

**National Atmospheric Deposition Program
Spring 2001 Interim Meeting
Attachments to Joint Committee Meeting Minutes**

1. CAL Report by Karen Harlin
2. MDN Report by Clyde Sweet
3. Hal Report by Bob Brunette
4. Update on Site Classification by Luther Smith and Bob Larson
5. Update on Developing a New Precipitation Sampler by Mark Nilles
6. Update on Rain Gage Comparison Study by Mark Nilles
7. Discussion presentation by Scott Dossett

Central Analytical Laboratory (CAL) Report

National Atmospheric Deposition Program
Illinois State Water Survey
2204 Griffith Dr., Champaign, IL 61820

Updated from last report to NOS on 10/00

CAL Internet Site active: nadp.sws.uiuc.edu/cal

?? Staff information, method summaries (coming soon), Quality Assurance reports, CALendar, Site Operator Training Manual, Site Operator Training Class announcements, and other forms and CAL related materials

Site Operations:

?? NTN 229 active sites (as of 2/11/01)

Ten new NTN sites in 2000

- o MI48 on 11/28/00, Seney National Wildlife Refuge—Headquarters, USFWS
- o SC05 on 11/21/00, Cape Romaine National Wildlife Refuge, USFWS
- o HI99 on 11/21/00, Hawaii Volcanoes National Park—Thurston, USGS/NPS
- o MD18 on 09/05/00, Assateague Island National Seashore—Woodcock, NPS/MD DNR
- o CA67 on 01/19/00, Joshua Tree National Park, Black Rock, NPS
- o 99CA on 09/26/00 (collocated site), Yosemite National Park, Hodgdon Meadow, NPS
- o CA96 on 06/13/00, Lassen Volcanic National Park—Manzanita Lake, NPS
- o MN32 on 05/30/00, Voyageurs National Park—Sullivan Bay, NPS
- o CA95 on 02/08/00, Death Valley National Park—Cow Creek, NPS
- o OK08 on 02/01/00, Lake Eucha, OK CC/EPA

?? 1 site moved (ND07 closed 12/12/00, site moved and restarted as ND00 on 01/30/01)

?? Terminated sites

- o 08CO on 09/26/00 (collocated site)
- o NM09 on 04/04/00

?? New Bucket Lids

- o Old Lids, Snap-on Plastic Bucket Lids (Freund Can Co, Chicago IL.)
- o New Lids, 3.5 Gallon Easy-off Lid (Encore Plastics, Bellevere, OH, PN 53000)

New lids are leached in dilute acid following same protocol as buckets.

?? Evaluation complete for 6-site study (CA88, FL11, ME02, MN01, OR09, TX03).

?? Lids were sent to all sites on 2/15/01 with instructions.

?? Survey results: 4/6 sites responded to memo.

?? Harder or easier to install? 3 harder, 1 easier after they figured it out

?? Harder or easier to remove? 3 harder, 1 same

?? Instructions useful? Good instructions, too much paper—save trees.

?? What worked? Pushing in center worked best

?? Comments? 2 none; 2 visually inspect lid to ensure its on all the way.

- ?? Site Operator Training Course
 - o **31st Site Operators Course scheduled at CAL on May 1-3, 2001**
 - o ~ 30 enrolled
 - ?? CA42, CA76, CAN, CO01, CO22, DE02 (AIRMoN), GA09, IL19, IN34, KS31, MA13, MD18, NC25, ND00, NH02/02NH, NM12, NY22, OK00, PA00, PA15, PA72, TX21, WI28/99 (MDN-WI31).
- ?? NTN Site Operator Training Manual
 - o Available on both NADP and CAL Internet Sites
 - ~~///~~ Nadp.sws.uiuc.edu
 - ~~///~~ Nadp.sws.uiuc.edu/cal

Laboratory Operations:

- ?? Stats:
 - o Samples received as of 4/13/01
 - ~~///~~ NTN: NV0800 sample ID = 210,800 samples logged in
 - ~~///~~ AIRMoN: AB1733 sample ID = 11,733 samples logged in
 - o In last 9 months:
 - ~~///~~ NTN ave. # samples/month = 1142
 - ~~///~~ AIRMoN ave. # samples/month = 164
 - ~~///~~ ~90 % of samples received are analyzed for 11 analytes ~ 13,000 analyses/mo
 - ~~///~~ External and internal QA/QC samples ~ additional 300 samples/mo
- ?? 1 year of Supplies and Parts database history (barcode system which tracks site supplies, mailer rotation); includes NTN; AIRMoN and MDN parts sent and received by the CAL
 - o Tailored reports are available for # mailers in rotation, supplies and parts to sites, response time for supply/parts request, use for inventory control, etc.
- ?? Computerized transfer of lab contamination codes, pH, and conductivity to CAL database
 - o Equipment ordered; investigating new technology (such as touch sensitive monitors)
 - o Programs written
 - o B-testing begins May 2001
- ?? Method Detection Limits (MDLs)
 - o Beginning January 2000, values below the MDL are now in the CAL NTN database
 - ?? Improved data resolution allows the use of this data for more rigorous statistics to compute the MDLs
 - ?? Faux rain 10th percentile (sodium, calcium, magnesium, nitrate, sulfate, chloride, and ammonium)
 - ?? Low level nutrient calibration check standard (orthophosphate)
 - ?? Faux rain 25th percentile (potassium)
 - o Evaluate new CAL Reporting Limits for nitrate, sulfate, chloride, and orthophosphate

<u>Analyte</u>	<u>Old Value</u>	<u>Proposed change</u>
Calcium	0.009 mg/L	same
Magnesium	0.003	same
Sodium	0.003	same
Potassium	0.003	same
Ammonium	0.02	same
Chloride	0.03	0.005
Nitrate	0.03	0.010
Sulfate	0.03	0.010

Data Operations:

- ?? **NTN Data to Program Office is still on schedule!** Data to PO through Dec. 2000
- ?? **AIRMoN Data to PO through February 2001**
- ?? Increased sample load required that 1200 samples analyzed and the data validated per month (1000 samples per month previously processed) for NTN to meet data turn-around targets of 120 days
- ?? Reviewers comments in NTN database effective 2nd Qtr 2001 (NV0500)
 - o In response to auditors concerns to eventually eliminate notation on FORFs for data reviews
- ?? AIRMoN database, hourly precipitation added to database effective Jan. 01, 2001

QA/QC

- ?? 1999 CAL Quality Assurance Report by Jane Rothert
 - o Paper copies available on request
 - o Internet access available soon
- ?? CAL Quality Assurance Plan status, sent to external reviewers for final comments. (External Reviewers: Leroy Schroder, Dave McTavish)
- ?? New AIRMoN field blank rules
 - o Old method: Must be first Tuesday of month with no precipitation within previous 24 hours. Problem: Few data points with >3 days of no precipitation events
 - o New method: Can use any weekday with no precipitation events within the previous 4-7 days (note: exclude days 1-3 with no precipitation events to preferentially obtain data with 4-7 days of no precipitation)
- ?? Interlaboratory Comparison Samples
 - o USGS Interlaboratory Comparison Samples
 - ?? (26 sets/year, 4 per set)
 - o World Meteorological Organization (WMO)/Global Atmospheric Watch (GAW) National Water Research Institute, Burlington, Ontario (NWRI), Ecosystem Interlaboratory QA Program
 - ?? Two sets per year, 3 per set
 - o Acid Deposition Monitoring Network in East Asia (EANET), NEW PROGRAM
 - ?? First set of 2 samples completed Feb. 2001. 3 dilutions/sample, 3 analysis/dilution
 - o Norwegian Institute for Air Research (NILU)
 - ?? 1 sample set/year, 4 per set; received in July 2000
 - o North Central Research Station, MN
 - ?? 2 sample sets/yr, 2 samples/set; received April 2000 and October 2000, not funded for 2001
 - o National Water Research Institute
 - ?? 2 sample sets/yr, 10 per set

Research

- ?? The World Meteorological Organization/Global Atmospheric Watch (WMO/GAW) sponsors an intercomparison study, the Analysis of Reference Precipitation Samples by WMO Laboratories on an annual basis with 96 laboratories in 48 countries. The Central Analytical Laboratory (CAL) of the NADP has participated in these studies for many years. CAL prepares the 122 sample sets of

three samples that are then sent to the Atmospheric Science Research Center in Albany, NY for distribution worldwide. The 2000 WMO intercomparison samples were prepared and shipped in December 2000.

- ?? The first set of 2001 World Meteorological Organization/Global Atmospheric Watch Intercomparison Study samples were prepared at the Central Analytical Laboratory and shipped to the Atmospheric Sciences Research Center, Albany, NY in March 2001. The Albany laboratory distributes these intercomparison samples to approximately 100 laboratories worldwide. The WMO/GAW coordinates international atmospheric deposition monitoring and quality assurance for the participating laboratories.
- ?? The CAL shipped approximately 7,000 archived precipitation samples to researchers throughout the US. The precipitation samples are being used to compile a modern global database of isotopes in precipitation for the *Global Network for Isotopes in Precipitation* being developed by the International Atomic Energy Commission, and by researchers for hydrological modeling, and paleoclimate and ecological studies.
- ?? Evaluation of bag liners for NADP sampling vs. unlined buckets:
The NADP invests considerable effort in washing and shipping buckets to sites. The capital investment in buckets, and mailers to ship them in, limits the ability of the network to investigate sampler designs that could improve the collection efficiency of blowing precipitation. The Canadian precipitation monitoring network, CAPMON, uses specially formulated bags as liners for their sample collectors. A collaborative arrangement with CAPMON and the NADP/CAL allowed for a special production run of 100 CAPMON style bags, specially sized for the NADP 3.5 gallon buckets, to be provided to us for testing. A study protocol is being developed that will allow us to determine the feasibility of using bag liners for the NADP project. The study will be conducted in 2001.
- ?? Organic and total nitrogen in NADP precipitation samples:
The NADP measures inorganic nitrogen (as nitrate and ammonium) in precipitation. Currently, there is interest in determining the amount of organic nitrogen in precipitation. Methods to determine organic nitrogen require a total nitrogen analysis; the organic nitrogen fraction is then determined by subtracting the inorganic nitrogen from the total amount. The project will involve the development of sampling and analysis protocols that minimize the degradation of the liable organic nitrogen component of the samples. We are collaborating with Bill Keene's graduate student, Kristina Russell, at the University of Virginia, Charlottesville, VA for analytical procedures. The study will be conducted in 2001-2002.
- ?? Continue investigations with thymol preservative for AIRMoN sampling

Goals for 2001

- ?? More updates to NTN preliminary printout to sites
 - o CAL newsletter replacing the footer information
 - o Combine two reports (Field and Preliminary) into one report
- ?? Site Operator Manual revisions
 - o Fully revised Appendix B (in final review)
 - o C, and D (edits in progress)
- ?? Replace aging equipment
- ?? Expand website

MDN REPORT, NADP INTERIM MEETING
TUCSON, AZ 4/23/01

- New Sites Operational between 9/00 and 5/01 (total operational sites = 59)

IN20, Huntington, USGS and IN DEP, 10/00 collocated with NTN
IN34, Indiana Dunes, USGS, NPS, and In DEP, 10/00, collocated with NTN
PA00, Arendtsville, PSU and PA DEP, NTN site, 11/00
IN28, Bloomington, USGS and IN DEP, 12/00
LA23, Alexandria, LaDEQ, 1/01
WI31, Devils Lake, WI DNR and USEPA, 1/01 (event sampling)
IN21, Clifty Falls, USGS and IN DEP, 1/01
SC03, Savannah River Site, 1/01
NH05, New Castle, resumed operation, 4/01
ON10, Burnt Island, Environment Canada IADN Site, 4/01
ON11, Pt. Petre, Environment Canada IADN Site, 4/01
GA22, Atlanta, Southern Co./ARA Inc., 5/01 (event sampling)

- Sites with Operations Suspended Temporarily and/or At-Risk

CA97, Covelo, EPRI, sampling suspended 12/00, site needs to be moved
NM10, Caballo, may lose funding 9/30/01

- New Sites Planned through 12/01 (total operational sites = 65 estimated)

NH00, Laconia, NHDEP, sampling to resume 5/01
MI05, Sleeping Bear Dunes, USEPA IADN site, 6/01
AL02, E. Mobile Bay, USEPA National Estuary Program, 6/01, NTN site
AL24, W. Mobile Bay, USEPA National Estuary Program, 6/01, NTN site

- Proposed Sites

OH09, Oxford, Ohio EPA/US EPA, NTN Site
TN11, Elkmont (Great Smokey Mtns NP), NPS, NTN Site
VA28, Big Meadows (Shenandoah NP), NPS, NTN Site
WI??, Menominee, Tribal site, NTN Site
NV??, Jarbridge Mtns, USEPA
TX??, Fort Worth, City of Fort Worth
NJ??, NJ DEP's air toxics program
CA??, New Idria, USGS, proposal pending

MDN REPORT, NADP INTERIM MEETING
TUCSON, AZ 4/23/01

- 2000 MDN data trough 6/00 on the NADP Web Site 12/00

- ATS Field QA Program (* = collocated with NTN)
 - IN20*, Huntington, 12/00
 - IN34*, Indiana Dunes, 12/00
 - TX21*, Longview, 1/01
 - GA09*, Okeefenokee, 2/01
 - AL03, Centerville, 2/01
 - GA40, Yorkville, 3/01

- Planned for the rest of 2001:
MEO2* ME09* ME96* ME98* PA72* PA00* IL11* NY20* WI99* PA13 PA90 PA30
PA60 NH05 LA05 LA10 LA23 LA28 PQ04 PQ05 CA72 NB02

- Sampler Intercomparison, IL11 Bondville, summer, 2001

- HAL Contract Renewal, RFP 5/01, New Contract 11/01

- Mercury Brochure

- Trace Metals "White Paper"

- MDN 1995-2000 Trends Paper

- Travel and Meetings

C. Sweet and E. Prestbo, March 27-29, Toronto, Ontario, Development of a North American Regional Action Plan for Environmental Monitoring and Assessment. Sponsored by Environment Canada and the Council on Environmental Cooperation (CEC).

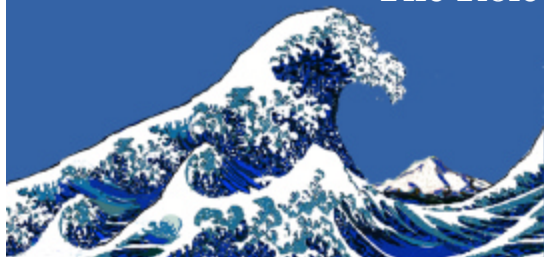
C. Sweet and E. Prestbo, May 8-10, West Palm Beach, FL, Workshop on the Fate, Transport, and Transformation of Mercury in Aquatic and Terrestrial Environments. Sponsored by USEPA.

