM-type collector	Motorbox operates within acceptable limits	
MDN	Siting Criteria	30 degree rule for buildings met (raingage)
		30 degree rule for buildings met (collector)
		Combustion sources meet NADP siting criteria (MDN only)
		Airports meet NADP siting criteria
		Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria
	Metalworking operations meet NADP siting criteria (MDN only)	
	Modified ACM	Does lid seal properly
Lid liner in good condition		

		Fan in good condition
		Cooling fan thermostat in good condition
		Heater in good condition
		Motorbox operates within acceptable limits
	N-CON	N-CON fan in good condition
		N-CON cooling fan thermostat in good condition
		N-CON heater thermostat in good condition
		N-CON sensor respond to a 20-second mist of water
		N-CON lid liner in good condition
AIRMoN	Sampling Media	Is sampling media quality maintained?
		Are samples stored and shipped properly?
	Siting Criteria	Is the orifice of the collector +/- 0.3 meters of raingage (elevation)
		No fences > 1 m height inside 2 m radius (raingage)
		Collector and sensor oriented properly
		No vegetation height > 0.6 m within 5 m radius (raingage)
		45 degree rule met (collector)
		30 degree rule for buildings met (collector)
		No fences > 1 m height inside 5 m radius (collector)
		No vegetation height > 0.6 m within 5 m (collector)
		No treated lumber inside 5 m radius (collector)
		No pastures and ag. activity within 20 m radius
		No herbicides and fertilizers used within 20 m radius
		Roads meet NADP siting criteria
		Waterways meet NADP siting criteria
		Airports meet NADP siting criteria
		Animal operations meet NADP 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	
	ACM-type collector	Dry side bucket is clean
		Does lid seal properly
		Lid liner in good condition
		ACM sensor operates properly
		Motor-box operates within acceptable limits

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

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 3-4. 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?	140	3	2.14
Are samples stored and shipped properly	1	0	0.0
Siting Criteria Assessments			
Is the orifice of the collector +/- .3 m of raingage (elevation)	143	16	11.19
30 degree rule for buildings met (raingage)	118	1	0.85
No objects > 1 m height inside 5 m radius (raingage)	118	45	38.14
No fences > 1 m height inside 2 m radius (raingage)	118	16	13.56
No vegetation height > 0.6 m within 5 m radius (raingage)	118	21	17.80
Collector and sensor oriented properly	143	10	6.99
45 degree rule met (collector)	143	28	19.58
30 degree rule for trees met (collector)	143	52	36.36
30 degree rule for buildings met (collector)	143	0	0.00
No objects > 1 m height within 5 m radius (collector)	143	52	36.36
No fences > 1 m height inside 5 m radius (collector)	143	20	13.99
No vegetation height > 0.6 m within 5 m radius (collector)	143	28	19.58
No treated lumber inside 5 m radius (collector)	143	17	11.89
No galvanized metal inside 5 m radius collector (MDN)	45	15	33.3
No pastures and ag. activity within 20 m radius	143	14	9.8
No herbicides and fertilizers used within 20 m radius	143	10	7.0
Roads meet NADP siting criteria	143	11	7.7
Waterways meet NADP siting criteria	143	2	1.4
Airports meet NADP siting criteria	143	0	0.0
Animal operations meet NADP siting criteria (NTN and AIRMoN)	98	0	0.0
Combustion sources meet NADP siting criteria (MDN only)	45	0	0.0
Parking lots and maintenance areas meet NADP siting criteria	143	5	3.5
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	143	1	0.7
Metalworking operations meet NADP siting criteria (MDN only)	45	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	93	13	14.0
Does lid seal properly	94	2	2.1
Lid liner in good condition	95	2	2.1
Fan in good condition	23	0	0.0
Cooling fan thermostat in good condition	23	0	0.0
Heater in good condition	19	0	0.0
Heater thermostat in good condition	19	0	0.0
Has flush wall filter mount been installed	23	4	17.4
Filter in good condition	14	0	0.0
Max / min thermometer within acceptable limits	23	4	17.4
ACM sensor operates properly	94	5	5.3
Motor-box operates within acceptable limits	94	0	0.0
N-CON Collector Assessments			
N-CON fan in good condition	22	0	0.0
N-CON cooling fan thermostat in good condition	22	0	0.0
N-CON heater in good condition	22	0	0.0
N-CON heater thermostat in good condition	22	0	0.0
N-CON max / min thermometer in acceptable limits	22	2	9.1
N-CON sensor respond to a 20-second mist of water	41	1	2.4
N-CON lid seal in good condition	48	3	6.3
N-CON lid liner in good condition	48	2	4.2
Belfort Raingage Assessments			
Was the 'as found' turn-over set properly	14	6	42.9
Electronic Gage Assessments			
Raingage operates properly (electronic gage)	103	1	1.0
Does datalogger receive event signals form all collectors (electronic gage)	101	6	5.9
Does optical sensor respond to "blocking" of light beam (electronic gage)	61	2	3.3
Does optical sensor respond to mist of water (electronic gage)	60	1	1.7

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. Additionally, on-site documentation (raingage charts, logs, forms) was also assessed for legibility, accuracy and completeness.

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 to the 30 degree tree guidelines for collectors followed by overgrown vegetation. The other most prevalent issues are the calibration and turn-over adjustment of the Belfort gage.

Table 3-5 lists the sites surveyed that have seen 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”). However, these changes may or may not have contributed to siting criteria compliance. The effects of the changes are captured in the current siting criteria results presented in the previous tables.

Table 3-5. Sites with Changes since Last Survey (not including e-gage installation)

CA20	MDN	This site was moved to a new location on the roof of an old building which is about 3.5 meters above ground. Still a few trees violate 30 degree guideline.
MN23	MDN/NTN	Trees were cleared to meet 30 and 45 degree criteria.
NY06	MDN	Emergency generator burning natural gas on site, infrequently used.
TN14	NTN	Site location is currently being used as a gravel pit. Mound of gravel is within 5 meter of raingage. Site is expected to be moved soon to a nearby location

Sites surveyed by EEMS for the first time during this reporting period are presented in Table 3-6.

Table 3-6. Sites Surveyed for the First Time by EEMS

MT95	MDN	PA30	NTN
NY06	NTN	SC03	NTN
NY43	NTN	WY26	MDN
OK22	MDN		

3.2 Survey Results for Sites with Second Survey Visits

One hundred and thirty four (134) of the 143 sites surveyed in 2013 had been previously visited by EEMS. Some 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 3-7. The percentages presented in this table are based on the 128 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 2013 and 2010, but not the survey conducted in 2008).

Table 3-7. Percent of Non-compliance Items for Sites Surveyed More than Once

Siting and Performance Checks	% Non-compliant During 2013	% Non-compliant During Previous Survey
30 degree rule for trees met (collector)	38%	39%
No objects > 1 m height inside 5 m radius (raingage)	9%	14%
No vegetation height > 0.6 m within 5 m radius (raingage)	18%	22%
No objects > 1 m height within 5 m radius (collector)	38%	34%
No vegetation height > 0.6 m within 5 m radius (collector)	21%	23%
No treated lumber inside 5 m radius (collector)	12%	4%
No pastures and ag. activity within 20 m radius	10%	8%
Is the orifice of the collector +/- .3 m of raingage (elevation)	8%	13%
No fences > 1 m height inside 5 m radius (collector)	13%	15%
Was the 'as found' turn over set properly (Belfort gage)	58%	43%
45 degree rule met (collector)	19%	14%
Dry side bucket is clean	11%	19%
No fences > 1 m height inside 2 m radius (raingage)	14%	12%
Collector and sensor oriented properly	2%	6%
No galvanized metal inside 5 m radius collector (MDN)	37%	29%
Parking lots and maintenance areas meet NADP siting criteria	4%	3%

Table 3-7 reveals that approximately half of the assessments were evaluated as having improved, whereas half were assessed as being worse than when last surveyed. Most of the changes of any single assessment over time are small, or as in the case of Belfort turn-over the number of

observations decreased resulting in a large percent change. Therefore, it is not likely that these changes represent a significant overall change.

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 3-7 reveals that many of these changes relate to the installation of new equipment at some of these sites. Nearly 30 N-CON collectors were installed at the sites considered here between the two surveys and 45 Belfort gages were replaced with electronic gages. 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.

Three of the five assessments that had more sites out of compliance are related to vegetation. This includes the height of the vegetation near the gage 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 gage 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.

Comparing data from one survey to another indicates that the number of compliant parameters increases at some sites, and decreases at other sites. As a result 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. The fact that the vegetation is allowed 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 unrealistic expectations.

In general, review of data from repeat survey visits indicates that there may be a slight trend toward site operation improvement but it has not been determined whether or not it is significant in terms of sample quality improvement 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 should 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 3-7 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. Thirty two of the 54 gages identified as encouraged to operate gages with a windshield in 2013 were found to have shields installed. This represents approximately 59% adherence to the guideline. Three gages were identified to have had a shield during the previous survey, prior to installing an electronic gage.

Table 3-8. Status of Surveyed Sites Requiring Raingage Shields

Site ID	Network	Condition in 2013	Previous Survey
AK01	NTN	Not present	Not present
AK03	NTN	Not present	Not present
AK06	MDN/NTN	Not present	---
AK97	NTN	Installed	---
AK98	MDN	Not present	---
AZ02	MDN	Not present	Not present
CA28	NTN	Installed	Installed
CA50	NTN	Installed	Installed
CA75	MDN/NTN	Installed	Not present
CA76	NTN	Installed	Installed
CA96	NTN	Installed	Installed
CA99	NTN	Installed	Installed
ID02	NTN	Installed	Installed
ID03*	NTN	Not present	Installed
ID11	NTN	Installed	Installed
IN34	NTN	Installed	Installed

Site ID	Network	Condition in 2013	Previous Survey
ND00	NTN	Installed	Installed
NY06	MDN/NTN	Installed	Installed
NY10	NTN	Not present	Not present
NY43	MDN/NTN	Installed	Installed
OR09	NTN	Installed	Installed
OR18	NTN	Installed	Installed
PA13	MDN/NTN	Not present	Not present
PA18	NTN	Not present	Not present
PA29	MDN/NTN	Installed	Installed
PA30	MDN/NTN	Not present	Not present
PA42	MDN/NTN	Not present	Not present
PA52	MDN	Not present	Not present
PA90	MDN	Not present	Not present
SD04	NTN	Not present	Not present
UT97	MDN	Installed	Installed
WI08	MDN	Installed	Installed

MA01	MDN/NTN	Not present	Not present
MA08	NTN	Installed	Installed
MD08	MDN/NTN	Installed	Installed
MI99	NTN	Not present	Not present
MN23	MDN/NTN	Not present	Installed
MN28	NTN	Not present	Not present
MN32	NTN	Not present	Not present
MT00	NTN	Not present	Not present
MT05	MDN/NTN	Installed	Installed
MT07	NTN	Not present	Installed
MT95	MDN	Installed	--

WI25	NTN	Not present	Not present
WI36	MDN/NTN	Installed	Not present
WV18	NTN	Installed	Not present
WY00	NTN	Installed	Installed
WY02	NTN	Installed	Not present
WY06	NTN	Installed	Not present
WY08	MDN/NTN	Installed	Installed
WY26	MDN	Installed	--
WY95	NTN	Installed	Installed
WY97	NTN	Installed	Installed
WY98	NTN	Installed	Installed

-- Indicates site not previously surveyed by EEMS

* ID03 operates a NOAH IV gage. At one time the gage had a windshield attached to its base. Since the site is extremely windy it is possible the shield was removed to reduce excessive shaking of the gage.

