2009 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

ACM	Aerochem Metrics
AIRMoN	Atmospheric Integrated Research Monitoring Network
CAL	Central Analytical Laboratory
CASTNET	Clean Air Status and Trends Network
DVM	Digital multi-meters
DQI	Data Quality Indicator
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
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 initiated 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 group, which measures precipitation chemistry and estimates atmospheric wet deposition for various pollutant ions and mercury. The four inter-related NADP networks are, the National Trends Network (NTN), the Atmospheric Integrated Research Monitoring Network (AIRMoN), the Mercury Deposition Network (MDN), and the Atmospheric Mercury Network (AMNet). The AMNet was approved and accepted into the NADP in October of 2009 and surveys of those sites have not been performed yet. EPA has provided long-standing support for the operation of NADP including operational support for four US Forest Service monitoring sites, and recurring funding for the chemical analysis and coordination for 31 other wet deposition sites, in addition to the support for the survey and quality assurance programs of the NADP atmospheric deposition site 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 for NADP reported data.

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 Site Performance Survey Report, with the survey data set. The final site survey data set is considered to be the final site survey report. The data set is delivered to the NADP QA Manager and the EPA Project Officer each month and contains data obtained during site surveys conducted the previous month. The data set 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.
    - Any additional pertinent supporting information.

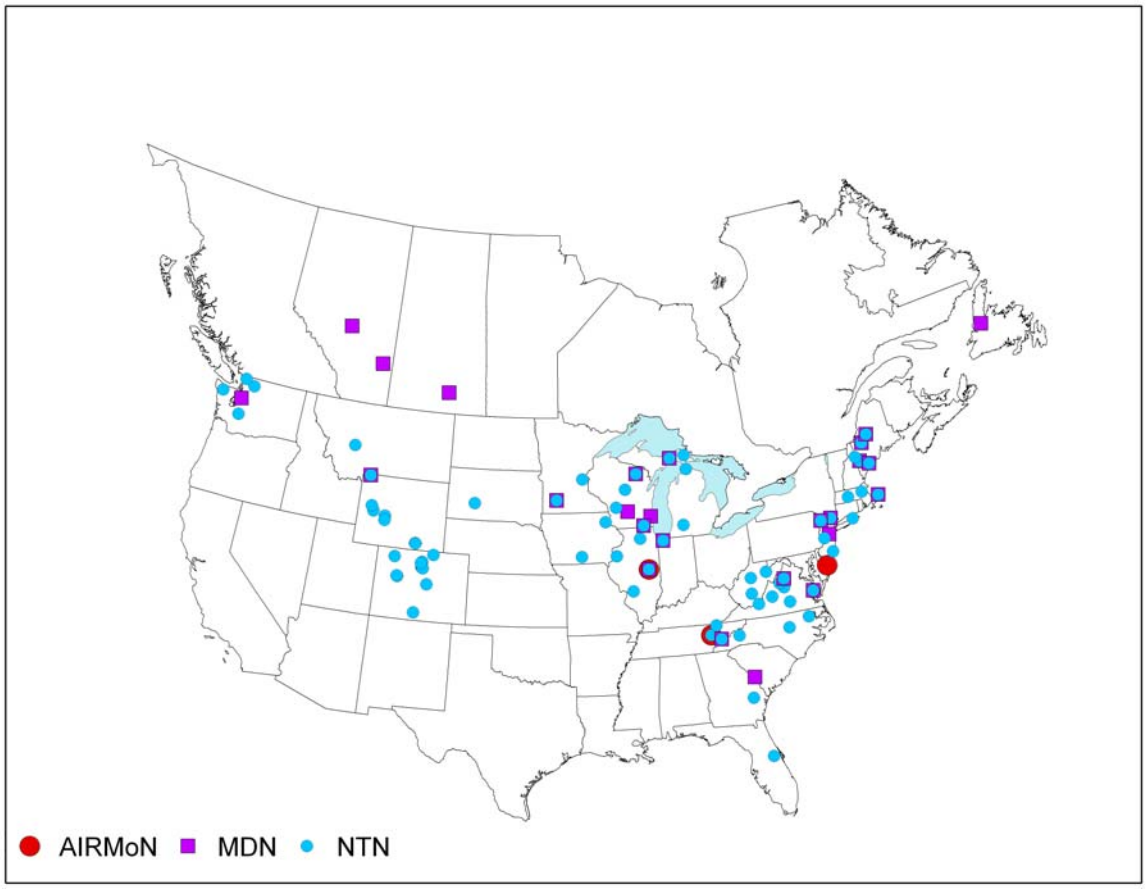
2.0 Status of Sites Surveyed

2.1 Sites Surveyed

This annual report includes site surveys performed between January and December of 2009. This annual report covers portions of two contract periods which begin and end in June of each year.

A total of 101 NADP sites (this number includes co-located sites) were surveyed during the period covered by this report at 82 distinct locations. These include 26 MDN sites, 72 NTN sites, and 3 AIRMoN sites. Figure 2-1 is a map of the locations of the sites visited during 2009. 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 2009



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 meets NADP quality objectives. Of the 84 precipitation gages surveyed (co-located sites use the same gage), 54 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. Since the survey data indicates that a large percentage of gages required attention, it is likely that the mechanical gages have reached, or in some cases exceeded, their useful life-expectancy. Altogether 30 electronic gages were surveyed (includes 2 backup and 1 co-located gage), with only a few minor problems observed with those gages. One of the electronic gages was not challenged with calibration weights because communication with the datalogger could not be established. This problem is discussed in further detail in section 5.0 of this report.

Of the 101 sites surveyed (collectors), only one site had an N-CON collector. The 100 other collectors were AerocChem Metrics (ACM) type and manufactured by either AeroChem Metrics or Loda Electronics Company.

Forty-five sites 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 them all 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 are, 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 2009 and the equipment found at the sites is shown in Table 2.1.

Table 2-1. Sites Surveyed from January through December 2009 and Equipment Found at the Sites

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
AB13	Henry Kroeger	MDN	8/25/2009	ACM-type	Belfort Electronic	NA
AB14	Genesee	MDN	8/25/2009	ACM-type	Electronic	Tipping Bucket
CO00	Alamosa	NTN	6/18/2009	ACM-type	Belfort	NA
CO02	Niwot Saddle	NTN	6/23/2009	ACM-type	Belfort	NA
CO08	Four Mile Park	NTN	6/1/2009	ACM-type	Belfort	NA
CO15	Sand Spring	NTN	5/29/2009	ACM-type	Belfort	NA
CO19	Rocky Mountain National Park-Beaver Meadows	NTN	6/23/2009	ACM-type	Belfort	NOAH IV
CO21	Manitou	NTN	9/16/2009	ACM-type	Belfort	NA
CO22	Pawnee	NTN	9/14/2009	ACM-type	Belfort	Stick Gage
CO90	Niwot Ridge-Southeast	NTN	9/15/2009	ACM-type	Belfort	Other
CO92	Sunlight Peak	NTN	6/1/2009	ACM-type	Belfort	NA
CO94	Sugarloaf	NTN	9/15/2009	ACM-type	Electronic	NA
CO98	Rocky Mountain National Park-Loch Vale	NTN	6/22/2009	ACM-type	Belfort	NOAH IV
DE02	Lewes	AIRMoN	10/28/2009	ACM-type	Stick Gage	Belfort
FL32	Orlando	NTN	2/10/2009	ACM-type	Belfort	Other
GA20	Claxton	NTN	12/8/2009	ACM-type	Electronic	NA
IA08	Big Springs Fish Hatchery	NTN	10/20/2009	ACM-type	Belfort	NA
IA23	McNay Research Center	NTN	10/14/2009	ACM-type	Belfort	Stick Gage
IL11	Bondville	MDN/NTN	8/10/2009	ACM-type	Electronic	Belfort
		AIRMoN			Stick Gage	Electronic

Table 2-1. Sites Surveyed from January through December 2009 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
IL18	Shabbona	NTN	10/12/2009	ACM-type	Belfort	Belfort
IL46	Alhambra	NTN	8/12/2009	ACM-type	Electronic	Tipping Bucket
IL78	Monmouth	NTN	9/23/2009	ACM-type	Belfort	Other
IN34	Indiana Dunes National Lakeshore	MDN/NTN	9/21/2009	ACM-type	Electronic	Stick Gage
MA01	North Atlantic Coastal Lab	MDN/NTN	3/27/2009	ACM-type	Belfort	Tipping Bucket
MA08	Quabbin Reservoir	NTN	3/25/2009	ACM-type	Belfort	NA
MA13	East	NTN	3/25/2009	ACM-type	Belfort	NA
ME02	Bridgton	MDN/NTN	5/18/2009	ACM-type	Electronic	NA
ME04	Carrabassett Valley	NTN	5/20/2009	ACM-type	Electronic	Belfort
		MDN		N-CON		
ME08	Gilead	NTN	5/21/2009	ACM-type	Belfort	NA
ME09	Greenville Station	MDN/NTN	5/20/2009	ACM-type	Electronic	NA
ME96	Casco Bay-Wolfe's Neck Farm	MDN/NTN	5/19/2009	ACM-type	Electronic	NA
MI09	Douglas Lake	NTN	9/14/2009	ACM-type	Electronic	Belfort
MI26	Kellogg Biological Station	NTN	9/18/2009	ACM-type	Electronic	NA
MI48	Seney National Wildlife Refuge-Headquarters	MDN	9/17/2009	ACM-type	Belfort	Tipping Bucket
		NTN				NA
MI98	Raco	NTN	9/16/2009	ACM-type	Belfort	NA
MN01	Cedar Creek	NTN	8/25/2009	ACM-type	Belfort	Tipping Bucket
MN27	Lamberton	MDN/NTN	8/24/2009	ACM-type	Belfort	NA
MT07	Clancy	NTN	5/8/2009	ACM-type	Belfort	NA

Table 2-1. Sites Surveyed from January through December 2009 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
NC03	Lewiston	NTN	3/4/2009	ACM-type	Belfort	Stick Gage
NC41	Finley Farm	NTN	2/27/2009	ACM-type	Belfort	NA
NC45	Mt. Mitchell	NTN	3/25/2009	ACM-type	Belfort	NA
NF09	Cormack	MDN	10/30/2009	ACM-type	Belfort	NA
NJ00	Edwin B. Forsythe National Wildlife Refuge	NTN	10/20/2009	ACM-type	Electronic	NA
NJ30	New Brunswick	MDN	10/20/2009	ACM-type	Belfort	NA
NJ99	Washington Crossing	NTN	10/22/2009	ACM-type	Belfort	NA
NY96	Cedar Beach, Southold	NTN	3/30/2009	ACM-type	Electronic	Belfort
NY99	West Point	MDN/NTN	3/24/2009	ACM-type	Belfort	NA
PA72	Milford	MDN/NTN	10/21/2009	ACM-type	Belfort	Stick Gage
SC03	Savannah River	MDN	10/13/2009	ACM-type	Belfort	Other
SD08	Cottonwood	NTN	7/22/2009	ACM-type	Belfort	NA
SK12	Bratt's Lake BSRN	MDN	8/23/2009	ACM-type	Belfort	Stick Gage
TN00	Walker Branch Watershed	NTN	5/19/2009	ACM-type	Belfort	Tipping Bucket
		AIRMoN			Stick Gage	Electronic
TN04	Speedwell	NTN	5/16/2009	ACM-type	Electronic	Tipping Bucket
TN11	Great Smoky Mountains National Park-Elkmont	MDN/NTN	5/12/2009	ACM-type	Electronic	Belfort
VA00	Charlottesville	NTN	2/25/2009	ACM-type	Belfort	NA
VA13	Horton's Station	NTN	2/23/2009	ACM-type	Belfort	Tipping Bucket
VA24	Prince Edward	NTN	2/26/2009	ACM-type	Electronic	Tipping Bucket

Table 2-1. Sites Surveyed from January through December 2009 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
VA27	James Madison University Farm	NTN	2/25/2009	ACM-type	Belfort	NA
VA28	Shenandoah National Park-Big Meadows	MDN/NTN	2/24/2009	ACM-type	Electronic	Tipping Bucket
VA98	Harcum	MDN/NTN	3/5/2009	ACM-type	Belfort	Tipping Bucket
VA99	Natural Bridge Station	NTN	2/23/2009	ACM-type	Belfort	NA
WA14	Olympic National Park-Hoh Ranger Station	NTN	8/20/2009	ACM-type	Electronic	Stick Gage
WA18	Seattle/NOAA	MDN	8/21/2009	ACM-type	Belfort	Belfort
WA19	North Cascades National Park-Marblemount Ranger Station	NTN	8/18/2009	ACM-type	Belfort	NA
WA21	La Grande	NTN	8/20/2009	ACM-type	Electronic	NA
WA99	Mount Rainier National Park-Tahoma Washington	NTN	8/19/2009	ACM-type	Electronic	Tipping Bucket
WI10	Potawatomi	MDN/NTN	8/31/2009	ACM-type	Electronic	Belfort
WI22	Milwaukee	MDN	10/22/2009	ACM-type	Belfort	NA
WI28	Lake Dubay	NTN	8/26/2009	ACM-type	Belfort	NA
WI31	Devil's Lake	MDN	10/20/2009	ACM-type	Electronic	Belfort
WI98	Wildcat Mountain	NTN	8/27/2009	ACM-type	Electronic	Belfort
WI99	Lake Geneva	MDN/NTN	10/22/2009	ACM-type	Belfort	Stick Gage
WV04	Babcock State Park	NTN	3/24/2009	ACM-type	Belfort	Stick Gage
WV05	Cedar Creek State Park	NTN	5/17/2009	ACM-type	Belfort	Tipping Bucket
WV18	Parsons	NTN	5/12/2009	ACM-type	Belfort	Stick Gage
WY00	Snowy Range	NTN	5/5/2009	ACM-type	Electronic	NA
WY02	Sinks Canyon	NTN	5/4/2009	ACM-type	Belfort	Other

Table 2-1. Sites Surveyed from January through December 2009 and Equipment Found at the Sites (continued)

Site ID	Site Name	Network	Survey Date	Collector Type	Raingage Type	Backup Raingage Type
WY06	Pinedale	NTN	5/6/2009	ACM-type	Belfort	NA
WY08	Yellowstone National Park-Tower Falls	MDN/NTN	5/7/2009	ACM-type	Electronic	Stick Gage
WY95	Brooklyn Lake	NTN	5/5/2009	ACM-type	Electronic	Belfort
WY97	South Pass City	NTN	6/29/2009	ACM-type	Belfort	NA
WY98	Gypsum Creek	NTN	5/6/2009	ACM-type	Belfort	NA

3.0 Specific Problems Encountered and Frequency

Each site survey consists of assessing, and entering into a database, information as it relates to NADP siting criteria, performance and condition of the equipment found (collector and primary gage), status of supplies, site operator's performance, and other general information relating to the site.

The questionnaire used during the performance survey of a typical NTN and MDN site (i.e., Belfort raingage, ACM-type collector and no backup raingage) contains 221 and 222 (not including memo fields) required entries, respectively. The typical AIRMoN site consists of an ACM-type collector and a NWS Stick Gage. The AIRMoN questionnaire contains 187 required entries (not including memo fields).

3.1 Findings Likely to Impact Data Quality

The assessments considered by EEMS to have the most impact on data quality can be categorized by four elements as:

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

Of the 101 sites included in this report, 69 sites were in accordance with all collector assessments, 58 sites were in accordance with all raingage assessments, and 25 sites conformed to all siting criteria rules and guidelines. With the exception of one MDN site (SK12), 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.

Of the 24 siting criteria assessments found to most impact data quality, 5 were found to be in conformity at all sites. Of the 5 assessments concerning NTN collectors, none were found compliant at all 72 NTN sites. Of the 12 assessments regarding MDN collectors, 4 were found to be in conformity at the 25 sites with ACM-type collectors. Of the 4 assessments for the electronic gage, two were found in conformity for all 28 gages (backup gages not included). As was the case during the previous reporting period, one assessment for Belfort gages (turn over) has the highest incidence of failures.

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 or the previous reporting period.

Tables 3-1 through 3-3 present the non-compliant survey data for the different networks and sites. Since as of this report no sites have been surveyed by EEMS for a second time it is not possible for EEMS to determine if siting or operation improvements have been made at any site. Likewise 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, Table 3-1 does include a comparison of the results of each assessment conducted in 2009 to the results observed during the previous reporting period. As stated the same sites were not visited so data presented cannot be interpreted as improvement or decline for the overall program, individual network, or site. This data is presented as general information and not to be used as an indication of trends.

However, if areas of operation are improved network or program wide, it would be expected that those improvements would be reflected within individual assessments. For example, if it was determined that the lid liners currently used throughout the networks were degrading sooner than the scheduled six month replacement interval and the PO revised the replacement protocol to be three months, then it would be expected that a corresponding positive change in lid liner condition would be observed regardless of the site visited.

