**NADP – Spring 2000 Interim Meeting – San Antonio, Texas - Joint Session – April 3, 2000 – 1300 to 1700 CDT**

1. Introduction of attendees. Attendance roster included as Attachment 1

2. Approval of joint session minutes from meeting conducted in Sacramento, CA in October 1999

Jane Rothert made the motion to approve the minutes as summarized on the NADP Web Site – Luther Smith seconded the motion – Motion was called to vote and passed unanimously

3. Nitrogen Brochure Report – Ellen Porter

The brochure has been completed and printed and is now available for distribution

4. Program Office Report – Van Bowersox

Various reports summarizing the activities conducted in 1999 have been prepared and submitted to the pertinent funding agencies

Technical committee membership defined as permanent members (essentially funders) and non-permanent members (essentially non-funders) – Non-permanent members will lose membership privileges if they are inactive in the NADP for periods of three years or longer

Site Status:
NTN – 223 sites – WA00, CA66, CA95 and OK08 have been added to the NADP since Fall 1999 – Possible sites with funding problems include AR27, MS 19 and (per Rick Artz) VA00; AIRMoN – 9 sites; MDN – 43 sites

NADP – Fall 200 Meeting scheduled for October 17 – 20, 2000 in Saratoga Springs, NY

Kathy Douglas (ISWS) is developing an inventory of all committee and subcommittee meeting minutes since the inception of the NADP to the present

Archival samples are being sent to various requestors for specified research needs

The Nutrient Brochure – Nitrogen in Nature's Rain – is being distributed

National Science Teachers Association has prepared and will soon publish a teacher / student guide entitled Teach with Databases: Inside Rain, Working with Precipitation Chemistry Data – The guide will incorporate portions of NADP's Inside Rain and will require users to access the NADP internet site

At the request of George Ryan, Governor of Illinois, all managers of programs operated by or with Illinois state agencies (e.g., the Water Survey) were required to submit a strategic plan for their program. Van has satisfied this request.

The NADP is reviewing the On-Site Systems and Performance Surveys as developed by ATS (U.S. EPA contractor) – Reports summarizing (a) sampling obstructions, (b) potential local sources, (c) nearest roads and (d) field installation problems have been prepared and submitted to pertinent site personnel

John Robertson has conducted an audit of the CAL and Program Office databases – A report was issued and necessary corrective actions have been implemented

A "trends" paper prepared by Jim Lynch, Van Bowersox and Jeff Grimm has been published in Environmental Science and Technology – Papers presented at the NADP Fall 1999 Meeting that have been accepted for publication will be published in Atmospheric Environment (34 / 11) – Editor's note: this edition of AE has been available since May 1, 2000.

5. Mercury Deposition Network (MDN) Report – Clyde Sweet (Attachment 2)

6. U.S. Geological Survey (USGS) Report – Mark Nilles

USGS currently supports 72 sites

USGS currently supports several assessment projects and proposals (e.g., hypoxia)

USGS continuing research on network modifications (e.g., new rain gauges)

New USGS employee to support external QA program – Natalie Latysh

Uses of NADP data are now being documented by the ISWS and USGS (some bizarre reasons are sometimes listed for downloading NADP data)

7. U.S. EPA Report – Gary Lear

Acid Rain Division has been renamed the Clean Air Markets Division (CAMD)

Recent GAO report was issued that included an assessment of emissions reduction programs (e.g., cap and trade program) operated by the U.S. EPA – The report results were presented in such a manner as to imply that recent emissions reductions (primarily by utilities) did little to help protect or help recover sensitive ecosystems in the northeast U.S. – The report was highly critical of the U.S. EPA's programs – U.S. EPA's position is that the emissions reductions programs are working to help protect sensitive ecosystems but that more emissions reductions may be needed in the future

The budgeting process is underway – stable funding is expected for FY 2001

8. CAL Report – Karen Harlin (Attachment 3)

Also, new employee (Angela Kwon) and others are working diligently to help validate backlog of data – CAL expects to return to the normal schedule for validating data soon

9. NOAA Report – Rick Artz

NOAA received two SBIR proposals pertaining to the conceptual design of a new precipitation collector – NOAA funding issues for this project are unknown at this time – expects to know by June 2000

Dry deposition issues – Rona Birnbaum (U.S. EPA) is pushing for a workshop to be conducted in May 2000 regarding U.S. EPA and NOAA's plans for dry deposition monitoring

Bruce Hicks (NOAA) is actively working on measuring dry deposition fluxes at several CASTNET / AIRMoN sites (e.g., Bondville, Penn State, Oak Ridge) – some preliminary results show that annual dry deposition fluxes are nearly the same or may be greater than wet deposition fluxes for sulfate and nitrate – the results are site specific

10. NADP – Fall 2000 Meeting Preview – Rick Artz

Meeting scheduled for October 17 – 20, 2000 in Saratoga Springs, NY

Meeting topics may include (a) Ten Years after the 1990 CAAA – Legal and Scientific Issues, (b) Coastal Eutrophification, (c) Climate Change, (d) Reports from Para Organizations and (e) Mercury Deposition

Rick Artz and Rona Birnbaum will invite notables who may also be interested in being keynote speakers (e.g., Gene Likens)

**NADP – Spring 2000 Interim Meeting – San Antonio, Texas – Network Operations Subcommittee (NOS) Meeting – April 4, 2000 – 0800 to 1530 CDT**

1. Introduction of attendees. Attendance roster included as Attachment 1

2. Approval of NOS minutes from meeting conducted in Sacramento, CA in October 1999

Scott Dossett made the motion to approve the minutes as summarized on the NADP Web Site – Dennis Lamb seconded the motion – Motion was called to vote and passed unanimously

3. CAL Audit Final Report – Karen Harlin

The audit was conducted on September 20 – 22, 1999 (the audit report listed incorrect dates)

Report was structured into two parts – the audit findings and CAL's responses – a copy of the final report can be obtained from Karen Harlin

Per Scott Dossett – CAL audit scheduled to be conducted every three years – contact with the recent audit team should be checked periodically to see if they may be available in the future – Next CAL audit scheduled to be conducted in 2002 – audit to be coordinated by sitting NOS Chair (John Shimshock?)

Charge for John Gordon – determine if the audit recommendations (a) have been or (b) are on-track to being implemented – paper to be presented at the Fall 2000 Meeting

4. ATS Site Audit Report – John Shimshock

ATS completed first round of site audits in December 1999 – audited 199 sites from January 1998 through December 1999

Second round of audits began in January 2000 – revisiting "old" sites as well as sites that became part of NTN since January 1998 (e.g., CASTNET sites)

Site audit program designed to correct some problems quickly (e.g., ordering supplies, recalibrating rain gauges) – Other problems such as siting criteria violations will take longer to resolve

Expect to present results for audits conducted in 1999 at the Fall 2000 meeting

5. Standing Report – USGS External QA Project – John Gordon (Attachment 4)

External QA Project consists of (a) Blind Audit Program, (b) Interlaboratory Comparison Program, (c) Field Blank and Reference Sample Program, (d) Collocated Sampler Program and (e) Intersite Comparison Program

Charge for John Gordon, Scott Dossett and Dave MacTavish – Blind Audit Program – Examine the effect of sample volume on the precipitation chemistry data for QA samples that have been filtered by the lab

**MOTION NO. 1**
By Mark Nilles – Seconded by Scott Dossett
NOS Secretary to prepare list of action items to be addressed by the NOS within two weeks of the meeting – list to be distributed via email - Motion was called to vote and passed unanimously

Per Dave MacTavish – Atmospheric Environment Service (AES) has been renamed the Meteorological Service of Canada (MSC) – The Ontario Ministry of the Environment (MOE) APIOS network has discontinued operations – John Gordon will investigate the changes at the MOE and recommend if the MOE should still participate in the interlaboratory comparison program

6. Trends in Seasonal Completeness Criteria for NADP / NTN 1981 – 1998 – Mark Nilles - (Attachment 5)

Data for the aforementioned period were examined using various statistical tests to ascertain if there are any trends (increasing or decreasing) in data completeness – the statistical tests were designed to remove the effect of the season of the year

In looking at the entire NTN, there appears to be no trends in data completeness

7. Decimal Place Change at the CAL – Karen Harlin

Due to improvements in the sensitivity of the analytical instruments used at the CAL, the CAL believes they are justified in reporting the preliminary sulfate, nitrate, chloride and ammonium concentration results (as shown on the monthly printouts) to three decimal places

**MOTION NO. 2**
By Karen Harlin – Seconded by Scott Dossett
The preliminary sulfate, nitrate, chloride and ammonium concentration results (as shown on the monthly printouts provided to the sites) will be reported to three decimal places

**FRIENDLY AMENDMENT TO MOTION NO. 2**
By Scott Dossett – The preliminary results will be the raw values from the analyzers, i.e., no screening of the data will occur prior to release of the preliminary results

Motion was called to vote and passed unanimously

8. Rain Gauge Shield Vote and Network Discussions – Jane Rothert and Scott Dossett

NTN protocol allows for the use of alter-shielded rain gauges. A paper presented by the CO98 (Loch Vale) site compared the data collected with an alter-shielded rain gauge with the data collected at the same site with a nipher-shielded rain gauge. CO98 requested the NOS to

approve the motion that the NTN allow the use the data generated from a nipher-shielded rain gauge at this site. The justifications for this were presented in the paper. Discussions and a vote by interested NOS members were conducted via email prior to this meeting. The results of the vote were in favor of the petition submitted by the CO98 site by a margin of approximately 10 to 2

Various NOS members wondered if other sites should be allowed to substitute nipher-shielded rain gauge data for alter-shielded rain gauge data – the question was left unanswered

Per Dennis Lamb –
Scott Dossett charged with digging through the Program Office archives to see if any other studies have been conducted in which data collected with alter-shielded rain gauges was compared with data collected with nipher-shielded rain gauges

9. Phase III Precipitation Gauge Update – Mark Nilles

Results from the Phase I and Phase II studies showed that the Ott-Pluvio rain gauge was the best performing rain gauge – The ETI rain gauge was considered an acceptable alternative

Early Phase III plans are as follows: 6 Ott-Pluvio units have been purchased; the units will be deployed at 5 sites (allows for a collocated unit at 1 site); the sites are to be determined; the target start date is June 30, 2000; an 18 month study is planned; the Phase III study will be coordinated by the USGS Nevada office

10. Precipitation Gauge Comparison – SWS – Van Bowersox

Studies conducted at the SWS from April 3, 1998 through July 26, 1999

Standard ACM collector vs. an MIC-driven ACM collector (MIC sensor) –
As expected, the results showed that the MIC-driven ACM collector opened earlier and stayed open longer than the standard ACM collector, thus yielding larger volume-weighed concentrations

Comparison of data collected with the ETI rain gauge, Belfort rain gauge and Stick gauge –
The ETI and Belfort rain gauges tended to under report precipitation depths by approximately 0.01 inches per event as compared with the Stick gauge; the ETI rain gauge showed many false positives that were attributed to circuitry problems (since corrected by the manufacturer)

Comparison of data collected with an Ott-Pluvio rain gauge, ETI rain gauge and Stick gauge –
For 31 precipitation events, the ETI rain gauge tended to under report precipitation depths (typically by 0.01 inches to 0.09 inches) – the under reporting was worse during snow events; the Ott-Pluvio rain gauge also showed false positives, but these were in the range of 0.001 inches to 0.009 inches (factor of 10 less than the ETI rain gauge); the false positives recorded by the Ott-

Pluvio rain gauges were attributed to temperature and wind interferences; SWS to request that Ott-Pluvio reprogram their gauges to record only positives greater than or equal to 0.01 inches

11. Dates Included with NTN Analytical Data – John Gordon

Karen Harlin charged with looking into the feasibility of tracking analyses dates for NTN data (perhaps using the AIRMoN model)

12. CAP-LTER and Network Site Design and Policy Issues – Van Bowersox

A. Central Arizona – Phoenix Long-Term Ecological Research Project – NSR-funded project

Designed to monitor and interpret the long-term impact of human settlement on the environment of the city and the surrounding area - Ten stations in this network – Van met with CAP-LTER personnel earlier this year

CAP-LTER is interested in including an NTN station at either their Phoenix "Supersite" or at their Sunny Slopes site – Van listed the attributes and drawbacks of each site as they pertain to the NTN siting criteria

However, due to extended dry periods in the Phoenix area (typically in the Spring and Fall), CAP-LTER is interested in submitting a sample to the CAL only when a precipitation event has occurred

**MOTION NO. 3**
By Van Bowersox – Seconded by Rick Artz
Establish an NTN site at one of the CAP-LTER sites and allow CAP-LTER to collect and submit samples to the CAL only when a precipitation event occurs

Several NOS members commented that this protocol is very similar to AIRMoN protocol

Motion was called to vote and was rejected unanimously – Van to report back to CAP-LTER

CAP-LTER is also interested in measuring dry deposition rates using the NTN ACM dry-side buckets – they are interested in establishing a dry deposition collection bucket at the Organ Pipe Cactus National Monument (AZ06) site – CAP-LTER would provide the buckets, gather the exposed buckets and conduct their own analyses – They would submit a formal proposal to conduct this study if they were granted approval to proceed

**MOTION NO. 4**
By Van Bowersox – Seconded by Dennis Lamb

Allow CAP-LTER to collect dry deposition samples using the dry-side buckets at the AZ06 site – CAP-LTER would provide the buckets, gather the exposed buckets and conduct their own analyses

NPS representatives (Kathy Tonnessen et al.) commented that this might be difficult to sell to the Park Superintendent at AZ06 – NADP discontinued dry-side measurements several years ago – The argument was made then that this is an incorrect technique for measuring dry deposition – Also, dry deposition data would be collected at the Park but the Park would not have access to the data – Rick Artz commented that perhaps NOS should be advising CAP-LTER that this collection technique has been essentially rejected by those involved in dry deposition measurements (e.g., CASTNET) – Van reminded NOS that NPS and the site would also have to approve this motion

Motion was called to vote – Motion was passed by a vote of 10 to 4 – Van to report back to CAP-LTER

Editor's Note: The following amendment was added to Motion No. 4 by the NADP Executive Committee based on their discussions of this motion at their meeting in Gettysburg, PA in June 2000:

Only qualitative analyses of the dry deposition samples will be conducted. No quantitative analyses of the dry deposition samples will be conducted.

B. AIRMoN Reporting Issues

**MOTION NO. 5**
By Van Bowersox – Seconded by Dennis Lamb
New AIRMoN Field Observer Form has been designed – Operator would be required to supply hourly precipitation depths for each event rather than providing these data on a monthly basis – Motion submitted would be to adopt the new form

Motion was called to vote and passed unanimously

**MOTION NO. 6**
By Van Bowersox – Seconded by Rick Artz
New AIRMoN Field Observer Form has been designed – Per Motion No. 5, Operator would be required to supply hourly precipitation depths for each event – The summed hourly depths will equal the total depth as recorded by the Belfort rain gauge – The Operator also records the total precipitation depth for the event as measured by a Stick gauge - At the CAL, a computer program will be used to scale-up the hourly precipitation depths so that the summed, scaled-up hourly depths equal the total depth as measured by the Stick gauge at the site

Motion was called to vote and passed unanimously

13. Network Equipment Depot (NED) Report – Scott Dossett –(Attachment 6)

14. Clone of NADP Collector – Scott Dossett – (Attachment 7)

**MOTION NO. 7**
By John Gordon – Seconded by Joel Frisch
Program Office to purchase 5 of the cloned motor boxes and 5 of the cloned sensors – the cloned units will be tested at the CAL – Scott to report to the NOS at the Fall 2000 meeting on progress to date

Motion was called to vote and passed unanimously

15. New Japanese (SIBATA) Collector – Scott Dossett

A picture of this collector was passed around – Price approximately $6500 per unit

**NADP – Spring 2000 Interim Meeting – San Antonio, Texas - Joint Session – April 5, 2000 – 0900 to 1030 CDT**

1. Clyde Sweet

Bob Brunette's HAL Report to be posted on the NADP Web Site
1999 HAL data due to be delivered to the NADP in April 2000

2. Van Bowersox

Expect to publish 1999 NTN data by the Fall 2000 NADP Meeting

3. Susan Johnson

NADP Spring 2001 Meeting - Choice No. 1 is Myrtle Beach, SC – New Orleans, LA and Tucson, AZ were voted as secondary choices

4. Jane Rothert

NOS Report – the motions listed above were summarized

5. Bob Larson

DMAS Report – Summary of Motions

Motion passed – Ad hoc committee for Site Classification to proceed with the existing scheme and perform a case study analysis using approximately 12 sites

Motion passed – Maps on NADP Web Site – Change isopleths and column headings to explicitly show ion or element units NO3 (as NO3)

Motion passed – DMAS Chair to discuss with the NADP Program Coordinator the possibility of creating interactive graphical displays on the Web for AIRMoN and MDN

Motion passed – Develop live database access over the Internet using ODBC

6. John Sherwell

Effects Subcommittee Report - Summary

Nitrogen brochure is complete, possibility of starting a mercury brochure
Examining coastal sites – e.g., Assateauge, two others
Examining urban sites – e.g., Baltimore

7. Adjourn

# Attachments

1. **Attendance Roster**
2. **MDN Report (Clyde Sweet)**
3. **CAL Report (Karen Harlin)**
4. **QA Reports (John Gordon)**
5. **Trends Analysis (Mark Nilles)**
6. **NED Report (Scott Dossett)**
7. **Collector Clone (Scott Dossett)**

**NADP SPRING 2000 MEETING - SAN ANTONIO, TEXAS - ATTENDANCE ROSTER**

| Name | Affiliation | Email Address | Attendance at Joint Session 03-Apr-00 | Attendance at NOS Session 04-Apr-00 |
|---|---|---|---|---|
| John Robertson | Retired | | X | |
| Dennis Lamb | Penn State University | lno@ems.psu.edu | X | X |
| Clyde Sweet | Illinois State Water Survey | | X | |
| Luther Smith | ManTech Environmental Technology | | X | |
| Joel Frisch | U.S. Geological Survey | | X | X |
| Rick Artz | NOAA - ARL | richard.artz@noaa.gov | X | X |
| John Sherwell | Maryland Department of Natural Resources | | X | |
| Kathy Tonnessen | National Park Service | kat@forestry.umt.edu | X | X |
| Ellen Porter | U.S. Fish & Wildlife Service | | X | |
| Gary Stensland | Illinois State Water Survey | | X | |
| Scott Dossett | Illinois State Water Survey | sdossett@uiuc.edu | X | X |
| Susan Johnson | Minnesota Pollution Control Agency | | X | X |
| John Shimshock | Advanced Technology Systems | jshimshock@atsengineers.com | X | X |
| Dave MacTavish | CAPMoN | dave.mactavish@ec.gc.ca | X | X |
| Bruce Rodger | Wisconsin Department of Natural Resources | rodgeb@dnr.state.wi.us | X | X |
| Daniel Jones | USDA / CSREES | ddjones@reeusda.gov | X | X |
| Rosemary Wolfe | U.S. Environmental Protection Agency | wolfe.rosemary@epa.gov | X | X |
| Karen Harlin | Illinois State Water Survey | k-harlin@uiuc.edu | X | X |
| Bob Larson | Illinois State Water Survey | | X | |
| Tom Lavery | ESE, Inc. | | X | |
| Van Bowersox | Illinois State Water Survey | | X | X |
| Jane Rothert | Illinois State Water Survey | rothert@uiuc.edu | X | X |
| Kristi Heuer | National Park Service | kristi_heuer@nps.gov | X | X |
| Natalie Latysh | U.S. Geological Survey | nlatysh@usgs.gov | X | X |
| Mark Nilles | U.S. Geological Survey | manilles@usgs.gov | X | X |
| John Gordon | U.S. Geological Survey | jgordon@usgs.gov | X | X |
| Gary Lear | U.S. Environmental Protection Agency | | X | |
| Jim Lynch | Penn State University | jal@psu.edu | | X |

MDN REPORT
SAN ANTONIO, APRIL 3, 2000

SCHEDULED NEW SITES FOR FY 2000 (10/1/99 TO 9/30/00)

PA60 VALLEY FORGE 11/23/99
NY20 HUNTINGTON 12/7/99 (NTN Site)
CA72 SAN JOSE 1/11/00 (NEP Site)
BC06 REIFEL ISLAND (Vancouver) 3/15/00
ON07 EGBERT (S. Ontario) 3/15/00
AB08 ESTHER (SE Alberta) 3/15/00
PA30 ERIE 5/00
AL03 CENTERVILLE 6/00
GA40 YORKVILLE 6/00
MS22 OAK GROVE 6/00
AL02 EAST MOBILE BAY 8/00 (NEP Site and NTN Site)
AL24 WEST MOBILE BAY 8/00 (NEP Site and NTN Site)
NF09 NEWFOUNDLAND 9/00

POSSIBLE NEW SITES LATE FY 2000 - FY 2001

GETTYSBURG
NE PENNSYLVANIA
SW WISCONSIN
UPPER MICHIGAN
NEW JERSEY (3-4 Sites)
LOUISIANA

AT-RISK SITES

NH05 NEW CASTLE contract ended 9/30/99, seeking new funding
ME02 BRIDGETON funding ends 6/30/00

DATA AND PUBLICATION

Final 1997 and 1998 Data Sets placed on the WEB site

Draft Manuscript "Wet Deposition of Mercury in the U.S. and Canada, 1995-1999: Results from the NADP Mercury Deposition Network (MDN)" to be submitted for publication.

FIELD QA PROGRAM- SITES VISITED

CO97 BUFFALO PASS 7/13/99 (NTN Site)
NH00 LACONIA 9/13/99
NC08 WACCAMAW 12/3/99, Belfort replaced 2/00
NC42 PETTIGREW 12/2/99, Site moved 3/00
FLO5 CHASSAHOWITZKA, 2/3/00 (NTN Site)
FL04 ANDYTOWN, 2/4/00
FL34 ENRP, 2/4/00
FL11 EVERGLADES, 2/5/00 (NTN Site)
SC19 CONGAREE SWAMP, 3/30/00, new Belfort installed
NM10 CABALLO, 4/00

HAL AUDIT

Scheduled for June, 2000

MEETINGS

Workshop on Persistent Organic Pollutants and Heavy Metals
Durham, NC 10/5 - 10/7/99, sponsored by CEC and USEPA

Where Air and Water Meet: Atmospheric Deposition to the Pacific Coast
Los Angeles, 2/9 - 2/10/00, Sponsored by the Ecological Society of America

# CAL Report to the NADP Spring Interim Meeting

## Network Stats

**NTN:** 200,000th sample in May 2000

~12,500 samples/year

Since Jan. 99, 25 new NTN sites

13% increase in samples/data processed

@ 11 analytes/sample:

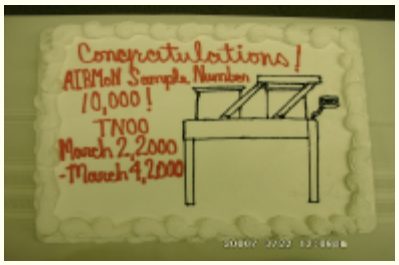
= 11,500 analyses/mo

= 14,000 analyses/mo w/QA

@105 data points/sample = 1.2 million data points to validate/mo

**AIRMoN:** 10,000th sample in March 2000

~1550 samples per year




## Data Turnaround to Program Office

**NTN:** July 1999

**AIRMoN:** December 1999

# What's New at CAL?

## Staff:

### New Data Analyst

Angela Kwon,  MS Chemistry

- 100% time Dec 99
- Currently full-time on NTN data validation
- Future role:  AIRMoN data validation

## What's New at CAL (con't)?

**Data Updates:**

NTN database changes for Jan 2000

Major reprogramming effort to modify all data input forms and data review programs and printouts.

