

2004 USGS Intersite-Comparison Program

Performance Evaluation Category	2003 IS Results (Comparison)	2004 Study #52 Results	2004 Study #53 Results
Site operators participating	92.1%	226 / 93%	216 / 88%
Acceptable pH measurements	86.5%	88.8%	89.4%
Acceptable SC measurements	96.8%	94.7%	97.1%

Summary and Conclusions

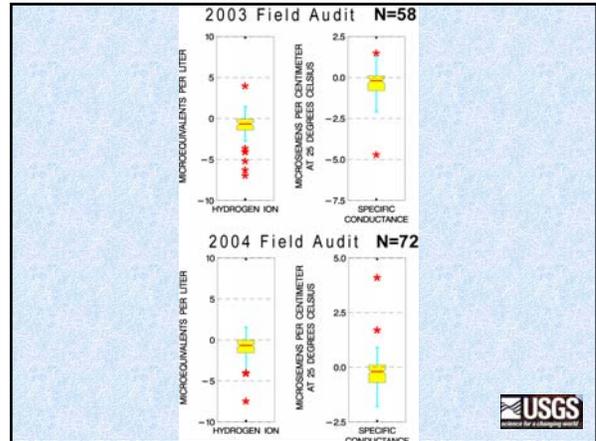
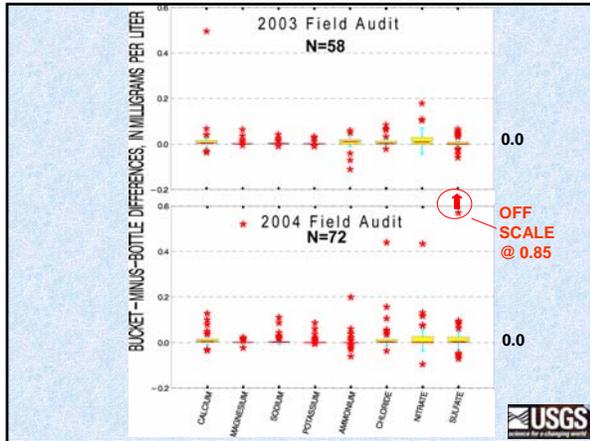
NTN INTERSITE

1. During 2004, site operator participation in the intersite program was the same as observed in 2003. Compared to 2003, performance **improved** slightly for **pH** and was about the **same** for **specific conductance**.
2. Intersite Program accuracy goals were met for approximately **89%** of NTN sites for **pH** and **96%** of NTN sites for **specific conductance**.

2004 FIELD AUDIT RESULTS

VARIABILITY AND BIAS ATTRIBUTED TO:

- FIELD EXPOSURE
- SAMPLE HANDLING
- SHIPPING
- LAB ANALYSIS



CONTAMINATION ESTIMATION USING FIELD-AUDIT DATA

Data Percentiles	Upper Confidence Limits - Contamination in 2004					
	90%	95%	99%	90%	95%	99%
90, 95, 99	0.041	0.041	0.051	0.009	0.009	0.012
90, 95, 99	0.029	0.029	0.03	0.013	0.013	0.038
90, 95, 99	0.04	0.04	0.04	1.31	1.31	1.36
	90% (red)		95% (blue)		99% (green)	

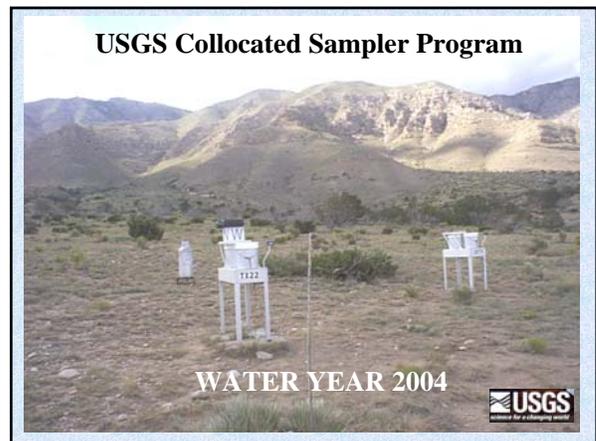
CONTAMINATION ESTIMATION USING FIELD-AUDIT DATA

Data Percentiles	Upper Confidence Limits - Contamination in 2004					
	90%	95%	99%	90%	95%	99%
90, 95, 99	0.05	0.05	0.057	0.077	0.077	0.119
90, 95, 99	0.083	0.083	0.093			
	90% (red)		95% (blue)		99% (green)	

