2011 National Atmospheric Deposition Program Site Survey Program Annual Report

Prepared for:

U.S. Environmental Protection Agency
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List of Acronyms and Abbreviations

AC	alternating current
ACM	Aerochem Metrics
AIRMoN	Atmospheric Integrated Research Monitoring Network
AMNet	Atmospheric Mercury 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 EPW-07061, Support for Conducting Systems and Performance Surveys of National Atmospheric 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 including 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 not 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.
- Updates to the graphical representation of the site instruments with respect to each other and the site surroundings.

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

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

1.0 Introduction / Background

The National Atmospheric Deposition Program (NADP) Site Survey Program is an independent and unbiased Quality Assurance (QA) program of systems and performance surveys to assess and document the conditions and operations of the collective sites of the NADP. The conditions and operations pertain to the siting, sample collection and handling, equipment operation and maintenance, recordkeeping, reports, 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 90 NADP sites (co-located are not considered separated 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 and cell tests (AIRMoN sites only).
- Verifying, or creating the site plan view. (The site plan view identifies all equipment and major features within a 30 meter radius.)
- 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 monthly 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 month. The data for each site consists of:

    - Survey results that have been subjected to duplicate entry and internal QA review.
    - Edited and scanned site plan view (or site sketch).
    - Digital photographs.
    - Scanned raingage chart (if applicable).
    - Any additional pertinent supporting information.

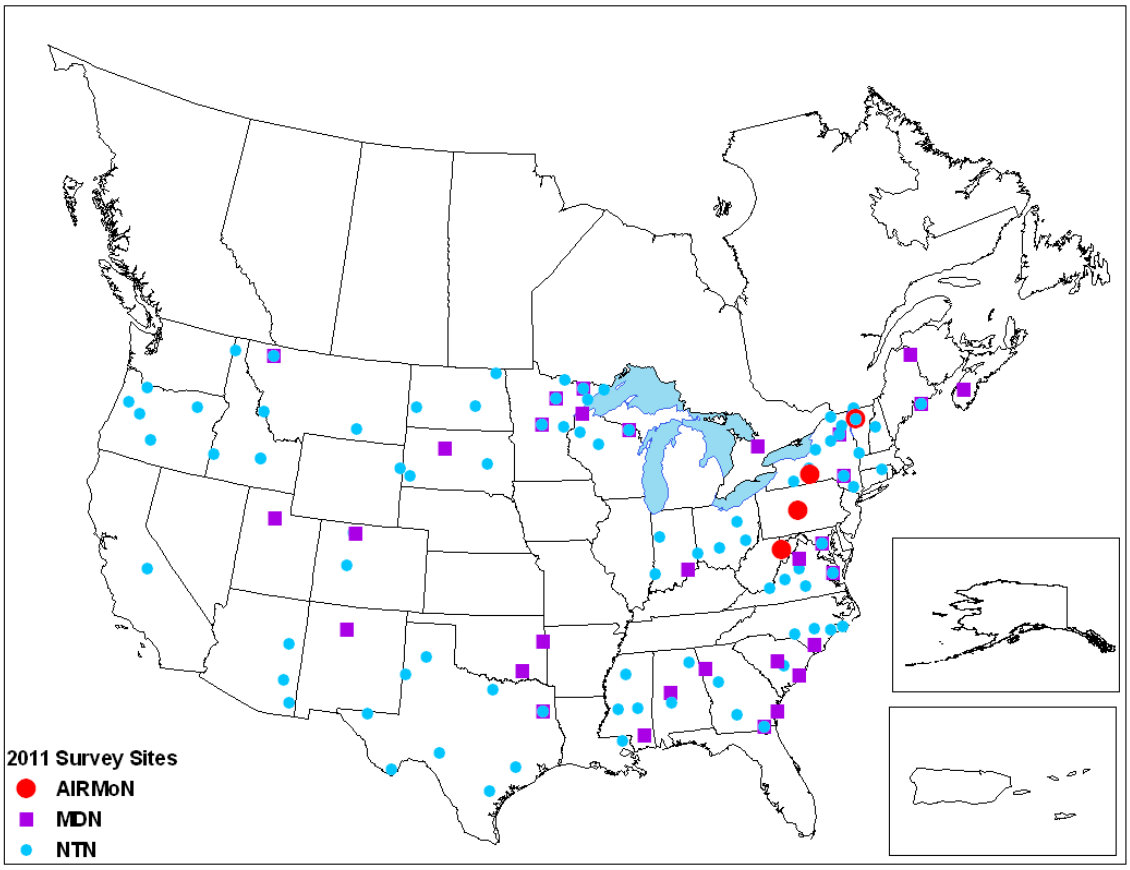
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed from January through December of 2011. This annual report covers portions of two contract periods which begin and end in June of each year.

A total of 133 NADP collectors (this number includes co-located sites) were surveyed during the period covered by this report at 108 distinct locations. These include 36 MDN sites, 93 NTN sites, and 4 AIRMoN sites. Figure 2-1 is a map of the locations of the sites visited during 2011. Table 2-1 is a list of the sites surveyed and includes the network, site name, survey date, and equipment found.

Figure 2-1. Site Survey Locations in 2011



Source – NADP Program Office

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 115 precipitation gages surveyed (co-located sites usually use the same gage), 48 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. Altogether 64 electronic gages were surveyed, with only a few minor problems observed with those gages. A NWS stick gage was used at each of the four AIRMoN sites that were surveyed.

Of the 133 sites surveyed (collectors), 19 sites operated N-CON collectors. The 114 other collectors were AerocChem Metrics (ACM) type and manufactured by either AeroChem Metrics or Loda Electronics Company.

Fifty two 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 2011 and the equipment found at the sites is shown in Table 2.1.

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AL03	Centreville	MDN	2/11/11	ACM-type	Belfort	Noah IV
AL10	Black Belt Research & Extension Center	NTN	2/11/11	ACM-type	Belfort	NWS Stick Gage
AL99	Sand Mountain Research & Extension Center	NTN	2/9/11	ACM-type	Belfort	Tipping Bucket
AR03	Caddo Valley	NTN	3/3/11	ACM-type	Belfort	NWS Stick Gage
AR27	Fayetteville	NTN	2/28/11	ACM-type	Belfort	Tipping Bucket
AZ06	Organ Pipe Cactus NP	NTN	2/22/11	ACM-type	Electronic	N/A
AZ97	Petrified Forest National Park-Rainbow Forest	NTN	6/1/11	ACM-type	Electronic	Tipping Bucket
AZ98	Chiricahua NM	NTN	5/31/11	ACM-type	Electronic	Tipping Bucket
AZ99	Oliver Knoll	NTN	2/21/11	ACM-type	Belfort	N/A
CA28	Kings River Experimental Watershed	NTN	5/17/11	ACM-type	Electronic	N/A
CAN5 CAN6	Frelighsburg	NTN	10/5/11	N-CON ACM-type	Electronic (2)	Other
CO10	Gothic	NTN	7/12/11	ACM-type	Electronic	Tipping Bucket
CO93	Dry Lake	NTN	7/11/11	ACM-type	Electronic	Tipping Bucket
CO97	Buffalo Pass - Summit Lake	MDN/NTN	8/12/11	N-CON ACM-type	Electronic	N/A
CT15	Abington	NTN	9/18/11	ACM-type	Electronic	Tipping Bucket
GA09	Okefenokee National Wildlife Refuge	MDN/NTN	1/11/11	ACM-type	Electronic	NWS Stick Gage
GA33	Sapelo Island	MDN/NTN	1/13/11	N-CON ACM-type	Electronic	N/A
GA40	Yorkville	MDN	2/9/11	ACM-type	Belfort	Noah IV
GA41	Georgia Station	NTN	2/8/11	ACM-type	Belfort	Tipping Bucket
GA99	Chula	NTN	1/24/11	ACM-type	Belfort	NWS Stick Gage

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
ID02	Priest River Experimental Forest	NTN	6/30/11	ACM-type	Electronic	N/A
ID03	Craters of the Moon National Monument	NTN	6/16/11	ACM-type	Electronic	N/A
ID11	Reynolds Creek	NTN	6/10/11	ACM-type	Belfort	Belfort
IN21	Clifty Falls State Park	MDN	4/11/11	ACM-type	Electronic	Belfort
IN22	Southwest Purdue Agriculture Center	NTN	4/13/11	ACM-type	Electronic	Tipping Bucket
IN41	Agronomy Center for Research and Extension	NTN	4/12/11	ACM-type	Belfort	N/A
LA30	Southeast Research Station	NTN	3/31/11	ACM-type	Electronic	N/A
MD99	Beltsville	MDN/NTN	11/22/11	ACM-type	Electronic	Tipping Bucket
ME00	Caribou	MDN/NTN	9/19/11	N-CON ACM-type	Electronic	N/A
ME98	Acadia National Park-McFarland Hill	MDN/NTN	9/21/11	ACM-type	Electronic	Tipping Bucket
MN08	Hovkabd	NTN	10/4/11	ACM-type	Belfort	N/A
MN16	Marcell Experimental Forest	MDN/NTN	10/5/11	ACM-type	Electronic	Belfort
MN18	Fernberg	MDN/NTN	10/5/11	ACM-type	Electronic	N/A
MN23	Camp Ripley	MDN/NTN	7/26/11	ACM-type	Belfort	N/A
MN28	Grindstone Lake	NTN	7/27/11	ACM-type	Belfort	N/A
MN32	Voyageurs National Park-Sullivan Bay	NTN	7/25/11	ACM-type	Electronic	N/A
MN99	Wolf Ridge	NTN	10/4/11	ACM-type	Belfort	N/A
MS10	Clinton	NTN	3/30/11	ACM-type	Belfort	OTT Pluvio
MS19	Newton	NTN	3/29/11	ACM-type	Belfort	N/A
MS22	Oak Grove	MDN	3/29/11	ACM-type	Belfort	Noah IV

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
MS30	Coffeeville	NTN	3/30/11	ACM-type	Belfort	N/A
MT00	Little Bighorn Battlefield National Monument	NTN	7/6/11	ACM-type	Electronic	N/A
MT05	Glacier National Park-Fire Weather Station	MDN/NTN	6/27/11	ACM-type	Electronic	Tipping Bucket
MT97	Lost Trail Pass	NTN	8/16/11	ACM-type	Electronic	N/A
NC06	Beaufort	NTN	10/27/11	ACM-type	Electronic	Tipping Bucket
NC08	Waccamaw State Park	MDN	6/9/11	ACM-type	Belfort	N/A
NC29	Hofmann Forest	NTN	6/9/11	ACM-type	Electronic	N/A
NC35	Clinton Crops Research Station	NTN	6/7/11	ACM-type	Belfort	N/A
NC36	Jordan Creek	NTN	6/6/11	ACM-type	Belfort	OTT Pluvio
ND00	Theodore Roosevelt National Park - Painted Canyon	NTN	7/21/11	ACM-type	Electronic	Tipping Bucket
ND08	Icelandic State Park	NTN	10/8/11	ACM-type	Belfort	N/A
ND11	Woodworth	NTN	10/7/11	ACM-type	Electronic	N/A
NH02	Hubbard Brook	NTN	9/16/11	ACM-type	Electronic	N/A
NM97	Valles Caldera National Preserve	MDN	6/2/11	N-CON	Electronic	N/A
NS01	Kejimkujik National Park	MDN	9/23/11	N-CON	Electronic	NWS Stick Gage
NY01	Alfred	NTN	9/9/11	N-CON	Electronic	N/A
NY08	Aurora Research Farm	NTN	11/1/11	ACM-type	Belfort	Belfort
NY20	Huntington Wildlife	MDN/NTN	9/27/11	ACM-type	Belfort	Tipping Bucket / N/A
NY22	Akwesasne Mohawk-Fort Covington	NTN	11/4/11	ACM-type	Electronic	N/A
NY29	Moss Lake	NTN	9/12/11	N-CON	Electronic	N/A

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
NY52	Bennett Bridge	NTN	11/3/11	ACM-type	Electronic	N/A
NY67	Ithaca	AIRMoN	11/1/11	ACM-type	NWS Stick Gage	Belfort
NY68	Biscuit Brook	MDN/NTN	10/7/11	ACM-type	Electronic	Belfort
NY98	Whiteface Mountain	NTN	9/29/11	N-CON	Electronic	Belfort
NY99	West Point	NTN	9/19/11	ACM-type	Belfort	N/A
OH09	Oxford	NTN	4/14/11	ACM-type	Electronic	Belfort
OH49	Caldwell	NTN	4/13/11	ACM-type	Electronic	N/A
OH54	Deer Creek State Park	NTN	4/11/11	ACM-type	Electronic	N/A
OH71	Wooster	NTN	4/12/11	ACM-type	Belfort	NWS Stick Gage
OK01	McGee Creek	MDN	3/1/11	N-CON	Electronic	N/A
OK99	Stillwell	MDN	2/27/11	N-CON	Electronic	Tipping Bucket
ON07	Egbert	MDN	11/7/11	N-CON	Electronic	N/A
OR09	Silver Lake Ranger Station	NTN	6/14/11	ACM-type	Belfort	N/A
OR10	H. J. Andrews Experimental Forest	NTN	6/13/11	ACM-type	Belfort	Tipping Bucket
OR18	Starkey Experimental Forest	NTN	6/16/11	ACM-type	Belfort	N/A
OR97	Hyslop Farm	NTN	6/15/11	ACM-type	Electronic	N/A
PA15	Penn State	AIRMoN NTN	10/11/11	ACM-type	NWS Stick Gage/Belfort	Belfort
PA15	Penn State	NTN	10/11/11	ACM-type	Belfort	Belfort
SC05	Cape Romain National Wildlife Refuge	MDN/NTN	1/19/11	ACM-type	Belfort	N/A
SC06	Santee National Wildlilfe Refuge	NTN	1/18/11	ACM-type	Belfort	N/A

