FINAL AGENDA
Joint Subcommittee and Network Operations Subcommittee Meetings
Monday October 20, 2003
NADP 2003 Fall Meeting, Washington D.C.

Joint Subcommittee session: MAP ROOM

10:30-10:40	Introduction of attendees and ground rules	Mark Nilles, Bob Larson John Sherwell
10:40-11:00	HAL audit summary	Chris Lehmann
11:00-11:15	HAL response	Bob Brunette
11:15-11:20	Belfort-Ott comparison report and Fact sheet	Mark Nilles
11:20-11:40	NADP Quality management plan	Chris Lehmann
11:40-11:50	Siting committee progress report	Chris Lehmann
11:50-12:00	CAMD-EPA roles in CASTNet	Mike Kolian
12:00-1:30	*Lunch (on your own)*	

NOS Subcommittee session

1:30-1:40	WA sample type protocol change-NTN	Chris Lehmann
1:40-2:05	CAL analytical method change	Karen Harlin
2:05-2:15	4 in1 mailing protocol test	Karen Harlin
2:15-2:30	NADP site visitation program	Tom Jones and John Shimshock
2:30-2:40	MDN Rain gage data review	Bob Brunette
2:40-2:50	HAL-MDN Equipment depot	Kirsi Longley
2:50-3:00	N-CON version II MDN prototype	Mark Nilles
3:00-3:15	Break	
3:15-3:50	CRN, new gage and collector testing, NED	Scott Dossett and Van Bowersox

3:50-4:00	NTN Collector dimensions committee report	Scott Dossett
4:00-4:20	USGS External QA - What's new?	Greg Wetherbee
4:20-4:30	Network QA report	Chris Lehmann
4:30-4:45	Election of 2004 NOS Secretary	Mark Nilles
4:45-5:00	Spring 2004 meeting update	Natalie Latysh
5:00	Adjourn	

Attachment 1b, NADP NOS minutes, Fall 2003

Fall 2003 NOS

Participation List

NAME	Agency/Assoc'n/Etc.	Phone
Rick Artz	NOAA	
Jack Beach	n-con system	800-932-6266
Martha Beach	n-con system	800-932-6266
Bob Brunette	HAL	206-622-6960
Brigita Demir	ISWS/CAL	217-333-7074
Tracy Dombek	ISWS/CAL	217-244-0869
Scott Dossett	ISWS/NTN	217-244-0372
Joel Frisch	USGS	703-648-6877
Cari Furiness	NCSU	919-515-4653
David Gay	ISWS/AES	217-244-0462
Karen Harlin	ISWS/CAL	217-244-6413
Andrew Johnson	Maine DEP	207-287-7047
Tom Jones	ATS	412-967-1900 ext 239
Natalie Latysh	USGS	303-236-1874
Chris Lehmann	ISWS/NADP	217-265-8512
Kirsi Longley	HAL	206-622-6960
Dave MacTavish	Environment Canada	416-739-4450
Lee A. Maull	Dynamac Corp.	321-861-2209
Kristi Morris	NPS-AIR	303-987-6941
Ralph Perron	USDA Forest Service	603-726-8902
Bruce Roger	Wisconsin DNR	608-253-4506
John Shimshock	ATS	412-967-1800
Kaye Surratt	ISWS/CAL	217-244-6791

NTN Sample "Wet-Add" Protocol

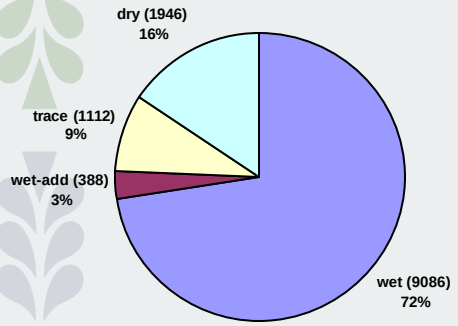
Chris Lehmann, Karen Harlin
& Jane Rothert

NADP Technical Committee Meeting
October 2003

NTN "Wet-Add" (WA) Protocols

- Follow-up issue from 2001 CAL Review
  - Review team questioned protocol
  - CAL seeks guidance/potential change from NOS
- Current NTN WA protocol
  - Samples with volume ~8-30 mL after filtration
  - Samples diluted with 50 mL DI-water to enable sufficient volume for analysis
  - Volume >~60 mL discarded

2002 NTN Samples



Map of 2002 Wet Add Samples

Protocol Options

A. Keep current protocol
B. Keep current protocol; modify procedure such that sample is diluted to 50 mL total volume, not by 50 mL.

Protocol Options

C. Eliminate WA protocol, and adopt AIRMoN incomplete analysis protocol until sample exhausted:
   1. pH & conductivity
   2. FIA: ammonium & o-phosphate
   3. IC: sulfate, nitrate, chloride
   4. AA: calcium, magnesium, potassium, sodium

Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES)

- **Background**
  - CAL has used flame atomic absorption spectroscopy (FAAS) for the base cations (sodium, potassium, calcium, & magnesium) since 1978
  - Last change in FAAS method was in 1992--new instrument purchase. This is now > 10 yrs old & needs replaced
- **Replacement instrument (ICP-AES) purchased April 2003**
  - ICP-AES method development completed by CAL
  - FAAS and ICP-AES comparison completed by CAL
  - Wed poster "Low Level Analysis of Base Cations in Precipitation Samples: Flame Atomic Absorption Spectroscopy vs. Inductively Coupled Plasma-Atomic Emission Spectroscopy", Dombek, Surratt, Harlin
- **CAL recommends NOS approval to analyze base cations by ICP-AES beginning January 1, 2004**

Research Approach

- **Develop a 'Research Plan for Method Validation and Method Comparability for the Central Analytical Laboratory**

1. ICP-AES Method Development
   - References:
     - J. Mark Green, *Analytical Chemistry* 1996, (68) 305A-309A A 'Practical Guide to Analytical Method Validation
     - USEPA Office of Research and Development, NERL, Cincinnati, OH, "Protocol for Nationwide Approval of New or Revised Methods for Inorganic and Organic Analytes in National Primary Drinking Water Regulations Monitoring", Rev 1.5, January 1996;
2. ICP-AES & FAAS method comparison study
   - Reference
     - Illinois State Water Survey Contract Report 476, Central Analytical Laboratory for NADP/NTN: Second Progress Report, Nov. 1989, "Flow Injection Analysis Method Evaluation Study" by Leon Olszewski, Susan R. Bachman, and Mark E. Peden.
3. NADP-QAAG Review of plan – completed early Oct. 2003

ICP-AES Method Development

1. **Bias/Accuracy**
2. **Precision**
3. **Recovery**
4. **Detection Limits**
5. **Linear Range**
6. **Performance Evaluation Samples**
7. **Differences between FAAS and ICP-AES**

ICP-AES Method Development

Bias/Accuracy

- **Reference materials analyzed (3 WMO levels, 4 USGS interlaboratory check samples, 3 NIST traceable standards)**
- **Analyzed in triplicate on different days**
- **Compared FAAS to ICP-AES results**
- **Reference: "Practical Statistics for Analytical Chemists" by Anderson pgs 74-77**
  - **F test compare variances ($\alpha = 0.05$)**
  - **T-test for differences of averages ($\alpha = 0.05$)**

✓ **Results were accurate when compared with target levels for standards analyzed**

✓ **Passed the statistical tests for comparison of FAAS vs ICP-AES results**

ICP-AES Method Development

Bias/Accuracy

N=9	Calcium ICP	Calcium AAS		Potassium ICP	Potassium AAS		Sodium ICP	Sodium AAS		Magnesium ICP	Magnesium AAS	
WMO 1	0.169	0.162	P	0.115	0.014	P	0.479	0.490	P	0.076	0.076	P
Target	**0.169**			**0.112**			**0.483**			**0.078**		
WMO 2	0.050	0.050	P	0.018	0.019	P	0.038	0.040	P	0.015	0.015	P
Target	**0.050**			**0.019**			**0.039**			**0.015**		
WMO 3	0.807	0.750	P	0.293	0.295	P	1.323	1.324	P	0.248	0.243	P
Target	**0.790**			**0.290**			**1.32**			**0.250**		

