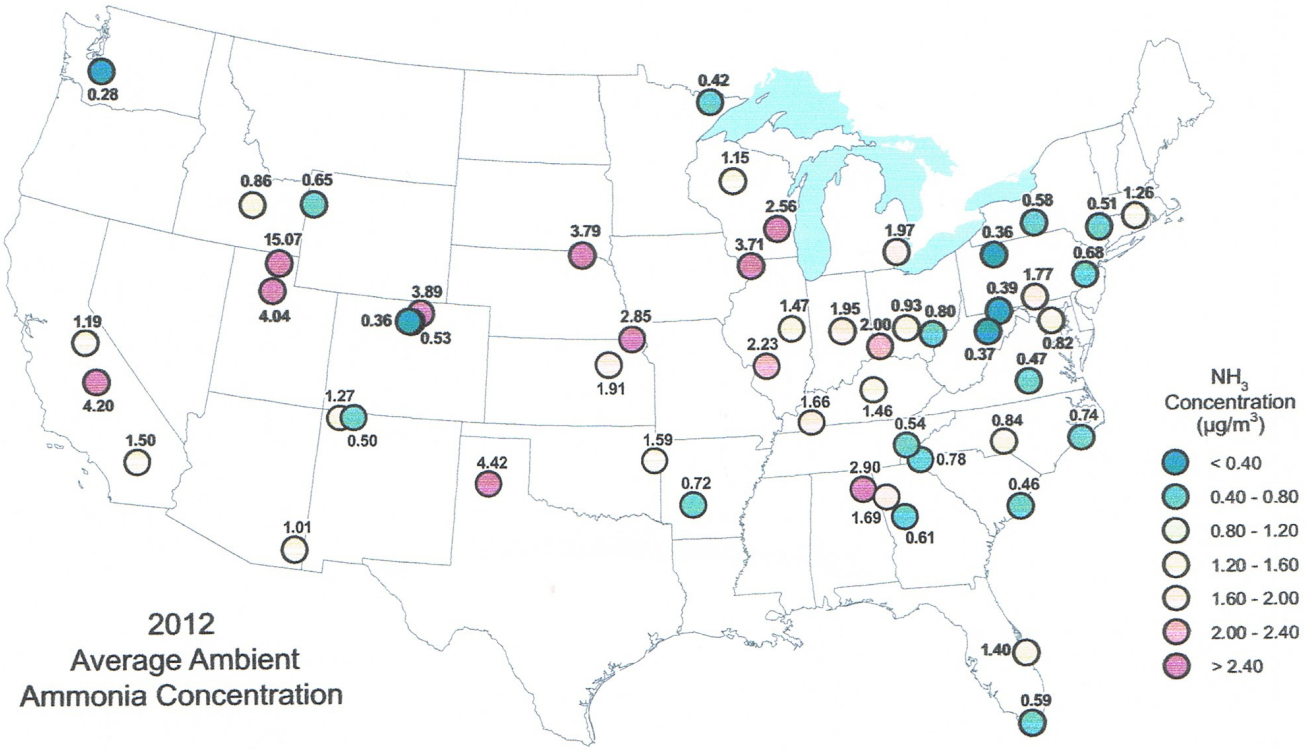
Ambient Ammonia Monitoring Network (AMoN)



The Ammonia Monitoring Network (AMoN) provides land managers, air quality modelers, ecologists, and policymakers critical data that allows them to:

- assess the long-term trends in ambient NH_3 concentrations and deposition of reduced nitrogen species;
- validate atmospheric models;
- better estimate total nitrogen inputs to ecosystems;
- assess changes in atmospheric chemistry due to SO_2 and NO_x reductions; and
- assess compliance with $PM_{2.5}$ standards.

There are currently 66 AMoN locations (see back cover).

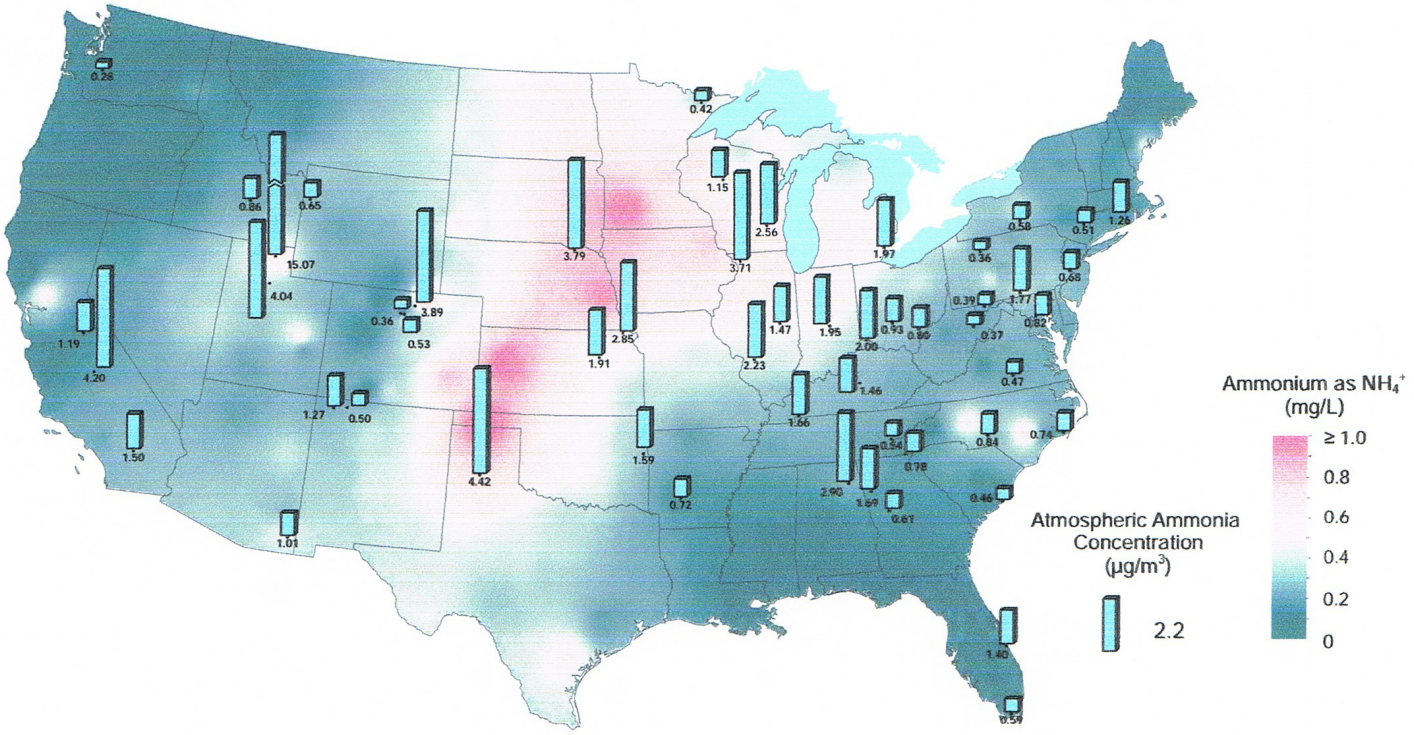
AMoN field site at Sequoia National Park (CA83)