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
SC19	Congaree Swamp	MDN	1/18/11	ACM-type	Belfort	Other
SD04	Wind Cave National Park-Elk Mountain	NTN	7/18/11	ACM-type	Belfort	Tipping Bucket
SD18	Eagle Butte	MDN	8/10/11	N-CON	Electronic	N/A
SD99	Huron Well Field	NTN	8/9/11	ACM-type	Electronic	NWS Stick Gage
TX02	Muleshoe National Wildlife Refuge	NTN	1/20/11	ACM-type	Belfort	Other
TX03	Beeville	NTN	1/25/11	ACM-type	Belfort	N/A
TX04	Big Bend National Park K-B	NTN	2/21/11	ACM-type	Electronic	N/A
TX10	APC NWR	NTN	1/26/11	ACM-type	Belfort	NWS Stick Gage
TX16	Sonora	NTN	1/24/11	ACM-type	Belfort	N/A
TX21	Longview	MDN/NTN	1/18/11	ACM-type	Belfort	Tipping Bucket
TX22	Guadalupe Mnt. NP	NTN	1/21/11	ACM-type	Electronic	N/A
TX43	Cañónceta	NTN	2/24/11	ACM-type	Electronic	Tipping Bucket
TX56	LBJ Grassland	NTN	1/19/11	ACM-type	Belfort	N/A
UT97	Salt Lake City	MDN	6/14/11	N-CON	Electronic	N/A
VA00	Charlottesville	NTN	11/29/11	N-CON	Electronic	N/A
VA13	Horton's Station	NTN	9/22/11	ACM-type	Electronic	N/A
VA24	Prince Edward	NTN	9/13/11	ACM-type	Electronic	Tipping Bucket
VA28	Shenandoah National Park-Big Meadows	MDN/NTN	11/15/11	ACM-type	Electronic	Tipping Bucket
VA98	Harcum	MDN/NTN	9/30/11	ACM-type	Belfort	Tipping Bucket N/A
VA99	Natural Bridge Station	NTN	11/29/11	ACM-type	Electronic	N/A

Table 2-1. Sites Surveyed from January through December 2011 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
VT01	Bennington	NTN	9/13/11	N-CON	Electronic	N/A
VT98 VT99	Underhill	MDN	10/3/11	N-CON ACM-type	Electronic	Belfort
VT99	Underhill	AIRMoN NTN	10/3/11	ACM-type N-CON	NWS Stick Gage/Electronic	Noah IV Belfort
WA98	Columbia River Gorge	NTN	6/15/11	ACM-type	Electronic	N/A
WI08/08WI 95WI	Brule River	MDN	7/30/11	ACM-type N-CON	Electronic	N/A
WI09	Popple River	MDN/NTN	7/29/11	ACM-type	Belfort	N/A
WI35	Perkinstown	NTN	7/28/11	ACM-type	Electronic	N/A
WI37	Spooner	NTN	7/27/11	ACM-type	Belfort	N/A
WV99	Canaan Valley Institute	AIRMoN MDN	11/17/11	ACM-type N-CON	NWS Stick Gage/Electronic	Noah IV NWS Stick Gage
WY99	Newcastle	NTN	7/19/11	ACM-type	Belfort	Tipping Bucket

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 reported.

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. Collectors, Raingages and Siting Meeting Criteria

Total number of collectors surveyed	133	Number of ACM – type	114
		Number of N-CON	19
Number of collectors meeting all assessments	66	Number of ACM-type	41
		Number of Modified ACM	10
		Number of NTN – N-CON	6
		Number of MDN – N-CON	9

Table 3-2. Collectors, Raingages and Siting Meeting Criteria (continued)

Total number of raingages surveyed	115	Number of Belfort gages	48
		Number of Electronic gages	63
		Number of NWS Stick Gage	4
Number of raingages meeting all assessments	74	Number of Belfort gages	23
		Number of Electronic gages	47
		Number of NWS Stick Gage	4
Sites meeting all siting criteria	27	MDN sites	2
		NTN sites	24
		AIRMoN	1

With the exception NY52, 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 buildings met (collector)
		Waterways meet NADP siting criteria
		Airports meet NADP siting criteria
		Animal operations meet NADP siting criteria (NTN and AIRMoN)
		Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria
	ACM-type collector	Lid seals properly
	N-CON Collector	N-CON sensor respond to a 20-second mist of water
		N-CON lid liner in good condition
MDN	Siting Criteria	30 degree rule for buildings met (collector)
		Waterways meet NADP siting criteria
		Airports meet NADP siting criteria
		Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria
		Combustion sources meet NADP siting criteria (MDN only)
		Metalworking operations meet NADP siting criteria (MDN only)
	Modified ACM	Fan in good condition
		Cooling fan thermostat in good condition
		Heater thermostat in good condition
		Max / min thermometer within acceptable limits

Table 3-3. Survey Questionnaire Items Met at All Sites (continued)

MDN	N-CON	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 sensor respond to a 20-second mist of water
		N-CON lid liner in good condition
AIRMoN	Siting Criteria	30 degree rule for buildings met (collector)
		Waterways meet NADP siting criteria
		Airports meet NADP siting criteria
		Animal operations meet NADP siting criteria (NTN and AIRMoN)
		Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria
		45 degree rule met (collector)
		No objects > 1 m height within 5 m radius (collector)
		No fences > 1 m height 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
		Parking lots and maintenance areas meet NADP siting criteria
	ACM-type collector	Does lid seal properly
		Lid liner in good condition
		Motor-box operates within acceptable limits
	NWS Stick Gage	Does the stick measure within tolerances (0.01")

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.

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?	132	1	0.8
Are samples stored and shipped properly	4	0	0.0
Siting Criteria Assessments			
Is the orifice of the collector +/- .3 m of raingage (elevation)	133	11	8.3
30 degree rule for buildings met (raingage)	110	1	0.9
No objects > 1 m height inside 5 m radius (raingage)	110	37	33.6
No fences > 1 m height inside 2 m radius (raingage)	110	10	9.1
No vegetation height > 0.6 m within 5 m radius (raingage)	110	24	21.8
Collector and sensor oriented properly	133	9	6.8
45 degree rule met (collector)	133	18	13.5
30 degree rule for trees met (collector)	133	38	28.6
30 degree rule for buildings met (collector)	133	0	0.0
No objects > 1 m height within 5 m radius (collector)	133	45	33.8
No fences > 1 m height inside 5 m radius (collector)	133	23	17.3
No vegetation height > 0.6 m within 5 m radius (collector)	133	27	20.3
No treated lumber inside 5 m radius (collector)	133	22	16.5
No galvanized metal inside 5 m radius collector (MDN)	36	12	33.3
No pastures and ag. activity within 20 m radius	133	9	6.8
No herbicides and fertilizers used within 20 m radius	133	6	4.5
Roads meet NADP siting criteria	133	3	2.3
Waterways meet NADP siting criteria	133	0	0.0
Airports meet NADP siting criteria	133	0	0.0
Animal operations meet NADP siting criteria (NTN and AIRMoN)	97	0	0.0
Combustion sources meet NADP siting criteria (MDN only)	36	0	0.0
Parking lots and maintenance areas meet NADP siting criteria	133	3	2.3
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	133	0	0.0
Metalworking operations meet NADP siting criteria (MDN only)	36	0	0.0
ACM-type Collector Assessments			
Dry side bucket is clean	111	15	13.5
Does lid seal properly	112	2	1.8
Lid liner in good condition	114	2	1.8

Table 3-4. Percent of Non-compliant Findings (continued)

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant
Fan in good condition	24	0	0.0
Cooling fan thermostat in good condition	24	0	0.0
Heater in good condition	23	0	0.0
Heater thermostat in good condition	24	0	0.0
Has flush wall filter mount been installed	24	2	8.3
Filter in good condition	20	0	0.0
Max / min thermometer within acceptable limits	24	0	0.0
ACM sensor operates properly	113	10	8.8
Motor-box operates within acceptable limits	113	3	2.7
N-CON Collector Assessments			
N-CON fan in good condition	12	0	0.0
N-CON cooling fan thermostat in good condition	12	0	0.0
N-CON heater in good condition	12	0	0.0
N-CON heater thermostat in good condition	12	0	0.0
N-CON max / min thermometer in acceptable limits	12	2	16.7
N-CON sensor respond to a 20-second mist of water	19	0	0.0
N-CON lid seal in good condition	18	1	5.6
N-CON lid liner in good condition	18	0	0.0
Belfort Raingage Assessments			
Was the 'as found' turn-over set properly	48	25	52.1
Electronic Gage Assessments			
Raingage operates properly (electronic gage)	63	3	4.8
Does datalogger receive event signals form all collectors (electronic gage)	63	5	7.9
Does optical sensor respond to "blocking" of light beam (electronic gage)	42	1	2.4
Does optical sensor respond to mist of water (electronic gage)	42	2	4.8
NWS Stick Gage Assessment			
Does the stick measure within tolerances (.01") (NWS stick gage)	4	0	0.0

As was the case during the previous year, the assessment with the highest percentage of failures is the Belfort gage turn-over setting. To better understand the turn-over problem, some additional description of the gage is necessary. The gage is a dual-traverse mechanical weighing precipitation gage designed to measure the amount of precipitation which falls during a seven day period. The precipitation is captured through an eight inch opening and funneled into a bucket.

The bucket rests on a mechanical scale that moves an ink pen as weight (precipitation) is added to the bucket. The pen trace is recorded on a paper chart attached to a rotating drum which completes one rotation during a seven day period. The chart is marked both vertically and horizontally so both time and precipitation can be determined from the pen trace.

The bottom of the chart begins at zero precipitation and the top of the chart corresponds to six inches of precipitation. The dual-traverse gage is designed to measure from zero to twelve inches of precipitation. This is accomplished by the first, or upward traverse of the pen from zero to six inches, and then as additional weight is added to the bucket the pen "turns over" and begins a second or downward traverse from six to twelve inches of precipitation. Proper function of the gage requires that the pen moves within ± 0.10 inches of the distance corresponding to the weight of the precipitation amount and that it turns over at the top of the chart.

Tables 1 through 3 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 the presence of objects made of galvanized metal near MDN collectors. The other most prevalent issues are the calibration and turn-over adjustment of the Belfort gage.

Table 3-4 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)

Station ID	Network	Brief Description of Site Changes
ON07	MDN	Site was moved approximately 500 meters from the former location
IN22	NTN	Large amount of exposed soil to S and SW, erosion control being attempted.
MS22	MDN	ARA site dismantled. Only NADP site running at this time.
LA30	NTN	Site moved Feb. 2011. OTT installed at the same time. Corn field 16m to the north.

3.2 Survey Results for Sites with Second Survey Visits

One hundred and two (102) of the 133 sites surveyed in 2011 had been previously visited by EEMS. A table indicating these sites can be found as Appendix C. Table 3-5 shows the most frequent items found to be non-compliant.

Table 3-6. Number of Sites Per Assessment Comparison between Site Surveys

Siting and Performance Checks	Total Non-compliant During First Survey	Total Non-compliant During Second Survey	Observed Trend in Compliance
Gage 30 degree rule for trees	40	45	Decrease
45 degree rule met (collector)	42	42	No change
30 degree rule for trees met (collector)	41	45	Decrease
No objects > 1 m height inside 5 m radius (raingage)	44	39	Increase
Was the 'as found' turn-over set properly	49	38	Increase
No objects > 1 m height within 5 m radius (collector)	31	24	Increase
No fences > 1 m height inside 2 m radius (raingage)	12	14	Decrease
No vegetation height > 0.6 m within 5 m radius (collector)	13	26	Decrease
No treated lumber inside 5 m radius (collector)	21	13	Increase
No vegetation height > 0.6 m within 5 m radius (raingage)	15	24	Decrease
Dry side bucket is clean	20	18	Increase
Collector and sensor oriented properly	12	8	Increase
No galvanized metal inside 5 m radius collector (MDN)	9	9	No change
Is the orifice of the collector +/- .3 m of raingage (elevation)	10	9	Increase
ACM sensor operates properly	8	8	No change
Motor-box operates within acceptable limits	8	0	Increase

Eight assessments showed improvement by having fewer sites out of compliance at the time of the second site survey visit, while five assessments were found to have more sites noncompliant during the second survey.

Four 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.

It is worth noting that most of the eight assessments that showed improvement related to the operation of the equipment and siting issues that were corrected by the site operators. The Belfort turn-over improvement could be attributed to both fewer Belfort gages in the network, and the maintenance performed during the first survey visit.

Comparing data from the first survey to the second survey, indicate that the number of compliant parameters increases at some sites, and decreases at other sites. As a result it is hard to predict whether there has been an overall or net improvement when the same value is applied to different deficiencies. That is, 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 Site Surveyed

Data provided by the NADP PO indicate that raingages located at elevations greater than 1000 meters are required to have a wind shield installed, as well as at sites where more than 20 percent of the annual precipitation is frozen. Table 3-4 presents the assessments of wind shields at the sites surveyed during the period covered by this annual report. Forty-two of the 50 sites identified as requiring windshields were found to have shields installed. This represents approximately 84% compliance. This is an improvement over previous years, and is expected as sites continue to install shields.