ICP-AES Method Development

✓ **Bias & Accuracy**

Precision

- Analyze internal QC solutions to prepare control charts
  - ~10th, 25th, and 75th percentile concentration levels
  - 3 sigma upper and lower control limits
- Compared ICP-AES with FAAS

ICP-AES Method Development

Precision

25th percentile solution						
		Lower control limit	Mean	Upper control limit	sd	n
calcium	ICP	0.073	0.076	0.079	0.001	16
	AAS	0.060	0.069	0.078	0.003	10
potassium	ICP	0.011	0.013	0.015	0.001	16
	AAS	0.008	0.014	0.020	0.002	10
sodium	ICP	0.043	0.046	0.050	0.001	16
	AAS	0.040	0.046	0.052	0.002	10
magnesium	ICP	0.016	0.017	0.018	0.0003	16
	AAS	0.013	0.016	0.019	0.001	10

ICP-AES Method Development

- ✓ Bias/Accuracy
- ✓ Precision

Recovery

4 natural precipitation samples were analyzed, then spiked at the 25th percentile level and measured 3 times on 3 different days

	mean	range
Calcium	101%	(100-104)
Potassium	93%	(88-96)
Sodium	99%	(96-102)
Magnesium	99%	(99-100)

ICP-AES Method Development

- ✓ Bias/Accuracy
- ✓ Precision
- ✓ Recovery

Detection Limits

40 CFR, Part 136, Vol 49, No 209, Fed. Register, Rules and Regulations, Appendix B, pp 198-199, Oct. 1984

	AAS (2000)	AAS(2002)	ICP
Calcium	0.009	0.015	0.001
Potassium	0.003	0.006	0.001
Sodium	0.003	0.003	0.002
Magnesium	0.003	0.003	0.0004

ICP-AES Method Development

- ✓ Bias/Accuracy
- ✓ Precision
- ✓ Recovery
- ✓ Detection Limits

Linear Range (mg/L)

	AAS	ICP
Calcium	0-2.00	0-25
Potassium	0-0.30	0-25
Sodium	0-2.00	0-25
Magnesium	0-0.30	0-25

ICP-AES Method Development

1. Bias/Accuracy
2. Precision
3. Recovery
4. Detection Limits
5. Linear Range
6. Performance Evaluation Samples

Same as AAS (external sources, internal QCS, interlaboratory comparison programs)

New trace elements performance samples purchased

ICP-AES Method Development

1. Bias/Accuracy
2. Precision
3. Recovery
4. Detection Limits
5. Linear Range
6. Performance Evaluation Samples
7. Differences between FAAS and ICP-AES

➢ICP-AES Method Development

Differences between FAAS and ICP-AES

AAS	ICP
air acetylene flame-2300 K	argon plasma 6000-7000 K
analytes analyzed separately	simultaneous analysis
~8 mL sample	~2 mL sample
modifiers required:	CsCl only added via pump
CsCl for Na and K	
$LaCl_3$ for Ca and Mg	
manual addition & 2 preparations req.	
samples above linear range req.	Expanded linear range
dilution and reanalysis	few samples req. dilution

➢ ICP-AES Method Development

1. Bias/Accuracy
2. Precision
3. Recovery
4. Detection Limits
5. Linear Range
6. Performance Evaluation Samples
7. Differences between FAAS and ICP-AES

➢ ICP-AES & FAAS method comparison study

➢ ICP-AES & FAAS method comparison study

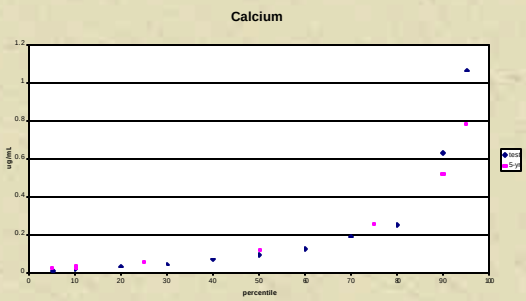
- ➢ Geographic Distribution
  - Sites from each of 18 USGS Hydrological regions
  - Also: Alaska, Hawaii, Puerto Rico, Virgin Islands, AIRMoN (IL11)
- ➢ Chemical Distribution
  - Sites from each of the 4 NADP site classifications
    - Isolated, Rural, Suburban, and Urban
    - Also: Coastal and non-coastal
- ➢ Seasonal Distribution
  - Sites selected above pulled from each meteorological season (summer, winter, spring, fall)
  - 2002 archived (all 4 seasons) and recent (early fall) samples
- ➢ Statistical Tests

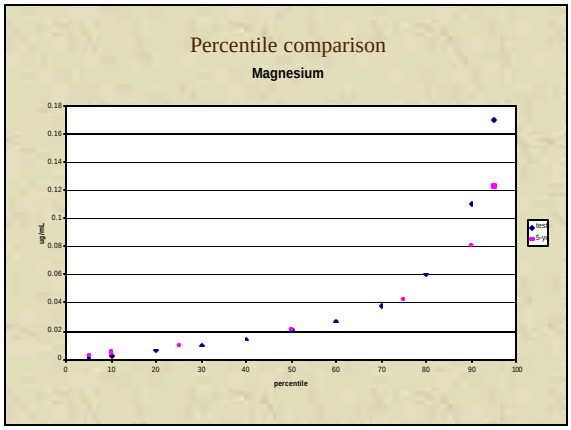
USGS Hydrologic Regions

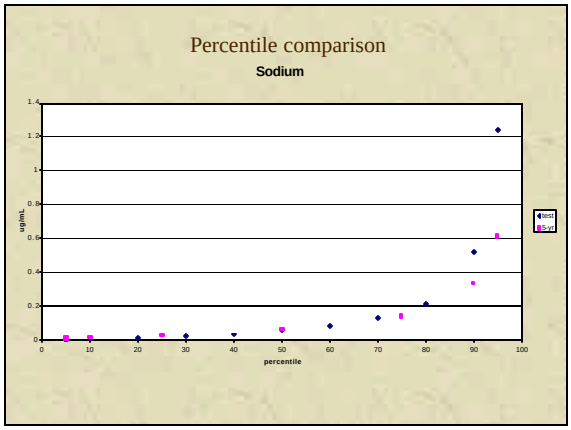
➢ ICP-AES & FAAS method comparison study

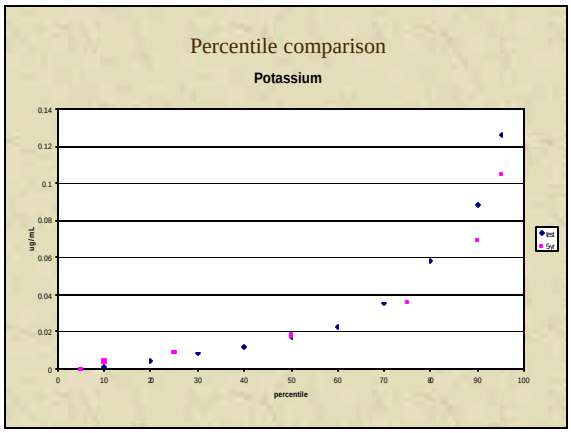
- ➢ Statistical Tests
  - **212** samples analyzed by FAAS and ICP-AES
    (within a 3 day window to ensure differences are due to methods and not chemical change)
  - Were the samples selected representative of the network concentrations? YES
  - Were the results statistically different? NO
    - Paired T test for differences of means
    - Median average differences--SD estimated from paired measurements (group by concentration ranges)
    - Regression analysis for FAAS vs ICP-AES