National Atmospheric Deposition Program

The Importance of Ammonia in the Atmosphere

Ammonia (NH_3) is a gas readily released into the air from a variety of biological sources, as well as from industrial and combustion processes. It is the principal basic gas in the atmosphere. While NH_3 has many beneficial uses, it can detrimentally affect the quality of the environment, through the acidification and eutrophication of natural ecosystems, the associated loss of biodiversity, and the formation of secondary particles in the atmosphere.

The dominant source of NH_3 emissions in the U.S. is agriculture (~85%), largely from animal waste and commercial fertilizer application. Data from the National Atmospheric Deposition Program/National Trends Network (NADP/NTN), a 35+ year wet deposition network with over 260 sites across the U.S., has shown "hot spots" of ammonium ion (NH_4) concentrations in the U.S. (see figure below). Yet, despite its importance in atmospheric chemistry and its impact on ecosystems, there has been no routine national monitoring of ambient NH_3 until recently. The NADP has established and has operated a routine, long-term, cost efficient passive NH_3 monitoring network since October 2007.

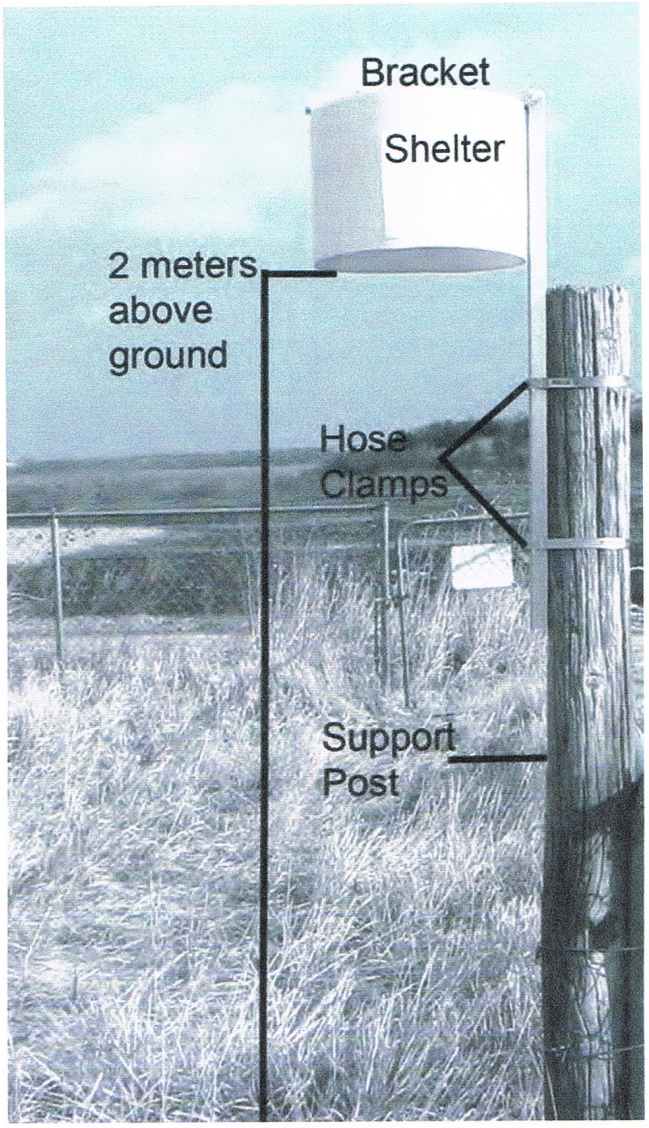


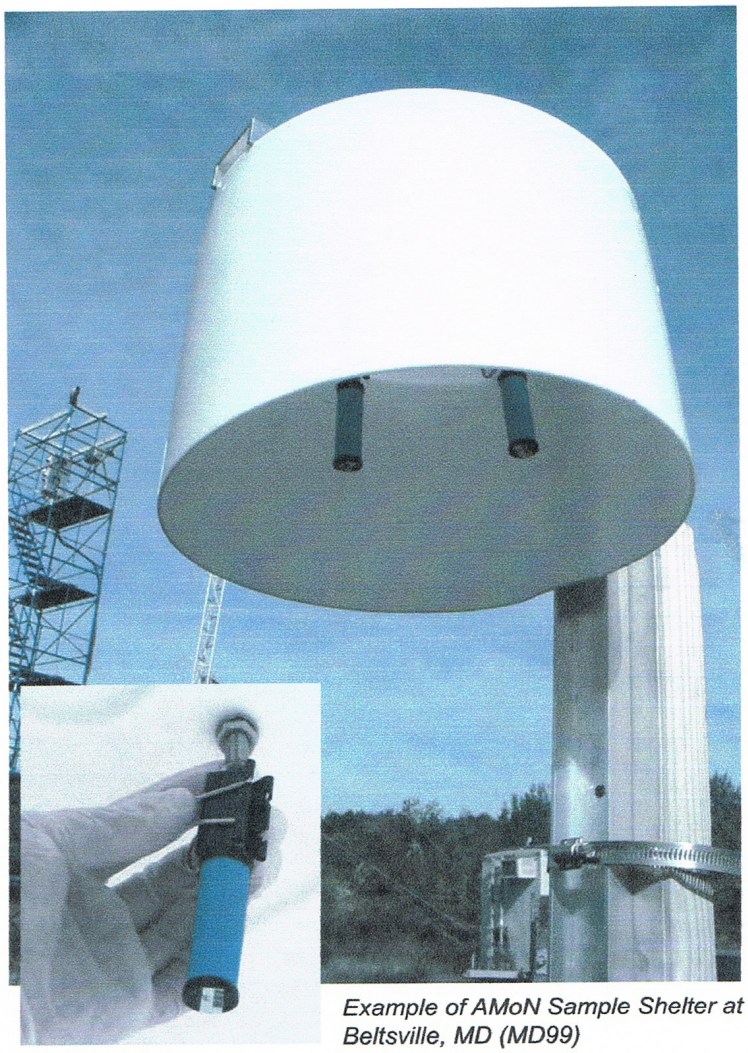
The background map represents the 2012 precipitation weighed mean ammonium ion concentration over the continental United States as measured by the NADP/National Trends Network (NADP/NTN). The blue bars represent the 2012 annual average atmospheric ammonia concentration as measured by AMoN.