Table 3-7. Status of Surveyed Sites Requiring Raingage Shields

Site ID	Network	Condition	Site ID	Network	Condition
AZ97	NTN	Installed	NY20	MDN/NTN	Installed
CA28	NTN	Damaged	NY22	NTN	Installed
CAN5	NTN	Installed after Survey	NY29	NTN	Installed
CAN6	NTN	Installed	NY52	NTN	Installed
CO10	NTN	Installed	NY67	AIRMoN	Installed
CO93	NTN	Installed	NY68	MDN/NTN	Installed
CT15	NTN	Installed	NY98	NTN	Installed

Table 3-7. Status of Surveyed Sites Requiring Raingage Shields (continued)

Site ID	Network	Condition	Site ID	Network	Condition
ID02	NTN	Installed	ON07	MDN	Installed
ID03	NTN	Installed	OR09	NTN	Installed
ID11	NTN	Installed	OR10	NTN	Installed
ME00	MDN/NTN	Installed	OR18	NTN	Installed
ME98	MDN/NTN	Installed	PA15	NTN	Not Present
MN16	MDN/NTN	Installed	PA15	AIRMoN	Not Present
MN18	MDN/NTN	Installed	SD04	NTN	Not Present
MN23	MDN/NTN	Installed	SD18	MDN	Not Present
MN32	NTN	Not Present	SD99	NTN	Installed
MT05	MDN/NTN	Installed	TX02	NTN	Installed
MT97	NTN	Installed	UT97	MDN	Installed
ND00	NTN	Installed	VT01	NTN	Installed
ND08	NTN	Installed	VT98	MDN	Installed
NH02	NTN	Installed	VT99	AIRMoN	Not Present
NM97	MDN	Installed	VT99	MDN/NTN	Installed
NS01	MDN	Installed	WA98	NTN	Installed
NY01	NTN	Installed	WI08/08WI/95WI	MDN	Installed
NY08	NTN	Not Present	WY99	NTN	Not Present

It was observed during the survey that the wind shield at site CA28-NTN was damaged during the winter after the gage was completely buried by snow. It is likely that the weight of the snow, and the snow removal process, bent the shield causing the shield height to be below the opening of the gage.

4.0 Field Site Survey Results

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

4.1 Belfort Raingage Accuracy

Figure 4.1 presents the "as found" Belfort raingage accuracy results for 48 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 represents 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 with a slope of approximately 1.00 and a correlation coefficient of 0.9946. 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 - 47 Gages

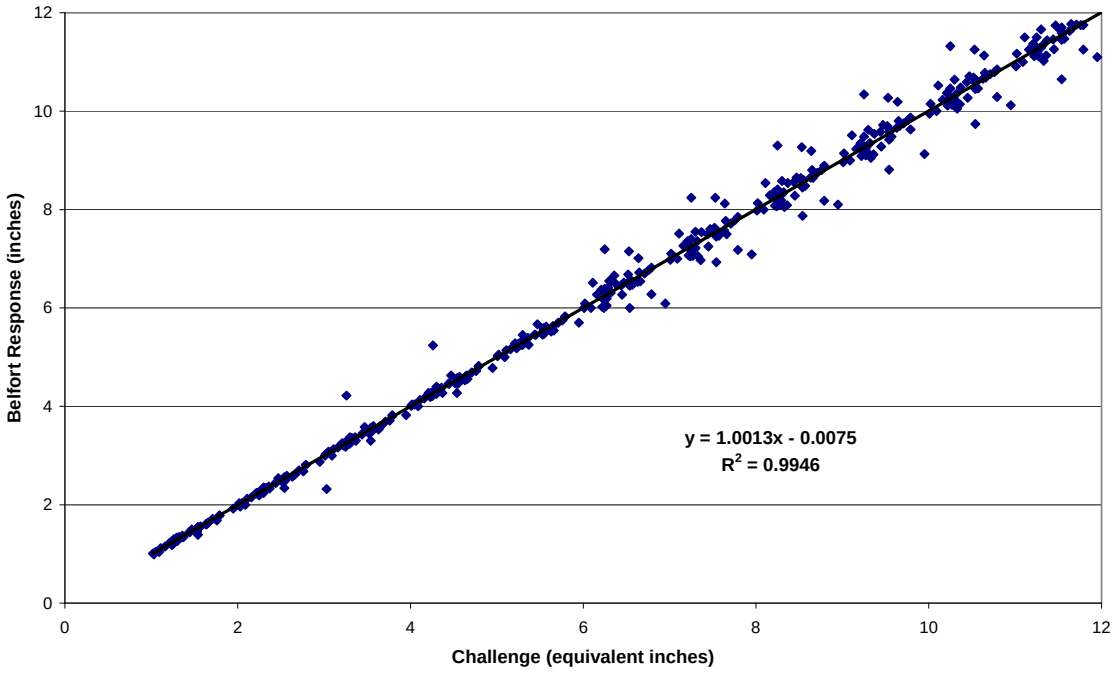
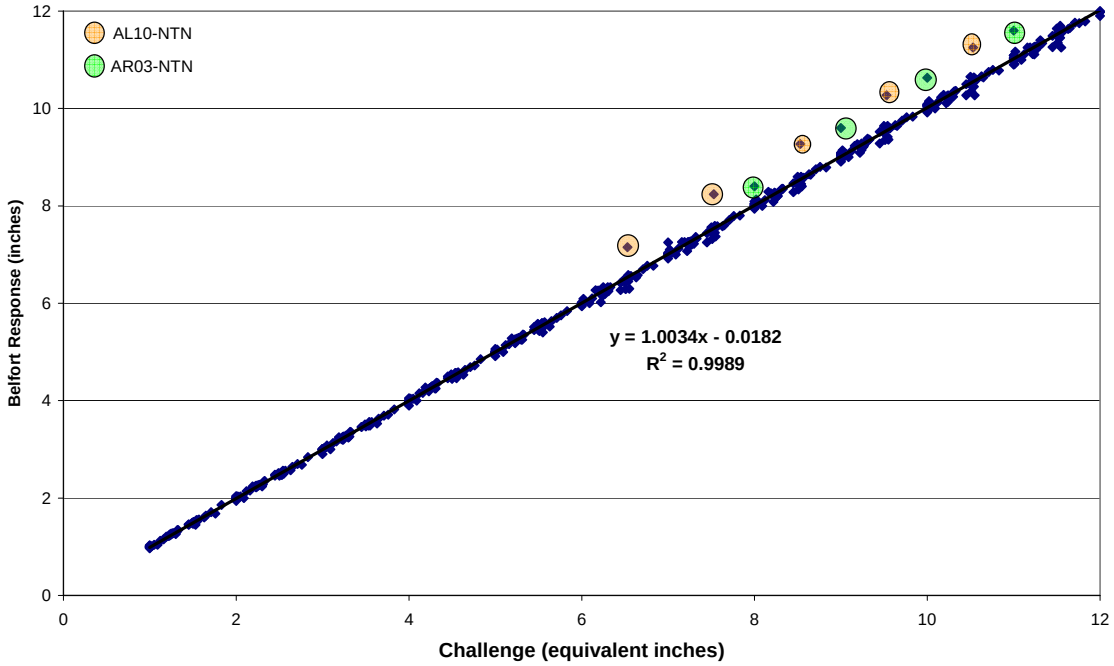


Figure 4-2 presents the "as left" Belfort raingage accuracy results for all gages encountered following any adjustments or improvements to the operation. Adjustments include leveling, cleaning, adjusting linkage, and calibration. Overall program-wide accuracy was improved as the results indicate with a slope of approximately 1.00 and a correlation coefficient of 0.9989. However there were still some gages that could not be adjusted to within the tolerance of 0.10 inch throughout the entire range of 0-12 inches. Site AR03-NTN was not able to be adjusted within acceptable limits. Adjustment of the gage at site AL10-NTN was not attempted since the Belfort gage was scheduled to be replaced with an electronic gage a few days after survey.

Figure 4-2. As left Belfort Accuracy - 47 Gages



4.2 Belfort Calibration Results

Of the 48 Belfort gages encountered, 26 gages required some type of adjustment. Only data from Belfort gages that were adjusted during the survey are presented in this subsection. 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. There is a noticeable decrease in accuracy observed in points above six inches in Figure 4-3. This is mostly attributed to improper gage turnover which was discussed in Section 3.0 and will be addressed again in Section 6.0 of this report.

Figure 4-3. As Found Belfort Accuracy - 26 Adjusted Gages

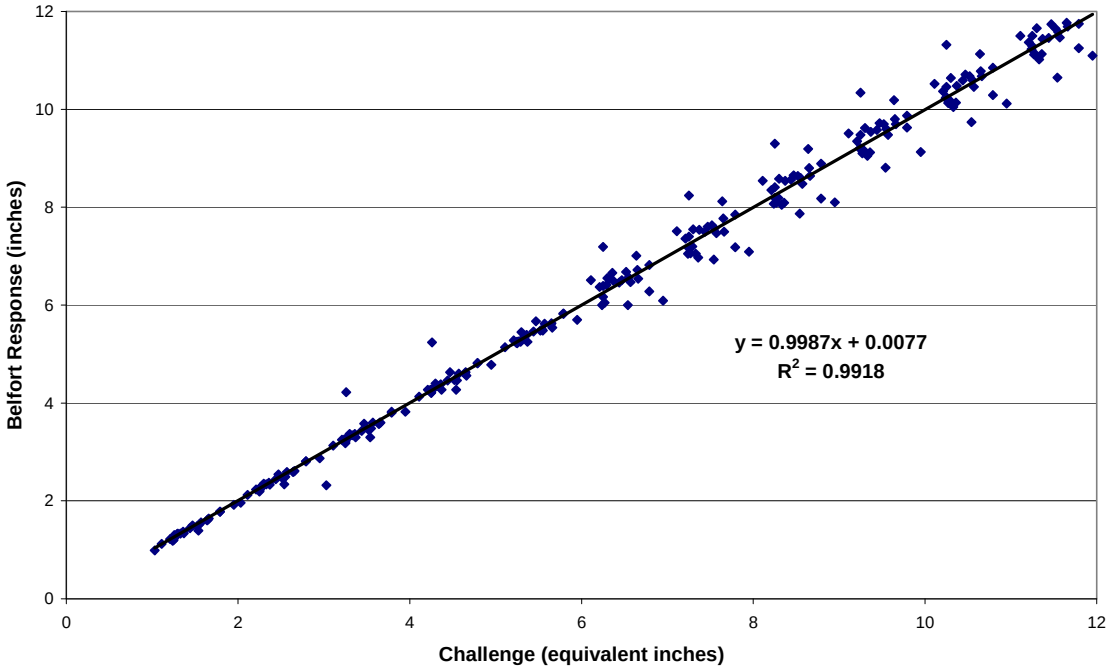
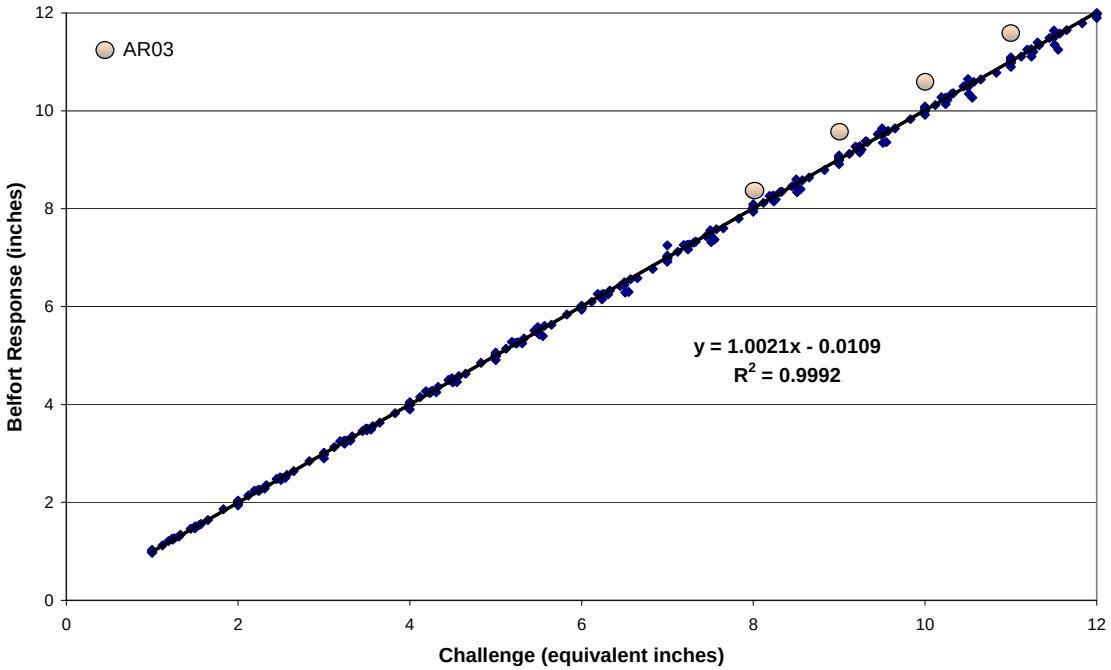


Figure 4-4. As Left Belfort Accuracy - 26 Adjusted Gages

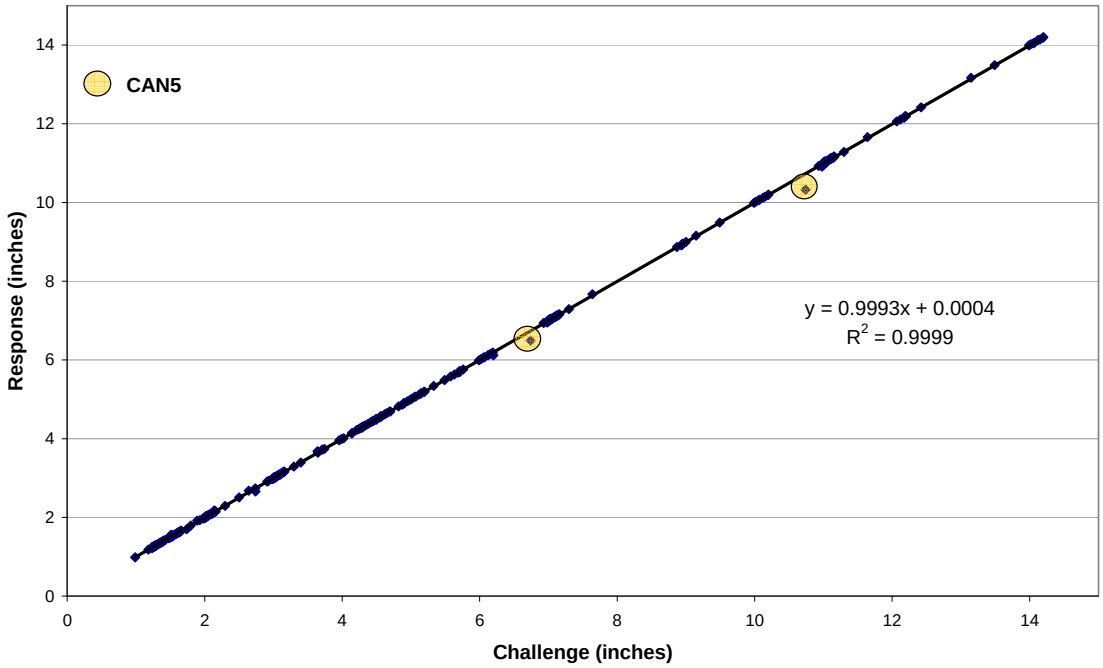


4.3 Electronic Gage Accuracy

The results of the accuracy tests for the 63 electronic raingages challenged during the period covered by this report are presented in Figure 4-5. CAN5 was being installed by personnel from Environment Canada at the time of the survey and it was discovered that the calibration factors stored in the datalogger were incorrect. The factors were corrected following the survey and the gage accuracy was verified by Environment Canada personnel.