Table 3-1. Percent of Non-compliant Findings - MDN

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
Sample Handling				
Is sampling media quality maintained?	26	1	3.8	-
Siting Criteria Assessments				
Is the orifice of the collector +/- .3 m of raingage (elevation)	26	2	7.7	+
30 degree rule for buildings met (raingage)	26	0	0.0	+
No objects > 1 m height inside 5 m radius (raingage)	26	5	19.2	+
No fences > 1 m height inside 2 m radius (raingage)	26	0	0.0	+
No vegetation height > 0.6 m within 5 m radius (raingage)	26	3	11.5	+
Collector and sensor oriented properly	26	0	0.0	+
45 degree rule met (collector)	26	4	15.4	+
30 degree rule for trees met (collector)	26	6	23.1	+
30 degree rule for buildings met (collector)	26	0	0.0	+
No objects > 1 m height within 5 m radius (collector)	26	4	15.4	+
No fences > 1 m height inside 5 m radius (collector)	26	2	7.7	+
No vegetation height > 0.6 m within 5 m radius (collector)	26	3	11.5	+
No treated lumber inside 5 m radius (collector)	26	2	7.7	+
No galvanized metal inside 5 m radius collector (MDN)	26	1	3.8	+
No pastures and ag. Activity within 20 m radius	26	1	3.8	-

Table 3-1. Percent of Non-compliant Findings - MDN (continued)

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
No herbicides and fertilizers used within 20 m radius	26	0	0.0	+
Roads meet NADP siting criteria	26	1	3.8	-
Waterways meet NADP siting criteria	26	0	0.0	+
Airports meet NADP siting criteria	26	0	0.0	+
Combustion sources meet NADP siting criteria (MDN only)	26	1	3.8	-
Parking lots and maintenance areas meet NADP siting criteria	26	1	3.8	-
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	26	0	0.0	+
Metalworking operations meet NADP siting criteria (MDN only)	26	0	0.0	+
ACM-type Collector Assessments				
Dry side bucket is clean	25	2	8.0	-
Does lid seal properly	25	1	4.0	-
Lid liner in good condition	25	1	4.0	-
Fan in good condition	25	0	0.0	+
Cooling fan thermostat in good condition	25	0	0.0	+
Heater in good condition	25	x	x	x
Heater thermostat in good condition	25	0	0.0	+
Has flush wall filter mount been installed	25	3	12.0	-
Filter in good condition	22	0	0.0	x
Max / min thermometer within acceptable limits	25	0	0.0	+
ACM sensor operates properly	25	1	4.0	+
Motorbox operates within acceptable limits	25	2	8.0	-
N-CON Collector Assessments				
N-CON fan in good condition	1	0	0.0	+
N-CON cooling fan thermostat in good condition	1	0	0.0	+
N-CON heater in good condition	1	0	0.0	+
N-CON heater thermostat in good condition	1	0	0.0	+
N-CON max / min thermometer in acceptable limits	1	0	0.0	+
N-CON sensor respond to a 20-second mist of water	1	0	0.0	+
N-CON lid seal in good condition	1	0	0.0	+
N-CON lid liner in good condition	1	0	0.0	x
Belfort Raingage Assessments				
Was the 'as found' turn over set properly *	13	11	84.6	-
Electronic Gage Assessments				
Raingage operates properly (electronic gage)	13	0	0.0	x
Does datalogger receive event signals form all collectors (electronic gage)	13	1	7.7	x
Does optical sensor respond to "blocking" of light beam (electronic gage)	13	0	0.0	x
Does optical sensor respond to mist of water (electronic gage)	13	0	0.0	x

x *Indicates data that could not be compared with previous year's data due to unable to test or missing value.*

***** *The assessment with the highest percentage of failures is the Belfort gage turnover setting. In order to better understand the problems noted with the Belfort raingages 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.

Table 3-2. Percent of Non-compliant Findings - NTN

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
Sample Handling				
Is sampling media quality maintained?	72	0	0.0	+
Siting Criteria Assessments				
Is the orifice of the collector +/- .3 m of raingage (elevation)	72	9	12.5	-
30 degree rule for buildings met (raingage)	72	0	0.0	No Change
No objects > 1 m height inside 5 m radius (raingage)	72	19	26.4	+
No fences > 1 m height inside 2 m radius (raingage)	72	9	12.5	-
No vegetation height > 0.6 m within 5 m radius (raingage)	72	9	12.5	+
Collector and sensor oriented properly	72	2	2.8	+
45 degree rule met (collector)	72	9	12.5	-
30 degree rule for trees met (collector)	72	25	34.7	-
30 degree rule for buildings met (collector)	72	1	1.4	-
No objects > 1 m height within 5 m radius (collector)	72	17	23.6	+
No fences > 1 m height inside 5 m radius (collector)	72	9	12.5	-
No vegetation height > 0.6 m within 5 m radius (collector)	72	10	13.9	-
No treated lumber inside 5 m radius (collector)	72	6	8.3	+
No pastures and ag. activity within 20 m radius	72	13	18.1	-
No herbicides and fertilizers used within 20 m radius	72	4	5.6	-
Roads meet NADP siting criteria	72	4	5.6	-

Table 3-2. Percent of Non-compliant Findings - NTN (continued)

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
Waterways meet NADP siting criteria	72	0	0.0	No Change
Airports meet NADP siting criteria	72	0	0.0	No Change
Animal operations meet NADP siting criteria (NTN and AIRMoN)	72	1	1.4	-
Parking lots and maintenance areas meet NADP siting criteria	72	1	1.4	-
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	72	0	0.0	No Change
ACM-type Collector Assessments				
Dry side bucket is clean	72	15	20.8	-
Does lid seal properly	72	0	0.0	+
Lid liner in good condition	72	3	4.2	-
ACM sensor operates properly	72	5	6.9	-
Motorbox operates within acceptable limits	72	3	4.2	+
Belfort Raingage Assessments				
Was the 'as found' turn over set properly	47	27	57.4	+
Electronic Gage Assessments				
Raingage operates properly (electronic gage)	27	1	3.7	x
Does datalogger receive event signals form all collectors (electronic gage)	27	2	7.4	x
Does optical sensor respond to "blocking" of light beam (electronic gage)	27	0	0.0	x
Does optical sensor respond to mist of water (electronic gage)	27	0	0.0	x

x *Indicates data that could not be compared with previous year's data due to unable to test or missing value.*

Table 3-3. Percent of Non-compliant Findings - AIRMoN

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
Sample Handling				
Is sampling media quality maintained?	3	0	0.0	No Change
Are samples stored and shipped properly	3	0	0.0	No Change
Siting Criteria Assessments				
Is the orifice of the collector +/- .3 m of raingage (elevation)	3	0	0.0	+
30 degree rule for buildings met (raingage)	3	0	0.0	No Change
No objects > 1 m height inside 5 m radius (raingage)	3	2	66.7	-
No fences > 1 m height inside 2 m radius (raingage)	3	0	0.0	No Change
No vegetation height > 0.6 m within 5 m radius (raingage)	3	1	33.3	+
Collector and sensor oriented properly	3	0	0.0	+
45 degree rule met (collector)	3	0	0.0	No Change

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

Siting and Performance Checks	Number of Assessments	Found Non-Compliant	Percent (%) Non-Compliant	Change from Pervious Report
30 degree rule for trees met (collector)	3	2	66.7	-
30 degree rule for buildings met (collector)	3	0	0.0	No Change
No objects > 1 m height within 5 m radius (collector)	3	2	66.7	-
No fences > 1 m height inside 5 m radius (collector)	3	0	0.0	No Change
No vegetation height > 0.6 m within 5 m radius (collector)	3	2	66.7	-
No treated lumber inside 5 m radius (collector)	3	0	0.0	+
No pastures and ag. activity within 20 m radius	3	0	0.0	No Change
No herbicides and fertilizers used within 20 m radius	3	0	0.0	No Change
Roads meet NADP siting criteria	3	0	0.0	No Change
Waterways meet NADP siting criteria	3	0	0.0	No Change
Airports meet NADP siting criteria	3	0	0.0	No Change
Animal operations meet NADP siting criteria (NTN and AIRMoN)	3	0	0.0	No Change
Parking lots and maintenance areas meet NADP siting criteria	3	0	0.0	No Change
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	3	0	0.0	No Change
ACM-type Collector Assessments				
Dry side bucket is clean	3	0	0.0	+
Does lid seal properly	3	0	0.0	No Change
Lid liner in good condition	3	0	0.0	No Change
ACM sensor operates properly	3	0	0.0	No Change
Motorbox operates within acceptable limits	3	0	0.0	No Change
NWS Stick Gage Assessment				
Does the stick measure within tolerances (.01") (NWS stick gage)	3	*	*	x

x *Indicates data that could not be compared with previous year's data due to unable to test or missing value.*

Tables 1 through 5 in Appendix B present EEMS's findings regarding the assessments of siting criteria, raingage and collector condition, and site operator proficiency (assessed as "sampling media quality maintained") which are considered to be the areas that may most impact data quality. As described in survey task #3, the assessment of site operator proficiency includes the qualitative evaluation of the site personnel regarding the methods and procedures used for sample handling, recordkeeping, reporting, equipment cleaning, maintenance, and material storage. Additionally, on-site documentation (raingage charts, logs, forms) was also assessed for legibility, accuracy and completeness.

The data indicate that most of the non-compliant findings are related to objects within the 5 meter radius of the raingage and/or collector. 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 survey (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 3-4. Sites with Changes Since Last Survey (not including e-gage installation)

Station ID	Network	Station ID	Network	Station ID	Network
CO00	NTN	MA08	NTN	TN11	MDN/NTN
CO02	NTN	MI09	NTN	VA98	NTN
CO19	NTN	MI26	NTN	WA19	NTN
FL32	NTN	MI48	MDN	WI10	MDN/NTN
GA20	NTN	MN27	MDN/NTN	WI22	MDN
IL11	AIRMON/MDN/NTN	NC03	NTN	WI28	NTN
IL46	NTN	NC41	NTN	WI98	NTN
IN34	MDN	NY96	NTN	WY95	NTN
IN34	NTN				

3.2 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 3-5 presents the assessments of wind shields at the sites surveyed during the period covered by this annual report. Thirty of the 43 sites identified as requiring windshields were found to have shields installed. This represents approximately 70% compliance and a significant improvement above the approximately 30% compliance that was observed during the previous reporting period.

Table 3-5. Status of Surveyed Sites Requiring Raingage Shields

Site ID	Network	Condition	Site ID	Network	Condition
AB13	MDN	Installed	MI98	NTN	Not Present
AB14	MDN	Installed	MN01	NTN	Not Present
CO00	NTN	Installed	MN27	MDN/NTN	Not Present
CO02	NTN	Installed	MT07	NTN	Installed
CO19	NTN	Not Present	NF09	MDN	Installed
CO22	NTN	Installed	NY99	MDN/NTN	Not Present
CO90	NTN	Installed	SD08	NTN	Not Present
CO94	NTN	Installed	SK12	MDN	Installed
CO98	NTN	Installed	VA28	MDN/NTN	Installed
IA08	NTN	Installed	WI10	MDN/NTN	Installed
IN34	MDN/NTN	Installed	WI22	MDN	Not Present

Table 3-5. Status of Surveyed Sites Requiring Raingage Shields (continued)

Site ID	Network	Condition
MA01	MDN/NTN	Not Present
MA08	NTN	Installed
MA13	NTN	Not Present
ME02	MDN/NTN	Installed
ME04	MDN/NTN	Installed
ME08	NTN	Installed
ME09	MDN/NTN	Installed
ME96	MDN/NTN	Installed
MI09	NTN	Installed
MI26	NTN	Installed
MI48	MDN/NTN	Not Present

Site ID	Network	Condition
WI28	NTN	Not Present
WI31	MDN	Installed
WI98	NTN	Installed
WI99	MDN/NTN	Not Present
WV18	NTN	Not Present
WY00	NTN	Installed
WY08	MDN/NTN	Installed
WY95	NTN	Installed
WY97	NTN	Installed
WY98	NTN	Installed

4.0 Field Site Survey Results

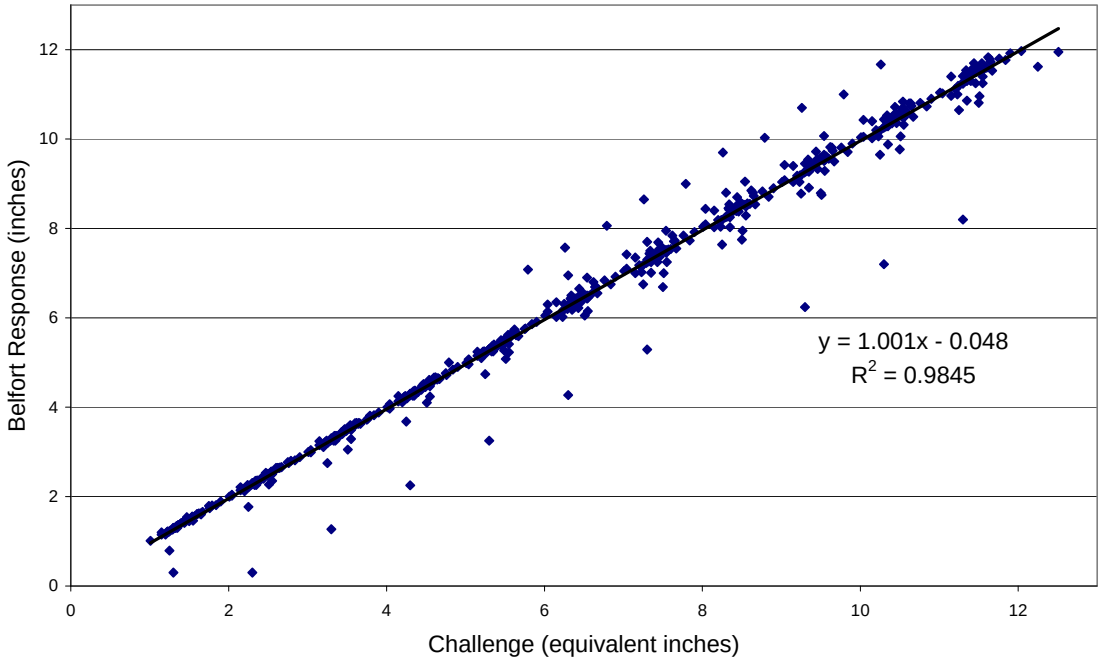
This section summarizes the quantifiable survey data relating to raingage accuracy tests and sensor heater performance.

4.1 Belfort Raingage Accuracy

Figure 4.1 presents the "as found" Belfort raingage accuracy results for 53 Belfort raingages[1] 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 100% and a correlation of 0.9845. A relatively few number of sites were not performing well and are easily identifiable in Figure 4-1.

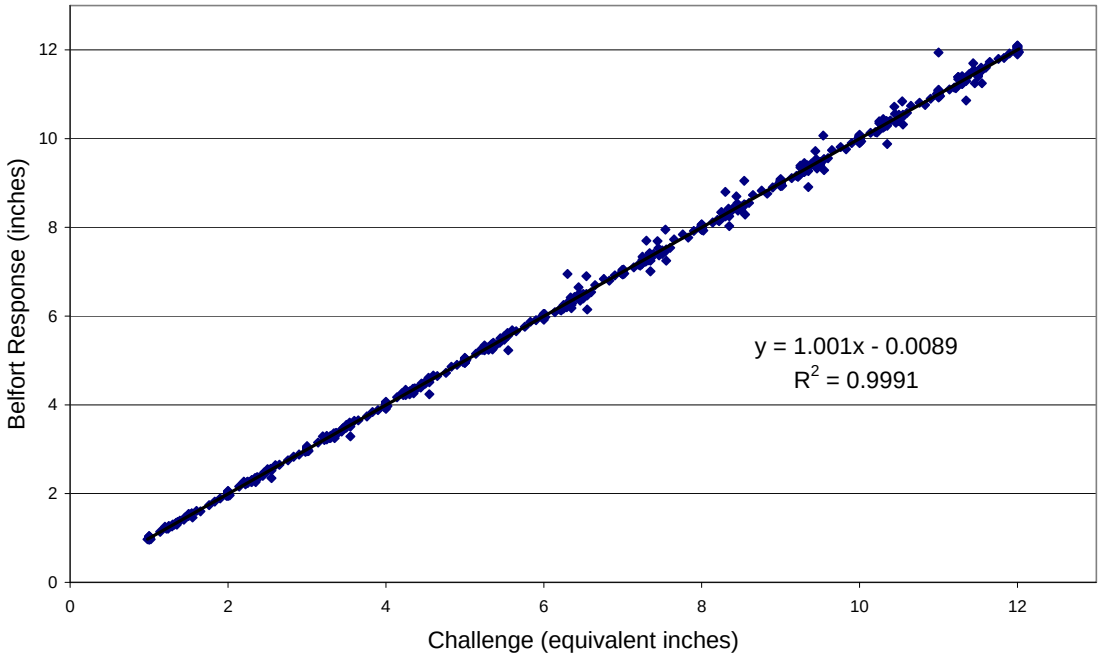
Figure 4-1. As Found Belfort Accuracy Results - 53 Gages



[1] One gage did not respond to the pre-calibration challenges.

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 100 % and a correlation of 0.9991, 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. Replacement gages were requested when it was determined to be necessary.