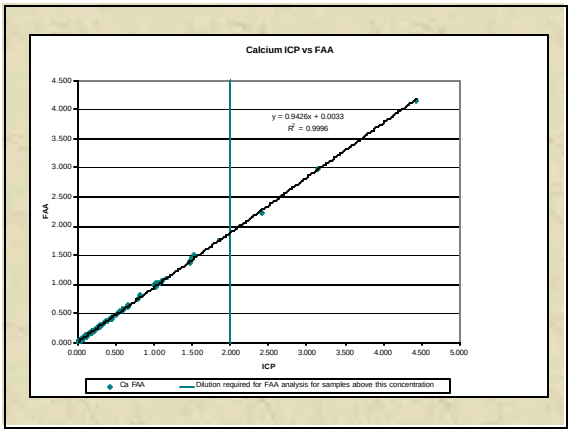
Percentile comparison

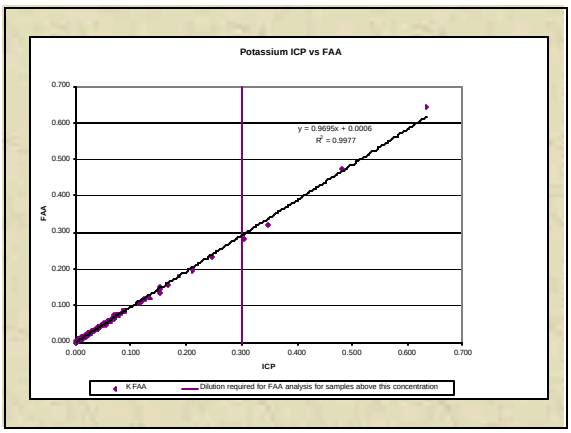


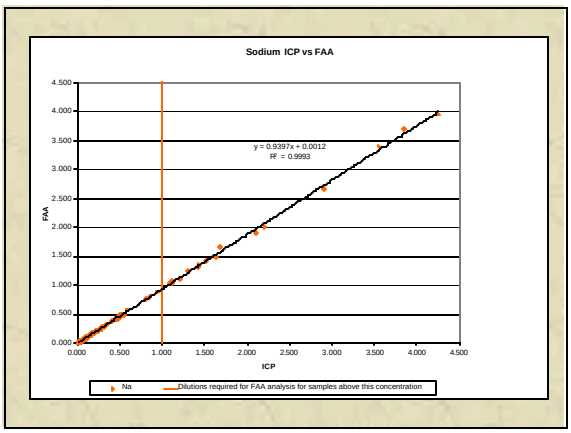

Percentile comparison
Magnesium
ug/mL
percentile
test
5-yr

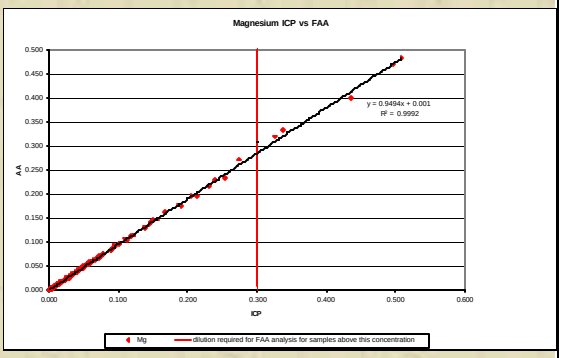

Percentile comparison
Sodium
ug/mL
percentile
test
5-yr


Percentile comparison
Potassium
ug/mL
percentile
test
5yr


Calcium ICP vs FAA
y = 0.9426x + 0.0033
R² = 0.9996
FAA
ICP
Ca FAA
Dilution required for FAA analysis for samples above this concentration


Potassium ICP vs FAA
y = 0.9695x + 0.0006
R² = 0.9977
FAA
ICP
K FAA
Dilution required for FAA analysis for samples above this concentration


Sodium ICP vs FAA
y = 0.9397x + 0.0012
R² = 0.9993
FAA
ICP
Na
Dilutions required for FAA analysis for samples above this concentration



- Wilcoxson-Mann-Whitney Ranked Sum Test
  for different treatments (2 instruments)
  - ✓ Not a statistically significant difference for ICP and AAS
- ✓ Median absolute differences by concentration
  - ✓ Not a statistically significant difference for ICP and AAS
  - ✓ Meets reanalysis QAP criteria

- **Research Plan for Method Validation and Method Comparability' for the Central Analytical Laboratory----Completed**
  - ✓ ICP-AES Method Development
  - ✓ ICP-AES & FAAS method comparison study

Motion:

CAL analyze base cations (sodium, potassium, calcium, and magnesium) by ICP-AES beginning January 1, 2004

4-in-1 Shipping Protocol Trial

Issues:

- Sites are charged extra by UPS & Fed Exp for non-standard boxes (handles, straps & metal corners)

  ~ $5.00 per mailer

  Complaints from funding agencies at NADP meetings

  esp. USGS who funds >70 sites (~30%)
- Security—homeland security for shipping may require 'sealed' shippers in future
- Model for bag sampling or new collector container shipping when new precipitation sampler comes on-line

  Black Cases are ~$70 each

  9 AIRMoN and 255 NTN sites would require 1600 mailers (~$115,000 for mailer inventory at current costs)

4-in-1 Shipping Protocol Trial is one option to save costs and plan for future network changes

Protocol

1/mo shipment of sampling supplies to sites

wkly return of 1-Liter sample bottle, raingage chart, and FORF

1/mo return of dirty sampling supplies to CAL

4-in-1 Shipping Protocol Trial is one option to save costs and plan for future network changes

Status

6 USGS sites started trial May 2003

USGS can do direct billing and track cost

All are Fed Exp.

AR03, CA45, FL14, NE99, PA18, WA24

14 additional sites added per July 2003 Exec. Comm. vote

Sept 2003 these were added:

USPS: AK03, CA75, HI99, ME95, NC45

UPS: C091, M043, NC03, NC29, NC34, NC35, NC41, NE15, WI99

Fed. Exp.:NC06

Scaling up to 20 sites

- Selected 14 more sites
  - Included UPS & USPS in addition to Fed. Exp.
  - Modified protocol
- CAL Issues
  - Special ordered heavier boxes (large and small)
  - Modifed SAP database as needed
  - Worked with USGS for SHE & FB sample shipping (larger boxes provided by USGS?)

Mailer vs. 5 x 5 x 9 in. 'sample in' box

Mailer & 15 x 30 in. 'Supplies' Box

Assemble "New Sampling Material" box

STEP3 Remove all supplies and materials from one of the large cardboard boxes, sleeve the 4 buckets together and combine the 4 clean and bagged field buckets, snap -on lids, and sample bottles into one box. This will be the "NEW SAMPLING MATERIALS" box. The other (now empty) large box will be for "USED SAMPLING MATERIALS" only. For the duration of this trial, all of your supplies will be used from a 4-in-1 box. You will use this 4-in-1 box to return used field buckets and snap -on lids to the CAL, so **don't discard it** or use it for other purposes.

NOTE

It is extremely important that USED MATERIALS not be used to collect a sample, please be certain that all used materials are promptly placed into the "Used Sampling Materials" box each week.

STEP2 Prepare the <u>used</u> field bucket and snap -on lid for storage. Remove the lid from the field bucket and place it by itself in a plastic bag. Place a "Used Sampling Material" sticker on the outside of the bag. Place the used field bucket by itself in another plastic bag and twist tie the bag loosely at the **bottom** of the bucket. Keeping the bag loose will allow you to stack the used buckets easily. Place a "Used Sampling Material" sticker on the outside of the bag.

STEP3 Place the loosely bagged, <u>used</u> field bucket and the bagged snap -on lid into the 4-in-1 "Used Sampling Materials" box (see ORGANIZE SUPPLIES-3). Each week you will add another used lid to the bag and sleev e another used bucket on top of the last one.