AMoN Sampling Methods

The AMoN uses Radiello® passive samplers (http://www.radiello.com), which do not require electricity or a data logger. AMoN sites can be installed almost anywhere, provided that the area meets the siting criteria. An example of the site setup is shown below.

Samples are deployed for 2 week periods. The time commitment of the site operator is approximately 30 minutes at the site every two weeks. The NADP's Central Analytical Laboratory assembles and ships passive samplers to sites and, when returned, analyzes, quality assures, and provides the analytical data to the NADP. The AMoN data including site specific information are available for download at http://nadp.isws.illinois.edu/AMoN.



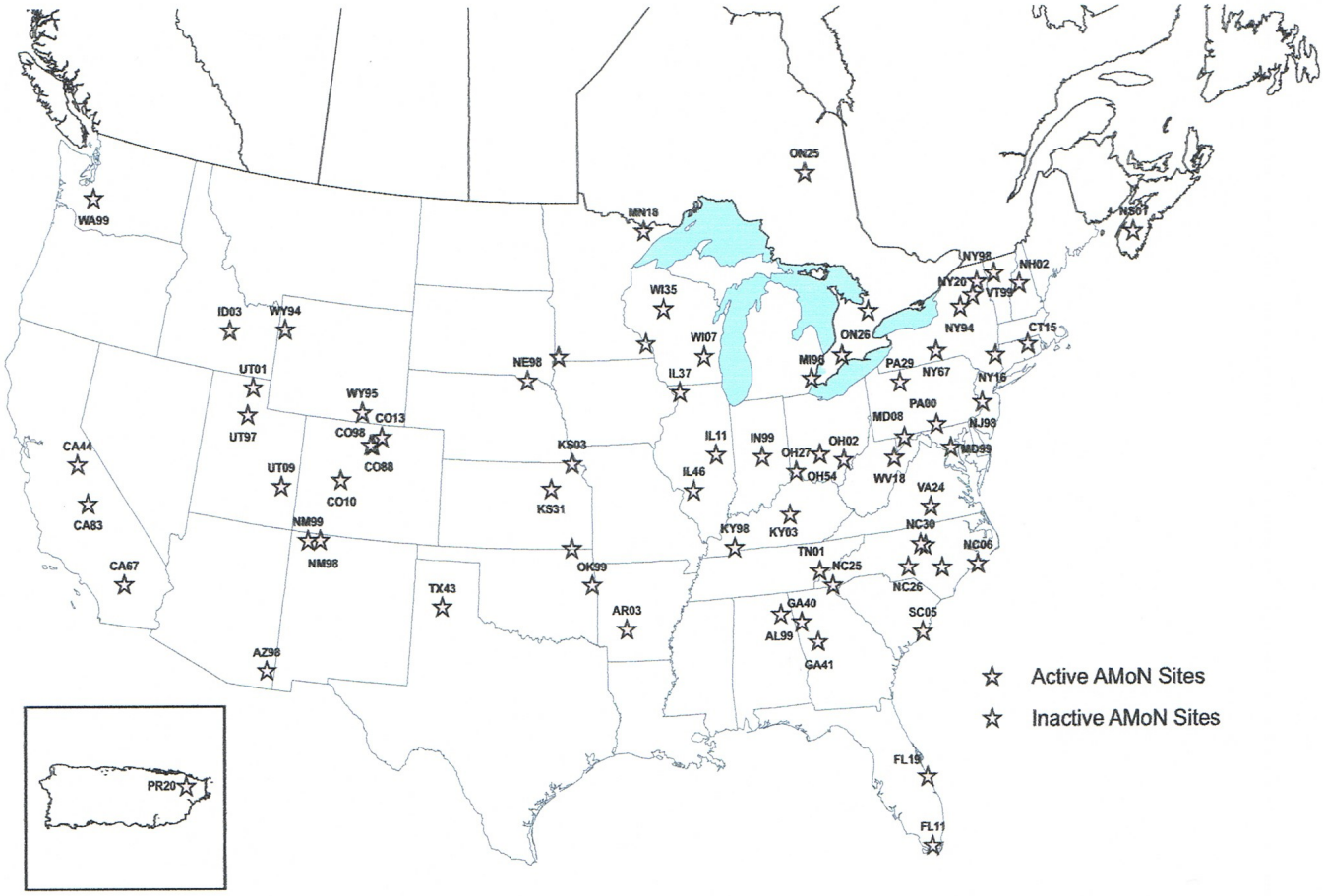


Example of AMoN Sample Shelter at Beltsville, MD (MD99)

The Future of the AMoN

Future plans for the AMoN include:

- growing the network to 300+ sites, covering all sensitive ecoregions of the continental U.S.;
- utilizing the measured NH_3 concentrations for validation of air quality and deposition models; and
- providing educational outreach materials highlighting the hands-on experience in atmospheric science that students can receive by participating in AMoN.



AMoN Site Costs

The annual cost of participating in the network is $3,100 per site/year. This annual cost includes site supplies, shipping to and from the site, sample analysis, quality assurance activities, and data reporting on the internet. A site installation kit is required ($250), and this cost will be added to the initial contract.