Figure 4-2. As Left Belfort Accuracy - 54 Gages



4.2 Belfort Calibration Results

Of the 54 Belfort gages encountered, 30 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 - 30 Adjusted Gages

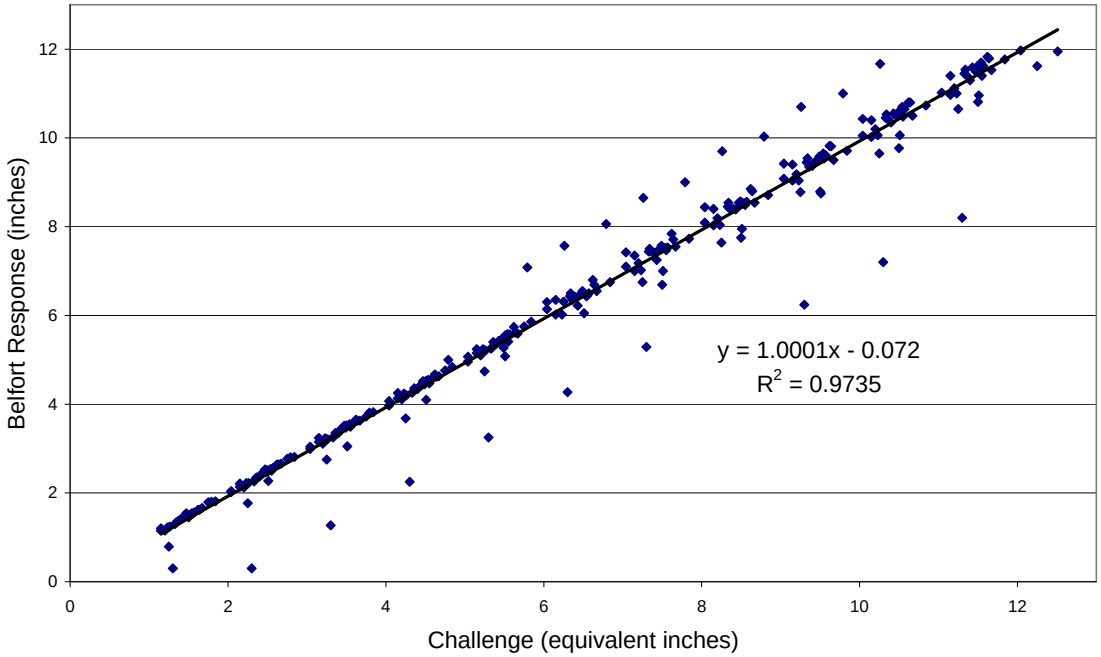
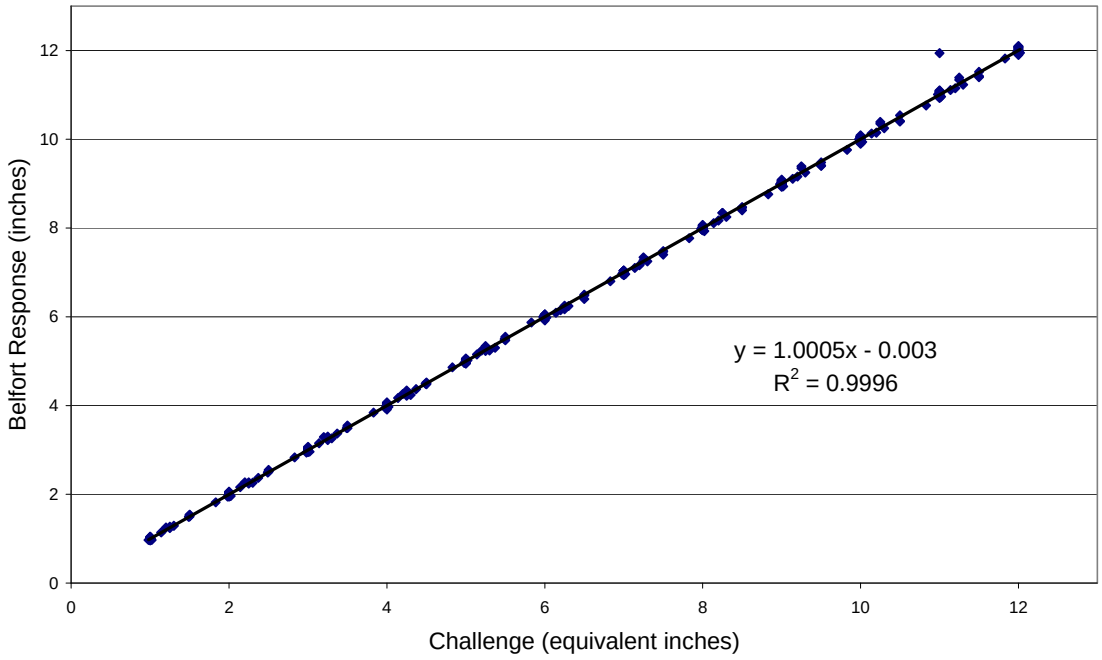


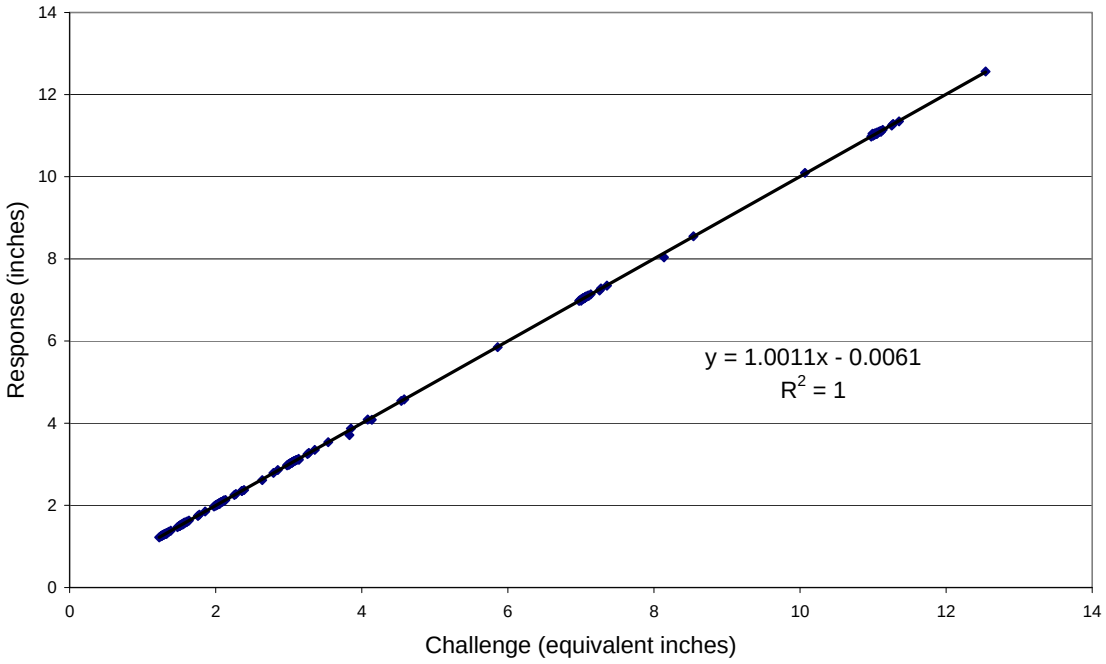
Figure 4-4. As Left Belfort Accuracy - 30 Adjusted Gages



4.3 Electronic Gage Accuracy

The results of the accuracy tests for the 29 electronic raingages challenged during the period covered by this report are presented in Figure 4-5. As clearly indicated the gages report the weight of the standards added very accurately for the entire span. No problems were encountered and no adjustments were required for the electronic gages. 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 - 29 Gages



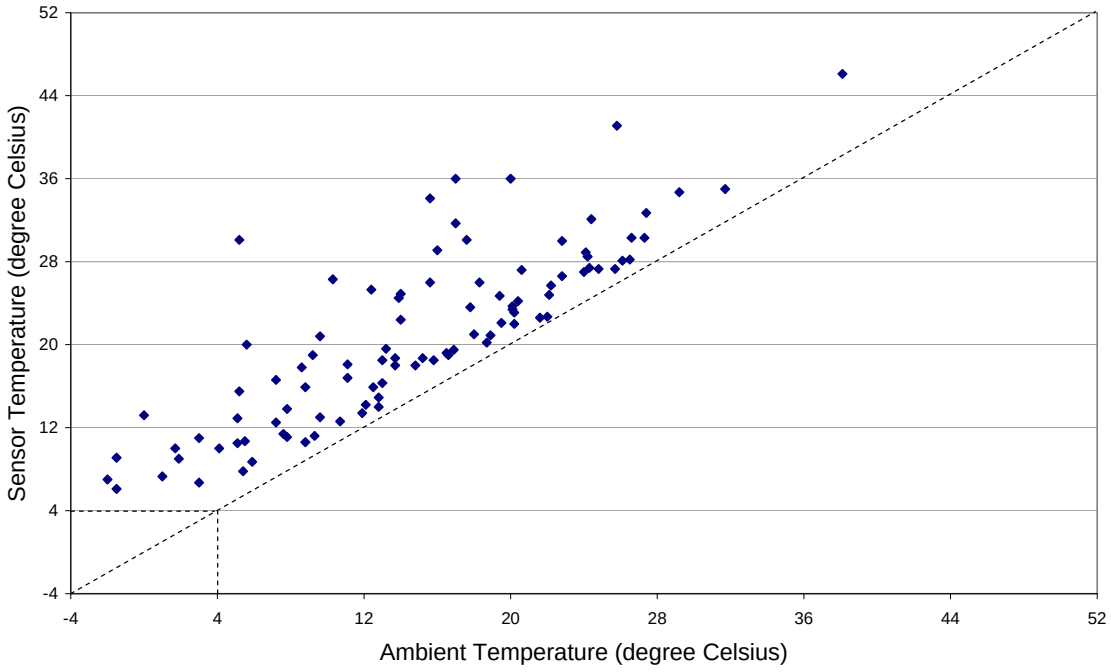
4.4 Sensor Heater Tests

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 enough 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.

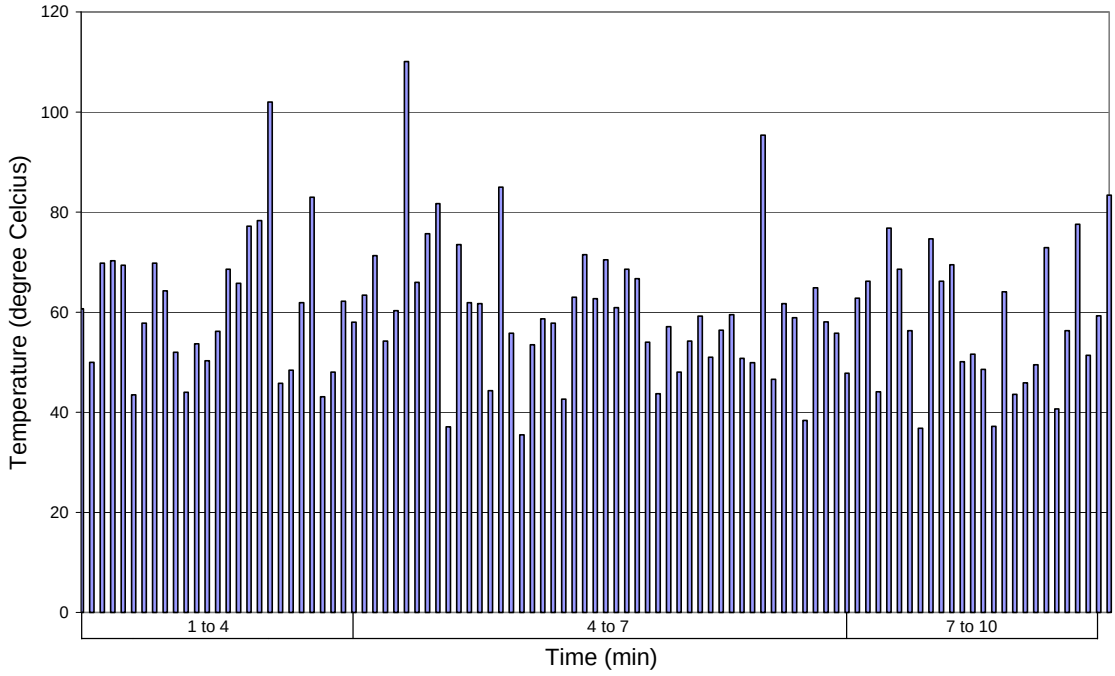
Figure 4-6. Inactivated Sensor Temperature



It appears that the sensors are maintaining a temperature above 4˚ when the ambient temperature is lower than 4˚C, however the data indicate that the sensor heaters may still be activated when the ambient temperature is above 4˚C.

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 around 60˚C prior to 10 minutes of activation.

Figure 4-7. Activated Sensor Temperature and Elapsed Time



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 3-1, 3-2, and 3-3 in 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.

One critical area that showed a slightly negative change at the sites visited during this reporting period was the condition of the lid seal and liner. Since a poor lid seal or lid liner can cause a highly adverse impact on data quality due to possible sample contamination or evaporation, the quality of both should be stressed as a high priority for site operators.

As surveys are completed and the survey database is populated, tracking of site conditions and improvements will be captured and reported on the three-year site survey rotation schedule. This should provide 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 Program Office 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.

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 the 2008 report, 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 reporting period, 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 collectors

In a number of cases water appears to seep between the funnel and chimney. 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. Figure 5-1 shows a typical funnel/chimney position during sample collection. Perhaps a different chimney cap material that would produce a better seal between the funnel and the chimney itself could be investigated to help solve this problem.

MDN dry side bucket protocol

For the most part dry side buckets at MDN sites were found to be in good condition given that a new bag is installed every week. 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.

At least one site had a poor lid seal on the dry side due to a bag “bubbling” from the wind beneath the bag.

Sensor temperature

A large percentage of site operators are not testing the sensor heater before activating the motorbox (see Section 4.0). If this is an important requirement, a notification should be sent to site operators requesting them to perform this test and giving them clear instructions on how to perform it. It has been EEMS’ experience that this evaluation is difficult to do accurately without

using the proper test equipment. It may be more desirable to have the site operators only report the observations of frozen precipitation on the sensor during the winter season which is when this function of the sensor is most important. The operators are routinely checking the sensor heaters after sensor activation.

Collector arms during cold season

Some site operators report malfunction of the motorbox 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. Also new collectors are being evaluated that do not exhibit the same problem. If those collectors are approved it may be possible to upgrade some of the sites where freezing conditions are the worst and samples are missed.

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 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. There are still some sites with electronic raingages that have problems communicating with the gage using the PDA.

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.

EEMS believes that this difference is being investigated by the Program Office to quantify the collection efficiency of the electronic gages compared to the mechanical gages.

Electronic gage installations

It was observed that some of the electronic gage installations were not performed according to the guidelines and rules provided by the NADP. Some photographs are included in Figure 5-1 through Figure 5-5 below.

Figure 5-1. Power Cords Not Secured - Gage Not Level – Objects within 5 Meters

Figure 5-2. Power Cords Not Secure and Gage Not Level

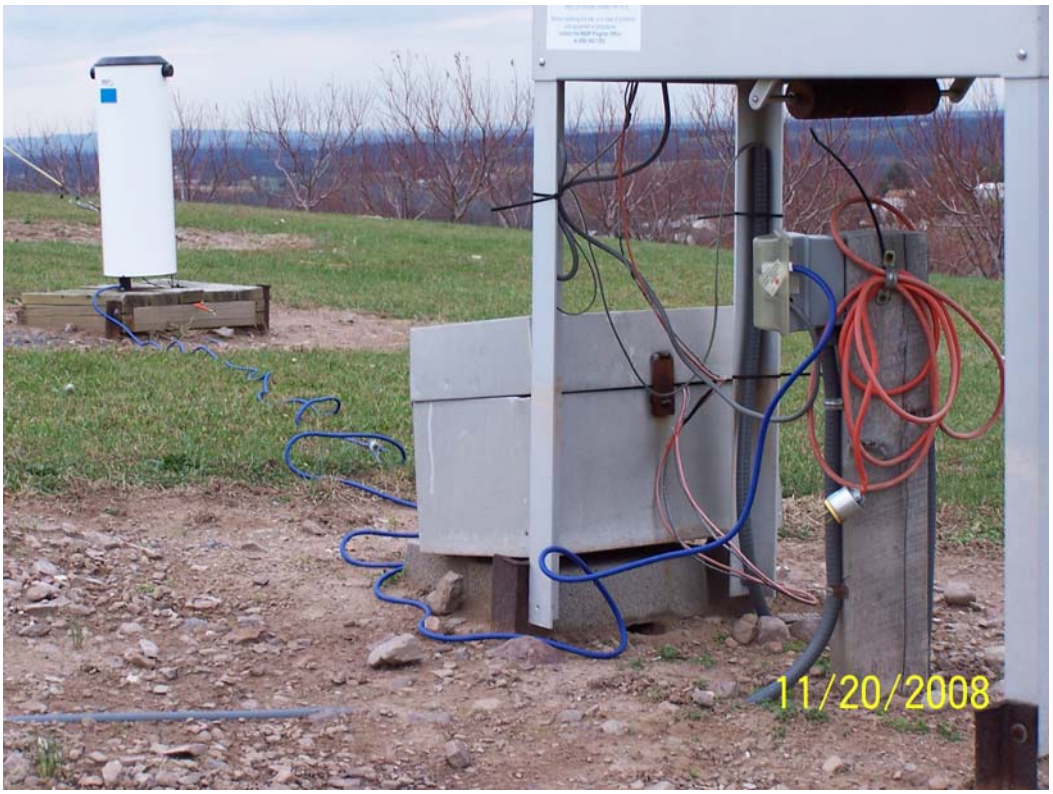


Figure 5-3. Optical Sensor Not Aligned North

Figure 5-4. Gage Installed Within 5 Meters of Collector and Not at Same Height

Figure 5-5. Gage Not Level – Not Stable – 45 Degree Rule Violation

EEMS recommends 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, decanting the NTN samples; and the weighing, decanting, pH and conductivity measurements of AIRMoN samples.

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
CO00	NTN	0.88%	ME02	NTN	0.02%	VA00	NTN	0.08%
CO02	NTN	-0.17%	ME04	NTN	-0.05%	VA13	NTN	0.07%
CO08	NTN	-0.09%	ME08	NTN	0.95%	VA24	NTN	0.00%
CO15	NTN	0.01%	ME09	NTN	0.03%	VA27	NTN	-1.70%
CO19	NTN	0.00%	ME96	NTN	-0.01%	VA28	NTN	-0.09%
CO21	NTN	0.05%	MI09	NTN	0.04%	VA98	NTN	-0.04%
CO22	NTN	0.01%	MI26	NTN	0.02%	VA99	NTN	-0.03%
CO90	NTN	-0.02%	MI48	NTN	0.08%	WA14	NTN	0.08%
CO92	NTN	-0.05%	MI98	NTN	-0.09%	WA19	NTN	2.33%
CO94	NTN	-0.02%	MN01	NTN	-0.03%	WA21	NTN	-0.03%
CO98	NTN	-0.01%	MN27	NTN	0.10%	WA99	NTN	-0.03%
DE02	AIRMoN	-0.01%	MT07	NTN	0.05%	WI10	NTN	0.04%
FL32	NTN	-0.24%	NC03	NTN	0.04%	WI28	NTN	-0.03%

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

Site Id	Network	Average % Difference
GA20	NTN	-0.21%
IA08	NTN	0.02%
IA23	NTN	0.21%
IL11	AIRMoN	-0.01%
IL11	NTN	-0.01%
IL18	NTN	-0.01%
IL46	NTN	0.05%
IL78	NTN	0.06%
IN34	NTN	0.11%
MA01	NTN	0.14%
MA08	NTN	-0.10%
MA13	NTN	-0.06%

Site Id	Network	Average % Difference
NC41	NTN	0.00%
NC45	NTN	0.06%
NJ00	NTN	-0.12%
NJ99	NTN	0.00%
NY96	NTN	0.09%
NY99	NTN	0.01%
PA72	NTN	0.01%
SD08	NTN	0.11%
TN00	AIRMoN	0.04%
TN00	NTN	-0.01%
TN04	NTN	0.12%
TN11	NTN	0.11%

Site Id	Network	Average % Difference
WI98	NTN	-0.04%
WI99	NTN	0.10%
WV04	NTN	-1.18%
WV05	NTN	0.14%
WV18	NTN	0.01%
WY00	NTN	0.00%
WY02	NTN	-0.04%
WY06	NTN	0.06%
WY08	NTN	0.04%
WY95	NTN	0.00%
WY97	NTN	-0.04%
WY98	NTN	0.06%

pH and Conductivity Measurements

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

In order to evaluate the pH and conductivity measurements performed in the field by the site operators, samples of simulated rain were obtained from the CAL. Prior to each AIRMoN site survey the AIRMoN Site Liaison provided the survey team with in-house prepared simulated rain samples. The CAL determined that the pH and conductivity of these samples is that indicated below as target values. The pH comparisons are presented in Table 6-2 and the conductivity comparisons are shown in Table 6-3.