Clean supplies: 4-buckets & 4-lids

Clean supplies: 4 1-Liter bottles in shipping boxes

Clean Supplies Box Ready to Ship

Clean supplies box labeling

1-Liter bottles to CAL

1-Liter bottle with forms

FORF notes

Incoming Supplies Box—1 per month per site

Used materials sticker—lid & bucket bag

Clean supplies—reused box

Feedback

- From test sites—no major problems
  - More storage required since mailers still on-site
  - Cost savings??? If yes—do it!
  - Instructions clear, no problems
- From CAL—no major problems
  - Heavier boxes added for phase II
  - Need way to track how & when other supplies are sent out when not sending large box
  - Need way to get Field Blank and Shipping Evaluation Samples returned (larger boxes provided by USGS?)
- What's next???
  - Continue 20 sites through holidays
  - Report on $$ and further evaluation Spring 2004 mtg
  - CAL to recommend further scale-up & modified protocol???

MDN Mini-NED Update

October 2002 - October 2003

Broken Parts Sent To Sites…

•Parts shipped dependent upon the operators schedule:
On average, received within 24-48 hours after their call

Sensors	Motor boxes	Event Recorders	Clocks	Belforts
38	21	5 dual, 10 single	20	6

Broken Parts Sent To CAL…

Sensors	Motor boxes	Event Recorders	Clocks	Belforts
30	21	12	20	3

New Parts Received From CAL…

Sensors	Motor boxes	Event Recorders	Clocks	Belforts
39	23	4	21	5

MDN NED Inventory…

Sensors	Motor boxes	Event Recorders	Clocks	Belforts
13	5	2	5	2

3rd Quarter Belfort Calibration Check Survey Results…

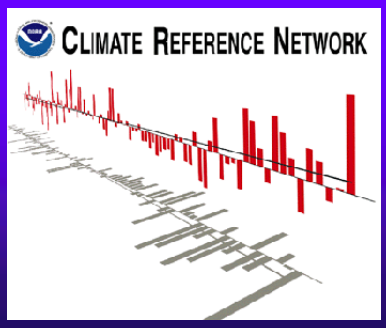
- 11 No Answers
- 62 Completed of 78 sites.
- 4 in -transit now
- 2 N/A
- 9 are outside of NADP specs.
- "Belfort Cleaning" SOP
- 4th Quarter Belfort Calibration Check

Chimney Cap Survey Results…

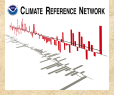
Of 77 sites surveyed:

- 56 responded
- 42 need chimney caps
- Chimney cap shipment

Climate Reference Network



CRN
Generic CRN Site



Proposed Typical CRN Station Configuration

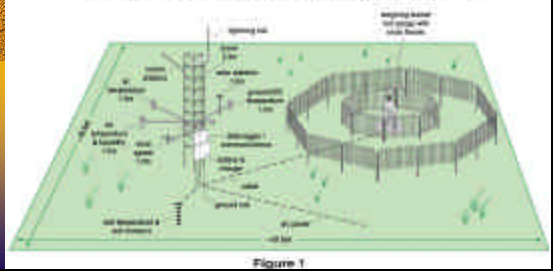


Figure 1

They want to use the NADP network if possible to help find suitable Climate Reference Network sites.

- Long term monitoring
- Well buffered sites, minimize landscape changes
- Good operational history
- SURFRAD, NWS, CASTNET?

First request from Regional Climate Center in Nebraska

Program Office Action

USEPA/NDAMN MODEL USED

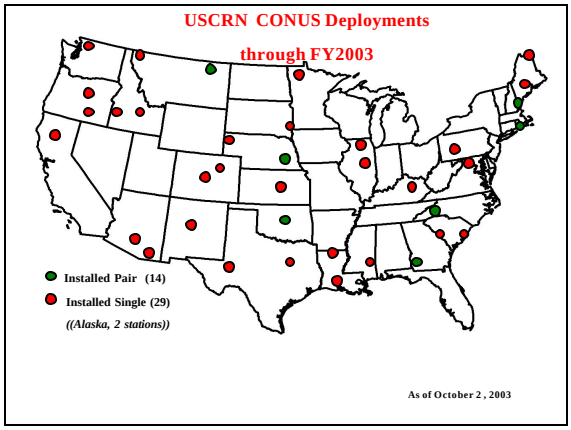
- •Get site specific list from interested party, formal request
- •Mail letters to site funder, supervisor and operator
- •Wait ~7 days
- •Provide information to interested party.

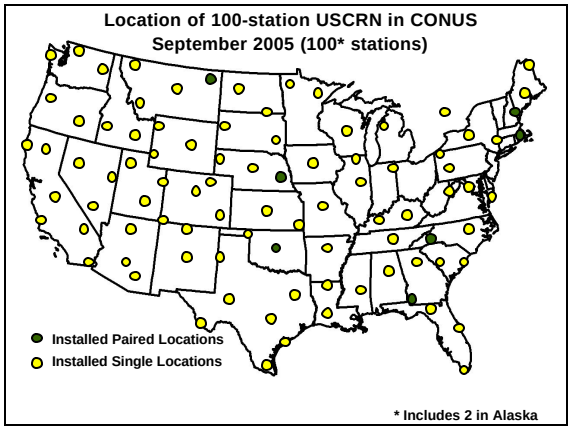
Climate Reference Network

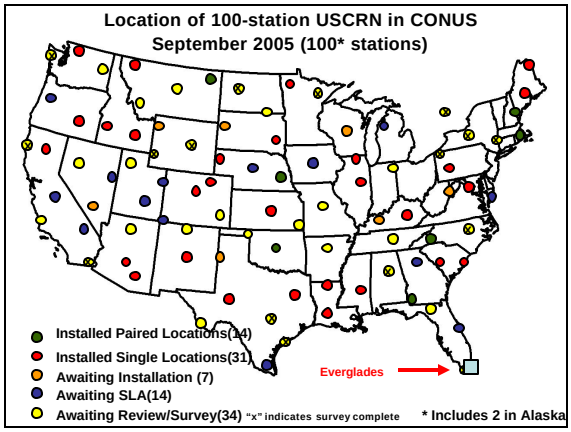
DATE: 16 July 2002

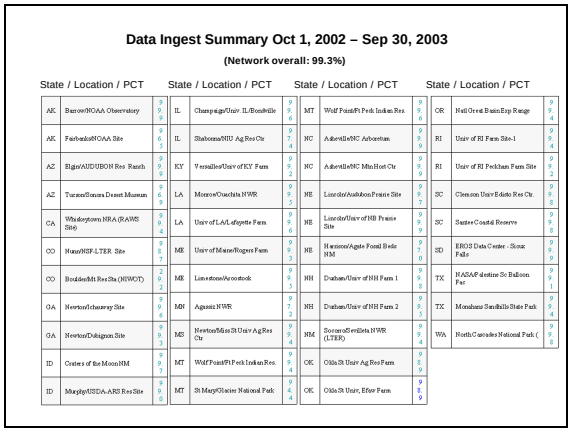
TO: IA23 Jim Seze
FROM: Scott Dossett, NADP Program Office
C.C.: Mark Nilles, USGS , Van Bowersox (NADP Coordinator)
SUBJECT: U.S. Climate Reference Network (CRN)

This quote from the CRN website describes an important new environmental monitoring initiative which is on the horizon;







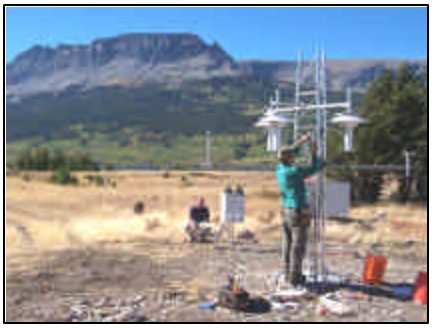


Data Ingest Summary Oct 1, 2002 – Sep 30, 2003

(Network overall: 99.3%)

