Minutes of the Meeting of the Subcommittee on Network Operations
National Atmospheric Deposition Program
Monday, August 27, 2001

Hawthorne Suites Hotel
Champaign, IL

John Shimshock called the meeting to order at 8:15 am.

The meeting agenda is provided in Attachment A and a list of meeting attendees is provided in Attachment B.

In a review of agenda items, Van Bowersox noted that Jerry Price of ETI Inc. has submitted an unsolicited proposal for a prototype retrofit of Belfort rain gages as a potential upgrade of network equipment. A copy of the proposal was made available to NOS attendees.

Agenda Item 1, ATS external site audit progress and results, John Shimshock, ATS Inc.

John Shimshock indicated that in the 2001-2002 audit cycle, all but 30 NTN sites will be visited. The current ATS contract ends in 2002 with future inspections pending contract rebidding processes. ~50% of MDN sites will be visited by the end of 2001.

John provided a summary of site compliance with the following four selected siting standards

- Vegetation height > 0.8 m
- Object height > 1m
- 45^{o} rule for encroaching objects
- Distance between gages < 5 m

The table below indicates the percentage of sites visited in the 1998-99 audit cycle and 2000-2001 audit cycle that had siting violations for these criteria.

	98-99	2000-2001
Veg. Height	27% violation	23%
Object > 1m	48%	50%
45^{o} rule	13%	16%
< 5 m separation	21%	21%

Discussion
Joel Frisch indicated site sponsors need more detailed info on what violations are present at their sites. John Shimshock indicated ATS data is in Microsoft Access database and this presents no systematic barriers to broader dissemination. Terry Wade, NYDEC, indicated the NY state network gives a time limit to site engineers for compliance with violations. Rosemary Wolfe, USEPA in response to Joel's comment indicated the audit data belongs to public, not proprietary and can be given broader dissemination. Van Bowersox, ISWS indicated the site sketches which detail siting criteria violations are going out as a feedback mechanism to site supervisors. Mark Nilles suggested the feedback to site sponsors and supervisors need more specifics, deadlines and consequences for inaction. John Shimshock indicated pictures are now taken of violations

- ***Joel Frisch made the following motion – "NOS chair will appoint an ad-hoc group to address the old working list of site violations, the new violation list and specifics regarding the current siting criteria and make recommendations at the Spring meeting, 2002 on how to facilitate change. A second ad-hoc group will review the siting criteria specifics and make recommendations on any needed changes to these specifications.***

The motion passed.

The first committee to examine current siting violation issues and present deliverables at the Spring 2002 meeting is chaired by Joel Frish with members Scott Dossett and Preston Lewis
The second committee, to provide a progress report on an evaluation of the overall siting criterions is chaired by Gary Stensland with members Rick Artz, Natalie Latysh, and John Shimshock.

John Shimshock then continued his presentation with results on Belfort rain gage performance.

In the 1998-99 audit cycle of sites examined pre-calibration raingage tests indicated:
90 (47%) of 191 gages passed
101 (53%) of 191 gages failed criteria
Following on-site calibration:
186 of 191 gages passed calibration
5 of 191 could not be calibrated and were put on priority for replacement

In the 2000-2001 round of inspections:
6 sites were not examined
30 sites were first time for ATS
127 sites were re-visits by ATS

Examining just the 127 rain gages that had been calibrated previously by ATS in earlier audits:
75 passed (60%) 75/127
52 failed (41%) 52/127

Van Bowersox noted that the percentage of gages that pass is much higher for the first several inches of precipitation. This amount covers the vast majority of weekly precipitation events in the U.S. Van mentioned that the detailed calibration and recalibration data is available via spreadsheets at Program Office

John Shimshock concluded with the rain gage status at conclusion of the second round of audits and following all recalibrations:
154/157 passed
3/157 were provided immediate replacement
18/157 had elements that were substandard and were flagged for eventual replacement

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Agenda Item 2, Siting violation package and summaries, Scott Dossett, ISWS