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 14 Belfort raingages encountered during the period covered by this report. At co-located sites the same gage 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 Results - 14 Gages

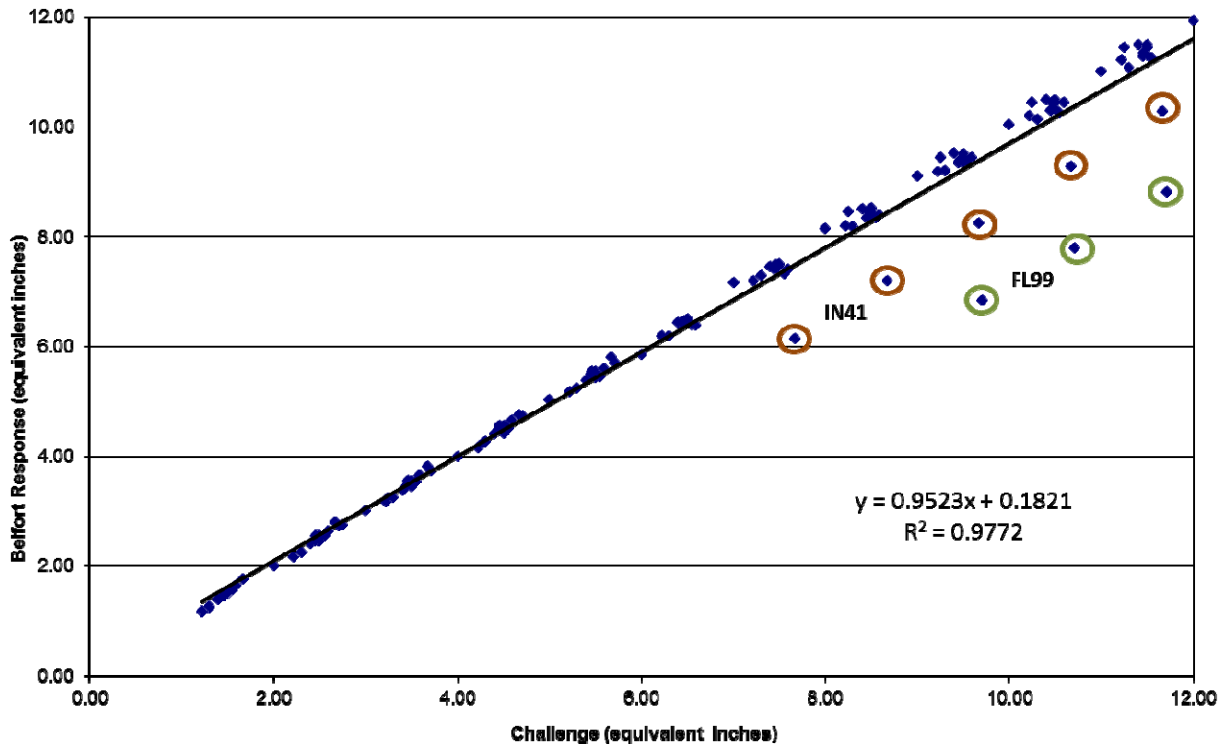
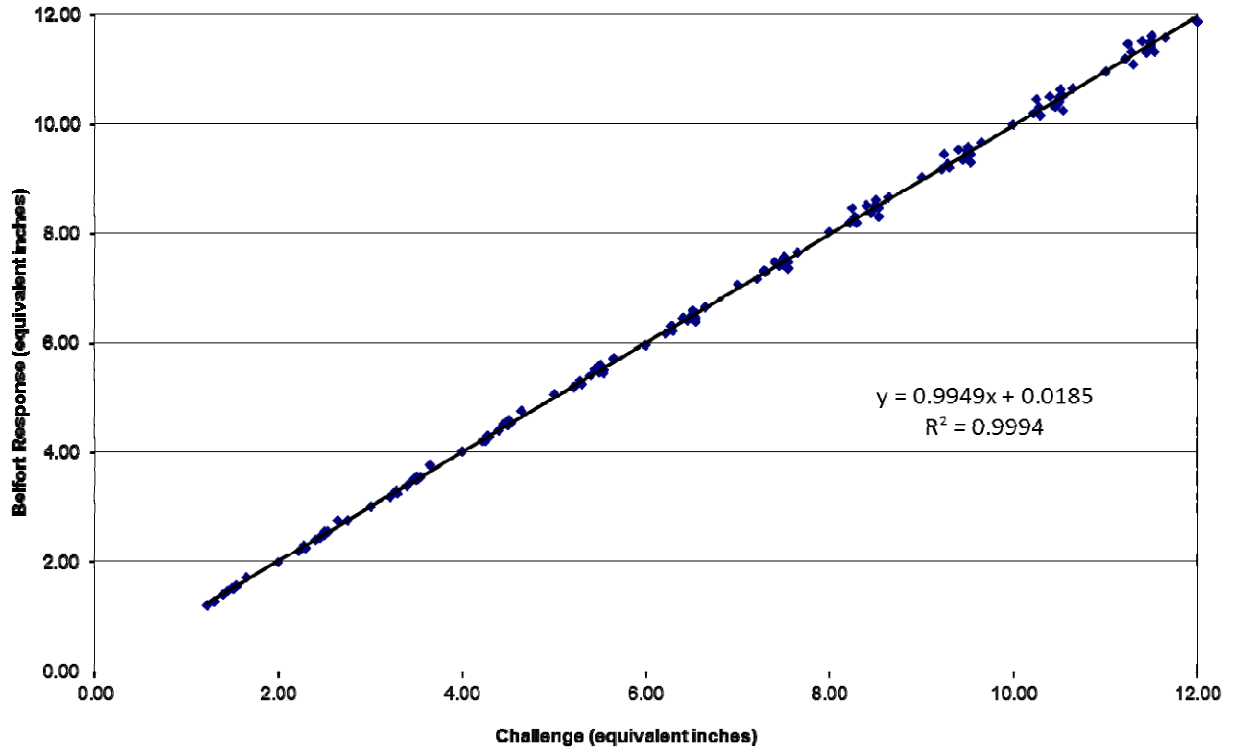


Figure 4-2 presents the “as left” Belfort raingage accuracy results for all gages encountered following any adjustments or improvements to the operation. Adjustments include leveling, cleaning, adjusting linkage, and calibration. Overall program-wide accuracy was improved as the results indicate with a slope and correlation coefficient close to 1.0.

Figure 4-2. As Left Belfort Accuracy - 14 Gages



4.2 Belfort Calibration Results

Of the 14 Belfort gages encountered, 8 gages (more than half) required some type of adjustment. Adjustments included cleaning, adjusting gage turnover, calibration, parts replacement, or gage replacement. Figures 4-3 and 4-4 present data from Belfort gages that were adjusted (a subset of all Belfort gages) during the survey. Gages that were already within tolerance or could not be adjusted to within tolerance are not included. Figure 4-3 presents the “unadjusted” calibration results and Figure 4-4 presents the results after adjustments and calibration.

The data indicate that half of the Belfort gages account for the majority of the as found gage error with an average calibration slope of 0.92 or nearly 10% low. There is also a noticeable decrease in accuracy observed in points above six inches in Figure 4-3. This is mostly attributed to improper gage turnover which is discussed in Section 6.0 of this report.

Figure 4-3. As Found Belfort Accuracy - 8 Adjusted Gages

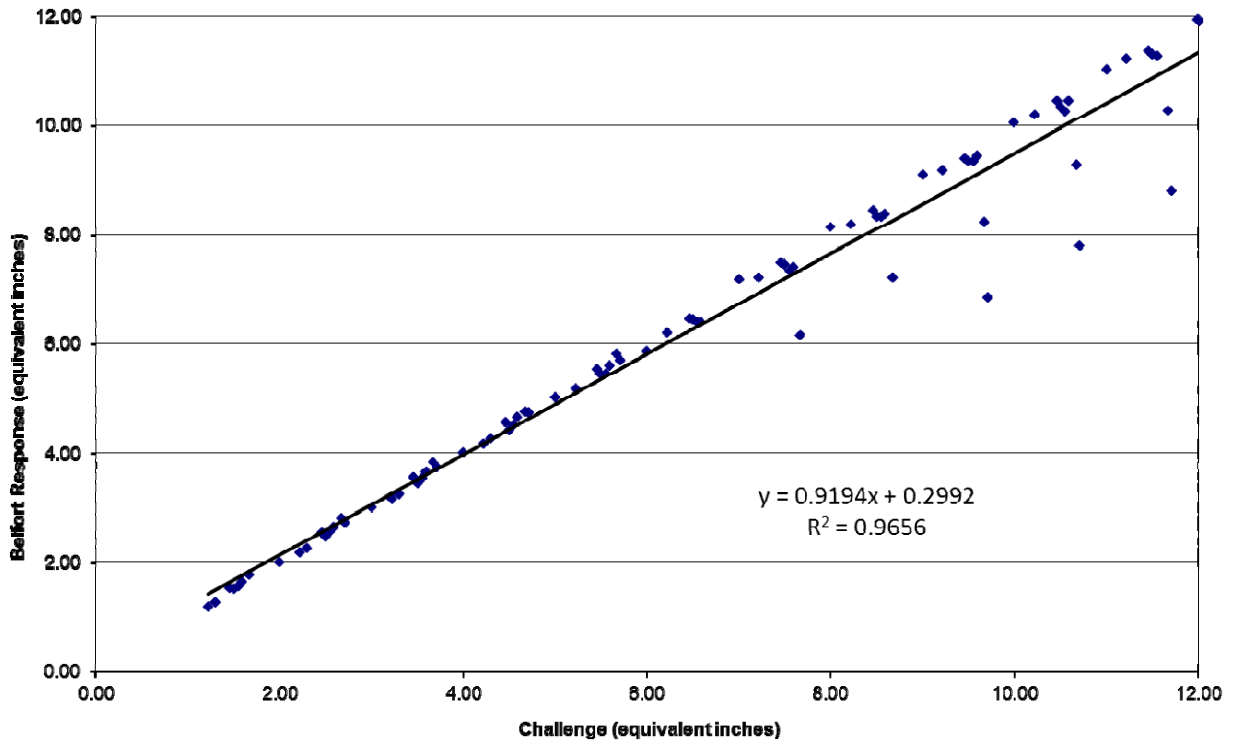
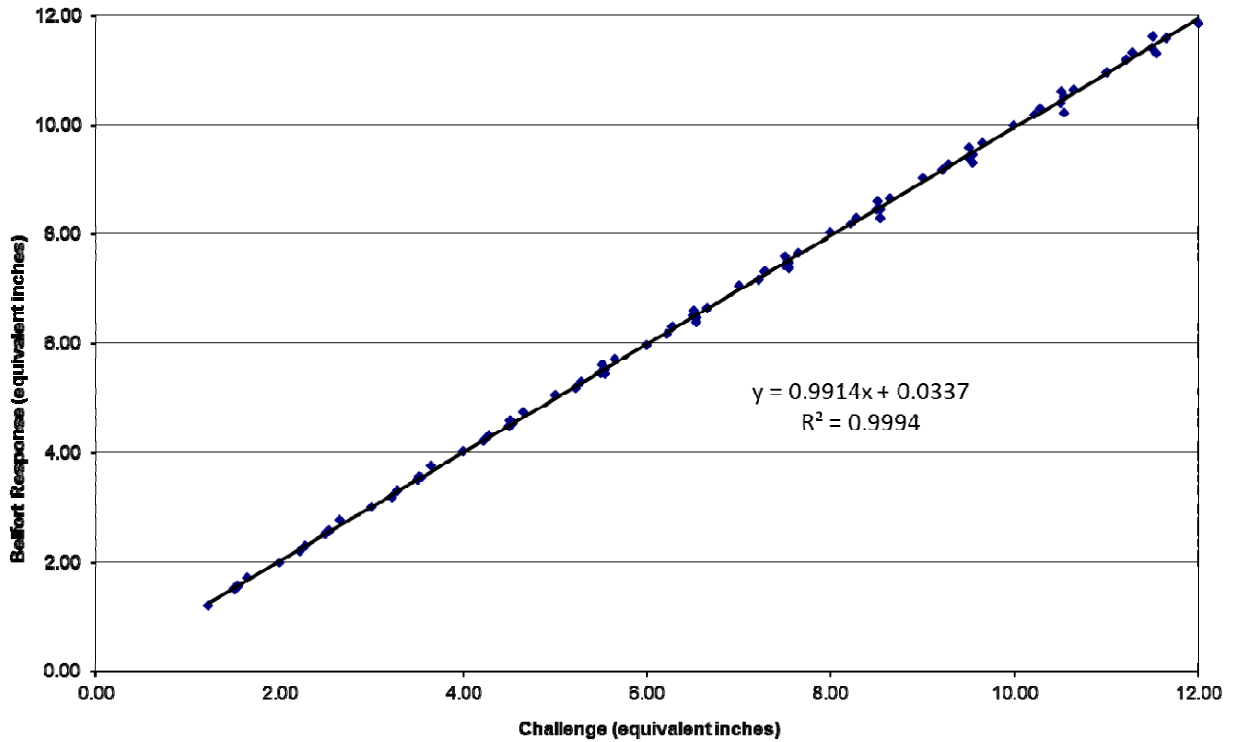


Figure 4-4. As Left Belfort Accuracy - 8 Adjusted Gages

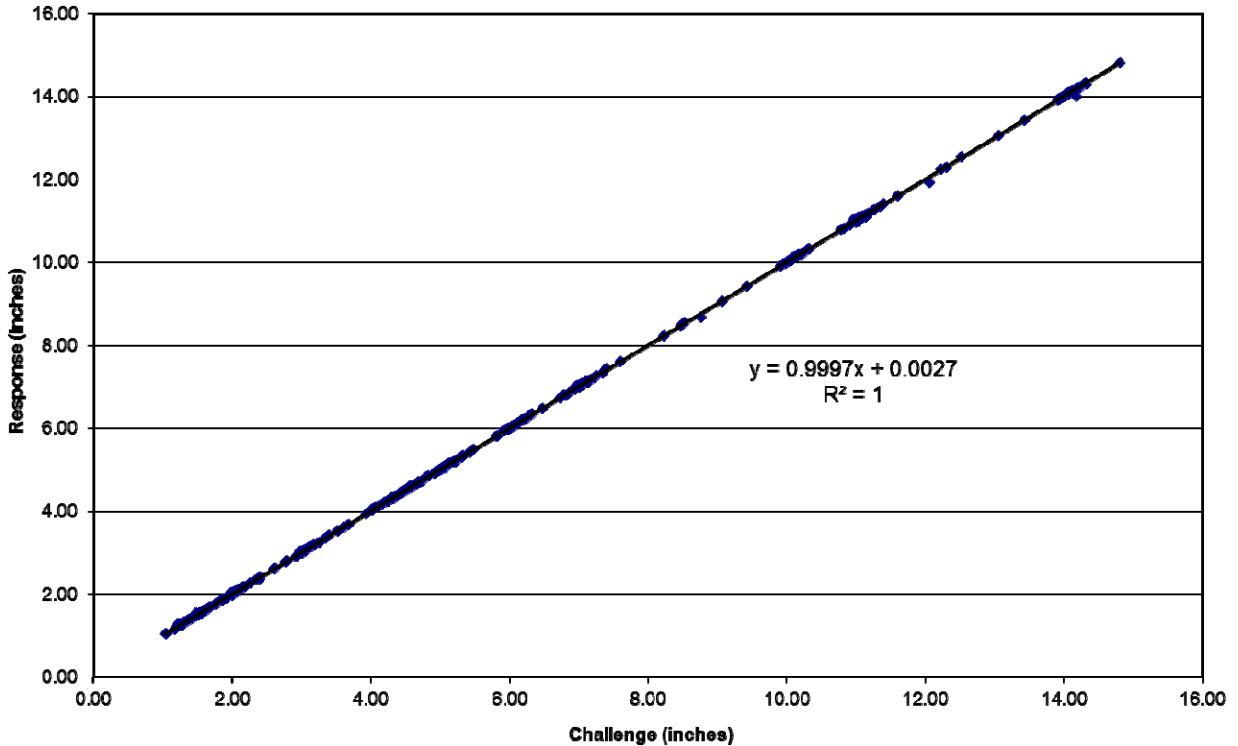


4.3 Electronic Gage Accuracy

The results of the accuracy tests for the 103 electronic raingages challenged during the period covered by this report are presented in Figure 4-5. As demonstrated the gages report the weight of the standards added very accurately for the entire span. No problems with the electronic gages were encountered and none needed calibration. The field protocol requires that if an electronic gage is outside calibration limits, and cannot be corrected by resetting data logger parameters, the gage is to be returned to the manufacturer for repair.