The results are all 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 ± 0.1	Response	Difference
TN00	AIRMoN	4.9	4.82	0.08
IL11	AIRMON	5.03	5.09	-0.06
DE02	AIRMoN	5.09	5.27	-0.18

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

Site Id	Network	Conductivity Target Value ±0.3	Response	Difference
TN00	AIRMoN	6.7	7.8	-1.1
IL11	AIRMON	3.9	4.8	-0.9
DE02	AIRMoN	3.9	4.4	-0.5

7.0 Data Quality Information

Several procedures are in place to help ensure survey data quality. Foremost, a comprehensive QAPP has been developed prior to collecting survey data. Field survey team training has been provided to ensure consistency of methods. Duplicate entry of survey data has been 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.

During the reporting period changes to the site survey questionnaire were planned that include the design and implementation of a new relational database to enable more efficient data collection and reporting. The design was planned and changes to the existing questionnaire were discussed and approved by the Program Office and EPA. The new database is expected to be operational in June of 2010. The database upgrade will require a corresponding update of the QAPP.

The expected date for the completion of the QAPP revision 01 is October 2010. This revision will include updated data entry screens and site data reporting, filing, and archiving procedures. This revision will include data entry screens and site reporting, filing and archiving procedures.

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

In August 2009, EEMS' QA Manager attended site surveys at the three network sites of IL11 to observe the performance of the three survey teams. This was the second internal QA audit of the site survey teams. An internal QA audit report of the survey was distributed to the appropriate interested parties by the QA Manager following the visit. This is an annual internal QA occurrence. Reports of results from this activity are included as Appendix E of this report. The next internal QA audit is tentatively scheduled for fall of 2010.

Beginning with the first site survey performed in calendar year 2009 (FL32), the EEMS QA Manager is providing site operators with a form for them to evaluate the performance of the field technician completing the site survey. These forms are provided with a self addressed stamped envelope in order to make it easier for the site operator to respond. The QA Manager is using the information gathered to provide reports to management and suggestions for improvements of techniques and procedures for the field technicians. The information is also provided to the NADP QA Manager and the EPA Project Officer.

One evaluation provided by the site operator at VA28 was used by the QA Manager to report that the quality of the survey conducted at that site was less than that expected of EEMS. With that feedback and information from the QA Manager, EEMS was able to schedule another visit with the operator while conducting other work at the site to address her concerns and correct any oversights that occurred during the first survey visit.

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 the semiannual site operator training classes provided by the Mercury Analytical Laboratory (HAL), Central Analytical Laboratory (CAL), and Program Office in conjunction with the NADP spring and fall meetings. This provides EEMS with a means to stay current with procedures and changes to site equipment. It also allows EEMS to provide the Program Office with feedback and suggestions to improve the site operator training classes.

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.

It is anticipated that upon completion of the new survey information database the process will be more streamline and require less time to complete and delivery survey data.

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. The approved changes can be found in Appendix C of this report. 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.

Site file review

The internal review and audit process performed by the EEMS QA Manager (as described in previous sections) has identified some problems with the files received from the site survey teams. The problems were generally a result of poor recordkeeping on the part of the survey team. Issues included illegible or incomplete field form entries, incomplete equipment forms, site sketches not notated, inconsistent file naming, and delays in providing survey information. The issues were addressed by providing a corrective action memo to the survey team members. Subsequent survey files and reports have improved considerably. Files and reports will continue to be reviewed and monitored to improve consistency and quality.

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 52,430 entries that are compared (minus memo fields, site ID, and Network) the entry error rate is less than 0.7%. The field entry errors are approximately 5 times higher than the duplicate entry errors. Of the 26,215 data points, 255 edits were made by the QA Manager as a result of errors other than an entry error. These errors included missing values from hardcopy forms, responses of "none" rather than "not applicable" (or similar), and data format discrepancies. The survey database is currently being revised to help eliminate these types of errors.

Table 7-1. Internal QA Results

	Field Entry	Duplicate QA Entry	Total Entries
Total Number of Entries Compared	26,215	26,215	52,430
Initial Field Entry Errors	318		
Duplicate QA Entry Errors		46	
Percent Errors	1.21%	0.18%	
Total Entry Errors	364		
Total Percent Errors	0.69%		
Total Edits	619		
Other Than Entry Edits	255		
Total Percent Other Edits	0.49%		

Internal survey audits

The first two internal audits of site surveys were conducted at FL32 in February 2009 and at IL11 in August 2009. Reports of the internal audit results are included in Appendix E of this report.

7.5 Survey Equipment Certification

The instruments used by the survey team are maintained and certified by the EEMS QA Manager. 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
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

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

N/A = Not applicable

APPENDIX B

Findings Most Likely to Impact Data Quality

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 1 of 8)

	CO00	CO02	CO08	CO15	CO19	CO21	CO22	CO90	CO92	CO94
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)		X		X						X
45 degree rule met (raingage)			X							
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No objects > 1 m height inside 5 m radius (raingage)		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		X								
45 degree rule met (collector)										
30 degree rule for trees met (collector)			X		X	X		X		X
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)			X							
No fences > 1 m height inside 5 m radius (collector)		X								
No vegetation height > 0.6 m within 5 m radius (collector)			X				X	X		X
No treated lumber inside 5 m radius (collector)										
No pastures and ag. activity within 20 m radius			X				X		X	
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean									X	
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly										
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	X	X	X							N/A
Raingage operates properly (electronic gage)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	
Does datalogger receive event signals form all collectors (electronic gage)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	
Does optical sensor respond to "blocking" of light beam (electronic gage)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	
Does optical sensor respond to mist of water (electronic gage)	N/A	N/A	N/A	N/A	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	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 2 of 8)

	CO98	FL32	GA20	IA08	IA23	IL11	IL18	IL46	IL78	IN34
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)	X									
45 degree rule met (raingage)	X									
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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				
Collector and sensor oriented properly										
45 degree rule met (collector)										
30 degree rule for trees met (collector)	X		X	X						
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)			X	X						
No fences > 1 m height inside 5 m radius (collector)			X	X						
No vegetation height > 0.6 m within 5 m radius (collector)	X					X				
No treated lumber inside 5 m radius (collector)		X								
No pastures and ag. activity within 20 m radius			X		X		X	X		
No herbicides and fertilizers used within 20 m radius							X	X	X	
Roads meet NADP siting criteria			X							
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)					X					
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean					X					
Does lid seal properly						X				
Lid liner in good condition		X								
ACM sensor operates properly					X					
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	X	X	N/A	X	X	N/A	X	N/A	X	N/A
Raingage operates properly (electronic gage)		N/A		N/A	N/A		N/A		N/A	
Does datalogger receive event signals form all collectors (electronic gage)	X	N/A		N/A	N/A		N/A		N/A	
Does optical sensor respond to "blocking" of light beam (electronic gage)		N/A		N/A	N/A	N/A	N/A		N/A	X
Does optical sensor respond to mist of water (electronic gage)		N/A		N/A	N/A	N/A	N/A		N/A	X

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 3 of 8)

	MA01	MA08	MA13	ME02	ME04	ME08	ME09	ME96	MI09	MI26
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)			X		X					
45 degree rule met (raingage)										
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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			
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)							X			X
No fences > 1 m height inside 5 m radius (collector)			X							
No vegetation height > 0.6 m within 5 m radius (collector)	X									
No treated lumber inside 5 m radius (collector)			X							
No pastures and ag. activity within 20 m radius								X		
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria			X							
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean		X						X		
Does lid seal properly										
Lid liner in good condition				X						
ACM sensor operates properly			X							
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	X	X	X	N/A	N/A		N/A	N/A	N/A	N/A
Raingage operates properly (electronic gage)	N/A	N/A	N/A			N/A				X
Does datalogger receive event signals form all collectors (electronic gage)	N/A	N/A	N/A			N/A				X
Does optical sensor respond to "blocking" of light beam (electronic gage)	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				

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 4 of 8)

	MI48	MI98	MN01	MN27	MT07	NC03	NC41	NC45	NJ00	NJ99
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)									X	
45 degree rule met (raingage)										
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No objects > 1 m height inside 5 m radius (raingage)								X		X
No fences > 1 m height inside 2 m radius (raingage)										
No vegetation height > 0.6 m within 5 m radius (raingage)			X					X		
Collector and sensor oriented properly										
45 degree rule met (collector)								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					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										X
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean				X		X	X			X
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly	X									
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly		X	X	X	X				N/A	X
Raingage operates properly (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A
Does datalogger receive event signals form all collectors (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A
Does optical sensor respond to "blocking" of light beam (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A
Does optical sensor respond to mist of water (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 5 of 8)

	NY96	NY99	PA72	SD08	TN00	TN04	TN11	VA00	VA13	VA24
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)										
45 degree rule met (raingage)			X				X			X
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
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		X	X
30 degree rule for trees met (collector)					X		X		X	
30 degree rule for buildings met (collector)			X							
No objects > 1 m height within 5 m radius (collector)	X		X							X
No fences > 1 m height inside 5 m radius (collector)										
No vegetation height > 0.6 m within 5 m radius (collector)										
No treated lumber inside 5 m radius (collector)										
No pastures and ag. activity within 20 m radius				X		X				
No herbicides and fertilizers used within 20 m radius						X				
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		N/A	X		X	X	X			
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly					X					
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	N/A	X	X		X	N/A	N/A			N/A
Raingage operates properly (electronic gage)		N/A	N/A	N/A	N/A			N/A	N/A	U to T
Does datalogger receive event signals form all collectors (electronic gage)		N/A	N/A	N/A	N/A			N/A	N/A	U to T
Does optical sensor respond to "blocking" of light beam (electronic gage)		N/A	N/A	N/A	N/A			N/A	N/A	U to T
Does optical sensor respond to mist of water (electronic gage)	MISSING	N/A	N/A	N/A	N/A			N/A	N/A	U to T

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 6 of 8)

	VA27	VA28	VA98	VA99	WA14	WA19	WA21	WA99	WI10	WI28
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)									X	
45 degree rule met (raingage)					X		X			
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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		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			
No treated lumber inside 5 m radius (collector)				X						
No pastures and ag. activity within 20 m radius						X				
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria										X
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean	X				X					
Does lid seal properly										
Lid liner in good condition										
ACM sensor operates properly		U to T								
Motorbox operates within acceptable limits		X					X	X		
Was the 'as found' turn over set properly	X	N/A	X		N/A		N/A	N/A	N/A	X
Raingage operates properly (electronic gage)	N/A		N/A	N/A		N/A				N/A
Does datalogger receive event signals form all collectors (electronic gage)	N/A		N/A	N/A		N/A	U to T			N/A
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	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 7 of 8)

	WI98	WI99	WV04	WV05	WV18	WY00	WY02	WY06	WY08	WY95
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)						X				
45 degree rule met (raingage)				X						
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)										
Collector and sensor oriented properly										
45 degree rule met (collector)			X							
30 degree rule for trees met (collector)			X	X					X	
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)			X		X					
No fences > 1 m height inside 5 m radius (collector)										
No vegetation height > 0.6 m within 5 m radius (collector)										
No treated lumber inside 5 m radius (collector)							X			
No pastures and ag. activity within 20 m radius								X		
No herbicides and fertilizers used within 20 m radius										
Roads meet NADP siting criteria				X						
Waterways meet NADP siting criteria										
Airports meet NADP siting criteria										
Animal operations meet NADP siting criteria (NTN and AIRMoN)										
Parking lots and maintenance areas meet NADP siting criteria										
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria										
Dry side bucket is clean				X						
Does lid seal properly				X						
Lid liner in good condition										
ACM sensor operates properly				X						
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	N/A			X	X	N/A	X		N/A	N/A
Raingage operates properly (electronic gage)		N/A	N/A	N/A	N/A		N/A	N/A		
Does datalogger receive event signals form all collectors (electronic gage)		N/A	N/A	N/A	N/A		N/A	N/A		
Does optical sensor respond to "blocking" of light beam (electronic gage)		N/A	N/A	N/A	N/A		N/A	N/A		
Does optical sensor respond to mist of water (electronic gage)		N/A	N/A	N/A	N/A		N/A	N/A		

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 1. Findings Most Likely to Impact Data Quality - NTN Sites (page 8 of 8)

	WY97	WY98
Is sampling media quality maintained?		
Is the orifice of the collector +/- .3 m of raingage (elevation)		
45 degree rule met (raingage)		
30 degree rule for buildings met (raingage)	N/A	N/A
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)		
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)	X	
No vegetation height > 0.6 m within 5 m radius (collector)		
No treated lumber inside 5 m radius (collector)		
No pastures and ag. activity within 20 m radius		
No herbicides and fertilizers used within 20 m radius		
Roads meet NADP siting criteria		
Waterways meet NADP siting criteria		
Airports meet NADP siting criteria		
Animal operations meet NADP siting criteria (NTN and AIRMoN)		
Parking lots and maintenance areas meet NADP siting criteria		
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria		
Dry side bucket is clean		
Does lid seal properly		
Lid liner in good condition	X	
ACM sensor operates properly		
Motorbox operates within acceptable limits		
Was the 'as found' turn over set properly		X
Raingage operates properly (electronic gage)	N/A	N/A
Does datalogger receive event signals form all collectors (electronic gage)	N/A	N/A
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	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

Table 2 -A. Findings Most Likely to Impact Data Quality - MDN Sites with ACM Collector (page 1of 3)

	AB13	AB14	IL11	IN34	MA01	ME02	ME09	ME96	MI48	MN27
Is sampling media quality maintained?										
Is the orifice of the collector +/- .3 m of raingage (elevation)	X									
45 degree rule met (raingage)										
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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					
Does NADP require a raingage wind shield at this site			X							
If raingage wind shield present, is it installed correctly			N/A		N/A				N/A	N/A
Collector and sensor oriented properly										
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							
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	
No galvanized metal inside 5 m radius collector (MDN)										
No pastures and ag. activity within 20 m radius						N/A		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					N/A	X		X		N/A
Does lid seal properly								X		
Lid liner in good condition								X		
Fan in good condition										
Cooling fan thermostat in good condition										
Heater in good condition										
Heater thermostat in good condition										
Has flush wall filter mount been installed										
Filter in good condition										
Max / min thermometer within acceptable limits										
ACM sensor operates properly				X						
Motorbox operates within acceptable limits			X							
Was the 'as found' turn over set properly	X	N/A	N/A	N/A	X	N/A	N/A	N/A		X
Raingage operates properly (electronic gage)					N/A				N/A	N/A
Does datalogger receive event signals form all collectors (electronic gage)	X				N/A				N/A	N/A
Does optical sensor respond to "blocking" of light beam (electronic gage)			N/A	X	N/A				N/A	N/A
Does optical sensor respond to mist of water (electronic gage)			N/A	X	N/A				N/A	N/A

X Indicates found non-compliant

U to T Indicates Unable to Test

N/A Not Applicable

Table 2 -A. Findings Most Likely to Impact Data Quality - MDN Sites with ACM Collector (page 2of 3)

	NF09	NJ30	NY99	PA72	SC03	SK12	TN11	VA28	VA98	WA18
Is sampling media quality maintained?						X				
Is the orifice of the collector +/- .3 m of raingage (elevation)										
45 degree rule met (raingage)				X	X		X			
30 degree rule for buildings met (raingage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No objects > 1 m height inside 5 m radius (raingage)				X	X					
No fences > 1 m height inside 2 m radius (raingage)										
No vegetation height > 0.6 m within 5 m radius (raingage)	X									
Does NADP require a raingage wind shield at this site		X		X	X		X		X	X
If raingage wind shield present, is it installed correctly		N/A	N/A	N/A	N/A		N/A		N/A	N/A
Collector and sensor oriented properly										
45 degree rule met (collector)				X	X		X			
30 degree rule for trees met (collector)				X			X	X		
30 degree rule for buildings met (collector)										
No objects > 1 m height within 5 m radius (collector)				X	X					
No fences > 1 m height inside 5 m radius (collector)		X			X					
No vegetation height > 0.6 m within 5 m radius (collector)	X									
No treated lumber inside 5 m radius (collector)										
No galvanized metal inside 5 m radius collector (MDN)										
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										
Does lid seal properly										
Lid liner in good condition										
Fan in good condition										
Cooling fan thermostat in good condition										
Heater in good condition				U to T						
Heater thermostat in good condition										
Has flush wall filter mount been installed	X							X	X	
Filter in good condition	N/A							N/A	N/A	
Max / min thermometer within acceptable limits										
ACM sensor operates properly										
Motorbox operates within acceptable limits										
Was the 'as found' turn over set properly	X	X	X	X	X	X	N/A	N/A	X	X
Raingage operates properly (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A
Does datalogger receive event signals form all collectors (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A
Does optical sensor respond to "blocking" of light beam (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A
Does optical sensor respond to mist of water (electronic gage)	N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A

X Indicates found non-compliant

U to T Indicates Unable to Test

N/A Not Applicable

Table 2 -A. Findings Most Likely to Impact Data Quality - MDN Sites with ACM Collector (page 3of 3)