- The Program office recently completed an analysis of siting violations that focused on the 45°,impingement rule and on objects that are closer than 5-meters from collector or rain gage.
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- Sketches were made in Adobe Illustrator format and mailed out to operator, supervisor and sponsor. The sketches showed violations in red with a request for action.
- Sketches that showed 45° violations were mailed to 34 sites
    - 17 sites responded
    - No action could be taken at 4 sites
    - The violation was corrected at 9 sites
        - 8 removed trees
-
- The next mailing will cover sites in violation of the 5 meter obstruction criteria:
    - Posts and fences are a common reason for this violation as well as solar power systems

Motion – Dossett

Siting criteria violations for objects within 5 meters of the wet bucket orifice be given a "grace" allowance of 0.5 meters for the purposes of administrative follow up and correction actions. (John Gordon seconded the motion)
A move to table the motion failed by a vote of 6 15

Discussion:
Van Bowersox noted that the practical implication of the motion would be that the Program Office wouldn't pursue changes for objects located 4.5m to 5.0m from NADP instruments.

The motion passed

Scott then brought up the issue of adherence of collectors to the collector orientation criteria of 270 degrees. Scott noted that 72.2% of collectors are orientated within a window of 255 to 275 degrees. Luther Smith noted that some collectors are exempt from the orientation specification due to previous appeals based on prevailing wind directions.

Motion
By Scott Dossett – That any orientation of collector from 225^{o} to 315^{o} be considered as meeting the collector orientation criteria standard and that a wet-bucket orientation should be standard for the preparing of administration follow up and corrective action.
2nd – Luther Smith

The motion passed

Agenda Item 3, Siting issues at potential new NTN sites, Scott Dossett, ISWS

Scott Dossett then introduced the topic of potential new NTN sites with siting problems. Scott requested NOS guidance on these issues at the new sites

Issues center on the Virginia Department of Natural Resources. They would like to have three sites join NADP-NTN. Two sites, at NASA Langley and Rock Bridge have issues with equipment separation, concrete pads, and fences. The site at Occoquan is located at a wastewater treatment plant.

Preston Lewis asked what are the criteria for needing new NADP sites; perhaps more variability in the eastern U.S. is due to precipitation amount, not chemical concentration? The committee responded that sites are not restricted from admission to NADP as long as siting issues are met and sponsors agree to NADP funding and operational issues.

Scott then described another new potential site in Washington State, Columbia River Gorge that meets all criteria with the exception of its proximity to an urban area.

Motion Accept WA98 – Columbia River Gorge sole exemption of urban proximity to Portland (2nd by Mark Nilles)
Motion carries unanimously

Motion – Scott is advised to communicate with Virginia DNR requesting their application package on Rock Bridge and NASA Langley and indicating all siting criteria must be met. They should be advised that the site at Occoquan would require a major site relocation prior to being considered for inclusion to the network

Motion Passed

Agenda Item 4, Documentation, Scott Dossett, ISWS

Scott Dossett then went on to describe needed changes to the NTN site info worksheet and plans to edit the site selection and installation manual.
Scott has noted inconsistencies between the site operators manual, especially with regards to the definition of the instrument and site "footprint". Scott indicated that no local or regional siting criteria would be changed to improve clarity and consistency. He also noted that if the site footprint size is interpreted most rigorously, an area larger than ½ of a football field would require operator maintenance.

Motion – Van Bowersox

> ***NOS approves revisions to Section 3 and Appendix A of the site selection and installation manual to achieve consistency and clarity with other documents. Scott Dossett seconded the motion***
>
> ***Motion passed***

Agenda Item 5, U.S. Fish and Wildlife Service Video Kristi Morris, USFWS

Ms. Morris presented a short video on air quality research and monitoring at the USFWS. The video included a section on NADP monitoring on USFWS lands. Highlights of the video included scenes featuring long-time NADP participant Ellen Porter.

Agenda Item 6, Program Office Report, NTN and AIRMoN, Van Bowersox, ISWS

- NTN currently has 231 operating sites – Two new sites have been added since spring '01, (near Mobile AL), with no sites closed recently.
- 22 sites have collocated MDN/NTN collectors
- At risk sites include: Maryland MD03. The current private sector sponsor may discontinue operation. The site sponsor and the program office is working with County and Chesapeake Bay research and monitoring organizations for new sponsorship
- TX38 is also at risk of closing due to equipment and other issues involving International Paper and Texas state government.
- Pending new NTN sites include 6 National Estuarine Program sponsored sites, 2 tribal sites, and 1 site sponsored by Missouri University
- AIRMoN – 10 sites currently operating.