E. Prestbo, October, Minamata, Japan, Mercury as a Global Pollutant, 6th International Conference.

Preliminary Quarterly Reports

Additional Data Products And Documents

- 2001 MDN Map
- Quarterly Laboratory QA Summary
- 1999 Annual MDN Quality Assurance Report
- Regional Lagrangian Model of Air Pollution (RELMAP)
- 1996-1999 MDN Annual Concentration and Deposition Maps
- Update - MDN Methyl Mercury Wet Deposition Program
- MDN and USEPA Hg Information Collection Request
- 1999 MDN Summary Map Overlay w/Hg Advisory Regions
- National Wildlife Federation Article - "Clean the Rain"
- National Science And Technology Council -
"The Role Of Monitoring Networks In The Management Of the Nation's Air Quality"



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HAL Staff Update

Dan Leeman, MDN Technician, Assistant Site Liaison

B.S. Watershed Management & Land Use Planning

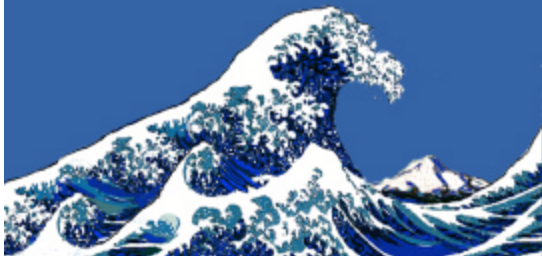
University of Wisconsin. In current position since November 3, 2001

Dan Corcoran, MDN Technician, Data Specialist

B.S. Biochemistry

University of Indiana. In current position since May 1, 2001

Currently Hiring For a 3rd Full Time HAL Technician.



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HAL Capacity

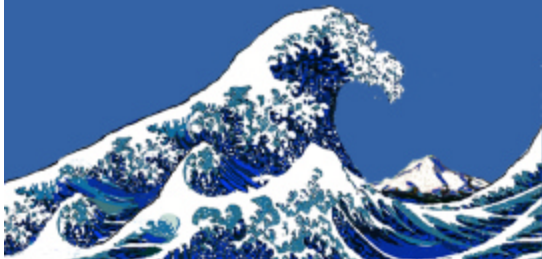
- ? HAL has analyzed 8388 Total Hg Samples to date
- ? Current Analysis Capacity is 150 Samples/day or ~ 3000/month
- ? 2 New Full Time MDN Employees – Site Liaison Assistant, Data
- ? Preparing for 10 additional sites (2 Event Based Sampling Sites)
- ? Two Additional Total/Methyl Hg Analyzers for MDN use only



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HAL MDN Data Status

- ? PO Released Final 1999 Data to NADP Web Site July/2000.
- ? PO Released Final 1st & 2nd Quarter 2000 Data to NADP Web Site Aug/2000
- ? HAL To Transmit Final 3rd and 4th Quarter 2000 Data To PO May 4, 2001
- ? 1st Qtr 2001 Preliminary Data – On Time – May 4, 2001
- ? 1st Qtr 2001 Site Sponsor Data Review Period May 4, 2001 – May 18, 2001
- ? HAL to Transmit Final 1st Qtr 2001 To PO May 31, 2001



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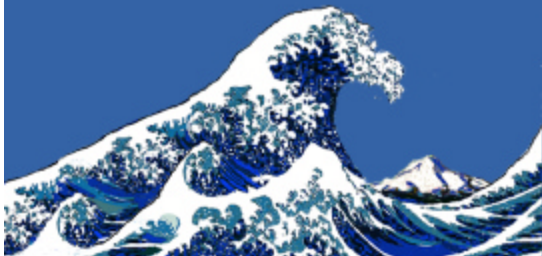
HAL/PO New Initiatives

Trace Metals (In addition to Mercury):

- ✍ Increasing number of MDN and Non MDN sponsor interest.
- ✍ HAL redesigned the ACM in order to utilize the second chimney.
- ✍ HAL designed a trace metals sample.
- ✍ HAL WA18 Trace Metals Study – 3 years
- ✍ PO Initiative To Include As Part Of MDN

Trace-Metals Dry Deposition:

NM10 Study To Continue Through 2001



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HAL Quality Assurance

2000 HAL Annual QA Report:

> Completion Data May 31, 2001 – Copies will be available on web site.

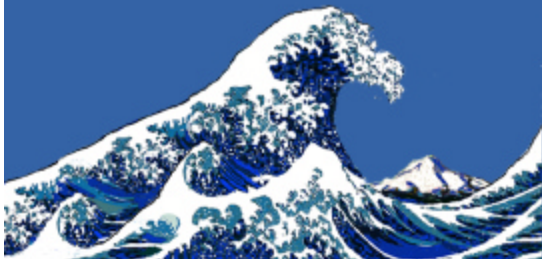
2001 Quarterly Laboratory QA Reports:

> Will continue to be sent with each MDN Preliminary Quarterly Data Report

2001 HAL Interlaboratory Comparison Studies:

> Interlab Comparison Study: Jan – June 2001 – Completion Data Aug 2001

> Interlab Comparison Study: July – Dec 2001 – Completion Data Feb 2002



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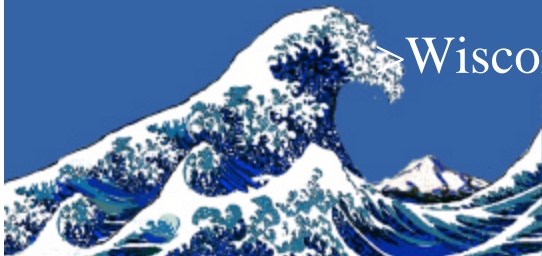
HAL Audits/Certifications

Frontier/HAL Laboratory Audits 2000:

- >US Army Core of Engineers – June 2000
- >NADP HAL Audit – June 2000 (Draft HAL Response Available)
- >Natl. Env. Lab Accreditation Program – July 2000
- >State of New York Dept. of Env. Conservation – Aug 2000
- >US EPA – Office Of Water – Sept 2000
- >Blue 292 – September 2000
- >Florida Dept. Of Environmental Protection – January 2001

New Frontier/HAL State Certifications:

- >New Jersey
- >New York
- >Louisiana
- >Wisconsin
- >California

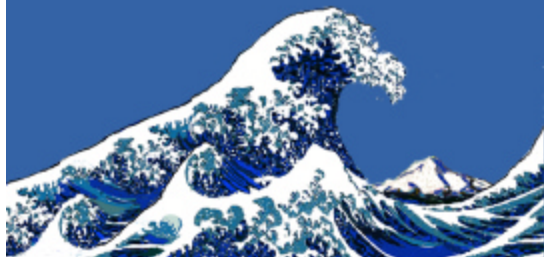


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HAL Field QA

HAL Field QA Studies:

- >ME98 with UMAQL – continuing through end of 2001
- >HAL Co-located ACM Study at WA18 – ended Feb 2000
- >MDN Co-located ACM Study to continue at IL11 by PO
- >HAL Co-located MDN ACM and MICB Collector –Dec 2000
- >Next Round Of System Blanks To Be Sent To MDN Sites – June 2001

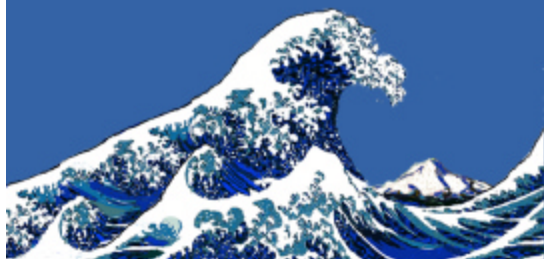


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PO HAL 2000 Audit

Copies Of HAL Response To PO Audit Available

- MDN HAL Sample Archival Program
- External Review Of HAL QA Report
- MDN External Blind Audit Program



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MDN Site Start-Up/Audit Program

Initial Site Visit/Start and Operator Training by HAL in 2000

✍ 7 Site Start-Ups with 2 Existing MDN Sites Visited

✍ Total of 16 Site Operators and Back-Up Operators Trained

Initial Site Visit/Start and Operator Training by HAL/PO 6/2001

✍ 9 Site Start-Ups with 1 existing site visited

✍ Total of 17 Site Operators and Back-Up Operators Trained

ATS Field QA Program:

> MDN sites to be Audited on a 3 year cycle



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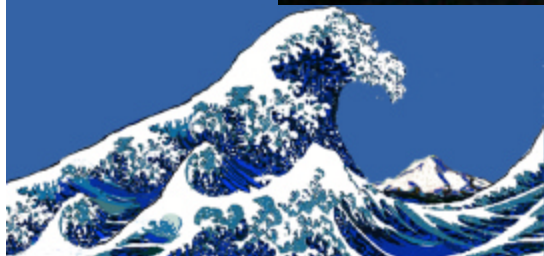
MDN ACM Chimney Cap

Previous MDN Funnel Support



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MDN Chimney Cap



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MDN Chimney Cap



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MDN Chimney Caps

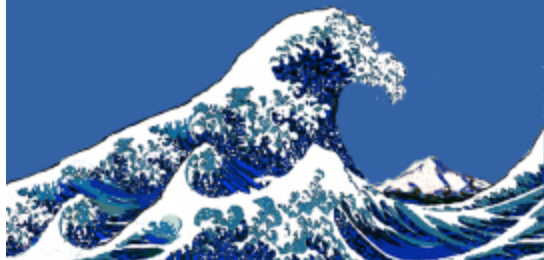


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MDN Chimney Caps

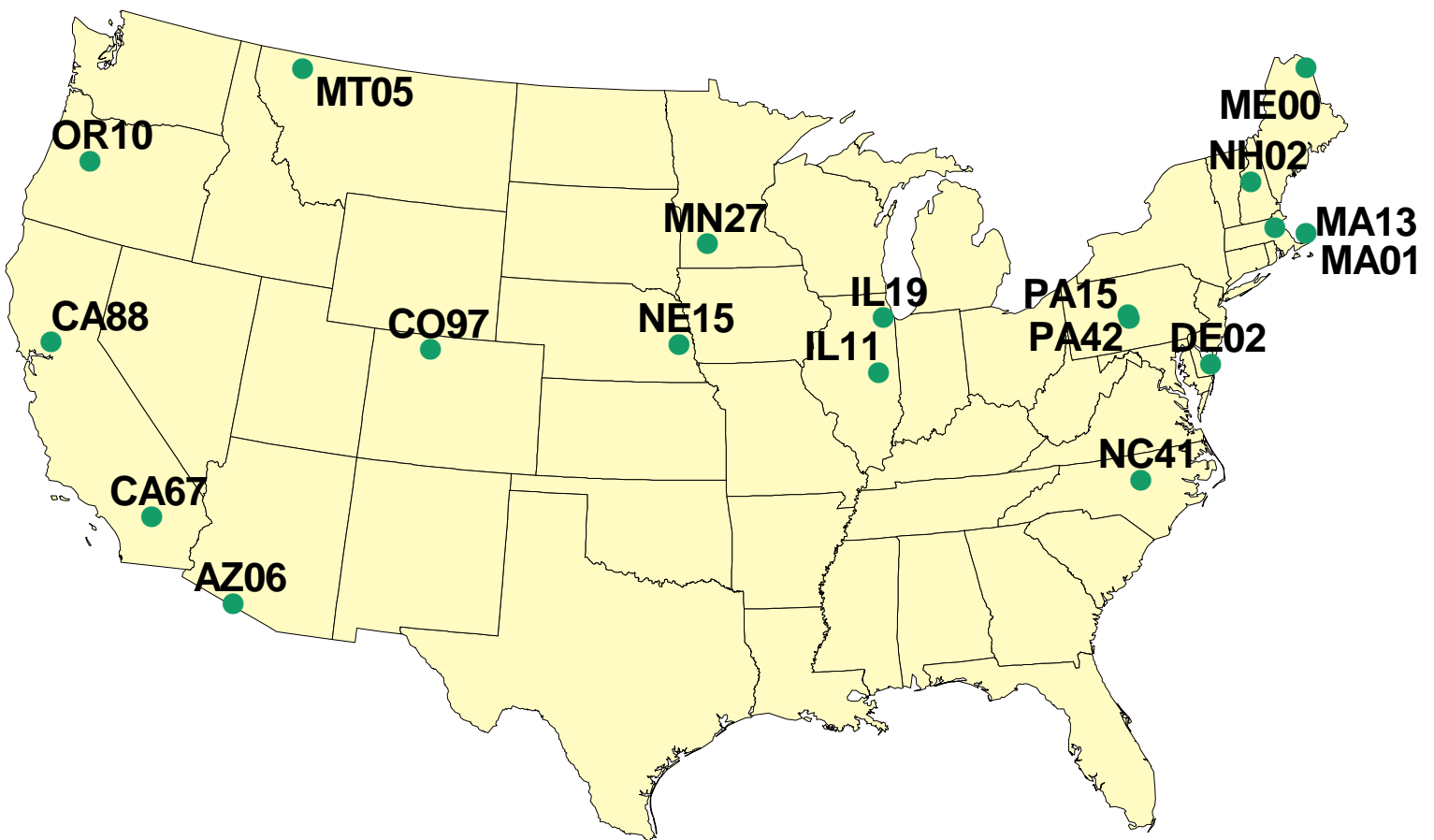


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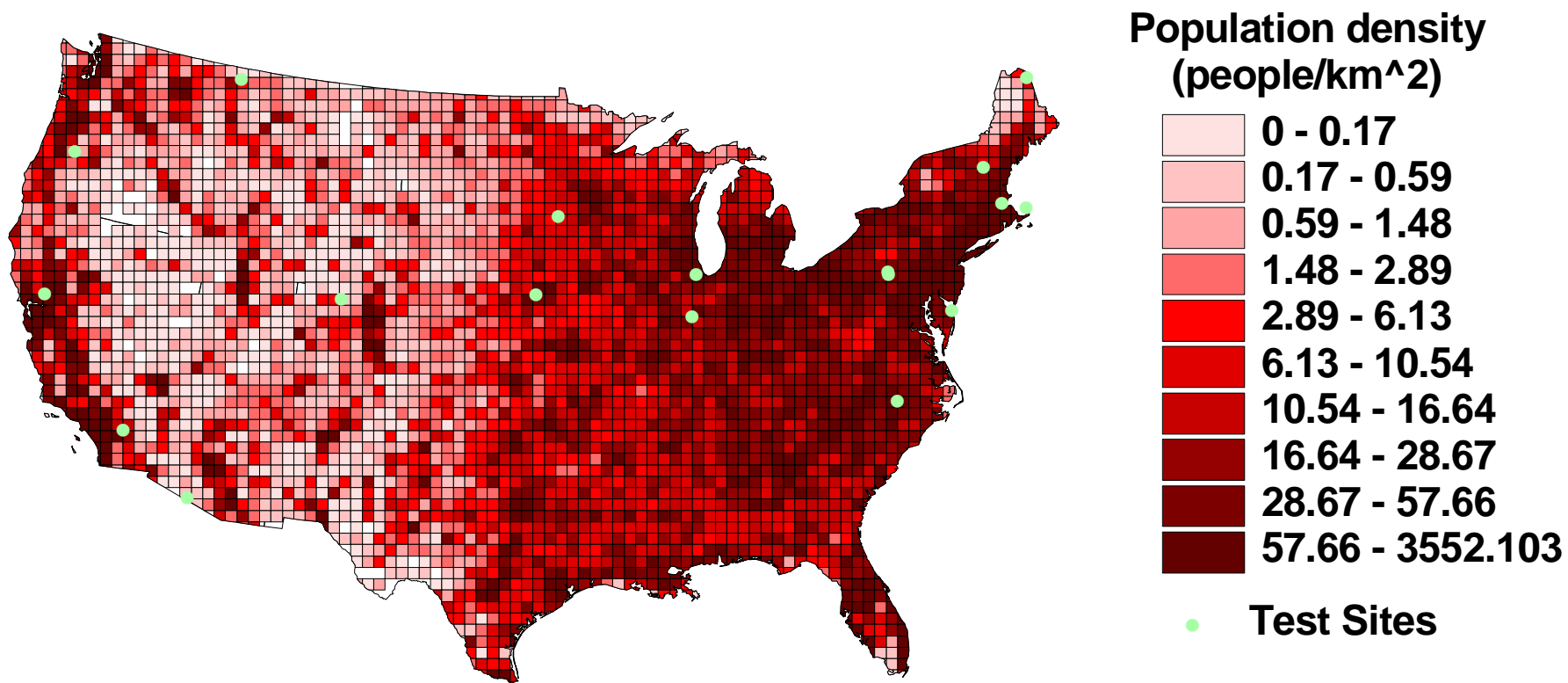