For more information, visit the AMoN website at http://nadp.isws.illinois.edu/AMoN.

National Atmospheric Deposition Program

The NADP is National Research Support Project-3: A Long-Term Monitoring Program in Support of Research on the Effects of Atmospheric Chemical Deposition. More than 250 sponsors support the NADP, including private companies and other non-governmental organizations, universities, local and state government agencies, State Agricultural Experiment Stations, national laboratories, Native American organizations, Canadian government agencies, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Tennessee Valley Authority, the U.S. Geological Survey, the National Park Service, the U.S. Fish & Wildlife Service, the Bureau of Land Management, the U.S. Department of Agriculture - Forest Service, and the U.S. Department of Agriculture - National Institute of Food and Agriculture, under agreement no. 2012-39138-20273. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the sponsors or the University of Illinois.

Rev. 2/28/14

National Atmospheric Deposition Program

Preliminary Data Report

12/4/2019

Ammonia Monitoring Network (AMoN)

Andrea Jones
Kickapoo Tribe in Kansas
Kickapoo Environmental Office
1107 Goldfinch Road
Horton, KS 66439

Please verify your contact information.

email: **Kickapoo.Andrea@gmail.com**

phone: **785-486-2601 ext100**

KS97 Kickapoo Tribe - Powhattan

N19001140

Sample Start: 5/14/2019 10:15:00AM
Sample End: 5/28/2019 9:15:00AM
Operator Initials: ARJ

Blank Storage:
Sample Conditions Noted: Animal;

Sample Description	CONC, µg/m³	QR	Notes
Deployed Sample A	3.36	B	ch
Deployed Sample B	3.56	B	ch
Deployed Sample C	3.36	B	ch
Travel Blank	0.06	B	ch

Field Notes:
Reviewer Questions: lab notes: Black marks on rivets of inner white part of coupler nut. N19001140

N19001192

Sample Start: 5/28/2019 9:20:00AM
Sample End: 6/11/2019 9:50:00AM
Operator Initials: ARJ

Blank Storage:
Sample Conditions Noted: Fertilizer; Animal;

Sample Description	CONC, µg/m³	QR	Notes
Deployed Sample A	6.54	H	ch

Field Notes:
Reviewer Questions: lab notes: N19001192. SOME DIRT SPECKS ON WHITE PART OF COUPLER NUT. FUZZ ON INNER JAR CAP.

Notes Codes for Individual Replicate Values

AMoN Sample Condition Flags		
Notes	**Description**	**QR Code[1]**
a	Laboratory analytical data missing	C
c	Local source of ammonia (within ~500m), based on site operator comments	B
d	For T samples "d" indicates < lab method detection limit (mg/L NH_4) For A, B and C samples "d" indicates < network method detection limit (mg/L NH_4)	B
e	Long sample time (> 360 hours)	B
f	Major field sampling issue (gross contamination, vandalism, etc.)	C
h	Sample handling issue in field, shipping, or laboratory	B
l	Major laboratory issue	C
m	Missing data from field operator	B
n	No sampler deployed	C
s	Short sample time (< 312 hours)	No change
t	Elevated travel blank concentration (>0.2 mg/L NH_4). Elevated travel blank concentration should be considered when utilizing the associated ambient sampler data.	B
y	Delayed sample processing (>21 days from date off to analysis date)	B

[1] Quality Rating (QR) Code Definitions:
A – Fully qualified data
B – Valid data with minor issues
C – Invalid data

Method Detection Limits

Sample ID Range	AMoN Network MDL (MDL_N) mg/L NH_4	AMoN Lab MDL (MDL_L) mg/L NH4
All Prior to N18005002	0.0469	0.0469
N18005002 – N18006407	0.119	0.008
N19000001 - Present	0.104	0.016

Revision: April 2019

National Atmospheric Deposition Program
Ammonia Monitoring Network (AMoN)

Date: 26 November 2019
To: AMoN Site Operators and Supervisors
Re: AMoN Preliminary Data Reports (N19001139 – N19001345)

Dear AMoN Site Operators and Supervisors,

This preliminary report includes data from samples received in June 2019. Data which are fully validated are available for download at http://nadp.slh.wisc.edu/data/AMoN/.

You will receive your preliminary data report as a separate e-mail. Please check your "Junk" e-mail folder if you don't receive the report.

FAQ: What if I cannot change out AMoN samplers on a scheduled Tuesday?
Answer:
We recognize that **holidays**, operator leave, and other unplanned events affect sample collection times. For example, this year AMoN change out date falls on **Tuesday 12/24 (Christmas Eve)**. While the scheduled Tuesday mornings are the preferred time for sample change outs, alternate schedules are possible.

To avoid having your site's data flagged for sampling period criteria, perform your sampler change outs between **13-15 days**, or the following time frames.

Short Sample Time is **less than 312 hours (13 days)**, while Long Sample Time is **greater than 360 hours (15 days)**.

Please contact NADP Site Support if you have questions or concerns about holiday sampling schedules.

NADP Site Support
at 1-800-952-7353 or via e-mail at amon@slh.wisc.edu

Sample Change Dates:
This is the Tuesday-Tuesday sample change schedule for December 2019–February 2020.

- December 10
- December 24
- January 7
- January 21
- February 4
- February 18

If you have any remaining questions, please call **1-800-952-7353** or email AMoN@slh.wisc.edu.

THANK YOU for your support!