Agenda Item 7, Central Analytical Laboratory Report, Karen Harlin

- The NADP-CAL web site is now on-line and active
- An NADP slide show developed by Scott Dossett to brief potential new sponsors is available
- The site operator-training course is scheduled for May 1-3, with 30 operators enrolled.
- The 1999 NTN database included: 80% w-type samples, 9% trace samples, 8% DA samples, 4% WA samples, 1% dry
- 1999 data – 92% of weeks had no data contamination qualification, 6% had a contamination code, 1% had gross field contamination
- 2000 data – 93% of weeks had no data contamination qualification, 7% had a code.

- Bag blanks testing revealed a quality criteria violation in May 01 for a lot of recently received bags. In response, the CAL started single-bagging buckets and lids to save on "known good" bags and ordered new bags from their custom supplier. The pH and conductance was always OK the problem was with small amounts of Cl- and NH4+ in bucket blanks coming from the bag source.

- A new M.S. Level chemist is in training at the CAL
- The lab purchased new IC auto sampler – this reduces sample volume requirements.
- The lab is looking at new instrumentation for base cation analysis – this would further reduce sample volume requirements.
- Karen noted the NTN and AIRMoN data are on schedule
- Effective immediately, review comments are being added to CAL sample database resulting in less paper records.
- The new site information database is online
- The 1999 CAL QA report is published

- Under the topic of CAL research;
    - The CAL continues to prepare the WMO/GAW QA samples
    - "Old" archive samples continue to be sent to external investigators
    - Method testing for determination of organic and total N is underway
    - Special studies are underway looking at organic acids, sulfite and nitrite in AIRMoN samples

Agenda Item 8, External Quality Assurance Results for NADP-NTN John Gordon, U.S. Geological Survey

- John Gordon reported that for the blind-audit and field blank studies in 2000:
    - Results indicated very low systematic error introduced from field exposure and field sample handling
    - For the network, systematic error from field sources was less than 5% for all analytes
    - Results in 2000 were slightly better than in 1999
- John then reported on laboratory quality assurance results:
    - CAL ranked highly in the intensive, 7 lab intercomparison
    - CAL ranked #1 of 7 labs for sulfate for replicate sample analyses
    - The CAL had very few data outliers for quality assurance samples
    - The CAL had no analyses above detection limit for analysis of blank water
    - The CAL had the lowest median and 90th percentile absolute differences for analysis of replicate samples for most analytes
    - John noted that lab error is significantly lower than field error
- John then reported on overall network precision from the Collocated Sampler Study
    - The program measures overall variability in the network methodology
        - CO08 and NH02 were the collocated sites in 2000
        - Uncertainty is higher for deposition versus concentration due to the additive uncertainty that the rain gauge introduces
        - Sample volume from collocated Aerochem collectors is in better agreement than precipitation depth from collocated Belfort rain gages.
- Results from the Intersite Comparison for field measurements
    - The last solution sent to operators was 4.98 pH. The pH range of QA samples are rising as the network pH goes up. Higher pH is more challenging for site operators.
    - 90% of site operators passed pH in the latest testing round
    - 97% passed specific conductance in the latest evaluation.

The meeting was adjourned for the day

Day 2 NOS Meeting, 8/28/01

Agenda Item 9, Election of NOS Secretary

Kristi Morris, USFWS nominated Natalie Latysh, USGS for NOS secretary.

The motion received a 2nd and Ms. Latysh was elected incoming NOS Secretary by a unanimous vote. Her term begins at the spring 2002 meeting in May.

Agenda Item 10, Network Modernization

A. Precipitation gage testing at the National Weather Service

- Rick Artz, NOAA indicated that the National Weather Service is upgrading recording rain gauges in their networks. Information has been hard to come by due to contracting/procurement issues.