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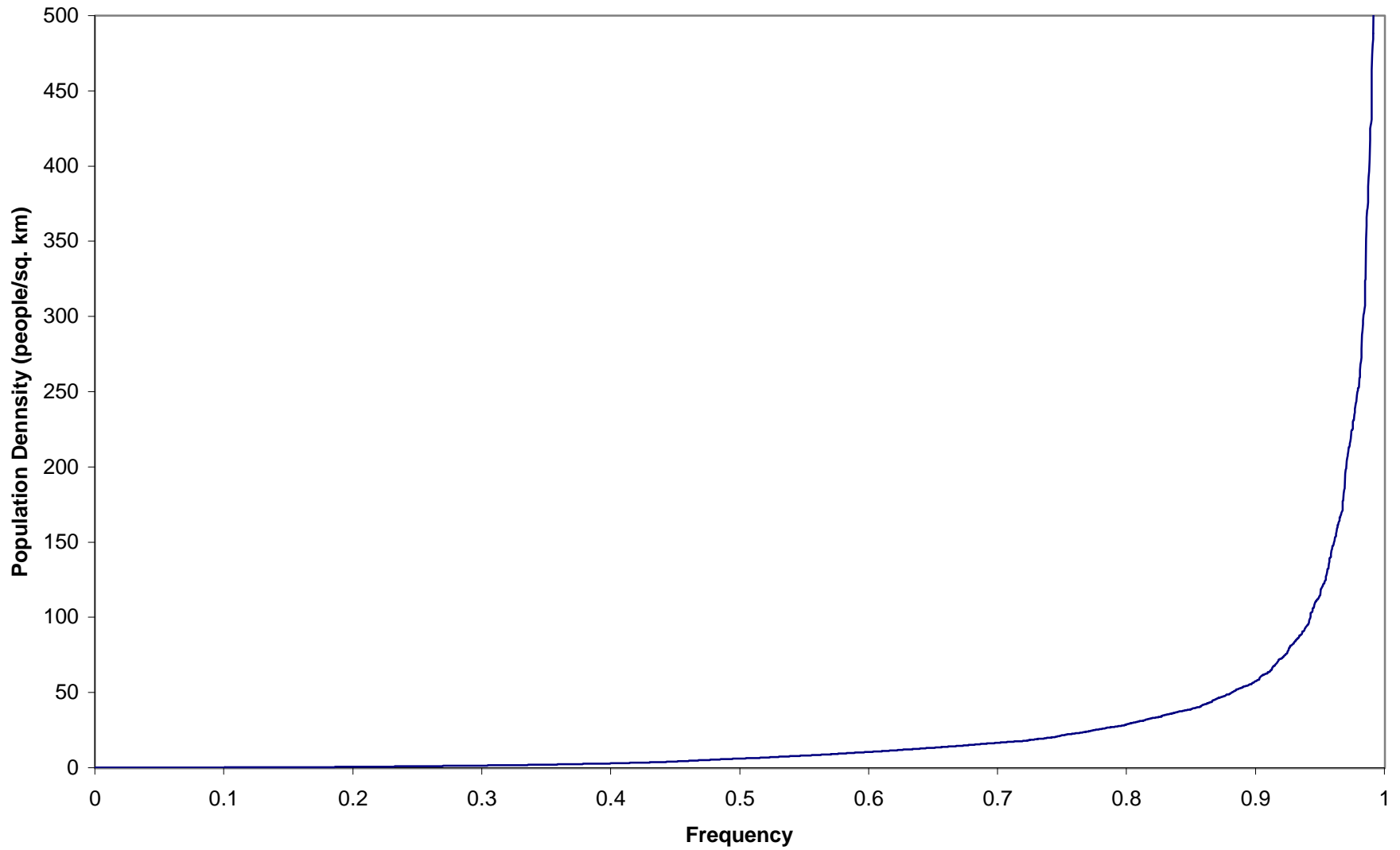
Test Case Sites



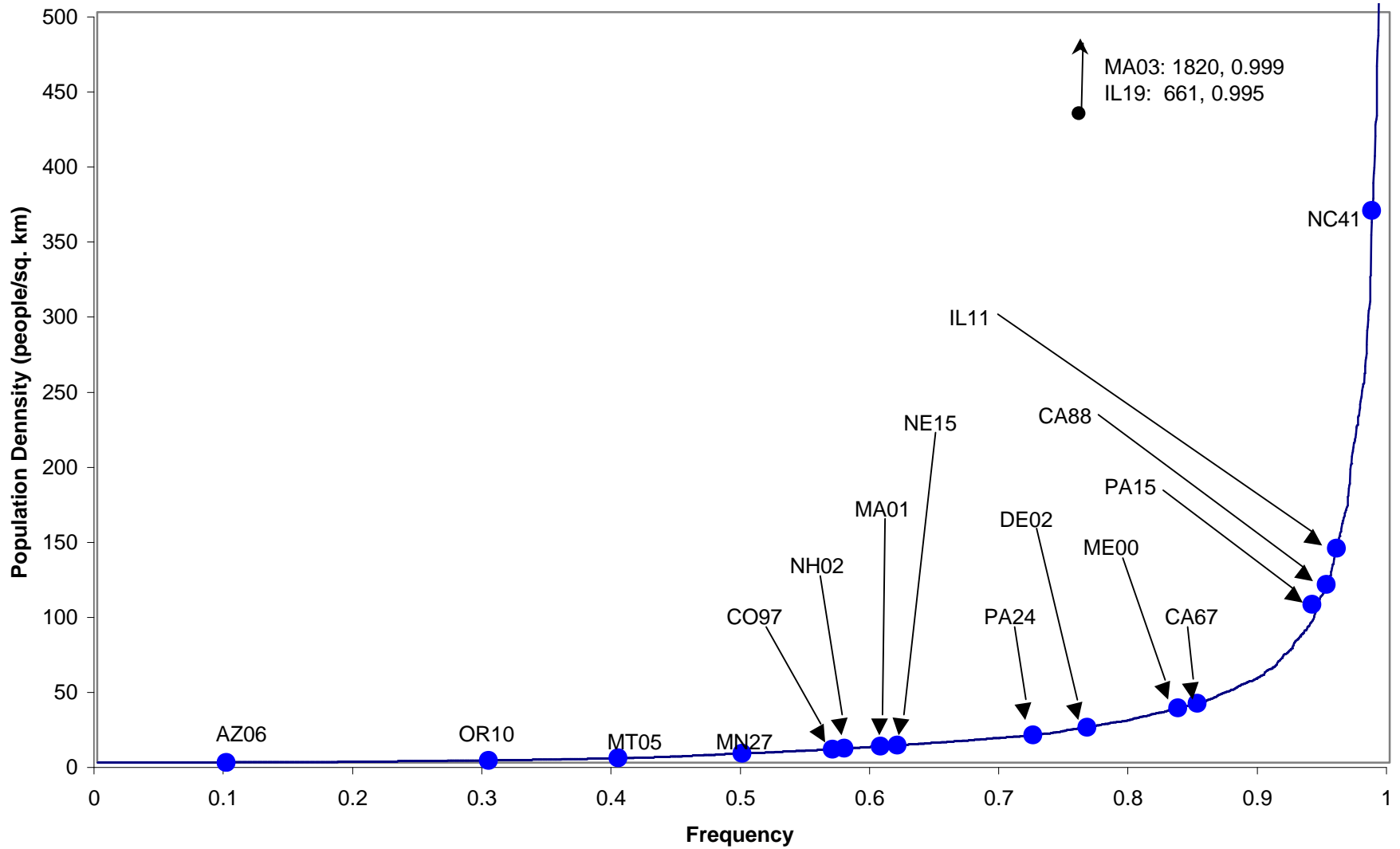
Gridded Population Density



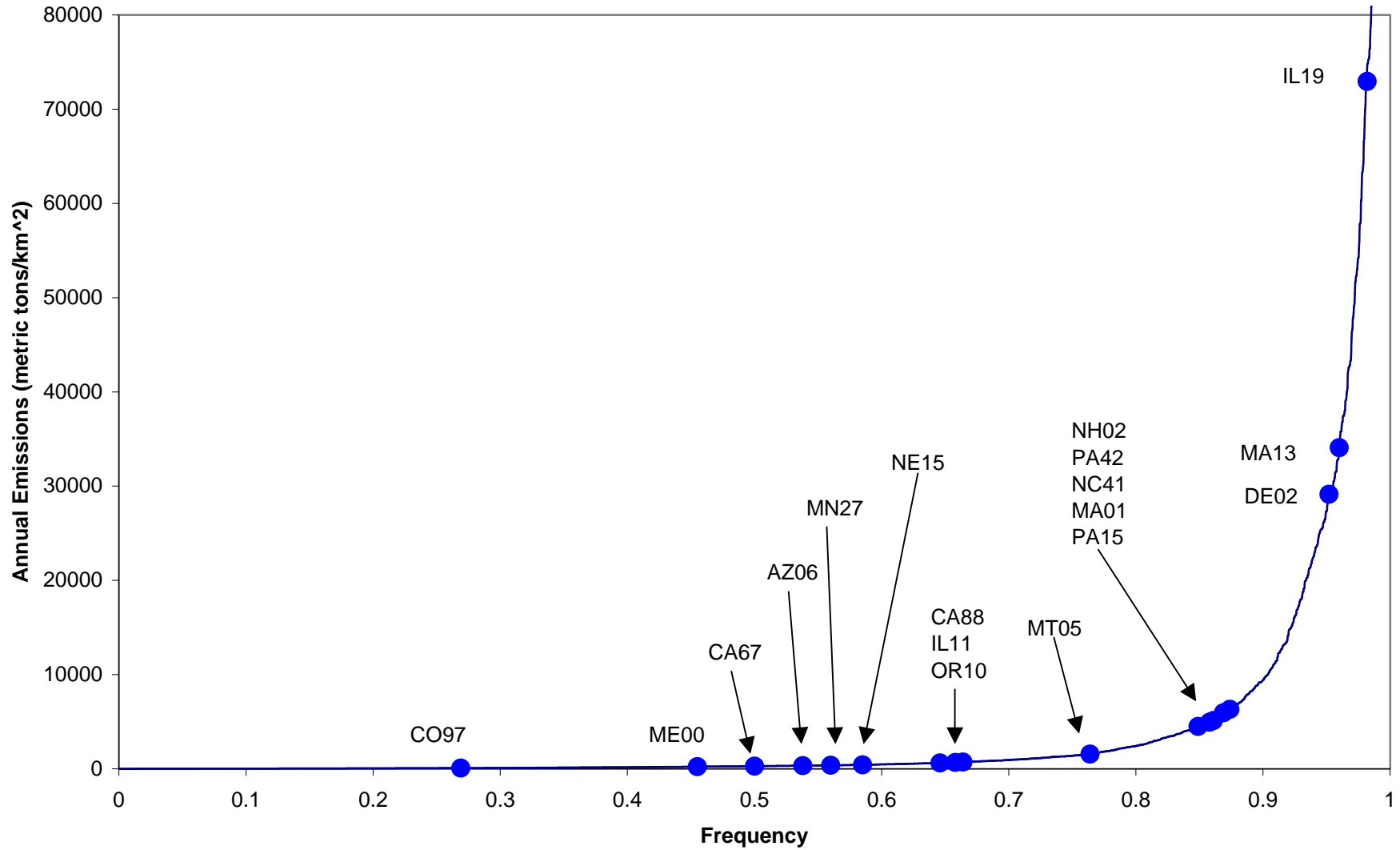
Population Density Frequency Distribution



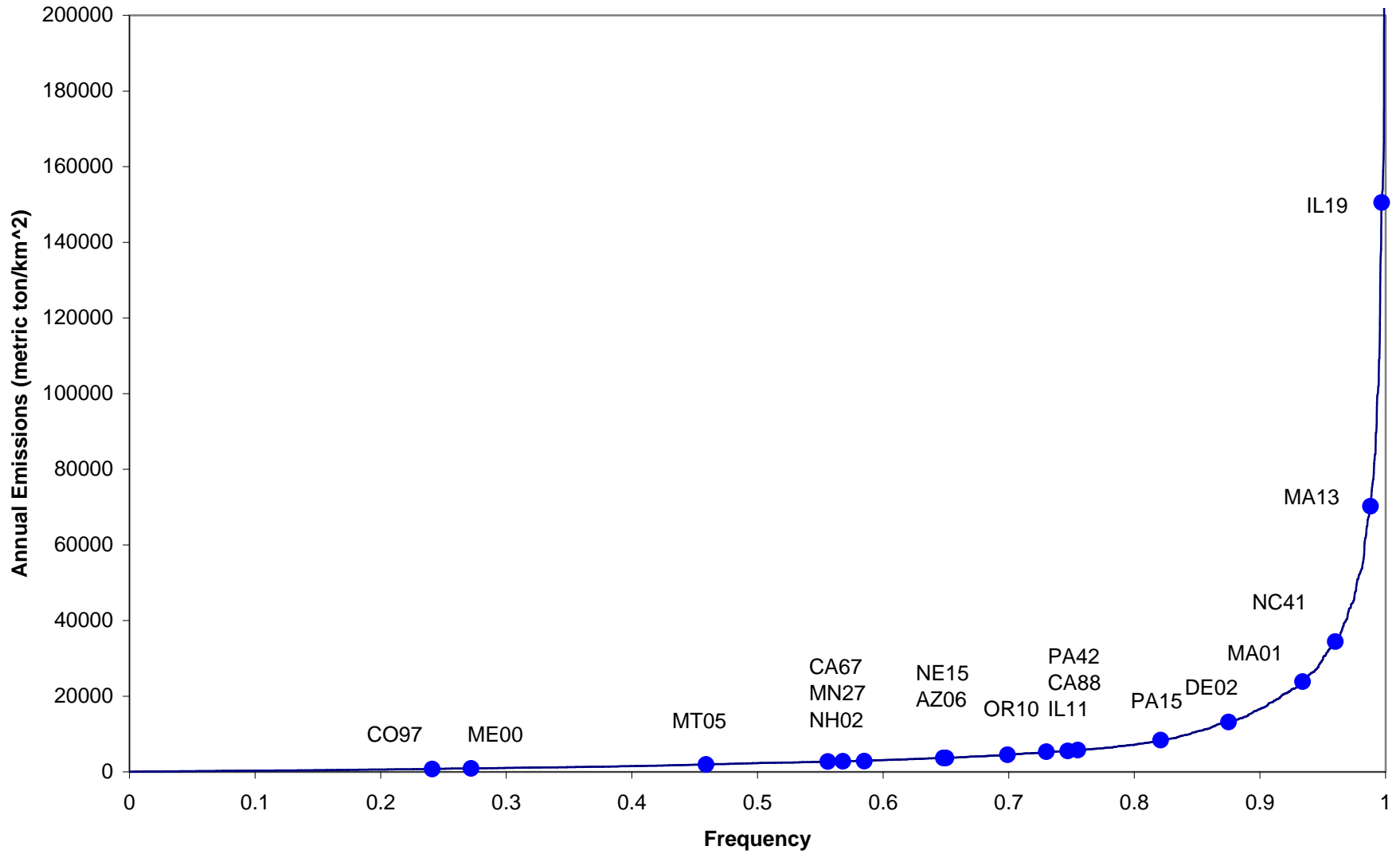
Population Density Frequency Distribution