Central Analytical Laboratory · Wisconsin State Laboratory of Hygiene · 2601 Agriculture Drive ·
· Madison, WI 53718 ·
Phone: (800) 952-7353 · Internet: http://nadp.slh.wisc.edu/amon/ · e-mail: amon@slh.wisc.edu

National Atmospheric Deposition Program (NADP) · A Cooperative Research Support Program of the State Agricultural Experiment Stations (NRSP-3), Federal and State Agencies, and Private Research Organizations

National Atmospheric Deposition Program
Ammonia Monitoring Network (AMoN)

Description of Data:
Radiello Type Passive Samplers
Individual Replicate Values

Rev. 4/5/2013

Field	Data Type	Description
NADPID	Text	Unique NADP identifier of individual sample sets consisting of one or more sample replicates and a travel blank deployed together
SITEID	Text	Two-letter location designator followed by a two digit number
REPLICATE	Text	Sample replicate (A, B, C) or travel blank (T)
STARTDATE	Date/Time	Start date and time of sample exposure, GMT
ENDDATE	Date/Time	End date and time of sample exposure, GMT
EXPTIME	Numeric (0)	Sample exposure time, minutes
AIRVOL	Numeric (0.00)	Sample volume, m^3
EXTRACTVOL	Numeric (0.00)	Filter extract solution volume, mL
NH4	Numeric (0.000)	Measured ammonium ion concentration of filter extract, in mg/L of solution as $NH4^+$; missing values are indicated by -9.00
CONC	Numeric (0.00)	Gaseous ammonia concentration, $\mu g/m^3$; missing values are indicated by -9.00
QR	Text	Quality Rating Code: A fully qualified with no problems B valid data with minor problems C invalid data
NOTES	Text	Sample notes flags; see next page
CHNGDATE	Date/Time	Most recent date and time any data values were edited within the NADPID set

Notes Codes for Individual Replicate Values

AMoN Sample Condition Flags		
Notes	**Description**	**QR Code[1]**
a	Laboratory analytical data missing	C
c	Local source of ammonia (within ~500m), based on site operator comments	B
d	Below laboratory detection limit	B
e	Long sample time (> 360 hours)	B
f	Major field sampling issue (gross contamination, vandalism, etc.)	C
h	Sample handling issue in field, shipping, or laboratory	B
l	Major laboratory issue	C
m	Missing data from field operator	B
n	No sampler deployed	C
s	Short sample time (< 312 hours)	No change
t	Elevated travel blank concentration	No change
y	Delayed sample processing (>16 days from date off to analysis date)	B

[1] Quality Rating (QR) Code Definitions:
A – Fully qualified data
B – Valid data with minor issues
C – Invalid data

NADPID	SITEID	REPLICATE	STARTDATE	ENDDATE	EXPTIME	AIRVOL	EXTRACTVOL	NH4	CONC	QR	NOTES	CHNGDATE
N15000181	KS97	A	1/13/2015 17:00	1/27/2015 17:15	20175	4.74	9.98	1.897	3.77	A		1/30/2015 17:51
N15000274	KS97	A	1/27/2015 17:18	2/10/2015 17:18	20160	4.74	9.98	1.381	2.75	A		2/25/2015 15:17
N15000370	KS97	A	2/10/2015 17:24	2/24/2015 17:29	20165	4.74	9.99	0.903	1.8	A		2/27/2015 18:07
N15000457	KS97	A	2/24/2015 17:32	3/10/2015 15:37	20045	4.71	10	1.26	2.52	A		3/13/2015 18:52
N15000556	KS97	A	3/10/2015 18:50	3/24/2015 15:08	19938	4.69	10.01	3.363	6.78	A		3/30/2015 15:48
N15000687	KS97	A	3/24/2015 15:09	4/7/2015 15:45	20196	4.75	10	1.699	3.38	A		4/14/2015 19:54
N15000748	KS97	A	4/7/2015 15:46	4/21/2015 16:32	20206	4.75	9.98	3.311	6.57	A		4/24/2015 15:58
N15000748	KS97	B	4/7/2015 15:46	4/21/2015 16:32	20206	4.75	9.98	3.363	6.67	A		4/24/2015 15:58
N15000748	KS97	C	4/7/2015 15:46	4/21/2015 16:32	20206	4.75	10	3.131	6.22	A		4/24/2015 15:58
N15000748	KS97	T	4/7/2015 15:46	4/21/2015 16:32	20206	4.75	9.98	0.099	0.2	A		4/24/2015 15:58
N15000832	KS97	A	4/21/2015 16:35	5/5/2015 16:02	20127	4.73	9.97	2.067	4.11	A		5/11/2015 14:48
N15000832	KS97	T	4/21/2015 16:35	5/5/2015 16:02	20127	4.73	9.99	0.084	0.17	A		5/11/2015 14:48
N15000947	KS97	A	5/5/2015 16:10	5/19/2015 16:15	20165	4.74	9.99	1.043	2.08	A		5/26/2015 15:15
N15001044	KS97	A	5/19/2015 16:20	6/2/2015 15:30	20110	4.73	10	0.862	1.72	A		6/8/2015 15:30
N15001123	KS97	A	6/2/2015 16:45	6/16/2015 16:55	20170	4.74	9.99	1.24	2.47	A		6/22/2015 17:32
N15001217	KS97	A	6/16/2015 16:55	6/30/2015 15:15	20060	4.71	9.96	1.593	3.18	B	c	7/10/2015 18:57
N15001342	KS97	A	6/30/2015 15:17	7/14/2015 16:50	20253	4.76	9.97	1.751	3.46	A		7/22/2015 19:06
N15001416	KS97	A	7/14/2015 16:50	7/28/2015 14:40	20030	4.71	9.99	2.409	4.83	A		8/3/2015 16:53
N15001613	KS97	A	8/11/2015 14:50	8/25/2015 15:50	20220	4.75	9.98	2.046	4.06	A		8/31/2015 16:31
N15001614	KS97	A	7/28/2015 14:40	8/11/2015 14:50	20170	4.74	9.99	2.186	4.35	B	y	8/31/2015 16:33
N15001709	KS97	A	8/25/2015 15:50	9/8/2015 16:30	20200	4.75	9.99	4.458	8.86	A		9/29/2015 20:54
N15001769	KS97	A	9/8/2015 16:30	9/22/2015 16:20	20150	4.74	10.02	1.172	2.34	A		9/29/2015 20:55
N15001769	KS97	T	9/8/2015 16:30	9/22/2015 16:20	20150	4.74	9.99	0.085	0.17	A		9/29/2015 20:55
N15001871	KS97	A	9/22/2015 16:20	10/6/2015 15:30	20110	4.73	9.98	1.481	2.95	A		10/9/2015 16:08
N15001871	KS97	T	9/22/2015 16:20	10/6/2015 15:30	20110	4.73	9.99	0.054	0.11	A		10/9/2015 16:08
N15002018	KS97	A	10/6/2015 15:30	10/20/2015 14:00	20070	4.72	9.99	1.266	2.53	B	y	11/2/2015 16:37
N15002069	KS97	A	10/20/2015 14:10	11/3/2015 17:45	20375	4.79	10	1.404	2.77	A		11/6/2015 15:58
N15002153	KS97	A	11/3/2015 17:45	11/17/2015 18:24	20199	4.75	10	1.108	2.2	A		##############
N15002242	KS97	A	11/17/2015 18:26	12/1/2015 17:05	20079	4.72	10	1.993	3.99	A		12/4/2015 17:09
N15002343	KS97	A	12/1/2015 17:05	12/15/2015 17:45	20200	4.75	9.99	1.509	3	A		##############
N15002343	KS97	B	12/1/2015 17:05	12/15/2015 17:45	20200	4.75	10	1.525	3.03	A		##############

