Wisconsin State Laboratory of Hygiene
EHD NADP PO GENOP 004
OB Version: 3
Effective: 10/14/2026

Ammonia Monitoring Network
Site Operations Manual

National Atmospheric Deposition Program

For information about the National Atmospheric Deposition Program (NADP) contact:

NADP Program Office
Wisconsin State Laboratory of Hygiene
465 Henry Mall
Madison, Wisconsin 53706

URL: http://nadp.slh.wisc.edu
e-mail: nadp@slh.wisc.edu
phone: 608-263-9162

Document Change History

Version	Description	Effective Date
OB3	Updated CAL to NAL references. Updated equipment to ALPHAs. Updated abbreviations list. Updated outdated forms, figures, and contacts.	10/14/2026
OB2	Scheduled review and terminology updated.	08/2024
OB1	Updated field form, duplicates, OnBase format and versioning	01/2022
3.0	Updated contact information to Wisconsin State Laboratory of Hygiene.	05/2019
1.4	Added Change History table Updated text in *Site Operation* and *FAQ* sections for extended duration samples. Updated FAQ to include statement about special studies. Changed “bi-weekly” to “every 2 weeks”, for clarity. Clarified participation in external Site Performance and Systems survey program.	01/2017
1.3	Initial document	03/2015

Abbreviations

AIRMoN	Atmospheric Integrated Research Monitoring Network *(no longer operating)*
AMNet	Atmospheric Mercury Network
AMoN	Ammonia Monitoring Network
CAL	Central Analytical Laboratory *(no longer used)*
CASTNET	Clean Air Status and Trends Network
FOF	Field Observer Form
FORF	Field Observer Report Form
HAL	Mercury (Hg) Analytical Laboratory *(no longer used)*
MDN	Mercury Deposition Network
MLN	Mercury Litterfall Network
MOF	Mercury Observer Form
NADP	National Atmospheric Deposition Program
NAL	NADP Analytical Laboratory
NED	Network Equipment Depot
NTN	National Trends Network
PDA	Personal Digital Assistant
PFN	PFAS – NTN Subnetwork
PO	Program Office
QA	Quality Assurance
QC	Quality Control
SAES	State Agricultural Experiment Stations
SOP	Standard Operating Procedures
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WSLH	Wisconsin State Laboratory of Hygiene

Introduction

The Ammonia Monitoring Network (AMoN) became an official network within the National Atmospheric Deposition Program (NADP) in the fall of 2010. A goal of this network is to establish a consistent, long-term record of atmospheric ammonia concentrations across North America.

Following review of the data for completeness and accuracy, data are made available on the National Atmospheric Deposition Program (NADP) website. Data are flagged for equipment failure, sample mishandling, and contamination. A map indicating active and inactive AMoN sites is available on the NADP website, as is the complete data record for each site in the network.

Quality Assurance/Quality Control (QA/QC) activities ensure integrity throughout the network. The U.S. Environmental Protection Agency (US EPA) administers an external QA program as additional oversight of the network and its operation.

NADP Site Selection and Site Re-location

Sites are selected to quantify concentration and deposition in major physiographic, agricultural, aquatic, and forested areas within states, regions, and ecoregions. Sites are located away from urban areas and point sources of pollution, e.g., coal-fired power plants and large animal operations. Siting criteria are presented in detail in the *NADP Site Selection and Installation Manual*. That document is available on the NADP website (http://nadp.slh.wisc.edu).

Should a site need to re-locate, the site sponsor should contact the NADP Program Office (PO) to ensure that the new location meets NADP siting criteria. Additional information regarding site re-location is available in the *NADP Site Selection and Installation Manual*.

Approved Equipment

Table 1 lists the equipment that has been approved by the NADP for use in AMoN. Periodically, equipment is tested and evaluated for inclusion in the network. Additional information on the procedures for evaluating and approving new equipment is available on the NADP website. The NADP website should be consulted for the most current list of approved equipment. Questions regarding the list of approved equipment may be directed to the Site Support contact for the network. Contact information for each of the manufacturers, Site Support, and for the NADP PO is included in the Contact List section of this document.