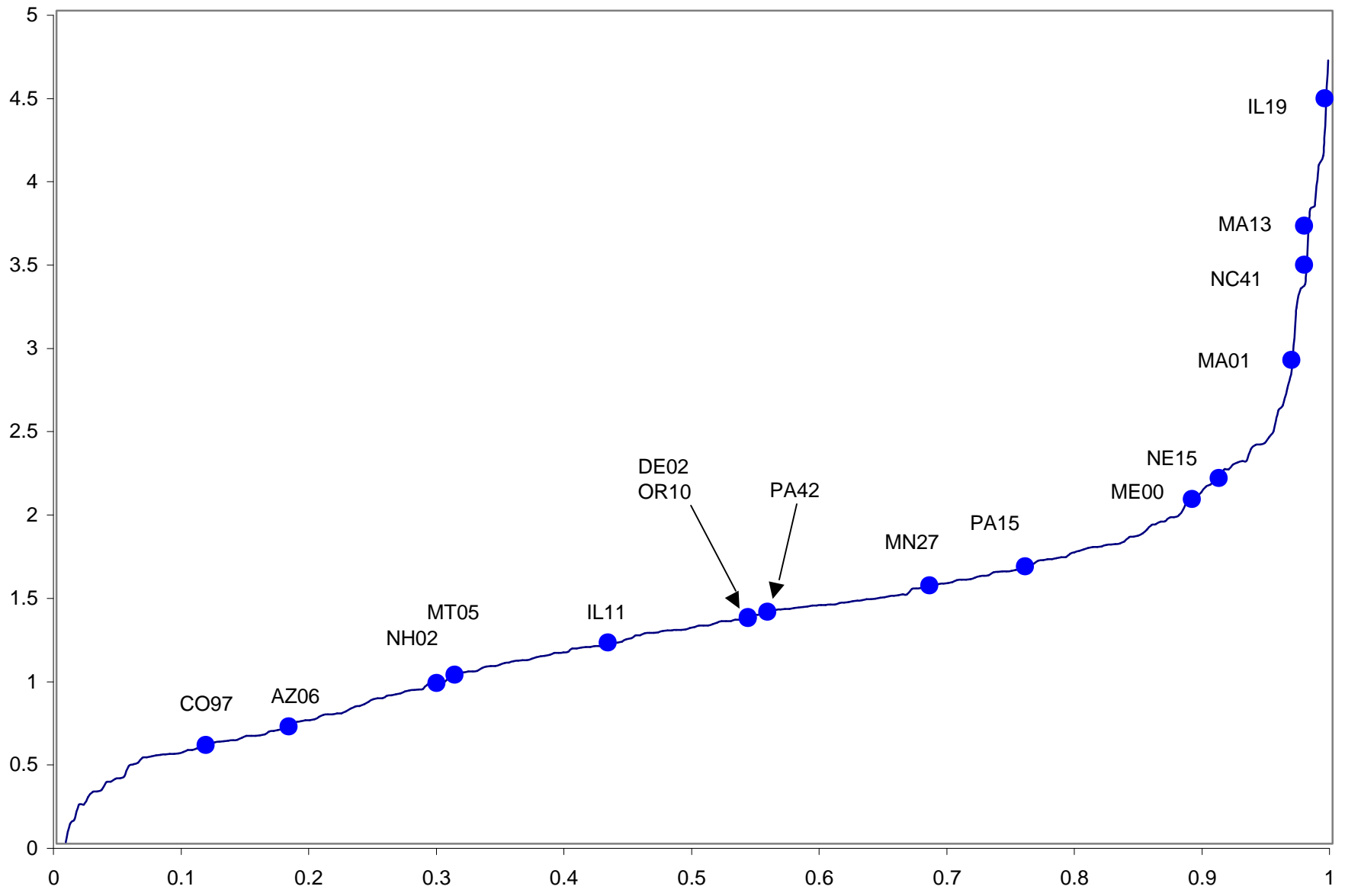


SOx Emissions Frequency Distribution



NOx Emissions Frequency Distribution





National Atmospheric Deposition Program – Spring 2001 Interim Meeting
 Joint Committee Minutes: Attachment 4

NADP Field Equipment Modernization – Progress Report

Mark Nilles

U.S. Geological Survey
manilles@usgs.gov

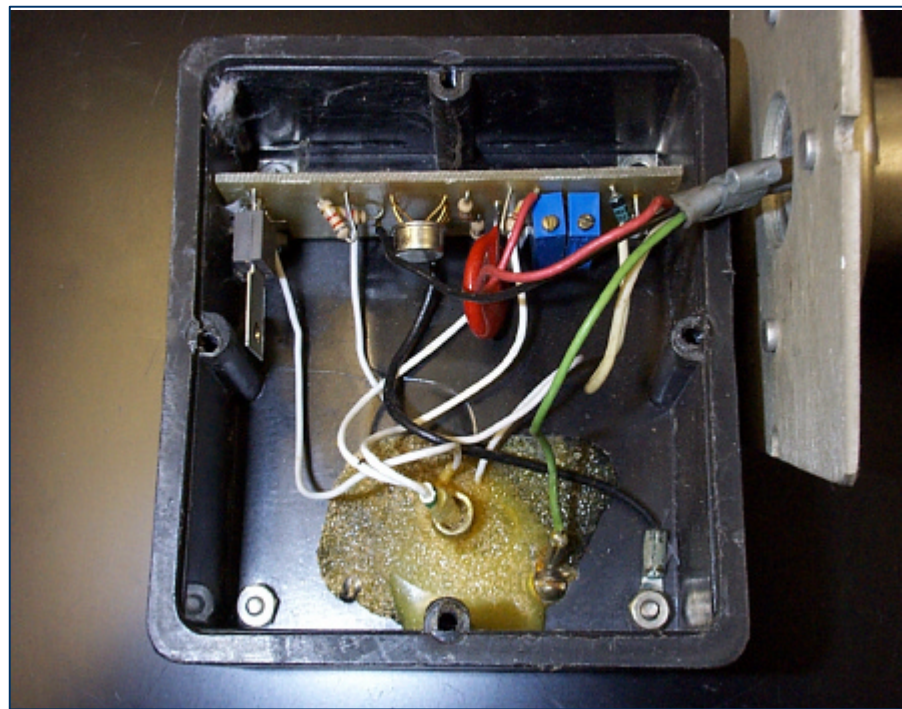
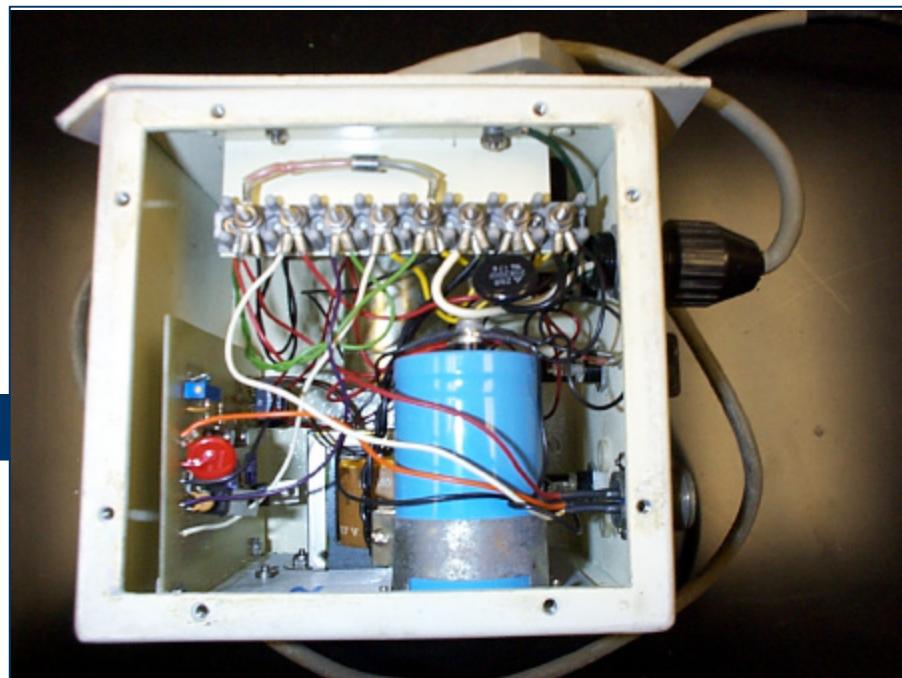
Vision: The NADP will meet the need for a modern, flexible and accurate long-term observing system to quantify on a national scale the wet deposition of important chemical species to our nation's aquatic and terrestrial ecosystems.



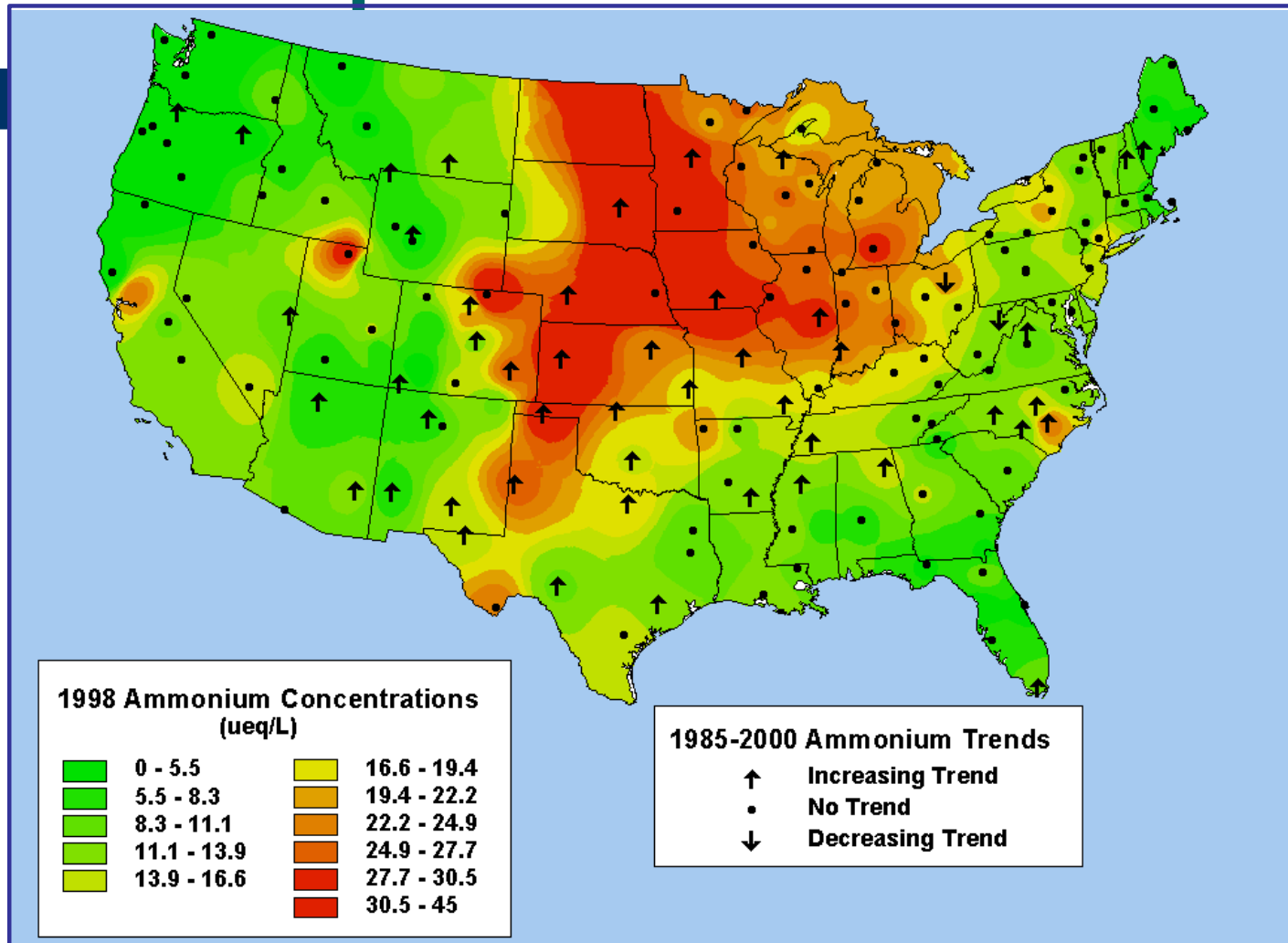
Modernization work-group

- ✍ Mark Nilles, Chair, USGS
- ✍ Van Bowersox, ISWS
- ✍ Rick Artz, NOAA
- ✍ Rona Birnbaum, USEPA
- ✍ Eric Prestbo, Frontier Geo.
- ✍ Al Reibeau, USFS