	WI10	WI22	WI31	WI99	WY08
Is sampling media quality maintained?					
Is the orifice of the collector +/- .3 m of raingage (elevation)	X				
45 degree rule met (raingage)					
30 degree rule for buildings met (raingage)	N/A		N/A	N/A	N/A
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		N/A		N/A	
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)					
No vegetation height > 0.6 m within 5 m radius (collector)					
No treated lumber inside 5 m radius (collector)			X		
No galvanized metal inside 5 m radius collector (MDN)		X			
No pastures and ag. activity within 20 m radius					
No herbicides and fertilizers used within 20 m radius					
Roads meet NADP siting criteria		X			
Waterways meet NADP siting criteria					
Airports meet NADP siting criteria					
Combustion sources meet NADP siting criteria (MDN only)		X			
Parking lots and maintenance areas meet NADP siting criteria		X			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria					
Metalworking operations meet NADP siting criteria (MDN only)					
Dry side bucket is clean					
Does lid seal properly					
Lid liner in good condition					
Fan in good condition					
Cooling fan thermostat in good condition					
Heater in good condition					
Heater thermostat in good condition					
Has flush wall filter mount been installed					
Filter in good condition					U to T
Max / min thermometer within acceptable limits					
ACM sensor operates properly					
Motorbox operates within acceptable limits	X				
Was the 'as found' turn over set properly	N/A	X	N/A		N/A
Raingage operates properly (electronic gage)		N/A		N/A	
Does datalogger receive event signals form all collectors (electronic gage)		N/A		N/A	
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 Indicates found non-compliant
U to T Indicates Unable to Test
N/A Not Applicable

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

	ME04
Is sampling media quality maintained?	
Is the orifice of the collector +/- .3 m of raingage (elevation)	
45 degree rule met (raingage)	
30 degree rule for buildings met (raingage)	N/A
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)	
No pastures and ag. activity within 20 m radius	N/A
No herbicides and fertilizers used within 20 m radius	
Roads meet NADP siting criteria	
Waterways meet NADP siting criteria	
Airports meet NADP siting criteria	
Combustion sources meet NADP siting criteria (MDN only)	
Parking lots and maintenance areas meet NADP siting criteria	
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria	
Metalworking operations meet NADP siting criteria (MDN only)	
N-CON fan in good condition	
N-CON cooling fan thermostat in good condition	
N-CON heater in good condition	
N-CON heater thermostat in good condition	
N-CON max / min thermometer in acceptable limits	
N-CON sensor respond 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	N/A
Raingage operates properly (electronic gage)	
Does datalogger receive event signals form all collectors (electronic gage)	
Does optical sensor respond to "blocking" of light beam (electronic gage)	
Does optical sensor respond to mist of water (electronic gage)	

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

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

	DE02	IL11	TN00
Is sampling media quality maintained?			
Are samples stored and shipped properly			
Is the orifice of the collector +/- .3 m of raingage (elevation)			
45 degree rule met (raingage)			
30 degree rule for buildings met (raingage)	N/A	N/A	N/A
No objects > 1 m height inside 5 m radius (raingage)		X	X
No fences > 1 m height inside 2 m radius (raingage)			
No vegetation height > 0.6 m within 5 m radius (raingage)		X	
Does NADP require a raingage wind shield at this site	X	X	X
If raingage wind shield present, is it installed correctly	N/A	N/A	N/A
Collector and sensor oriented properly			
45 degree rule met (collector)			
30 degree rule for trees met (collector)	X		X
30 degree rule for buildings met (collector)			
No objects > 1 m height within 5 m radius (collector)		X	X
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)			
No pastures and ag. activity within 20 m radius			
No herbicides and fertilizers used within 20 m radius			
Roads meet NADP siting criteria			
Waterways meet NADP siting criteria			
Airports meet NADP siting criteria			
Animal operations meet NADP siting criteria (NTN and AIRMoN)			
Parking lots and maintenance areas meet NADP siting criteria			
Storage areas (fertilizers, road salt, manure, etc) meet NADP siting criteria			
Dry side bucket is clean			
Does lid seal properly			
Lid liner in good condition			
ACM sensor operates properly			
Motorbox operates within acceptable limits			
Was the 'as found' turn over set properly	X	N/A	N/A
Does the stick measure within tolerances (.01") (NWS stick gage)			U to T

X	Indicates found non-compliant
U to T	Indicates Unable to Test
N/A	Not Applicable

APPENDIX C

Suggested Modifications to the Site Survey Questionnaire

	Question Number	Parameter	Question	Existing Database Data Table	Exisiting Database Field Name
	1	site Information	Station name:	tblSiteInformation(OFFICE)	StationName
	2		Network:	tblSiteInformation(OFFICE)	Network
	3		Survey start date/time:	tblSiteInformation(OFFICE)	ArrivalDateTime
	4		Survey end date/time:	tblSiteInformation(OFFICE)	DepartureDateTime
new	5		Supervisor's name:		
new	6		Supervisor's telephone number:		
new	7		Supervisor's telephone extension:		
new	8		Supervisor's fax number:		
new	9		Supervisor's email:		
	10		Operator's name:	tblSiteInformation(OFFICE)	Operator
	11		Operator's telephone number:	tblSiteInformation(OFFICE)	OperatorPhone
	12		Operator's telephone extension:	tblSiteInformation(OFFICE)	OperatorExtension
	13		Operator's fax number:	tblSiteInformation(OFFICE)	OperatorFax
	14		Operator's email:	tblSiteInformation(OFFICE)	OperatorEmail
	15		Operator's cell phone number:	tblSiteInformation(OFFICE)	OperatorCell
	16		Does site conduct other environmental data collection	tblSiteInformation(OFFICE)	OtherDataCollection
	17		Non - NADP precipitation chemistry	tblSiteInformation(OFFICE)	OtherPptChemistry
	18		Gas monitoring - SOx / NOx / CO / etc.	tblSiteInformation(OFFICE)	GasMonitoring
	19		IMPROVE	tblSiteInformation(OFFICE)	IMPROVE
	20		CASTNET	tblSiteInformation(OFFICE)	CASTNet
	21		AIRMoN - dry deposition station	tblSiteInformation(OFFICE)	AirmonDry
	22		PM-10, PM-2.5, TSP	tblSiteInformation(OFFICE)	Particulate
	23		UV-b	tblSiteInformation(OFFICE)	Uvb
	24		SURFRAD	tblSiteInformation(OFFICE)	SURFRAD
	25		CRN (Climate Reference Network)	tblSiteInformation(OFFICE)	CRN
	26		NWS (National Weather Service)	tblSiteInformation(OFFICE)	NWS
	27		NEON (National Ecological Observatory Network)	tblSiteInformation(OFFICE)	NEON
	28		Other weather monitoring	tblSiteInformation(OFFICE)	OtherWeatherMonitoring
	29		Specify other weather monitoring program:	tblSiteInformation(OFFICE)	OtherMonitoringName
	30		Other environmental monitoring?	tblSiteInformation(OFFICE)	OtherEnviroMonitoring
	31		Specify other environmental monitoring program:	tblSiteInformation(OFFICE)	OtherEnviroMonitoringName
	32		Survey cancelled due to precipitation?	tblSiteInformation(OFFICE)	PrecipitationCancel
	33		Precipitation during visit?	tblSiteInformation(OFFICE)	Precipitation
	34		Date of rescheduled survey:	tblSiteInformation(OFFICE)	RainDate
	35		Ambient temperature - deg. C	tblSiteInformation(OFFICE)	AmbientTemp
	36		Does site report daylight savings time on FORF?	tblSiteInformation(OFFICE)	DaylightSavingsTime
	37		EEMS field team leader:	tblSiteInformation(OFFICE)	EemsTeamLeader
	38		Electrical connections are in good condition	tblSiteInformation(OFFICE)	ConnectionsOk

	39		Collector connected to a GFCI circuit	tblSiteInformation(OFFICE)	GfciCollector
	40		Power supply	tblSiteInformation(OFFICE)	PowerSupply
	41		Solar power	tblSiteInformation(OFFICE)	SolarPower
	42		Indicate solar output capacity (Watts):	tblSiteInformation(OFFICE)	SolarOutput
	43		Solar panel operating properly, no further maintenance needed	tblSiteInformation(OFFICE)	SolarMaintenance
	44		Is sampling media quality maintained	tblSiteInformation(OFFICE)	SamplingMediaOk
	45		Operator is competent	tblSiteInformation(OFFICE)	OperatorCompetent
new	46		EEMS assessment of site operator's performance		
	47		No CAL/HAL follow-up needed with operator on technique/training	tblSiteInformation(OFFICE)	OperatorTraining
new	48		Is additional training recommended following support provided during survey		
	49		Does operator check sensor heater before/after collector opening?	tblSiteInformation(OFFICE)	SensorHeaterChecks
	50		Is recordkeeping adequate	tblSiteInformation(OFFICE)	DocumentationOk
	51	Siting Criteria	Site type	tblSitingCriteria(OFFICE)	SiteType
new	52		Survey team assessment of designated site type		
	53		Is the orifice of the collector +/- 0.3 m of raingage (elevation)	tblSitingCriteria(OFFICE)	CollectorOrificePosition
	54		Distance from collector to primary raingage (meters)	tblSitingCriteria(OFFICE)	CollectorGageDistance
	55		Raingage mounting	tblSitingCriteria(OFFICE)	GageMounting
	56		Height of raingage (meters)	tblSitingCriteria(OFFICE)	GagePlatformHeight
	57		Raingage ground cover, 30 m radius	tblSitingCriteria(OFFICE)	RainGageGroundCover
	58		45 degree rule met (raingage)	tblSitingCriteria(OFFICE)	Gage45DegreeRule
	59		If raingage mounting is building, is 30 degree rule met	tblSitingCriteria(OFFICE)	GageBuilding30DegreeRule
	60		30 degree rule for trees met (raingage)	tblSitingCriteria(OFFICE)	Gage30DegreeTreeRule
	61		30 degree rule for buildings met (raingage)	tblSitingCriteria(OFFICE)	Gage30DegreeBuildingRule
	62		No objects > 1 m height inside 5 m radius (raingage)	tblSitingCriteria(OFFICE)	Gage5mRadius1mHeight
	63		No fences > 1 m height inside 2 m radius (raingage)	tblSitingCriteria(OFFICE)	Gage2mRadiusFenceHeight
	64		No vegetation height > 0.6 m within 5 m radius (raingage)	tblSitingCriteria(OFFICE)	GageVegeHeight
	65		Does NADP require a raingage wind shield at this site	tblSitingCriteria(OFFICE)	GageShieldRequired
	66		If raingage wind shield present, is it installed correctly	tblSitingCriteria(OFFICE)	GageShieldOk
	67		Raingage wind shield type	tblSitingCriteria(OFFICE)	GageShieldType
	68		Collector mounting	tblSitingCriteria(OFFICE)	CollectorMounting
	69		Height of collector (meters)	tblSitingCriteria(OFFICE)	CollectorPlatformHeight
	70		Collector ground cover, 30 m radius	tblSitingCriteria(OFFICE)	CollectorGroundCover
	71		Collector and sensor oriented properly	tblSitingCriteria(OFFICE)	CollectorOrientation
	72		If collector and sensor are not oriented properly, was orientation corrected	tblSitingCriteria(OFFICE)	CollectorOrientationCorrected
	73		45 degree rule met (collector)	tblSitingCriteria(OFFICE)	Collector45DegreeRule
	74		If collector mounting is building, is 30 degree rule met	tblSitingCriteria(OFFICE)	CollectorBuilding30DegreeRule
	75		30 degree rule for trees met (collector)	tblSitingCriteria(OFFICE)	Collector30DegreeTreeRule
	76		30 degree rule for buildings met (collector)	tblSitingCriteria(OFFICE)	Collector30DegreeBuildingRule
	77		No objects > 1 m height within 5 m radius (collector)	tblSitingCriteria(OFFICE)	Collector5mRadius1mHeight
	78		No fences > 1 m height inside 5 m radius (collector)	tblSitingCriteria(OFFICE)	Collector5mRadiusFenceHeight
	79		No vegetation height > 0.6 m within 5 m radius (collector)	tblSitingCriteria(OFFICE)	CollectorVegeHeight

	80		No sources of treated lumber inside 5 m radius (collector)	tblSitingCriteria(OFFICE)	TreatedLumberPresent
	81		No galvanized metal inside 5 m radius (MDN collector)	tblSitingCriteria(OFFICE)	GalvPresent
	82		No pastures and agricultural activity within 20 m radius	tblSitingCriteria(OFFICE)	AgInside20m
	83		No herbicides and fertilizers used within 20 m radius	tblSitingCriteria(OFFICE)	HerbFertWithin20m
	84		Collector snow roof present	tblSitingCriteria(OFFICE)	CollectorSnowRoofPresent
	85		If collector snow roof present, is it present year round	tblSitingCriteria(OFFICE)	CollectorSnowRoof
	86		Roads meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpRoad
new	87		No access roads within 10m of collector		
new	88		No unpaved roads within 100m of collector		
new	89		No paved roads within 100m of collector		
new	90		No highways within 500m of collector		
new	91		No Interstate highways within 1km		
	92		Waterways meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpWaterway
	93		Airports meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpAirport
	94		Animal operations meet NADP siting criteria (NTN and AIRMoN only)	tblSitingCriteria(OFFICE)	NadpAnimalOperation
	95		Combustion sources meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpCombustion
	96		Parking lots and maintenance areas meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpParkingMaintenance
	97		Storage areas (fertilizers, road salt, manure, etc.) meet NADP siting criteria	tblSitingCriteria(OFFICE)	NadpStorageArea
	98		Metalworking operations meet NADP siting criteria (MDN only)	tblSitingCriteria(OFFICE)	NadpMetalworking
	99		GPS latitude - decimal degrees of the collector	tblSitingCriteria(OFFICE)	Latitude
	100		GPS longitude - decimal degrees of the collector	tblSitingCriteria(OFFICE)	Longitude
	101		GPS altitude - meters of the collector	tblSitingCriteria(OFFICE)	Altitude
	102		Indicated GPS accuracy - meters	tblSitingCriteria(OFFICE)	GpsAccuracyMeter
	103		No significant changes to local site conditions within 500 m of the collector since pre	tblSitingCriteria(OFFICE)	NoSignificantChanges
	104	ACM Type Collector	Does collector cycle under battery power	tblAcmCollector(OFFICE)	BatteryCyclesCollector
new	105		Equipment mounting type		
new	106		Height of equipment opening		
new	107		Ground cover within 30 meter radius of equipment		
new	108		45 degree rule met for equipment		
new	109		If equipment mounting is building, is 30 degree rule met		
new	110		30 degree rule for buildings meet		
new	111		30 degree guideline for trees meet		
new	112		No objects > 1m height within 5 meters of equipment		
new	113		No fences > 1m height within 5 meters of equipment		
new	114		No fences > 1m height within 2 meters of equipment		
new	115		No vegetation > 0.6m height within 5 meters of equipment		
new	116		Orientation of collector sensor (N,NW,W,SW,S,SE,E,NE)		
new	117		Is equipment level		
new	118		If equipment is not level, was it leveled		
new	119		Is equipment stable		
new	120		If equipment was is not stable, was it stabilized		

	121		Has liner actuator been installed	tblAcmCollector(OFFICE)	LinearActuatorPresent
	122		Were the correct fuses found	tblAcmCollector(OFFICE)	FuseCorrect
	123		Were all fuse problems corrected during survey	tblAcmCollector(OFFICE)	FuseProblemCorrected
	124		Battery capacity - cold crank amps	tblAcmCollector(OFFICE)	BatteryCCA
	125		Batteries in good condition	tblAcmCollector(OFFICE)	AcmBatteryCondition
new	126		Battery (s) in good condition	tblAcmCollector(OFFICE)	AcmBatteryCondition
	127		Order replacement ACM battery	tblAcmCollector(OFFICE)	AcmBatteryOrdered
new	128		Order replacement equipment battery		
	129		Battery pass load test	tblAcmCollector(OFFICE)	BatteryLoadTestOk
	130		Precipitation collector manufacturer	tblAcmCollector(OFFICE)	PrecipCollectorMfg
	131		Heated base in winter	tblAcmCollector(OFFICE)	HeaterBaseWinter
	132		Heated arms in winter	tblAcmCollector(OFFICE)	HeaterArmsWinter
	133		Heated lid in winter	tblAcmCollector(OFFICE)	HeatedLidWinter
	134		Correct counter weight	tblAcmCollector(OFFICE)	CounterWeightOk
	135		Are boots used for lid arms	tblAcmCollector(OFFICE)	LidArmBootsUsed
	136		Base not enclosed to ground	tblAcmCollector(OFFICE)	BaseEnclosedToGround
	137		Is collector level	tblAcmCollector(OFFICE)	CollectorLevel
	138		If collector is not level, was collector leveled	tblAcmCollector(OFFICE)	CollectorLevelCorrected
	139		Is collector stable	tblAcmCollector(OFFICE)	CollectorStable
	140		If collector is not stable, was collector stabilized	tblAcmCollector(OFFICE)	CollectorStableCorrected
	141		Number of tie down springs needed (if required)	tblAcmCollector(OFFICE)	DownSpringsRequired
	142		Is drive rod straight	tblAcmCollector(OFFICE)	DriveRodLinear
	143		Was arm alignment lubricated (NTN and AIRMoN)	tblAcmCollector(OFFICE)	ArmAlignmentLube
	144		Distance ground to top of bucket - meters	tblAcmCollector(OFFICE)	BucketToGround
	145		Dry side bucket is clean	tblAcmCollector(OFFICE)	DrySideBucketClean
	146		Dry side bucket or bag is changed	tblAcmCollector(OFFICE)	DrySideBucketChanged
	147		Does lid seal properly	tblAcmCollector(OFFICE)	LidSeal
	148		Lid liner in good condition	tblAcmCollector(OFFICE)	LidLiner
	149		Dry bucket holder height (inches)	tblAcmCollector(OFFICE)	DryBucketHolderHeight
	150		Wet bucket holder height (inches)	tblAcmCollector(OFFICE)	WetBucketHolderHeight
	151		Blue clip in good condition	tblAcmCollector(OFFICE)	BlueClip
	152		Arm boots in good condition	tblAcmCollector(OFFICE)	ArmBoots
	153		Chimney cap in good condition	tblAcmCollector(OFFICE)	ChimneyCap
	154		Does collector have a motor box inspection door	tblAcmCollector(OFFICE)	MbInspectionDoorPresent
	155		Fan in good condition	tblAcmCollector(OFFICE)	Fan
	156		Cooling fan thermostat in good condition	tblAcmCollector(OFFICE)	CoolingFanTstat
	157		Heater in good condition	tblAcmCollector(OFFICE)	Heater
	158		Heater thermostat in good condition	tblAcmCollector(OFFICE)	HeatingFanTstat
	159		Has flush wall filter mount been installed	tblAcmCollector(OFFICE)	WallFilterMountPresent
	160		Filter in good condition	tblAcmCollector(OFFICE)	Filter
	161		Lab jack in good condition	tblAcmCollector(OFFICE)	LabJack