The only notable problem with the electronic gage operation is related to the Personal Digital Assistant (PDA) and the required interfacing software. This is discussed further in Section 5.0.

Figure 4-5. As Found Electronic Gage Accuracy - 103 Gages



4.4 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 and to maximize the precipitation catch. 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 4-6. The results indicate that all inactive sensor heaters were functioning properly.

Figure 4-6. Inactivated Sensor Temperature

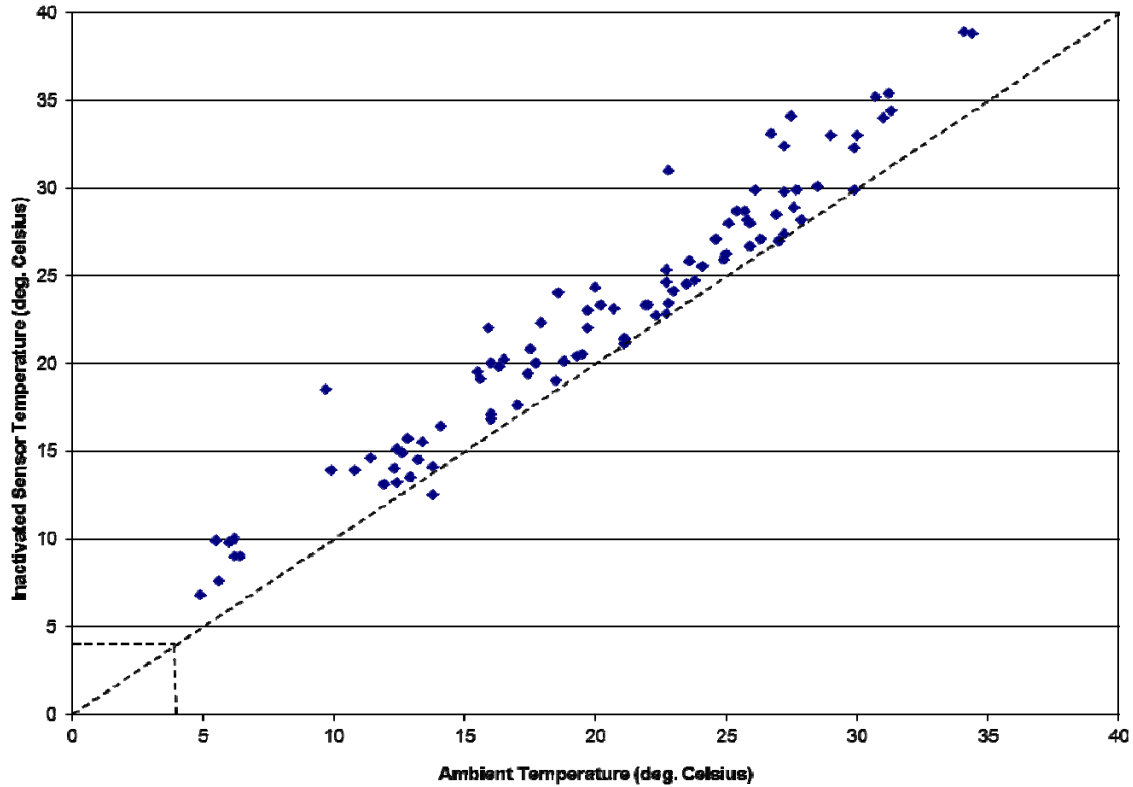
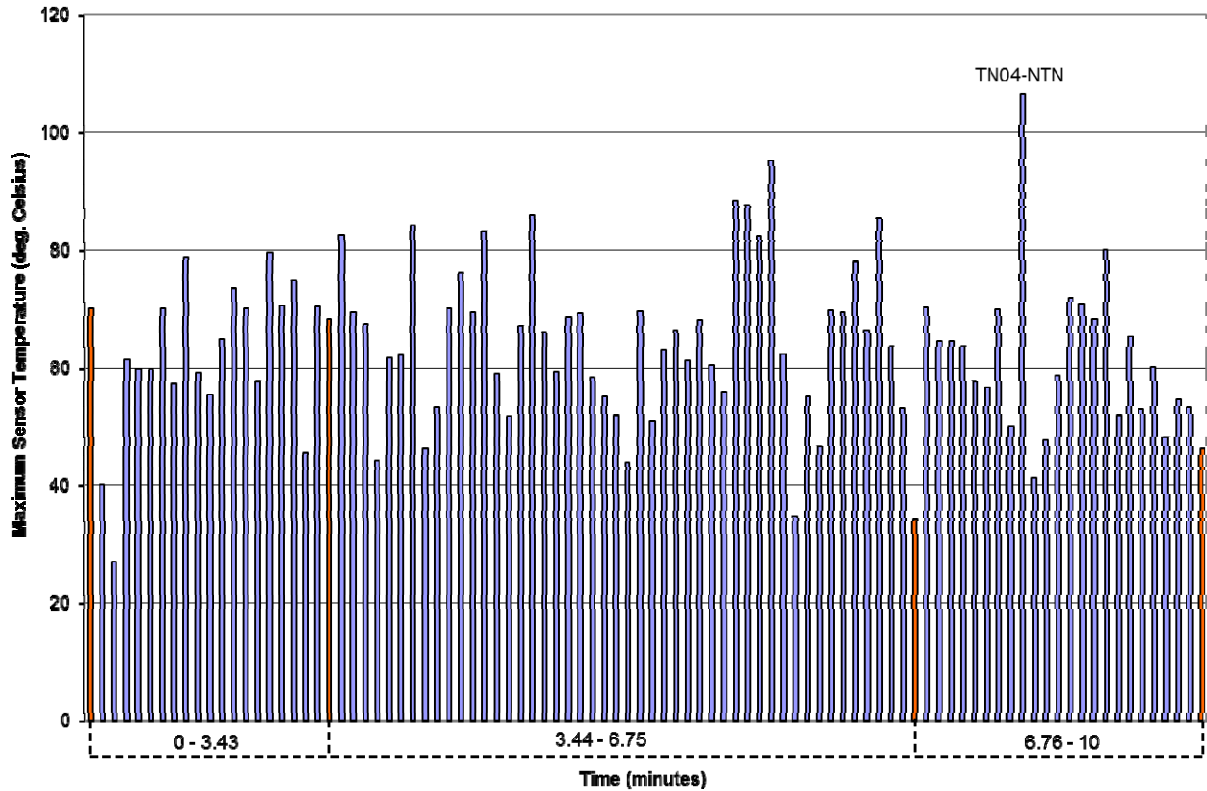


Figure 4-7 presents the maximum temperature reached by each sensor when activated, and the time required for each sensor to reach that temperature. There seems to be considerable variability between sensors for maximum temperature, but nearly all sensors are between 60°C and 80°C prior to 10 minutes 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 4-7. Activated Sensor Temperature Increase and Elapsed Time



Further evaluation of the data presented in Figure 4-7 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 Sensors for each Temperature Range

Temperature Range	Number of Sensors
< 30.0 °C	1
30.0° to 40.0 °C	2
40.1° to 50.0 °C	10
50.1° to 60.0 °C	25
60.1° to 70.0 °C	31
70.1° to 80.0 °C	15
80.1° to 90.0 °C	8
> 90.1°C	2

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 the siting criteria. For the sites visited in 2013 objects within 5 meters of the gage was the most prevalent non-compliant issue followed by the 30 ° tree guideline for collectors, and objects within 5 meters of collector.

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.

5.1 Documentation

Improvement was observed during this reporting period regarding updating and distributing procedures and training material. This is largely due to the implementation of the online training sessions offered by both the CAL and the HAL. It was also observed during the site surveys that information pertaining to the schedule and agenda of the webinars had been distributed by various means, and was available to the site operators. 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 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 greatly 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 easily identified through the NADP PO website.

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

Only 14 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 very limited due to the relatively small number of gages encountered. Those problems continue to be related to routine maintenance of the gages, specifically improper pen turnover setting and dirty linkage.

As documented in previous reports, additional raingage operation and maintenance procedure may benefit data quality. If Belfort gages are going to remain as part of the network, two solutions that could be easily implemented and could help to eliminate inaccuracies in precipitation measurement due to turnover problems are:

- Reduce the amount of antifreeze used during the winter and have the site operator empty the bucket and replace the antifreeze more frequently during the winter to avoid reaching the second transverse.
- Have the site operator check and adjust the turnover on a regular schedule.

The first suggestion may not be practical at all site locations due to both the amount of precipitation that falls during one week and the logistics involved with winterization of the gage.

The second solution requires removing the gage cover and making an adjustment to a linkage. There is always a potential for undesired results when adjustments are made to the mechanical linkage of the gage, therefore training should be provided and proper care should be exercised if implementing this approach. It has been our experience however, that the turnover adjustment is relatively straightforward and easily accomplished. Most site operators would be able to perform this adjustment given proper instruction. It is further suggested that if the second approach (check and adjust the turnover) is to be performed, it should be done during good weather just prior to winterizing the gage.

The second problem affecting the gages surveyed was the accumulation of dirt on the internal moving linkages. In most cases cleaning the linkages restored proper function of the gage. Therefore it is suggested that the site operators be instructed to clean the gages at least once per year. The best time to clean the gage would vary from site to site based on the local weather patterns. For example, gages in the southwest should be cleaned following the spring windstorms when they are likely to receive the most wind-blown dust. This would also ensure that they are clean and working properly prior to the season most likely for precipitation to occur.

It would also be advisable to clean the gage when performing the turnover adjustment, and check the turnover when cleaning the gage, since both procedures require removing the gage cover.

5.2.2 ACM Type Collector

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

Motor Box Fuse Holders

Several instances of broken, too loose or too tight motor box fuse holders were observed and recorded during this reporting period. The fuse holders are difficult to service in the field and most site operators should not attempt a repair.

It is suggested that as part of the motor box refurbishing process, all fuse holders be replaced. Some of the motor boxes are many years, or decades old, and if the fuse holders are original they have outlasted the expected duty cycle for the type of material they are made of, and the normal wear-and-tear of the twisting motion they endure. As part of the replacement process the nuts and lock washers which secure the holders should be evaluated and upgraded to improve the ability to lock the holders in place. Once the holder becomes loose there is a danger of damaging the connecting wires and causing an open circuit and loss of collector operation.

MDN Chimneys

As observed in past years, some of the MDN sites have chimney insulation that is showing signs of deterioration. It may be necessary to implement a procedure and schedule for insulation replacement for the modified ACM collectors.

Additionally, it was observed that there is some lack of consistency regarding sealing of the unused 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.

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 and stresses the importance of testing the sensors each week.

5.2.3 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.

As part of the continuing improvements being implemented in the field, all set screws and lid arm bolts are being tightened and Loctite is being added to the screw threads. 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.

It was observed and recorded that some of the new N-CON collectors were not properly oriented during the installation process. Unless there is a sound reason for the incorrect orientation, they are usually corrected during site surveys since it is relatively easy to rotate the collector on the mounting post.

It was also noted that many of the sites that received N-CON collectors did not receive the tool kit supplied by the manufacturer, and the sensor test switch supplied by the CAL. It is suggested that all site operators that operate N-CON collectors be polled to see if they have the kit, and be provided the kit if they do not.

5.2.4 Electronic Gage and PDA

The introduction of the electronic raingages into the network is a great improvement. All site operators that are operating electronic gages reported that they are happy with the improvement.

PDA and Thumb Drives

EEMS is aware that software development and testing requires time. Also the introduction of new electronic devices including PDA sometimes renders the older models obsolete. As the program moves to the digital world these challenges are evident. Improvement in the areas of software development and documentation has been observed during the surveys that took place during this year. Effort should stay focused as continued changes occur going forward.

It is suggested that the PDA documentation include detailed references to the various versions of both hardware and software. An effort should be made to standardize the software as much as possible. If need be this should include specific versions of software for specific hardware. This information can be used to evaluate if the appropriate combination and latest version is available at each site. This evaluation can become part of the site survey assessment.

The efforts to standardize and improve the PDA operation should continue even though new gage installations have required new methods of data collection and transfer. Technology

advancements have made PDA use obsolete, and the NADP has evolved to other methods to transmit data from the site loggers to the CAL.