NADP sampler today



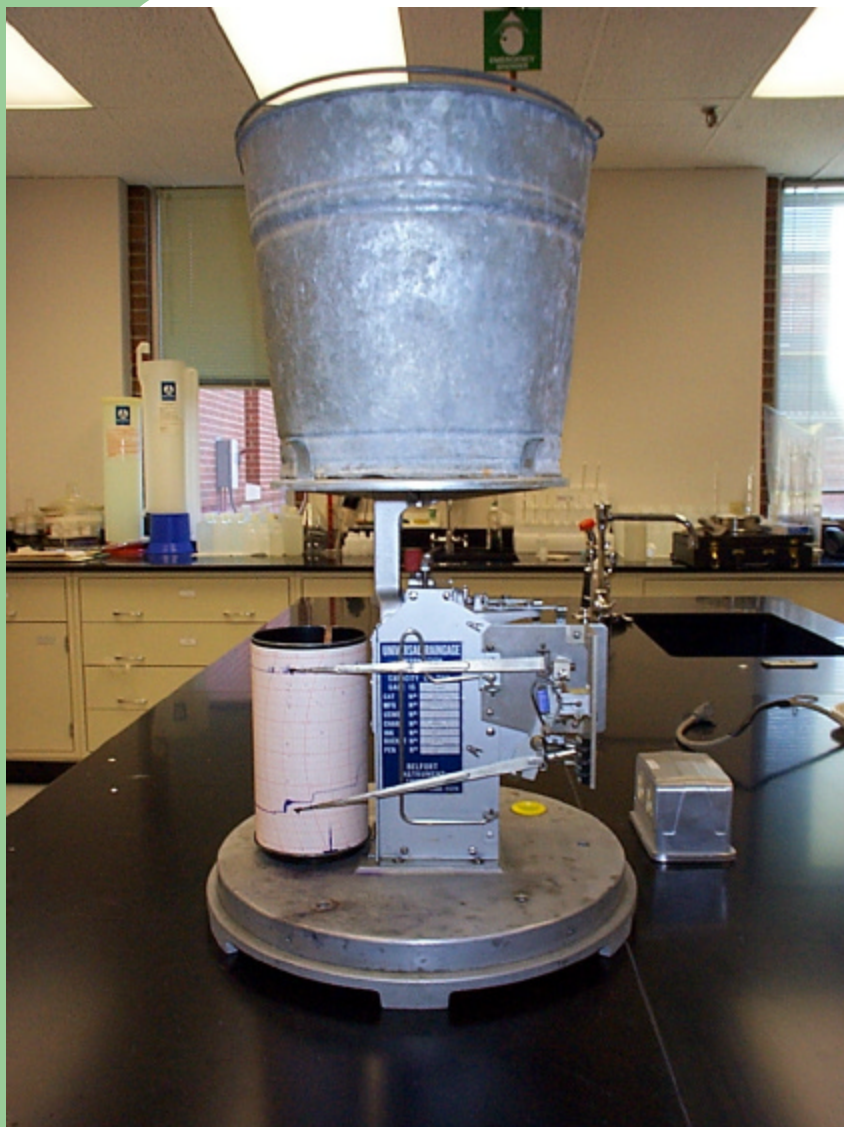
Trends in Ammonium in Precipitation 1985-2000



1950



2003?



Timeline – Recent accomplishments

- ✍ **July 2000** – Phase III raingage testing commenced at six NADP sites (18 month study planned)
- ✍ **January 2001** - Mercury workgroup finalized new Hg and other trace metals sampling train
- ✍ **February 2001** – N-Con began development of trace metals sampler

Timeline – Recently completed tasks

- ✍ **February 2001** – N-Con Inc. begins marketing a new “NTN spec” deposition sampler.
- ✍ **March 2001** - Program office procures N-Con sampler for Phase I testing.
- ✍ **March 2001** – Phase I N-Con sampler testing begins.
- ✍ **February 2000** - NOAA-SBIR phase I funding awarded to Yankee Environmental Systems.

N-Con NTN-style sampler



Timeline – Recent accomplishments

- ✍ **January 2001** – Yankee Environmental completes Phase I report. (Paper design and mockup).
- ✍ **February 2001** – Yankee Environmental submits application to NOAA SBIR for Phase II funding for prototype development.

Upcoming Tasks - Rain gage

- ✍ **April 2001** – NOS briefed on preliminary rain gage results.
- ✍ **August 2001** - Executive committee reviews results of preliminary Phase III rain gage test results.
- ✍ **December 2001** - Phase III rain gage testing completed.

Upcoming Tasks - Raingage

- ✍ **April 2002** - Final results of Phase III rain gage tests delivered to NOS. NOS considers recommendation for use of Ott rain gage in NADP networks and forwards decision to Technical and Executive Committee.
- ✍ **October 2002-2003** - Exec and Technical committee consider NOS recommendation. If approved and funded the new rain gage is procured and deployed network-wide.

Upcoming tasks – N-Con Sampler

- ✍ **April-October 2001** - Phase II N-Con sampler testing commences (initial field testing).
- ✍ **October 2001** - Initial results from Phase II new sampler testing presented to NADP NOS and Technical committee. Committees endorse or rescind Phase III testing. If endorsed, study plan prep and site selection for phase III testing commences.
- ✍ **November 2001** - Phase III samplers procured.
- ✍ **April 2002** - Phase III testing commences.
- ✍ **April 2003** - Phase III preliminary results reported to NOS.
- ✍ **October 2003** - Phase III sampler testing completed.

Upcoming tasks – YES Sampler

- ✍ **April-May 2001** - NOAA decision is pending regarding funding of Phase II YES sampler development.
- ✍ **May-July 2001** - If NOAA approves Phase II, NADP budget committee will consider cost-sharing for partial Phase II support.

Network-wide Deployment - Costs

Assumptions

- NADP-NTN (weekly sampling) 230
- non-collocated NADP-MDN (mercury) 35
- non-collocated NADP-Airmon (event sampling) 5

Total discrete sites ~270

Network-wide deployment - costs

Assumptions - Cost per site

- \$8K Precipitation gage with data logger
- \$4K-\$7K New wet deposition sampler
- \$5K Sutron DCP setup w/ antenna (precipitation, temperature and collector
- \$1K Installation
- \$1K repair upgrade of solar systems or AC wiring and electrical panels
- Total per site=\$22K

Network-wide Deployment - Costs

- ✍ Subtotal ~\$6M.
 - Plus spare parts (25 sets of equipment) ~\$500K.
- ✍ **Grand total \$6.5M one-time (net direct) costs for refurbishment.**

For comparison, the annual operating cost for all NADP sites is on the order of \$4.5M.

Phase III Testing of The OTT-Pluvio Rain Gage



Introduction

- National Atmospheric Deposition Program/National Trends Network (NADP/NTN) collects rainfall rate and chemistry data at over 200 sites throughout the United States
- Design of current Belfort rain gage is 50 years old
- Belfort gage is prone to mechanical breakdown and data loss
- Rainfall data is used to calculate depositional loads from network



OTT-Pluvio Rain Gage



NV03

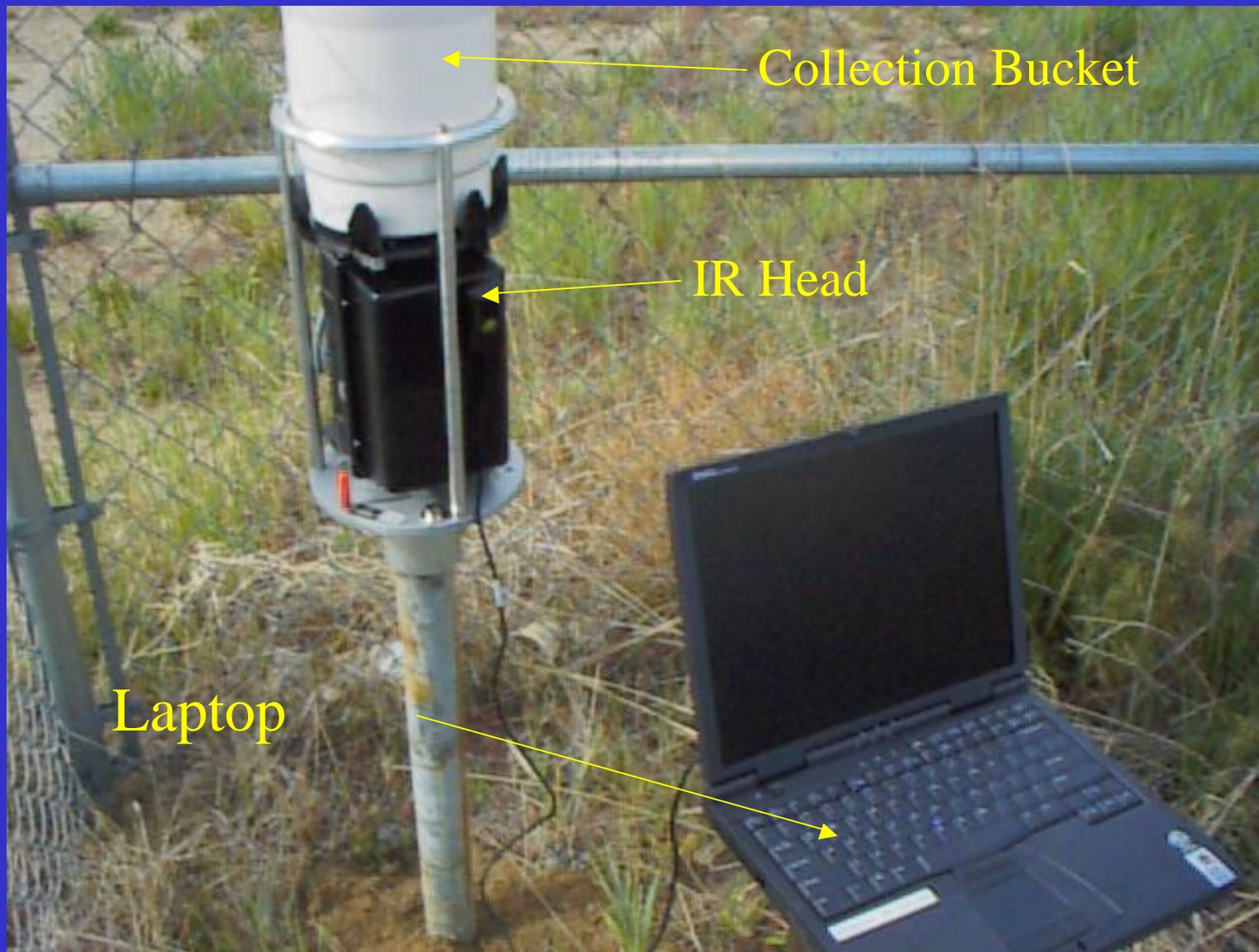




Load Cell

Data Logger





Laptop

Collection Bucket

IR Head



Objectives

- Determine comparability of existing Belfort rain gage and OTT-Pluvio gage
- Compile Standard Operating Procedures for installation, data collection, and maintenance
- Analyze quality of data collected from the OP gage and suitability as a replacement for existing gage



Approach

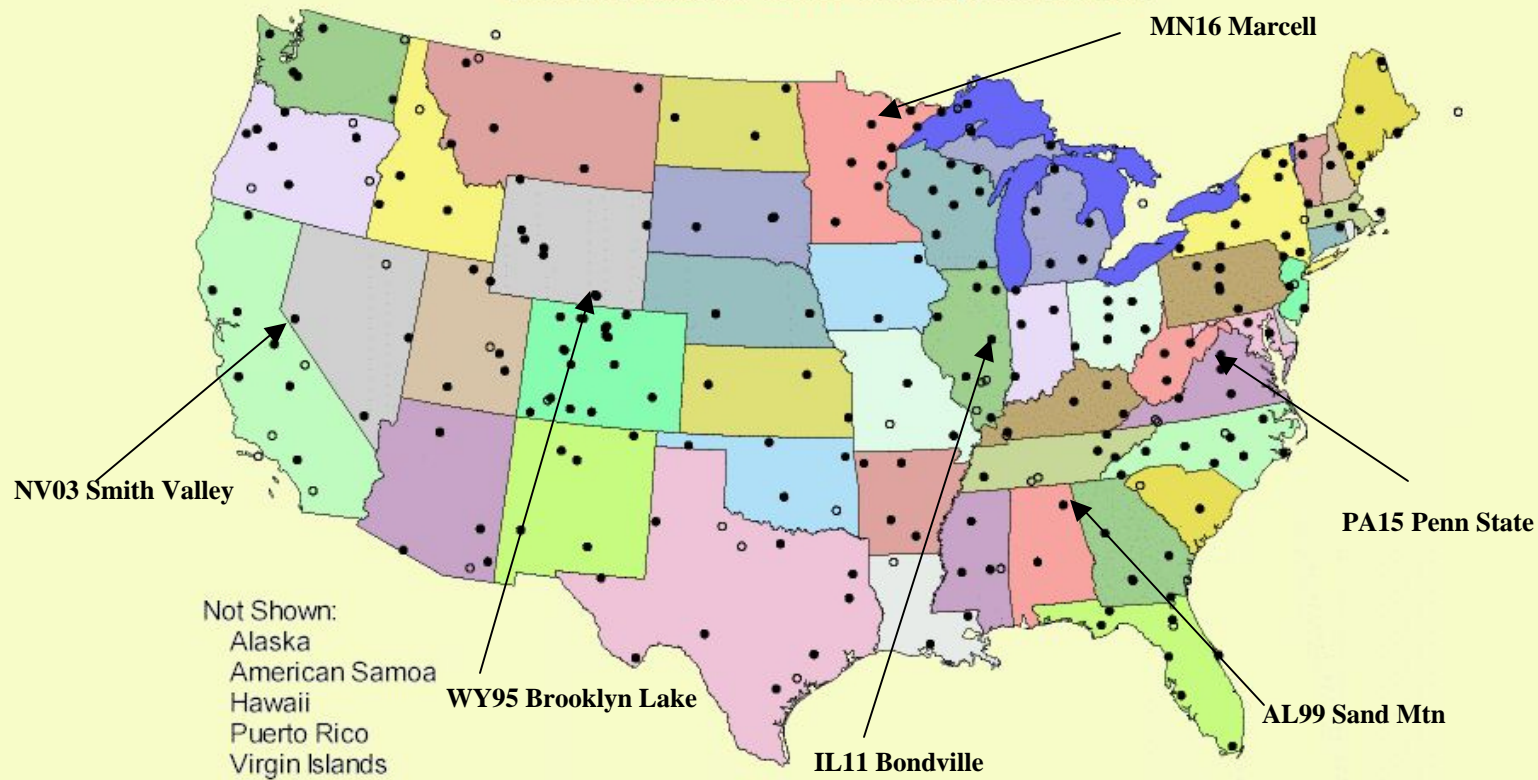
- Seven OTT gages installed at six NTN sites throughout the country
- Illinois Water Survey has two OTT gages at IL11
- Gages collocated with Belforts will be tested for eighteen months





NADP/NTN SiteList

Click on a State to access a NADP/NTN Site List



Site Equipment

Site	OTT	Belfort	Stick	Power
AL99	1	1	0	AC
IL11	2	3	1	AC
MN16	1	2	0	AC
NV03	1	1	0	DC
PA15	1	2	2	AC
WY95	1	1	0	DC