	162		Overflow bucket in good condition	tblAcmCollector(OFFICE)	OverflowBucket
	163		Graduated cylinder in good condition	tblAcmCollector(OFFICE)	GradCylinder
	164		Indicated temperature on max / min thermometer (oF)	tblAcmCollector(OFFICE)	MinMaxIndicatedTemp
	165		Survey team's temperature reading (oF)	tblAcmCollector(OFFICE)	SurveyTemp
	166		Max / min thermometer in acceptable limits	tblAcmCollector(OFFICE)	MinMaxThermo
new	167		Type of max / min thermometer		
	168		Is 'as found' caulk around chimney in good condition	tblAcmCollector(OFFICE)	ChimneyCaulkOk
	169		Was chimney recaulked by survey team	tblAcmCollector(OFFICE)	RecaulkChimney
	170		Dry side bag installed correctly	tblAcmCollector(OFFICE)	DrySideBagStatus
new	171		Is quantity of liquid in dry side bag assessed and reported		
	172		Correct sensor grid type	tblAcmCollector(OFFICE)	SensorGridTypeCorrect
new	173		Sensor grid number		
	174		Does sensor respond to a drop of water	tblAcmCollector(OFFICE)	SensorResponseWaterDrop
new	175		Does sensor respond to one drop of water	tblAcmCollector(OFFICE)	SensorResponseWaterDrop
	176		Temperature of sensor inactivated (deg. C)	tblAcmCollector(OFFICE)	SensorTempInactive
	177		Maximum temperature of sensor within 10 minutes (deg. C)	tblAcmCollector(OFFICE)	MaxTempTime
	178		Time to maximum temperature = < 10 minutes	tblAcmCollector(OFFICE)	MaxTempLt10Min
	179		Sensor operates properly	tblAcmCollector(OFFICE)	AcmSensorOperation
	180		Order replacement ACM sensor	tblAcmCollector(OFFICE)	AcmSensorOrder
	181		Voltage of motorbox at E.R. terminal (collector closed)	tblAcmCollector(OFFICE)	ErVoltageClosedMotorbox
	182		Voltage of motorbox at E.R. terminal (collector open)	tblAcmCollector(OFFICE)	ErVoltageOpenMotorbox
	183		Voltage of raingage at E.R. terminal (collector open)	tblAcmCollector(OFFICE)	ErVoltageOpenER
	184		Clutch lift 2 raingage weights	tblAcmCollector(OFFICE)	ClutchLifts2RainGageWeights
	185		Motorbox operates within acceptable limits	tblAcmCollector(OFFICE)	MotorBox
	186		Order replacement ACM motorbox	tblAcmCollector(OFFICE)	OrderMotorbox
	187	Belfort Raingage	Is 8 inch orifice round	tblBelfort(OFFICE)	IsEightInchOrificeRound
	188		Does site have raingage funnel	tblBelfort(OFFICE)	RainGageFunnelPresent
	189		Is gage level	tblBelfort(OFFICE)	GageLevel
	190		If gage is not level, was it re-leveled	tblBelfort(OFFICE)	GageLevelCorrected
	191		Is gage stable	tblBelfort(OFFICE)	GageStable
	192		If the gage is not stable, was it stabilized	tblBelfort(OFFICE)	GageStableCorrected
	193		Clock operates properly 'as found'	tblBelfort(OFFICE)	ClockOperation
	194		E.R. solenoid operates properly 'as found'	tblBelfort(OFFICE)	EventRecorderSolenoid
	195		No dashpot fluid added	tblBelfort(OFFICE)	DashpotFluidAdded
	196		Order dashpot fluid	tblBelfort(OFFICE)	DashpotFluidNeeded
	197		Order raingage ink	tblBelfort(OFFICE)	RaingageInkNeeded
	198		Order replacement pen nibs	tblBelfort(OFFICE)	PenNibsNeeded
	199		As found gage baseline reading	tblBelfort(OFFICE)	BaselineGageReading
	200		equivalent height 1.00 std. weight	tblBelfort(OFFICE)	OneInchWeightStandard
	201		equivalent height 2.00 std. weight	tblBelfort(OFFICE)	TwoInchWeightStandard
	202		equivalent height 3.00 std. weight	tblBelfort(OFFICE)	ThreeInchWeightStandard

203		equivalent height 4.00 std. weight	tblBelfort(OFFICE)	FourInchWeightStandard
204		equivalent height 5.00 std. weight	tblBelfort(OFFICE)	FiveInchWeighStandard
205		equivalent height 6.00 std. weight	tblBelfort(OFFICE)	SixInchWeightStandard
206		equivalent height 7.00 std. weight	tblBelfort(OFFICE)	SevenInchWeightStandard
207		equivalent height 8.00 std. weight	tblBelfort(OFFICE)	EightInchWeightStandard
208		equivalent height 9.00 std. weight	tblBelfort(OFFICE)	NineInchWeightStandard
209		equivalent height 10.00 std. weight	tblBelfort(OFFICE)	TenInchWeightStandard
210		equivalent height 11.00 std. weight	tblBelfort(OFFICE)	ElevenInchWeightStandard
211		equivalent height 12.00 std. weight	tblBelfort(OFFICE)	TwelveInchWeightStandard
212		As found gage 1.00 std. weight reading	tblBelfort(OFFICE)	OneInchWeightSite
213		As found gage 2.00 std. weight reading	tblBelfort(OFFICE)	TwoInchWeightSite
214		As found gage 3.00 std. weight reading	tblBelfort(OFFICE)	ThreeInchWeightSite
215		As found gage 4.00 std. weight reading	tblBelfort(OFFICE)	FourInchWeightSite
216		As found gage 5.00 std. weight reading	tblBelfort(OFFICE)	FiveInchWeightSite
217		As found gage 6.00 std. weight reading	tblBelfort(OFFICE)	SixInchWeightSite
218		As found gage 7.00 std. weight reading	tblBelfort(OFFICE)	SevenInchWeightSite
219		As found gage 8.00 std. weight reading	tblBelfort(OFFICE)	EightInchWeightSite
220		As found gage 9.00 std. weight reading	tblBelfort(OFFICE)	NineInchWeightSite
221		As found gage 10.00 std. weight reading	tblBelfort(OFFICE)	TenInchWeightSite
222		As found gage 11.00 std. weight reading	tblBelfort(OFFICE)	ElevenInchWeightSite
223		As found gage 12.00 std. weight reading	tblBelfort(OFFICE)	TwelveInchWeightSite
224		Post calibration gage baseline reading	tblBelfort(OFFICE)	PostCalBaselineReading
225		Post calibration equivalent height 1.00 std. weight	tblBelfort(OFFICE)	PcOneInchWeightStandard
226		Post calibration equivalent height 2.00 std. weight	tblBelfort(OFFICE)	PcTwoInchWeightStandard
227		Post calibration equivalent height 3.00 std. weight	tblBelfort(OFFICE)	PcThreeInchWeightStandard
228		Post calibration equivalent height 4.00 std. weight	tblBelfort(OFFICE)	PcFourInchWeightStandard
229		Post calibration equivalent height 5.00 std. weight	tblBelfort(OFFICE)	PcFiveInchWeightStandard
230		Post calibration equivalent height 6.00 std. weight	tblBelfort(OFFICE)	PcSixInchWeightStandard
231		Post calibration equivalent height 7.00 std. weight	tblBelfort(OFFICE)	PcSevenInchWeightStandard
232		Post calibration equivalent height 8.00 std. weight	tblBelfort(OFFICE)	PcEightInchWeightStandard
233		Post calibration equivalent height 9.00 std. weight	tblBelfort(OFFICE)	PcNineInchWeightStandard
234		Post calibration equivalent height 10.00 std. weight	tblBelfort(OFFICE)	PcTenInchWeightStandard
235		Post calibration equivalent height 11.00 std. weight	tblBelfort(OFFICE)	PcElevenInchWeightStandard
236		Post calibration equivalent height 12.00 std. weight	tblBelfort(OFFICE)	PcTwelveInchWeightStandard
237		As left gage 1.00 std. weight reading	tblBelfort(OFFICE)	PcOneInchWeight
238		As left gage 2.00 std. weight reading	tblBelfort(OFFICE)	PcTwoInchWeight
239		As left gage 3.00 std. weight reading	tblBelfort(OFFICE)	PcThreeInchWeight
240		As left gage 4.00 std. weight reading	tblBelfort(OFFICE)	PcFourInchWeight
241		As left gage 5.00 std. weight reading	tblBelfort(OFFICE)	PcFiveInchWeight
242		As left gage 6.00 std. weight reading	tblBelfort(OFFICE)	PcSixInchWeight
243		As left gage 7.00 std. weight reading	tblBelfort(OFFICE)	PcSevenInchWeight

	244		As left gage 8.00 std. weight reading	tblBelfort(OFFICE)	PcEightInchWeight
	245		As left gage 9.00 std. weight reading	tblBelfort(OFFICE)	PcNineInchWeight
	246		As left gage 10.00 std. weight reading	tblBelfort(OFFICE)	PcTenInchWeight
	247		As left gage 11.00 std. weight reading	tblBelfort(OFFICE)	PcElevenInchWeight
	248		As left gage 12.00 std. weight reading	tblBelfort(OFFICE)	PcTwelveInchWeight
	249		Was the 'as found' zero plate set properly	tblBelfort(OFFICE)	ZeroPlate
	250		Was the 'as found' turn over set properly	tblBelfort(OFFICE)	TurnOver
	251		Was the 'as found' event recorder set properly	tblBelfort(OFFICE)	EventRecorder
	252		Order replacement gage	tblBelfort(OFFICE)	GageNeedsReplacement
	253		Has Belfort " RED " knob modification been made	tblBelfort(OFFICE)	BelfortRedKnobModified
	254	Electronic Raingage	Is orifice round	tblElecRainGage(OFFICE)	ElecGageEightInchOrificeRound
	255		Is bucket in good condition	tblElecRainGage(OFFICE)	ElecGageBucketConditionGood
	256		Is gage level	tblElecRainGage(OFFICE)	ElecGageLevel
	257		If gage is not level, was it re-leveled	tblElecRainGage(OFFICE)	ElecGageLevelCorrected
	258		Is gage stable	tblElecRainGage(OFFICE)	ElecGageStable
	259		If gage is not stable, was it stabilized	tblElecRainGage(OFFICE)	ElecGageStableCorrected
	260		As found gage baseline reading	tblElecRainGage(OFFICE)	BaselineElecGageReading
	261		equivalent height 0.25 inch std. weight	tblElecRainGage(OFFICE)	QuarterInchWeightElecStd
	262		equivalent height 0.50 inch std. weight	tblElecRainGage(OFFICE)	HalfInchWeightElecStd
	263		equivalent height 1.00 inch std. weight	tblElecRainGage(OFFICE)	OneInchWeightElecStd
	264		equivalent height 2.00 inch std. weight	tblElecRainGage(OFFICE)	TwoInchWeightElecStd
	265		equivalent height 6.00 inch std. weight	tblElecRainGage(OFFICE)	SixInchWeightElecStd
	266		equivalent height 10.00 inch std. weight	tblElecRainGage(OFFICE)	TenInchWeightElecStd
	267		As found gage 0.25 std. weight reading	tblElecRainGage(OFFICE)	QuarterInchWeightElec
	268		As found gage 0.50 std. weight reading	tblElecRainGage(OFFICE)	HalfInchWeightElec
	269		As found gage 1.00 std. weight reading	tblElecRainGage(OFFICE)	OneInchWeightElec
	270		As found gage 2.00 std. weight reading	tblElecRainGage(OFFICE)	TwoInchWeightElec
	271		As found gage 6.00 std. weight reading	tblElecRainGage(OFFICE)	SixInchWeightElec
	272		As found gage 10.00 std. weight reading	tblElecRainGage(OFFICE)	TenInchWeightElec
	273		Rain gage operates properly	tblElecRainGage(OFFICE)	ElecGageOperation
	274		Battery voltage	tblElecRainGage(OFFICE)	BatteryVoltage
	275		Does battery pass load test	tblElecRainGage(OFFICE)	LoadTestPass
	276		Battery capacity, amp-hr	tblElecRainGage(OFFICE)	BatteryCapacity
	277		Battery in good condition	tblElecRainGage(OFFICE)	ElecGageBatteryCondition
	278		Order electronic gage battery	tblElecRainGage(OFFICE)	ElecGageBatteryOrder
	279		Does datalogger receive event signals from all collectors	tblElecRainGage(OFFICE)	DataloggerEventSignalsOk
	280		Does optical sensor respond to "blocking" of light beam	tblElecRainGage(OFFICE)	OpticalSensorBlockResponse
	281		Does optical sensor respond to mist of water	tblElecRainGage(OFFICE)	OpticalSensorMistResponse
new	282		Internal jumper switch setting		
new	283		Internal precipitation bucket level		
new	284		internal leveling screws secured with locking nuts		

	285	Field Laboratory	Does site conduct field chemistry	tblFieldLab(OFFICE)	SitePerformsFieldChemistry
	286		Is laboratory temperature controlled	tblFieldLab(OFFICE)	IsLabTempControlled
	287		pH meter simulation test 7.00	tblFieldLab(OFFICE)	pHSimTestSeven
	288		pH meter simulation test 4.00	tblFieldLab(OFFICE)	pHSimTestFour
	289		Acceptable conductivity measurement techniques	tblFieldLab(OFFICE)	ConductivityTechniqueOk
	290		Target conductivity of audit sample	tblFieldLab(OFFICE)	AuditSampleConductivity
	291		Measured conductivity of audit sample	tblFieldLab(OFFICE)	AuditSampleConductivityFound
	292		Acceptable pH measurement techniques	tblFieldLab(OFFICE)	pHTechniqueOk
	293		Target pH of audit sample	tblFieldLab(OFFICE)	AuditSamplepH
	294		Measured pH of audit sample	tblFieldLab(OFFICE)	AuditSamplepHFound
	295		Order pH probe	tblFieldLab(OFFICE)	ReplacepHProbe
	296		Good weighing practices	tblFieldLab(OFFICE)	WeighingTechniqueOk
	297		Calibration Std. Wt. - one weight	tblFieldLab(OFFICE)	CalWeightOneStd
	298		Calibration Std. Wt. - two weights	tblFieldLab(OFFICE)	CalWeightTwoStd
	299		Calibration Std. Wt. - three weights	tblFieldLab(OFFICE)	CalWeightThreeStd
	300		Calibration Std. Wt. - four weights	tblFieldLab(OFFICE)	CalWeightFourStd
	301		As found scale response - one std. weight	tblFieldLab(OFFICE)	CalWeightOneScale
	302		As found scale response - two std. weights	tblFieldLab(OFFICE)	CalWeightTwoScale
	303		As found scale response - three std. weights	tblFieldLab(OFFICE)	CalWeightThreeScale
	304		As found scale response - four std. weights	tblFieldLab(OFFICE)	CalWeightFourScale
	305		Are samples stored and shipped properly	tblFieldLab(OFFICE)	SampleHandlingOk
	306		Temperature of blank bottles in refrigerator	tblFieldLab(OFFICE)	FridgeTemp
new	307		Temperature of samples and blank bottles in refrigerator	tblFieldLab(OFFICE)	FridgeTemp
	308	Site Supplies	MDN coolers	tblSupplies(OFFICE)	MdnCoolers
	309		Unused buckets in bags, ready to be used	tblSupplies(OFFICE)	UnusedBuckets
	310		Unused bucket lids in bags, ready to be used	tblSupplies(OFFICE)	UnusedLids
	311		Unused 1-L sample bottles in bags, ready to be used	tblSupplies(OFFICE)	Unused1LBottles
	312		Unused 250-mL sample bottles in bags, ready to be used (AIRMoN)	tblSupplies(OFFICE)	Unused250mLBottles
	313		Large shipping boxes	tblSupplies(OFFICE)	LargeShippingBoxes
	314		Small 1-L bottle boxes	tblSupplies(OFFICE)	SmallShippingBoxes
	315		Wet side used buckets, do not include dry side or discard buckets	tblSupplies(OFFICE)	UsedBuckets
	316		Used bucket lids	tblSupplies(OFFICE)	UsedLids
	317		Used 1-L sample bottles	tblSupplies(OFFICE)	Used1LBottltes
	318		Used 250 mL sample bottles (AIRMoN)	tblSupplies(OFFICE)	Used250mLBottles
	319		No used collector and raingage components on hand	tblSupplies(OFFICE)	SpareEquipment
	320		Sample mailers on hand Black Box w/blue tape	tblSupplies(OFFICE)	SampleMailersPresent
	321		Ice Packs	tblSupplies(OFFICE)	IcePacks
	322		Temperature blank bottles on hand	tblSupplies(OFFICE)	TempBlankBottlesPresent
	323		Order Site Operations Manual/SOPS	tblSupplies(OFFICE)	SiteOpsManualNeeded
	324		Order raingage manual	tblSupplies(OFFICE)	RaingageManualNeeded
	325		Order copy of training video	tblSupplies(OFFICE)	TrainingVideoNeeded