- Daily precipitation data now in one database
- Winterization/Summerization dates added to the precipitation validation program. Error generated if snow or mixed precp is coded and the raingage is not winterized.
- Field Comments now in one database
- Lab Comments now in one database
- Sensitivity increase from 2 to 3 decimal places for $NO_3$, $SO_4$, Cl, $NH_4$
- Full-screen text editors used to expedite data review and editing
- Values <MDL are now stored in the CAL database (same procedure as AIRMoN). **Data users will see no change in the data reporting format used by the Program Office.**

## What's New at CAL (con't)?

**Data Updates (con't):**

Other:

- Sample Dateoff added LORF to add second check for correct sample ID prior to pH/conductivity measurement

**Monthly Site Reports Reformatted**--Discussion

- Current mailing
  - Field Printout w/Data review Notes and Errors
  - Preliminary Printout w/CAL notes
- Proposed mailing
  - Combine Field and Preliminary results on 1 page
  - Eliminate deposition data
  - Add CAL newsletter with CAL notes on 1 page

**Sampler ID Labels**

- NOS approved (~1996) labels for samplers
  - revised with current Program Office contact information
  - weather resistant materials

## What's New at CAL (Cont)?

Laboratory Updates:

**New Reverse Osmosis System**

- Install date May 2000
- Increased water quality and capacity needed for increased work load/dishwasher load due to new sites

**Color-coding buckets, lids, and sample bottles**

- Initiated Jan 2000 to ensure inventory is rotated

## What's New at CAL (Cont)?

Laboratory Updates (con't):

**NADP Parts and Supplies Management Software**

Developed to assist in tracking shipments of parts and supplies to and from NTN and AIRMoN sites and repair vendors.

Began use at CAL on Feb 1, 2000

- Easily accessible part repair record
- Easily accessible supply shipment record
- Tracking defective parts to NED
- Record of tests and repairs performed on parts
- Simplify daily mailer unpacking and packing operation
- Provide a database for supply and parts information
- Provide information to allow the tracking of mailer rotation, sample shipments, immediate feedback from site liaison to shipping staff for supply/parts needs

# What's New at CAL (Cont)?

**NADP Parts and Supplies Management Software (cont)**

Components

- Microsoft SQL Server 7 database allows multiple users to access real-time
- Transaction based allowing a history to be viewed based on site, mailer ID, or part/supply item
- Database interface is Microsoft Visual Basic 6.0 allowing multiple forms to be viewed simultaneously
- Allows ACCESS database use
- Data entry via BARCODE READER

## What's New at CAL (Cont)?

**NADP Parts and Supplies Management Software (con't)**

Feedback from Shipping Staff after two months of use

- Very user friendly, love it!
- Improved record keeping
- Ease of tracking supplies and parts
- Useful for inventory control and budgeting
- Improved response time to sites
- Alarm will not allow mailer to be closed if requested supplies are pending
- Allows inventory of mailers at each site and the rotation of mailers
- Give Tom a raise!!!

**New sample coding system for non-site samples**

- QA samples such as blanks, FR check samples,
- Internally prepared solutions
- Special samples or studies
- Inter-laboratory comparison samples

## Continuing Projects

**Site Operators Training Course**

30th Training Course, **May 16th-18th**

3/28 status: 27 operators from 28 sites

AR16 **CA95 CA96** CA99 CO93/97 CO99 **KY99** MA01 **MI46** MN01 **MN32** NC03 NC35 NE99 **NY99** NY68 NV00 OH09 **OK08** OK17 PR20 **SC05** UT01 WA14 WA19 **WA99** WV04

**1998 QA Report Status**

All reviewers comments in but one

Target date: Fall 2000

**Site Operator Training Manual Status**

Revised Appendix B

In review, target date— Fall 2000

Revised Appendices C & D

In progress, target date—Dec 2000

## Continuing Projects

### Plastic Bags used for buckets and lids

- Positive calcium bias observed in internal blanks
- Occurred ~Feb. 1999 to Sept. 1999
- Ran over 200 extra blanks
- Isolated problem to bags used to protect the cleaned buckets and lids
- Problem traced to extra anti-blocking agent added to bag shipment in late Dec. 1999
- The agent is Calcium carbonate.
- Evaluated many bag materials and selected a slightly bigger bag with low anti-blocking agent
- Initiated weekly BAG Blanks into internal QA samples
- Problem resolved!!!
- Will continue to monitor

### NADP Precipitation Collector Clone Status

- NOS request
- CAL working with LODA
- Delivery Feb 2000, testing in progress
- See S. Dossett report to NOS @2:30 Tues.

## Continuing Projects

**Final CAL Report from Sept. 1999 NOS Audit**

Summarized at Fall 1999 NOS meeting

Final report available at NOS or see Harlin

## 2000 Projects

- Data on schedule to Program Office
- CAL Web Page on-line
- Computerization of pH/Conductivity lab
- Data validation streamlining

  Continue creating "smart" programs to improve the efficiency of data validation
- Laboratory database for non-site samples
- Data retention policy revision
- Records inventory
- New mailer design trials

  Pack-Lite System, Tulsa, OK

  6 White mailers to be tested at a current site

## 2000 Projects

# Field Blank and Reference Sample Program

Objective:

Quantify the contribution of:
sample collector container surfaces
to NADP/NTN precipitation chemistry

A portion of each sample is added to a bucket exposed for 1 week at the site. The remaining portion serves as the control and is analyzed separately

USGS
science for a changing world

# Field Blank and Reference Samples Program

Paired Sample Design:

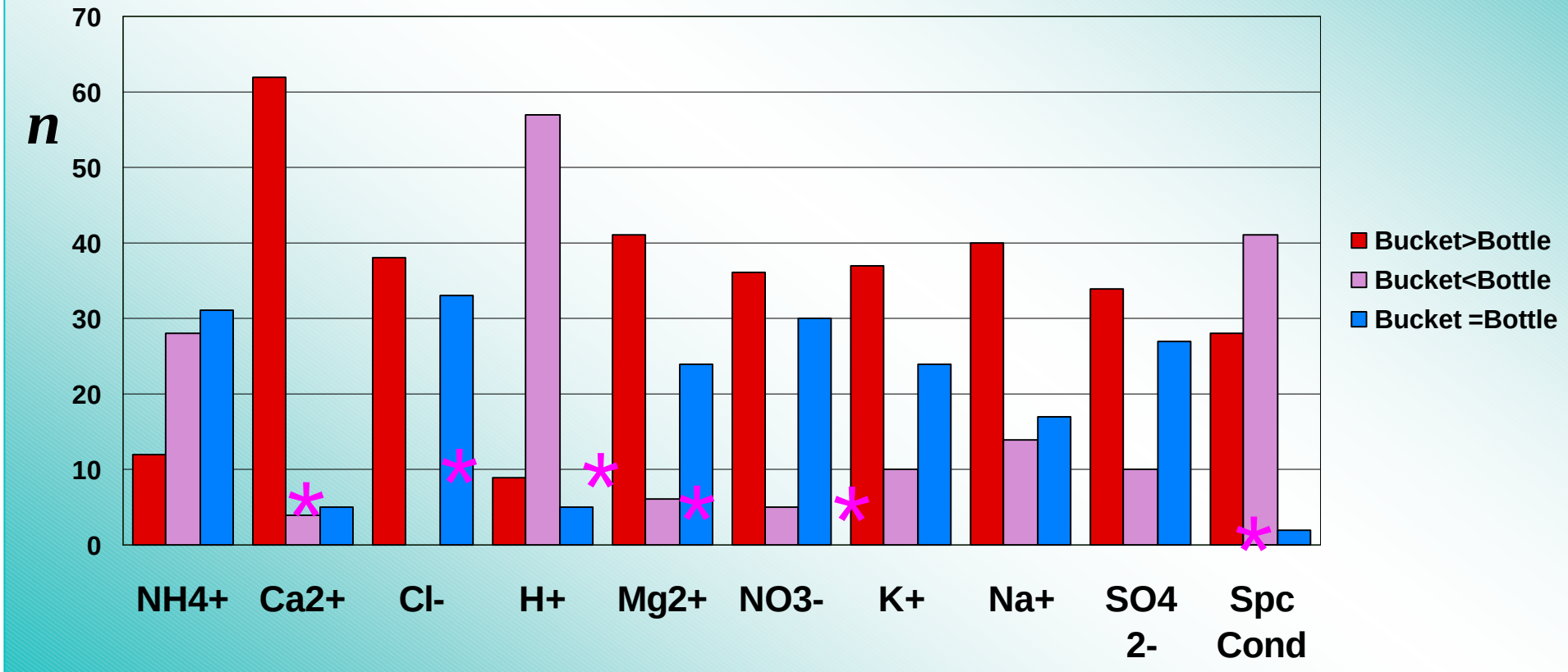
- Field Exposed (Bucket portion)

- Control (Bottle portion)
  Minimally handled samples

USGS
science for a changing world

# Field Blank Program: Paired Sample Results

* Significant @ $\alpha = 0.05$




Preliminary 1999 Results

n=71

USGS science for a changing world

# Target Concentrations for the Solutions Used in the Field Blank Program During 1999

| Solution | Ca2+ | Mg2+ | Na+ | K+ | NH4+ | Cl- | NO3- | SO42- | pH | Sp. Cond. |
|---|---|---|---|---|---|---|---|---|---|---|
| SP-2 | 0.46 | .070 | .360 | .060 | 0.56 | 0.45 | 3.00 | 2.33 | 4.53 | 24.5 |
| SP-3 | 0.16 | .049 | .111 | .023 | 0.14 | 0.17 | 1.08 | 0.96 | 4.71 | 11.5 |
| Ultrapure | -.009 | -.003 | -.003 | -.003 | -.02 | -.03 | -.03 | -0.03 | 5.60 | 1.5 |

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# Field Blank Program: Relative Percent Differences

| Analytes | 25th % | Median | 75th % |
|---|---|---|---|
| Ammonium | -7.14 | 0.00 | 0.00 |
| Calcium | 1.74 | 10.39 | 28.30 |
| Chloride | 0.00 | 2.22 | 6.25 |
| Hydrogen Ion | -12.19 | -6.52 | -2.28 |
| Magnesium | 0.00 | 2.86 | 6.12 |
| Nitrate | 0.00 | 0.33 | 1.85 |
| Potassium | 0.00 | 1.67 | 9.52 |
| Sodium | 0.00 | 0.83 | 3.89 |
| Sulfate | -3.48 | -1.67 | 3.35 |
| Spec Cond | 0.00 | 0.00 | |

**Preliminary 1999 Results** n=71

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# Field Blank Program: Absolute Percent Differences

| Analytes | 25th % | Median | 75th % |
|---|---|---|---|
| Ammonium | 0.00 | 1.79 | 7.14 |
| Calcium | 1.89 | 10.39 | 28.30 |
| Chloride | 0.00 | 2.22 | 6.25 |
| Hydrogen Ion | 3.74 | 7.15 | 12.90 |
| Magnesium | 0.00 | 2.86 | 6.12 |
| Nitrate | 0.00 | 0.93 | 1.85 |
| Potassium | 0.00 | 4.35 | 11.67 |
| Sodium | 0.28 | 1.79 | 4.48 |
| Sulfate | 1.74 | 3.48 | 7.41 |
| Spec Cond | 0.00 | 0.86 | |

**Preliminary 1999 Results** **n=71**

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# Field Blank Program:

## Paired-Sample Concentration Differences

n=71

| Analytes | Minimum | 25th % | Median | 75th % | Maximum |
|---|---|---|---|---|---|
| Ammonium | -0.170 | -0.010 | 0.000 | 0.000 | 0.120 |
| Calcium | -0.004 | 0.005 | 0.016 | 0.034 | 0.366 |
| Chloride | 0.000 | 0.000 | 0.010 | 0.020 | 0.260 |
| Magnesium | -0.002 | 0.000 | 0.002 | 0.003 | 0.041 |
| Nitrate | -0.030 | 0.000 | 0.010 | 0.030 | 1.625 |
| Potassium | -0.005 | 0.000 | 0.001 | 0.003 | 0.270 |
| Sodium | -0.143 | 0.000 | 0.001 | 0.005 | 0.074 |
| Sulfate | -0.030 | 0.000 | 0.000 | 0.020 | 1.055 |
| Spec Cond (mS/cm) | -10.500 | -0.600 | -0.200 | 0.100 | 11.000 |
| Hydrogen Ion (meq/L) | -7.461 | -2.141 | -1.058 | -0.139 | |

Preliminary 1999 Results

in mg/L except as noted

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# 1999 Field Blank Program Results -- by Target Concentration

**Preliminary 1999 data**

| Analyte | Bucket minus bottle differences significance levels (p-value) by sample target concentration | Statistically significant ($\alpha$=0.05) differences by concentration |
|---|---|---|
| Ammonium | 0.160 | No |
| Chloride | 0.157 | No |
| Hydrogen Ion | 0.091 | No |
| Potassium | 0.632 | No |
| Sodium | 0.935 | No |
| Sulfate | 0.124 | No |
| Calcium | 0.015 | Yes |
| Magnesium | 0.031 | Yes |
| Nitrate | 0.018 | Yes |
| Specific Conductance | 0.000 | Yes |

*Results of the Kruskal-Wallis analysis of variance test to determine the relation between paired field-blank sample differences and the sample target concentrations*

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# 1999 Field Blank Program Results --by sample volume

**Preliminary 1999 data**

| Analyte | Bucket minus bottle concentrations attained significance (p-value) levels on a concentration basis | Statistically significant ($\alpha$=0.05) differences determined between 250-, 500- and 1,000- mL USGS samples |
|---|---|---|
| Ammonium | 0.284 | No |
| Hydrogen Ion | 0.010 | No |
| Potassium | 0.074 | No |
| Sodium | 0.224 | No |
| Sulfate | 0.013 | Yes |
| Specific Conductance | 0.031 | Yes |
| Nitrate | 0.027 | Yes |
| Magnesium | 0.009 | Yes |
| Chloride | 0.037 | Yes |
| Calcium | 0.001 | Yes |

*Results of the Kruskal-Wallis analysis of variance test to determine if bucket minus bottle differences for the 250-, 500-, and 1,000- mL samples have equivalent distributions on a concentration basis*

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# 1999 Field Blank Program Results
# -- by sample volume, on a mass basis

**Preliminary 1999 data**

| Analyte | Bucket minus bottle concentrations attained significance (p-value) levels on a mass per bucket basis | Statistically significant ($\alpha$=0.05) differences determined between 250-, 500- and 1,000- mL USGS samples |
|---|---|---|
| Chloride | 0.663 | No |
| Hydrogen Ion | 0.308 | No |
| Magnesium | 0.096 | No |
| Nitrate | 0.323 | No |
| Potassium | 0.961 | No |
| Sodium | 0.230 | No |
| Specific Conductance | 0.591 | No |
| Sulfate | 0.032 | Yes |
| Calcium | 0.010 | Yes |
| Ammonium | 0.046 | Yes |

*Results of the Kruskal-Wallis analysis of variance test to determine if bucket minus bottle differences for the 250-, 500-, and 1,000- mL samples have equivalent distributions on a mass per bucket basis*

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# Preliminary 1999 Results from the USGS External QA Program

NADP Network Operations Subcommittee Meeting

April 2000

San Antonio, Texas

# Preliminary 1999 Results from the USGS External QA Program

- Blind Audit Program
- Field Blank Program
- Interlaboratory Comparison Program
- Collocated Program
- Intersite Comparison Program

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# Blind Audit Program

Objective:

Quantify the contribution of:

sample collection,
shipping,
and processing (e.g., filtration)

to precipitation chemistry

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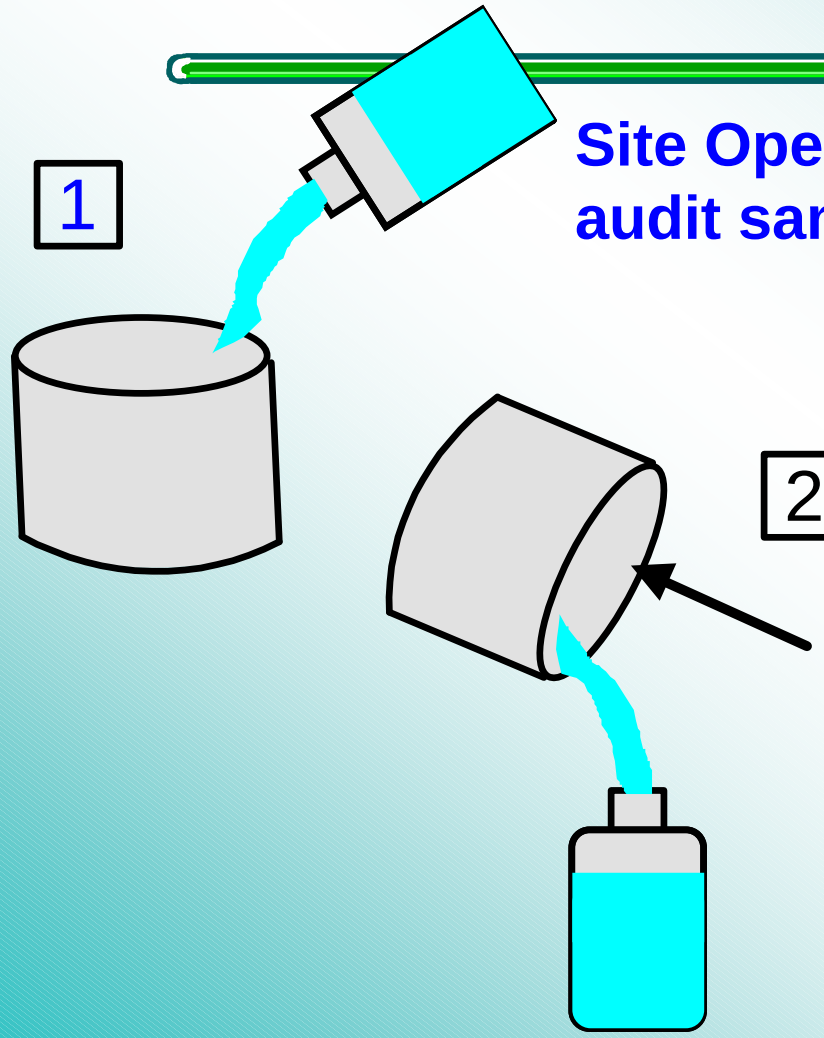
# How Blind Audit Samples Are Submitted




**Site Operator Pours 75% of the blind audit sample into a clean bucket**

**AFTER A MINIMUM OF 24 HOURS RESIDENCE TIME,THIS PORTION OF THE BLIND AUDIT SAMPLE IS TRANSFERRED TO A CLEAN 1 LITER SHIPPING BOTTLE**

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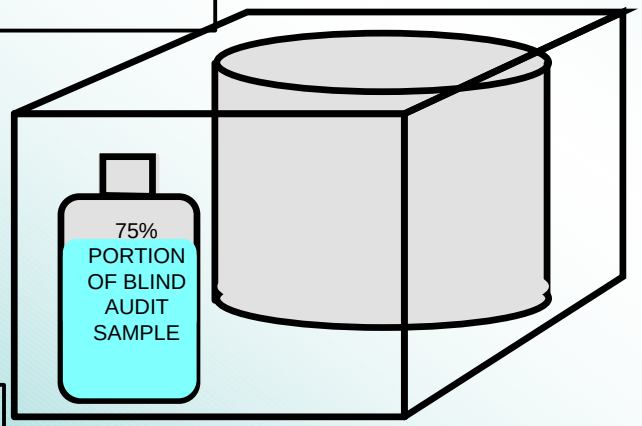
# OVERVIEW OF HOW BLIND AUDIT SAMPLES ARE SUBMITTED