Table 1. NADP Approved Equipment for use in the AMoN

Equipment	Manufacturer	Model Number
Passive sampler	UK Centre for Ecology & Hydrology	ALPHA (Adapted Low-cost Passive High Absorption)*

passive sampler for light sensitive compounds	Radiello	120-1

*Current equipment in use for the network.

Site Operation

Four entities have direct responsibility for the operation of a monitoring site: the Site Sponsor, the Funding Agency, the Site Operator, and the Site Supervisor. The individuals in these roles are responsible for the operation of the site in accordance with standard AMoN procedures and criteria.

The Site Sponsor may provide in-kind services for the operation of the monitoring site. This may include: site location, site facilities, and/or a site operator. The Funding Agency provides funds for the operation of a site. This may include: equipment, personnel, sample analysis, shipping, and other expenses related to operation of the site. In some cases, the Site Sponsor and the Funding Agency are the same.

Tables 2 and 3 indicate the responsibilities of the Site Supervisor and the Site Operator, respectively, and the frequency of those activities.

Table 2. Responsibilities of the Site Supervisor.

Activity	Frequency
Ensure conformance with AMoN procedures	as needed
Ensure conformance with AMoN siting criteria	
Arrange for resources to correct problems	
Review site data	monthly
Review data reports and summaries	annually

It is recommended that each site identify a Backup Operator. The Backup Operator performs Site Operator duties when the Primary Operator is not available.

Excluding travel to and from the site, normal activities associated with operation of the site may take approximately 30 minutes to complete.

In order to maintain uniformity throughout the network, the sampler should be processed every other Tuesday morning as close to 9:00 am as possible. Inclement weather and the availability of personnel during holidays may prohibit the sample from being processed on this schedule. To account for such instances, the network allows samples to be processed early, or up to 360 hours (15 days) after the sampler was deployed. If a sample is collected early, the Site Operator should pay particular attention to the time that the subsequent sampler is deployed.

The quality rating code of samples that exceed 360 hours in duration is downgraded. Samples that are deployed between 360 hours (15 days) and 720 hours (30 days) are considered valid, but

receive a quality rating code of B. Samples that are deployed more than 720 hours (30 days) are considered invalid, and receive a quality rating code of C.

Table 3. Responsibilities of the Site Operator.

Activity	Frequency
Inspect site	once every 2 weeks*
Inspect and clean AMoN shelter	
Collect and process sampler(s)**	
Deploy new sampler(s)**	
Complete AMoN Field Form	
Ship sampler and field form to the NAL	
Replace/upgrade equipment	as needed
Participate in External Site Performance and Systems Survey (for sites that are collocated with either NADP wet-deposition or CASTNET)	once every 3-4 years

* Every other Tuesday morning, according to the AMoN deployment schedule.
** At random, duplicate samplers will be deployed for QA purposes.

This document does not address safety issues that may result from the operation and maintenance of a monitoring site. It is the responsibility of the site operator and the site supervisor to determine regulatory requirements, and establish appropriate safety protocols.

Activities Performed Once Every Two Weeks

As indicated in Table 3, some activities associated with the operation of an AMoN site must be performed every 2 weeks. The schedule for completing these tasks is defined for the network as a whole, and is documented in the NADP Calendar and in preliminary data reports sent by the NADP Analytical Laboratory (NAL). Detailed instructions for these activities are included in the Standard Operating Procedure (SOP) titled *AMoN Sampler Change-out*. That document is available from the NADP website. On-line video instruction materials detailing these same activities are also available on the website.

Field Observer Report Form

When processing the sampler, an AMoN field form should be completed. Figure 1 illustrates that form. The Site Operator, i.e., the person processing the sample, should complete Blocks 1-5 on the form. Incomplete forms require additional resources to process, and require a phone call to the Site Operator to gather the missing information. It is recommended that the Site Operator verify that the form is complete and that the information is legible before sending the form, and the sampler, to the NAL.