The more recent methods involve 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 gage 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.

Sensor Response Tests

In addition to comparison of gage 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 gages.

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

Some site scales used for sample weighing require attention. 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 the as-found 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. As-Found Average Percent Difference for Site Scales

Site Id	Network	Average % Difference	Site Id	Network	Average % Difference	Site Id	Network	Average % Difference
AK01	NTN	0.02%	AK03	NTN	0.03%	AK06	NTN	0.00%
AK97	NTN	-0.14%	CA28	NTN	0.02%	CA42	NTN	-0.05%
CA45	NTN	0.09%	CA50	NTN	-0.11%	CA66	NTN	0.04%
CA67	NTN	0.08%	CA75	NTN	-0.03%	CA76	NTN	0.02%
CA88	NTN	0.03%	CA94	NTN	0.03%	CA96	NTN	0.04%
CA99	NTN	-0.05%	FL03	NTN	-0.14%	FL05	NTN	0.05%
FL11	NTN	-0.12%	FL14	NTN	0.09%	FL23	NTN	-0.19%
FL41	NTN	0.18%	FL99	NTN	0.01%	GA09	NTN	0.03%
GA20	NTN	-0.07%	GA33	NTN	-0.38%	GA99	NTN	0.06%

Site Id	Network	Average % Difference
ID02	NTN	-0.16%
IN22	NTN	0.10%
KY03	NTN	0.11%
KY22	NTN	0.11%
MA01	NTN	0.06%
MD15	NTN	-0.03%
MI99	NTN	0.06%
MN32	NTN	0.16%
MT05	NTN	0.12%
NC29	NTN	-0.08%
ND00	NTN	0.04%
NY43	NTN	0.11%
OK00	NTN	-0.01%
OR09	NTN	0.05%
OR97	NTN	0.08%
PA18	NTN	0.09%
PA42	NTN	0.09%
SC03	NTN	0.00%
SD04	NTN	-0.26%
TN14	NTN	0.09%
WI25	NTN	0.05%
WV18	NTN	0.06%
WY06	NTN	0.07%
WY97	NTN	0.01%

Site Id	Network	Average % Difference
ID03	NTN	0.15%
IN34	NTN	0.10%
KY10	NTN	0.04%
KY35	NTN	0.02%
MA08	NTN	0.13%
MD18	NTN	0.03%
MN23	NTN	-0.04%
MS12	NTN	0.02%
MT07	NTN	0.07%
NC35	NTN	0.07%
NY06	NTN	0.03%
NY96	NTN	0.11%
OK17	NTN	0.06%
OR10	NTN	0.01%
PA00	NTN	0.17%
PA29	NTN	0.12%
PA47	NTN	0.09%
SC05	NTN	-0.01%
TN00	AIRMoN	-0.14%
VI01	NTN	0.09%
WI36	NTN	0.01%
WY00	NTN	-0.04%
WY08	NTN	0.11%
WY98	NTN	0.07%

Site Id	Network	Average % Difference
ID11	NTN	0.02%
IN41	NTN	0.07%
KY19	NTN	-0.17%
KY99	NTN	0.14%
MD08	NTN	-0.04%
MI52	NTN	0.13%
MN28	NTN	-0.05%
MT00	NTN	0.01%
NC06	NTN	0.09%
NC36	NTN	0.07%
NY10	NTN	-0.02%
OH17	NTN	-0.54%
OK29	NTN	0.10%
OR18	NTN	0.06%
PA13	NTN	0.09%
PA30	NTN	0.09%
PR20	NTN	0.10%
SC06	NTN	0.20%
TN04	NTN	0.04%
WA98	NTN	0.05%
WV05	NTN	-0.03%
WY02	NTN	0.01%
WY95	NTN	-0.04%

6.2 pH and Conductivity Measurements

This subsection presents the results of the field chemistry evaluations performed at the only 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 pH and conductivity sample provided by the PO did not include a range of uncertainty as it has in past years. As a result it is unclear whether the values obtained by the site operator are within the acceptable error. The uncertainty values used in the tables below represent the largest errors from similar samples provided by the PO in past years. When compared to these uncertainties, both the pH and conductivity assessment results were above acceptable limits.

The site operator of the only AIRMoN site surveyed demonstrated 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 best as possible.

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

Site Id	Network	pH Target Value	Response	Difference
TN00	AIRMoN	4.83 ± 0.15^3	4.61	0.22

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

Site Id	Network	Conductivity Target Value (± 0.9) ³	Response	Difference
TN00	AIRMoN	10.1 ± 0.9^3	11.5	-1.4

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

³ The sample provided by the CAL did not indicate an acceptable error for the pH and conductivity measurements. The acceptable errors presented here are those provided with the samples for the AIRMoN sites in 2014.

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 is expected to continue.

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

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. 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 reinstated. 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 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 64,312 entries that are compared (does not include memo fields), the entry error rate is about 0.8% and approximately the same for both field and office entry.

Table 7-1. 2013 Internal QA Results for Duplicate Entry Errors

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	32,156	32,156	64,312
Initial File Entry Errors	244	N/A	N/A
Duplicate QA Entry Errors	N/A	245	N/A
Percent Errors	0.76%	0.76%	N/A
Total Entry Errors	489		
Total Percent Errors	0.76%		

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

APPENDIX B

Findings Most Likely to Impact Data Quality

APPENDIX C

Comparison between Surveys of Findings Most Likely to Impact Data Quality

APPENDIX D

Transfer Standard Instrument Certifications

APPENDIX A

Assessments Determined to Impact Data Quality

Assessments Determined to Impact Data Quality

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

Field Entry	NTN	MDN	AIRMON
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/A	✓	N/A
N-CON lid seal in good condition	N/A	✓	N/A
N-CON lid liner in good condition	N/A	✓	N/A
Was the 'as found' turn over set properly (Belfort gage)	✓	✓	N/A
Raingage operates properly (electronic gage)	✓	✓	N/A
Does datalogger receive event signals form all collectors (electronic gage)	✓	✓	N/A
Does optical sensor respond to "blocking" of light beam (electronic gage)	✓	✓	N/A
Does optical sensor respond to mist of water (electronic gage)	✓	✓	N/A

N/A = Not applicable

APPENDIX B

Findings Most Likely to Impact Data Quality

Table B-1. Findings Most Likely to Impact Data Quality – NTN with ACM-type Collector and Electronic Gage (1 of 3)

	AK01	AK03	AK06	AK97	CA28	CA67	CA75	CA94	CA96	CA99	FL05	FL11	FL23	GA09	GA20	GA33	ID02	ID03	IN34	KY10
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				
No fences > 1 m height inside 2 m radius (raingage)															X					
No vegetation height > 0.6 m within 5 m radius (raingage)						X		X	X		X			X				X		
Collector and sensor oriented properly																				
45 degree rule met (collector)						X	X						X							
30 degree rule for trees met (collector)		X			X		X			X				X	X					
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)						X	X	X					X	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		
No pastures and ag. activity within 20 m radius															X					
No herbicides and fertilizers used within 20 m radius											X							X		
Roads meet NADP siting criteria											X									
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP 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							U to T									X		X		
Does lid seal properly				X			U to T													
Lid liner in good condition																				
ACM sensor operates properly							U to T													
Motorbox operates within acceptable limits							U to T													
Raingage operates properly (electronic gage)																				
Does datalogger receive event signals form all collectors (electronic gage)								X							X		X	X		
Does optical sensor respond to "blocking" of light beam (electronic gage)	U to T							X												N/A
Does optical sensor respond to mist of water (electronic gage)	U to T																			N/A

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

Table B-1. Findings Most Likely to Impact Data Quality – NTN with ACM-type Collector and Electronic Gage (2 of 3)

	KY19	KY99	MA01	MA08	MD08	MD18	MI52	MN32	MS12	MT00	MT05	NC06	NC29	NC35	NC36	ND00	NY96	OH17	OK29
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)											X								
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)							X								X				
No vegetation height > 0.6 m within 5 m radius (raingage)				X	X					X						X			
Collector and sensor oriented properly																			
45 degree rule met (collector)			X				X									X			
30 degree rule for trees met (collector)				X				X			X							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			
No vegetation height > 0.6 m within 5 m radius (collector)				X	X			X		X						X			
No treated lumber inside 5 m radius (collector)																			
No pastures and ag. activity within 20 m radius																			
No herbicides and fertilizers used within 20 m radius	X					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																			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																			
Dry side bucket is clean			X				X	U to T											X
Does lid seal properly																			
Lid liner in good condition																			X
ACM sensor operates properly																			
Motorbox operates within acceptable limits																			
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)	N/A					U to T			N/A				N/A	N/A	N/A				N/A
Does optical sensor respond to mist of water (electronic gage)	N/A								N/A				N/A	N/A	N/A				N/A

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

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

	OR97	PA00	PA29	PR20	SC05	SC06	TN04	TN11*	TN14	VI01	WA98	WI36	WV05	WV18	WY00	WY02	WY06	WY08	WY95	WY98
Is sampling media quality maintained?													U to T							
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)														X						
No vegetation height > 0.6 m within 5 m radius (raingage)				X					X											
Collector and sensor oriented properly	X								X		X									
45 degree rule met (collector)						X	X			X			X							
30 degree rule for trees met (collector)					X	X		X	X				X						X	
30 degree rule for buildings met (collector)																				
No objects > 1 m height within 5 m radius (collector)				X				X		X								X	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			
No treated lumber inside 5 m radius (collector)																X		X		X
No pastures and ag. activity within 20 m radius	X						X									X	X			X
No herbicides and fertilizers used within 20 m radius	X																			
Roads meet NADP siting criteria																			X	
Waterways meet NADP siting criteria																				
Airports meet NADP siting criteria																				
Animal operations meet NADP 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									X											
Dry side bucket is clean							X			X			X							
Does lid seal properly													X							
Lid liner in good condition																				
ACM sensor operates properly				X	X		X													
Motorbox operates within acceptable limits																				
Raingage operates properly (electronic gage)								N/A												
Does datalogger receive event signals form all collectors (electronic gage)								N/A					U to T							
Does optical sensor respond to "blocking" of light beam (electronic gage)						N/A		N/A	N/A		U to T									
Does optical sensor respond to mist of water (electronic gage)				X		N/A		N/A	N/A		U to T									

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

* TN11 is the only AIRMoN site and has been included in this table given the similarities between the NTN and AIRMoN survey questionnaire. The primary gage was assumed to be the NWS Stick Gage. It did not meet the 0.01" tolerance.

Table B-2. Findings Most Likely to Impact Data Quality – NTN Site with ACM-type Collector and Belfort Gage

	CA42	CA66	FL03	FL99	IN41	MD15	MI99	MN28	OK17	OR10	SD04	WI25	WY97
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			
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)										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
No fences > 1 m height inside 5 m radius (collector)													
No vegetation height > 0.6 m within 5 m radius (collector)	X		X			X		X	X				
No treated lumber inside 5 m radius (collector)						X							
No pastures and ag. activity within 20 m radius									X				
No herbicides and fertilizers used within 20 m radius													
Roads meet NADP siting criteria										X			
Waterways meet NADP siting criteria													
Airports meet NADP siting criteria													
Animal operations meet NADP 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					X				
Does lid seal properly													
Lid liner in good condition											X		
ACM sensor operates properly													
Motorbox operates within acceptable limits													
Was the 'as found' turn-over set properly	X			X	X			X					X

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

Table B-3. Findings Most Likely to Impact Data Quality – NTN Site with N-CON Collector and Electronic Gage (1 of 2)

	CA45	CA50	CA76	CA88	FL14	FL41	GA99	ID11	IN22	KY03	KY22	KY35	MN23
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
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			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		X				X	X		X
No fences > 1 m height inside 5 m radius (collector)													
No vegetation height > 0.6 m within 5 m radius (collector)	X		X										
No treated lumber inside 5 m radius (collector)	X		X										X
No pastures and ag. activity within 20 m radius	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								X					
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria													
N-CON lid liner in good condition			X										X
N-CON lid seal in good condition	X	X											
N-CON sensor responds to a 20-second mist of water													N/A
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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Does optical sensor respond to mist of water (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

Table B-3. Findings Most Likely to Impact Data Quality – NTN Sites with N-CON Collector and Electronic Gage (2 of 2)

	MT07	NY06	NY10	NY43	OK00	OR09	OR18	PA13	PA18	PA30	PA42	PA47	SC03
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
No fences > 1 m height inside 2 m radius (raingage)			X	X									X
No vegetation height > 0.6 m within 5 m radius (raingage)					X					X			
Collector and sensor oriented properly													
45 degree rule met (collector)			X	X						X			X
30 degree rule for trees met (collector)	X		X	X					X	X	X		X
30 degree rule for buildings met (collector)													
No objects > 1 m height within 5 m radius (collector)	X	X	X	X			X	X		X			X
No fences > 1 m height inside 5 m radius (collector)			X	X									X
No vegetation height > 0.6 m within 5 m radius (collector)			X		X								
No treated lumber inside 5 m radius (collector)	X			X		X	X						
No pastures and ag. activity within 20 m radius							X						
No herbicides and fertilizers used within 20 m radius													
Roads meet NADP siting criteria				X									
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													
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria													
N-CON lid liner in good condition													
N-CON lid seal in good condition													
N-CON sensor responds to a 20-second mist of water	N/A		X	N/A									
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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	U to T
Does optical sensor respond to mist of water (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	U to T

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

Table B-4. Findings Most Likely to Impact Data Quality – MDN Sites with ACM-type Collector and Electronic Gage (1 of 2)