3

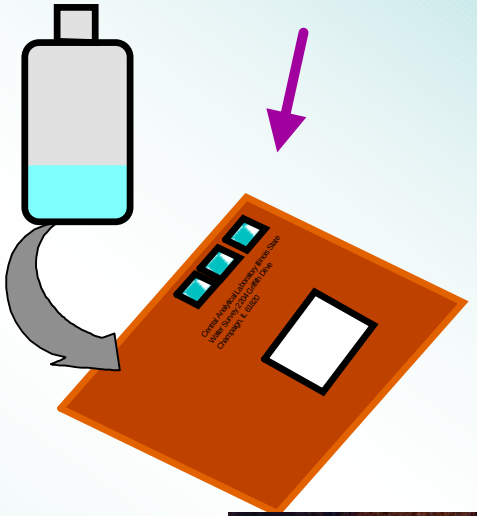
**NORMAL FIELD OBSERVER REPORT FORM FILLED OUT AS SPECIFIED**

**ACTUAL RAIN GAGE CHART FROM YOUR SITE**




4

**SEND WHAT'S LEFT TO CAL USING ENCLOSED ENVELOPE**



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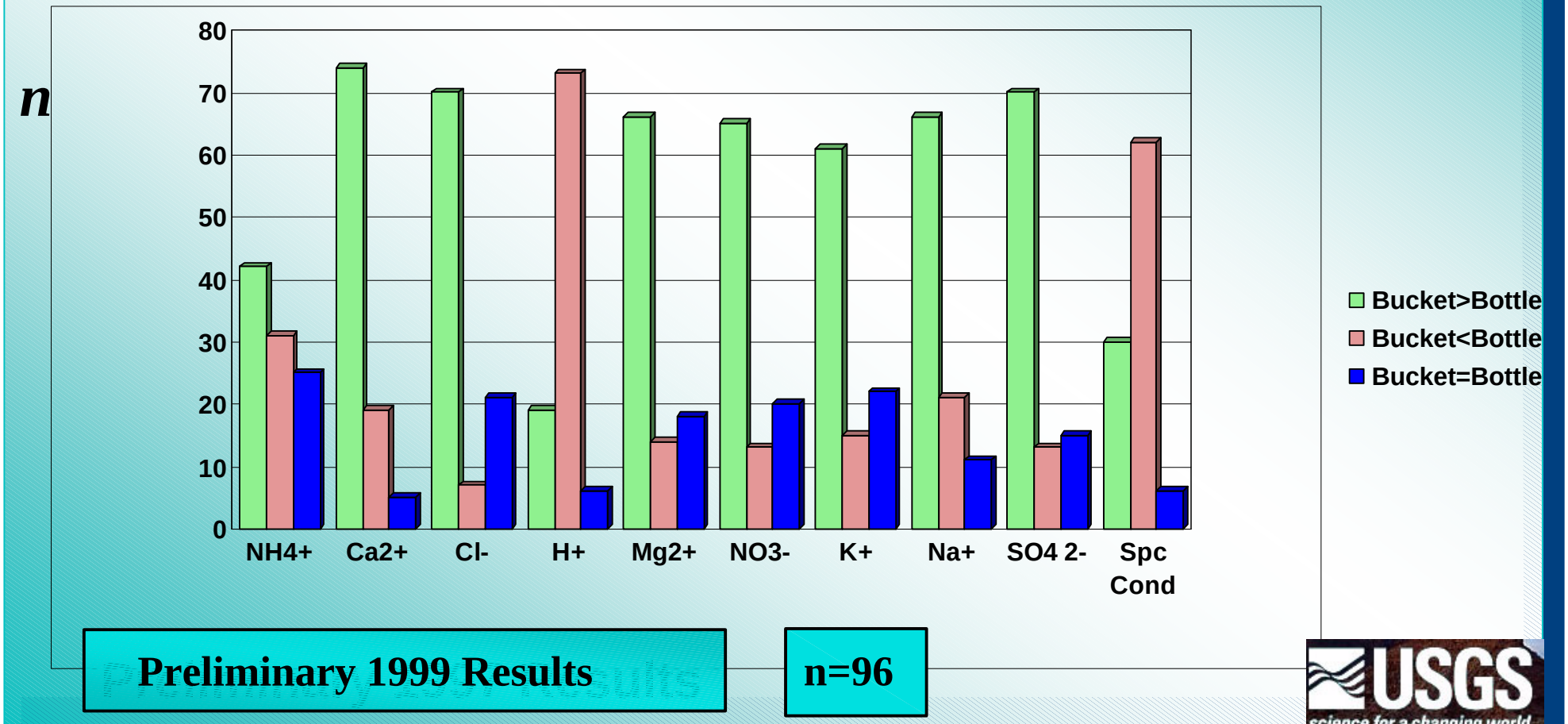
# Blind Audit Program:

## Paired Sample Results




**Preliminary 1999 Results**

**n=96**

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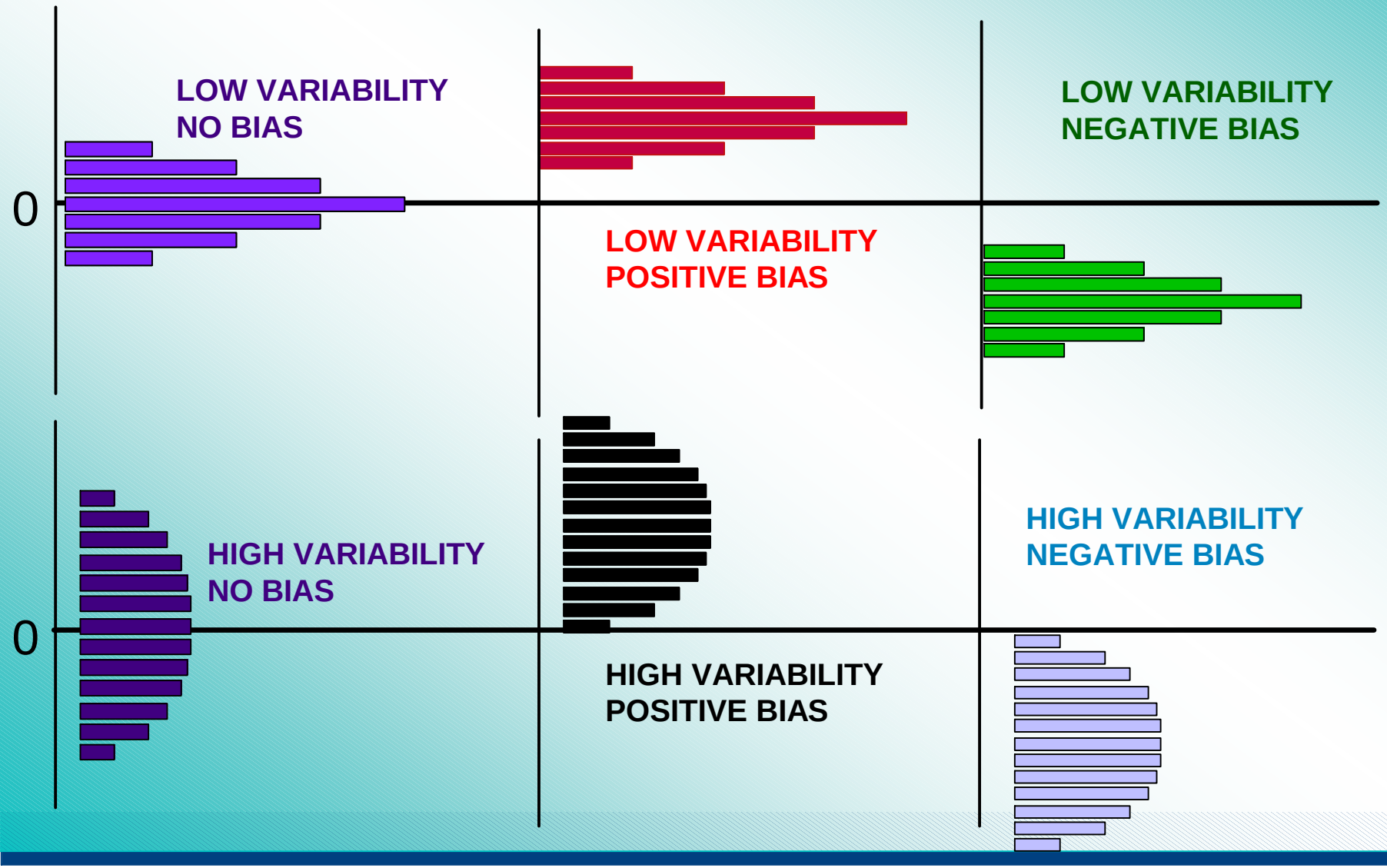
# BIAS AND VARIABILITY



# Blind Audit Program:

## Relative Percent Differences

Preliminary 1999 Results

| Analytes | 25th % | Median | 75th % |
|---|---|---|---|
| Ammonium | -4.41 | 1.41 | 5.63 |
| Calcium | 0.87 | 4.35 | 12.70 |
| Chloride | 1.39 | 4.17 | 6.78 |
| Hydrogen Ion | -9.06 | -4.93 | 0.00 |
| Magnesium | 0.60 | 2.98 | 7.74 |
| Nitrate | 0.48 | 1.66 | 2.75 |
| Potassium | 0.00 | 5.00 | 15.00 |
| Sodium | 0.22 | 2.20 | 4.19 |
| Sulfate | 0.67 | 1.72 | 2.66 |
| Spec Cond | -4.69 | -2.05 | |

n=96

$$\frac{[\text{Bucket}] - [\text{Bottle}]}{[\text{Target}]} * 10$$

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# Blind Audit Program:

Preliminary 1999 Results

## Absolute Percent Differences

| Analytes | 25th % | Median | 75th % |
|---|---|---|---|
| Ammonium | 1.41 | 4.41 | 12.50 |
| Calcium | 2.61 | 5.22 | 14.35 |
| Chloride | 1.39 | 4.17 | 6.94 |
| Hydrogen Ion | 3.67 | 6.61 | 10.35 |
| Magnesium | 1.79 | 3.57 | 8.57 |
| Nitrate | 0.78 | 1.75 | 3.51 |
| Potassium | 2.41 | 5.36 | 17.65 |
| Sodium | 1.32 | 2.86 | 4.65 |
| Sulfate | 1.04 | 1.77 | 2.88 |
| Spec Cond | 1.55 | 3.43 | |

n=96

$$\left| \frac{[\text{Bucket}] - [\text{Bottle}]}{[\text{Target}]} \right| * 100$$

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# 1998 Blind Audit Program:

## Paired-Sample Concentration Differences

n=88

| Analytes | Minimum | 25th % | Median | 75th % | Maximum |
|---|---|---|---|---|---|
| Ammonium | -0.130 | -0.010 | 0.000 | 0.000 | 0.470 |
| Calcium | -0.143 | -0.004 | 0.003 | 0.010 | 0.462 |
| Chloride | -0.120 | 0.000 | 0.000 | 0.013 | 0.880 |
| Magnesium | -0.155 | 0.000 | 0.001 | 0.003 | 0.069 |
| Nitrate | -2.130 | 0.000 | 0.010 | 0.030 | 2.250 |
| Potassium | -0.021 | 0.000 | 0.001 | 0.004 | 0.079 |
| Sodium | -0.103 | 0.000 | 0.002 | 0.006 | 0.345 |
| Sulfate | -0.915 | 0.000 | 0.010 | 0.030 | 2.325 |
| Spec Cond (µS/cm) | -11.80 | -0.800 | -0.100 | 0.200 | 8.700 |
| Hydrogen Ion (meq/L) | -32.53 | -2.981 | -1.065 | 0.000 | |

**Final 1998 Results** in mg/L except as noted

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# 1999 Blind Audit Program:

## Paired-Sample Concentration Differences

n=96

| Analytes | Minimum | 25th % | Median | 75th % | Maximum |
|---|---|---|---|---|---|
| Ammonium | -0.620 | -0.010 | 0.000 | 0.020 | 0.420 |
| Calcium | -0.567 | 0.002 | 0.014 | 0.030 | 0.443 |
| Chloride | -0.685 | 0.000 | 0.010 | 0.030 | 0.260 |
| Magnesium | -0.172 | 0.000 | 0.002 | 0.005 | 0.106 |
| Nitrate | -2.505 | 0.000 | 0.020 | 0.060 | 2.530 |
| Potassium | -0.121 | 0.000 | 0.003 | 0.007 | 0.045 |
| Sodium | -0.437 | 0.000 | 0.003 | 0.013 | 0.174 |
| Sulfate | -4.485 | 0.000 | 0.040 | 0.090 | 2.120 |
| Spec Cond (mS/cm) | -142.5 | -1.000 | -0.400 | 0.150 | 12.100 |
| Hydrogen Ion (meq/L) | -441.0 | -3.384 | -2.060 | 0.000 | |

**Preliminary 1999 Results** in mg/L except as noted

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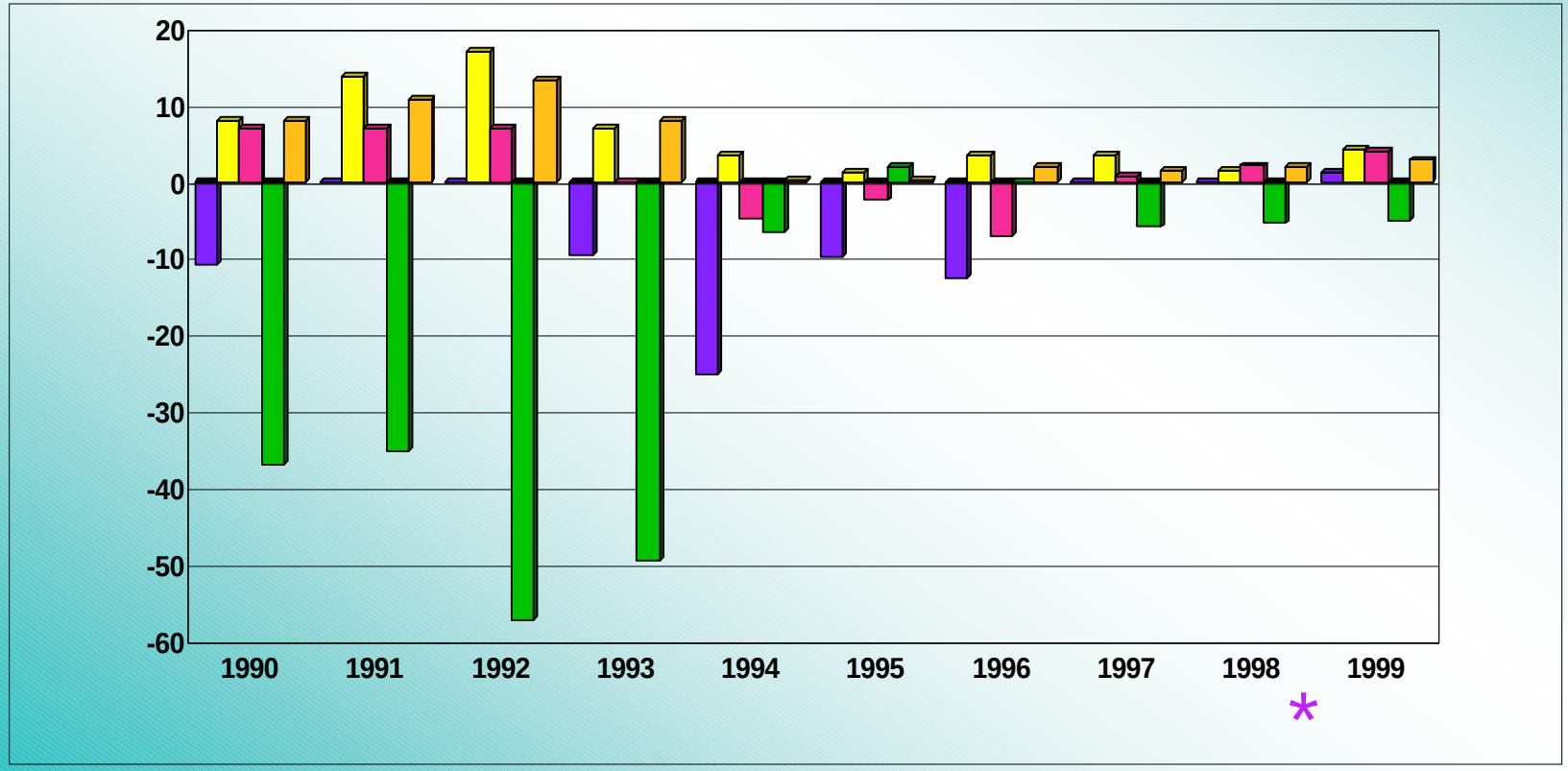
# Median Relative Percent Differences from 1990 to 1999

## Blind Audit




*Preliminary 1999 Results

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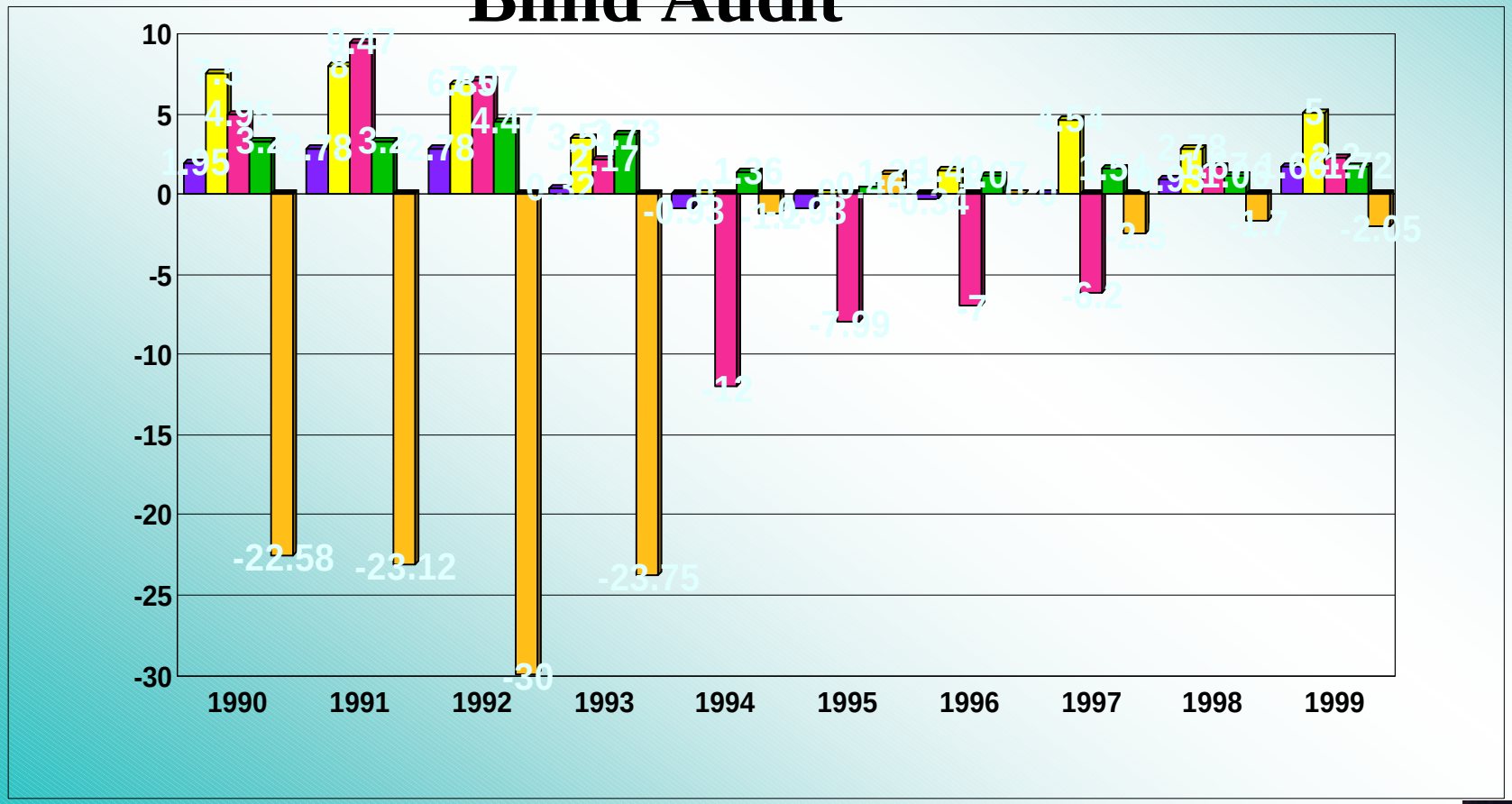
# Median Relative Percent Differences from 1990 to 1999

## Blind Audit




Preliminary 1999 Results

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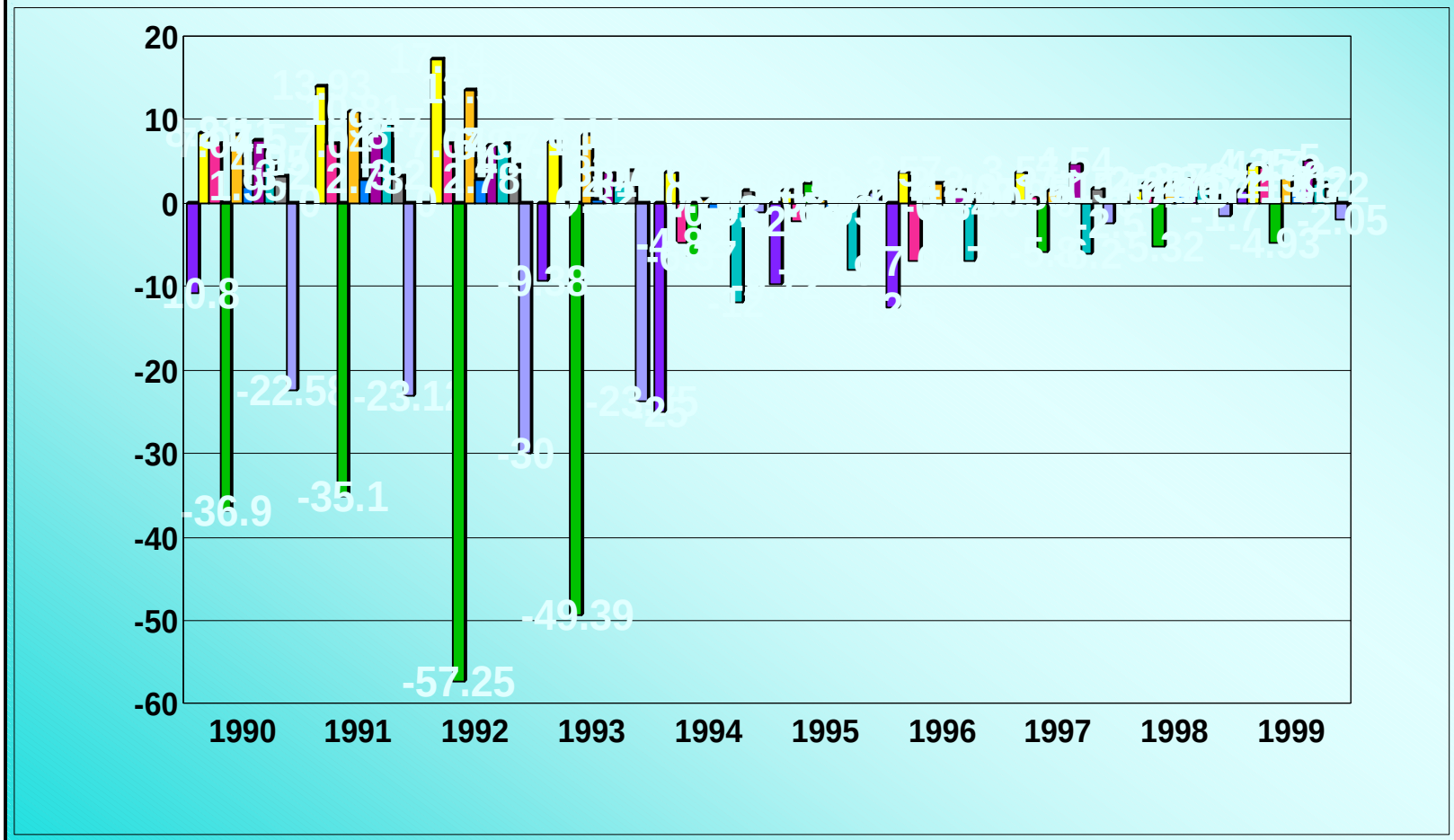
# Median Relative Percent Differences (1990 to 1999)