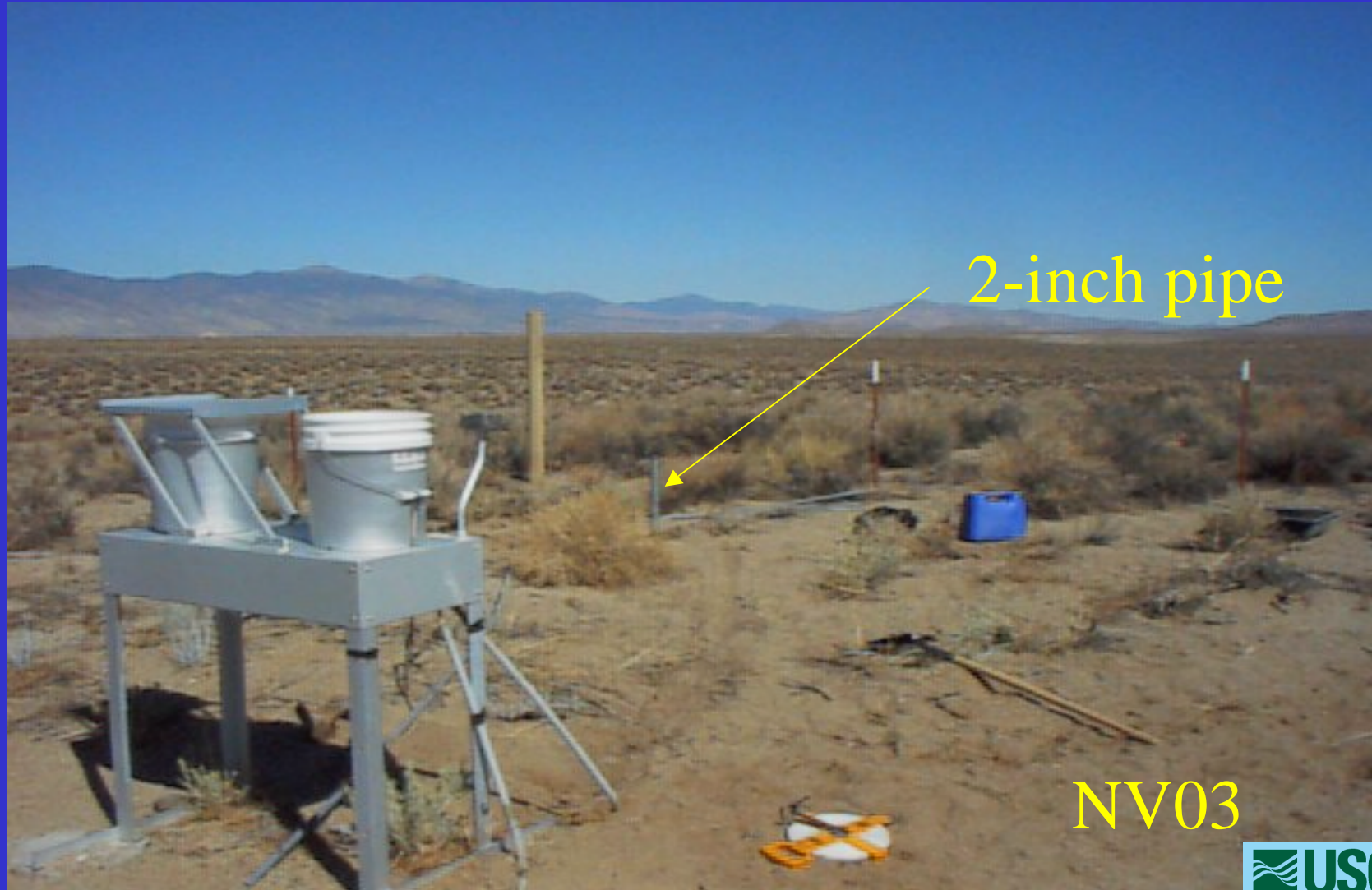


Installation

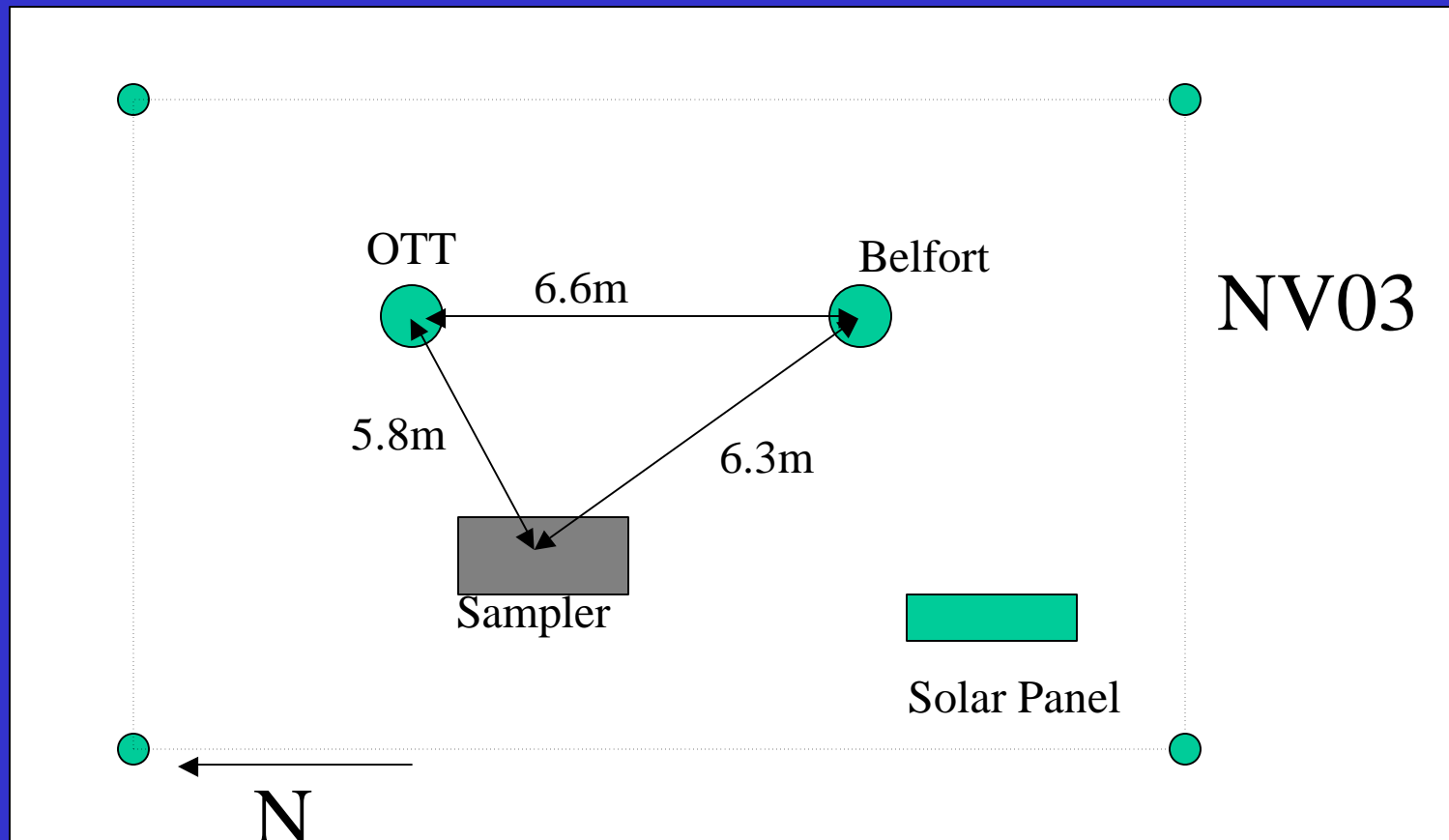
- Set on 2” pipe
- Gage installed >5m from sampler and Belfort
- Obey 45° rule
- Gage orifice at same height as Belfort
- Alter shield for OTT if Belfort has one



Installation



Installation



Installation

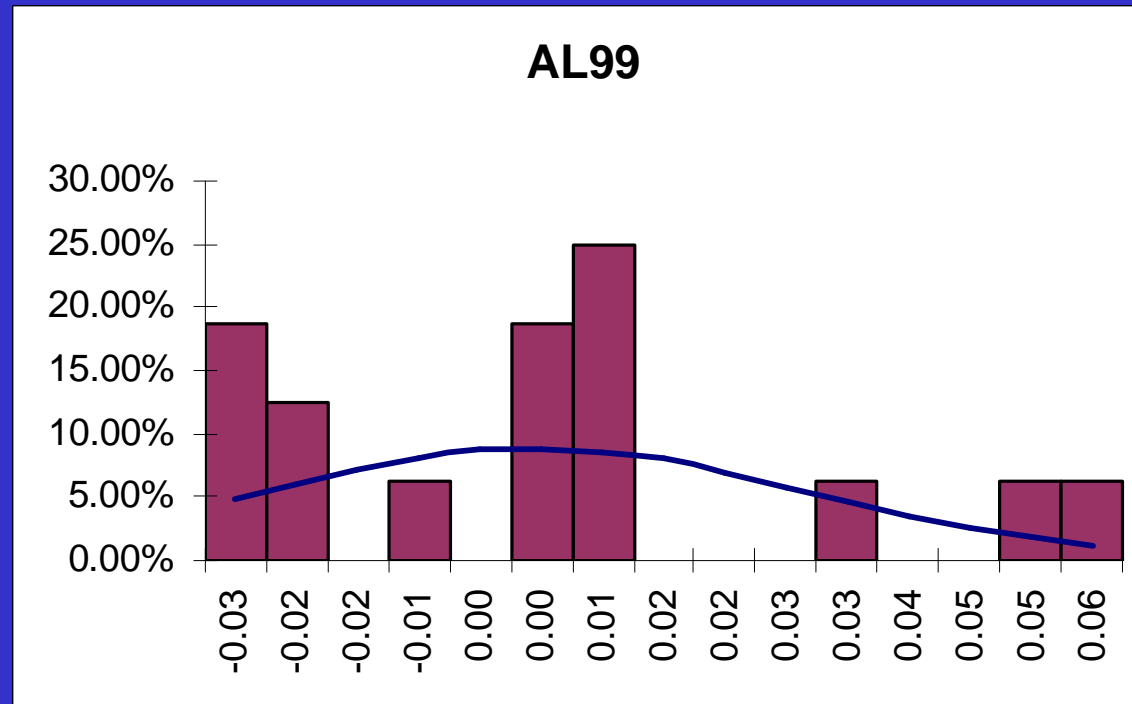


Data Collection

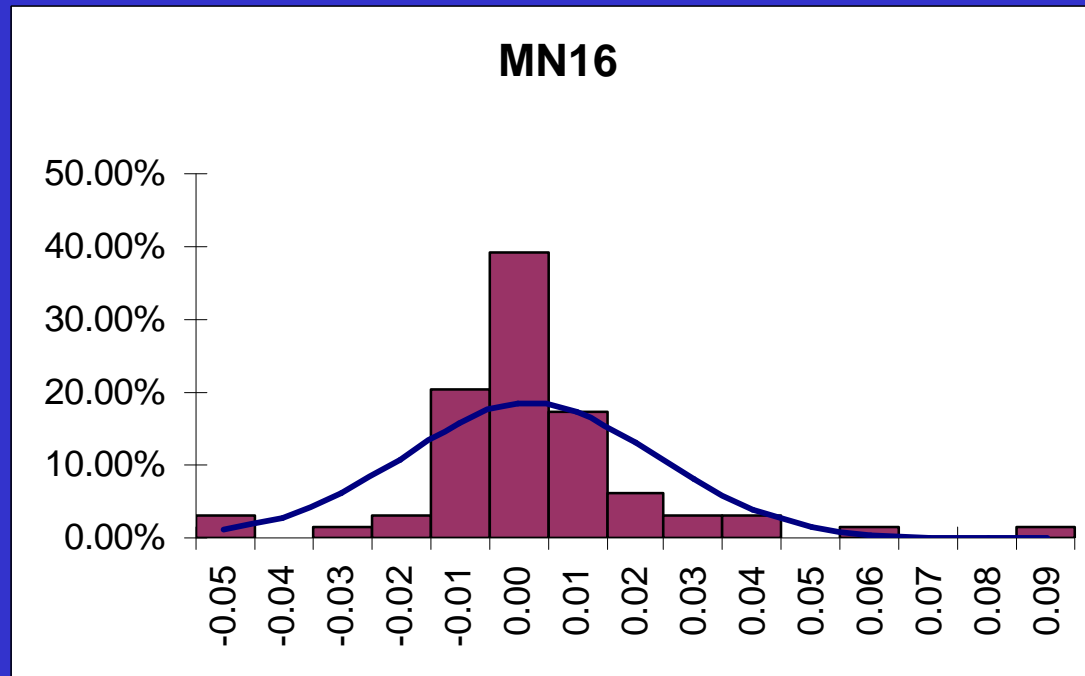
- OTT visited every Tuesday
- Download previous week of data
- Visually inspected in field
- Sent as attachment via email
- FORF and Belfort chart for each site sent by NADP program office