	AK06	AK98	AZ02	CA20*	CA75	CA94	FL05	FL11	FL34	FL97	GA09	KY10
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	
No fences > 1 m height inside 2 m radius (raingage)		X										
No vegetation height > 0.6 m within 5 m radius (raingage)						X	X				X	
Collector and sensor oriented properly	X			X								
45 degree rule met (collector)					X							X
30 degree rule for trees met (collector)			X	X	X	X					X	
30 degree rule for buildings met (collector)												
No objects > 1 m height within 5 m radius (collector)		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)												
No galvanized metal inside 5 m radius collector (MDN)			X		X				X			
No pastures and ag. activity within 20 m radius												
No herbicides and fertilizers used within 20 m radius							X					
Roads meet NADP siting criteria							X					
Waterways meet NADP siting criteria												
Airports meet NADP siting criteria												
Combustion sources meet NADP siting criteria (MDN only)												
Parking lots and maintenance areas meet NADP siting criteria												
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria												
Metalworking operations meet NADP siting criteria (MDN only)												
Dry side bucket is clean										X		
Does lid seal properly												
Lid liner in good condition												
Fan in good condition												
Cooling fan thermostat in good condition												
Heater in good condition								N/A	N/A	N/A		
Heater thermostat in good condition								N/A	N/A	N/A		
Has flush wall filter mount been installed	X	X										
Filter in good condition	N/A	N/A	U to T		U to T	U to T						U to T
Max / min thermometer in acceptable limits							X					X
ACM sensor operates properly			X						X			
Motorbox operates within acceptable limits												
Raingage operates properly (electronic gage)				N/A								
Does datalogger receive event signals form all collectors (electronic gage)				N/A								
Does optical sensor respond to "blocking" of light beam (electronic gage)		U to T	N/A	N/A		X						
Does optical sensor respond to mist of water (electronic gage)		U to T	N/A	N/A								

- X Indicates found non-compliant
- N/A Indicates "Not applicable"
- U to T Indicates "Unable to test"

* CA20 is the only MDN site operating a Belfort gage as the primary gage. The 'as found' Belfort turn-over was not set properly

Table B-4. Findings Most Likely to Impact Data Quality – MDN Sites with ACM-type Collector and Electronic Gage (2 of 2)

	MA01	MD00	MD08	MN23	MS12	MT05	PA00	SC05	SC19	WI36	WY08
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)						X					
No objects > 1 m height inside 5 m radius (raingage)	X	X	X	X	X	X			X		X
No fences > 1 m height inside 2 m radius (raingage)											
No vegetation height > 0.6 m within 5 m radius (raingage)			X								
Collector and sensor oriented properly											
45 degree rule met (collector)		X							X		
30 degree rule for trees met (collector)								X	X		X
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)		X				X			X		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 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					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)											
Dry side bucket is clean	X										
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				U to T							
Has flush wall filter mount been installed			X				X				
Filter in good condition			N/A				N/A				N/A
Max / min thermometer in acceptable limits						X				X	
ACM sensor operates properly											
Motorbox operates within acceptable limits											
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)				N/A	N/A				N/A		
Does optical sensor respond to mist of water (electronic gage)		U to T		N/A	N/A				N/A		

X Indicates found non-compliant

N/A Indicates "Not applicable"

U to T Indicates "Unable to test"

Table B-5. Findings Most Likely to Impact Data Quality - MDN Sites with N-CON Collector and Electronic Gage (1 of 2)

	GA33	GA40	MT95	NY06	NY43	OK01	OK04	OK06	OK22	OK31	PA13
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			X	X	X	X		X	
No vegetation height > 0.6 m within 5 m radius (raingage)									X	X	
Collector and sensor oriented properly			X								
45 degree rule met (collector)			X		X						
30 degree rule for trees met (collector)					X						X
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)	X	X	X	X	X						X
No fences > 1 m height inside 5 m radius (collector)		X		X	X	X		X		X	
No vegetation height > 0.6 m within 5 m radius (collector)									X	X	
No treated lumber inside 5 m radius (collector)					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	X	X	
No herbicides and fertilizers used within 20 m radius											
Roads meet NADP siting criteria					X						
Waterways meet NADP siting criteria											
Airports meet NADP siting criteria											
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						X					
N-CON sensor responds to a 20-second mist of water			N/A		N/A						
N-CON lid seal in good condition			X								
N-CON lid liner in good condition											
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)		U to T						X			N/A
Does optical sensor respond to mist of water (electronic gage)		U to T									N/A

X Indicates found non-compliant

N/A Indicates "Non-applicable"

U to T Indicates "Unable to test"

Table B-5. Findings Most Likely to Impact Data Quality - MDN Sites with N-CON Collector and Electronic Gage (2 of 2)

	PA29	PA30	PA42	PA47	PA52	PA60	PA90	SC03	UT97	WI08	WY26
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	X	X	
No fences > 1 m height inside 2 m radius (raingage)						X		X		X	
No vegetation height > 0.6 m within 5 m radius (raingage)		X					X				
Collector and sensor oriented properly				X							
45 degree rule met (collector)		X					X	X			
30 degree rule for trees met (collector)		X	X		X	X	X			X	
30 degree rule for buildings met (collector)											
No objects > 1 m height within 5 m radius (collector)		X		X	X	X			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
No galvanized metal inside 5 m radius collector (MDN)									X	X	
No pastures and ag. activity within 20 m radius					N/A						
No herbicides and fertilizers used within 20 m radius											
Roads meet NADP siting criteria									X		
Waterways meet NADP siting criteria		X									
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											
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									N/A	N/A	
N-CON lid seal in good condition											
N-CON lid liner in good condition											
Raingage operates properly (electronic gage)											
Does datalogger receive event signals from all collectors (electronic gage)				X					X		
Does optical sensor respond to "blocking" of light beam (electronic gage)		N/A	N/A	N/A	N/A	N/A	N/A	U to T			
Does optical sensor respond to mist of water (electronic gage)		N/A	N/A	N/A	N/A	N/A	N/A	U to T		U to T	

X Indicates found non-compliant

N/A Indicates "Non-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 Year	AZ02		CA20		CA75		CA94		FL05		FL11		FL34		FL97		GA09			GA33			
	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2011	2008	2013	2011	2008	
Is sampling media quality maintained?																							
Is the orifice of the collector +/- .3 m of raingage (elevation)										X						X							
45 degree rule met, rain gage					X	X													X				
30 degree rule for trees met, rain gage		X	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	
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	
45 degree rule met (collector)					X	X													X				
Collector and sensor oriented properly			X													X							
30 degree rule for trees met (collector)	X	X	X	X	X	X	X	X									X	X	X				X
30 degree rule for buildings met (collector)																							
No objects > 1 m height within 5 m radius (collector)		X			X	X	X	X												X	X		
No fences > 1 m height inside 5 m radius (collector)	X	X																					
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)																							
No galvanized metal inside 5 m radius collector (MDN)	X	X			X									X	X								
No pastures and ag. activity within 20 m radius		--						--											--				
No herbicides and fertilizers used within 20 m radius		--						--	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																							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							
Metalworking operations meet NADP siting criteria (MDN only)																							

- 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 Year	GA40			KY10		MA01		MD00		MD08		MN23			MT05			NY06		NY43		OK01	
	2013	2011	2008	2013	2010	2013	2009	2013	2010	2013	2008	2013	2011	2008	2013	2011	2008	2013	2010	2013	2010	2013	2011
Is sampling media quality maintained?						X																	
Is the orifice of the collector +/- .3 m of raingage (elevation)																				X	X		
45 degree rule met, rain gage				X		X		X	X						X	X				X	X		
30 degree rule for trees met, rain gage												X			X	X	X			X	X		
30 degree rule for buildings met (raingage)															X	X							
No objects > 1 m height inside 5 m radius (raingage)	X					X	X	X	X	X		X			X	X	X	X	X	X	X		
No fences > 1 m height inside 2 m radius (raingage)	X																	X		X	X	X	X
No vegetation height > 0.6 m within 5 m radius (raingage)							X			X	X		X		X								X
45 degree rule met (collector)				X			X	X												X	X		
Collector and sensor oriented properly																			X				
30 degree rule for trees met (collector)							X						X				X			X	X		
30 degree rule for buildings met (collector)																							
No objects > 1 m height within 5 m radius (collector)	X							X	X						X			X	X	X	X		
No fences > 1 m height inside 5 m radius (collector)	X														X	X	X	X		X	X	X	X
No vegetation height > 0.6 m within 5 m radius (collector)										X	X		X		X	X							X
No treated lumber inside 5 m radius (collector)												X					X			X			
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			--																				
Roads meet NADP siting criteria															X					X			
Waterways meet NADP siting criteria																							
Airports meet NADP siting criteria																							
Combustion sources meet NADP siting criteria (MDN only)																							
Parking lots and maintenance areas meet NADP siting criteria																							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							
Metalworking operations meet NADP siting criteria (MDN only)																							

- 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 Year	OK04		OK06		OK31		PA00		PA13			PA30			PA42		PA47		PA52		PA60	
	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2013	2010	2013	2010	2013	2010
Is sampling media quality maintained?													X	X								
Is the orifice of the collector +/- .3 m of raingage (elevation)														X				X				X
45 degree rule met, rain gage							X	X			X	X			X	X						
30 degree rule for trees met, rain gage									X	X	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			X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)	X	X	X	X	X	X															X	X
No vegetation height > 0.6 m within 5 m radius (raingage)					X							X	X	X								
45 degree rule met (collector)											X	X										
Collector and sensor oriented properly																	X					
30 degree rule for trees met (collector)									X	X	X	X	X	X	X	X			X		X	X
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)		X		X		X			X			X	X	X		X	X		X	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)																						
No galvanized metal inside 5 m radius collector (MDN)	X	X	X	X	X	X																
No pastures and ag. activity within 20 m radius			X		X	X	X	X			--			--					--			
No herbicides and fertilizers used within 20 m radius							X	X			--			--								
Roads meet NADP siting criteria																						
Waterways meet NADP siting criteria												X	X	X								
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)																						

- 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 Year	PA90			SC03		SC05			SC19			UT97		WI08			WI36			WY08		
	2013	2010	2008	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2013	2011	2008	2013	2010	2008	2013	2009	
Is sampling media quality maintained?																						
Is the orifice of the collector +/- .3 m of raingage (elevation)	X								X													
45 degree rule met, rain gage	X	X		X	X			X	X	X												
30 degree rule for trees met, rain gage	X	X	X	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	X							X	
No fences > 1 m height inside 2 m radius (raingage)				X										X	X							
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X													X							
45 degree rule met (collector)	X	X		X	X				X	X												
Collector and sensor oriented properly																X						
30 degree rule for trees met (collector)	X	X	X			X	X	X	X	X	X			X							X	X
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)		X			X				X	X	X	X	X	X	X						X	X
No fences > 1 m height inside 5 m radius (collector)					X				X	X	X			X	X							
No vegetation height > 0.6 m within 5 m radius (collector)														X	X							
No treated lumber inside 5 m radius (collector)																					X	
No galvanized metal inside 5 m radius collector (MDN)									X	X	X	X	X	X	X	X					X	
No pastures and ag. activity within 20 m radius																--			--			
No herbicides and fertilizers used within 20 m radius																--			--			
Roads meet NADP siting criteria												X	X								X	
Waterways meet NADP siting criteria																						
Airports meet NADP siting criteria																						
Combustion sources meet NADP siting criteria (MDN only)																						
Parking lots and maintenance areas meet NADP siting criteria												X	X								X	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																--			--			
Metalworking operations meet NADP siting criteria (MDN only)																						

- 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 10)

StationId Year	AK01		AK03		CA28		CA42		CA45		CA50		CA66		CA67		CA75		CA76		CA94	
	2013	2010	2013	2010	2013	2011	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010
Is sampling media quality maintained?		X															U to T					
Is the orifice of the collector +/- .3 m of raingage (elevation)					X	X	X	X														
45 degree rule met, rain gage				X		X				X	X	X	X	X	X	X	X	X				
30 degree rule for trees met, rain gage			X	X	X	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
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	
45 degree rule met (collector)						X					X	X			X	X	X	X				
Collector and sensor oriented properly									X													
30 degree rule for trees met (collector)			X	X	X	X	X	X	X	X	X	X					X	X				X
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)							X	X	X	X					X	X	X	X			X	X
No fences > 1 m height inside 5 m radius (collector)										X												
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			
No pastures and ag. activity within 20 m radius									X													
No herbicides and fertilizers used within 20 m radius									X	X												
Roads meet NADP siting criteria																						
Waterways meet NADP siting criteria																						
Animal operations meet NADP siting criteria (NTN and AIRMoN)																						
Airports meet NADP siting criteria																						
Parking lots and maintenance areas meet NADP siting criteria																						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																						

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 10)

StationId	CA96		CA99		FL03		FL05		FL11		FL14		FL23		FL41		FL99		GA09			
	Year	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2011	2008
Is sampling media quality maintained?																						
Is the orifice of the collector +/- .3 m of raingage (elevation)								X						X	X							
45 degree rule met, rain gage						X						X	X	X	X		X					X
30 degree rule for trees met, rain gage				X	X	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		
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	
45 degree rule met (collector)												X		X	X		X					X
Collector and sensor oriented properly																						
30 degree rule for trees met (collector)				X	X	X	X					X	X		X	X	X			X	X	X
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)														X	X	X				X		
No fences > 1 m height inside 5 m radius (collector)																						
No vegetation height > 0.6 m within 5 m radius (collector)	X			X	X	X								X								
No treated lumber inside 5 m radius (collector)														X								
No pastures and ag. activity within 20 m radius																						
No herbicides and fertilizers used within 20 m radius								X														
Roads meet NADP siting criteria								X														
Waterways meet NADP siting criteria																						
Animal operations meet NADP siting criteria (NTN and AIRMoN)																						
Airports meet NADP siting criteria																						
Parking lots and maintenance areas meet NADP siting criteria																			X			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																						