1999 Results are Preliminary

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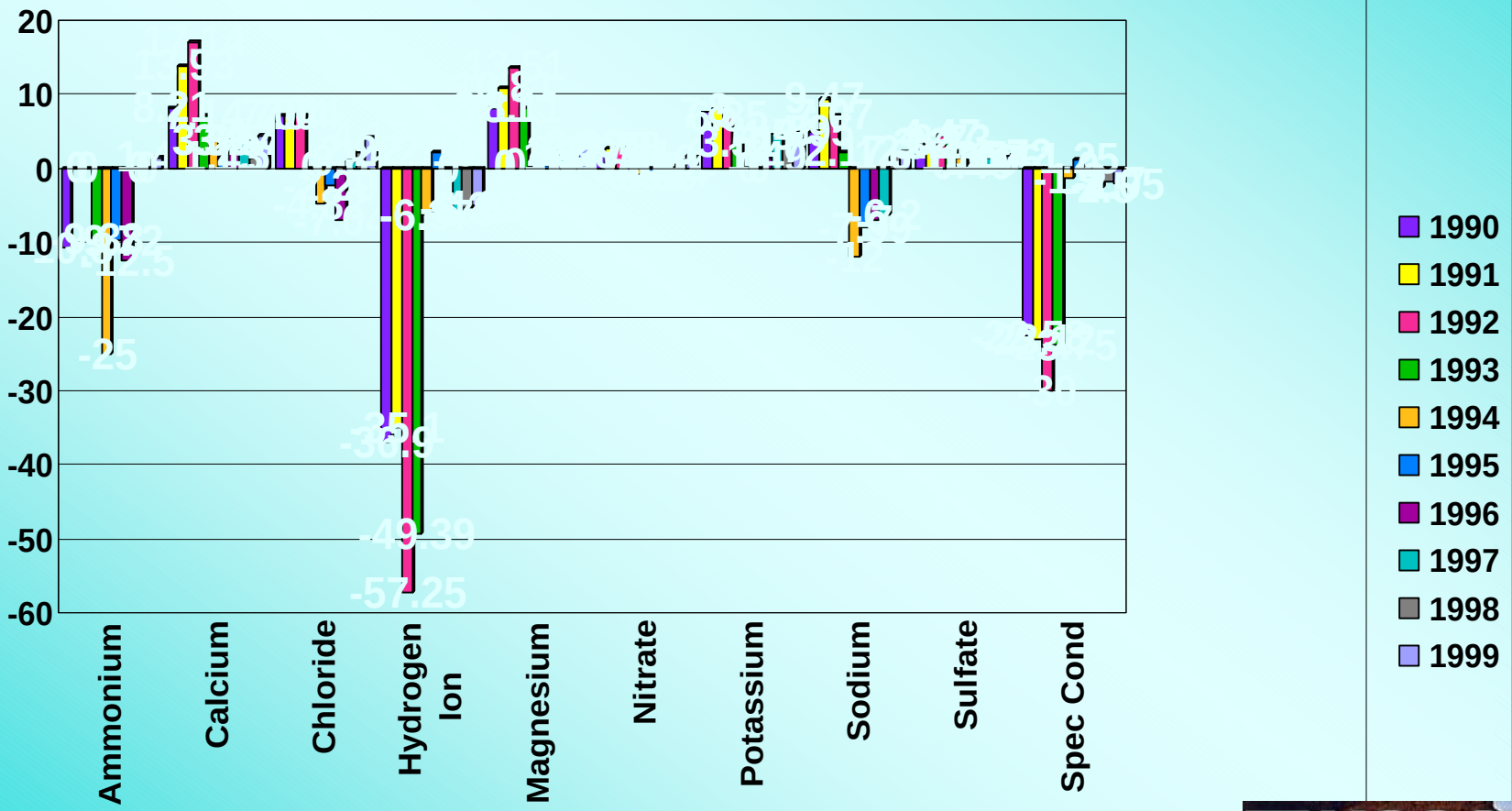
# Median Relative Percent Differences (1990 to 1999)




1999 Results are Preliminary

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# Interlaboratory Comparison Program

Objective is to quantify:

Bias and precision of CAL measurements

Comparability of CAL with other laboratories routinely analyzing low ionic strength samples

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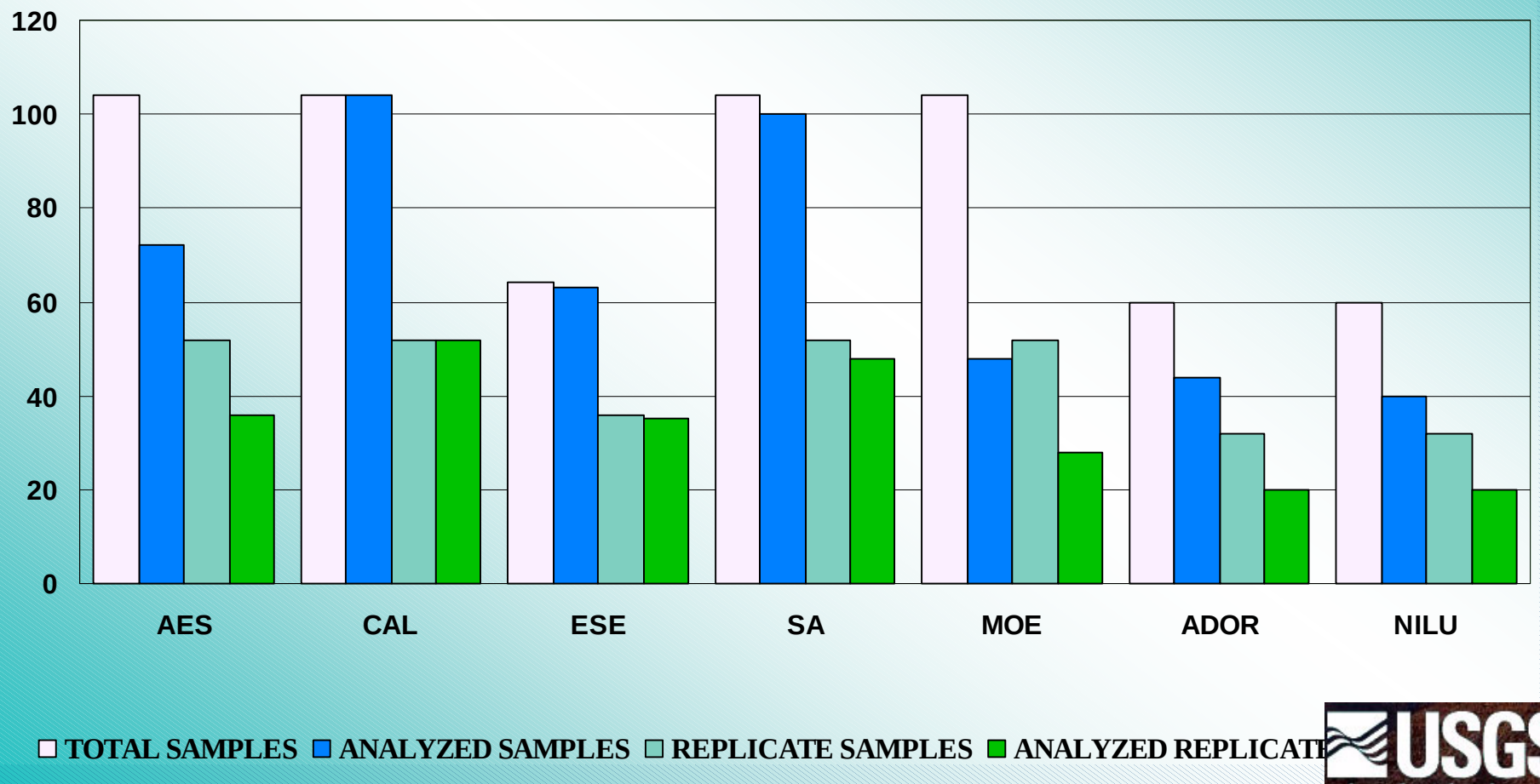
# SUMMARY OF LABORATORY PARTICIPATION - 1999 (AS OF MARCH 31, 2000)

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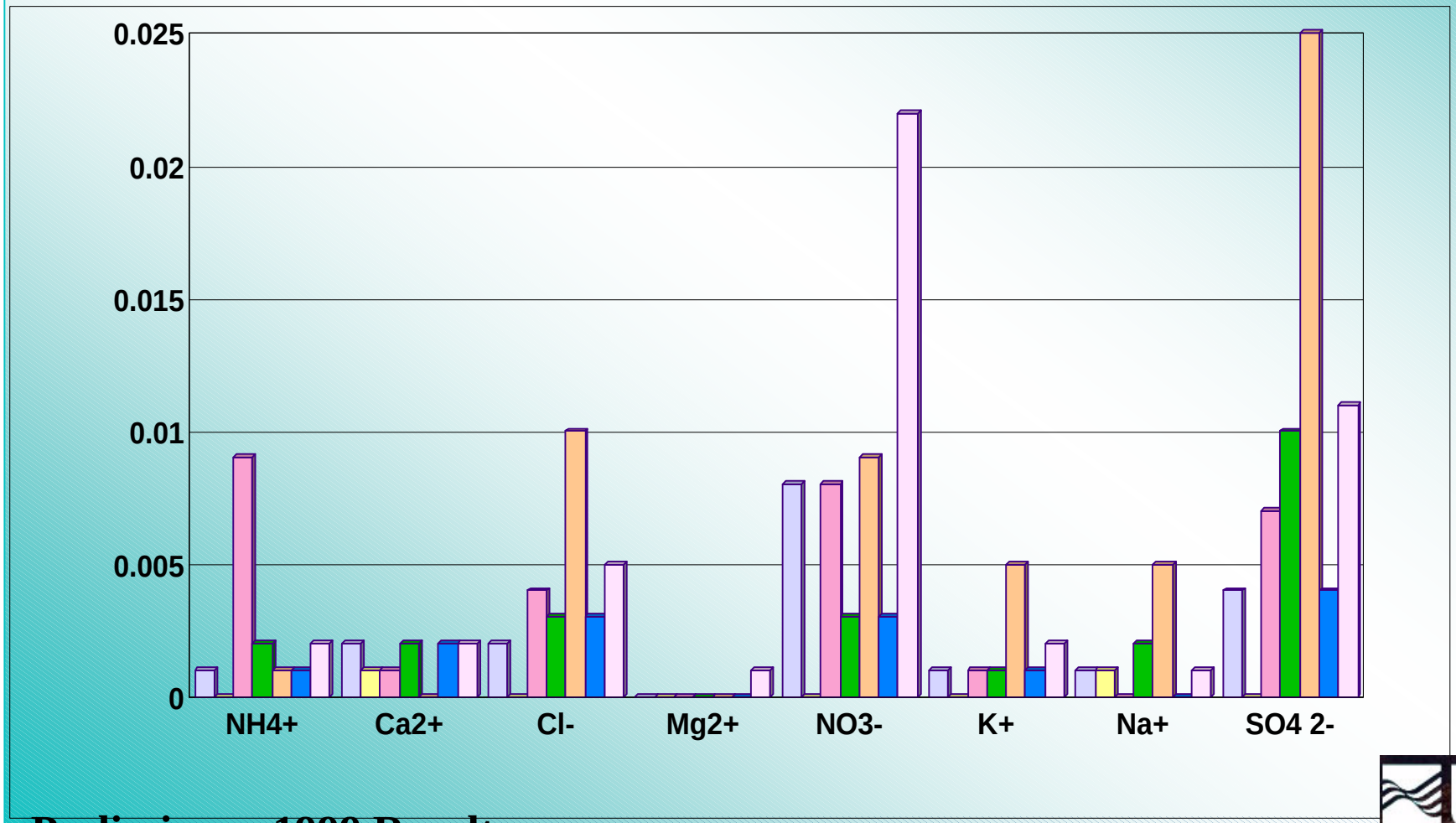
# Interlaboratory Comparison Program:

## Median Absolute Differences for Replicate Samples




**Preliminary 1999 Results**

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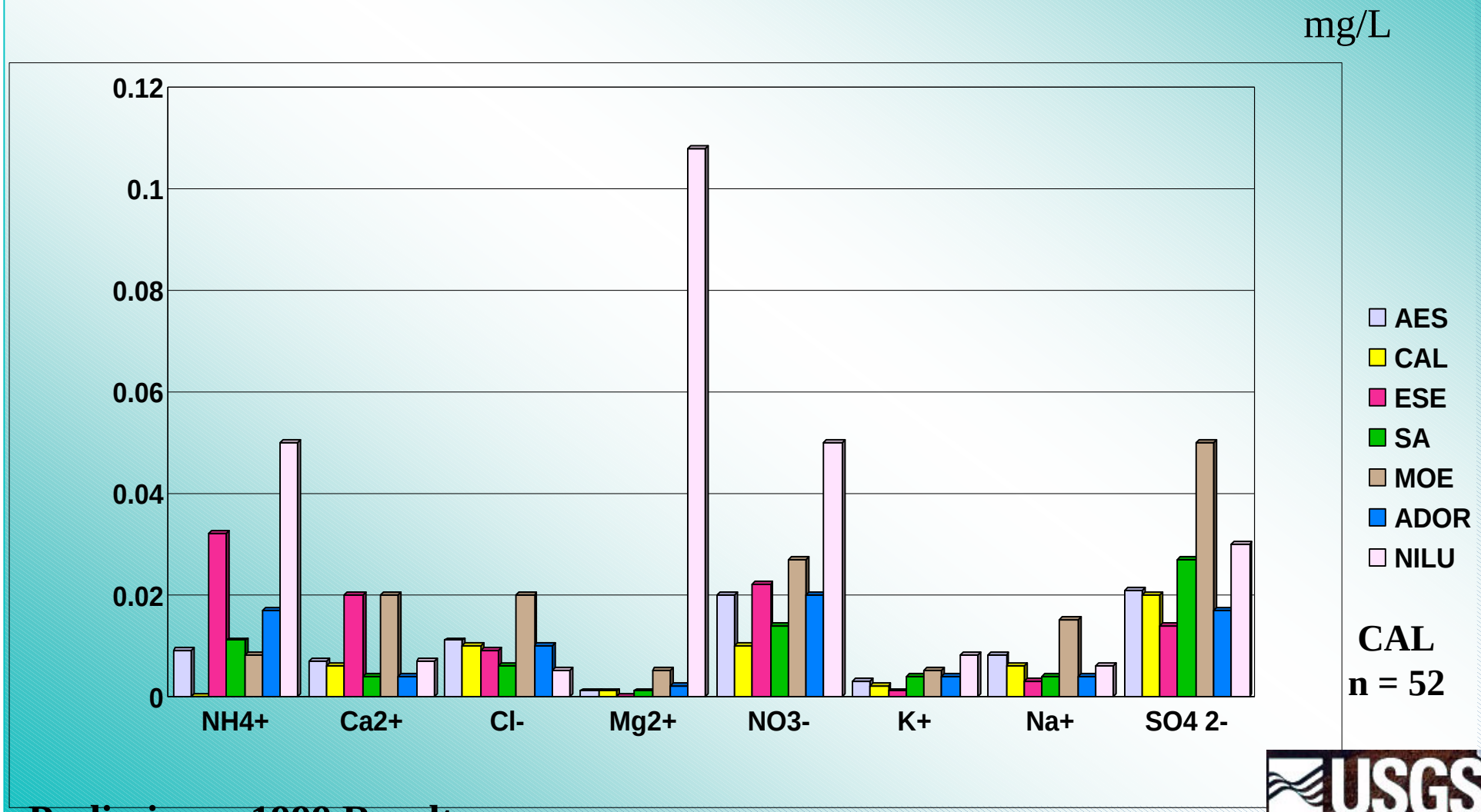
# Interlaboratory Comparison Program:

## 90th Percentile Absolute Differences for Replicate Samples




Preliminary 1999 Results

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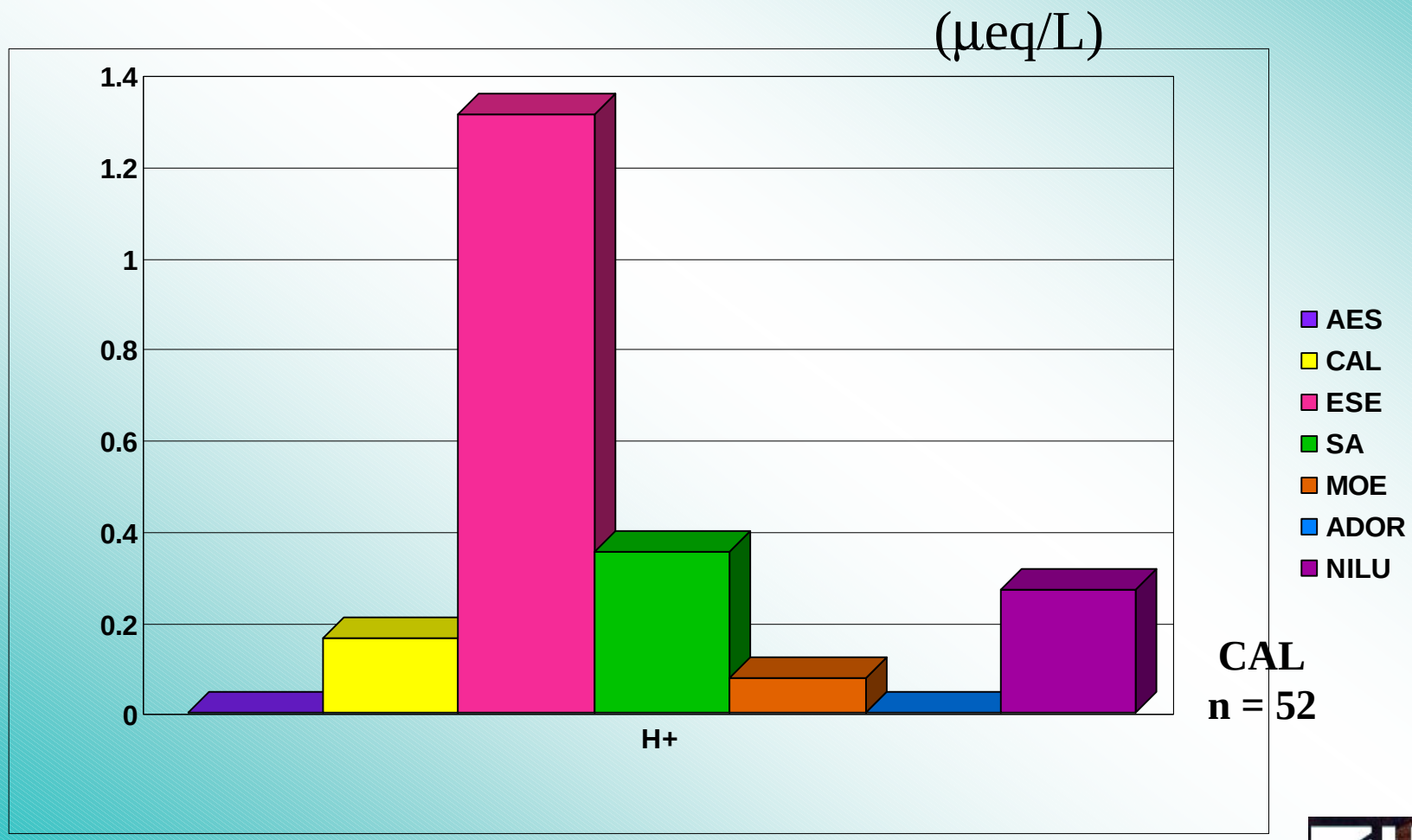
# Interlaboratory Comparison Program:

## Median Absolute Differences for Replicate Samples




Preliminary 1999 Results

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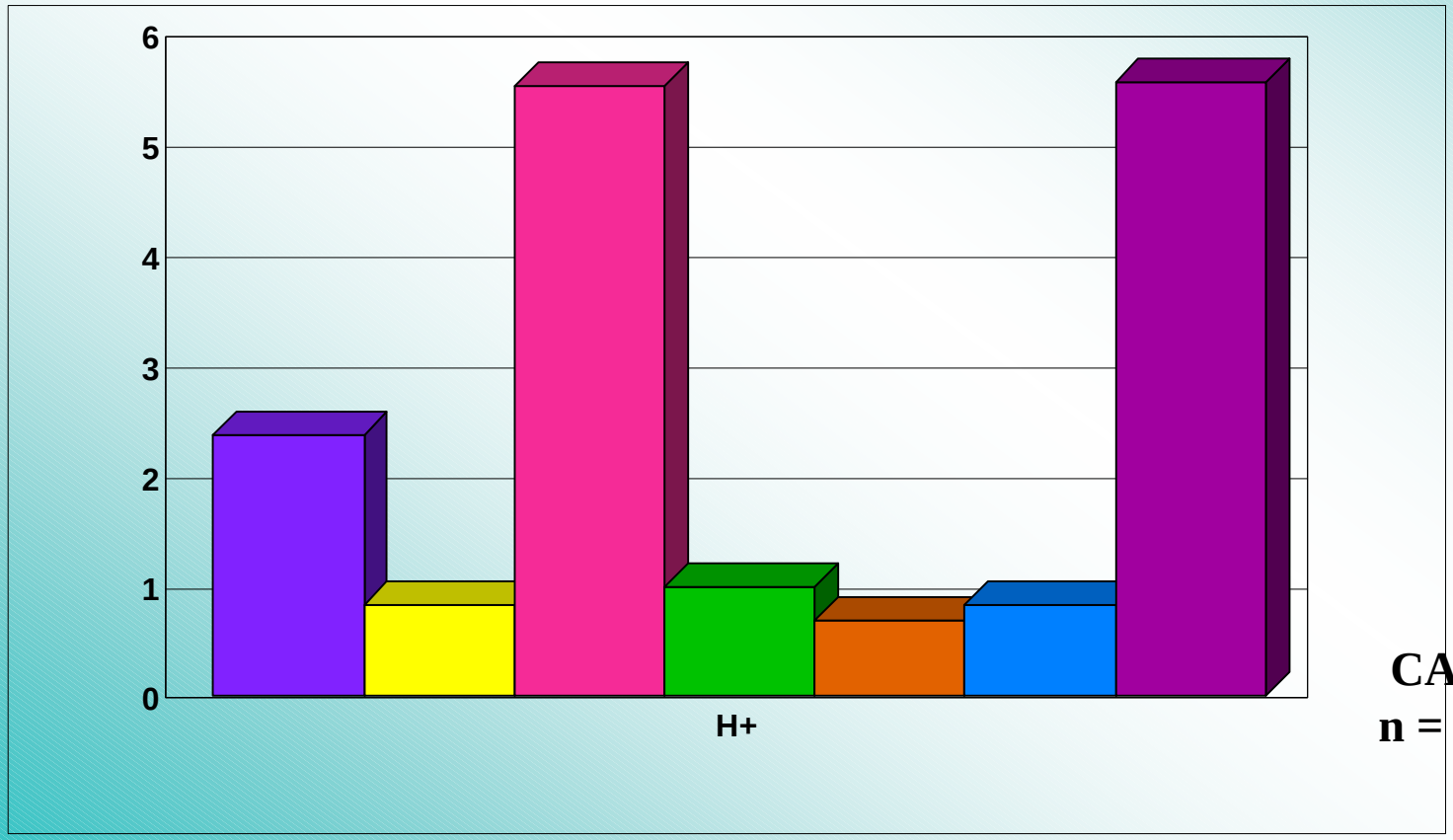
# Interlaboratory Comparison Program:

## 90th Percentile Absolute Differences for Replicate Samples

(µeq/L)




**CAL**
**n = 52**

**Preliminary 1999 Results**

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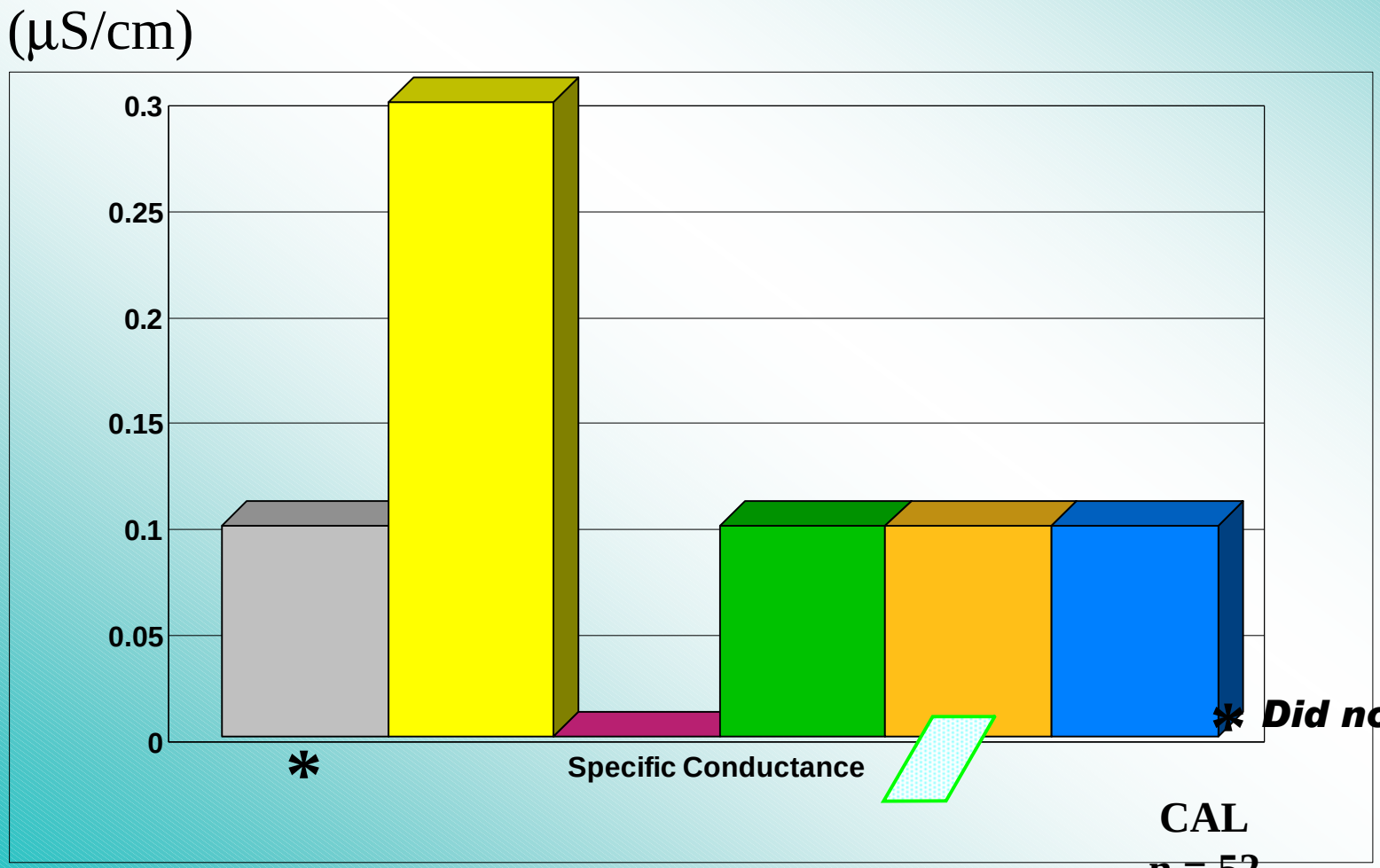
# Interlaboratory Comparison Program:

## Median Absolute Differences for Replicate Samples




Preliminary 1999 Results

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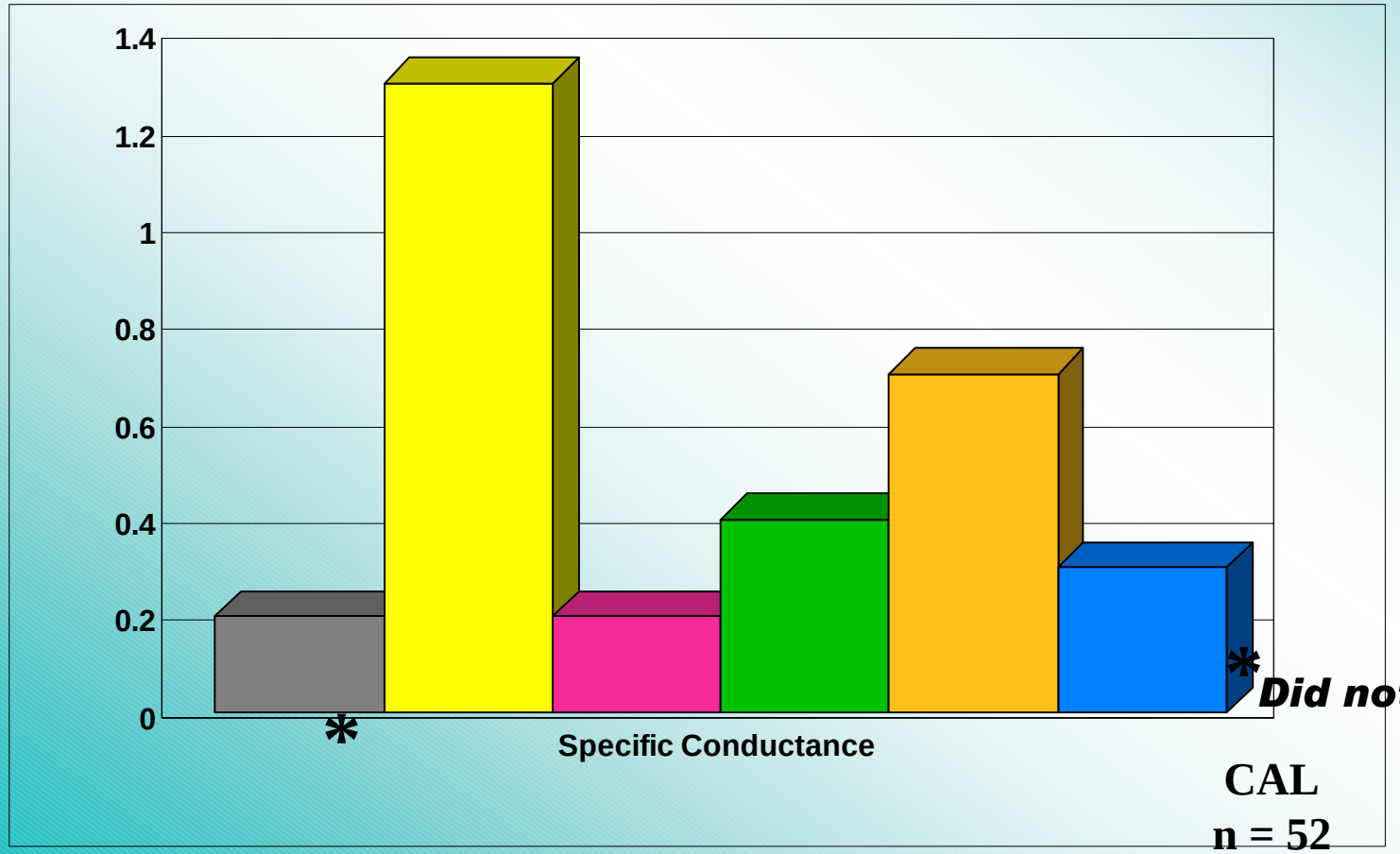
# Interlaboratory Comparison Program:

## 90th Percentile Absolute Differences for Replicate Samples

(µS/cm)




CAL
n = 52

Preliminary 1999 Results

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# CAL'S PRELIMINARY RANKINGS IN THE 1999 INTERLABORATORY COMPARISON

| ANALYTE | 50th percentile results | 90th percentile results |
|---|---|---|
| AMMONIUM | 1ST | 1ST |
| CALCIUM | 2ND (TIE) | 2ND |
| CHLORIDE | 1ST | 3RD |
| MAGNESIUM | 1ST (TIE) | 2ND (TIE) |
| NITRATE | 1ST | 1ST |
| POTASSIUM | 1ST | 2ND |
| SODIUM | 2ND (TIE) | 3RD (TIE) |
| SULFATE | 1ST | 3RD |

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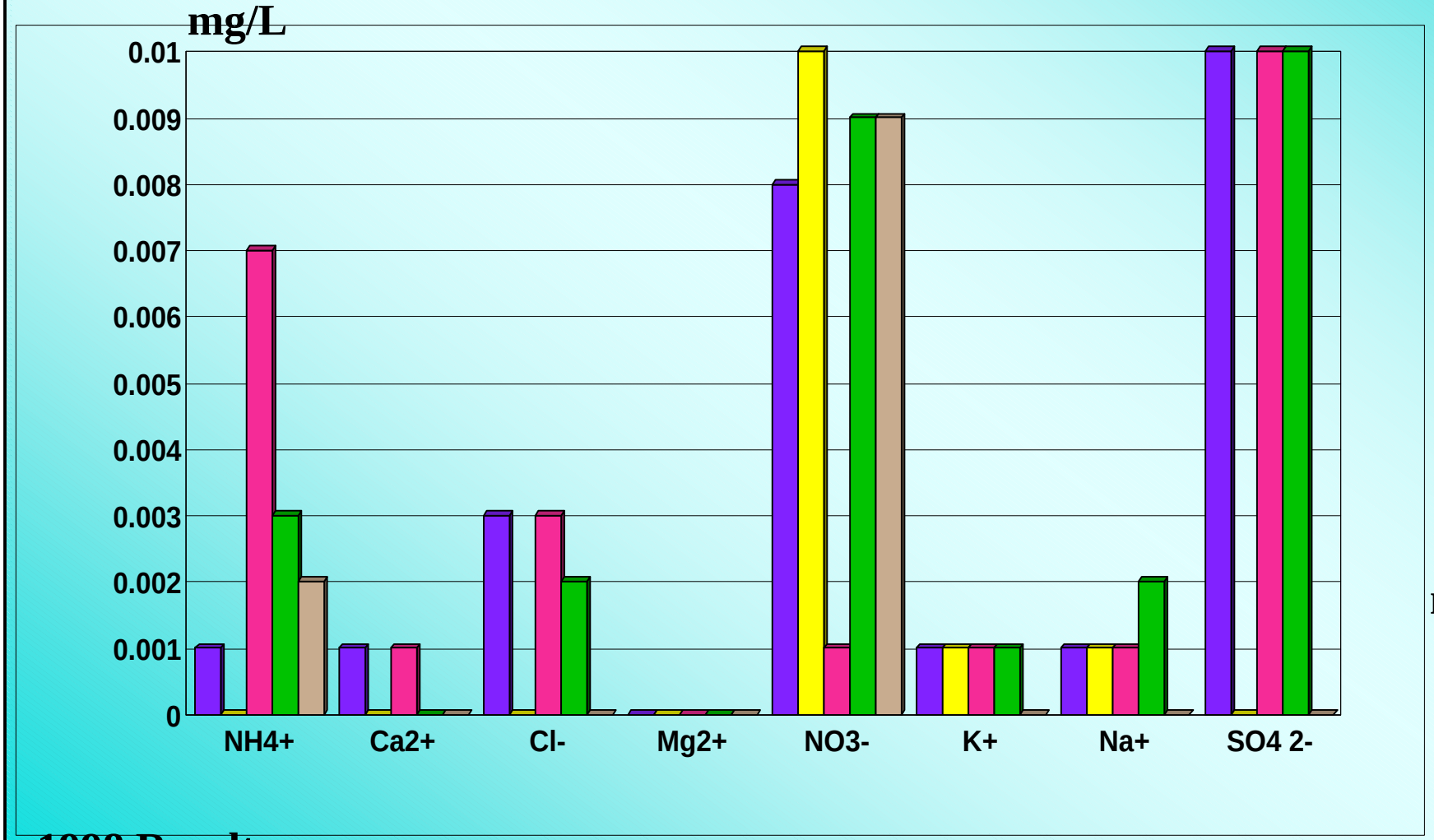
# Interlaboratory Comparison Program:

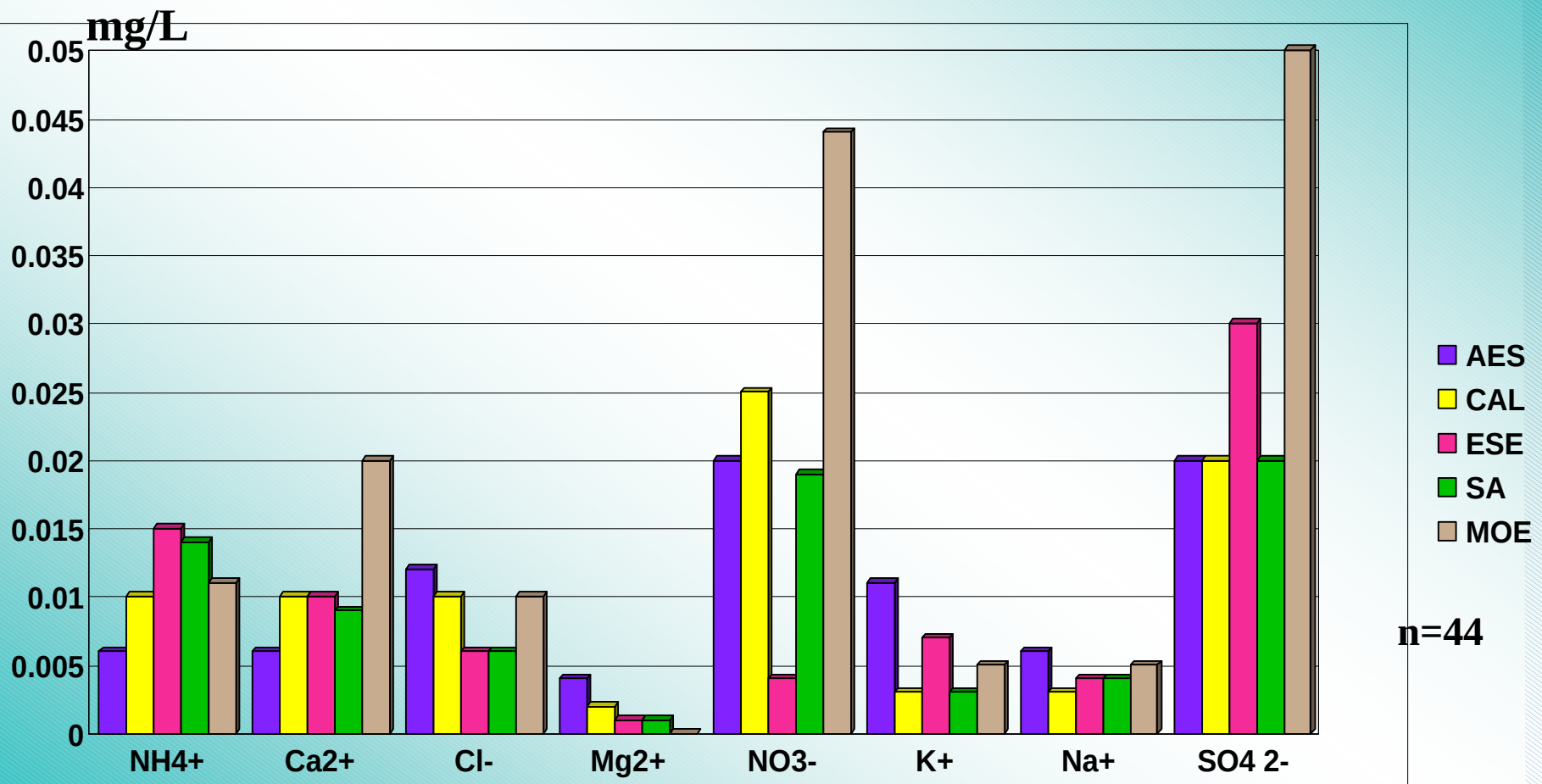
## Median Absolute Differences for Replicate Samples




1998 Results

# Interlaboratory Comparison Program:

## 90th Percentile Absolute Differences for Replicate Samples




n=44

1998 Results

# Collocated sampler program

- Objectives
  - Estimate overall variability of NADP/NTN precipitation measurements -- physical parameters and chemical analyses
  - Detect changes in variability in response to new protocols or changes in sampling equipment
  - Compare overall variability to random error measured by other QA programs

# 1998/1999 Collocated Sites

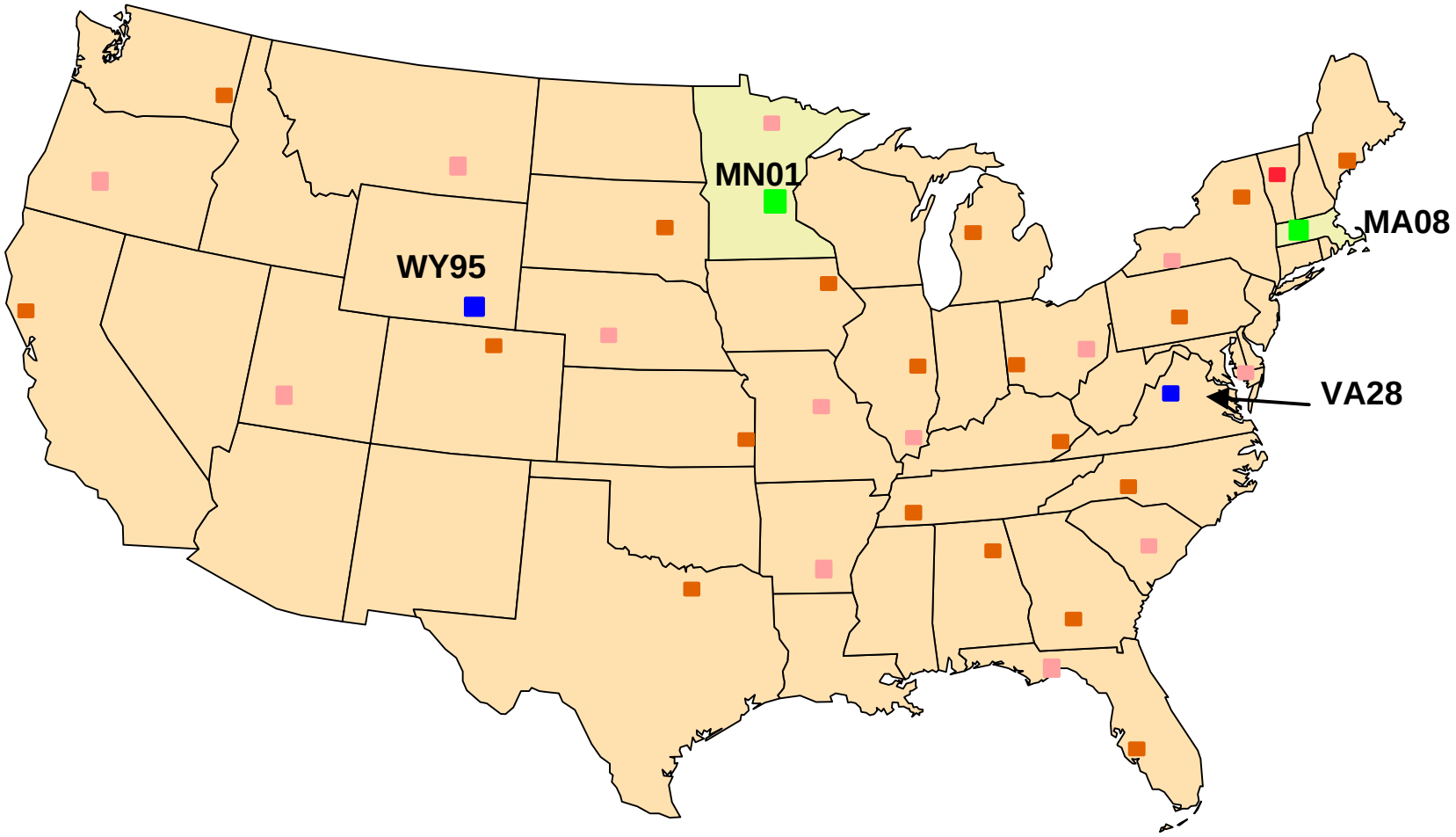
1998 Sites:

- WY95/95WY - Brooklyn Lake
- VA28/28VA - Shenandoah National Park

1999 Sites:

- MA08/08MA - Quabbin Reservoir
- MN01/01MN - Cedar Creek

# Collocated Sites 1998-99



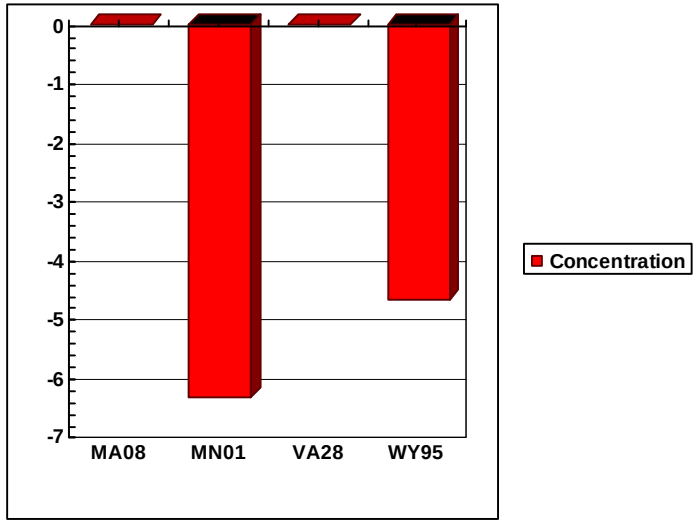

- 1988-93
- 1994-97
- October 1997- September 1998
- October 1998- September 1999

- Bias was calculated as the median signed differences between the original and collocated sites:

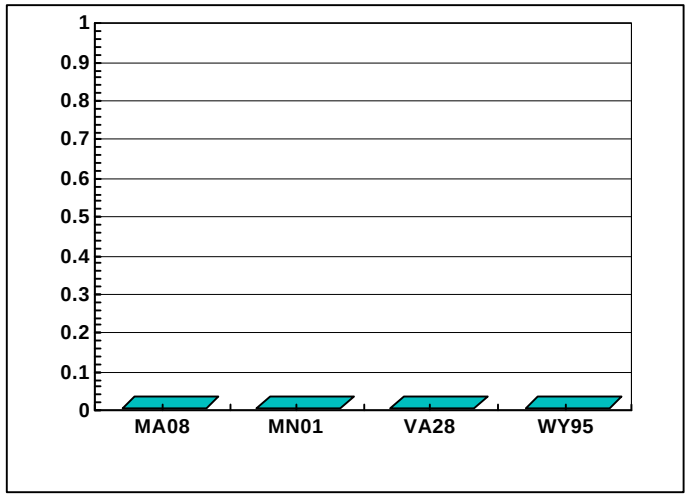
$$100 * \frac{X1 - X2}{(X1 + X2)/2}$$

BIAS, IN PERCENT

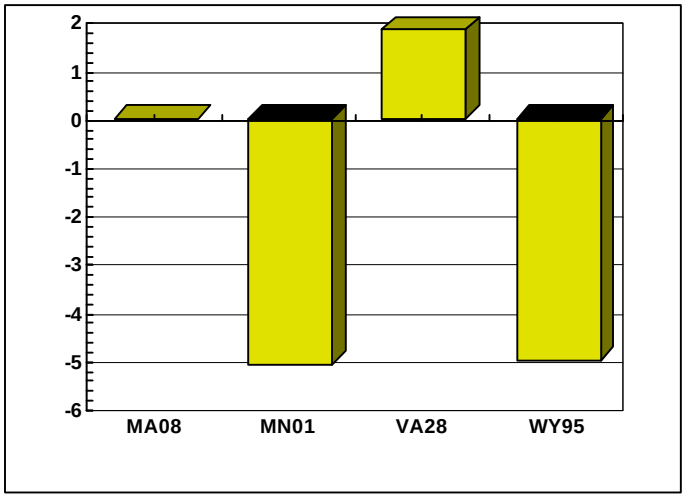
## Sodium



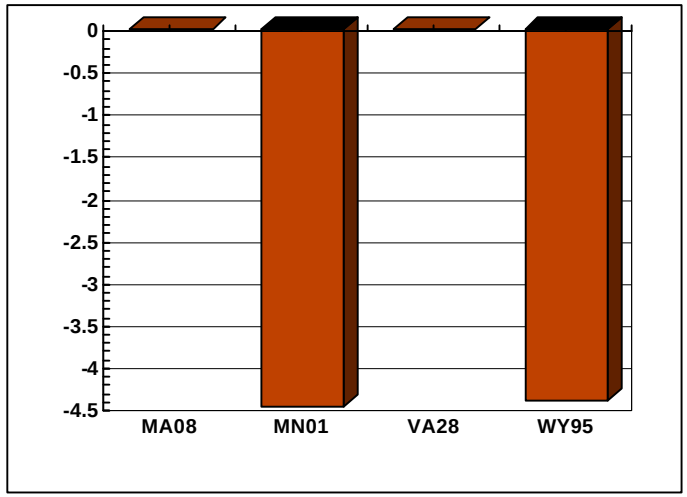

## Chloride




## Nitrate



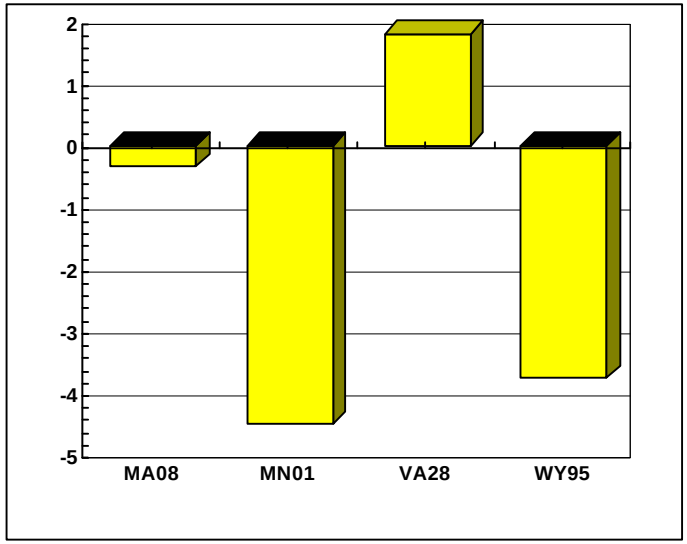

## Sulfate



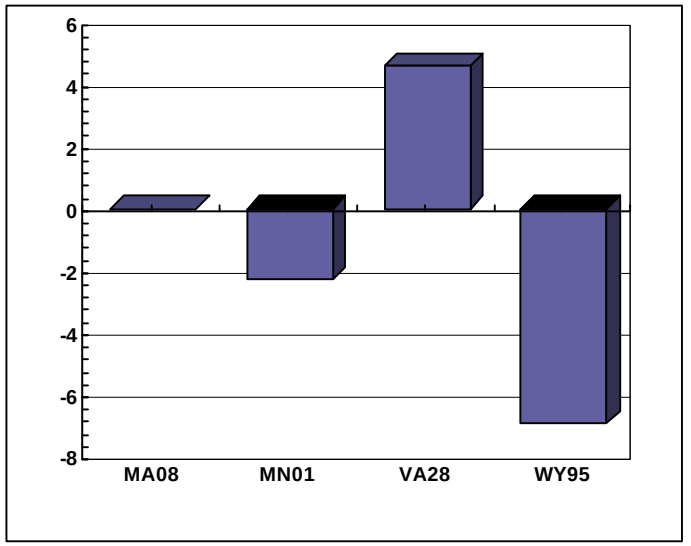

USGS

BIAS, IN PERCENT

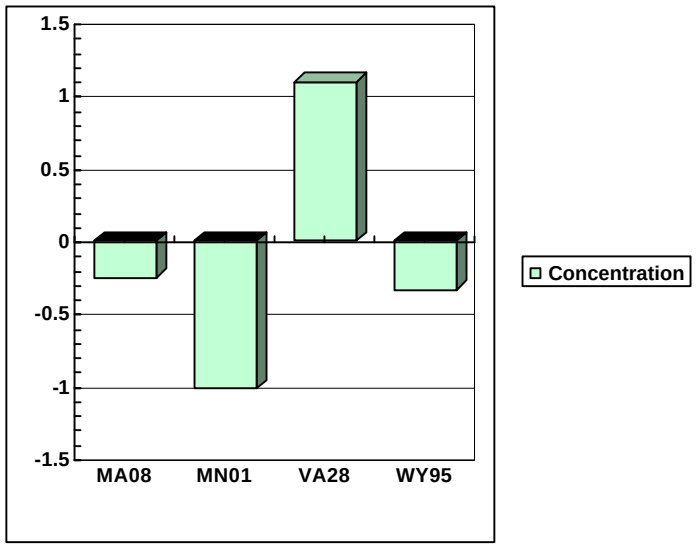
## Specific Conductance



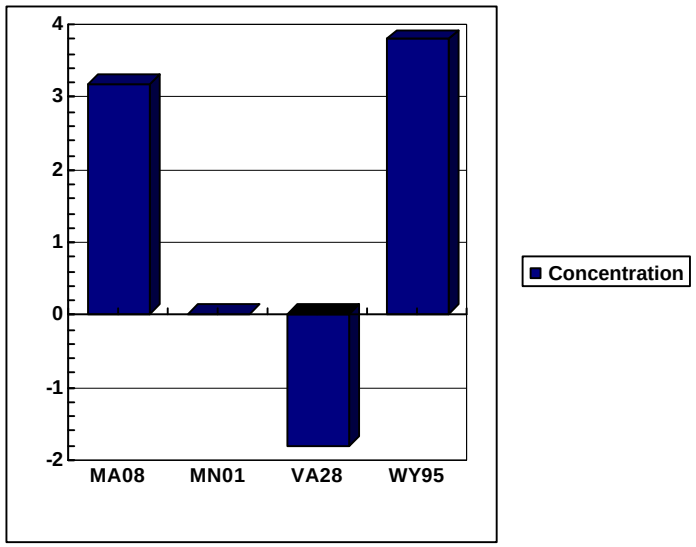

## pH




## Volume



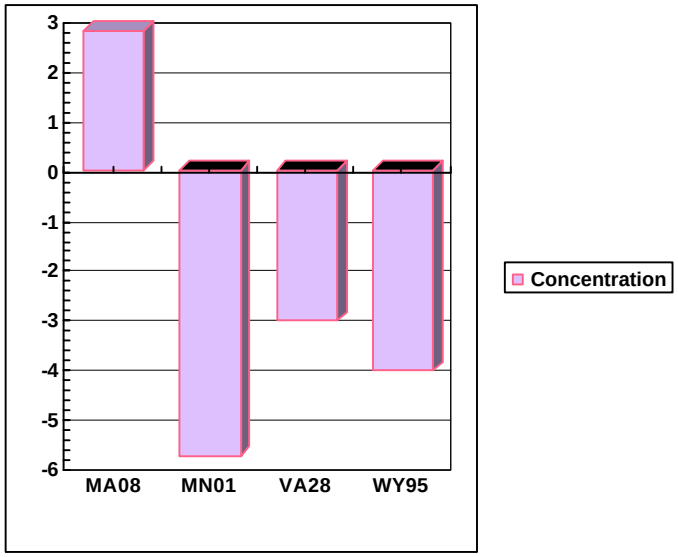

## Precipitation Depth



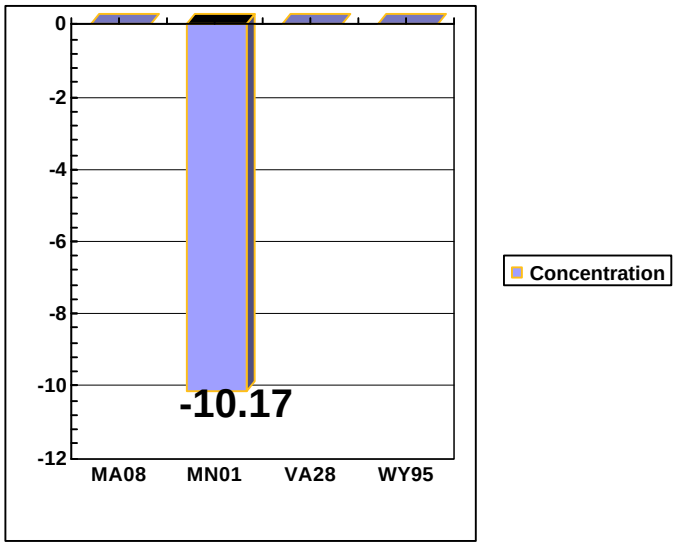

1999 DATA FOR MA08 AND MN01 IS PRELIMINARY

BIAS, IN PERCENT

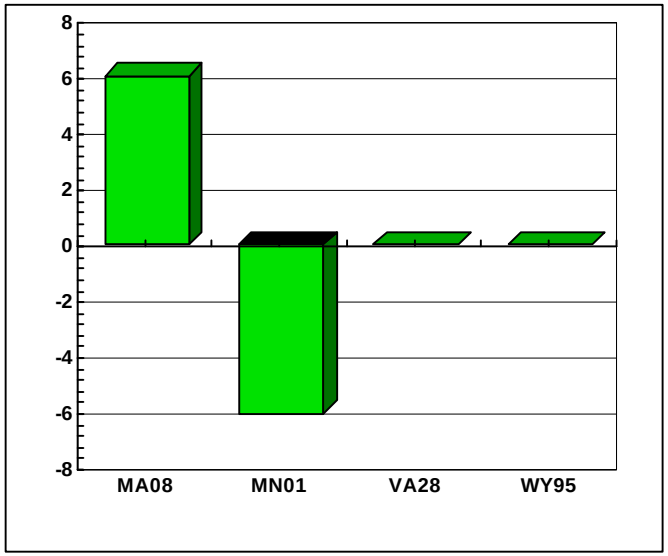
## Calcium



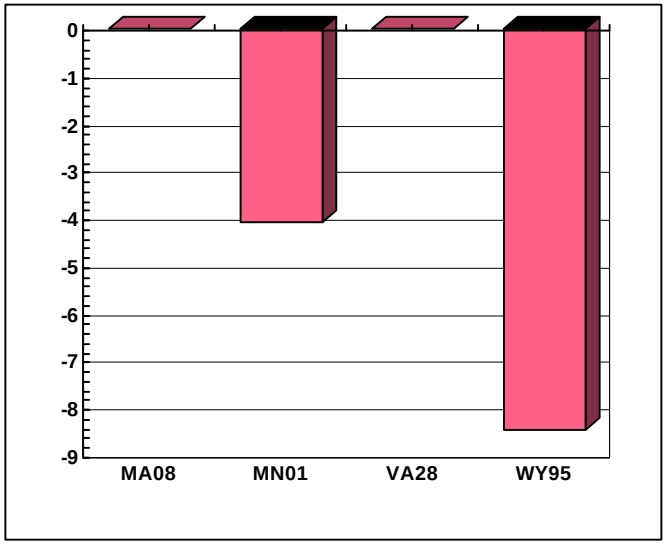

## Magnesium




## Potassium




## Ammonium




1999 DATA FOR MA08 AND MN01 IS PRELIMINARY

# Sample Volume -- Median Differences

| SITE ID | VOLUME DIFFERENCE BETWEEN COLLECTORS milliliters | VOLUME DIFFERENCE in percent | ABSOLUTE VOLUME DIFFERENCE millimeters | ABSOLUTE VOLUME DIFFERENCE in percent | VOLUME MEDIAN YEARLY VALU millimeters |
|---|---|---|---|---|---|
| MA08 | -9.00 | -0.26 | 23.00 | 0.88 | 2194.0 |
| MN01 | -22.00 | -1.02 | 38.00 | 2.09 | 1601.5 |
| VA28 | 25.2 | 1.09 | 52.70 | 3.36 | 2242.0 |
| WY95 | -2.95 | -0.34 | 31.90 | 2.37 | 1058.5 |

# Sample Depth -- Median Differences

| SITE ID | ABSOLUTE DEPTH DIFFERENCE BETWEEN COLLECTORS millimeters | DEPTH DIFFERENCE in percent | ABSOLUTE DEPTH DIFFERENCE millimeters | ABSOLUTE DEPTH DIFFERENCE in percent | DEPTH MEDIA YEARLY VALU millimeters |
|---|---|---|---|---|---|
| MA08 | 0.030 | 3.17 | 0.050 | 6.19 | 20.32 |
| MN01 | 0.000 | 0.0 | 0.000 | 0.00 | 12.70 |
| VA28 | -0.015 | -1.82 | 0.045 | 2.35 | 25.27 |
| WY95 | 0.030 | 3.78 | 0.050 | 7.16 | 15.75 |

# Calcium -- Median Concentration Differences

| SITE ID | CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | CONCENTRATION DIFFERENCE in percent | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.001 | 2.82 | 0.008 | 12.77 |
| MN01 | -0.018 | -5.75 | 0.024 | 6.59 |
| VA28 | -0.002 | -3.03 | 0.006 | 13.99 |
| WY95 | -0.004 | -4.03 | 0.015 | 15.15 |

# Calcium -- Median Deposition Differences

| SITE ID | DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | DEPOSITION DIFFERENCE in percent | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.001 | 8.42 | 0.008 | 19.14 |
| MN01 | -0.002 | -6.06 | 0.012 | 9.05 |
| VA28 | -0.001 | -8.11 | 0.010 | 21.63 |
| WY95 | -0.004 | -4.09 | 0.012 | 13.51 |

# Sulfate -- Median Concentration Differences

| SITE ID | CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | CONCENTRATION DIFFERENCE in percent | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.000 | 0.00 | 0.030 | 1.80 |
| MN01 | -0.060 | -4.47 | 0.060 | 4.80 |
| VA28 | 0.000 | 0.00 | 0.030 | 3.43 |
| WY95 | -0.030 | -4.41 | 0.030 | 8.79 |

# Sulfate -- Median Deposition Differences

| SITE ID | DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | DEPOSITION DIFFERENCE in percent | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.007 | 3.18 | 0.055 | 5.68 |
| MN01 | -0.006 | -4.44 | 0.026 | 4.57 |
| VA28 | -0.014 | -3.03 | 0.075 | 4.37 |
| WY95 | -0.005 | -6.82 | 0.041 | 13.58 |

# Nitrate -- Median Concentration Differences

| SITE ID | CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | CONCENTRATIONDIFFERENCE in percent | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS mg/L | ABSOLUTE CONCENTRATION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.000 | 0.00 | 0.040 | 2.90 |
| MN01 | -0.090 | -5.07 | 0.090 | 5.64 |
| VA28 | 0.010 | 1.83 | 0.050 | 5.67 |
| WY95 | -0.040 | -5.00 | 0.045 | 8.37 |

# Nitrate -- Median Deposition Differences

| SITE ID | DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | DEPOSITION DIFFERENCE in percent | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS kg/ha | ABSOLUTE DEPOSITION DIFFERENCE BETWEEN COLLECTORS in percent |
|---|---|---|---|---|
| MA08 | 0.003 | 2.45 | 0.056 | 6.12 |
| MN01 | -0.011 | -5.20 | 0.055 | 6.36 |
| VA28 | -0.002 | -0.49 | 0.041 | 4.65 |
| WY95 | -0.003 | -4.72 | 0.064 | 13.68 |

# Specific Conductance -- Median Differences

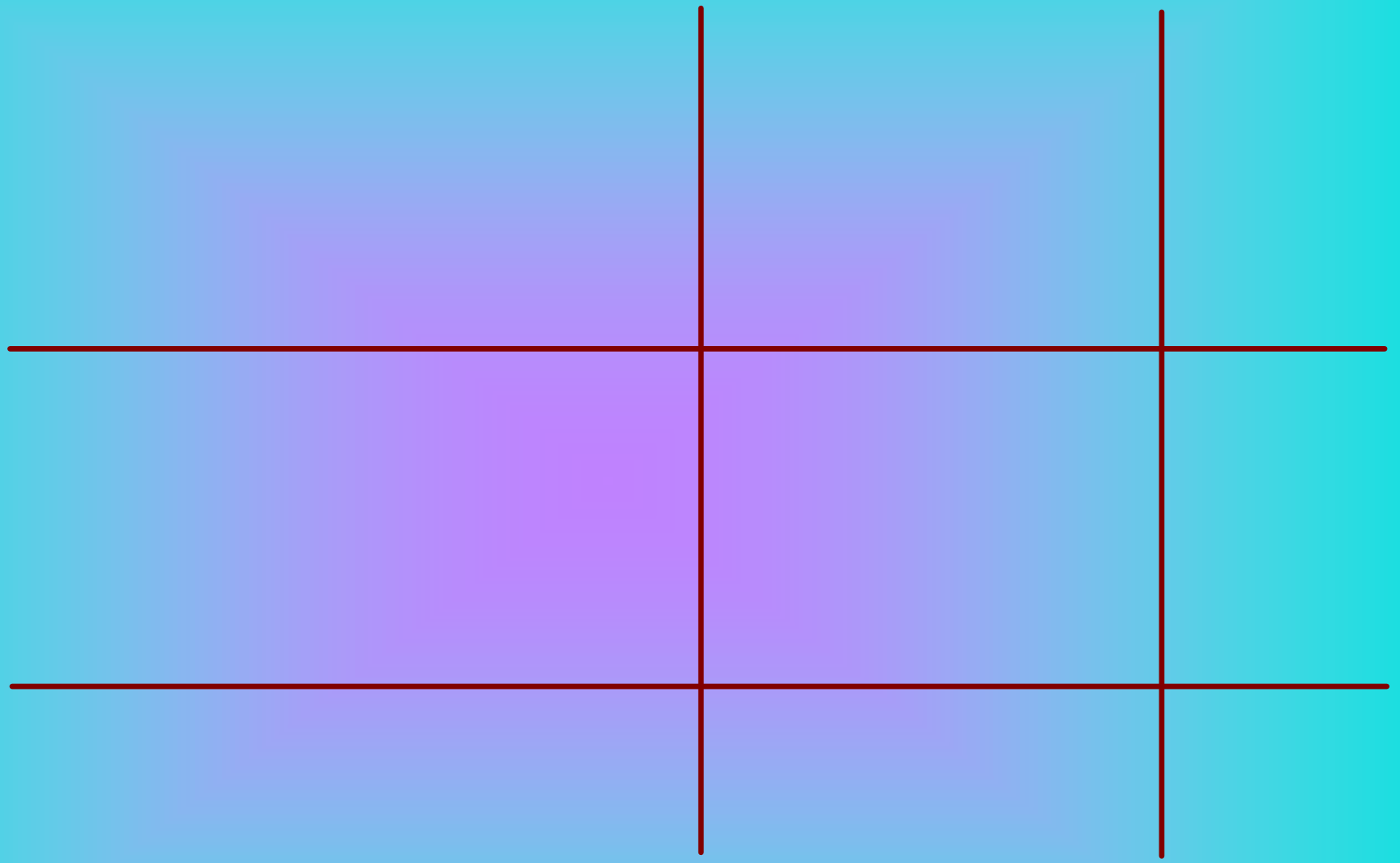
| SITE ID | DIFFERENCE BETWEEN COLLECTORS mS/cm | DIFFERENCE in percent | ABSOLUTE DIFFERENCE mS/cm | ABSOLUTE DIFFERENCE in percent |
|---|---|---|---|---|
| **MA08** | -0.100 | -0.34 | 0.500 | 1.87 |
| **MN01** | -0.800 | -4.50 | 0.800 | 6.57 |
| **VA28** | 0.200 | 1.80 | 0.400 | 2.80 |
| **WY95** | -0.300 | -3.76 | 0.600 | 8.41 |