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. As was the case with the gage at CAN5, when a gage is found out of calibration it is identified as requiring further correction. This may necessitate the gage being sent to the manufacturer for maintenance. 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 - 63 Gages



4.4 Sensor Heater Tests

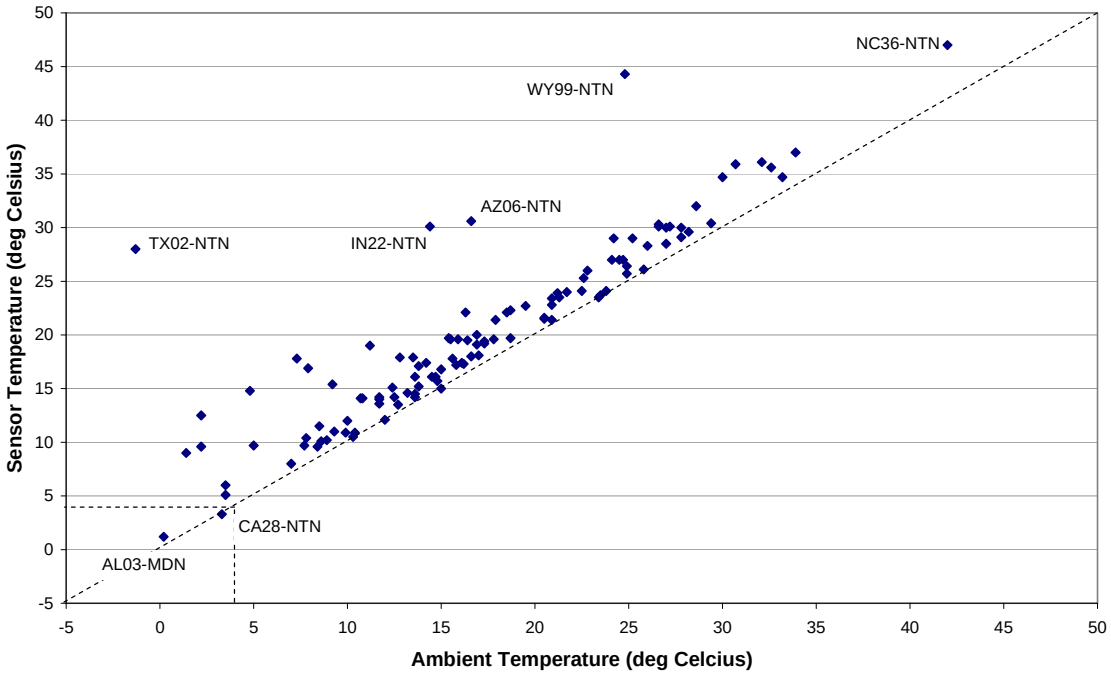
The ACM type collectors used throughout the networks of the NADP utilize a contact grid sensor. When precipitation bridges the gap between the grid and the sensor plate the sensor is "activated" and the collector opens. In order to optimize that operation the sensor is heated at a low level when the ambient temperature is below 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.

Figure 4-6. Inactivated Sensor Temperature

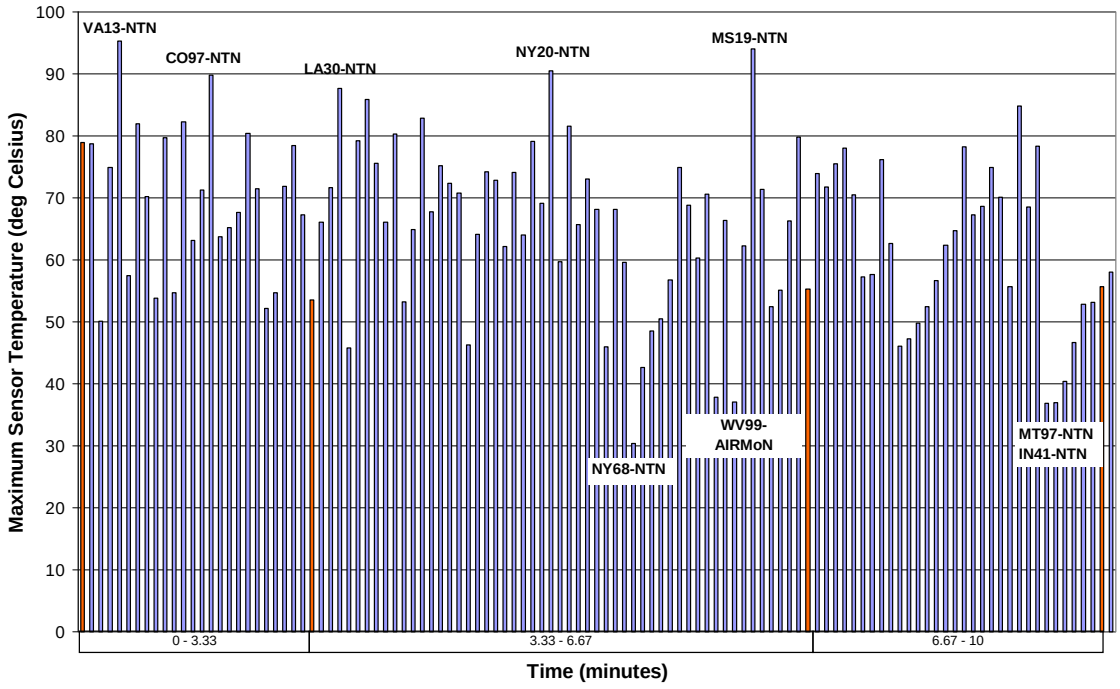


As can be seen in Figure 4-6 a few sensors appeared to be considerably warmer than ambient when the temperature was above 4 ˚C, and a couple of sensors did not appear to be heating when the ambient temperature was below 4 ˚C. AL03-MDN was reported as operating properly by the surveyor with no follow-up suggestions. The sensor for CA28-NTN was reported as not functioning properly, and it was suggested that it be replaced. Records indicate that a replacement sensor was sent to the site after the site survey took place.

Replacements for two of the sensors (sites TX02 and WY99) were requested during the site surveys. The other three sites that had sensors at higher than ambient temperature were considered to be reasonable at the time of the test most likely due to residual radiant heat and not enough time shaded prior to making the temperature measurement.

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 generally 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. Avtivated 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° to 40 °C	5
40° to 50 °C	10
50° to 60 °C	24
60° to 70 °C	27
70° to 80 °C	34
80° to 90 °C	10
90° to 100 °C	3

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.

In an attempt to quantify the NADP QA program's effectiveness, EEMS added a quality indicator to Tables 3-1in order to assess whether there are positive or negative changes in some individual assessments each year. Each of the non-compliant assessments that are identified to have a possible impact on data quality is compared to the non-compliant assessments from the previous reporting period to determine if there has been a change. Since the number of sites or distribution of networks visited is not the same each year this data cannot be used to determine trends. This year's assessments indicated a notable improvement in motorbox operation, but poorer performance in ACM sensor operation. Another assessment that showed improvement was Belfort turn-over. Most other assessments did not show large differences one way or the other. These data were discussed and evaluation was provided in Section 3.2.

It is suggested that the list of assessments that are critical to the operation of the sites and data quality continue to be refined. In addition, research that has been conducted by the USGS and others that relate siting criteria to sample quality should be used to determine if assessments can be removed or added to the site surveys. For example it has been shown in a USGS Open-File Report *"Four Studies on Effects of Environmental Factors on the Quality of National Atmospheric Deposition Program Measurements"* by Gregory Wetherbee et al, that taller vegetation near the collector may actually improve collection efficiency and therefore could be considered to be positive and not a negative influence.

Although qualitative information is important, further refinement of the assessments should include more quantitative information that might be more useful and valuable. For example, the ground cover assessment could be refined to include the presence of any buildings with 30 meters and the square footage of ground covered by un-natural materials if those items are determined to be significant to sample quality. By improving the information gathered during surveys more meaningful interpretation can be performed.

Once this is accomplished, and a smaller list of items that are significant to site operation and data quality is identified, tracking of site conditions and improvements may lead to trends in data as to specific improvements at individual sites.

5.1 Documentation

Although most sites surveyed have been operating for a very long time, and most site operators are experienced and knowledgeable of the procedures and duties they are required to perform,

some of the documentation of those procedures is outdated. 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 P O 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 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. Changes to procedures that are distributed via direct mailing to operators, and are intended to append or replace pages in the current documentation are not always retained on-site. Some site operators suggested that revised operations manuals be distributed, and subsequent revisions and updates be supplied and tracked electronically. This may be accomplished using a registration and download process through the current 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

As indicated in previous reports, analysis of the survey data obtained from the sites surveyed during this reporting period also suggests that an additional raingage operation and maintenance procedure may benefit data quality. As was the case with the sites encountered during the previous periods, the most common problems observed with the Belfort raingages include improper turnover adjustment and dirty linkage. Dirty linkage causes sticky or poor pen response to changes in weight. However, as the mechanical gages are replaced with electronic gages the problems will be less significant.

Measured precipitation is affected by incorrect pen turnover when large amounts of precipitation occur during the sample period, or when the gage is winterized which raises the pen baseline and allows precipitation to accumulate for multiple weeks. Both cases are more likely to cause the pen to turnover and begin the downward transverse. In most cases where the gage turnover was an issue, a minor adjustment corrected the second transverse (six to twelve inch) response.

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 with proper instruction received during the annual training classes provided by the Central Analytical Laboratory (CAL) and the Mercury Analytical Laboratory (HAL) and/or on site training provided during the site surveys.

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:

Chimney Caulking for MDN (Modified ACM) Collectors

In a number of cases water appears to seep between the funnel and chimney in the modified ACM collectors. This is especially prevalent during events with high winds. This has the potential to cause confusion regarding the source of the liquid in the over-flow container and possibly the Quality Rating (QR) code of the sample. This seeping between the funnel and chimney does not seem to be a problem in the MDN N-CON collectors.

Some of the MDN sites also 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.

Dry Side Bucket Protocol

For the most part dry side buckets were found to be in good condition. However, there were some exceptions and some site operators were unsure of the procedure to get a replacement dry side bucket. It would be constructive to clarify the procedure for dry side bucket replacement and cleaning.

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.

Collector Arms during Cold Season

Some site operators report malfunction of the motor-box due to the arms freezing in one position. This has been an ongoing problem throughout the history of the NADP. EEMS is aware that the Program Office is investigating some options for improvement to the collector to help minimize the problem. Many of the upgrade bushing kits have been installed by operators and field technicians. Hopefully improved collector operation will be observed in the network.

At least one site was operating a collector with deteriorated boot covers for the collector arms. This was reported during the survey and a replacement set was requested. Due to the expense of the current approved boots it is suggested that efforts continue to identify other acceptable materials for boot covers.

Lid Liner Replacement Protocol

EEMS noticed an improvement regarding the lid liner replacement protocol. Most site operators are now aware of the scheduled replacement of the lid liners. It is still helpful to remind site operators of the minimum required replacement schedule and procedures, and reinforce the requirement for the liner to be replaced whenever needed due to damage from birds or other animals.

5.2.3 N-CON NTN Single Bucket Collector

An additional collector has been approved for use in the NTN network and installations occurred during this reporting period. Generally the collectors function well and are easy to operate and are an improvement to the network.

Some problems discovered include:

- Motor/lid-arm adapters that become loose and need adjustment either after shipping or operation of the collector.
- Lid modification for different size buckets.
- High power consumption and not well suited for DC operation.

The Program Office and the CAL are aware of these issues and they are being addressed.

5.2.4 Electronic Gage and PDA

The introduction of the electronic raingages into the network is a great improvement. All of the site operators where they have been installed are very glad to be operating them. However there is still some room for improvement with their operation.

PDA Software Versions and Procedures

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.

Comparison of Electronic Gage Measurements to Mechanical Gage Measurements

Although the electronic gages encountered proved to be very accurate balances and were able to report the weight of the standards accurately, there are still some questions regarding their comparability to the mechanical gages used historically. The electronic gages most widely in use rely on the combination of a load cell for weighing and optical sensors to determine precipitation events. Unlike the mechanical gage, the datalogger inside the electronic gage is programmed to determine if the change in weight of the collection bucket is due to precipitation.