NADP

AMMONIA MONITORING NETWORK (AMoN)

Send Completed Form with Each Sample Set to:
NADP Sample Receiving
465 Henry Mall, Madison, WI 53706

1. SITE NAME NADP Program Office Site — P O O 1 (SITE ID)

2. OBSERVER NAME NADP Site Liaison — N S L (Initials)

3. SAMPLE START AND END

	Date MO	DAY	YR	Time (24 hour) 0001-2400
ON	09	08	26	0922
OFF	09	22	26	1223

4. SITE CONDITIONS *Please check conditions that apply. Comment on any other site conditions in Block 5.*

YES$_2$ NO$_1$

- ○ ● 1. Significant smoke or fire
- ○ ● 2. Fertilizer use nearby
- ○ ● 3. Farm animal activity nearby

5. REMARKS *For example: equipment malfunction, contamination, farming, burning*

Raining until 12 pm on 9/22. Changed sample after rain event ended.

LAB USE ONLY

Questions? Call 1-800-952-7353 or E-mail amon@slh.wisc.edu

White Copy: Return to NAL **Blue Copy:** Retain for Your Records

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Figure 1. Example of a completed AMoN field form.

Non-standard Operation

In some instances, it is necessary to operate in a non-standard mode (e.g., extended duration sampling). This should be noted in Block 5 **Remarks** of the AMoN field form.

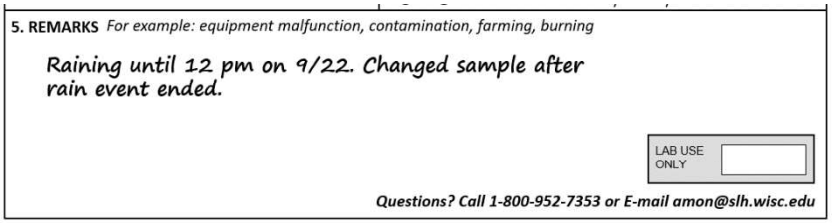


Figure 2. FORF Block 5 indicating extended sampling period.

Field Chemistry

Field chemistry is not part of the standard procedures for the AMoN.

Other Activities

Some activities associated with the operation of an AMoN site are performed less frequently than every two weeks, as described earlier in this document. For example, the NAL may provide duplicate samplers for deployment during a sampling period. Deployment of duplicate samplers occurs on a scheduled basis.

Training

In addition to this manual, it is recommended that those responsible for the operation of a site read the document *NADP Site Selection and Installation Manual*. That document describes the NADP siting criteria and is available from the NADP website. On-line training videos for the AMoN are available. Training materials are available on the NADP website (http://nadp.slh.wisc.edu/siteops).

Troubleshooting

AMoN uses passive samplers. As there are neither mechanical nor electrical parts, troubleshooting should not be required.

Field Quality Assurance Program

Two types of QC samples, travel blanks and duplicate samplers, provide field QA within AMoN.

A travel blank sampler is shipped with the passive sampler(s) on a scheduled basis. The travel blank sampler must remain sealed in its glass bottle at all times. This includes: shipment to the site, while at the site, and shipment back to the NAL.

Duplicate samplers are shipped to AMoN sites on a random basis. They help assess the precision of the sampling protocol.

Site Performance and Systems Survey

The U.S. EPA sponsors an external, independent survey of sites in the NADP networks. AMoN sites that are collocated with either an NADP wet-deposition site or a Clean Air Status and Trends Network (CASTNET) site are surveyed once every 3-4 years by an independent survey team. The survey team will contact the site approximately one month prior to their visit to schedule the survey.

Weather permitting, the survey team will:

- document site information
- document compliance with siting criteria
- photograph the site
- verify conformance with NADP procedures
- answer operator questions
- assist with minor repairs and maintenance

Contact information for the Site Performance and Systems Survey program is available in the Contact List section of this document.