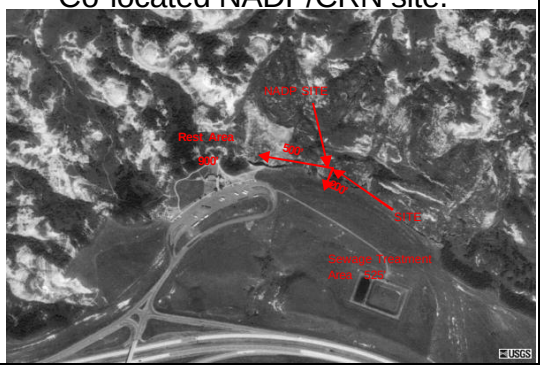
State / Location / PCT		State / Location / PCT		State / Location / PCT		State / Location / PCT	
AK	Barrow/NOAA Observatory 99.2	IL	Champaign/Univ. IL/Bondville 99.6	MT	Wolf Point/Ft Peck Indian Res. 99.6	OR	Hall Great Basin Exp Range 99.4
AK	Fairbanks/NOAA Site 96.2	IL	Shabonna/NIU Ag Res Ctr 97.4	NC	Asheville/NC Arboretum 99.9	RI	Univ of RI Farm Site-1 99.4
AZ	Elgin/AUDUBON Res Ranch 99.9	KY	Versailles/Univ of KY Farm 99.2	NC	Asheville/NC Mtn Hort Ctr 99.9	RI	Univ of RI Peckham Farm Site 99.2
AZ	Tucson/Sonora Desert Museum 96.9	LA	Monroe/Ouachita NWR 99.2	NE	Lincoln/Audubon Prairie Site 97.7	SC	Clemson Univ/Edisto Res Ctr. 99.8
CA	Whiskeytown NRA (RAWS Site) 99.4	LA	Univ of LA/Lafayette Farm 99.6	NE	Lincoln/Univ of NE Prairie Site 99.9	SC	Santee Coastal Reserve 99.8
CO	Nunn/NSF-LTER Site 98.7	ME	Univ of Maine/Rogers Farm 99.3	NE	Harrison/Agate Fossil Beds NM 97.0	SD	EROS Data Center - Sioux Falls 99.9
CO	Boulder/Mt Res Sta (NWOT) 29.2	ME	Limestone/Arnostock 99.7	NH	Durham/Univ of NH Farm 1 99.8	TX	NASA/Palestine Sc Balloon Fac 99.1
GA	Newton/Chasarey Site 99.6	MN	Agassiz NWR 97.3	NH	Durham/Univ of NH Farm 2 97.3	TX	Monahans Sandhills State Park 99.4
GA	Newton/Dubignon Site 99.3	MS	Newton/Miss St Univ Ag Res Ctr 99.4	NM	Socorro/Sevilleta NWR (LTER) 99.4	WA	North Cascades National Park (99.8
ID	Craters of the Moon NM 97.7	MT	Wolf Point/Ft Peck Indian Res. 99.4	OK	Olds St Univ Ag Res Farm 99.0		
ID	Murphy/USDA-ARS Res Site 99.0	MT	St Mary/Glacier National Park 99.4	OK	Olds St Univ, Efner Farm 99.9		

GLACIER NATIONAL PARK, MT



SOLAR-POWERED USCRN SITE IN PALESTINE, TX

Teddy Roosevelt NP, North Dakota
Co-located NADP/CRN site.



NUNN, CO CRN-NADP Co-Lo's

Program Office Collector Comparison

- 4 different precipitation collectors
- ISWS "backyard" site
- 30 events full chemistry
- High resolution status (event recorder) information
- Paired to new technology raingages

Program Office Collector Comparison

- 4 different precipitation collectors

Program Office Collector Comparison

- 4 different precipitation collectors


Program Office Collector Comparison

- 4 different precipitation collectors



Program Office Collector Comparison

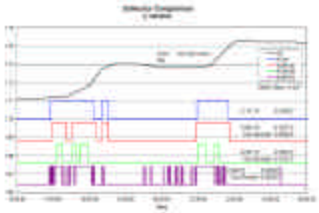
- 4 different precipitation collectors




Program Office Collector Comparison

Program Office Collector Comparison

Case 2 LIGHT RAIN



HYPER CLOSE-UP - 8 hour event

Yankee Environmental Systems TPS 3000 Update

- DOC/NOAA SBIR winner
- Second generation machine just received

Yankee Environmental Systems TPS

Yankee Environmental Systems TPS 3000 Update

Yankee Environmental Systems TPS

Yankee Environmental Systems TPS

Yankee Environmental Systems TPS

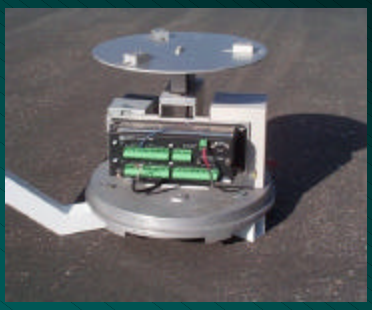
Status lights

IRDA

Yankee Environmental Systems TPS

NOAH III GAGE

- load cell technology
- signal filtered by optical sensor
- AC or DC power
- PDA with PConnect



Gage Comparison

Statistic	NOAH III (W)	NOAH III (E)	Ott	NWS Stick Gage
Number of Events	48	48	48	48
Mean Precipitation (inches)	0.50(4)	0.49(5)	0.50(5)	0.50(6)
Median Precipitation (inches)	0.20(5)	0.20(0)	0.20(5)	0.20(1)
Total Precipitation (inches)	24.18	23.76	24.24	24.30

Gauge	False Positive Total	Avg Per Event		
NOAH III (W)	0.00"	0.00(0)		
NOAH III (E)	0.00"	0.00(0)		
Ott	0.13"	0.00(3)		

Gage Comparison

NOTE FALSE POSITIVES <1%

Statistic	NOAH III (W)	NOAH III (E)	Ott	NWS Stick Gage
Number of Events	48	48	48	48
Mean Precipitation (inches)	0.50(4)	0.49(5)	0.50(5)	0.50(6)
Median Precipitation (inches)	0.20(5)	0.20(0)	0.20(5)	0.20(1)
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NOAH III (W)	0.00"	0.00(0)		
NOAH III (E)	0.00"	0.00(0)		
Ott	0.13"	0.00(3)		

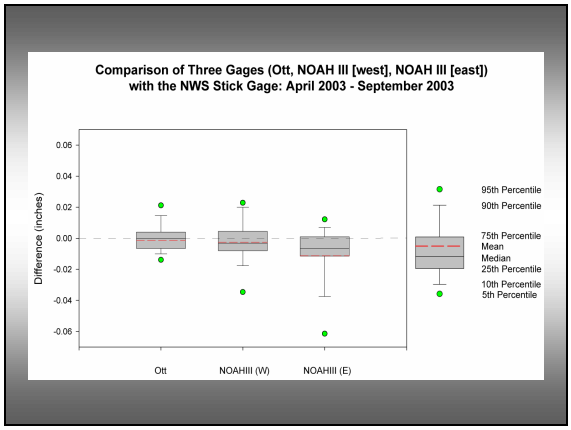
Gage Comparison

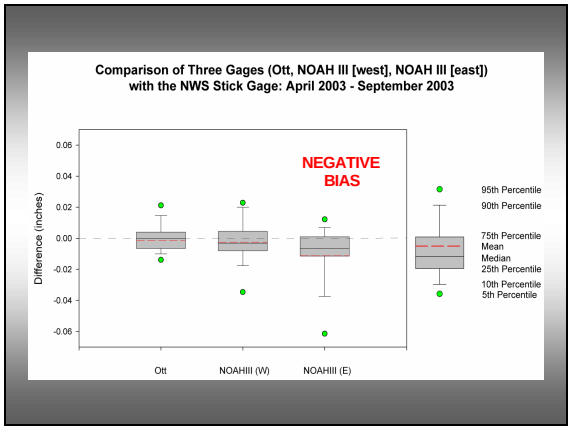
NOTE FALSE POSITIVES <1%

OTT WILL LIKELY INCREASE IN WINTER

Statistic	NOAH III (W)	NOAH III (E)	Ott	NWS Stick Gage
Number of Events	48	48	48	48
Mean Precipitation (inches)	0.50(4)	0.49(5)	0.50(5)	0.50(6)
Median Precipitation (inches)	0.20(5)	0.20(0)	0.20(5)	0.20(1)
Total Precipitation (inches)	24.18	23.76	24.24	24.30