B. ETI Inc. proposal for retrofitting Belfort gages with load cells

- Van Bowersox distributed a handout that described a proposal for a ADM II recording rain gage retrofit put forward by ETI Inc. Jerry Price at ETI proposes to have a rain gage integration with a wet deposition collection. ETI indicated that if NADP would provide a Belfort rain gage, he would replace the mechanism with a load cell and Campbell data logger making the gage all electronic. He would also incorporate his optical precipitation sensor in the design to replace the AeroChem sensor for precipitation detection. The proposed data to be recorded would be the rain gage signal from the load cell and particle counts from the optical sensor. Mr. Price would like to know what other parameters are needed by NADP to be recorded. An estimated cost for each retrofit would be les than $4K.
- Van Bowersox provided some data on an optical sensor driven ACM versus standard ACM sensor: The only difference is the sensor; both are driving AeroChems at the ISWS experiment.

  Optical sensor on AeroChem -0.7% difference from stick gage
  Regular AeroChem sensor -9.2% difference from stick

Motion: by Scott Dossett, seconded by Van Bowersox, "Have NOS chair appoint an ad-hoc group to provide Jerry Price with additional parameters for data logging Chair of the workgroup is Scott Dossett, members are Dennis Lamb, Rick Artz and Mark Nilles

The motion passed

C. Report on ISWS rain gage testing

Van Bowersox provided some preliminary information from the testing of the two Ott Pluvio precipitation gages at the ISWS. Key findings included;

- The Ott Pluvio agrees with the collocated stick gage within <1%
- The collocated Belfort gage was 10% low relative to the stick gage.
- For both Parametric and non-parametric tests
  - The Ott = stick
  - The Belfort ≠ stick
  - Ott #1 = Ott #2
- Distribution of the differences of the Ott versus stick had a median of 0.0 and were normally distributed
- The Belfort gage had greater variability and was biased low
- Antifreeze in the Ott gage appears to cause false positives, potentially by water absorption
  - A salt solution does not exhibit the false positive problem, but salt at NADP sites could contaminate samples and the whole site in general
  - Oil and antifreeze mix greatly reduced the Ott false positives versus antifreeze alone.
- Testing is now underway on a Geonor gage
  - For a 10 event record – Geonor was somewhat biased low relative to the Ott and biased high relative to the Belfort

D. Progress report on N-Con deposition sampler testing, Scott Dossett, ISWS

- Scott Dossett conducted freeze down testing of the N-Con sampler in a freezer. He indicated he could not get instrument to freeze closed even when entire unit was covered with ice.

- In splash tests the N-Con exhibited much less splash than the AeroChem. The lid splash shield did transfer some dye to rim of the bucket and the vendor has subsequently redesigned the splash shield.
- The redesign of the lid has caused more problems – the lid is scraping on lid holder
- Three weeks of data are available with the sampler unplugged to evaluate ability of the lid seal to keep out contaminants
    - N-Con was installed at Bondville and left unplugged for three weeks
    - Analysis of the N-Con "dry" buckets were similar to AeroChem dry buckets
    - HOWEVER, on week three, the N-con lid flipped over in heavy winds and the sample bucket blew out. N-Con has added a bucket holder clip to the design.
- Notes on the N-Con sensor
    - Sensor orientation is important. Sunlight causes sensor failure in mis-orientated collectors
    - Spiders and bugs on the optical detector can be a problem with the optical sensor
    - Sensor exhibited good sensitivity with various types of precipitation
- Summary comments from Scott Dossett on N-Con design
    - General assembly and craftsmanship is acceptable.
    - Lid mechanism is not sufficient. Lid position control still needs work.
    - Primary driving and switching systems work well.
    - Extensive shakedown tests have resulted in improvements.

- Future needs
    - GFI power cord
    - Dual AC/DC power supply.
    - MDN design
    - Recommend Phase II backyard testing of wet deposition with chemistry
- Scott handed out a table that indicated how closely the N-Con NTN design meets the NOS specifications for a new collector

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Mark Beaubien of YES Inc. presented an update on activities at YES for development of a new wet deposition sampler. YES is the recipient of NOAA, SBIR Program funding for developing a new sampler. In addition to phase I funding, YES Inc. has received 2 year funding $150K/year from NOAA phase II SBIR

- The new sampler design is modular – scalable design
- Plan is to use Phase II to integrate a datalogger with the sampler
- Infrared data transfer and programming/software updates
- YES has a patent application submitted for an optical sensor.
- The sampler development is an in-house design effort for 2 years
- MPS is YES's internal acronym for the project It stands Modular precipitation sampler

Agenda Item 11, AIRMoN Orthophosphate data, Jane Rothert, ISWS

Jane reported that although only 6% of NTN samples have PO_4^{3-} concentrations above reporting levels, 48.8% AIRMoN samples have PO_4^{3-} levels above reporting limits.