The USGS has investigated the differences between the Belfort gages and the ETI NOAH IV gages and presented a paper describing the capture efficiencies. Research to quantify the difference of the Belfort gages and the Ott Puvio-2 gages is pending.

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 responding 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).

Electronic Gage Installations

In the past it has been observed that some of the electronic gage installations were not performed according to the guidelines and rules provided by the NADP. This has improved with recent installations of new equipment.

EEMS continues to recommend that when site upgrades are planned, such as the installation of new electronic gages, that care should be exercised to improve the site conditions with respect to siting criteria issues and instrument operation. It may be necessary to review the rules and guidelines with the installer prior to the installation to ensure compliance.

Whenever EEMS observes gage installations that can be improved the site operator, supervisor, and network liaison is advised. It is suggested that during the next site survey (if not sooner) that installation issues be addressed and corrected if possible.

6.0 Field Laboratory Survey Results

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, and results of the pH and conductivity measurements at AIRMoN 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.

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 results for the scales surveyed when challenged with four standard Belfort weights (from approximately 830g to 3400g). An average error of 0.5% or more was used as the accuracy tolerance.

Table 6-1. Average Percent Difference for Site Scales

Site Id	Network	Average % Difference	Site Id	Network	Average % Difference	Site Id	Network	Average % Difference
AL10	NTN	-0.01%	MN32	NTN	0.04%	OR97	NTN	-0.02%
AL99	NTN	0.02%	MN99	NTN	-0.10%	PA15	NTN	-0.02%
AR03	NTN	-0.04%	MS10	NTN	-0.16%	PA15	AIRMoN	-0.02%
AR27	NTN	0.03%	MS19	NTN	-0.01%	SC05	NTN	0.00%
AZ06	NTN	-0.01%	MS30	NTN	-0.04%	SC06	NTN	0.01%
AZ97	NTN	-0.36%	MT00	NTN	-0.01%	SD04	NTN	-0.28%
AZ98	NTN	0.02%	MT05	NTN	0.00%	SD99	NTN	0.09%
AZ99	NTN	0.03%	MT97	NTN	-0.01%	TX02	NTN	0.16%
CA28	NTN	0.00%	NC06	NTN	-0.31%	TX03	NTN	-0.04%
CAN5	NTN	0.00%	NC29	NTN	-0.09%	TX04	NTN	0.06%
CAN6	NTN	0.00%	NC35	NTN	0.02%	TX10	NTN	0.01%
CO10	NTN	0.08%	NC36	NTN	0.04%	TX16	NTN	0.07%
CO93	NTN	-0.02%	ND00	NTN	0.14%	TX21	NTN	0.17%

Table 6-1. Average Percent Difference for Site Scales (continued)

Site Id	Network	Average % Difference
CO97	NTN	0.01%
CT15	NTN	0.02%
GA09	NTN	-0.02%
GA33	NTN	-0.35%
GA41	NTN	-0.05%
GA99	NTN	0.11%
ID02	NTN	-0.16%
ID03	NTN	0.14%
ID11	NTN	-0.01%
IN22	NTN	0.01%
IN41	NTN	0.13%
LA30	NTN	0.01%
MD99	NTN	0.28%
ME00	NTN	0.13%
ME98	NTN	0.10%
MN08	NTN	0.01%
MN16	NTN	-0.01%
MN18	NTN	0.03%
MN23	NTN	-0.11%
MN28	NTN	-0.10%

Site Id	Network	Average % Difference
ND08	NTN	-0.02%
ND11	NTN	-0.15%
NH02	NTN	-0.02%
NY01	NTN	0.13%
NY08	NTN	-0.05%
NY20	NTN	0.01%
NY22	NTN	0.01%
NY29	NTN	0.03%
NY52	NTN	0.10%
NY67	AIRMoN	0.04%
NY68	NTN	0.00%
NY98	NTN	-0.04%
NY99	NTN	0.02%
OH09	NTN	0.02%
OH49	NTN	0.17%
OH54	NTN	0.09%
OH71	NTN	0.01%
OR09	NTN	0.08%
OR10	NTN	-0.02%
OR18	NTN	0.01%

Site Id	Network	Average % Difference
TX22	NTN	0.08%
TX43	NTN	-0.09%
TX56	NTN	-0.28%
VA00	NTN	0.07%
VA13	NTN	0.05%
VA24	NTN	-0.28%
VA28	NTN	-0.10%
VA98	NTN	0.00%
VA99	NTN	-0.02%
VT01	NTN	-0.02%
VT99	AIRMoN	-0.10%
VT99	NTN	-0.10%
WA98	NTN	0.02%
WI09	NTN	-0.08%
WI35	NTN	0.04%
WI37	NTN	-0.06%
WV99	AIRMoN	-0.04%
WY99	NTN	0.03%

pH and Conductivity Measurements

This subsection presents the results of the field chemistry evaluations performed at the four AIRMoN sites.

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 CAL. Prior to each AIRMoN site survey the AIRMoN Site Liaison provided the survey team with in-house prepared simulated rain. The CAL determined that the pH of this sample was 4.84 ± 0.12 pH units and 9.7 ± 0.9 uS/cm. The pH comparisons are presented in Table 6-2 and the conductivity comparisons are shown in Table 6-3.

The pH and conductivity results are good with no sites outside the tolerance for pH and conductivity measurements. All of the site operators 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 (± 0.12)	Response	Difference
NY67	AIRMoN	4.84	4.85	-0.01
PA15	AIRMoN	4.84	4.81	0.03
WV99	AIRMoN	4.84	4.78	0.06
VT99	AIRMoN	4.84	4.81	0.03

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

Site Id	Network	Conductivity Target Value (± 0.9)	Response	Difference
NY67	AIRMoN	9.7	8.9	0.8
PA15	AIRMoN	9.7	10.4	-0.7
WV99	AIRMoN	9.7	9.6	0.1
VT99	AIRMoN	9.7	10.26	-0.56

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.

Internal QA Audits and Site Operator Reviews

No internal QA audits were conducted in 2011. It is anticipated that at least one will occur in 2012.

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 2012 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 and the EEMS QA Manager 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 when the training program is reinstituted.

7.3 Duplicate Data Entry

A routine procedure utilized as part of the 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 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.

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. It is EEMS' goal to forward this information on a monthly basis, however there are times when data verification may take longer than expected.

7.4 Identifiable Areas 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.

Prior to the 2008 fall NADP meeting, EEMS prepared a list of items from the site survey questionnaire that can cause confusion or be misinterpreted during surveys. This list was discussed with the NADP QA Manager and the EPA Project Officer. Some of these items required further definition and refinement; others were candidates for removal from the questionnaire. Changes were approved by the NADP QA Manager, and by the EPA Project Officer. EEMS is finalizing these changes which will be included in the new version of the data-collection database. This is an ongoing process and a meeting is held each spring to discuss further refinement of the survey questionnaire.

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.

The data indicates that of the 64,544 entries that are compared (minus memo fields, site ID, and Network) the entry error rate is less than 0.6%. The field entry errors are approximately twice as high as the duplicate entry errors.

Table 7-1. 2011 Internal QA Results for Duplicate Entry Errors

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	32,272	32,272	64,544
Initial File Entry Errors	238		
Duplicate QA Entry Errors		120	
Percent Errors	0.74%	0.37%	
Total Entry Errors	358		
Total Percent Errors	0.55%		

Internal Survey Audits

No internal survey audits were conducted in 2011.

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 the manufacturer. The DVMs are used to measure temperature with a thermocouple input which is certified with a NIST traceable thermometer.

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

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

All certification documentation is provided in Appendix D.

APPENDIX A

Assessments Determined to Impact Data Quality

Assessments Determined to Impact Data Quality

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

Field Entry	NTN	MDN	AIRMON
Heater in good condition	N/A	✓	N/A
Heater thermostat in good condition	N/A	✓	N/A
Has flush wall filter mount been installed	N/A	✓	N/A
Filter in good condition	N/A	✓	N/A
Max / min thermometer in acceptable limits	N/A	✓	N/A
ACM sensor operates properly	✓	✓	✓
Motorbox operates within acceptable limits	✓	✓	✓
N-CON fan in good condition	N/A	✓	N/A
N-CON cooling fan thermostat in good condition	N/A	✓	N/A
N-CON heater in good condition	N/A	✓	N/A
N-CON heater thermostat in good condition	N/A	✓	N/A
N-CON max / min thermometer in acceptable limits	N/A	✓	N/A
N-CON sensor responds to a 20-second mist of water	✓	✓	✓
N-CON lid seal in good condition	✓	✓	✓
N-CON lid liner in good condition	✓	✓	✓
Was the 'as found' turn over set properly (Belfort gage)	✓	✓	✓
Raingage operates properly (electronic gage)	✓	✓	✓
Does datalogger receive event signals form all collectors (electronic gage)	✓	✓	✓
Does optical sensor respond to "blocking" of light beam (electronic gage)	✓	✓	✓
Does optical sensor respond to mist of water (electronic gage)	✓	✓	✓
Does the stick measure within tolerances (.01") (NWS stick gage)	✓	✓	✓

N/A= Not applicable to the particular network

APPENDIX B

Findings Most Likely to Impact Data Quality

Table 1-A. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Electronic Raingage (page 1 of 5)

	AZ06	AZ97	AZ98	CA28	CAN6	CO10	CO93	CO97	CT15	GA09
Is sampling media quality maintained? (1)										
Is the orifice of the collector +/- .3 m of raingage (elevation)	X			X		X	X			
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)				X		X		X	X	
No fences > 1 m height inside 2 m radius (raingage)										
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	
No fences > 1 m height inside 5 m radius (collector)			X							
No vegetation height > 0.6 m within 5 m radius (collector)									X	
No treated lumber inside 5 m radius (collector)				X			X			
No pastures and ag. activity within 20 m radius									X	
No herbicides and fertilizers used within 20 m radius									X	
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean	X	X								
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly				X						
Motor-box operates within acceptable limits										
Raingage operates properly (electronic gage)	X									
Does datalogger receive event signals form all collectors (electronic gage)								X		
Does optical sensor respond to "blocking" of light beam (electronic gage)		U to T				U to T	N/A	N/A		
Does optical sensor respond to mist of water (electronic gage)		U to T				U to T	N/A	N/A		

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-A. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Electronic Raingage (page 2 of 5)

	GA33	ID02	ID03	IN22	LA30	MD99	ME00	ME98	MN16	MN18
Is sampling media quality maintained? (1)										
Is the orifice of the collector +/- .3 m of raingage (elevation)										
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)	X					X	X	X		
No fences > 1 m height inside 2 m radius (raingage)										
No vegetation height > 0.6 m within 5 m radius (raingage)	X		X			X		X		
Collector and sensor oriented properly									X	
45 degree rule met (collector)								X		
30 degree rule for trees met (collector)									X	
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X					X	X		X	X
No fences > 1 m height inside 5 m radius (collector)										
No vegetation height > 0.6 m within 5 m radius (collector)	X					X		X		
No treated lumber inside 5 m radius (collector)		X				X	X			
No 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										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean				X	X					
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly					X					
Motor-box operates within acceptable limits										
Raingage operates properly (electronic gage)										
Does datalogger receive event signals form all collectors (electronic gage)										
Does optical sensor respond to "blocking" of light beam (electronic gage)				N/A	N/A					
Does optical sensor respond to mist of water (electronic gage)				N/A	N/A		X			

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-A. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Electronic Raingage (page 3 of 5)

	MN32	MT00	MT05	MT97	NC06	NC29	ND00	ND11	NH02	NY22
Is sampling media quality maintained? (1)										
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			
No fences > 1 m height inside 2 m radius (raingage)										
No vegetation height > 0.6 m within 5 m radius (raingage)		X	X				X		X	
Collector and sensor oriented properly										
45 degree rule met (collector)							X			
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			
No fences > 1 m height inside 5 m radius (collector)			X				X			
No vegetation height > 0.6 m within 5 m radius (collector)	X	X	X				X			
No treated lumber inside 5 m radius (collector)				X						
No pastures and ag. activity within 20 m radius					X					
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		U to T								
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly				X						
Motor-box operates within acceptable limits										
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)				N/A		N/A	X	N/A		
Does optical sensor respond to mist of water (electronic gage)				N/A		N/A	X	N/A		

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-A. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Electronic Raingage (page 4 of 5)

	NY52	NY68	OH09	OH49	OH54	OR97	SD99	TX04	TX22	TX43
Is sampling media quality maintained? (1)	X									
Is the orifice of the collector +/- .3 m of raingage (elevation)										
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)	X		X		X				X	
No fences > 1 m height inside 2 m radius (raingage)	X									
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X			X			X		X
Collector and sensor oriented properly										
45 degree rule met (collector)	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						X
No vegetation height > 0.6 m within 5 m radius (collector)	X				X			X		X
No treated lumber inside 5 m radius (collector)	X									
No pastures and ag. activity within 20 m radius										X
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean										
Does lid seal properly	U to T									
Lid liner in good condition										
ACM sensor operates properly	U to T									
Motor-box operates within acceptable limits	U to T									
Raingage operates properly (electronic gage)	U to T									
Does datalogger receive event signals form all collectors (electronic gage)	U to T		X		X					
Does optical sensor respond to "blocking" of light beam (electronic gage)	U to T	N/A	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			N/A			

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-A. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Electronic Raingage (page 5 of 5)