Gauge	False Positive Total	Avg Per Event		
NOAH III (W)	0.00"	0.00(0)		
NOAH III (E)	0.00"	0.00(0)		
Ott	0.13"	0.00(3)		





Statistic	Ott	NOAH III (W)	NOAH III (E)	Stick
Number of Events	48	48	48	48
Mean Precipitation (inches)	0.50(5)	0.50(4)	0.49(5)	0.50(6)
Median Precipitation (inches)	0.20(5)	0.20(5)	0.20(0)	0.20(1)
Total Precipitation (inches)	24.24	24.18	23.76	24.30

Paired t-Test	Mean Difference	p-value	Mean Difference = 0	
Ott vs. Stick	-0.00(2) ± 0.00(5)	0.5868	Do not Reject	
NOAH III (W) vs. Stick	-0.00(3) ± 0.00(6)	0.3986	Do not Reject	
NOAH III (E) vs. Stick	-0.01(1) ± 0.00(7)	0.0017	Reject	

Wilcoxon signed-rank test	p-value	Mean Difference = 0	
Ott vs. Stick	0.4980	Do not Reject	
NOAH III (W) vs. Stick	0.2839	Do Not Reject	
NOAH III (E) vs. Stick	0.0003	Reject	

Statistic	Ott	NOAH III (W)	NOAH III (E)	Stick
Number of Events	48	48	48	48
Mean Precipitation (inches)	0.50(5)	0.50(4)	0.49(5)	0.50(6)
Median Precipitation (inches)	0.20(5)	0.20(5)	0.20(0)	0.20(1)
Total Precipitation (inches)	24.24	24.18	23.76	24.30

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Wilcoxon signed-rank test	p-value	Mean Difference = 0	
Ott vs. Stick	0.4980	Do not Reject	
NOAH III (W) vs. Stick	0.2839	Do Not Reject	
NOAH III (E) vs. Stick	0.0003	Reject	

NOAH III West vs East

Statistic	NOAH III (West)	NOAH III (East)	
Number of Events	48	48	
Mean Precipitation (inches)	0.50(4)	0.49(5)	
Median Precipitation (inches)	0.20(5)	0.20(0)	
Total Precipitation (inches)	24.18	23.76	

Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0	RMS value
NOAH III(W) vs. NOAH III(E)	0.00(9) ± 0.00(4)	0.0000	Reject	0.01(6)

Wilcoxon signed-rank test	p-value	Hyp: Mean Difference = 0	
NOAH III(W) vs. NOAH III(E)	0.0001	Reject	

NOAH III West vs East

NOAH III GAGES SHOW VARIABILITY

Statistic	NOAH III (West)	NOAH III (East)	
Number of Events	48	48	
Mean Precipitation (inches)	0.50(4)	0.49(5)	
Median Precipitation (inches)	0.20(5)	0.20(0)	
Total Precipitation (inches)	24.18	23.76	

Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0	RMS value
NOAH III(W) vs. NOAH III(E)	0.00(9) ± 0.00(4)	0.0000	Reject	0.01(6)

Wilcoxon signed-rank test	p-value	Hyp: Mean Difference = 0	
NOAH III(W) vs. NOAH III(E)	0.0001	Reject	

Ott East vs West

Statistic	Ott (East)	Ott (West)	
Number of Events	132	132	
Mean Precipitation (inches)	0.29(1)	0.28(9)	
Median Precipitation (inches)	0.13(0)	0.13(5)	
Total Precipitation (inches)	38.38	38.13	

Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0	RMS value
Ott(East) vs. Ott(West)	0.00(2) ± 0.00(3)	0.1829	Do Not Reject	0.01(6)

Wilcoxon signed-rank test	p-value	Hyp: Mean Difference = 0
Ott(East) vs. Ott(West)	0.0736	Do Not Reject

Ott East vs West

OTTS SHOW BETTER AGREEMENT

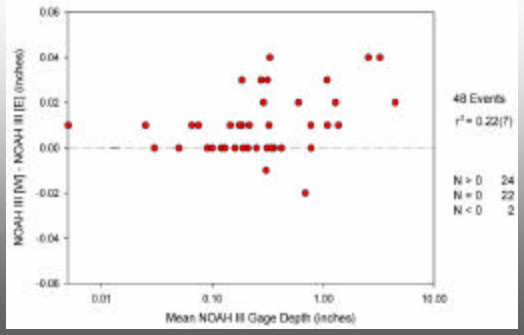
Statistic	Ott (East)	Ott (West)	
Number of Events	132	132	
Mean Precipitation (inches)	0.29(1)	0.28(9)	
Median Precipitation (inches)	0.13(0)	0.13(5)	
Total Precipitation (inches)	38.38	38.13	

Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0	RMS value
Ott(East) vs. Ott(West)	0.00(2) ± 0.00(3)	0.1829	Do Not Reject	0.01(6)

Wilcoxon signed-rank test	p-value	Hyp: Mean Difference = 0
Ott(East) vs. Ott(West)	0.0736	Do Not Reject

Ott Pluvio

NOAH III Gage Differences vs. Mean NOAH III Depth



Performance Requirements

OTT	NOAH	
X	X	Capacity: ≥ 25 cm liquid equiv., unattended
X+	X+	Resolution: 0.02 cm.
X+	X	Accuracy: within 5% or 0.05 cm of stick gage

Performance Requirements

OTT	NOAH	
?	?	Reporting: provide status report indicating condition
X	X	Reporting: report data within 5 minutes of request
X	X -	Reporting: no delays due to freezing or sticking to gage orifice
X -	X +	Reporting: no false positives in absence of precipitation // NOAH needs bug screen

Performance Requirements

OTT	NOAH	
?	?	Reporting: provide status report indicating condition
X	X	Reporting: report data within 5 minutes of request
X	X -	Reporting: no delays due to freezing or sticking to gage orifice
X -	X +	Reporting: no false positives in absence of precipitation // NOAH needs bug screen

Temperature and wind are source of false positives, NOAH III optics have advantage

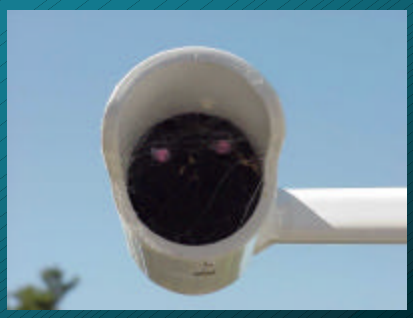
Performance Requirements

OTT	NOAH	
X	X -	Anti-icing: snow, ice, & rime will not interfere with operation
X	X	Temperature: - 45 C to + 50 C with accuracy
X	X	Wind: 15 m/s steady, 25 m/s gust (5 second), fully operational

Performance Requirements

OTT	NOAH	
X	X -	Anti-icing: snow, ice, & rime will not interfere with operation
X	X	Temperature: - 45 C to + 50 C with accuracy
X	X	Wind: 15 m/s steady, 25 m/s gust (5 second), fully operational

Ott small orifice area reduces trapping



Performance Requirements

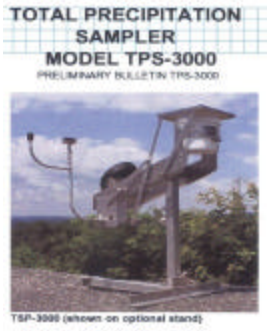
OTT	NOAH	
X +	X +	Reliability: mean time between failures >1000 days
X +	X +	Maintenance: maintenance interval ≥ 90 days
?	?	Availability: mean time to repair or maintain < 30 minutes
?	?	Lightning: field-induced and other surges shall not damage instrument

Performance Requirements

OTT	NOAH	
X	X	Grounds: use mower or string trimmer up to base without damage
X	X +	Power: 110VAC or 12VDC with max consumption <5 amps @12VDC // NOAH AC version on order
X -	X +	Data Access: Ott uses a PC with Ott data acquisition hardware & software and connects to gage using an IR port // NOAH uses a PDA with PConnect hardware & software (on order)

Geonor T-200

→ ?