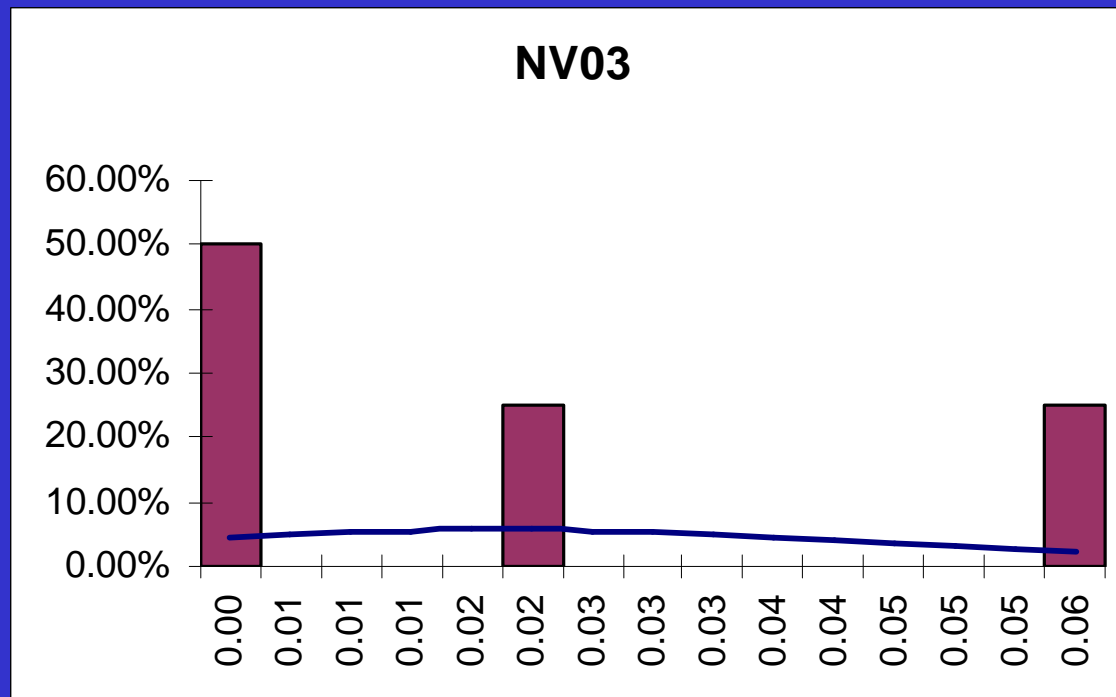
Preliminary Results



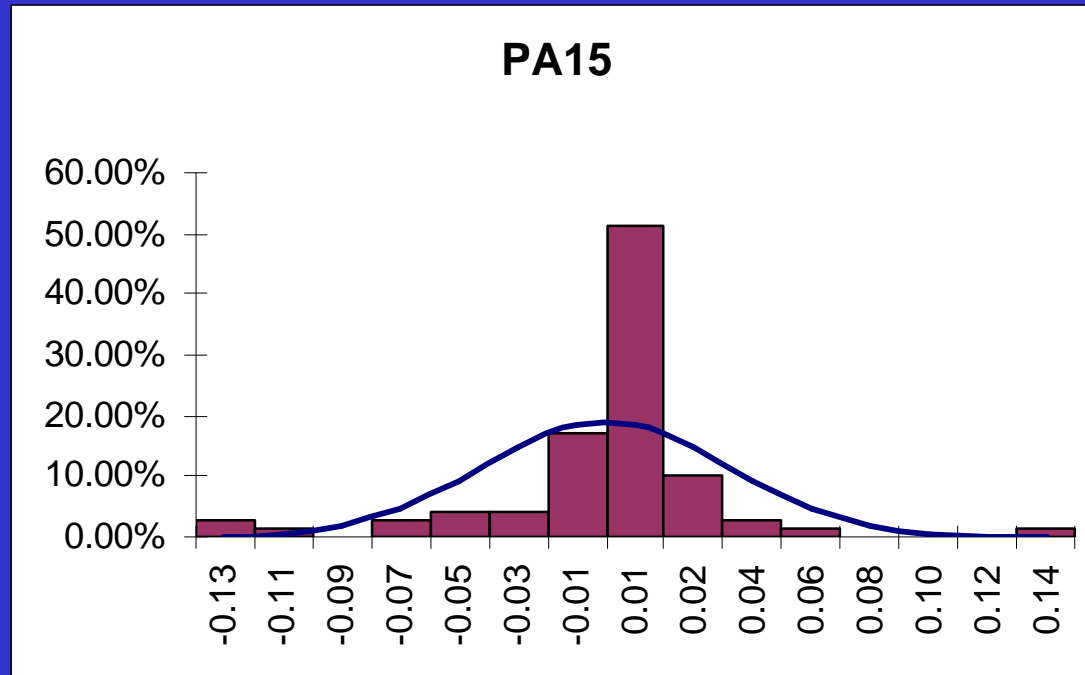
Preliminary Results



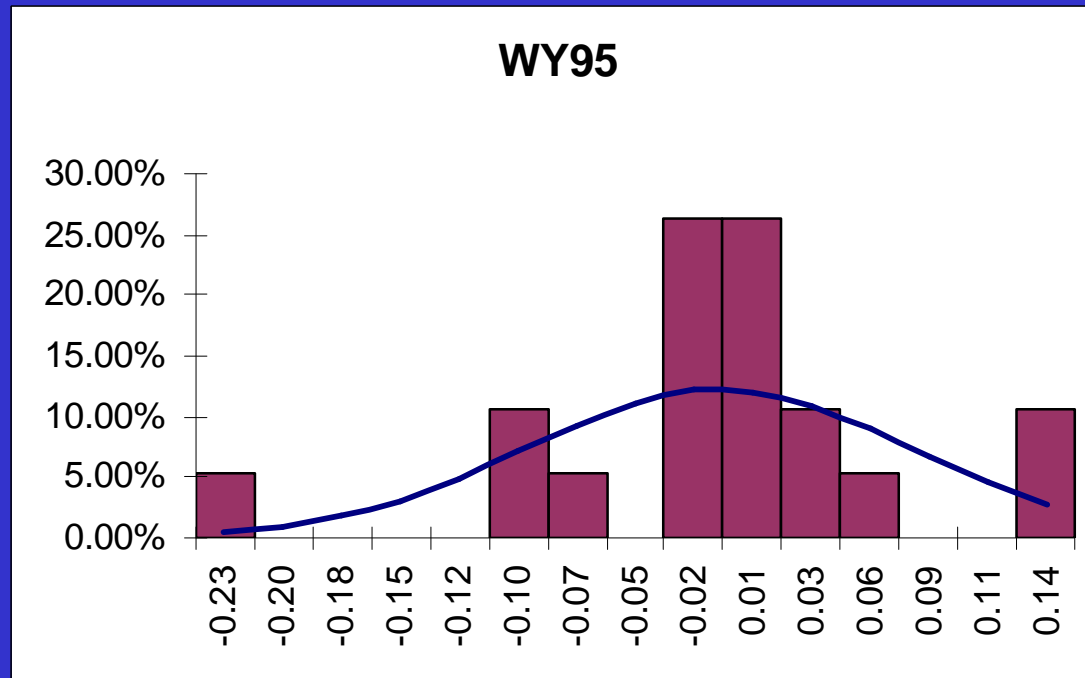
Preliminary Results



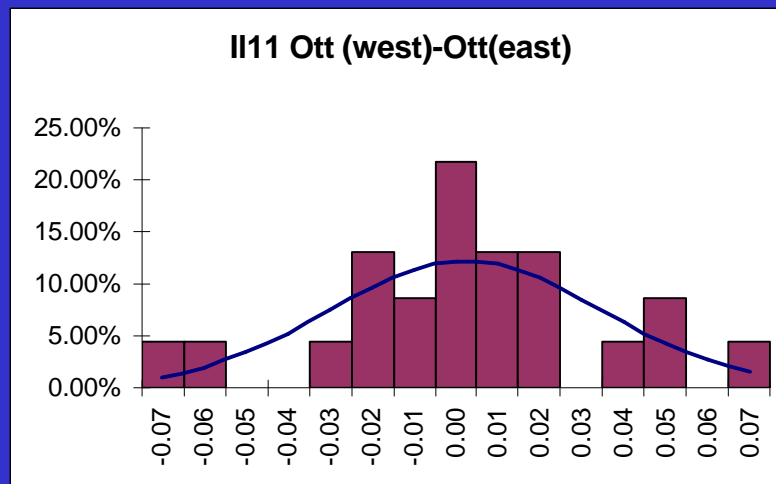
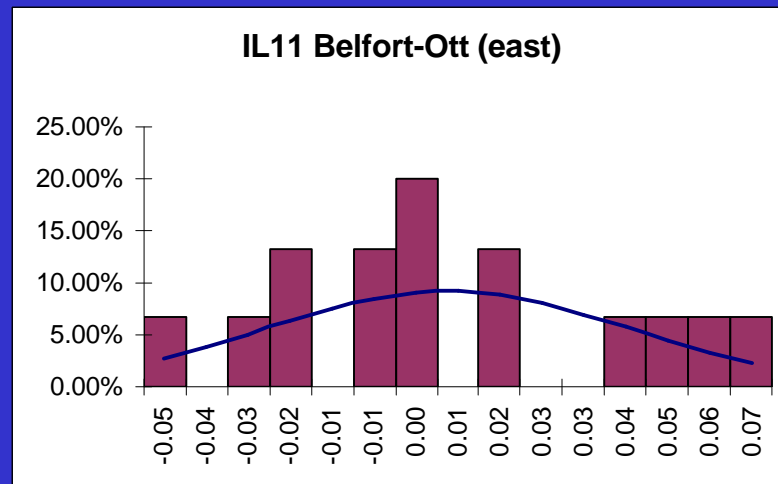
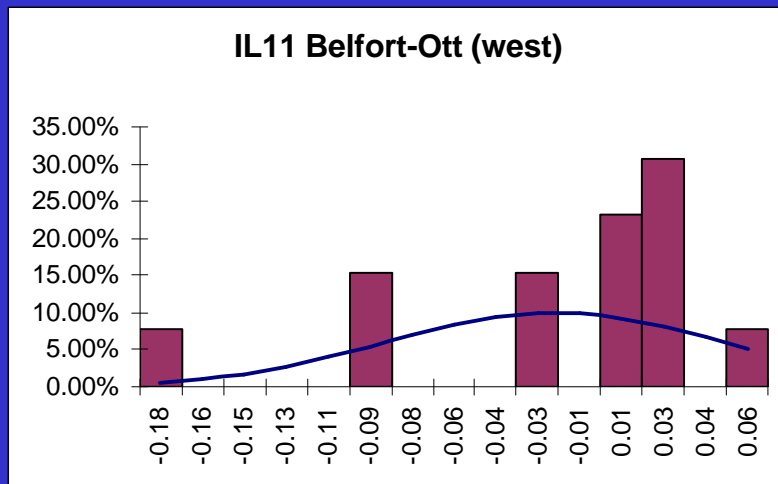
Preliminary Results



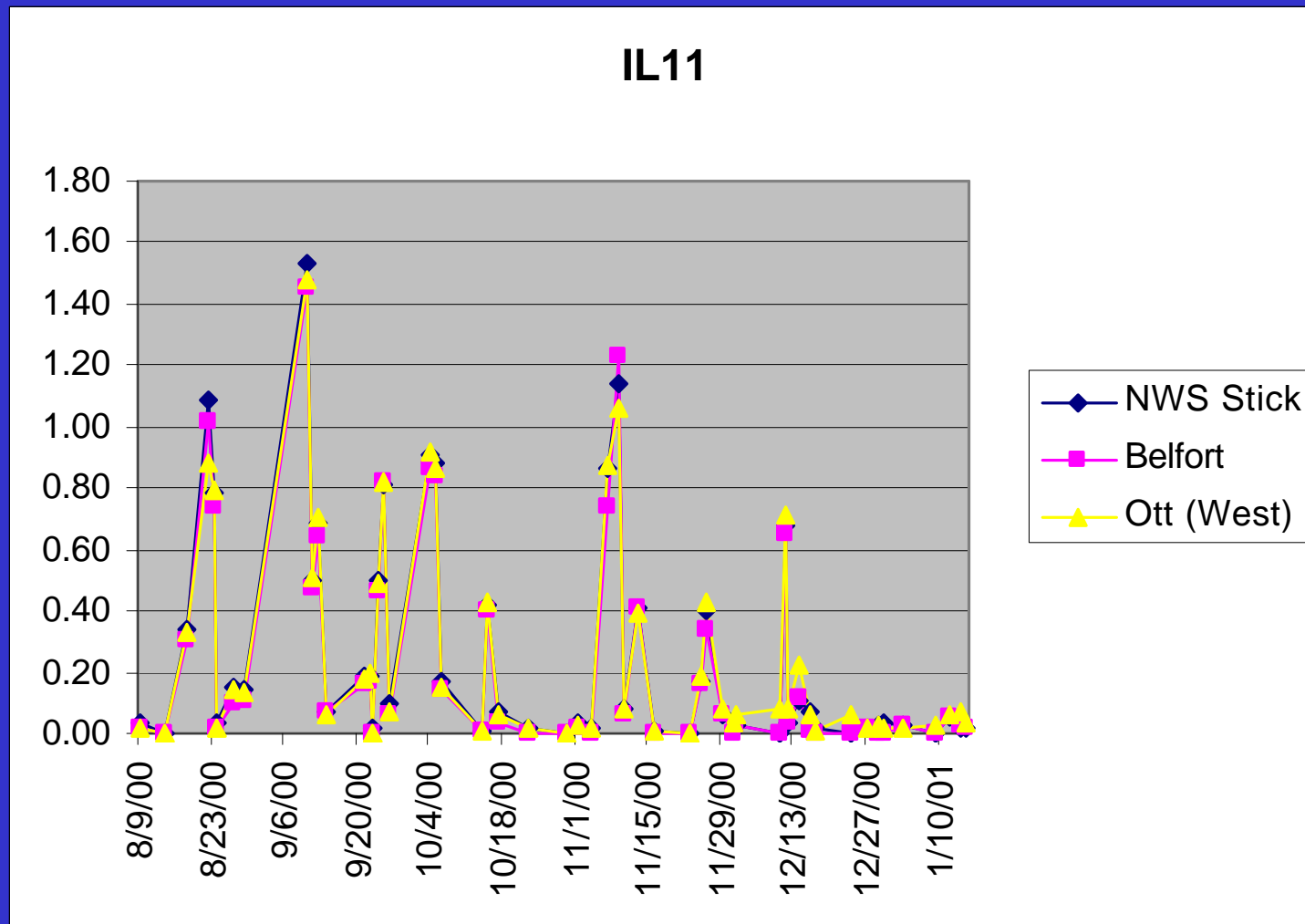
Preliminary Results



Preliminary Results



Preliminary Results



Statistical Analysis

- Data from seven OTT gages, ten Belforts, two stick gages
- Compared on a daily basis for each site, for each pair of gages
- Null hypothesis for analysis is difference between measurements equals 0
- If differences have normal distribution, a paired t-test is used
- If differences are symmetric, but not normally distributed, a signed rank test is used
- Every three months a station will be picked at random to run hourly comparisons



Current Progress and Scheduling

- All seven gages are installed and functioning
- SOP completed and distributed to observers
- Receiving data from observers
- Data collection scheduled to run through 1/02
- Statistical analysis will be ongoing during data collection period
- Installed additional data logger channel to record sampler opening
- Analysis complete by 4/02
- Report complete by 9/02 – web based report



Plans for upcoming year

- Continue with data collection and analysis
- Install small weather station at NV03 with wind speed/direction, temperature, and barometric pressure
- Install DCP at NV03 – send data to web site-awaiting frequency allocation



Problems and Concerns

- Laptops may not be ideal for data collection, don't function well in cold weather
- Downloading of data from gage is cumbersome
- Software is not user-friendly
- Transmittal of data is complicated – four files for each download