N15002343	KS97	C	12/1/2015 17:05	12/15/2015 17:45	20200	4.75	9.99	1.476	2.93	A		##############
N15002343	KS97	T	12/1/2015 17:05	12/15/2015 17:45	20200	4.75	10.01	0.06	0.12	A		##############
N16000049	KS97	A	12/15/2015 17:50	12/29/2015 17:00	20110	4.73	9.99	0.563	1.12	A		1/5/2016 16:10
N16000161	KS97	A	12/29/2015 17:00	1/12/2016 17:34	20194	4.75	10.01	0.588	1.17	A		1/19/2016 16:22
N16000161	KS97	T	12/29/2015 17:00	1/12/2016 17:34	20194	4.75	9.98	0.051	0.1	A		1/19/2016 16:22
N16000263	KS97	A	1/12/2016 17:34	1/26/2016 16:30	20096	4.72	10	0.673	1.35	A		2/1/2016 16:06
N16000263	KS97	T	1/12/2016 17:34	1/26/2016 16:30	20096	4.72	10	0.034	0.07	B	d	2/1/2016 16:06
N16000326	KS97	A	1/26/2016 16:30	2/9/2016 16:30	20160	4.74	10	1.1	2.19	A		2/17/2016 21:17
N16000429	KS97	A	2/9/2016 16:30	2/23/2016 17:09	20199	4.75	10.01	1.748	3.48	A		2/26/2016 16:21
N16000551	KS97	A	2/23/2016 17:09	3/8/2016 17:22	20173	4.74	10	3.92	7.81	A		3/14/2016 15:27
N16000645	KS97	A	3/8/2016 17:22	3/22/2016 15:45	20063	4.72	9.96	2.349	4.68	A		3/28/2016 15:31
N16000759	KS97	A	3/22/2016 15:45	4/5/2016 17:00	20235	4.76	10	1.898	3.77	A		4/11/2016 16:14
N16000759	KS97	T	3/22/2016 15:45	4/5/2016 17:00	20235	4.76	9.99	0.044	0.09	B	d	4/11/2016 16:14
N16000870	KS97	A	4/5/2016 17:00	4/19/2016 16:40	20140	4.73	10	1.844	3.68	A		4/27/2016 16:37
N16000891	KS97	A	4/19/2016 16:40	4/29/2016 16:50	14410	3.39	9.99	2.28	6.35	A	s	6/8/2016 13:53
N16001160	KS97	A	5/17/2016 18:47	5/31/2016 16:30	20023	4.71	9.99	1.281	2.57	B	y	6/8/2016 14:33
N16001160	KS97	B	5/17/2016 18:47	5/31/2016 16:30	20023	4.71	10.02	1.246	2.5	B	y	6/8/2016 14:33
N16001160	KS97	C	5/17/2016 18:47	5/31/2016 16:30	20023	4.71	10	1.26	2.53	B	y	6/8/2016 14:33
N16001160	KS97	T	5/17/2016 18:47	5/31/2016 16:30	20023	4.71	10.01	0.05	0.1	B	y	6/8/2016 14:33
N16001213	KS97	A	5/31/2016 16:45	6/14/2016 14:15	20010	4.7	10.01	1.194	2.4	A		6/17/2016 15:01
N16001161	KS97	A	4/29/2016 16:50	5/17/2016 18:43	26033	6.12	9.99	3.423	5.28	B	ey	7/5/2016 18:18
N16001359	KS97	A	6/14/2016 14:15	6/28/2016 16:00	20265	4.76	10.04	2.377	4.73	A		7/19/2016 18:25
N16001359	KS97	T	6/14/2016 14:15	6/28/2016 16:00	20265	4.76	10.02	0.079	0.16	A		7/19/2016 18:25
N16001468	KS97	A	6/28/2016 16:00	7/12/2016 16:05	20165	4.74	9.99	2.518	5.01	B	y	7/21/2016 14:59
N16001575	KS97	A	7/12/2016 16:05	7/26/2016 17:15	20230	4.75	10.02	1.687	3.36	A		8/4/2016 15:27
N16001665	KS97	A	7/26/2016 17:15	8/9/2016 14:00	19965	4.69	9.98	2.222	4.46	A		8/16/2016 15:32
N16001758	KS97	A	8/9/2016 14:00	8/23/2016 14:20	20180	4.74	9.99	1.27	2.53	A		8/29/2016 14:30
N16001853	KS97	A	8/23/2016 14:20	9/6/2016 14:23	20163	4.74	9.99	1.444	2.87	A		9/12/2016 15:14
N16002185	KS97	A	10/4/2016 16:55	10/18/2016 15:45	20090	4.72	9.98	1.578	3.15	A		##############
N16001988	KS97	A	9/6/2016 14:23	9/20/2016 15:35	20232	4.75	9.99	1.24	2.46	A		##############
N16002036	KS97	A	9/20/2016 15:35	10/4/2016 16:55	20240	4.76	10.03	1.471	2.93	B	c	##############
N16002036	KS97	T	9/20/2016 15:35	10/4/2016 16:55	20240	4.76	10	0.059	0.12	B	c	##############
N16002290	KS97	A	10/18/2016 15:45	11/1/2016 18:30	20325	4.78	10	1.833	3.62	B	c	##############
N16002363	KS97	A	11/1/2016 18:30	11/16/2016 14:40	21370	5.02	10	2.403	4.52	B	c	##############