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 10)

StationId	GA20		GA33			GA99			ID02			ID03			ID11			IN22			IN34		
	Year	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2009
Is sampling media quality maintained?																							
Is the orifice of the collector +/- .3 m of raingage (elevation)																X	X	X					
45 degree rule met, rain gage																							
30 degree rule for trees met, rain gage		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					
No fences > 1 m height inside 2 m radius (raingage)		X	X															X					
No vegetation height > 0.6 m within 5 m radius (raingage)					X	X							X	X	X								
45 degree rule met (collector)																							
Collector and sensor oriented properly							X																
30 degree rule for trees met (collector)		X	X																			X	
30 degree rule for buildings met (collector)																							
No objects > 1 m height within 5 m radius (collector)			X		X	X																	
No fences > 1 m height inside 5 m radius (collector)		X	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										X	X								X				
Roads meet NADP siting criteria			X																				
Waterways meet NADP siting criteria																							
Animal operations meet NADP siting criteria (NTN and AIRMoN)																							
Airports meet NADP siting criteria																							
Parking lots and maintenance areas meet NADP siting criteria																X	X						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							

- 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 10)

StationId	IN41			KY03		KY10		KY19		KY22		KY35		KY99		MA01		MA08		MD08		MD15		
	Year	2013	2011	2007	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2009	2013	2009	2013	2008	2013	2010
Is sampling media quality maintained?					X																			
Is the orifice of the collector +/- .3 m of raingage (elevation)					X	X																		
45 degree rule met, rain gage					X	X	X				X	X					X							
30 degree rule for trees met, rain gage					X	X					X	X		X					X					
30 degree rule for buildings met (raingage)																								
No objects > 1 m height inside 5 m radius (raingage)																	X	X			X	X		
No fences > 1 m height inside 2 m radius (raingage)											X	X												
No vegetation height > 0.6 m within 5 m radius (raingage)																		X	X		X	X		
45 degree rule met (collector)											X	X					X	X						
Collector and sensor oriented properly																								
30 degree rule for trees met (collector)					X						X	X		X				X	X					
30 degree rule for buildings met (collector)																								
No objects > 1 m height within 5 m radius (collector)				X	X	X		X			X	X		X							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	
No pastures and ag. activity within 20 m radius								X																
No herbicides and fertilizers used within 20 m radius									X	X														
Roads meet NADP siting criteria																								
Waterways meet NADP siting criteria																								
Animal operations meet NADP siting criteria (NTN and AIRMoN)																								
Airports meet NADP siting criteria																								
Parking lots and maintenance areas meet NADP siting criteria																								
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																								

- 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 10)

StationId	MD18		MI52		MI99			MN23			MN28			MN32			MT00			MT05			
	Year	2013	2010	2013	2010	2013	2010	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008
Is sampling media quality maintained?																							
Is the orifice of the collector +/- .3 m of raingage (elevation)		X	X												X	X							
45 degree rule met, rain gage				X	X																X	X	X
30 degree rule for trees met, rain gage						X				X					X	X					X	X	X
30 degree rule for buildings met (raingage)																					X	X	
No objects > 1 m height inside 5 m radius (raingage)		X	X	X	X				X												X	X	X
No fences > 1 m height inside 2 m radius (raingage)				X																			
No vegetation height > 0.6 m within 5 m radius (raingage)					X				X		X					X	X	X				X	
45 degree rule met (collector)				X	X																		
Collector and sensor oriented properly														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	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	
No treated lumber inside 5 m radius (collector)									X														
No pastures and ag. activity within 20 m radius																							
No herbicides and fertilizers used within 20 m radius		X																					
Roads meet NADP siting criteria																					X		
Waterways meet NADP siting criteria																							
Animal operations meet NADP siting criteria (NTN and AIRMoN)																							
Airports meet NADP siting criteria																							
Parking lots and maintenance areas meet NADP siting criteria																							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							

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 10)

StationId	MT07		NC06			NC29			NC35			NC36			ND00			NY10			NY96		
	Year	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2010	2008	2013	2009
Is sampling media quality maintained?															X								
Is the orifice of the collector +/- .3 m of raingage (elevation)													X										
45 degree rule met, rain gage		X													X	X	X	X					
30 degree rule for trees met, rain gage		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	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		
45 degree rule met (collector)															X	X	X	X					
Collector and sensor oriented properly																							
30 degree rule for trees met (collector)		X	X															X	X	X			
30 degree rule for buildings met (collector)																							
No objects > 1 m height within 5 m radius (collector)		X	X	X	X	X						X			X	X	X	X			X		X
No fences > 1 m height inside 5 m radius (collector)			X												X	X		X			X		
No vegetation height > 0.6 m within 5 m radius (collector)															X	X	X	X			X		
No treated lumber inside 5 m radius (collector)		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																							
Animal operations meet NADP siting criteria (NTN and AIRMoN)																							
Airports meet NADP siting criteria																							
Parking lots and maintenance areas meet NADP siting criteria																							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																							

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 10)

StationId	OH17		OK00			OK17			OK29			OR09			OR10			OR18			OR97			
	Year	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008
Is sampling media quality maintained?						X																		
Is the orifice of the collector +/- .3 m of raingage (elevation)																					X			
45 degree rule met, rain gage																X	X							
30 degree rule for trees met, rain gage		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			
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															
45 degree rule met (collector)																X	X	X						
Collector and sensor oriented properly																							X	
30 degree rule for trees met (collector)		X	X				X	X	X							X	X	X		X	X			
30 degree rule for buildings met (collector)								X																
No objects > 1 m height within 5 m radius (collector)																X		X	X		X			
No fences > 1 m height inside 5 m radius (collector)																		X						
No vegetation height > 0.6 m within 5 m radius (collector)				X			X																	
No treated lumber inside 5 m radius (collector)												X						X	X	X				
No pastures and ag. activity within 20 m radius							X											X	X			X		
No herbicides and fertilizers used within 20 m radius																							X	
Roads meet NADP siting criteria																X								
Waterways meet NADP siting criteria																								
Animal operations meet NADP siting criteria (NTN and AIRMoN)																								
Airports meet NADP siting criteria																								
Parking lots and maintenance areas meet NADP siting criteria																								
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																								

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 10)

StationId	PA00		PA18			PA29			PA42			PA47		PR20		SC05			SC06			
	Year	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2008	2013	2010	2013	2010	2013	2011	2008	2013	2011	2008
Is sampling media quality maintained?																						
Is the orifice of the collector +/- .3 m of raingage (elevation)													X									
45 degree rule met, rain gage		X	X							X	X								X			
30 degree rule for trees met, rain gage				X	X	X			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							
No fences > 1 m height inside 2 m radius (raingage)																						
No vegetation height > 0.6 m within 5 m radius (raingage)														X								
45 degree rule met (collector)																				X		
Collector and sensor oriented properly																						
30 degree rule for trees met (collector)				X	X	X			X	X	X	X					X	X	X	X	X	
30 degree rule for buildings met (collector)																						
No objects > 1 m height within 5 m radius (collector)								X	X					X	X							
No fences > 1 m height inside 5 m radius (collector)																						
No vegetation height > 0.6 m within 5 m radius (collector)														X								
No treated lumber inside 5 m radius (collector)																						
No pastures and ag. activity within 20 m radius			X																			
No herbicides and fertilizers used within 20 m radius			X																			
Roads meet NADP siting criteria																						
Waterways meet NADP siting criteria																						
Animal operations meet NADP siting criteria (NTN and AIRMoN)																						
Airports meet NADP siting criteria																						
Parking lots and maintenance areas meet NADP siting criteria																						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																						

- 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 10)

StationId	SD04			TN00*		TN04		TN14		VI01		WA98			WI25			WI36			WV05		
	Year	2013	2011	2008	2013	2009	2013	2009	2013	2010	2013	2010	2013	2011	2008	2013	2010	2008	2013	2010	2008	2013	2009
Is sampling media quality maintained?														X								U to T	
Is the orifice of the collector +/- .3 m of raingage (elevation)														X									
45 degree rule met, rain gage		X	X	X			X			X	X	X										X	X
30 degree rule for trees met, rain gage									X							X	X	X				X	X
30 degree rule for buildings met (raingage)					X	X																	
No objects > 1 m height inside 5 m radius (raingage)					X	X			X		X	X											X
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												
45 degree rule met (collector)							X				X	X			X							X	
Collector and sensor oriented properly									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											
No fences > 1 m height inside 5 m radius (collector)																							
No vegetation height > 0.6 m within 5 m radius (collector)		X	X						X		X		X										
No treated lumber inside 5 m radius (collector)																							
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																							
Animal operations meet NADP siting criteria (NTN and AIRMoN)																							
Airports meet NADP siting criteria																							
Parking lots and maintenance areas meet NADP siting criteria										X	X												
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria									X														

* TN00 is an AIRMoN Site

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

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

StationId	WV18		WY00		WY02		WY06		WY08		WY95		WY97		WY98		
	Year	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009
Is sampling media quality maintained?																	
Is the orifice of the collector +/- .3 m of raingage (elevation)				X													
45 degree rule met, rain gage																	
30 degree rule for trees met, rain gage									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			
No vegetation height > 0.6 m within 5 m radius (raingage)																	
45 degree rule met (collector)																	
Collector and sensor oriented properly																	
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				
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	
No pastures and ag. activity within 20 m radius					X			X	X							X	
No herbicides and fertilizers used within 20 m radius																	
Roads meet NADP siting criteria										X							
Waterways meet NADP siting criteria																	
Animal operations meet NADP siting criteria (NTN and AIRMoN)																	
Airports meet NADP siting criteria																	
Parking lots and maintenance areas meet NADP siting criteria										X							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria																	

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 Year	AZ02		CA20		CA75		CA94		FL05		FL11		FL34		FL97		GA09			GA33		
	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2011	2008	2013	2011	2008
Dry side bucket is clean	--															X				--	--	--
Does lid seal properly																				--	--	--
Lid liner in good condition																				--	--	--
Fan in good condition																			X	--	--	--
Cooling fan thermostat in good condition																				--	--	--
Heater in good condition											--	--	--	--	--	--				--	--	--
Heater thermostat in good condition											--	--	--		--					--	--	--
Has flush wall filter mount been installed						X														--	--	--
Filter in good condition	U to T	U to T			U to T	--	U to T													--	--	--
Max / min thermometer in acceptable limits						X			X											--	--	--
ACM sensor operates properly	X			X										X						--	--	--
Motorbox operates within acceptable limits																				--	--	--
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
N-CON lid liner in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
N-CON fan in good condition	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
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)	--	--	--	--						--				--		--						--
Was the 'as found' turn-over set properly	--	X	X	X	--	--	--	--	--	X	--	--	--	X	--	X	--	--		--	--	

- 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 Year	GA40			KY10		MA01		MD00		MD08		MN23			MT05			NY06		NY43		OK01	
	2013	2011	2008	2013	2010	2013	2009	2013	2010	2013	2008	2013	2011	2008	2013	2011	2008	2013	2010	2013	2010	2013	2011
Dry side bucket is clean	--					X	--											--	--	--	--	--	--
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	U to T					--	--	--	--	--	--
Heater thermostat in good condition	--											U to T						--	--	--	--	--	--
Has flush wall filter mount been installed	--	X								X								--	--	--	--	--	--
Filter in good condition	--	--	X	U to T						--				X				--	--	--	--	--	--
Max / min thermometer in acceptable limits	--		X	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		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--					X	X
N-CON sensor responds to a 20-second mist of water		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--			
Raingage operates properly (electronic gage)		--	--						X				--	--									
Does datalogger receive event signals form all collectors (electronic gage)		--	--						X				--	--									
Does optical sensor respond to "blocking" of light beam (electronic gage)	U to T	--	--									--	--	--									
Does optical sensor respond to mist of water (electronic gage)	U to T	--	--					U to T				--	--	--				U to T					
Was the 'as found' turn-over set properly	--		X	--	--	--	X	--	--	--	--			X	--	--	--	--	--	--	--	--	--

- 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 Year	OK04		OK06		OK31		PA00		PA13			PA30			PA42		PA47		PA52		PA60	
	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2013	2010	2013	2010	2013	2010
Dry side bucket is clean	--	--	--	--	--	--			--			--	X		--		--		--	--	--	
Does lid seal properly	--	--	--	--	--	--			--			--			--		--		--	--	--	X
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	--	--	--	--	--	--	X		--	X		--	X		--	X	--	X	--	--	--	
Filter in good condition	--	--	--	--	--	--	--		--	--	U to T	--	--	U to T	--	--	--	--	--	--	--	
Max / min thermometer in acceptable limits	--	--	--	--	--	--			--			--		X	--		--		--	--	--	X
ACM sensor operates properly	--	--	--	--	--	--			--		X	--			--		--		--	--	--	
Motorbox operates within acceptable limits	--	--	--	--	--	--			--			--			--		--		--	--	--	
N-CON lid seal in good condition							--	--		--	--		--	--		--		--				--
N-CON lid liner in good condition							--	--		--	--		--	--		--		--				--
N-CON fan in good condition							--	--		--	--		--	--		--		--				--
N-CON cooling fan thermostat in good condition							--	--		--	--		--	--		--		--				--
N-CON heater in good condition							--	--		--	--		--	--		--		--				--
N-CON heater thermostat in good condition							--	--		--	--		--	--		--		--				--
N-CON max / min thermometer in acceptable limits		X					--	--		--	--		--	--		--		--				--
N-CON sensor responds to a 20-second mist of water							--	--		--	--		--	--		--		--				--
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)									--	--	--	--	--	--	--	--	--	--	--	--	--	--
Was the 'as found' turn-over set properly	--	--	--	--	--	--	--	--	--		X	--	X		--	X	--		--	X	--	X