	VA13	VA24	VA28	VA99	WA98	WI35
Is sampling media quality maintained? (1)						
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
No fences > 1 m height inside 2 m radius (raingage)						
No vegetation height > 0.6 m within 5 m radius (raingage)						
Collector and sensor oriented properly		X				
45 degree rule met (collector)		X				X
30 degree rule for trees met (collector)	X		X	X		
30 degree rule for buildings met (collector)						
No objects > 1 m height within 5 m radius (collector)						X
No fences > 1 m height inside 5 m radius (collector)						
No vegetation height > 0.6 m within 5 m radius (collector)					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						
Roads meet NADP siting criteria						
Waterways meet NADP siting criteria						
Airports meet NADP siting criteria						
Animal operations meet NADP siting criteria (NTN and AIRMoN)						
Parking lots and maintenance areas meet NADP siting criteria						
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria						
Dry side bucket is clean						
Does lid seal properly						
Lid liner in good condition						
ACM sensor operates properly	X					
Motor-box operates within acceptable limits						
Raingage operates properly (electronic gage)						
Does datalogger receive event signals form all collectors (electronic gage)						
Does optical sensor respond to "blocking" of light beam (electronic gage)						
Does optical sensor respond to mist of water (electronic gage)						

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-B. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Belfort Raingage (page 1 of 4)

	AL10	AL99	AR03	AR27	AZ99	GA41	GA99	ID11	IN41	MN08
Is sampling media quality maintained? (1)										
Is the orifice of the collector +/- .3 m of raingage (elevation)								X		
30 degree rule for buildings met (raingage)										
No objects > 1 m height inside 5 m radius (raingage)	X			X			X	X		X
No fences > 1 m height inside 2 m radius (raingage)										
No vegetation height > 0.6 m within 5 m radius (raingage)										
Collector and sensor oriented properly										X
45 degree rule met (collector)			X							
30 degree rule for trees met (collector)			X							X
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X		X	X	X					X
No fences > 1 m height inside 5 m radius (collector)					X					
No vegetation height > 0.6 m within 5 m radius (collector)								X		
No treated lumber inside 5 m radius (collector)										
No pastures and ag. activity within 20 m radius	X									
No herbicides and fertilizers used within 20 m radius				X						
Roads meet NADP siting criteria				X						
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria				X				X		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean			X			X			X	
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly					X					
Motor-box operates within acceptable limits					X					
Was the 'as found' turn over set properly	X		X				X	X	X	X

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-B. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Belfort Raingage (page 2 of 4)

	MN23	MN28	MN99	MS10	MS19	MS30	NC35	NC36	ND08	NY08
Is sampling media quality maintained? (1)										
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
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										
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
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 pastures and ag. activity within 20 m radius										X
No herbicides and fertilizers used within 20 m radius										X
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean	X			X						
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly					X					X
Motor-box operates within acceptable limits										
Was the 'as found' turn over set properly					X	X		X	X	X

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-B. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Belfort Raingage (page 3 of 4)

	NY20	NY99	OH71	OR09	OR10	OR18	PA15	SC05	SC06	SD04
Is sampling media quality maintained? (1)										
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)			X							X
Collector and sensor oriented properly										
45 degree rule met (collector)					X					
30 degree rule for trees met (collector)					X	X		X	X	
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)										
No fences > 1 m height inside 5 m radius (collector)										
No vegetation height > 0.6 m within 5 m radius (collector)	X									X
No treated lumber inside 5 m radius (collector)	X					X				
No pastures and ag. activity within 20 m radius						X				
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean										
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly										
Motor-box operates within acceptable limits										
Was the 'as found' turn over set properly				X			X	X		

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-B. Findings Most Likely to Impact Data Quality – NTN Sites with ACM-type Collector and Belfort Raingage (page 4 of 4)

	TX02	TX03	TX10	TX16	TX21	TX56	VA98	WI09	WI37	WY99
Is sampling media quality maintained? (1)							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)			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										
45 degree rule met (collector)									X	
30 degree rule for trees met (collector)							X		X	X
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)			X			X				X
No fences > 1 m height inside 5 m radius (collector)			X	X						
No vegetation height > 0.6 m within 5 m radius (collector)										
No treated lumber inside 5 m radius (collector)			X							
No pastures and ag. activity within 20 m radius										
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean	X	X	X				N/A			
Does lid seal properly							N/A			
Lid liner in good condition		X								
ACM sensor operates properly	X									
Motor-box operates within acceptable limits	X									
Was the 'as found' turn over set properly	X	X	X	X	X	X	N/A	X		

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 1-C. Findings Most Likely to Impact Data Quality – NTN Sites with N-CON Collector and Electronic Raingage

	CAN5	NY01	NY29	NY98	VA00	VT01	VT99
Is sampling media quality maintained? (1)							
Is the orifice of the collector +/- .3 m of raingage (elevation)							
30 degree rule for buildings met (raingage)							
No objects > 1 m height inside 5 m radius (raingage)			X	X		X	
No fences > 1 m height inside 2 m radius (raingage)			X			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			
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	
No treated lumber inside 5 m radius (collector)			X	X			X
No pastures and ag. activity within 20 m radius							
No herbicides and fertilizers used within 20 m radius							
Roads meet NADP siting criteria							
Waterways meet NADP siting criteria							
Airports meet NADP siting criteria							
Animal operations meet NADP siting criteria (NTN and AIRMoN)							
Parking lots and maintenance areas meet NADP siting criteria							
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria							
N-CON sensor respond to a 20-second mist of water							X
N-CON lid seal in good condition							
N-CON lid liner in good condition							
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	N/A	N/A	
Does optical sensor respond to mist of water (electronic gage)		N/A	N/A	N/A	N/A	N/A	

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

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

	08WI	CO97	GA09	IN21	MD99	ME98	MN16	MN18	MT05	NY68
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)										
30 degree rule for buildings met (raingage)									X	
No objects > 1 m height inside 5 m radius (raingage)		X		X	X	X			X	
No fences > 1 m height inside 2 m radius (raingage)	X									
No vegetation height > 0.6 m within 5 m radius (raingage)	X		X		X	X			X	X
Collector and sensor oriented properly										
45 degree rule met (collector)		X				X				
30 degree rule for trees met (collector)			X	X			X			X
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X	X			X			X		
No fences > 1 m height inside 5 m radius (collector)	X								X	
No vegetation height > 0.6 m within 5 m radius (collector)					X	X			X	
No treated lumber inside 5 m radius (collector)					X					
No galvanized metal inside 5 m radius collector (MDN)	X	X								
No pastures and ag. activity within 20 m radius										
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										
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										N/A
Does lid seal properly				X						
Lid liner in good condition										
Fan in good condition										
Cooling fan thermostat in good condition										
Heater in good condition										
Heater thermostat in good condition										
Has flush wall filter mount been installed										
Filter in good condition					U to T					
Max / min thermometer within acceptable limits										
ACM sensor operates properly										X
Motor-box operates within acceptable limits										
Raingage operates properly (electronic gage)				X						
Does datalogger receive event signals form all collectors (electronic gage)	X	X								
Does optical sensor respond to "blocking" of light beam (electronic gage)		N/A		N/A						N/A
Does optical sensor respond to mist of water (electronic gage)		N/A		N/A						N/A

X Indicates found non-compliant

U to T Indicates "Unable to test"

N/A Indicates "Not applicable"

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

	VA28	VT99	WI08
Is sampling media quality maintained?			
Is the orifice of the collector +/- .3 m of raingage (elevation)			
30 degree rule for buildings met (raingage)			
No objects > 1 m height inside 5 m radius (raingage)			
No fences > 1 m height inside 2 m radius (raingage)			X
No vegetation height > 0.6 m within 5 m radius (raingage)			X
Collector and sensor oriented properly			
45 degree rule met (collector)			
30 degree rule for trees met (collector)	X		
30 degree rule for buildings met (collector)			
No objects > 1 m height within 5 m radius (collector)			X
No fences > 1 m height inside 5 m radius (collector)			X
No vegetation height > 0.6 m within 5 m radius (collector)			X
No treated lumber inside 5 m radius (collector)		X	
No galvanized metal inside 5 m radius collector (MDN)			X
No pastures and ag. activity within 20 m radius			
No herbicides and fertilizers used within 20 m radius			
Roads meet NADP siting criteria			
Waterways meet NADP siting criteria			
Airports meet NADP siting criteria			
Combustion sources meet NADP siting criteria (MDN only)			
Parking lots and maintenance areas meet NADP siting criteria			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria			
Metalworking operations meet NADP siting criteria (MDN only)			
Dry side bucket is clean			X
Does lid seal properly		X	
Lid liner in good condition			
Fan in good condition			
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	U to T		
Max / min thermometer within acceptable limits			
ACM sensor operates properly			
Motor-box operates within acceptable limits		X	
Raingage operates properly (electronic gage)			
Does datalogger receive event signals form all collectors (electronic gage)			X
Does optical sensor respond to "blocking" of light beam (electronic gage)			
Does optical sensor respond to mist of water (electronic gage)			
Electronic Gage Assessments			

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

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

	95WI	GA33	ME00	NM97	NS01	OK01	OK99	ON07	SD18	UT97
Sample Handling										
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
No fences > 1 m height inside 2 m radius (raingage)	X					X	X		X	
No vegetation height > 0.6 m within 5 m radius (raingage)	X	X				X				
Collector and sensor oriented properly										
45 degree rule met (collector)										
30 degree rule for trees met (collector)										
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)	X	X	X	X					X	X
No fences > 1 m height inside 5 m radius (collector)	X			X		X	X		X	
No vegetation height > 0.6 m within 5 m radius (collector)		X	X			X				
No treated lumber inside 5 m radius (collector)			X				X			
No galvanized metal inside 5 m radius collector (MDN)	X		X		X	X	X			X
No pastures and ag. activity within 20 m radius							X			
No herbicides and fertilizers used within 20 m radius							X			
Roads meet NADP siting criteria										X
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Combustion sources meet NADP siting criteria (MDN only)										
Parking lots and maintenance areas meet NADP siting criteria										X
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Metalworking operations meet NADP siting criteria (MDN only)										
N-CON Collector Assessments										
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 respond to a 20-second mist of water										
N-CON lid seal in good condition			U to T							
N-CON lid liner in good condition			U to T							
Electronic Gage Assessments										
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)			X	U to T						

X Indicates found non-compliant

U to T Indicates "Unable to test"

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

	VT98	WV99
Sample Handling		
Is sampling media quality maintained?		
Is the orifice of the collector +/- .3 m of raingage (elevation)		
30 degree rule for buildings met (raingage)	X	
No objects > 1 m height inside 5 m radius (raingage)		
No fences > 1 m height inside 2 m radius (raingage)		
No vegetation height > 0.6 m within 5 m radius (raingage)		
Collector and sensor oriented properly		
45 degree rule met (collector)	X	X
30 degree rule for trees met (collector)		
30 degree rule for buildings met (collector)		
No objects > 1 m height within 5 m radius (collector)		
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)	X	
No pastures and ag. activity within 20 m radius	X	
No herbicides and fertilizers used within 20 m radius		
Roads meet NADP siting criteria		
Waterways meet NADP siting criteria		
Airports meet NADP siting criteria		
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 Collector Assessments		
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 respond to a 20-second mist of water		
N-CON lid seal in good condition		
N-CON lid liner in good condition		
Electronic Gage Assessments		
Raingage operates properly (electronic gage)		
Does datalogger receive event signals form all collectors (electronic gage)		
Does optical sensor respond to "blocking" of light beam (electronic gage)		
Does optical sensor respond to mist of water (electronic gage)		U to T

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

Table 2-C. Findings Most Likely to Impact Data Quality - MDN Sites with ACM-type Collector and Belfort Raingage

	AL03	GA40	MN23	MS22	NC08	NY20	SC05	SC19	TX21	VA98	WI09
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			
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											
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)					X	X					
No galvanized metal inside 5 m radius collector (MDN)					X			X			
No pastures and ag. activity within 20 m radius											X
No herbicides and fertilizers used within 20 m radius											
Roads meet NADP siting criteria											
Waterways meet NADP siting criteria											
Airports meet NADP siting criteria											
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								X			
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							
Filter in good condition		N/A		N/A							
Max / min thermometer within acceptable limits											
ACM sensor operates properly											
Motor-box operates within acceptable limits											
Was the 'as found' turn over set properly *								X	X	X	X

X — Indicates found non-compliant

U to T — Indicates "Unable to test"

N/A — Indicates "Not applicable"

Table 3. Findings Most Likely to Impact Data Quality – AIRMoN Sites

	NY67	PA15	VT99	WV99
Is sampling media quality maintained?				
Are samples stored and shipped properly				
Is the orifice of the collector +/- .3 m of raingage (elevation)			X	
30 degree rule for buildings met (raingage)				
No objects > 1 m height inside 5 m radius (raingage)				
No fences > 1 m height inside 2 m radius (raingage)				
No vegetation height > 0.6 m within 5 m radius (raingage)	X			
Collector and sensor oriented properly	X			X
45 degree rule met (collector)				
30 degree rule for trees met (collector)				X
30 degree rule for buildings met (collector)				
No objects > 1 m height within 5 m radius (collector)				
No fences > 1 m height inside 5 m radius (collector)				
No vegetation height > 0.6 m within 5 m radius (collector)	X			
No treated lumber inside 5 m radius (collector)			X	
No pastures and ag. activity within 20 m radius				
No herbicides and fertilizers used within 20 m radius				
Roads meet NADP siting criteria				
Waterways meet NADP siting criteria				
Airports meet NADP siting criteria				
Animal operations meet NADP siting criteria (NTN and AIRMoN)				
Parking lots and maintenance areas meet NADP siting criteria				
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria				
Dry side bucket is clean		X		
Does lid seal properly				
Lid liner in good condition				
ACM sensor operates properly				X
Motorbox operates within acceptable limits				
Does the stick measure within tolerances (.01") (NWS stick gage)				