# Intersite Comparison Program

**Objective:**

**Evaluate the precision and accuracy of onsite pH and specific conductance determinations**

# INTERSITE-COMPARISON NO. 43
# CHECK SAMPLE RESULTS



SPECIFIC CONDUCTANCE, mS/cm

pH, IN UNITS

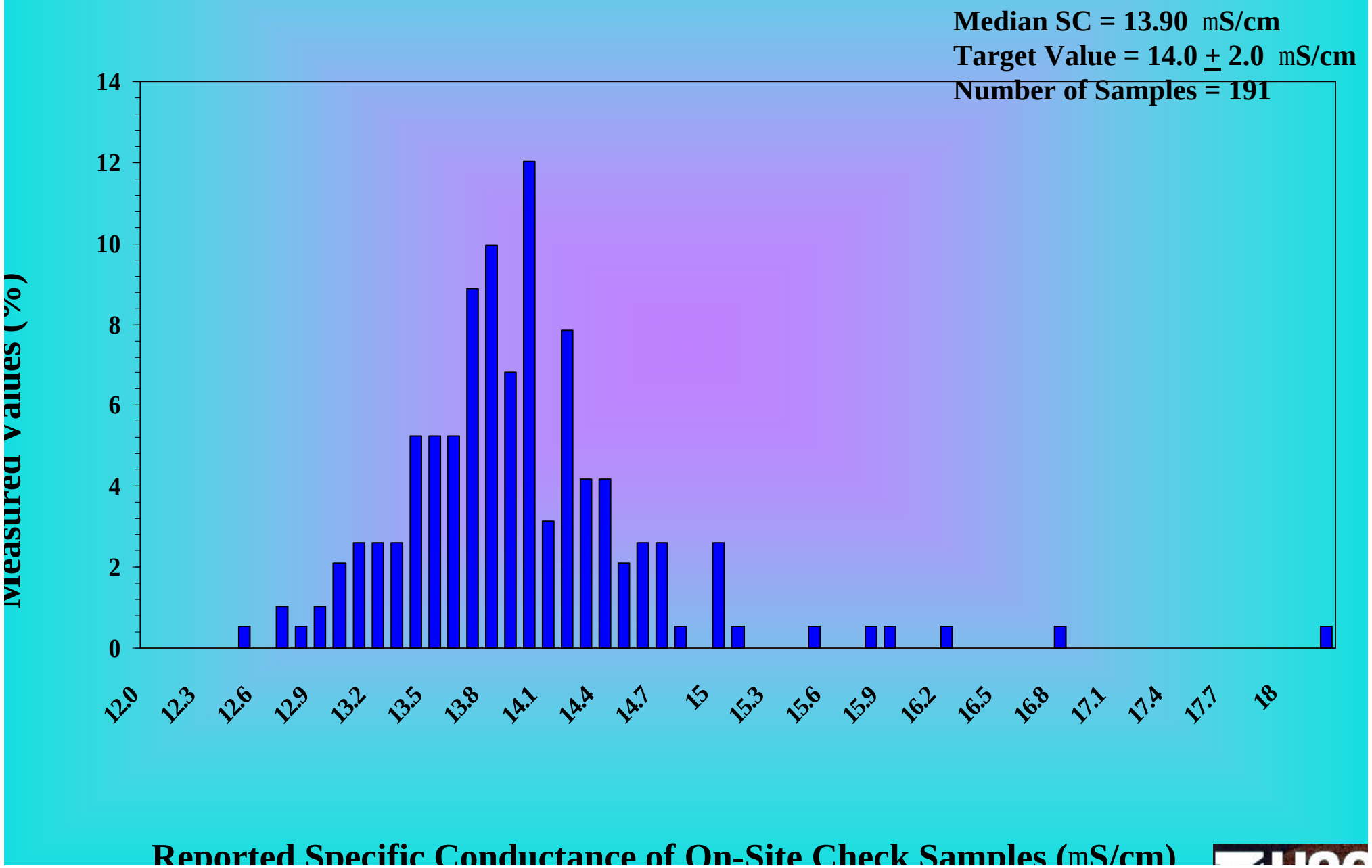
**Median pH Value: 4.91**

**pH Target Value: 4.90 ± 0.15**

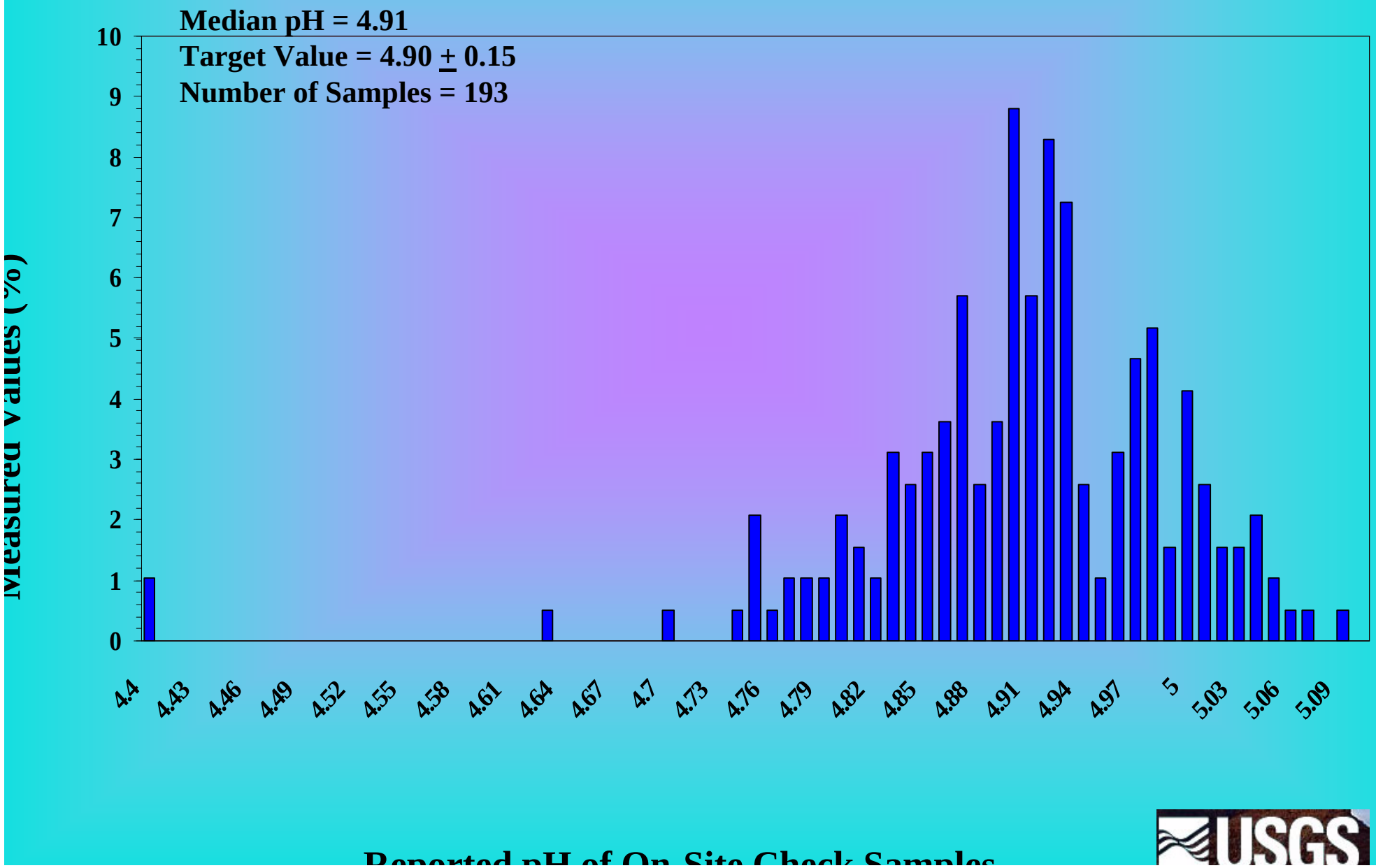
**Median Specific Conductance Value: 13.90 mS/cm**

**Specific Conductance Target Value: 14.0 ± 2 mS/cm**

# Specific Conductance of On-Site Check Samples - Reported by Site Operators

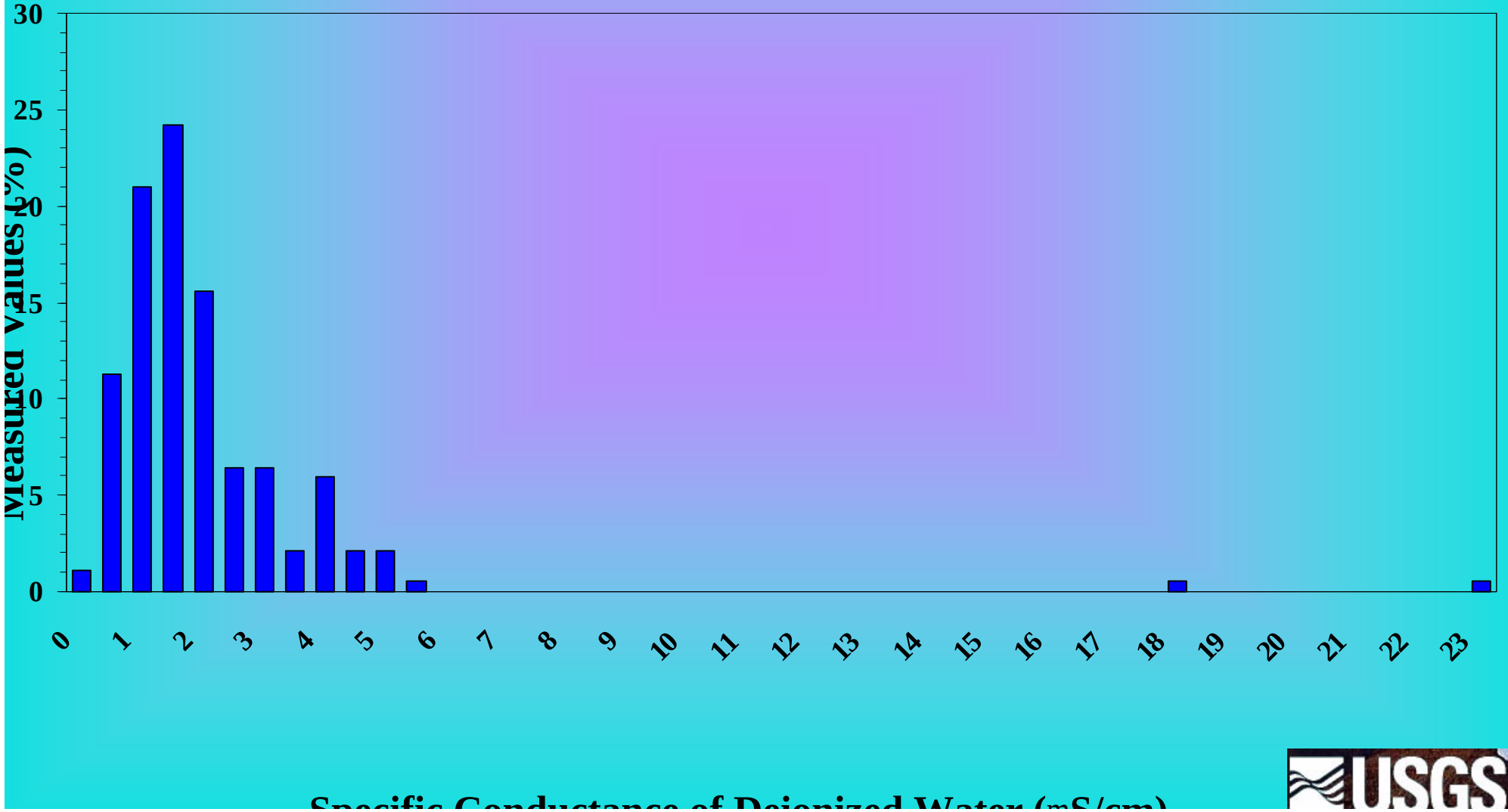


# pH of On-Site Check Samples - Reported by Site Operators

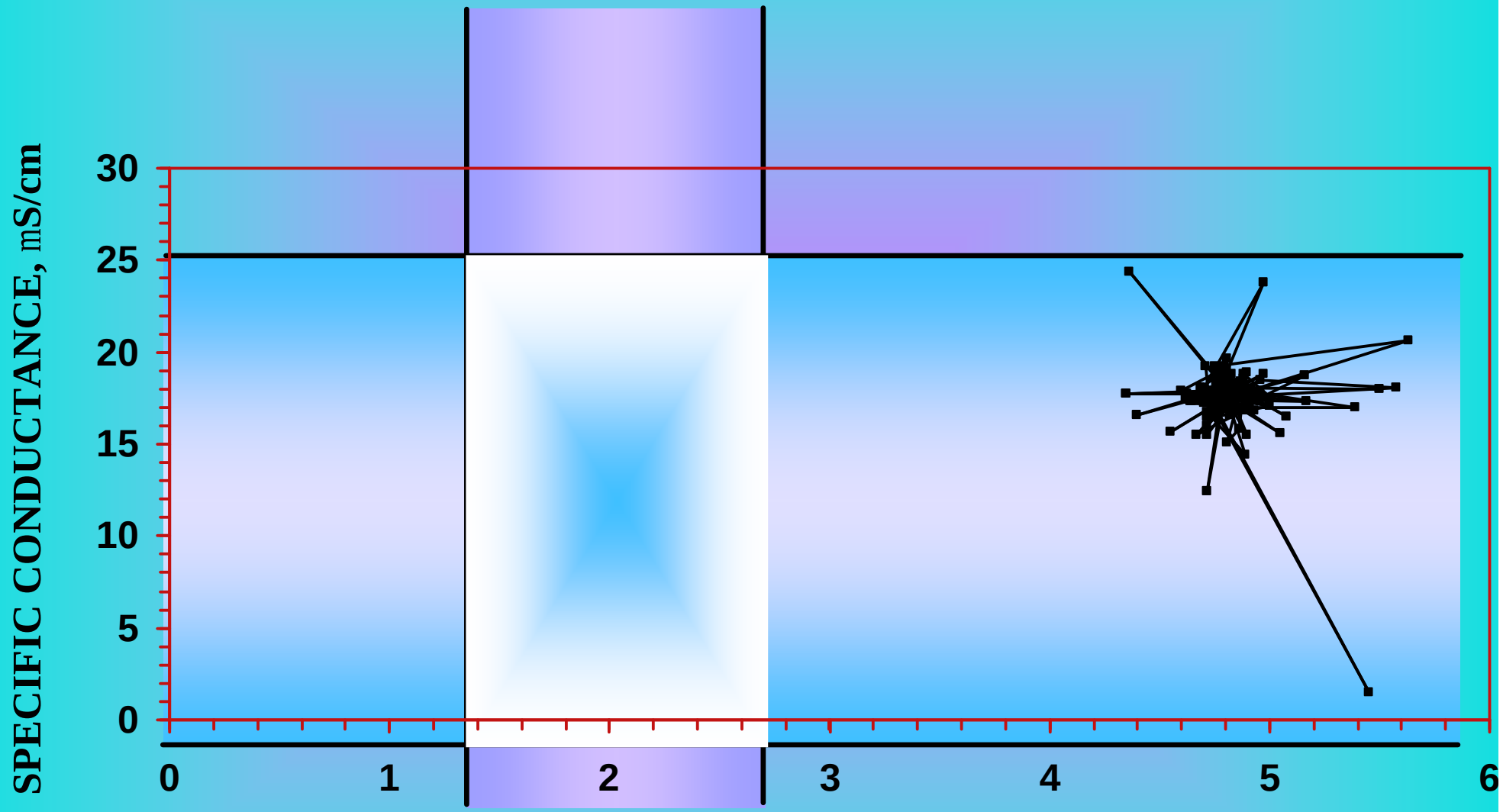


# Specific Conductance of Deionized Water - Reported by Site Operators

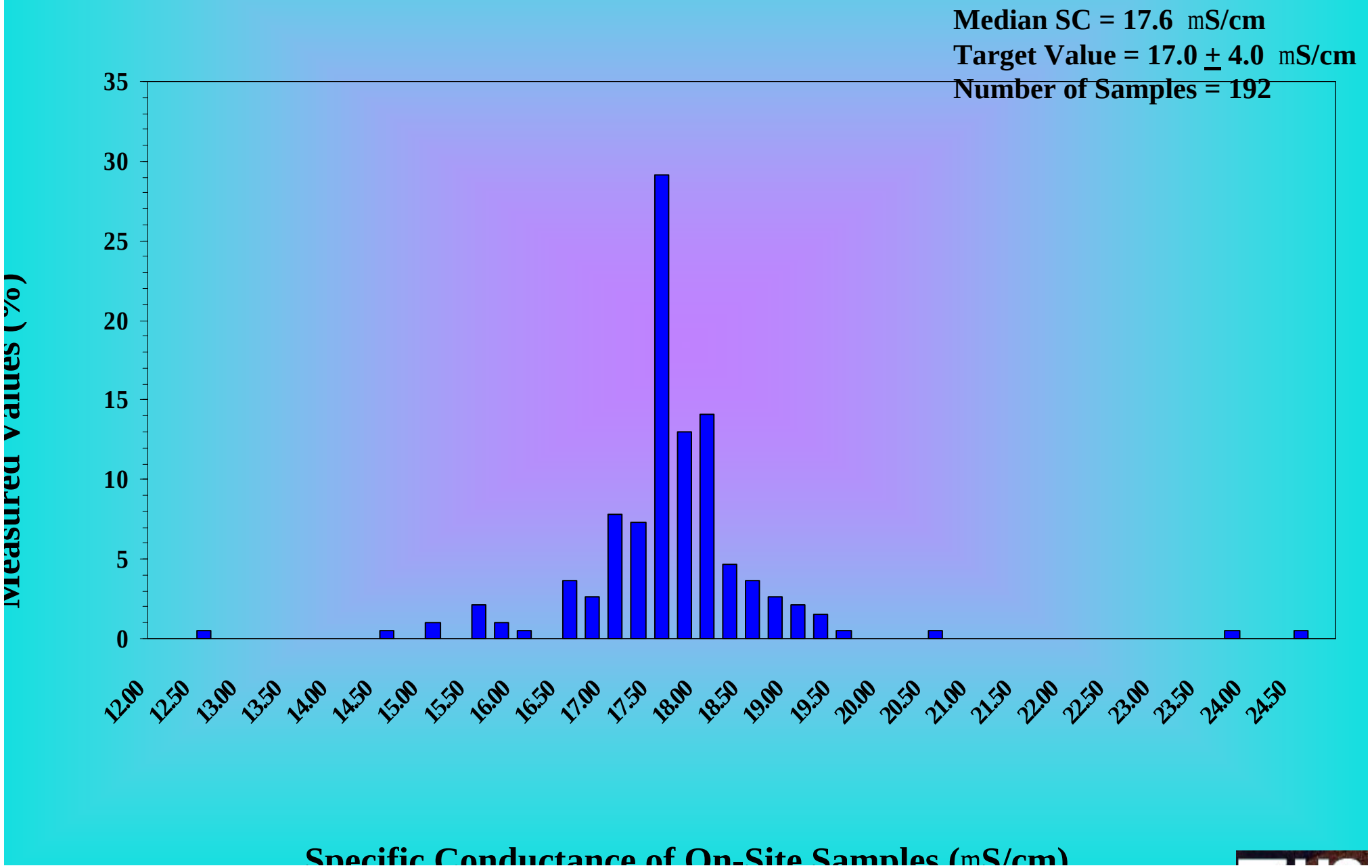
**ACCEPTABLE VALUE: < 5.0 mS/cm**
**NUMBER OF SAMPLES: 186**



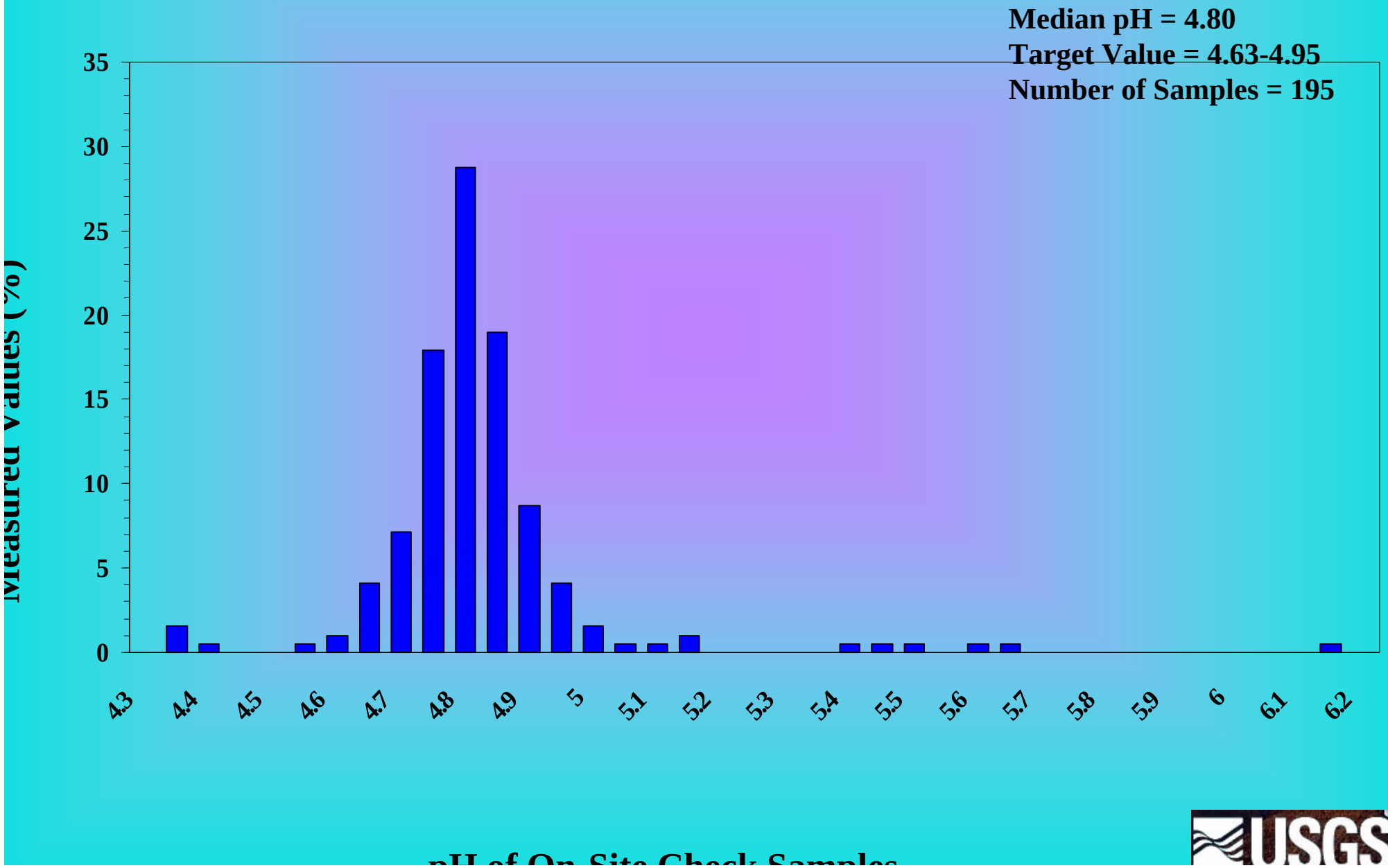
# INTERSITE COMPARISON STUDY NO. 43 RESULTS



# Intersite Comparison Study No. 43 - Specific Conductance of On-Site Samples



# Intersite Comparison Study No. 43 - pH of On-Site Samples



# INTERSITE COMPARISON STUDY NO. 43
# SUMMARY STATISTICS

**195 SITES SUBMITTED pH VALUES**

**171 (87.7%) OF THE RESPONDING SITES MET THE ACCURACY GOALS**

**MEDIAN pH: 4.80**
**TARGET VALUE: 4.80**
**ACCURACY GOALS: 4.63-4.95**

**F-PSEUDOSIGMA: 0.067**

- **192 SITES SUBMITTED SPECIFIC CONDUCTANCE VALUES**

- **188 (97.9%) OF THE RESPONDING SIT MET THE ACCURACY GOALS**

- **MEDIAN CONDUCTANCE: 17.6 mS/cm**
  **TARGET VALUE: 17.0 mS/cm**
  **ACCURACY GOALS: 13-21 mS/cm**

- **F-PSEUDOSIGMA: 0.445**

$$\text{F-PSEUDOSIGMA} = \frac{\text{UPPER QUANTILE - LOWER QUANTILE}}{1.349}$$

USGS science for a changing world

# An Analysis of Trends in Seasonal Data Completeness Criteria 1, 2, and 3 at NADP/NTN Sites, 1985 – 1998

Brooke Conley and Mark Nilles
U.S. Geological Survey

NADP Interim Meeting
San Antonio,TX April 3-5, 2000

# Introduction

- NADP produces numerical and objective measurements of data completeness for NTN seasonal and annual averages.
- Changes in site performance affect these completeness criteria values.
- Aging equipment, operator training, and improvements in network operations may effect these values.