TOTAL PRECIPITATION
SAMPLER
MODEL TPS-3000
PRELIMINARY BULLETIN TPS-3000
TSP-3000 (shown on optional stand)

→ ?

Network Equipment Depot Update to NOS Washington DC 2003

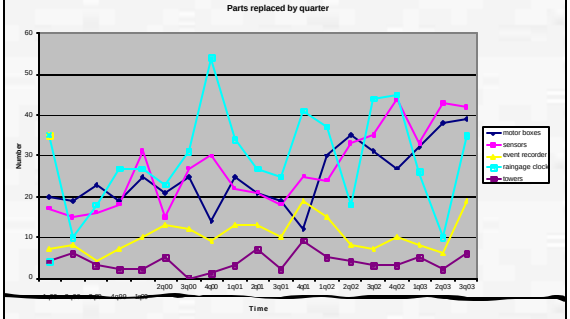
- Parts status
- News Items
- Complaints

Parts Status

PART	AVAILABLE	REPLACED last 12 mos
motor boxes	45	144
sensors	54	171
event recorders	39	43
gage clocks	77	116
gage mechanisms	51	16
		====
		490

YEAR	00/01	01/02
motor boxes	96	122
sensors	99	142
event recorders	55	37
gage clocks	121	137
gages	20	17
	====	====
TOTAL	391	455

Parts Status



News items

•We are barely holding our own with provision of motor boxes and sensors to sites. FGS mini-NED below targets.NEDM below targets.

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•There are aspects of the interaction of the motor box and sensor mechanism related to switching which we do not understand and can not predict. Starting in Fall 2003 we are pairing motor boxes to sensors to effect repairs.

News items

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•There are aspects of the interaction of the motor box and sensor mechanism related to switching which we do not understand and can not predict. Starting in Fall 2003 we are pairing motor boxes to sensors to effect repairs.

•Vendor BEST has been excluded from consideration. New vendor RIES LABS is evaluating components and repair histories.

News items

- New monies have been allocated from the Executive Committee to start another round of hybrid clock rebuilds
  - Outside machining
  - 9 bodies modified
  - 2 complete build-up, test and ship
  - Goal is to do 50 clocks
    - Machining
    - Battery fabrication (student)
    - Assembly

News items

- Repeat failures at sites seem to indicate that AC power systems are fatiguing. Surge protector duplex outlets (at $50 each) purchased to trial at 5 sites.
- The electro-magnetic solenoids we use to repair and manufacture event recorders are no longer being made to our specifications. We are working on a retro-fit with radio-controlled modeling components.

Complaints

NED IS UNDER FUNDED

Current system for repair of motor box, sensor,event recorder, raingage clock and raingage internal mechanism funded at $2/week (the same amount the Program uses to fund the purchase of solely pH electrodes). At current revenue (330x2x52) and current part consumption (455) We are funded approximately $75 per repair(34320/455)*. Although repairs are highly variable, shipping costs alone consume about 10 to 15% of this revenue . Average component repair (BEST Inc.) through 3rd quarter 2003 is ~ $139.25 with a range of $75 to $225.

* 1-80% NED technician not included

USGS
EXTERNAL QUALITY ASSURANCE PROJECT

WHAT'S NEW FOR WATER YEAR 2004 AND BEYOND?

FALL 2003 NADP MEETING

Greg Wetherbee: wetherbe@usgs.gov
Natalie Latysh: nlatysh@usgs.gov

COMPARISON OF THE SAMPLE HANDLING EVALUATION TO THE BLIND AUDIT PROGRAM

What's the difference?

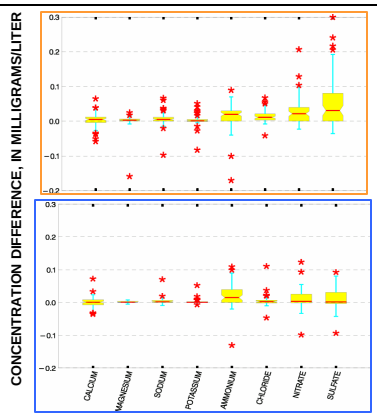
Answer: Single Blind vs Double Blind

1) **Are the SHE data different from the BA data?**

2) **Should the SHE Program be continued?**

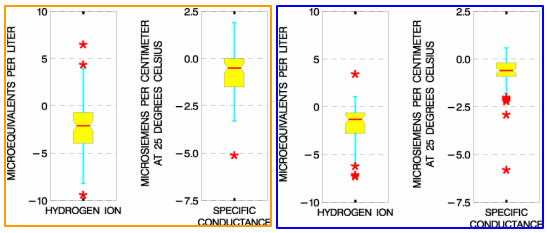
BLIND AUDIT
2002
N=100

SHE
2003
N=60



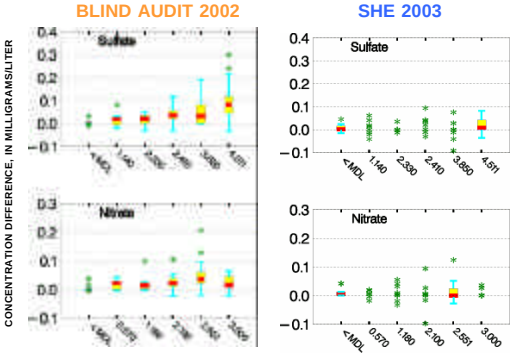
BLIND AUDIT
2002

SHE
2003

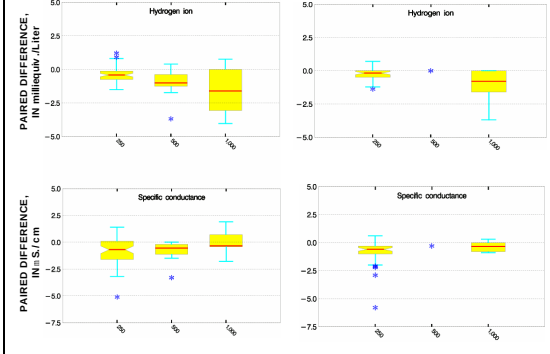


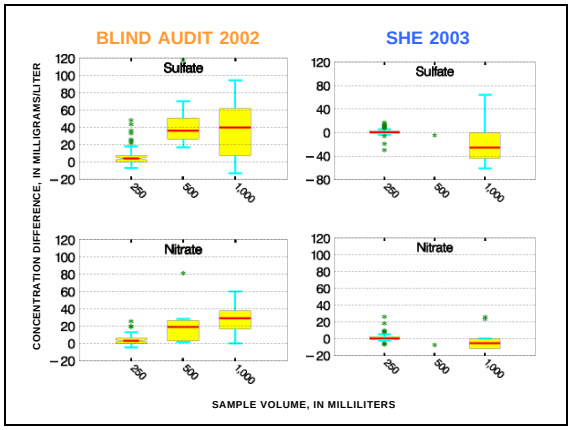
N=100 N=60

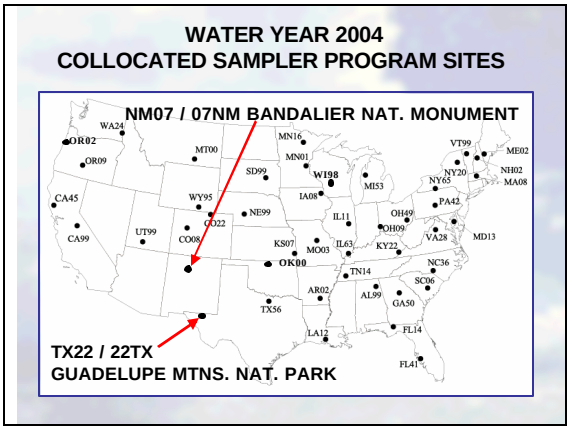
BLIND AUDIT 2002 SHE 2003



BLIND AUDIT 2002 SHE 2003







WATER YEAR 2005
COLLOCATED SAMPLER PROGRAM CHANGES

1) Establish 2 long-term benchmark collocated sites
   - WI98
   - Another snow dominated location

2) Discontinue shipping eqiupment around the country to different ecoregions

3) Collocate existing technology with modern technology to quantify potential "step-function" changes in data resulting from new equipment.