N16002363	KS97	B	11/1/2016 18:30	11/16/2016 14:40	21370	5.02	9.98	2.291	4.3	B	c	##############
N16002363	KS97	C	11/1/2016 18:30	11/16/2016 14:40	21370	5.02	9.99	2.266	4.25	B	c	##############
N16002363	KS97	T	11/1/2016 18:30	11/16/2016 14:40	21370	5.02	9.97	0.041	0.08	B	cd	##############
N16002456	KS97	A	11/16/2016 14:40	11/29/2016 16:40	18840	4.43	9.96	1.9	4.03	A		12/5/2016 16:09
N16002575	KS97	A	11/29/2016 16:40	12/13/2016 17:56	20236	4.76	10.01	2.86	5.68	A		##############
N16002575	KS97	T	11/29/2016 16:40	12/13/2016 17:56	20236	4.76	9.99	0.085	0.17	A		##############
N17000054	KS97	A	12/13/2016 17:56	12/27/2016 18:30	20194	4.75	9.99	0.867	1.72	B	y	1/9/2017 16:52
N17000147	KS97	A	12/27/2016 18:30	1/10/2017 17:50	20120	4.73	10	0.956	1.91	B	c	1/19/2017 17:09
N17000247	KS97	A	1/10/2017 17:50	1/24/2017 17:10	20120	4.73	10	0.923	1.84	B	y	2/13/2017 22:25
N17000540	KS97	A	2/21/2017 19:24	3/7/2017 19:27	20163	4.74	9.99	1.937	3.86	B	c	3/13/2017 15:18
N17000540	KS97	T	2/21/2017 19:24	3/7/2017 19:27	20163	4.74	9.95	0.056	0.11	B	c	3/13/2017 15:18
N17000259	KS97	A	1/24/2017 17:10	1/31/2017 17:25	10095	2.37	10.01	0.588	2.34	A	s	3/14/2017 13:56
N17000459	KS97	A	1/31/2017 17:25	2/21/2017 19:24	30359	7.13	9.95	4.555	6	B	ey	3/21/2017 15:01
N17000655	KS97	A	3/7/2017 19:27	3/21/2017 15:15	19908	4.68	9.99	2.938	5.92	B	c	3/28/2017 15:51
N17000768	KS97	A	3/21/2017 15:15	4/5/2017 14:40	21565	5.07	9.98	2.289	4.26	A		4/14/2017 15:10
N17001125	KS97	A	5/2/2017 15:45	5/16/2017 18:54	20349	4.78	10	2.098	4.14	B	cy	6/2/2017 15:50
N17000883	KS97	A	4/5/2017 14:40	4/18/2017 16:01	18801	4.42	9.98	1.579	3.37	B	y	6/2/2017 19:15
N17000974	KS97	A	4/18/2017 16:11	5/2/2017 15:45	20134	4.73	9.98	1.458	2.9	B	c	6/5/2017 13:37
N17000974	KS97	B	4/18/2017 16:11	5/2/2017 15:45	20134	4.73	9.97	1.487	2.96	B	c	6/5/2017 13:37
N17000974	KS97	C	4/18/2017 16:11	5/2/2017 15:45	20134	4.73	9.98	0.084	0.17	C	cdf	6/5/2017 13:37
N17000974	KS97	T	4/18/2017 16:11	5/2/2017 15:45	20134	4.73	10	0.061	0.12	B	c	6/5/2017 13:37
N17001256	KS97	A	5/30/2017 17:00	6/13/2017 15:45	20085	4.72	10.03	2.335	4.68	A		6/19/2017 14:50
N17001354	KS97	A	6/13/2017 15:45	6/27/2017 17:00	20235	4.76	10.05	2.735	5.46	B	c	6/30/2017 15:58
N17001200	KS97	A	5/16/2017 18:54	5/30/2017 17:00	20046	4.71	9.99	1.487	2.98	B	cy	7/25/2017 20:14
N17001200	KS97	T	5/16/2017 18:54	5/30/2017 17:00	20046	4.71	10.03	0.063	0.13	B	cy	7/25/2017 20:14
N17001400	KS97	A	6/27/2017 17:00	7/6/2017 14:50	12830	3.02	9.99	1.247	3.9	B	sy	8/14/2017 20:12
N17001593	KS97	A	7/6/2017 15:00	7/25/2017 17:00	27480	6.46	9.98	2.187	3.19	B	ce	8/14/2017 20:12
N17001779	KS97	A	8/8/2017 17:45	8/22/2017 18:20	20195	4.75	9.99	1.754	3.49	A		8/25/2017 16:45
N17001779	KS97	T	8/8/2017 17:45	8/22/2017 18:20	20195	4.75	10	0.072	0.14	A		8/25/2017 16:45
N17001928	KS97	A	8/22/2017 18:20	9/6/2017 15:50	21450	5.04	10.06	1.834	3.45	A		9/18/2017 15:28
N17001714	KS97	A	7/25/2017 17:00	8/8/2017 17:45	20205	4.75	10.01	5.513	10.97	B	c	9/21/2017 14:43
N17002028	KS97	A	9/6/2017 16:00	9/19/2017 15:30	18690	4.39	9.99	1.563	3.36	A	s	9/27/2017 15:10
N17002028	KS97	B	9/6/2017 16:00	9/19/2017 15:30	18690	4.39	10	1.671	3.59	A	s	9/27/2017 15:10
N17002028	KS97	C	9/6/2017 16:00	9/19/2017 15:30	18690	4.39	9.99	1.624	3.49	A	s	9/27/2017 15:10