- ***Motion: Jane Rothert moved that NADP should publish the AIRMON orthophosphate data on the NADP website .The motion was 2nd by Scott Dossett and the motion passed***

Agenda Item 12, Update on the Mercury Deposition Network sampler, Clyde Sweet, ISWS

A technical issue has arisen with the MDN sampler chimney design. This is where the funnel is placed on the MDN sampler. Problem – wind can lift the funnel and disconnect the sampling train and also rain can run under the funnel through the sampler vent holes. A Chimney cap has been designed to fix the problem and side-by-side testing at ISWS on going. Results look promising and the committee will likely be asked at a future meeting to consider adopting the design change.

Agenda Item 13, Network Equipment Depot, Scott Dossett, ISWS

- Scott reported the typical winter spike for motor boxes replacements
- No sample loss has occurred due to component shortages. It's not obvious if the frequency of repairs is decreasing due to component improvements.
- Future:
    - Scott continues to examine replacement options for items only provided by AeroChem.
    - Loda Inc. is being used and recommended for procurement of new collectors for new NTN and MDN sites

Agenda Item 14, Results from Phase I and Phase II testing of all weather rain gages. John Gordon, USGS

Phase I

- Four new gages were evaluated against the existing network gage and the NWS stick gage. The new gages evaluated were the Ott Pluvio, Geonor T-200, ETI NOAH II, and the Belfort 3200
- Phase I testing consisted of lab-bench testing with controlled volumes of water
    - Belfort 3200 exhibited low bias and large variance in measuring the mass of known volumes of water
    - Belfort 5-780 exhibited low bias and low variance
    - Geonor T-200 exhibited low bias but larger variance
    - ETI Noah II exhibited low bias low variance, with a few outliers
- The Ott, ETI, & Belfort 5-780 gages worked well over the range of 0-9" of simulated precipitation
- The Geonor &Belfort 3200 had significant problems over this range
- No differences were noted between the pairs of same gauges.

Phase II

Phase II outdoor single site testing at Bay St. Louis, MS versus stick

- Belfort 5-780 low bias
- Geonor low bias increased variability
- Ott, low bias, low variability

John provided a summary ranking based on absolute performance of the gages and a ranking based on ease of use. The ETI gage came out on top for ease of use while the Ott had the best performance. John noted a three-wire transducer upgrade is available for the Geonor, which may increase performance. In relation to the current gage, John considered the Geonor, Ott and ETI gages to be suitable gages and improvements over what we have. For these three gages difference in rain gage shielding is likely a much larger source of error and variability in relationship to the difference between the performances of the gages.

Performance Rank:	Ease of Use:
Ott	ETI
ETI	Ott – Tied for 2nd with Geonor
Geonor	Geonor – Tied for 2nd with Ott
Belfort 3200	Belfort 3200

Attachment A

NADP – Summer 2001 Network Operations Subcommittee Meeting

August 27 through 28, 2001 – Final Agenda

Monday August 27, 2001 – Network Operations Subcommittee

Time	Agenda Topic and Presenter(s)
< 0800	Breakfast – on your own
0800	Morning coffee
0815	Introduction and sign-in of attendees; agenda review – John Shimshock
0830	ATS External Site Survey / Audit Report – Part I – Progress Update and Summary Statistics - John Shimshock
0900	ATS External Site Survey / Audit Report – Part II – Recommendations to the U.S. EPA to report audit findings to the NOS – John Shimshock, Joel Frisch et al.
0915	ATS External Site Survey / Audit Report – Part III – Follow-up to the report audit findings – actions to be undertaken and schedule to implement such actions – John Shimshock, Joel Frisch, Scott Dossett et al.
1000	30-minute break
1030	Possible new sites with some siting problems – Scott Dossett
1100	Changes to NADP/NTN Site Information Worksheet and plans to edit the Site Selection and Installation Manual – Scott Dossett
1130	Fish & Wildlife Service "Air Quality" video – Kristi Morris
1200	1-hour, 30-minute lunch break
1330	CAL Report – Karen Harlin
1430	USGS External QA Report – Part I – John Gordon Includes (i) Blind Audit Program, (ii) Field Blank and Reference Sampler Program and (iii) Interlaboratory Comparison Program
1530	30-minute break
1600	USGS External QA Report – Part II – Natalie Latysh Includes (i) Collocated Sampler Program and (ii) Intersite Comparison Program
1700	Adjourn