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

APPENDIX C

Comparison between Surveys of Findings Most Likely to Impact Data Quality

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	08WI		AL03		AL10		AL99		AR16		AR27		AZ06		AZ97		AZ98		AZ99	
Network	MDN		MDN		NTN		NTN		NTN		NTN		NTN		NTN		NTN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2010	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)			X	X										X						
30degree guideline for trees met (raingage)									X	X							X			
No objects > 1 m height inside 5 m radius (raingage)			X	X	X	X					X	X					X			
No fences > 1 m height inside 2 m radius (raingage)		X																		
No vegetation height > 0.6 m within 5 m radius (raingage)		X																		
Collector and sensor oriented properly																				
45 degree rule met (collector)			X						X											
30 degree rule for trees met (collector)									X	X							X			
No objects > 1 m height within 5 m radius (collector)		X				X					X	X					X	X	X	X
No fences > 1 m height inside 5 m radius (collector)		X															X	X	X	X
No vegetation height > 0.6 m within 5 m radius (collector)																				
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	X														
No herbicides and fertilizers used within 20 m radius												X								
Dry side bucket is clean											X		X	X		X				
Does lid seal properly	X														X					
Lid liner in good condition																				
ACM sensor operates properly	X												X						X	X
Motor-box operates within acceptable limits															X					X
Was the 'as found' turn over set properly	X					X											X		X	
Raingage operates properly (electronic gage)																				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	CAN5		CO10		CO93		CO97		CO97		CT15		FL32		GA09		GA09		GA33	
Network	NTN		NTN		NTN		MDN		NTN		NTN		NTN		MDN		NTN		MDN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2009	2012	2008	2011	2008	2011	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)				X	X	X														
30degree guideline for trees met (raingage)															X	X	X	X		
No objects > 1 m height inside 5 m radius (raingage)			X	X			X	X	X	X	X	X	X	X					X	X
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)												X				X		X	X	X
Collector and sensor oriented properly			X	X							X			X						
45 degree rule met (collector)								X		X					X		X			
30 degree rule for trees met (collector)															X	X	X	X	X	
No objects > 1 m height within 5 m radius (collector)			X	X			X	X	X	X	X	X								X
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)												X							X	X
No treated lumber inside 5 m radius (collector)						X							X	X						
No galvanized metal inside 5 m radius collector (MDN)								X												
No pastures and ag. activity within 20 m radius											X	X								
No herbicides and fertilizers used within 20 m radius											X	X								
Dry side bucket is clean														X						
Does lid seal properly	X										U to T									
Lid liner in good condition													X		X					
ACM sensor operates properly											U to T									
Motor-box operates within acceptable limits											X									
Was the 'as found' turn over set properly	X				X						X		X	X						
Raingage operates properly (electronic gage)		X																		

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	GA33		GA40		GA41		GA99		ID02		ID03		ID11		IN21		IN22		IN41	
Network	NTN		MDN		NTN		NTN		NTN		NTN		NTN		MDN		NTN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2007	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)													X	X						
30degree guideline for trees met (raingage)															X	X	X			
No objects > 1 m height inside 5 m radius (raingage)	X	X						X					X	X	X	X				
No fences > 1 m height inside 2 m radius (raingage)													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)																				
30 degree rule for trees met (collector)															X	X	X			
No objects > 1 m height within 5 m radius (collector)	X	X																	X	
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)	X	X											X	X						
No treated lumber inside 5 m radius (collector)					X				X	X									X	
No galvanized metal inside 5 m radius collector (MDN)															X					
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius										X										
Dry side bucket is clean					X	X											X	X	X	X
Does lid seal properly																X				
Lid liner in good condition																				
ACM sensor operates properly													X		X					
Motor-box operates within acceptable limits													X							
Was the 'as found' turn over set properly			X		X		X	X	X				X	X	X		X		X	X
Raingage operates properly (electronic gage)																X				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	KS07		KS31		KS32		MD99		MD99		ME00		ME00		ME98		ME98		MI99	
Network	NTN		NTN		NTN		MDN		NTN		MDN		NTN		MDN		NTN		NTN	
Year	2008	2010	2008	2010	2008	2010	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2010
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)			X								X	X								
30degree guideline for trees met (raingage)															X	X	X	X		
No objects > 1 m height inside 5 m radius (raingage)	X		X	X	X		X	X	X	X	X	X	X	X		X		X		
No fences > 1 m height inside 2 m radius (raingage)				X																
No vegetation height > 0.6 m within 5 m radius (raingage)						X		X		X					X	X	X	X		
Collector and sensor oriented properly																				
45 degree rule met (collector)															X	X	X	X		
30 degree rule for trees met (collector)											X									
No objects > 1 m height within 5 m radius (collector)		X	X				X	X	X	X	X	X	X	X						
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)						X	X	X	X	X		X			X	X	X	X		
No treated lumber inside 5 m radius (collector)							X	X	X	X	X	X	X	X						
No galvanized metal inside 5 m radius collector (MDN)						X					X	X								
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Dry side bucket is clean									X				X							
Does lid seal properly																				
Lid liner in good condition																				
ACM sensor operates properly																				
Motor-box operates within acceptable limits																			X	
Was the 'as found' turn over set properly	X	X	X			X													X	
Raingage operates properly (electronic gage)																				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	MN08		MN16		MN16		MN18		MN18		MN23		MN23		MN28		MN32		MN99	
Network	NTN		MDN		NTN		MDN		NTN		MDN		NTN		NTN		NTN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)							X											X		
30degree guideline for trees met (raingage)	X	X	X	X		X						X		X				X		
No objects > 1 m height inside 5 m radius (raingage)		X																		
No fences > 1 m height inside 2 m radius (raingage)																				
No vegetation height > 0.6 m within 5 m radius (raingage)												X		X			X			
Collector and sensor oriented properly	X	X				X			X						X					
45 degree rule met (collector)																				
30 degree rule for trees met (collector)	X	X	X	X		X						X					X	X		
No objects > 1 m height within 5 m radius (collector)		X			X	X	X	X	X	X									X	
No fences > 1 m height inside 5 m radius (collector)																				
No vegetation height > 0.6 m within 5 m radius (collector)												X		X			X	X		
No treated lumber inside 5 m radius (collector)																				
No galvanized metal inside 5 m radius collector (MDN)																				
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																				
Dry side bucket is clean														X						
Does lid seal properly																				
Lid liner in good condition																				
ACM sensor operates properly																				
Motor-box operates within acceptable limits																				
Was the 'as found' turn over set properly	X	X	X		X		X		X		X		X		X		X		X	
Raingage operates properly (electronic gage)																				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	MS10		MS19		MS22		MS30		MT00		MT05		MT05		MT97		NC06		NC08	
Network	NTN		NTN		MDN		NTN		NTN		MDN		NTN		NTN		NTN		MDN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
30degree guideline for trees met (raingage)			X	X			X	X			X	X	X	X	X	X			X	X
No objects > 1 m height inside 5 m radius (raingage)		X			X	X					X	X	X	X	X		X	X	X	X
No fences > 1 m height inside 2 m radius (raingage)																			X	X
No vegetation height > 0.6 m within 5 m radius (raingage)										X		X		X						
Collector and sensor oriented properly																				
45 degree rule met (collector)				X			X	X											X	X
30 degree rule for trees met (collector)			X	X			X	X			X		X	X	X	X			X	X
No objects > 1 m height within 5 m radius (collector)													X	X	X		X	X	X	X
No fences > 1 m height inside 5 m radius (collector)		X									X	X	X	X					X	X
No vegetation height > 0.6 m within 5 m radius (collector)										X		X		X						
No treated lumber inside 5 m radius (collector)											X				X	X			X	X
No galvanized metal inside 5 m radius collector (MDN)																			X	X
No pastures and ag. activity within 20 m radius																		X		
No herbicides and fertilizers used within 20 m radius																				
Dry side bucket is clean	X	X	X							U to T							X			X
Does lid seal properly					X															
Lid liner in good condition																				
ACM sensor operates properly				X												X				
Motor-box operates within acceptable limits																				
Was the 'as found' turn over set properly			X	X	X		X	X							X				X	
Raingage operates properly (electronic gage)																				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	NC29		NC35		NC36		ND00		ND08		ND11		NH02		NM01		NM07		NM08	
Network	NTN		NTN		NTN		NTN		NTN		NTN		NTN		NTN		NTN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2011	2008	2008	2010	2008	2010	2008	2010
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)						X														
30degree guideline for trees met (raingage)													X	X					X	X
No objects > 1 m height inside 5 m radius (raingage)							X	X											X	X
No fences > 1 m height inside 2 m radius (raingage)																			X	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
No objects > 1 m height within 5 m radius (collector)							X	X											X	X
No fences > 1 m height inside 5 m radius (collector)								X											X	X
No vegetation height > 0.6 m within 5 m radius (collector)							X	X			X					X				
No treated lumber inside 5 m radius (collector)														X						
No galvanized metal inside 5 m radius collector (MDN)																				
No pastures and ag. activity within 20 m radius											X									
No herbicides and fertilizers used within 20 m radius																				
Dry side bucket is clean																			X	
Does lid seal properly																				
Lid liner in good condition																				
ACM sensor operates properly																				
Motor-box operates within acceptable limits											X									
Was the 'as found' turn over set properly	X		X		X	X				X	X				X	X		X	X	X
Raingage operates properly (electronic gage)												U to T								

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	NS01		NY01		NY08		NY10		NY20		NY20		NY22		NY29		NY52		NY67	
Network	MDN		NTN		NTN		NTN		MDN		NTN		NTN		NTN		NTN		AIRMoN	
Year	2011	2008	2008	2011	2008	2011	2008	2010	2008	2011	2008	2011	2008	2011	2008	2011	2011	2008	2008	2011
Is sampling media quality maintained?																	X			
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
30degree guideline for trees met (raingage)							X	X								X	X	X	X	X
No objects > 1 m height inside 5 m radius (raingage)					X	X	X								X	X	X	X		
No fences > 1 m height inside 2 m radius (raingage)						X	X	X							X	X	X	X		
No vegetation height > 0.6 m within 5 m radius (raingage)							X									X	X	X	X	X
Collector and sensor oriented properly															X				X	X
45 degree rule met (collector)																	X			
30 degree rule for trees met (collector)							X	X								X	X	X		
No objects > 1 m height within 5 m radius (collector)		X			X	X	X		X	X					X	X	X	X		
No fences > 1 m height inside 5 m radius (collector)					X	X	X								X	X	X	X		
No vegetation height > 0.6 m within 5 m radius (collector)							X					X					X	X		X
No treated lumber inside 5 m radius (collector)									X	X	X	X			X	X	X	X	X	
No galvanized metal inside 5 m radius collector (MDN)	X	X																		
No pastures and ag. activity within 20 m radius					X	X							X							
No herbicides and fertilizers used within 20 m radius					X	X														
Dry side bucket is clean					X		X						X							
Does lid seal properly																	U to T			
Lid liner in good condition																				
ACM sensor operates properly		X				X											U to T			
Motor-box operates within acceptable limits																	U to T			
Was the 'as found' turn over set properly		X	X		X	X	X		X		X		X					X		X
Raingage operates properly (electronic gage)																	U to T			

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	NY68		NY68		NY98		NY99		OH49		OH71		OK00		OK17		OK29		OK99	
Network	MDN		NTN		NTN		NTN		NTN		NTN		NTN		NTN		NTN		MDN	
Year	2008	2011	2008	2011	2011	2008	2009	2011	2008	2011	2008	2011	2008	2010	2008	2010	2008	2010	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																				
30degree guideline for trees met (raingage)	X	X	X	X	X	X			X	X					X	X				
No objects > 1 m height inside 5 m radius (raingage)	X		X		X	X							X						X	
No fences > 1 m height inside 2 m radius (raingage)																			X	X
No vegetation height > 0.6 m within 5 m radius (raingage)		X		X							X	X	X		X					
Collector and sensor oriented properly																				
45 degree rule met (collector)	X				X	X														
30 degree rule for trees met (collector)	X	X			X	X			X	X					X	X				
No objects > 1 m height within 5 m radius (collector)	X				X	X			X	X									X	
No fences > 1 m height inside 5 m radius (collector)									X	X									X	X
No vegetation height > 0.6 m within 5 m radius (collector)																				
No treated lumber inside 5 m radius (collector)	X				X														U to T	X
No galvanized metal inside 5 m radius collector (MDN)																				X
No pastures and ag. activity within 20 m radius																				X
No herbicides and fertilizers used within 20 m radius																				X
Dry side bucket is clean	X															X				
Does lid seal properly																				
Lid liner in good condition																				
ACM sensor operates properly		X															X			
Motor-box operates within acceptable limits																				
Was the 'as found' turn over set properly						X	X		X		X				X		X			
Raingage operates properly (electronic gage)																			U to T	

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	VA00		VA13		VA24		VA28		VA28		VA98		VA98		VA99		VT01		VT99	
Network	NTN		NTN		NTN		MDN		NTN		MDN		NTN		NTN		NTN		AIRMoN	
Year	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2008	2011	2008	2011
Is sampling media quality maintained?																				
Is the orifice of the collector +/- .3 m of raingage (elevation)																			X	X
30degree guideline for trees met (raingage)			X	X			X	X	X	X		X		X			X	X	X	
No objects > 1 m height inside 5 m radius (raingage)					X												X	X		
No fences > 1 m height inside 2 m radius (raingage)																	X	X		
No vegetation height > 0.6 m within 5 m radius (raingage)																		X	X	
Collector and sensor oriented properly					X	X														
45 degree rule met (collector)			X		X	X														
30 degree rule for trees met (collector)			X	X			X	X	X	X		X		X	X	X	X	X		
No objects > 1 m height within 5 m radius (collector)					X												X	X		
No fences > 1 m height inside 5 m radius (collector)																	X	X		
No vegetation height > 0.6 m within 5 m radius (collector)																		X		
No treated lumber inside 5 m radius (collector)																X			X	X
No galvanized metal inside 5 m radius collector (MDN)																				
No pastures and ag. activity within 20 m radius																				
No herbicides and fertilizers used within 20 m radius																	X			
Dry side bucket is clean																				
Does lid seal properly																				
Lid liner in good condition																				
ACM sensor operates properly				X					U to T											
Motor-box operates within acceptable limits									X											
Was the 'as found' turn over set properly											X	X	X				X			
Raingage operates properly (electronic gage)					U to T															