N17002028	KS97	T	9/6/2017 16:00	9/19/2017 15:30	18690	4.39	10.02	0.088	0.19	A	s	9/27/2017 15:10
N17002135	KS97	A	9/19/2017 15:30	10/3/2017 15:25	20155	4.74	9.99	1.369	2.73	A		##############
N18000096	KS97	A	11/28/2017 17:15	12/13/2017 18:25	21670	5.09	10.02	2.813	5.23	B	cey	1/22/2018 20:13
N18000093	KS97	A	12/13/2017 18:47	1/2/2018 18:00	28753	6.76	10.01	1.696	2.37	B	ce	2/2/2018 21:48
N17002564	KS97	A	10/31/2017 16:20	11/28/2017 17:15	40375	9.49	10.01	8.513	8.48	B	cey	2/15/2018 15:38
N17002564	KS97	T	10/31/2017 16:20	11/28/2017 17:15	40375	9.49	10.01	0.062	0.06	B	cey	2/15/2018 15:38
N18000306	KS97	A	1/2/2018 18:00	1/17/2018 18:50	21650	5.09	10	1.089	2.02	B	y	3/16/2018 18:15
N18000507	KS97	A	2/6/2018 20:00	2/21/2018 18:50	21530	5.06	10.01	1.334	2.49	B	c	3/28/2018 21:03
N18000671	KS97	A	3/13/2018 14:30	3/20/2018 15:15	10125	2.38	9.99	1.904	7.55	B	cs	4/3/2018 15:52
N18000416	KS97	A	1/17/2018 18:50	2/6/2018 20:00	28870	6.78	10.02	1.884	2.63	B	cey	4/5/2018 19:18
N18000786	KS97	A	3/20/2018 15:15	4/3/2018 15:49	20194	4.75	9.99	1.469	2.92	A		4/9/2018 15:03
N18000786	KS97	B	3/20/2018 15:15	4/3/2018 15:49	20194	4.75	9.99	1.418	2.82	A		4/9/2018 15:03
N18000786	KS97	C	3/20/2018 15:15	4/3/2018 15:49	20194	4.75	9.98	1.478	2.93	A		4/9/2018 15:03
N18000786	KS97	T	3/20/2018 15:15	4/3/2018 15:49	20194	4.75	10	0.048	0.1	A		4/9/2018 15:03
N18000618	KS97	A	2/21/2018 18:50	3/13/2018 14:30	28540	6.71	9.99	2.504	3.52	B	ce	4/26/2018 14:36
N18000930	KS97	A	4/3/2018 15:50	4/17/2018 16:15	20185	4.74	10	2.096	4.17	B	cy	5/3/2018 15:36
N18005079	KS97	A	6/1/2018 15:49	6/12/2018 18:45	16016	3.76	9.99	2.088	5.23	A	s	6/19/2018 16:18
N18001013	KS97	A	4/17/2018 16:15	5/8/2018 16:11	30236	7.11	9.98	4.194	5.56	B	e	6/26/2018 20:46
N18001013	KS97	T	4/17/2018 16:15	5/8/2018 16:11	30236	7.11	10	0.053	0.07	B	e	6/26/2018 20:46
N18001206	KS97	A	5/8/2018 16:11	5/15/2018 15:35	10044	2.36	10.02	1.599	6.41	B	sy	6/28/2018 20:55
N18005180	KS97	A	6/12/2018 18:59	6/20/2018 18:31	11492	2.7	9.99	1.174	4.1	A	s	7/3/2018 14:27
N18001216	KS97	A	5/15/2018 15:35	5/29/2018 15:37	20162	4.74	9.99	3.823	7.61	B	y	7/25/2018 14:41
N18005547	KS97	A	7/3/2018 14:40	7/18/2018 15:40	21660	5.09	9.99	2.603	4.82	B	ey	8/24/2018 19:06
N18005557	KS97	A	7/18/2018 15:40	8/7/2018 15:20	28780	6.76	10	3.35	4.68	B	ey	8/24/2018 19:24
N18005601	KS97	A	8/7/2018 15:20	8/21/2018 15:30	20170	4.74	9.99	3.691	7.34	A		8/31/2018 20:06
N18005802	KS97	A	8/28/2018 15:00	9/18/2018 15:00	30240	7.11	9.99	2.493	3.31	B	ce	10/3/2018 15:06
N18005890	KS97	A	9/18/2018 15:00	10/1/2018 17:45	18885	4.44	9.99	1.523	3.24	B	c	10/9/2018 15:14
N18006002	KS97	A	10/1/2018 17:55	10/17/2018 19:32	23137	5.44	9.99	1.24	2.15	B	ce	##############
N18006170	KS97	A	10/17/2018 19:32	10/30/2018 20:30	18778	4.41	9.99	2.461	5.26	B	cy	##############
N18006170	KS97	T	10/17/2018 19:32	10/30/2018 20:30	18778	4.41	9.99	0.033	0.07	B	cy	##############
N18005297	KS97	A	6/20/2018 18:31	7/3/2018 14:40	18489	4.35	9.98	1.713	3.71	B	sy	##############
N18005297	KS97	T	6/20/2018 18:31	7/3/2018 14:40	18489	4.35	10	0.034	0.07	B	sy	##############
N18005604	KS97	A	8/21/2018 16:30	8/28/2018 14:40	9970	2.34	10.01	0.802	3.23	A	s	1/4/2019 15:10
N18005604	KS97	B	8/21/2018 16:30	8/28/2018 14:40	9970	2.34	10.01	0.786	3.17	A	s	1/4/2019 15:10

N18005604	KS97	C	8/21/2018 16:30	8/28/2018 14:40	9970	2.34	9.98	0.782	3.14	A	s	1/4/2019 15:10
N18005604	KS97	T	8/21/2018 16:30	8/28/2018 14:40	9970	2.34	9.99	0.047	0.19	B	s	1/4/2019 15:10
N19000630	KS97	A	3/12/2019 13:00	3/19/2019 15:50	10250	2.41	9.99	0.83	3.25	A	s	3/25/2019 20:53
N19000753	KS97	A	3/19/2019 15:50	4/2/2019 15:22	20132	4.73	9.99	2.02	4.03	B	c	4/9/2019 15:10
N19000753	KS97	T	3/19/2019 15:50	4/2/2019 15:22	20132	4.73	9.99	0.027	0.05	B	c	4/9/2019 15:10
N19000564	KS97	A	10/30/2018 20:30	3/12/2019 13:00	191070	44.9	9.98	11.974	2.51	B	e	8/6/2019 14:59
N19000795	KS97	A	4/2/2019 15:27	4/16/2019 15:20	20153	4.74	10	2.639	5.26	B	c	8/7/2019 14:41
N19000961	KS97	A	4/16/2019 15:20	4/30/2019 14:35	20115	4.73	10	4.164	8.32	B	c	9/20/2019 17:26
N19001047	KS97	A	4/30/2019 14:40	5/14/2019 15:10	20190	4.74	9.96	1.924	3.81	B	c	9/23/2019 20:45