Tuesday August 28, 2001 – Network Operations Subcommittee

< 0800	Breakfast – on your own
0800	Morning coffee
0815	Introduction and sign-in of attendees; agenda review – John Shimshock
0830	Progress update – modernization of sampling hardware and new instrument developer – Rick Artz and Van Bowersox
0930	Progress update – experiences with the N-CON precipitation sampler – Scott Dossett and Van Bowersox
1000	Progress update – experiences with the Ott-Pluvio rain gauge – Van Bowersox and Scott Dossett
1015	30-minute break
1045	Network equipment depot (NED) report – Scott Dossett
1115	AIRMoN - orthophosphate data – Jane Rothert
1130	Late agenda items
1230	Adjourn for 1-hour 30-minute lunch
Field trip to the CAL	
1730	**Poster Session**

Attachment B, List of Attendees

National Atmospheric Deposition Program
August 27 - 30, 2001 Network Operations Subcommittee

Artz, Richard	NOAA - Air Resources Lab
Bachman, Sue	Illinois State Water Survey
Banwart, Wayne	University of Illinois
Beaubien, Mark	Yankee Environmental Systems, Inc.
Bergerhouse, Thomas	Illinois State Water Survey
Birnbaum, Rona	USEPA Clean Air Markets Division
Bowersox, Van	Illinois State Water Survey
Claybrooke, Roger	Illinois State Water Survey
Cline, Richard	USDA Forest Service
Cornelius, Wayne	NC Dept of Environment and Natural Resources
Demir, Brigita	Illinois State Water Survey
Dossett, Scotty	Illinois State Water Survey
Douglas, Kathy	Illinois State Water Survey
Dzurisin, Greg	Illinois State Water Survey
Faller, Scott	USEPA
Fringer, Joyce	Illinois State Water Survey
Frisch, Joel	U.S. Geological Survey
Gordon, John	U.S. Geological Survey
Grant, Richard	Purdue University
Harlin, Karen	Illinois State Water Survey
Islam, Tahmina	North Carolina DENR--Air Quality--Air Monitoring
Johnson, Andrew	Maine Department of Environmental Protection
Jones, Daniel	USDA/CSREES
Larson, Robert	Illinois State Water Survey
Latysh, Natalie	U.S. Geological Survey
Lear, Gary	USEPA Clean Air Markets Division
Lewis, Preston	New York State Dept of Environmental Conservation
Lynch, James	Penn State University
Lynch, Malcolm	C. C. Lynch & Associates, Inc.
Malone, Patrick	New York State Dept of Environmental Conservation
Maull, Lee	Dynamac Corp.
McCormick, Kathy	Illinois State Water Survey
Mesarch, Mark	University of Nebraska - Lincoln
Milton, Sarah	Illinois State Water Survey
Morris, Kristi	National Park Service -- AIR
Nilles, Mark	U.S. Geological Survey
Peden, Mark	Illinois State Water Survey
Pribble, Jeff	Illinois State Water Survey
Rothert, Jane	Illinois State Water Survey
Sherwell, John	Maryland Department of Natural Resources
Shimshock, John	Advanced Technology Systems, Inc
Smith, Luther	ManTech Environmental Technology
Sommers, Lee	Colorado State University, Agricultural Experiment Station
Stensland, Gary	Illinois State Water Survey
Sweet, Clyde	Illinois State Water Survey
Tonnessen, Kathy	National Park Service/RM-CESU
Wade, Terry	Texas A&M University
Welker, Jeff	University of Wyoming
Wolfe, Rosemary	USEPA Clean Air Markets Division