Sites that are not collocated with a NADP wet-deposition site or a CASTNET site are not surveyed by the external review team. In such cases, the site operator is encouraged to submit photos (i.e., each of the cardinal directions, and an overview photo) to the NAL on an annual basis for review.

NADP Website

The NADP website can be accessed at http://nadp.slh.wisc.edu. The website contains the complete data archive for each site in the network, documents relating to the operation of the network, documentation from the site surveys, and a range of data products. Site Operators and Site Supervisors are encouraged to use the website.

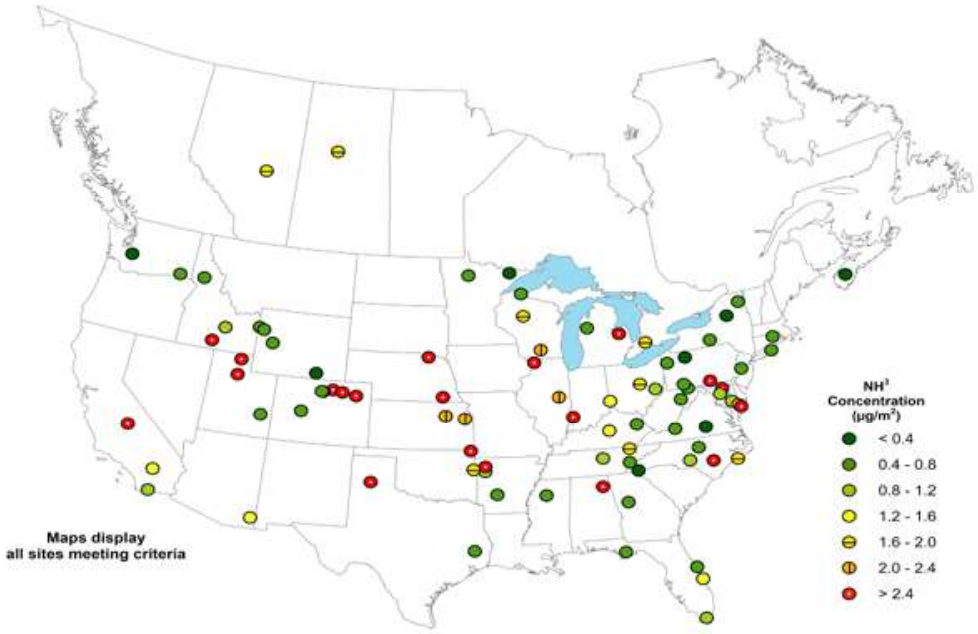


Figure 3. Average ammonia concentrations as measured by AMoN from 2025 Annual Summary report.

Frequently Asked Questions

We would like to start a new site in the network. What do we need to do?

The "NADP Site Selection and Installation Manual" and the "Site Installation Worksheet" are two documents that will help with this process. Both documents are available from the NADP website. Once complete, the "Site Installation Worksheet," with a sketch and photos of the proposed site, should to be submitted to the NADP Program Office for evaluation and determination of acceptance into the network. Contact the NADP Site Liaison for additional information.

We would like to conduct a special study at our NADP site. The study might use NADP equipment. What should we do?

Please contact the NADP PO before proceeding. All special studies at NADP sites require network approval. This is particularly true if NADP equipment (e.g., the dry-side bucket) will be used in the study.

A new operator will start next month and will assume primary responsibility for the site. What should we do?

First, we extend our thanks to the current site operator for all of their efforts operating and maintaining the site.

Next, contact the NADP PO. The PO will need contact information for the new operator. If possible, provide overlap training for the new Site Operator. Provide a copy of this document (the "Ammonia Monitoring Network Site Operations Manual"), and the "NADP Site Selection and Installation Manual." Both documents are available on the NADP website. An on-line training video for the AMoN is available. Training materials are available on the NADP website (http://nadp.slh.wisc.edu/siteops).

I need to re-locate my site. What do I need to do?

The"NADP Site Selection and Installation Manual" includes guidance for site re-location. This document is available on the NADP website. The NADP PO can provide guidance as well. The "move" date for the site must be documented. The funding agency should be notified at the outset, and should be kept apprised as work progresses.