	326		Order wash bottle	tblSupplies(OFFICE)	WashBottleNeeded
	327		Order deionized water	tblSupplies(OFFICE)	DiWaterNeeded
	328		Order disposable towels	tblSupplies(OFFICE)	DispTowelsNeeded
	329		Order 4 ml polystyrene sampling vials	tblSupplies(OFFICE)	FourMlVialsNeeded
	330		Order vial style	tblSupplies(OFFICE)	VialStyleNeeded
	331		Order pH 4.0 buffer solution	tblSupplies(OFFICE)	pHFourBufferNeeded
	332		Order pH 7.0 buffer solution	tblSupplies(OFFICE)	pHSevenBufferNeeded
	333		Order specific conductance standard	tblSupplies(OFFICE)	ConductivityStandardNeeded
	334		Order 4.3 Quality control check sample	tblSupplies(OFFICE)	QcCheckSampleNeeded
	335		Order electrode fill solution	tblSupplies(OFFICE)	ElectrodeFillSolutionNeeded
	336		Order blank field forms	tblSupplies(OFFICE)	BlankFieldFormsNeeded
	337		Order blank raingage charts	tblSupplies(OFFICE)	BlankRainGageChartsNeeded
	338		Order NADP vial holder	tblSupplies(OFFICE)	NadpVialHolderNeeded
	339		Order NADP vial holder cover	tblSupplies(OFFICE)	NadpVialHolderCoverNeeded
	340		Order gloves	tblSupplies(OFFICE)	GlovesNeeded
	341	Backup Raingage	Type of backup gage within 30 m of NADP collector	tblBackupGage(OFFICE)	BackupGage
	342		Is the orifice of the collector +/- .3 m of backup raingage	tblBackupGage(OFFICE)	BackupGageCollectorOrificePositio
	343		Distance from collector to backup raingage (meters)	tblBackupGage(OFFICE)	CollectorBackupGageDistance
	344		Backup raingage ground cover, 30 m radius	tblBackupGage(OFFICE)	BackupGageGroundCover
	345		45 degree rule met (backup raingage)	tblBackupGage(OFFICE)	BackupGage45DegreeRule
	346		If backup raingage mounting is Building, is 30 degree rule met	tblBackupGage(OFFICE)	BackupGageBuilding30DegreeRule
	347		30 degree rule for trees met (backup raingage)	tblBackupGage(OFFICE)	BackupGage30DegreeTreeRule
	348		30 degree rule for buildings met (backup raingage)	tblBackupGage(OFFICE)	BackupGage30DegreeBuildingRule
	349		No objects > 1 m height inside 5 m radius (backup raingage)	tblBackupGage(OFFICE)	BackupGage5mRadius1mHeight
	350		No fences > 1 m height inside 2 m radius (backup raingage)	tblBackupGage(OFFICE)	BackupGage2mRadiusFenceHeigh
	351		No vegetation height > 0.6 m within 5 m radius (backup raingage)	tblBackupGage(OFFICE)	BackupGageVegeHeight
	352		If backup raingage wind shield present, is it installed correctly	tblBackupGage(OFFICE)	BackupGageShieldOk
	353		Backup raingage wind shield type	tblBackupGage(OFFICE)	BackupGageShieldType
	354	NWS Stick Gage	Is Stick gage level	tblStickGage(OFFICE)	StickGageLevel
	355		If Stick gage is not level, was it re-leveled	tblStickGage(OFFICE)	StickGageLevelCorrected
	356		Is Stick gage stable	tblStickGage(OFFICE)	StickGageStable
	357		If Stick gage is not stable, was it stabilized	tblStickGage(OFFICE)	StickGageStableCorrected
	358		Are the gage can, funnel, and stick in good condition	tblStickGage(OFFICE)	StickGageComponetsOk
	359		Does the stick measure within tolerances (.01")	tblStickGage(OFFICE)	StickGageTolerancesOk
	360		1.21 Inch Calibration Check - PASSED	tblStickGage(OFFICE)	OnePointTwoOneCal
	361		2.43 Inch Calibration Check - PASSED	tblStickGage(OFFICE)	TwoPointFourThreeCal
new	362		Stick gage funnel diameter		
new	363		Stick gage outer cylinder diameter		
new	364		Stick gage inner cylinder diameter		
new	365		Equvilent height std volume input 1		
new	366		Equvilent height std volume input 2		

new	367		Stick gage response from std input 1		
new	368		Stick gage response from std input 2		
	369	N-Con Collector	Were the correct fuses found	tblN-ConCollector(OFFICE)	NconFuseCorrect
	370		Were all fuse problems corrected during survey	tblN-ConCollector(OFFICE)	NconFuseProblemCorrected
	371		Is the chimney heated	tblN-ConCollector(OFFICE)	HeatedChimney
	372		Is collector level	tblN-ConCollector(OFFICE)	NconCollectorLevel
	373		If collector is not level, was it re-leveled	tblN-ConCollector(OFFICE)	NconCollectorLevelCorrected
	374		Is collector stable	tblN-ConCollector(OFFICE)	NconCollectorStable
	375		Was collector stabilized during survey?	tblN-ConCollector(OFFICE)	NconCollectorStabilized
	376		Lid seal in good condition	tblN-ConCollector(OFFICE)	NconLidSeal
	377		Lid liner in good condition	tblN-ConCollector(OFFICE)	NconLidLiner
	378		Blue clip in good condition	tblN-ConCollector(OFFICE)	NconBlueClip
	379		Fan in good condition	tblN-ConCollector(OFFICE)	NconFan
	380		Cooling fan thermostat in good condition	tblN-ConCollector(OFFICE)	NconCoolingFanTstat
	381		Heater in good condition	tblN-ConCollector(OFFICE)	NconHeater
	382		Heater thermostat in good condition	tblN-ConCollector(OFFICE)	NconHeatingFanTstat
	383		Overflow bucket in good condition	tblN-ConCollector(OFFICE)	NconOverflowBucket
	384		Graduated cylinder in good condition	tblN-ConCollector(OFFICE)	NconGradCylinder
	385		Indicated temperature on max / min thermometer	tblN-ConCollector(OFFICE)	NconMinMaxIndicatedTemp
	386		Survey team's temperature reading	tblN-ConCollector(OFFICE)	NconSurveyTemp
	387		Max / min thermometer in acceptable limits	tblN-ConCollector(OFFICE)	NconMinMaxThermo
	388		Does sensor respond to a 20-second mist of water	tblN-ConCollector(OFFICE)	SensorRespondToMist
	389		Sensor operates properly, no maintenance needed	tblN-ConCollector(OFFICE)	SensorMfgMaintNeeded
new	390		comment 1		
new	391		comment 2		
new	392		comment 3		
new	393		comment 4		
new	394		comment 5		
	395		Was the as found Belfort E.R. wiring correct	tblBelfort(OFFICE)	WiringCorrected
	396		Stick gage mount	tblStickGage(OFFICE)	StickGageMounting
	397		Height of Stick gage	tblStickGage(OFFICE)	StickGagePlatformHeight

APPENDIX D

Transfer Standard Instrument Certifications

FLUKE ® Everett Service Center

1420 75th St. SW
Everett, Washington 98203
USA

Calibration Certificate

NQA ISO 9000:2000 (10100/2)

Description:	TRUE RMS MULTIMETER	**Certificate Number:**	**1567749-86590148:1262607160**
Manufacturer:	FLUKE	**Date of Calibration:**	04 January 2010
Model:	187	**Date of Certificate:**	04 January 2010
Serial Number:	86590148	**Date Due:**	04 January 2011
Customer Name:		**Procedure Name:**	
EEMS		FLUKE 187: (1 YEAR) ZCAL VER RS-232 /5520	
City, State:	GAINESVILLE, FL	**Procedure Revision:**	2.0
Customer Item ID:	86590148	**Data Type:**	FOUND-LEFT
PO Number:	CCS CHARLES K HALBROOK	**Temperature:**	22.08 °Celsius
RMA Number:	4371587	**Relative Humidity:**	30 %
Result Summary:	PASS		

The Data type that could be found in this certificate must be interpreted as:

- As-Found - Calibration data collected before the unit is adjusted and/or repaired.
- As-Left - Calibration data collected after the unit is adjusted and/or repaired.
- Found-Left - Calibration data collected without any adjustment and/or repair performed.

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Comments:

Long Le
Metrology Technician

Traceability Information
For each parameter listed below the calibration was conducted using an unbroken chain of standards to:

DC Voltage
The Voltage Reference standard group, traceable to the Fluke Primary Standards Laboratory, which is traceable to the U.S. representation of the volt, through the internationally accepted value of the Josephson constant Kj=483597.9 GHz/V and a 10 Volt Josephson Array Voltage Standard.

Frequency and Period
The GPS-Rubidium Disciplined oscillator frequency standard, traceable to the United States Naval Observatory (USNO), which is traceable to the National Institute of Standards and Technology.

AC Voltage, Resistance, DC Current, AC Current, Capacitance, Inductance, Phase
The Fluke Primary Standards Laboratory, which is traceable to the National Institute of Standards and Technology.

AC Voltage Flatness
The Fluke Primary Standards Laboratory, or Agilent Technologies Standards Laboratory which are traceable to the National Institute of Standards and Technology.

Humidity
The Vaisala Measurement Standards Laboratory Primary Salt calibration bath, with traceability based on the physical phenomena in which the equilibrium relative humidity values associated with certain saturated salt solutions are known.

Rise Time
The Tektronix GmbH Calibration Laboratory which is traceable to the Physikalisch-Tecnische Bundensanstalt.

Radiation Temperature
The National Institute of Standards and Technology, the Physikalisch-Tecnische Bundensanstalt, or Hart Scientific.

Contact Temperature
The Fluke Primary Standards Laboratory, Hart Scientific, which are traceable to the National Institute of Standards and Technology.

Gas Flow
The DHI Calibration Laboratory, which is traceable to the National Institute of Standards and Technology.

Pressure
The DHI Calibration Laboratory, which is traceable to the Laboratoire National D'Essais, Physikalisch-Technische Bundesanstalt and National Institute of Standards and Technology, or traceable to the Mensor or Ashcroft Calibration Laboratories, which are traceable to the National Institute of Standards and Technology.

Standards Used

Asset #	Instrument Model	Cal Date	Cal Due
10127	FLUKE 5520A CALIBRATOR	29 May 2009	28 February 2010

End of Report

FLUKE ® Everett Service Center

1420 75th St. SW
Everett, Washington 98203
USA

Calibration Certificate

NQA ISO 9000:2000 (10100/2)

Description:	TRUE RMS MULTIMETER	**Certificate Number:**	**2740201-95740135:1262608274**
Manufacturer:	FLUKE	**Date of Calibration:**	04 January 2010
Model:	287	**Date of Certificate:**	04 January 2010
Serial Number:	95740135	**Date Due:**	04 January 2011
Customer Name:		**Procedure Name:**	
EEMS		FLUKE 287: (1 YEAR) ZCAL VER RS-232 /5520	
City, State:	GAINESVILLE, FL	**Procedure Revision:**	1.3
Customer Item ID:	95740135	**Data Type:**	FOUND-LEFT
PO Number:	CCS CHARLES K HALBROOK	**Temperature:**	22.08 °Celsius
RMA Number:	602533	**Relative Humidity:**	30 %
Result Summary:	PASS		

The Data type that could be found in this certificate must be interpreted as:

- As-Found - Calibration data collected before the unit is adjusted and/or repaired.
- As-Left - Calibration data collected after the unit is adjusted and/or repaired.
- Found-Left - Calibration data collected without any adjustment and/or repair performed.

This certificate applies only to the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. The user is obliged to have the object recalibrated at appropriate intervals.

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Comments:

Long Le
Metrology Technician

Traceability Information
For each parameter listed below the calibration was conducted using an unbroken chain of standards to:

DC Voltage
The Voltage Reference standard group, traceable to the Fluke Primary Standards Laboratory, which is traceable to the U.S. representation of the volt, through the internationally accepted value of the Josephson constant Kj=483597.9 GHz/V and a 10 Volt Josephson Array Voltage Standard.

Frequency and Period
The GPS-Rubidium Disciplined oscillator frequency standard, traceable to the United States Naval Observatory (USNO), which is traceable to the National Institute of Standards and Technology.

AC Voltage, Resistance, DC Current, AC Current, Capacitance, Inductance, Phase
The Fluke Primary Standards Laboratory, which is traceable to the National Institute of Standards and Technology.

AC Voltage Flatness
The Fluke Primary Standards Laboratory, or Agilent Technologies Standards Laboratory which are traceable to the National Institute of Standards and Technology.

Humidity
The Vaisala Measurement Standards Laboratory Primary Salt calibration bath, with traceability based on the physical phenomena in which the equilibrium relative humidity values associated with certain saturated salt solutions are known.

Rise Time
The Tektronix GmbH Calibration Laboratory which is traceable to the Physikalisch-Tecnische Bundensanstalt.

Radiation Temperature
The National Institute of Standards and Technology, the Physikalisch-Tecnische Bundensanstalt, or Hart Scientific.

Contact Temperature
The Fluke Primary Standards Laboratory, Hart Scientific, which are traceable to the National Institute of Standards and Technology.

Gas Flow
The DHI Calibration Laboratory, which is traceable to the National Institute of Standards and Technology.

Pressure
The DHI Calibration Laboratory, which is traceable to the Laboratoire National D'Essais, Physikalisch-Technische Bundesanstalt and National Institute of Standards and Technology, or traceable to the Mensor or Ashcroft Calibration Laboratories, which are traceable to the National Institute of Standards and Technology.

Standards Used

Asset #	Instrument Model	Cal Date	Cal Due
10127	FLUKE 5520A CALIBRATOR	29 May 2009	28 February 2010

End of Report

FLUKE ® Everett Service Center

1420 75th St. SW
Everett, Washington 98203
USA

Calibration Certificate

NQA ISO 9000:2000 (10100/2)

Description:	TRUE RMS MULTIMETER	**Certificate Number:**	**2740201-95740243:1262674389**
Manufacturer:	FLUKE	**Date of Calibration:**	05 January 2010
Model:	287	**Date of Certificate:**	05 January 2010
Serial Number:	95740243	**Date Due:**	05 January 2011
Customer Name:		**Procedure Name:**	
EEMS		FLUKE 287: (1 YEAR) ZCAL VER RS-232 /5520	
City, State:	GAINESVILLE, FL	**Procedure Revision:**	1.3
Customer Item ID:	95740243	**Data Type:**	FOUND-LEFT
PO Number:	CCS CHARLES K HALBROOK	**Temperature:**	22.08 °Celsius
RMA Number:	4371587	**Relative Humidity:**	30 %
Result Summary:	PASS		

The Data type that could be found in this certificate must be interpreted as:

- As-Found - Calibration data collected before the unit is adjusted and/or repaired.
- As-Left - Calibration data collected after the unit is adjusted and/or repaired.
- Found-Left - Calibration data collected without any adjustment and/or repair performed.

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Comments:

Long Le
Metrology Technician

Traceability Information
For each parameter listed below the calibration was conducted using an unbroken chain of standards to:

DC Voltage
The Voltage Reference standard group, traceable to the Fluke Primary Standards Laboratory, which is traceable to the U.S. representation of the volt, through the internationally accepted value of the Josephson constant Kj=483597.9 GHz/V and a 10 Volt Josephson Array Voltage Standard.

Frequency and Period
The GPS-Rubidium Disciplined oscillator frequency standard, traceable to the United States Naval Observatory (USNO), which is traceable to the National Institute of Standards and Technology.

AC Voltage, Resistance, DC Current, AC Current, Capacitance, Inductance, Phase
The Fluke Primary Standards Laboratory, which is traceable to the National Institute of Standards and Technology.

AC Voltage Flatness
The Fluke Primary Standards Laboratory, or Agilent Technologies Standards Laboratory which are traceable to the National Institute of Standards and Technology.

Humidity
The Vaisala Measurement Standards Laboratory Primary Salt calibration bath, with traceability based on the physical phenomena in which the equilibrium relative humidity values associated with certain saturated salt solutions are known.

Rise Time
The Tektronix GmbH Calibration Laboratory which is traceable to the Physikalisch-Tecnische Bundensanstalt.

Radiation Temperature
The National Institute of Standards and Technology, the Physikalisch-Tecnische Bundensanstalt, or Hart Scientific.

Contact Temperature
The Fluke Primary Standards Laboratory, Hart Scientific, which are traceable to the National Institute of Standards and Technology.

Gas Flow
The DHI Calibration Laboratory, which is traceable to the National Institute of Standards and Technology.

Pressure
The DHI Calibration Laboratory, which is traceable to the Laboratoire National D'Essais, Physikalisch-Technische Bundesanstalt and National Institute of Standards and Technology, or traceable to the Mensor or Ashcroft Calibration Laboratories, which are traceable to the National Institute of Standards and Technology.