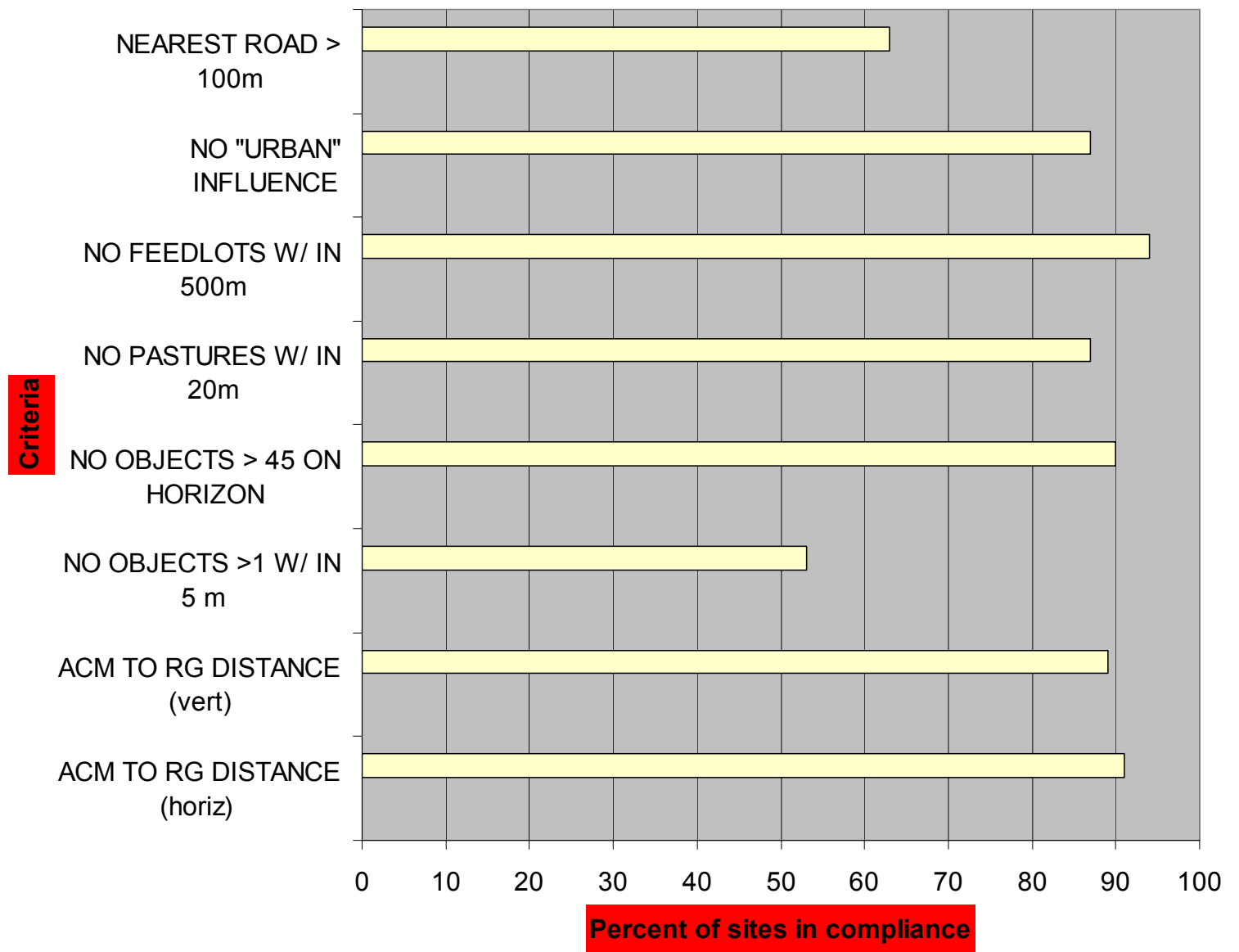
NATIONAL ATMOSPHERIC DEPOSITION PROGRAM



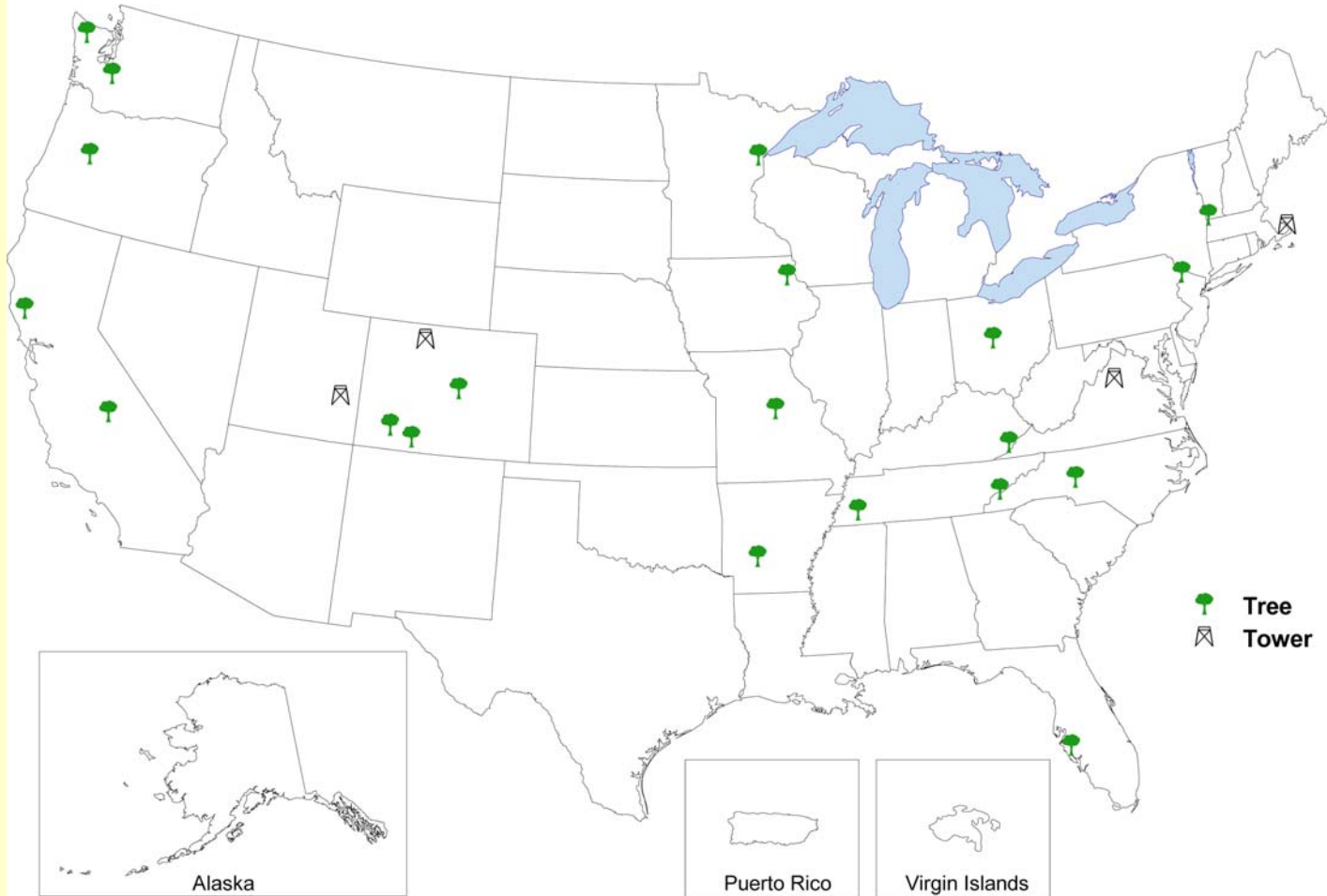
NADP Site Systems and
Performance Survey Data:
Summary and Use of 1998-1999
Results for the NTN Network.
**Tucson 2001, report to NOS
ATS Part III**

SITING UNIFORMITY

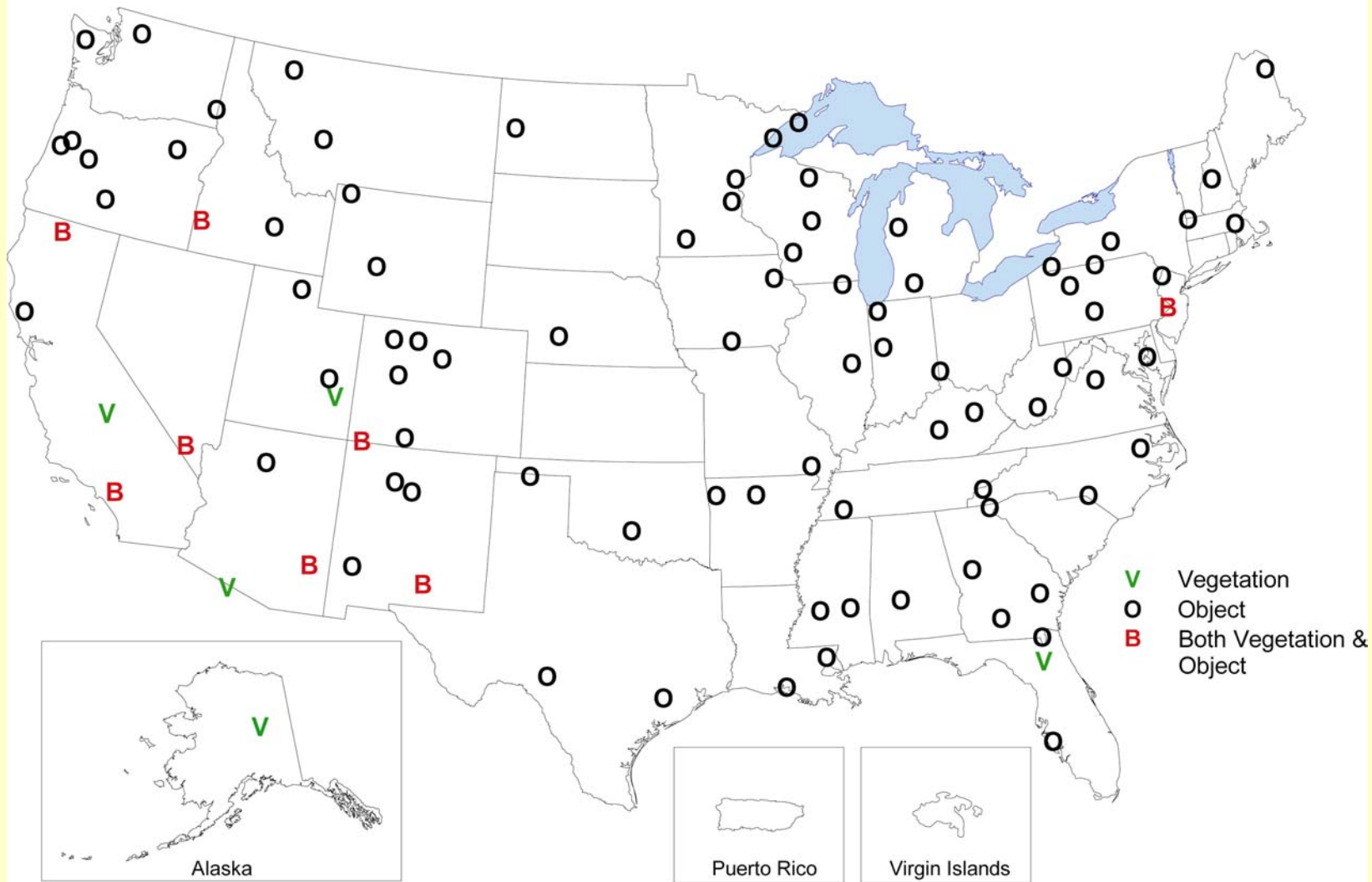
This section provides an overall snapshot of how well the NTN meets its charge of having “regionally representative” sites.



NTN Sites with "45-Degree Rule" Violations

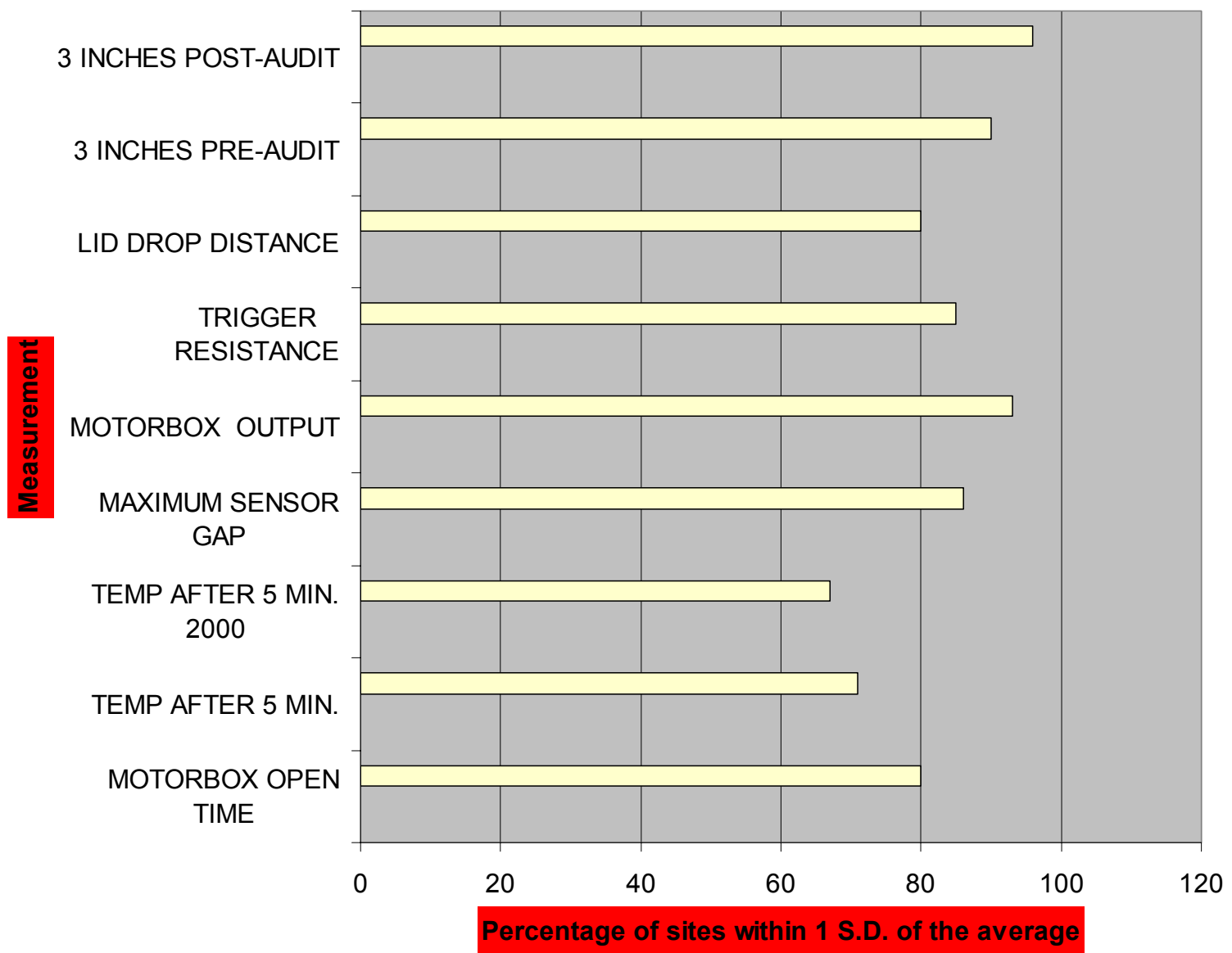


NTN Sites with Obstructions Within 5 Meters



EQUIPMENT UNIFORMITY

As the table below illustrates, when 9 different variables are considered, an average of 80% of the field equipment at sites operate within a narrowly defined range.



OPERATOR UNIFORMITY

As the figure illustrates; sample custody and bucket weighing have very high rates of procedural compliance. The measurement of a liquid sample of known pH and specific conductance exhibited much higher variability.