- 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 Year	PA90			SC03		SC05			SC19			UT97		WI08			WI36			WY08		
	2013	2010	2008	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2013	2011	2008	2013	2010	2008	2013	2009	
Dry side bucket is clean	--			--								--	--	--	X			--				
Does lid seal properly	--			--								--	--	--								
Lid liner in good condition	--			--						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	--			--								--	--	--								
Filter in good condition	--		X	--								--	--	--						--	U to T	
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		--	--		--	--	--	--	--	--	--			X	--	--	--	--	--	--	--	--
N-CON sensor responds to a 20-second mist of water		--	--		--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--					--		--	--			
Does optical sensor respond to mist of water (electronic gage)	--	--	--	U to T	--	--	--	--	--	--	--			U to T		--		--	--			
Was the 'as found' turn-over set properly	--	X	X	--	X	--		X	--	X	X	--	--	--	--	X	--	X		--	--	--

- 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 10)

StationId	AK01		AK03		CA28		CA42		CA45		CA50		CA66		CA67		CA75		CA76		CA94		
	2013	2010	2013	2010	2013	2011	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	
Dry side bucket is clean									--		--							U to T		--			
Does lid seal properly											--							U to T		--			
Lid liner in good condition											--									--			
ACM sensor operates properly						X					--							U to T		--			
Motorbox operates within acceptable limits		X									--							U to T		--			
N-CON lid seal in good condition	--	--	--	--	--	--	--	--	X	--	X	--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--	--	X	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--	--	--	--	--	--
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						--	--	--	--	--	--	--	--	--			--	--	X		
Does optical sensor respond to mist of water (electronic gage)	U to T	U to T						--	--	--	--	--	--	--	--	--			--	--			
Was the 'as found' turn-over set properly	--	--	--	--	--	--	X	X	--		--				--	--	--	--	--	--		--	--

- 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 10)

StationId	CA96		CA99		FL03		FL05		FL11		FL14		FL23		FL41		FL99		GA09			
	Year	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2011	2008
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)					--	--		--				--	--			--	--	--	--			--
Was the 'as found' turn-over set properly	--	--	--	--			--	X	--	--	--		--	--	--	X	X	X	--	--		

- 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 10)

StationId	GA20		GA33			GA99			ID02			ID03			ID11			IN22			IN34	
	Year	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013
Dry side bucket is clean			X			--						X			--			--	X	X		
Does lid seal properly						--									--			--				
Lid liner in good condition						--									--			--				
ACM sensor operates properly						--									--		X	--				
Motorbox operates within acceptable limits						--									--		X	--				
N-CON lid seal in good condition	--	--	--	--	--		--	--	--	--	--	--	--	--		--	--		--	--	--	--
N-CON lid liner in good condition	--	--	--	--	--		--	--	--	--	--	--	--	--		--	--		--	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--	--	--	--		--	--	--	--	--	--	--	--		--	--		--	--	--	--
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
Was the 'as found' turn-over set properly	--	--	--	--		--	X	X	--	--	X	--	--	--	--	X	X	--	--	X	--	--

- 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 10)

StationId	IN41			KY03		KY10		KY19		KY22		KY35		KY99		MA01		MA08		MD08		MD15		
	Year	2013	2011	2007	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013	2009	2013	2009	2013	2008	2013	2010
Dry side bucket is clean		X	X		X				X		X		X			X		X						
Does lid seal properly																								
Lid liner in good condition																								
ACM sensor operates properly																								
Motorbox operates within acceptable limits																								
N-CON lid seal in good condition	--	--	--		--	--	--	--	--		--		--	--	--	--	--	--	--	--	--	--	--	--
N-CON lid liner in good condition	--	--	--		--	--	--	--	--		--		--	--	--	--	--	--	--	--	--	--	--	--
N-CON sensor responds to a 20-second mist of water	--	--	--		--	--	--	--	--		--		--	--	--	--	--	--	--	--	--	--	--	--
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				--	--	--	--	--	--			--		--			--	--	
Does optical sensor respond to mist of water (electronic gage)	--	--	--		U to T				--	--	--	--	--	--			--		--			--	--	
Was the 'as found' turn-over set properly	X	X	X	--	--	--	--	--	X	--	X	--		--	--	--	X	--	X	--	--		X	

- 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 10)

StationId	MD18		MI52		MI99			MN23			MN28			MN32			MT00			MT05				
	Year	2013	2010	2013	2010	2013	2010	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	
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								X	--															
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)		U to T			--	--	--		--	--	--	--	--			--				--				
Does optical sensor respond to mist of water (electronic gage)					--	--	--		--	--	--	--	--			--				--				
Was the 'as found' turn-over set properly	--	--	--	--				X	--		X	X		X	--	--	X	--	--		--	--	--	--

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

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 6 of 10)

StationId	MT07		NC06			NC29			NC35			NC36			ND00			NY10			NY96		
	Year	2013	2009	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2010	2008	2013	2009
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	--																		--				
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--
Raingage operates properly (electronic gage)		--			--			--		--	--		--	--			--			--	--		
Does datalogger receive event signals form all collectors (electronic gage)		--			--			--		--	--	U to T	--	--			--		X	--	--		
Does optical sensor respond to "blocking" of light beam (electronic gage)	--	--			--	--	--	--	--	--	--	--	--	--			X	--	--	--	--		
Does optical sensor respond to mist of water (electronic gage)	--	--			--	--	--	--	--	--	--	--	--	--			X	--	--	--	--		MISSING
Was the 'as found' turn-over set properly	--	X	--	--		--	--	X	--		X	--	X	X	--	--		--			X	--	--

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

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 7 of 10)

StationId	OH17		OK00			OK17			OK29			OR09			OR10			OR18			OR97			
	Year	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008	2013	2011	2008
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	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			--
Was the 'as found' turn-over set properly	--	--	--						X			X	--	X	X				--			--	--	X

- 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 8 of 10)

StationId	PA00		PA18			PA29			PA42			PA47		PR20		SC05			SC06			
	Year	2013	2010	2013	2010	2008	2013	2010	2008	2013	2010	2008	2013	2010	2013	2010	2013	2011	2008	2013	2011	2008
Dry side bucket is clean				X					--	X		--	U to T									X
Does lid seal properly			--						--			--										
Lid liner in good condition			--						--			--										
ACM sensor operates properly			--						--	X		--		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	--	--		--	--	--	--	--		--	--		--	--	--	--	--	--	--	--	--	--
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)			--	--	--			--	--	--	--	--	--	X	--		--	--	--	--	--	--
Was the 'as found' turn-over set properly	--	--	--	X	X	--	--	X	--	X	X	--		--		--	X	X	--			X

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

Table C-4. NADP – NTN – Raingage and Collector: Comparison Between Surveys of Findings Most Likely to Impact Data Quality (page 9 of 10)

StationId	SD04			TN04		TN14		VI01		WA98			WI25			WI36			WV05		WV18		
	Year	2013	2011	2008	2013	2009	2013	2010	2013	2010	2013	2011	2008	2013	2010	2008	2013	2010	2008	2013	2009	2013	2009
Dry side bucket is clean				X	X			X				X								X	X		
Does lid seal properly				X																X	X		
Lid liner in good condition	X																						
ACM sensor operates properly				X														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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)	--	--	--				--	--			U to T		--	--	--		--	--			--		--
Does optical sensor respond to mist of water (electronic gage)	--	--	--				--	--			U to T		--	--	--		--	--			--		--
Was the 'as found' turn-over set properly				--	--	--	--	--	--	--	--	X		X	X	--	X		--	X		--	X

- 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 10 of 10)

StationId	WY00		WY02		WY06		WY08		WY95		WY97		WY98		
	Year	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013	2009
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)				--		--					--	--			--
Was the 'as found' turn-over set properly	--	--	--	X	--		--	--	--	--	X		--		X

X Indicates found non-compliant

-- Indicates "Not Applicable"

U to T Indicates "Unable to Test"

APPENDIX D

Transfer Standard Instrument Certifications

BL2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
12/13/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	1500.00	1499.48	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	1000.00	999.67	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	500.00	499.81	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	200.00	199.92	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	100.00	99.96	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	50.00	49.98	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/13/2012	8028481064	BL2-0	Audit		999.4	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-1			822.7	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-2			820.1	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-3			824.1	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-4			824.7	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-5			822.9	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-6			823.7	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-7			823.2	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-8			823.1	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-9			823.2	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-10			823.4	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-11			823.2	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-12			823.8	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-a			206.80	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-b			205.70	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-c			206.28	MMH	ETI/Belfort Set #2 - EOH
12/13/2012	8028481064	BL2-d			206.45	MMH	ETI/Belfort Set #2 - EOH
2/13/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	1500.00	1499.50	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	1000.00	999.68	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	500.00	499.83	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	200.00	199.93	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	100.00	99.96	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	50.00	49.98	MMH	Post Balance Check
2/13/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check

Calibrator Signature: Melissa Hebert

Date: 2/13/2012

Reviewer Signature: *Melissa Hebert*

Date: 1/2/2013

P2OTT2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
12/13/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	1500.00	1499.51	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	1000.00	999.68	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	500.00	499.82	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	200.00	199.91	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	100.00	99.96	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	50.00	49.98	MMH	Initial Balance Check
12/13/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/13/2012	8028481064	P2OTT2-1			1016.5	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-2			1017.0	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-3			1017.1	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-4			1016.9	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-5			1017.0	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-6			1017.1	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-7			1017.0	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-8			1015.7	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-9			1016.3	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-a			254.2	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-b			254.2	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-c			254.5	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	P2OTT2-d			254.4	MMH	Ott P2 Set #2 - EOH
12/13/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	1500.00	1499.50	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	1000.00	999.71	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	500.00	499.83	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	200.00	199.92	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	100.00	99.96	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	50.00	49.98	MMH	Post Balance Check
12/13/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check

Calibrator Signature: Melissa Hebert

Date: 12/13/2012

Reviewer Signature: *Ein Hebert*

Date: 1/2/2013

BL1 And BL3 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
12/14/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	1500.00	1499.94	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	1000.00	999.94	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	500.00	499.94	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	200.00	199.97	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	100.00	99.98	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	50.00	49.99	MMH	Initial Balance Check
12/14/2012	8028481064	26677	Bal Init	0.00	0.00	MMH	Initial Balance Check
12/14/2012	8028481064	BL3-0	Audit		1000.4	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-1			823.9	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-2			823.1	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-3			824.9	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-4			823.4	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-5			823.5	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-6			822.8	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-7			823.3	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-8			824.4	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-9			823.9	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-10			820.7	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-11			823.6	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL3-12			822.9	MMH	ETI/Belfort Set #3 - SEG
12/14/2012	8028481064	BL1-a			207.60	MMH	ETI/Belfort Set #1 - SEG
12/14/2012	8028481064	BL1-b			207.37	MMH	ETI/Belfort Set #1 - SEG
12/14/2012	8028481064	BL1-c			207.26	MMH	ETI/Belfort Set #1 - SEG
12/14/2012	8028481064	BL1-d			207.64	MMH	ETI/Belfort Set #1 - SEG
12/14/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	1500.00	1499.94	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	1000.00	999.94	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	500.00	499.94	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	200.00	199.96	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	100.00	99.98	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	50.00	49.99	MMH	Post Balance Check
12/14/2012	8028481064	26677	Bal Post	0.00	0.00	MMH	Post Balance Check

Calibrator Signature: Melissa Hebert Date: 2/14/2012

Reviewer Signature: *Ein Hebert* Date: 1/2/2013

P2OTT1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/2/2013	8028481064	26677	Bal Init	0.00	0.00	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	1500.00	1499.95	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	1000.00	999.95	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	500.00	499.93	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	200.00	199.96	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	100.00	99.98	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	50.00	49.98	CSL	Initial Balance Check
1/2/2013	8028481064	26677	Bal Init	0.00	0.00	CSL	Initial Balance Check
1/2/2013	8028481064	P2OTT1-1			1018.04	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-2			1018.14	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-3			1017.51	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-4			1018.33	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-5			1017.00	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-6			1017.17	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-7			1017.83	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-8			1016.71	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-9			1018.13	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-a			255.5	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-b			255.2	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-c			255.3	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	P2OTT1-d			255.7	CSL	Ott P2 Set #1 - SEG
1/2/2013	8028481064	26677	Bal Post	0.00	0.00	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	1500.00	1499.93	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	1000.00	999.95	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	500.00	499.94	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	200.00	199.97	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	100.00	99.99	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	50.00	49.99	CSL	Post Balance Check
1/2/2013	8028481064	26677	Bal Post	0.00	0.00	CSL	Post Balance Check

Calibrator Signature: Corbin S. Land Date: 1/2/2013
 Reviewer Signature: *Ein Hebert* Date: 1/2/2013