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	VT99		VT99		WA98		WI08		WI09		WI09		WI25		WI35		WI36		WI36	
Network	MDN		NTN		NTN		MDN		MDN		NTN		NTN		NTN		MDN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2010	2008	2011	2008	2010	2008	2010
Is sampling media quality maintained?					X															
Is the orifice of the collector +/- .3 m of raingage (elevation)					X															
30degree guideline for trees met (raingage)	X	X	X	X									X	X						
No objects > 1 m height inside 5 m radius (raingage)															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				
30 degree rule for trees met (collector)														X						
No objects > 1 m height within 5 m radius (collector)								X							X	X				
No fences > 1 m height inside 5 m radius (collector)								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 galvanized metal inside 5 m radius collector (MDN)							X	X												
No pastures and ag. activity within 20 m radius										X										
No herbicides and fertilizers used within 20 m radius																				
Dry side bucket is clean					X			X												
Does lid seal properly		X																		
Lid liner in good condition																				
ACM sensor operates properly																			X	
Motor-box operates within acceptable limits	X	X															X			
Was the 'as found' turn over set properly	X		X		X		X			X		X	X	X	X			X		X
Raingage operates properly (electronic gage)																				

Comparison Between Surveys of Findings Most Likely to Impact Data Quality

StationId	WI37		WV99		WV99		WY99	
Network	NTN		AIRMoN		MDN		NTN	
Year	2008	2011	2008	2011	2008	2011	2008	2011
Is sampling media quality maintained?								
Is the orifice of the collector +/- .3 m of raingage (elevation)								
30degree guideline for trees met (raingage)	X	X		X		X	X	X
No objects > 1 m height inside 5 m radius (raingage)								X
No fences > 1 m height inside 2 m radius (raingage)								
No vegetation height > 0.6 m within 5 m radius (raingage)								
Collector and sensor oriented properly			X	X	X	X		
45 degree rule met (collector)	X	X						
30 degree rule for trees met (collector)	X	X		X				X
No objects > 1 m height within 5 m radius (collector)								X
No fences > 1 m height inside 5 m radius (collector)								
No vegetation height > 0.6 m within 5 m radius (collector)								
No treated lumber inside 5 m radius (collector)								
No galvanized metal inside 5 m radius collector (MDN)								
No pastures and ag. activity within 20 m radius								
No herbicides and fertilizers used within 20 m radius								
Dry side bucket is clean			X					
Does lid seal properly								
Lid liner in good condition								
ACM sensor operates properly				X				
Motor-box operates within acceptable limits								
Was the 'as found' turn over set properly	X						X	
Raingage operates properly (electronic gage)								

APPENDIX D

Transfer Standard Instrument Certifications

BL1 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/14/2012	8028481064	26677	Bal Init	0.00	0.00	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	1500.00	1500.00	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	1000.00	999.99	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	500.00	499.97	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	200.00	199.96	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	100.00	99.99	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	50.00	49.99	EOH	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	0.00	0.00	EOH	Initial Balance Check
			Audit				
2/14/2012	8028481064	BL1-0			1033.95	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-1			824.51	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-2			824.45	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-3			823.56	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-4			823.53	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-5			824.31	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-6			823.14	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-7			822.88	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-8			822.67	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-9			824.58	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-10			824.67	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-11			823.97	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-12			824.25	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-a			206.8	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-b			206.4	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-c			206.5	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	BL1-d			206.6	EOH	ETI/Belfort Set #1 - SEG
2/14/2012	8028481064	26677	Bal Post	0.00	0.00	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	1500.00	1500.00	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	1000.00	999.99	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	500.00	499.96	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	200.00	199.97	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	100.00	99.99	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	50.00	49.99	EOH	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	0.00	0.00	EOH	Post Balance Check

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

Reviewer Signature: Dandy Trenville Date: 2/14/2012

BL2 Weight / Balance Calibration Log

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
2/14/2012	8028481064	26677	Bal Init	0.00	0.00	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	1500.00	1500.03	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	1000.00	1000.01	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	500.00	499.95	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	200.00	199.97	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	100.00	99.98	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	50.00	49.99	CSL	Initial Balance Check
2/14/2012	8028481064	26677	Bal Init	0.00	0.00	CSL	Initial Balance Check
2/14/2012	8028481064	BL2-0	Audit		999.8	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-1			823.0	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-2			820.3	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-3			824.3	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-4			824.9	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-5			823.2	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-6			824.0	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-7			823.4	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-8			823.3	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-9			823.5	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-10			823.7	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-11			823.4	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-12			824.0	CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-a				CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-b				CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-c				CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	BL2-d				CSL	ETI/Belfort Set #2 - EOH
2/14/2012	8028481064	26677	Bal Post	0.00	0.00	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	1500.00	1500.03	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	1000.00	1000.00	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	500.00	499.97	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	200.00	199.97	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	100.00	99.99	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	50.00	49.99	CSL	Post Balance Check
2/14/2012	8028481064	26677	Bal Post	0.00	0.00	CSL	Post Balance Check

Calibrator Signature: _____ Date: 2/14/2012

Reviewer Signature: Erin Hebert Date: 2/14/2012

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	190037
Quantity:	1
Calibration Due:	1/2013

EEMS # 01265

Declination functional

John Noga

John Noga, Quality Control

January 30, 2012

Measurement Standards:
Theodolite: Wild T-3 S/N 18801/CAL 5/14/97 NIST# 738/229329-83 738/223398
Optical Wedge: K&E 71-7020 S/N 5167/CAL 4/19/01 NIST# 731/244084-89

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	192034
Quantity:	1
Calibration Due:	1/2013

EEMS # 01270

Declination Not Functional

John Noga

John Noga, Quality Control

January 30, 2012

Measurement Standards:
Theodolite: Wild T-3 S/N 18801/CAL 5/14/97 NIST# 738/229329-83 738/223398
Optical Wedge: K&E 71-7020 S/N 5167/CAL 4/19/01 NIST# 731/244084-89

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

CERTIFICATION OF CALIBRATION AND CONFORMANCE

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

Customer Name:	EE & MS
Purchase Order #:	
Instrument:	S-25 Tracon Surveying Compass
Serial Number:	191832
Quantity:	1
Calibration Due:	1/2013

EEMS # 01272

Declination functional (EL)

John Noga, Quality Control

January 30, 2012

Measurement Standards:
Theodolite: Wild T-3 S/N 18801/CAL 5/14/97 NIST# 738/229329-83 738/223398
Optical Wedge: K&E 71-7020 S/N 5167/CAL 4/19/01 NIST# 731/244084-89

Certificate Number
A1061518

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32505
FEDEX

P.O. Number: HOLD

ID Number: 01310
EMS #

Description:	TRUE RMS MULTIMETER	Calibration Date:	2/9/2012
Manufacturer:	FLUKE	Calibration Due:	2/9/2013
Model Number:	187	Procedure:	METCAL FLUKE 187
Serial Number:	86590148	Rev:	
Technician:	CHRISTIAN CRUZ	Temperature:	75 °F
		Humidity:	37 % 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 and complies with the requirements of ANSI/NCSL Z540.3, 10 CFR 50 Appendix B and 10 CFR Part 21. ISO17025 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements.

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.

TONY ROGERS, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
1566901	FLUKE	5522A	1/7/2012	1/7/2013

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

ANSI/NCSL Z540-1-1994

Certificate Number
A1061517

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32505
FEDEX

P.O. Number: HOLD

EMS #
ID Number: 01311

Description:	TRUE RMS MULTIMETER	Calibration Date:	2/9/2012
Manufacturer:	FLUKE	Calibration Due:	2/9/2013
Model Number:	287	Procedure:	METCAL FLUKE 287
Serial Number:	95740135		Rev:
Technician:	CHRISTIAN CRUZ	Temperature:	75 °F
		Humidity:	37 % RH
On-Site Calibration: ☐		**As Found Condition:**	**IN TOLERANCE**
Comments:		**Calibration Results:**	**IN TOLERANCE**

Limiting Attribute:

This instrument has been calibrated using standards traceable to the 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.

TONY ROGERS, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
1566901	FLUKE	5522A	1/7/2013	1/7/2013

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

ANSI/NCSL Z540-1-1994

Certificate Number
A1061516

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32505
FEDEX

P.O. Number: HOLD

ID Number: 01312
EEMS #

Description:	TRUE RMS MULTIMETER	Calibration Date:	2/9/2012
Manufacturer:	FLUKE	Calibration Due:	2/9/2013
Model Number:	287	Procedure:	METCAL FLUKE 287
Serial Number:	95740243	Rev:	
Technician:	CHRISTIAN CRUZ	Temperature:	75 °F
		Humidity:	37 % RH
		As Found Condition:	**IN TOLERANCE**
On-Site Calibration: ☐		**Calibration Results:**	**IN TOLERANCE**

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.

TONY ROGERS, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
1566901	FLUKE	5522A	1/7/2012	1/7/2013

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

ANSI/NCSL Z540-1-1994

Certificate Number
A1061705

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32505
FEDEX

P.O. Number: HOLD

ID Number: 01230

Description:	TEMPERATURE INDICATOR	Calibration Date:	2/10/2012
Manufacturer:	EUTECHNICS	Calibration Due:	2/10/2013
Model Number:	4600-1.2.5	Procedure:	TMI- M-THERMO
Serial Number:	01D102193	Rev:	
Technician:	ANTHONY MOORE	Temperature:	68 °F
On-Site Calibration: ☐		Humidity:	49 % RH
Comments:		**As Found Condition:**	**IN TOLERANCE**
		Calibration Results:	**IN TOLERANCE**

Limiting Attribute:

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

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K=2. 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 and complies with the requirements of ANSI/NCSL Z540.3, 10 CFR 50 Appendix B and 10 CFR Part 21. ISO17025 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements.

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.

TONY ROGERS, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
A06118	HART SCIENTIFIC	9103	10/10/2011	10/10/2012

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

ANSI/NCSL Z540-1-1994

INSTRUMENT DATA SHEET

Serial/Asset Number: 01230 Customer: EE & MS
Date Tested: 02/10/12

Parameter Tested	Nominal Value In °C	Tolerance ±.13 °C	Lower Limit	Upper Limit	As Found	Pass/Fail	As Left
Temperature Accuracy							
	0.000	0.130	-0.130	0.130	0.05	PASS	AS FOUND
	10.000	0.130	9.870	10.130	9.98	PASS	AS FOUND
	20.000	0.130	19.870	20.130	19.95	PASS	AS FOUND
	30.000	0.130	29.870	30.130	29.95	PASS	AS FOUND
	40.000	0.130	39.870	40.130	40.08	PASS	AS FOUND
	50.000	0.130	49.870	50.130	50.10	PASS	AS FOUND

Slope = 1.001571

int = -0.02095

r = 0.999995

Certificate Number
A1061721

Certificate of Calibration

Customer: EE & MS
1128 NW 39TH DRIVE
GAINESVILLE, FL 32505
FEDEX

P.O. Number: HOLD

ID Number: 01231

Description:	TEMPERATURE PROBE	Calibration Date:	2/10/2012
Manufacturer:	UNKNOWN	Calibration Due:	2/10/2013
Model Number:	SP034-39	Procedure:	TMI- M-THERMO
Serial Number:	01H0060	Rev:	
Technician:	ANTHONY MOORE	Temperature:	68 °F
On-Site Calibration: ☐		Humidity:	49 % RH
Comments:		**As Found Condition:**	**IN TOLERANCE**
		Calibration Results:	**IN TOLERANCE**

Limiting Attribute:

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

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K=2. 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.

TONY ROGERS, BRANCH MANAGER

JACK SHULER, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
A06118	HART SCIENTIFIC	9103	10/10/2011	10/10/2012

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

ANSI/NCSL Z540-1-1994

2/13/2012 - - Calibration and verification of three thermocouples and fluke meters with most recent certification of EEMS RTD

	TMI STD	EEMS RTD		EEMS 2/13/2012 RTD			fluke =	01311		01312		01310	
								EEMS SEG		EEMS		EEMS EOH	
cert date=	10/10/2011	01230 / 01231					thermo =	01236		01237		01238	
EEMS cert date =	**2/10/2012**			raw	corrected			raw	corrected	raw	corrected	raw	corrected
	0.000	0.05	-0.050	0.10	0.12			0.0	0.10	0.0	0.06	0.0	0.11
	10.000	9.98	0.020	8.51	8.52			8.5	8.58	8.5	8.54	8.5	8.56
	20.000	19.95	0.050	19.52	19.51			19.4	19.45	19.5	19.52	19.5	19.50
	30.000	29.95	0.050	28.00	27.98			28.0	28.02	28.0	28.00	28.0	27.96
	40.000	40.08	-0.080	39.30	39.26			39.3	39.29	39.3	39.27	39.3	39.20
	50.000	50.10	-0.100	47.39	47.41			47.4	47.37	47.4	47.35	47.5	47.36
				56.50	56.52			56.6	56.54	56.6	56.53	56.8	56.61
		RTD 01230/01231		17.99	17.98			17.9	17.95	18.0	18.02	18.0	18.01
		slope=	1.001571										
		intercept=	-0.02095			Thermocouple offset =		-0.4		-0.5		0.4	
			0.9999949										
						slope =		**1.002957**		**1.00232**		**1.00531**	
						intercept =		**-0.10525**		**-0.06293**		**-0.10666**	
						correlation =		**0.999997**		**0.999998**		**0.999997**	