MDN EXTERNAL QA PROGRAM

1) Pilot programs in November and December 2003

2) Start all new programs in January 2004

3) Four (4) programs

   - System Blank
   - Field Blank
   - Interlaboratory Comparison
   - Collocated Sampler

ANALYSIS OF MDN COLLOCATED SAMPLER DATA

[ng/L: nanograms per liter; ng/m2: nanograms per square meter; mm: millimeters; ml: milliliters]

	Site IL11			Site WA18		
Analyte (units)	Number of Sample Pairs	Median Absolute Difference (units)	Median Absolute Difference (%)	Number of Sample Pairs	Median Absolute Difference (units)	Median Absolute Difference (%)
Total Mercury Concentration (ng/L)		0.967	4.88		0.978	10.4
Total Mercury Deposition (ng/m^2)	37	7.82	6.17	56	18.6	10.7
Sample Volume (ml)		4.70	3.68		23.1	7.14

EVALUATION OF MODERN MONITORING EQUIPMENT

1) Collocated Aerochem Metrics Collector / Belfort 5-780 with N-CON NTN-type Collector / Ott Pluvio
2) Located in Arvada, Colorado Community Garden Site
3) Planned to start…anytime N-CON and Ott deliver (October 2003 – September 2004)

Quality Management Report

Christopher Lehmann,
NADP QA Manager

NADP-NOS Subcommittee
October 2003

Outline

- ✓ HAL Review
- ✓ Quality Management Plan
- ✓ Siting Criteria
- ✓ Sample Wet-Add Protocol

I. CAL Follow-up Review
II. Network QA Plan
III. Siting Criteria/Site Remedial Actions

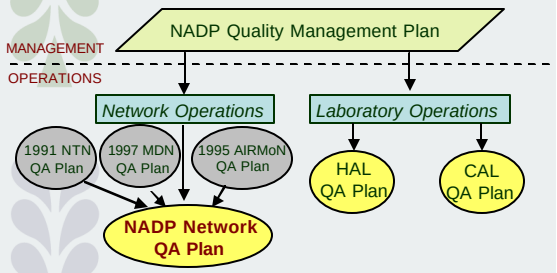
I. CAL Follow-up Review

- CAL Review: March 2002
- Review Team:
  - Brook Connor, USGS
  - Nancy Lance, Env. Canada
  - Bob Brunette, Frontier Geosciences
  - Chris Lehmann, NADP (observer)
- Original Review Report: May 2002
- CAL Response: February 2003
- Follow-up Report: July 2003

CAL Review: Unresolved Issues from Follow-Up Review

1. Sample Wet-Add Protocol (referred to NOS)
2. Matrix Spike QA Samples (CAL should report to NOS)
3. Updated Network QA Plan (QA Manager/QAAG)
4. Sample Data Minimum Reporting Levels (DMAS)

II. Network QA Plan

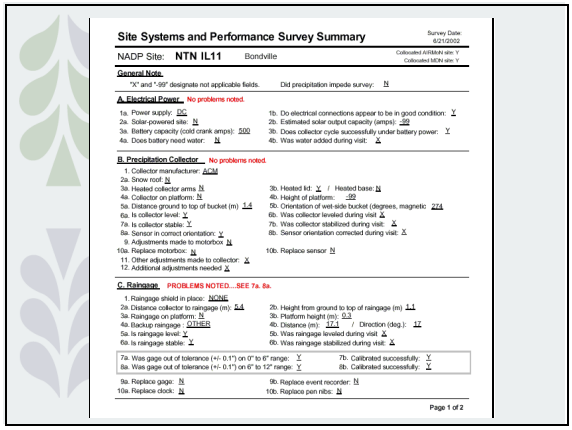


III. Siting Criteria/Site Remedial Actions

- Site Remedial Action Plan
- Site Survey Reports to sites
- Release of Siting Criteria data on NADP Web Site

Site Remedial Action Plan

1. Survey data received at Program Office from ATS
2. Site plan view prepared/updated
3. Survey data verified, site survey summary report issued to site operator, supervisor, and funding agency (goal: 3 months after receiving data)
4. Report responses documented (~2 months after report sent)
5. Site plan view, siting criteria posted to NADP web site (~6 months after survey)
6. All actions documented in database



Site Systems and Performance Survey Summary

Survey Date: 6/21/2002

NADP Site: **NTN IL11** Bondville

Collocated AIRMoN site: Y
Collocated MDN site: Y

General Note:
"X" and "-99" designate not applicable fields. Did precipitation impede survey: N

A. Electrical Power No problems noted.

1a. Power supply: DC
2a. Solar-powered site: N
3a. Battery capacity (cold crank amps): 500
4a. Does battery need water: N
1b. Do electrical connections appear to be in good condition: Y
2b. Estimated solar output capacity (amps): -99
3b. Does collector cycle successfully under battery power: Y
4b. Was water added during visit: X

B. Precipitation Collector No problems noted.

1. Collector manufacturer: ACM
2a. Snow roof: N
3a. Heated collector arms: N
4a. Collector on platform: N
5a. Distance ground to top of bucket (m): 1.4
6a. Is collector level: Y
7a. Is collector stable: Y
8a. Sensor in correct orientation: Y
9. Adjustments made to motorbox: N
10a. Replace motorbox: N
11. Other adjustments made to collector: X
12. Additional adjustments needed: X
3b. Heated lid: Y / Heated base: N
4b. Height of platform: -99
5b. Orientation of wet-side bucket (degrees, magnetic: 274
6b. Was collector leveled during visit: X
7b. Was collector stabilized during visit: X
8b. Sensor orientation corrected during visit: X
10b. Replace sensor: N

C. Raingage PROBLEMS NOTED...SEE 7a. 8a.

1. Raingage shield in place: NONE
2a. Distance collector to raingage (m): 1.4
3a. Raingage on platform: N
4a. Backup raingage: OTHER
5a. Is raingage level: Y
6a. Is raingage stable: Y
2b. Height from ground to top of raingage (m): 1.1
3b. Platform height (m): 0.3
4b. Distance (m): 17.1 / Direction (deg.): 17
5b. Was raingage leveled during visit: X
6b. Was raingage stabilized during visit: X

7a. Was gage out of tolerance (+/- 0.1") on 0" to 6" range: Y
8a. Was gage out of tolerance (+/- 0.1") on 6" to 12" range: Y
7b. Calibrated successfully: Y
8b. Calibrated successfully: Y

9a. Replace gage: N
10a. Replace clock: N
9b. Replace event recorder: N
10b. Replace pen nibs: N

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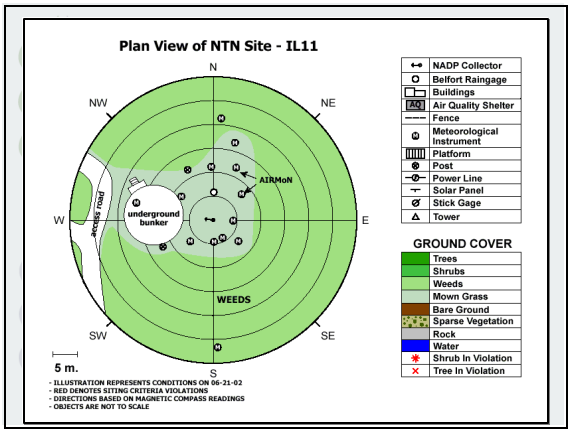

Remedial Action Status