2/3/2013 - - Calibration and verification of three RTD meters with most recent certification of EEMS RTD

TMI Data -- 1/29/2013		
TMI STD	EEMS RTD	
cert date: 10/12/2012	01230 / 01231	
0.002	0.01	-0.008
9.986	9.99	-0.004
19.991	20.00	-0.009
29.995	30.00	-0.005
39.996	40.00	-0.004
50.032	50.02	0.012
RTD 01230/01231		
2013 correction:		
slope=	0.9997029	
intercept=	0.0104287	
	1.0000000	

EEMS 2/3/2013		RTD 01226		RTD 01227		RTD 01228	
RTD		EEMS		EEMS		EEMS	
01230 / 01231				SEG		EOH	
raw	corrected	raw	corrected	raw	corrected	raw	corrected
-0.01	-0.02	0.11	0.08	-0.04	0.04	-0.11	0.01
13.61	13.60	13.62	13.56	13.56	13.59	13.57	13.59
17.92	17.91	17.94	17.87	17.89	17.90	17.92	17.91
23.86	23.86	23.89	23.81	23.84	23.82	23.89	23.84
31.26	31.26	31.32	31.22	31.27	31.22	31.33	31.23
40.71	40.70	40.83	40.71	40.77	40.68	40.86	40.69
52.25	52.24	52.45	52.30	52.45	52.31	52.54	52.28
		slope =	1.002239	slope =	1.004349	slope =	1.007318
		intercept =	0.029333	intercept =	-0.0848	intercept =	-0.1238
		correlation =	0.999994	correlation =	0.999997	correlation =	0.999999

2/3/2013 - - Calibration and verification of three thermocouples and fluke meters with most recent certification of EEMS RTD

TMI Data -- 1/29/2013			
TMI STD	EEMS RTD		
cert date: 10/12/2012	01230 / 01231		
0.002	0.01	-0.008	
9.986	9.99	-0.004	
19.991	20.00	-0.009	
29.995	30.00	-0.005	
39.996	40.00	-0.004	
50.032	50.02	0.012	
	RTD 01230/01231		
2013 correction:	slope=	0.9997029	
	intercept=	0.0104287	
		1.0000000	

EEMS 2/3/2013 RTD 01230 / 01231		fluke = 01311 thermo = 01236	01312 EEMS 01237		01310 EEMS 01238		
raw	corrected	raw	corrected	raw	corrected	raw	corrected
0.01	0.00	0.0	0.03	0.0	0.21	0.0	-0.01
9.75	9.74	9.8	9.81	9.8	9.88	9.9	9.80
22.21	22.21	22.2	22.18	22.2	22.13	22.3	22.08
29.52	29.52	29.6	29.57	29.5	29.34	29.8	29.51
39.95	39.95	40.0	39.94	40.0	39.71	40.3	39.91
50.20	50.19	50.3	50.22	50.3	49.89	50.7	50.21
55.53	55.52	55.6	55.51	56.6	56.11	56.1	55.56
16.45	16.44	16.3	16.30	16.3	16.30	16.7	16.53
	Thermocouple offset =	-0.4		-0.7		0.6	
	slope =	1.002248		1.0124806		1.009565	
	intercept =	-0.03427		-0.207736		0.011242	
	correlation =	0.999999		0.999883		0.999996	

INSTRUMENT DATA SHEET

Serial/Asset Number: 01230 Customer: EE & MS
Date Tested: 01/29/13

<u>Parameter Tested</u>	<u>Nominal Value</u> <u>In °C</u>	<u>Tolerance</u> <u>±.13 °C</u>	<u>Lower</u> <u>Limit</u>	<u>Upper</u> <u>Limit</u>	<u>As Found</u>	<u>Pass/Fail</u>	<u>As Left</u>
<u>Temperature Accuracy</u>	0.002	0.130	-0.128	0.132	0.01	PASS	AS FOUND
	9.986	0.130	9.856	10.116	9.99	PASS	AS FOUND
	19.991	0.130	19.861	20.121	20.00	PASS	AS FOUND
	29.995	0.130	29.865	30.125	30.00	PASS	AS FOUND
	39.996	0.130	39.866	40.126	40.00	PASS	AS FOUND
	50.032	0.130	49.902	50.162	50.02	PASS	AS FOUND

RTD 01230 / 01231

EOH

2/3/2013

Slope = 0.9997029

int = 0.0104287

r² = 1.000000

625 East Bunker Court
 Vernon Hills, Illinois 60061
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 Fax: 847-327-2993
 www.innocalsolutions.com

NIST Traceable Calibration Report



Reference Number: 277938
 PO Number: ERIC HEBERT0102

EEMS
 1128 NW 39th Dr
 Gainesville, FL 32605 United States

Manufacturer: Extech Instruments	Calibration Date: 01/12/2013
Model Number: 407907	Calibration Due Date: 01/12/2014
Description: Temperature RTD, Handheld Thermometer	Condition As Found: Initial Calibration
Asset Number: CP100701	Condition As Left: In Tolerance, No adjustment
Serial Number: H232734	
Procedure: DS Extech Instrument Co. 407907	

Remarks:
 NIST-traceable calibration performed on the unit referenced above in accordance with customer requirements, published specifications and the lab's standard operating procedures. No adjustments were made to the unit.

Standards Utilized

Asset No.	Manufacturer	Model No.	Description	Cal. Date	Due Date
CPM126	Fluke Corporation	5520A-SC1100/PQ	Calibrator, Multi-Function Calibrator	10/20/2012	10/20/2013

Calibration Data

FUNCTION TESTED	Nominal Value	As Found	Out of Tol	As Left	Out of Tol	CALIBRATION TOLERANCE
RTD Temperature	-199.500 °C	-199.60		Same		-199.899 to -199.101 °C [EMU 0.013 °C][TUR 31:1]
	-100.000 °C	-100.16		Same		-100.300 to -99.700 °C [EMU 0.0080 °C][TUR 37:1]
	0.000 °C	-0.03		Same		-0.200 to 0.200 °C [EMU 0.0031 °C][TUR 65:1]
	200.000 °C	200.12		Same		199.600 to 200.400 °C [EMU 0.013 °C][TUR 31:1]
	500.000 °C	500.6		Same		499.300 to 500.700 °C [EMU 0.054 °C][TUR 13:1]
	800.000 °C	800.7		Same		799.000 to 801.000 °C [EMU 0.18 °C][TUR 5.6:1]

EEMS #
 01227
 SEG

Temperature: 19° C
Humidity: 49% RH
Rpt. No.: 332326

Calibration Performed By:			Quality Reviewer:	
Panich, Eduard B	Metrologist	847-327-5322	Pietronitto, Mike	1/14/2013
<small>Name</small>	<small>Title</small>	<small>Phone</small>	<small>Name</small>	<small>Date</small>

This report may not be reproduced, except in full, without written permission of Innocal. The results stated in this report relate only to the items tested or calibrated. Measurements reported herein are traceable to SI units via national standards maintained by NIST and were performed in compliance with MIL-STD-45662A, ANSI/NCSS Z540-1-1994, 10CFR50, Appendix B, ISO 9002-94, and ISO 17025:2005. Guard Banding, if reported on this certificate, is applied at a Z-factor of 30% for test points with a test uncertainty ratio (TUR) below 4:1. The estimated measurement uncertainty (EMU), if reported on this certificate, is being reported at a confidence level of 95% or K=2 unless otherwise noted in the remarks section.

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NIST Traceable Calibration Report



332327

Reference Number: 277938
 PO Number: ERIC HEBERT0102

EEMS
 1128 NW 39th Dr
 Gainesville, FL 32605 United States

Manufacturer: Extech Instruments
Model Number: 407907
Description: Temperature RTD, Handheld Thermometer
Asset Number: CP100702
Serial Number: H232679
Procedure: DS Extech Instrument Co. 407907

Calibration Date: 01/12/2013
Calibration Due Date: 01/12/2014
Condition As Found: Initial Calibration
Condition As Left: In Tolerance, No adjustment

Remarks:

NIST-traceable calibration performed on the unit referenced above in accordance with customer requirements, published specifications and the lab's standard operating procedures. No adjustments were made to the unit.

Standards Utilized

Asset No.	Manufacturer	Model No.	Description	Cal. Date	Due Date
CPM126	Fluke Corporation	5520A-SC1100/PQ	Calibrator, Multi-Function Calibrator	10/20/2012	10/20/2013

Calibration Data

FUNCTION TESTED	Nominal Value	As Found	Out of Tol	As Left	Out of Tol	CALIBRATION TOLERANCE
RTD Temperature	-199.500 °C	-199.68		Same		-199.899 to -199.101 °C [EMU 0.013 °C][TUR 31:1]
	-100.000 °C	-100.23		Same		-100.300 to -99.700 °C [EMU 0.0080 °C][TUR 37:1]
	0.000 °C	-0.07		Same		-0.200 to 0.200 °C [EMU 0.0031 °C][TUR 65:1]
	200.000 °C	200.04		Same		199.600 to 200.400 °C [EMU 0.013 °C][TUR 31:1]
	500.000 °C	500.6		Same		499.300 to 500.700 °C [EMU 0.054 °C][TUR 13:1]
	800.000 °C	800.8		Same		799.000 to 801.000 °C [EMU 0.18 °C][TUR 5.6:1]

EEMS #
 01228
 EOH

Temperature: 19° C
 Humidity: 49% RH
 Rpt. No.: 332327

Calibration Performed By:			Quality Reviewer:	
Panich, Eduard B	Metrologist	847-327-5322	Pietronicco, Mike	1/14/2013
Name	Title	Phone	Name	Date

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Certificate of Calibration

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

P.O. Number: HOLD

ID Number: 01311

Description: TRUE RMS MULTIMETER
Manufacturer: FLUKE
Model Number: 287
Serial Number: 95740135
Technician: TONY ROGERS

Calibration Date: 1/26/2013
Calibration Due: 1/26/2014
Procedure: METCAL FLUKE 287
Rev: 8/30/2012
Temperature: 70 °F
Humidity: 49 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:
Comments:

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. Either the measurement standard TUR to the item being calibrated is 4:1 or measurement uncertainties are reported. 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 17025 and ANSI/NCSL Z540-1 by A2LA. ISO17025 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 Z540-1-1994.

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

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FRANK BAHMANN, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

<u>Asset Number</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Date Calibrated</u>	<u>Cal Due</u>
2184901	FLUKE	5522A-SC1100	10/5/2012	10/5/2013



Technical Maintenance, Inc.

12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637

ANSI/NCSL Z540-1-1994

Certificate of Calibration

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

P.O. Number: HOLD

ID Number: 01312

Description: TRUE RMS MULTIMETER
Manufacturer: FLUKE
Model Number: 287
Serial Number: 95740243
Technician: TONY ROGERS

Calibration Date: 1/26/2013
Calibration Due: 1/26/2014
Procedure: METCAL FLUKE 287
Rev: 8/30/2012
Temperature: 70 °F
Humidity: 49 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:
Comments:

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. Either the measurement standard TUR to the item being calibrated is 4:1 or measurement uncertainties are reported. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

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FRANK BAHMANN, BRANCH MANAGER



JACK SHULER, QUALITY MANAGER

Calibration Standards

<u>Asset Number</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Date Calibrated</u>	<u>Cal Due</u>
2184901	FLUKE	5522A-SC1100	10/5/2012	10/5/2013



Technical Maintenance, Inc.

12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637

ANSI/NCSL Z540-1-1994

Certificate of Calibration

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

P.O. Number: HOLD

ID Number: 01310

Description: TRUE RMS MULTIMETER
Manufacturer: FLUKE
Model Number: 187
Serial Number: 86590148
Technician: TONY ROGERS

Calibration Date: 1/27/2013
Calibration Due: 1/27/2014
Procedure: METCAL FLUKE 187
Rev: 8/30/2012
Temperature: 70 °F
Humidity: 49 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:
Comments:

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. Either the measurement standard TUR to the item being calibrated is 4:1 or measurement uncertainties are reported. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

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

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FRANK BAHMANN, BRANCH MANAGER



JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
2184901	FLUKE	5522A-SC1100	10/5/2012	10/5/2013



Technical Maintenance, Inc.

12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637

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

www.tmiclibration.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

EE MS # 01265

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	190037
Quantity:	1
Calibration Due:	1/2015

John Noga, Quality Control

January 30, 2014

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 05/08/13 Due 05/08/14 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/27/09 Due 02/27/14 731/244084-89



Warren-Knight Instrument Company

2045 Bennett Road

Philadelphia, PA 19116

Phone: 215-464-9300; Fax: 215-464-9303

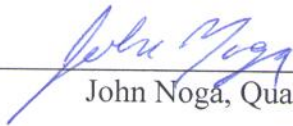
Web: <http://www.warrenind.com>

CERTIFICATION OF CALIBRATION AND CONFORMANCE

~~192034~~ ^{EEMS} #01270

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	190034
Quantity:	1
Calibration Due:	1/2015


John Noga, Quality Control

January 30, 2014

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 05/08/13 Due 05/08/14 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/27/09 Due 02/27/14 731/244084-89



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

EMS # 01272

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	191832
Quantity:	1
Calibration Due:	1/2015

John Noga, Quality Control

January 30, 2014

Measurement Standards
Theodolite Wild T-3 S/N 18801 Calibration 05/08/13 Due 05/08/14 NIST Number 738/229329-83 738/223398
Optical Wedge K&E 71-2020 S/N 5167 Calibration 02/27/09 Due 02/27/14 731/244084-89