# Objectives

- Evaluate seasonal data completeness criteria for trends
- Determine if the cumulative affect of network changes has resulted in changes in seasonal data completeness criteria.

# Data Screening

- Sites having data from winter 1985 through fall 1998
- First quarter data must be a full quarter (83 days or more)
- An entire season that is missing data is removed from data set

# Seasonal Data for Site NH02

| Site | Season | Criteria 1 | Criteria 2 | Criteria 3 | Criteria 4 | Sulfate | Nitrate | Valid Samples (Lab) |
|---|---|---|---|---|---|---|---|---|
| NH02 | Fall 1993 | 84.6 | 100 | 94.4 | 96.9 | 29.89 | 16.65 | 11 |

# Trend Analysis Approach

- Trend Detection: Seasonal Kendal Test
  - Nonparametric test for randomness versus trend
  - Detects monotonic patterns
  - Removes the effects of seasonality without attempting to explicitly model it

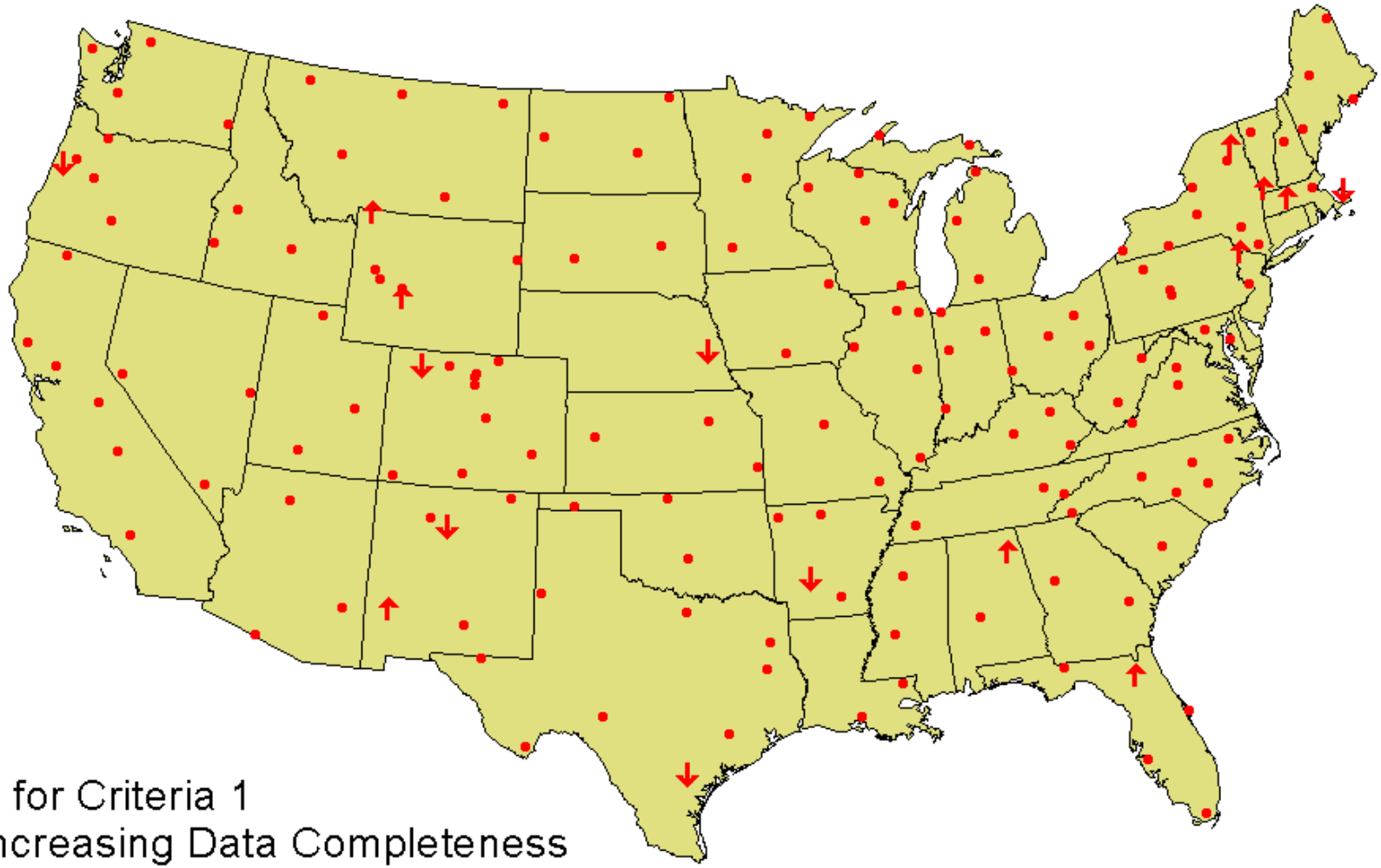
# Criteria 1

- Percent valid samples for seasonal period, where valid samples;
  - Are non-contaminated wet deposition samples
  - Have complete chemistry and corresponding rain gage depth

    or

    substituted sample volume used for the precipitation amount

# Trends in Seasonal Completeness Criteria 1 (1985-1998)



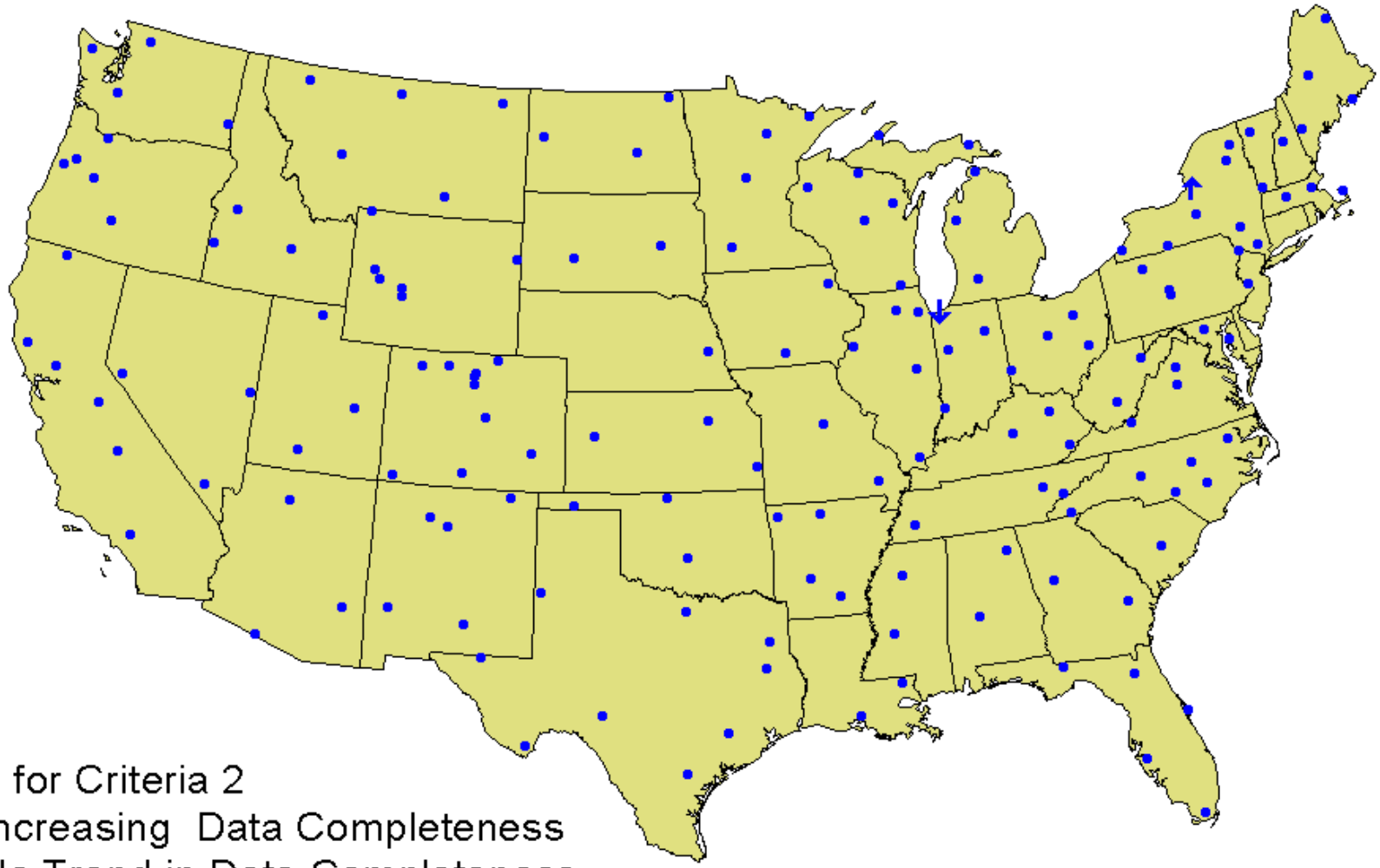
Trends for Criteria 1

- ↑ Increasing Data Completeness
- • No Trend in Data Completeness
- ↓ Decreasing Data Completeness

# Criteria 2

- Percentage of weeks with measured precipitation (including zero amounts) from rain gage or estimated precipitation from sample volume in a given seasonal period.

# Trends in Seasonal Completeness Criteria 2 (1985-1998)



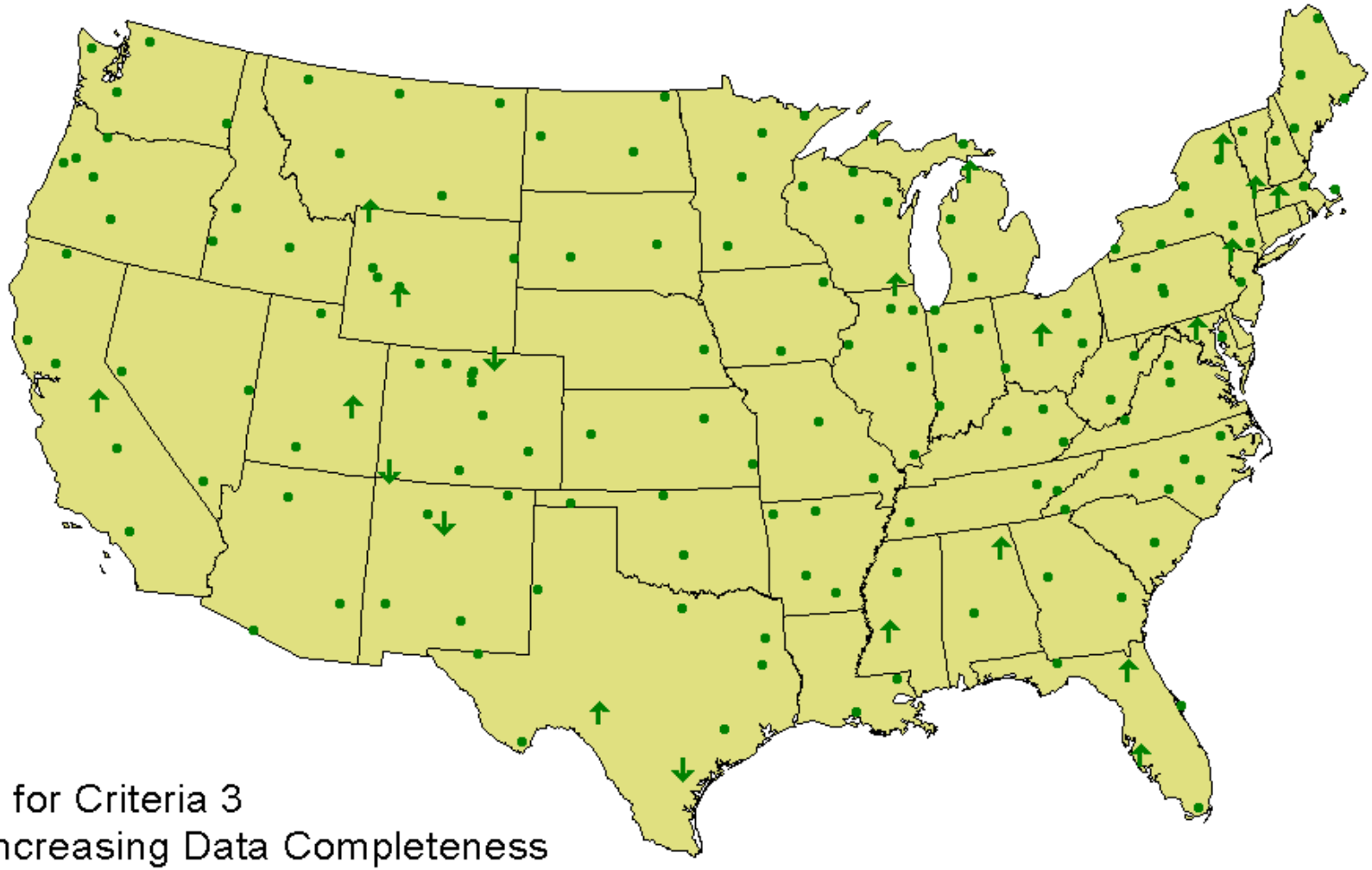
Trends for Criteria 2

- ↑ Increasing Data Completeness
- • No Trend in Data Completeness
- ↓ Decreasing Data Completeness

# Criteria 3

- Percentage calculated from the amount of precipitation corresponding to valid samples divided by the total valid precipitation.

# Trends in Seasonal Completeness Criteria 3 (1985-1998)



Trends for Criteria 3

- ↑ Increasing Data Completeness
- • No Trend in Data Completeness
- ↓ Decreasing Data Completeness

# Summary

| | No trend $\alpha=0.05$ | Increasing trend | Decreasing trend |
|---|---|---|---|
| Criteria 1 | 151 | 9 | 7 |
| Criteria 2 | 165 | 1 | 1 |
| Criteria 3 | 147 | 16 | 4 |

# Conclusions

- In contrast to environmental trends for some constituents, there are few significant trends in completeness criteria 1, 2, or 3 for the period 1985-1998.

# References


- Schertz, T.L., Alexander, R.B., Ohe, D.J., 1991, The computer program Estimate Trend (ESTREND), a system for the detection of trends in water-quality data: U.S. Geological Survey Water Resources Investigations Report 91-4040, pp.12

# STATUS OF NETWORK EQUIPMENT DEPOT (NED)
## Spring 2000 meeting San Antonio, TX,

3.31.00 srd

## COMPONENT STATI

## COMPONENT REPLACEMENT HISTORY

MOTOR BOXES- UPWARD TREND. LAST QUARTER 25% ABOVE YEARLY AVERAGE QUARTER (NOT BAD FOR WINTER QUARTER)

SENSORS- UPWARD TREND. LAST QUARTER 87% ABOVE YEARLY AVERAGE QUARTER (HEAVIST USAGE USUALLY SPRING, THIS COULD BE A PROBLEM)

EVENT RECORDERS- UPWARD TREND. 33% ABOVE YEARLY AVERAGE QUARTER (NOT SIGNIFICANT)

RAINGAGE CLOCKS- DOWNWARD TREND 9% BELOW YEARLY AVERAGE QUARTER (GOOD CONSIDERING THIS WAS WINTER QUARTER)

## COMPONENTS AVAILABLE INVENTORY

MOTOR BOXES- 3 available or **.45** months.

SENSORS- 2 available or **.36** months.

EVENT RECORDERS- 5 available or **2.8** months.

RAINGAGE CLOCKS- 12 available or **1.7** months

ALL THESE VALUES ARE DOWN SIGNIFICANTLY AND TOO LOW!
COMPONENTS OUT TO REPAIR

MOTOR BOXES- DOWN, ALL HAVE BEEN REPIERD AND AWAIT OUT-CHECK PRIOR TO SHIPMENT

SENSORS- MORE TO REPAIR, STILL IN LEARNING CURVE ON BUILD-UP USING SCRAPPED SENSORS

EVENT RECORDERS- NO SIGNIFICANT TREND

RAINGAGE CLOCKS- EVEN THOUGH THE WINTER DEMAND WAS MODERATE TO LIGHT, MANY NEEDING REPAIR. REPAIR DECISION BEING COMPLICATED BY "NEW" 44 ELECTRICS FROM E.P.A.

## COMPONENTS TO TEST

MOTOR BOXES- MANY ON HAND, AWAITING TESTING TO WORK ON OTHER THINGS, MOST POST-REPAIR

SENSORS- FEWER TO TEST DUE TO DELAY IN REBUILT AND REPAIR

EVENT RECORDERS- LARGE INCREASE DUE TO E.P.A. CONTRIBUTION

RAINGAGE CLOCKS-LARGE INCREASE DUE TO E.P.A. CONTRIBUTION

## RECENT IMPROVEMENTS

Elimination of all 11 grid sensors from NTN. This means we have more spares for MDN.

EPA contribution of 44 Belfort Recording Raingages. Many with electric clocks. Several are in good condition (non-tested at this time).

USGS purchase of additional sensors and motor boxes from Aerochem (16 and 5 respectively).

Production of clone NADP collector. Testing continuing. This raises the possibility that motor units and sensors could be purchased from LODA.

We are independence from ACM for all component repair and production (dependent on final testing of LODA produced components).

Another raingage clock repair firm has been identified. We are pursuing repair with them.

## RECENT PROBLEMS

**RAINGAGE REPAIR**

Still significantly behind in filling requests (ATS audits).

**COMPONENT SUPPLY**

We are placing more emphasis on the clone and retrieval of EPA raingages, many parts to be tested. We do not have long term component supply problems.

## SUMMARY OF CURRENT OPERATION

No sample loss due to lack of components.

Not possible to tell if the frequency of repairs is decreasing due to component improvements.

## PLANS

Triage the material received from E.P.A.

Evaluate replacement components from LODA.

Include collector “crossbow” in replacements provided by NED.

Continue improvement on component tracking capability.

Improve NED documentation and operator change instructions

# NADP PRECIPITATION COLLECTOR (CLONE)

OBJECTIVES:

- MOTION #5 Spring 1999 meeting in Boulder, CO NOS recommends that inclusion in the FY2000 Program Offcie budget an item to fund an Aerochem equivalent prototype collector be built.

- MANUFACTURER AN NADP TYPE COLLECTOR FROM THE GROUND UP

- ESTIMATE COST FOR PRODUCTION OF THE INSTRUMENT

## CONTENT OF THIS DISCUSSION

PICTURES

PROBLEMS

PERFORMANCE

FUTURE

PICTURES

- GENERAL(3)
-LID
-SENSOR ANGLE
-MOTORBOX INTERNAL
-CLUTCH SIDE
-CROSSBOW

PROBLEMS

**FABRICATION**

-SENSOR ANGLE TOO SEVERE

- NUTSERTS NOT IN FOR SENSOR

- CASE LOWER FLANGES WERE TOO WIDE AND CAUSED SCRAPING WITH THE LID SUPPORT/DRIVING ARMS. THEY SPREAD THE CASE.

-LID SEAL L-BRACKET HOLES TOO BIG, SCREWS PULL THROUGH THE ALUMINUM

-NO FLANGE ON THE FLAT LID TO ATTACH THE PEAKED ROOF TO

-THE CASE IS A LITTLE BRIGHTER AND THE FINISH IS A LITTLE

ROUGH.

-GENERAL:  I RATE IT FAIR TO GOOD. LODA NOTES THAT THE ANODIZING COULD BE DONE IN SEVERAL COLORS IF DESIRED.

**ELECTRONICS**

-THERE WAS SOMETHING THEY DID NOT UNDERSTAND ABOUT HOW THE SCR WAS TRIGGERED TO DRIVE THE MOTOR PARTICULARLY WHEN THE SENSOR WAS IN THE DRY STATE.  SOMETHING ABOUT BALANCING THE VALUES OF TWO TRANSISTORS WHICH PUT A VOLTAGE ABOVE SOME THRESHOLD TO START THE SCR.  LODA HAS REQUESTED THE SUBSTITUTION OF ONE FIXED POINT RESISTOR FOR A VARIABLE RESISTIR TI ALLOW EASIER SET-UP.

-AMBIENT HEATER TOO HOT (CAUSING SNOW COLLECTION PROBLEMS).  THE VALUE OF THE FIXED RESISTOR IN THE SENSOR WHICH SETS THIS CAN BE CHANGED EASILY.

PERFORMANCE

TEST METHOD

- EVENT SAMPLES (GRAVIMETRIC ANALYSIS)
- 192 HOUR GEAR FOR OPENING DURATION VALUES

COLLECTION EFFICIENCY

- CLONE HAD SLIGHTLY LOWER CATCHES
(- 1.2%)

OPENING DURATION

-CLONE HAS LOWER OPEN INTERVAL
(~ 10% AVERAGE), NOT ELECTRONICALLY CAPTURED, RESOLUTION +/- .5 HOURS

-SNOW DIFFERENCES WORSE THAN RAIN

FUTURE

GET REST OF DELIVERABLES FROM LODA AND FINAL PAY THE CONTRACT.

WHAT IS THE COMMITTEES PLEASURE?

CONTINUE CAL TRIAL AS CURRENT?

EXPAND CAL TRIAL?

CAL TRIAL WITH CHEMICAL ANALYIS AND COMPUTERIZED DATA LOGGER

EXPANDED FIELD TRIAL WITH CHEMISTRY AND DATA LOGGER?

---

PURCHASE WHOLE COLLECTORS?

PURCHASE COMPONENTS?

- MOTOR BOX
- SENSOR
- CROSSBOW