My site will be closing. What do I need to do?

Contact the NADP PO. The final "Date Off" for samples will need to be documented. The PO will discuss the fate of equipment and supplies. Site closure must be done in collaboration with the funding agency.

The sampler is scheduled for change-out and it is raining (or snowing). Should I change the sampler in the rain (snow)?

It is best to change the sampler after the precipitation has stopped. If this is not possible, and if it is safe to collect the sampler, then the sampler may be collected during the precipitation event. Use caution so as to prevent bodily harm, and possible

contamination of the sampler. Indicate in Block 5 of the AMoN field form that the sampler was collected during a precipitation event.

The next scheduled sampler change-out is a holiday. No one will be available to change-out the sampler. What should I do?

When personnel are otherwise unavailable to change-out a sampler on a scheduled date, the network allows the sample to be collected early, or up to 1 day late without impacting the sample's quality rating. Samplers that are deployed between 360 hours (15 days) and 720 hours (30 days) are considered valid, and receive a quality rating of B. Samplers that are deployed more than 720 hours (30 days) are considered invalid, and receive a quality rating of C. If the sampler is collected early, the operator should pay particular attention to the time that the subsequent sampler is deployed. The quality rating of that sampler will be downgraded if, inadvertently, the sampler is deployed longer than 360 hours.

How long should I keep my blue copies of the AMoN Field Form?

Retain the site copies on site for 2 years after submission of samples.

The passive sampler was on the ground, or fell to the ground during change-out. What should I do?

Include a note in Block 5 ***Remarks*** *of the AMoN field form indicating what happened. If the sampler was on the ground for an unknown period of time (e.g, the sampler was found on the ground) then the sample will be invalidated. If the sampler fell to the ground when it was being deployed (or changed-out), and was picked up immediately, the sample will receive a handling code, but may still be valid.*

I am scheduled to change-out the AMoN sampler tomorrow, and I have not received the new sampler. What should I do?

Contact Site Support to verify when the sampler was shipped. They will decide whether a replacement sampler should be shipped. If possible, wait until the new sampler arrives before collecting the deployed sampler.

I received a travel blank. What should I do with it?

Leave the travel blank sealed in its glass bottle and store the shipping box as normal. Return the travel blank with the newly deployed sampler at the end of the sampling period.

I received 2 sampler bodies. What should I do?

This is the duplicate field QC sample. Deploy both sampler bodies following the same protocol for deploying a single sampler body.

Contact Lists

Table 4. NADP contact information.

NADP Personnel		
Contact	**Phone Number**	**email address**
AMNet Site Support	800-952-7353	amnet@slh.wisc.edu
AMoN Site Support		amon@slh.wisc.edu
MDN Site Support		mdn@slh.wisc.edu
MLN Site Support		mln@slh.wisc.edu
NTN Site Support		ntn@slh.wisc.edu
PFN Site Support		pfn@slh.wisc.edu
Network Equipment Depot		ned@slh.wisc.edu
Site Performance and Systems Survey Program		nadp@slh.wisc.edu
NADP Coordinator/Principal Investigator	(608) 263-9162	Sarah.Benish@slh.wisc.edu
NADP Assistant Coordinator	(608) 265-2449	Nichole.Miller@slh.wisc.edu
Program Operations Supervisor	(608) 224-4336	Ella.Osby@slh.wisc.edu

Table 5. Manufacturer contact information for NADP AMoN approved equipment.

NADP Equipment Manufacturers		
Manufacturer	**Phone Number**	**URL**
UK Centre for Ecology & Hydrology	provided by the NAL	

Appendix: References

National Atmospheric Deposition Program (NADP). 2024. *NADP Site Selection and Installation Manual*. Wisconsin State Laboratory of Hygiene, Madison, WI

National Atmospheric Deposition Program (NADP). 2021. *NADP Site Information Worksheet*. Wisconsin State Laboratory of Hygiene, Madison, WI