Standards Used

Asset #	Instrument Model	Cal Date	Cal Due
10127	FLUKE 5520A CALIBRATOR	29 May 2009	28 February 2010

End of Report

EOH

Weight / Balance Calibration Log

Eric's Set

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1500.00	1500.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1000.00	1000.01	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	500.00	499.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	200.00	199.97	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	100.00	99.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	50.00	49.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	20.00	20.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	10.00	10.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	5.00	4.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	2.00	1.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1.00	1.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	3-12			823.68	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-11			823.71	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-10			823.41	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-9			822.90	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-8			823.27	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-7			823.70	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-6			822.79	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-5			824.55	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-4			824.20	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-3			823.49	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-2			823.04	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	3-1			823.16	CKH	Weight Set #3 Belfort
1/1/2010	8028481064	EL-1			207.71	CKH	Electronic Cal Weights
1/1/2010	8028481064	EL-2			205.56	CKH	Electronic Cal Weights
1/1/2010	8028481064	EL-3			204.61	CKH	Electronic Cal Weights
1/1/2010	8028481064	EL-4			204.30	CKH	Electronic Cal Weights
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1500.00	1500.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1000.00	1000.01	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	500.00	499.97	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	200.00	200.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	100.00	100.01	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	50.00	50.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	20.00	20.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	10.00	10.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	5.00	5.01	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	2.00	2.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1.00	1.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check

Calibrator Signature: _____ Date: 1/1/2010

Reviewer Signature: Nancy J Halbrook Date: 1/1/2010

Weight / Balance Calibration Log

Scott's Set

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1500.00	1500.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1000.00	1000.01	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	500.00	500.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	200.00	200.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	100.00	100.01	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	50.00	50.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	20.00	20.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	10.00	10.01	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	5.00	5.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	2.00	2.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1.00	1.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	1-0			1034.39	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-12			824.69	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-11			824.61	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-10			822.78	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-9			824.36	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-8			823.63	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-7			824.41	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-6			824.78	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-5			823.24	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-4			822.96	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-3			823.66	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-2			824.53	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	1-1			824.10	CKH	Weight Set #1 Belfort
1/1/2010	8028481064	2008-5			205.07	CKH	Electronic Cal Weights
1/1/2010	8028481064	2008-6			205.03	CKH	Electronic Cal Weights
1/1/2010	8028481064	2008-7			205.06	CKH	Electronic Cal Weights
1/1/2010	8028481064	2008-8			204.91	CKH	Electronic Cal Weights
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1500.00	1500.01	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1000.00	1000.01	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	500.00	499.97	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	200.00	199.98	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	100.00	100.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	50.00	49.99	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	20.00	19.99	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	10.00	10.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	5.00	5.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	2.00	2.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1.00	1.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check

Calibrator Signature: _____ Date: 1/1/2010

Reviewer Signature: Nancy J Holbrook Date: 1/1/2010

Weight / Balance Calibration Log

Sandy's Set

Date	Balance SN#	Weight SN#	Cal Type	Std. (g)	Act. (g)	Calibrator	Notes
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1500.00	1500.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1000.00	1000.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	500.00	499.48	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	200.00	199.97	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	100.00	99.99	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	50.00	50.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	20.00	20.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	10.00	10.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	5.00	5.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	2.00	2.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	1.00	1.00	CKH	Initial Balance Check
1/1/2010	8028481064	26677	Bal Init	0.00	0.00	CKH	Initial Balance Check
1/1/2010	8028481064	0-2			1000.12	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-12			823.41	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-11			823.91	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-10			823.77	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-9			824.21	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-8			824.74	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-7			824.91	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-6			824.47	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-5			823.78	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-4			823.72	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-3			825.14	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-2			823.39	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2-1			824.14	CKH	Weight Set #2 Belfort
1/1/2010	8028481064	2008-1			205.12	CKH	Electronic Cal Weights
1/1/2010	8028481064	2008-2			205.11	CKH	Electronic Cal Weights
1/1/2010	8028481064	2010-1			205.05	CKH	Electronic Cal Weights
1/1/2010	8028481064	2010-2			205.22	CKH	Electronic Cal Weights
1/1/2010	8028481064	2010-3			204.93	CKH	Electronic Cal Weights
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1500.00	1502.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1000.00	1000.03	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	500.00	499.96	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	200.00	199.98	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	100.00	99.98	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	50.00	49.99	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	20.00	20.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	10.00	9.99	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	5.00	5.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	2.00	2.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	1.00	1.00	CKH	Post Balance Check
1/1/2010	8028481064	26677	Bal Post	0.00	0.00	CKH	Post Balance Check

Calibrator Signature: _____ Date: 1/1/2010

Reviewer Signature: Stacy J Holbrook Date: 1/1/2010

Certificate of Calibration

Certificate Number
A666628

Customer: EE & MS
1950 NW 39TH PLACE
GAINESVILLE, FL 32605
352-317-2463

P.O. Number: HOLD

ID Number: 01230

Description:	TEMPERATURE INDICATOR	Calibration Date:	1/5/2010
Manufacturer:	EUTECHNICS	Calibration Due:	1/5/2011
Model Number:	4600-1.2.5	Procedure:	TMI-M-THERMOMETER Rev: 2/1/2005
Serial Number:	01D102193	Temperature:	70 °F
Technician:	BRANDON BLACK	Humidity:	50 % RH
On-Site Calibration: ☐		**As Found Condition:**	**IN-TOLERANCE**
Comments:		**Calibration Results:**	**PASS**

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

Reported uncertainties and "test uncertainty ratios" (TUR's) are expressed as expanded uncertainty values at approximately 95% confidence level using a coverage factor of K-2. A TUR of 4:1 is routinely observed between the accuracy of the reference standard and the tolerance of the UUT unless otherwise noted on the certificate. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System complies with the requirements of ISO 9001, ANSI/NCSL Z540-1, ISO 10012 and MIL STD 45662A.

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.

Anthony Rogers, Branch Manager

Jack Shuler, Quality Manager

Calibration Standards

Asset Number	Manufacturer	Model Number	Serial Number	Cal Due
30946	FLUKE	5616	30946	11/30/2010
A06118	HART SCIENTIFIC	9103	A06118	2/10/2011
A88072	FLUKE	1502A	A88072	10/11/2010

TMI Technical Maintenance, Inc.
12530 Telecom Drive, Temple Terrace, FL 33637
(813) 978-3054 Fax: (813) 978-3758
www.tmicalibration.com

ISO 9001:2000
ANSI/NCSL Z540-1-1994

Technical Maintenance, Inc.

Eutechnics
4600
Digital Thermometer/Probe

INSTRUMENT DATA SHEET

Asset Number: 01230 Customer: EE & MS
Date Tested: 5 Jan 2010

Parameter Tested	Nominal Value	Tolerance	Lower Limit	Upper Limit	As Found	Pass/Fail	As Left
Temperature Accuracy							
Deg. C	-0.021	+/-.13	-0.151	0.109	0.000	PASS	AS FOUND
	9.964	+/-.13	9.834	10.094	10.000	PASS	AS FOUND
	19.936	+/-.13	19.806	20.066	19.970	PASS	AS FOUND
	29.951	+/-.13	29.821	30.081	29.990	PASS	AS FOUND
	39.970	+/-.13	39.840	40.100	39.980	PASS	AS FOUND
	49.935	+/-.13	49.805	50.065	49.920	PASS	AS FOUND

	TMI STD	EEMS RTD	EEMS RTD 01230 / 01231 raw	EEMS RTD 01230 / 01231 corrected	EEMS SEG 01237	EEMS SD 01236	EEMS EOH 01310
cert date=	1/5/2010	01230 / 01231					
	-0.021	0	0.08	0.04	0.4	0.3	0.2
	9.964	10	48.11	48.11	48.5	48.3	48.5
	19.936	19.97	0.09	0.05	0.4	0.3	0.3
	29.951	29.99	35.78	35.77	36.1	36.1	36.1
	39.97	39.98	30.08	30.06	30.5	30.3	30.3
	49.935	49.92	19.7	19.66	20.1	19.9	19.9
			10.06	10.02	10.4	10.1	10.1
		slope= 0.999277					
		intercept= 0.038887		Thermocouple offset =	-0.6	-0.3	N/A
				slope =	**1.000614**	**1.000615**	**1.004334**
				intercept =	**0.371651**	**0.214493**	**0.152425**
				correlation =	**0.999998**	**0.999991**	**0.999993**

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 # 01265 SD
Purchase Order #:	
Instrument:	S25 Compass
Serial Number:	190037
Quantity:	1
Calibration Due:	1/2011

John Noga, Quality Control

January 15, 2010

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
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Customer Name:	EE & MS # 01270 EOH
Purchase Order #:	
Instrument:	S25 Compass
Serial Number:	192034
Quantity:	1
Calibration Due:	1/2011

John Noga

John Noga, Quality Control

January 15, 2010

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

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Customer Name:	EE & MS # 01272 SEG
Purchase Order #:	
Instrument:	S25 Compass
Serial Number:	191832
Quantity:	1
Calibration Due:	1/2011

John Noga, Quality Control

January 15, 2010

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

APPENDIX E

Internal QA Audit Reports

Quality Assurance Audit Report

Site: FL32 NTN – Orlando, FL
Date Audit Conducted: 02/10/2009
Auditor: C. Keith Halbrook
Survey Team: Eric Hebert, Sandy Grenville
Site Operators: Efren Vazquez, Catherine Johnson
Observers: Maria Jones, EEMS

General Observations:
Arrival time: 9:30 am
Site condition: Site located near UCF, behind greenhouses and materials testing, between two retention ponds, grounds well maintained, e.g. grass mowed, equipment appears to be in good condition.
Weather: sunny, light variable winds, temp approx. 22°C
Site Operators and Sandy Grenville already present onsite when Auditor and rest of Survey Team arrived.

Audit Process:
Eric Hebert informed Site Operators that Keith Halbrook would be auditing the survey process. Survey Team began standard NADP site survey procedures by interviewing Site Operators about current site conditions and their knowledge of equipment.
Survey Team then conducted site survey and inspection of all equipment at site.
When survey was complete a site closure meeting was held and items of issue reviewed w/ Site Operator.

Auditor Observations:
1. Survey Team interface with Site Operators was professional and helpful in determining current condition of equipment.
2. Survey Team proceeded to divide tasks between two surveyors. Having two surveyors onsite provided some confusion about division of tasks.
3. Sandy completed site information, siting criteria, and field lab forms.
4. Eric and Efren completed as-found review and documentation of wet/dry collector and Belfort.
5. Wet/dry collector was found to be inoperable and unplugged from power source.
6. Belfort raingage was found with 2" of water in bucket and was still reading a measurement of below 0".
7. Eric completed necessary repairs on wet/dry collector and Belfort.
8. Sandy worked with Catherine to survey field laboratory process and completed required forms for lab and site supplies.
9. Catherine and Maria dug trench and buried cable for event recorder on Belfort.
10. Keith confirmed that event recorder was operational after installation.
11. Eric and Sandy worked together to complete as-left calibrations on Belfort, confirmed proper wet/dry collector operation, connected battery to wet/dry collector and checked for proper DC operation of wet/dry collector.

12. Survey Team measured 30°and 45° rule conformity for raingage and collector and discussed different methods of measuring angles.
13. Survey Team collected measurements for object table and plan view diagram. Survey technique issue with measurement tape discovered onsite and resolved.
14. Sandy and Eric double-checked site survey forms for completeness.
15. Survey team then reviewed findings with site supervisor, collected their equipment and left the site at approximately 13:00.

Discrepancies:

1. Survey team forgot to pull weekly chart or raise pen arm before as-found audit of Belfort.
2. Belfort gage left at "zero" instead of ~0.5 by survey team.
3. Siting Criteria question 11 was indicated as a "no" for meeting the criteria of no objects >1m high within 5m radius of raingage. Survey team did not indicate in comments section of forms or within spot report exactly what the item in violation was. (Item in violation was 4x4 post on which backup raingage was mounted.)

Follow-up Items:

1. Weekly chart not impacted; error noticed at start of repairs and corrected.
2. Belfort baseline issue noticed by CAL and will be adjusted to ~0.5 by site operator.
3. Siting criteria discrepancy discovered during QA review and resolved via email w/ survey team.
4. Collector bucket heights formerly measured using 1/10 of a foot increments will be converted to inches. Eric and Maria will fix previous entries in database impacted by change.

Summary:

Survey team completed a successful survey of FL32 NTN site. Survey Team and Site Operators worked together to complete a full review of site equipment and accomplish equipment repairs within a short amount of time. Having two surveyors onsite gave opportunity for each one to critique the other's technique and establish best practices.

Keith Halbrook
QA Manager

4/1/09
Date

NADP Site Survey Questionnaire

Site ID: FL32
Site Operator Name: Efren Vazquez
Date Questionnaire Completed: 2/13/09
by Catherine Johnson

Please circle your response or add comments in the space provided:

1. Were you contacted prior to the survey visit? (YES) NO
2. Was the survey date/time scheduled with you with ample time to prepare for the surveyors visit? (YES) NO
3. Did the surveyor arrive on the date/time as scheduled? (YES) NO
4. Was the surveyor prepared to survey the site and answer questions related to the survey process? (YES) NO
5. Did the surveyor explain any deficiencies found during the survey? (YES) NO
6. Did you receive any helpful advice or training from the surveyor during the survey? (YES) NO
   a. If so, what was the most helpful information provided:
   ① care of rainguage ② calibration of rainguage
   ③ technique pointers
7. Did the surveyor follow up with you if answers/information were not available on the date/time of survey? (YES) NO
8. Was the surveyor professional and courteous during his/her visit? (YES) NO
9. Did the surveyor provide you with a report outlining the survey findings within two days following the site visit? (YES) NO
10. Are there any other comments that could help the survey team provide NADP with better service in the future?
    Excellent team approach - I feel that our staff understand more about the process & will provide better samples

Thank you for your time and input to help us better serve you and the NADP.

Quality Assurance Audit Report

Sites: IL11, NTN, MDN, AirMoN- Bondville, IL
Date Audit Conducted: 08/10/2009 and 08/11/2009
Auditor: Keith Halbrook
Survey Team: Eric Hebert, Sandy Grenville, Scott Dossett
Site Operators: Clyde Sweet, Michael Snyder, David Gay (Clyde Sweet was on site for audit. Spoke with Michael Snyder on 8/12/2009 during CastNet Audit.)
Observer: Maria Jones, EEMS

This was the second Quality Assurance Audit of the EEMS Site Survey Team. The first audit took place at FL32 on February 10, 2009. This was the first audit with all survey team members present.

General Observations:
Arrival time: 8/10/2009-16:55 CST
Finish time: 8/11/2009-14:45 CST
Weather: light winds, low hanging clouds, ~77ºF, sun breaking through the clouds (cool front moving through area made for great weather for this audit)

Audit Process:
8/10/2009
Eric Hebert and Maria Jones started site GPS and pictures. Since the site operator was not present, some confusion existed regarding which sampler comprised which site. Team will proceed with information on sampler and A, B, C, etc. lettering for current purposes. The sampler information was confirmed with site operator the following day.
Equipment mounting was thoroughly checked by Eric.
Weeds and grass around samplers and rain gauges were found to be high and needed to be trimmed.
Sandy on site at 17:25 CST for site overview. Plans were made for next day's activities.
Left site at 17:44 CST.

08/11/2009
Persons on site were as follows: Eric Hebert, Maria Jones, Sandy Grenville, Scott Dossett, Clyde Sweet
Visitors to site were as follows: Matt Layden and Mark Rhodes (9:35 CST)

(7:32 CST) tailgate meeting. Discussed changes in procedures with audit team-good meeting.
NOTE: This site is unique as it is the NADP home site; samples are not mailed to a lab.
The division of the site was as follows:
AirMoN-Scott
NTN-Eric
MDN-Sandy
Maria to help with folders, data, and site sketch

Site operator walked through the site layout: (8:12 CST)
AirMoN- collector is A3, stick gauge A4, 12" Belfort A2 as backup
MDN- collector is B2, OTT gauge, Belfort B3 as backup
NTN- collector is B4, OTT gauge, Belfort B3 as backup
(8:25 CST) Survey team observed/ worked with site operator during sample collection and change out. Procedures and techniques were discussed.
(9:00 CST) Survey teams worked through check list of equipment.
(10:30 CST) All survey team members worked on audit of the new OTT rain gauge.
(12:00 CST) Finalized audit at site and going to Water Survey Lab.
(12:25 CST) Survey team members audited:
Procedures of sample decanting and testing were critiqued and recorded:
Audit of lab scale performed
pH and conductivity tested and equipment calibrated
(14:00 CST) Back on site to make site sketch and measurements
(14:45 CST) Finished with site audit and team members discussed outstanding questions

Auditor Observations:

1. Site condition: Site located in Bondville, IL in a corn field area. Grounds and equipment could use a little more maintenance, e.g. grass mowed, equipment repairs (this is the NADP home site).
2. Survey Team proceeded to divide tasks between three surveyors. Having three surveyors onsite caused some confusion regarding division of tasks.
3. Sandy not feeling good, but is performing well.
4. Must take care not to trip collector during sensor ambient testing. (this may be difficult- but need to get a pre-heat/opening measurement)
5. This site weighs stick gauge sample- not using the gauge stick. Survey team used the stick for audit.
6. Survey Team interface with Site Operators was professional and helpful; determined current condition of equipment.
7. OTT rain gauge audit proved to be helpful and informative for survey team members.
8. Suggested Scott level 12" Belfort inlet.
9. Lab could use some newer pH and conductivity equipment.
10. Lab data for unknown audit sample was good.
11. The survey team measured all objects from a single collector and geometrically calculated the angles and distances from the other collectors to each object to complete the site sketches and object tables.
12. The QA Manager worked with Eric to make an independent measurement with the compass and tape measure from the MDN collector to compare with the calculated measurements from the one point method.
13. The measurements and differences are presented in Table 1 below. It appears as though the distances are within one meter with an average of less than 0.5 meter, which is within the precision of the range finder used during the survey. The average of the differences between the angle measurements is less than one degree with a maximum of 5 degrees.

Table 1. Comparison of Object Table Differences

Object	Measured by QA		Measured by Survey		Difference	
	Angle	Distance	Angle	Distance	Deg	Meter
AIRMON ACM	138	7.3	143	8.1	-5	-0.8
AIRMON BELFORT	84	4.6	84	4.91	0	-0.31
BELFORT	180	5.25	180	5.8	0	-0.55
NTN ACM	180	10.6	180	11	0	-0.4
NTN N-CON	161	16.35	162	16.85	-1	-0.5
OTHER ACM	180	20.65	180	21.36	0	-0.71
OTT PLUVIO	205	11.3	205	11.76	0	-0.46
STICK GAUGE	151	11.6	154	11.83	-3	-0.23
UVB	229	8.2	228	8.5	1	-0.3
average difference					-0.89	-0.47

Discrepancies:

1. Site operator needs to check expiration dates on pH and conductivity standards, and record each time of use.
2. Some confusion on the site equipment primary and backup rain gauge layout still exists.

Follow-up Items:

1. Need to communicate with Mark Rhodes on collector sensor testing- insulated vs. shaded.
2. May suggest team member purchase a laser measuring device (works well and is faster).
3. Need to make a site picture check list for survey team members to keep in their folders.

Data Folders and Files:

1. QA check of one point site sketch method was within the precision of the range finder used during the survey when compared to site sketch done by Keith and Eric using a tape measure and compass. (See table 1)
2. Some common data that was transferred to the different site forms at a later date was found to have typos compared to field electronic data and hard copies.

Summary:

Survey team completed a successful survey of IL11 NTN/MDN/AirMoN site. Survey Team and Site Operator worked together to complete a full review of site equipment, accomplished equipment repairs, and performed an audit of lab procedures within a short amount of time. Having three surveyors onsite gave opportunity for each one to critique the others' technique and to brush up on proper survey audit procedures and standardize the procedures used.

The internal QA audit of the site survey team continues to be a useful tool for improving the survey techniques and procedures. The observations made and the notes obtained while the survey team members shared experiences gained through previous surveys will be incorporated into the annual revisions of the Standard Operating Procedures and QAPP. The excellent communication and cooperation between the individual survey team members and the EEMS QA team demonstrates an effort to improve the survey program and meet the needs of the NADP.

_____ _____

Keith Halbrook Date
QA Manager