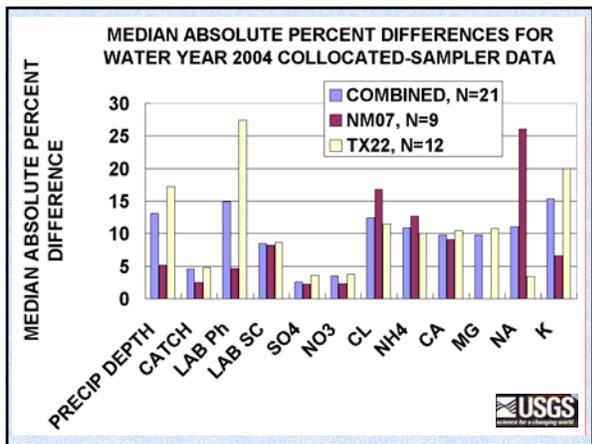
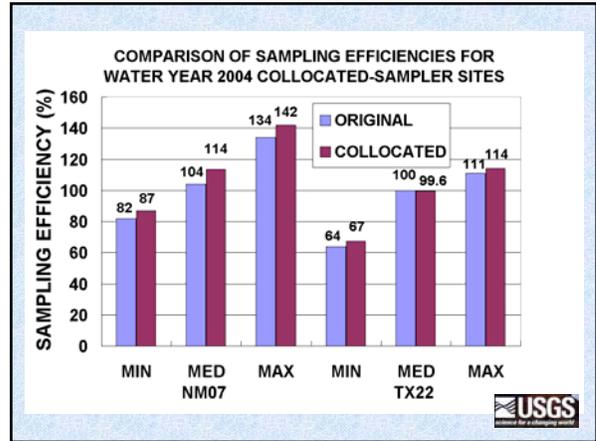
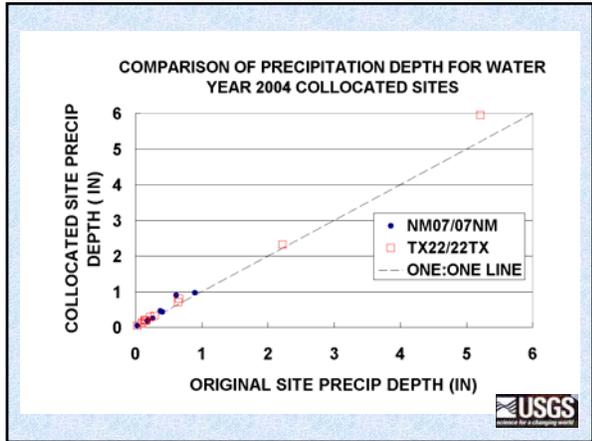
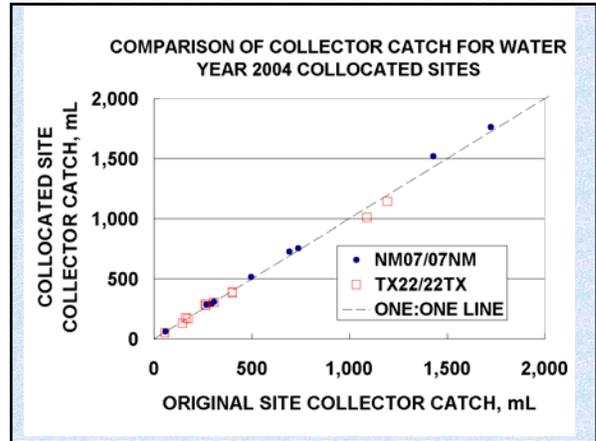
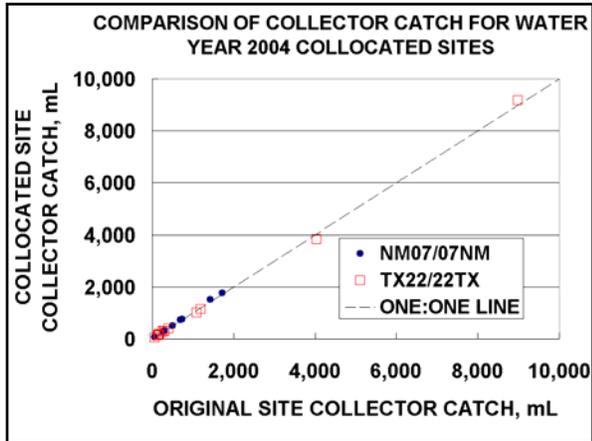
Summary and Conclusions

NTN FIELD AUDIT

- 2004 Field-Audit data are similar to 2003 data.
- Sample contact with bucket causes pH buffering and associated reduction in specific conductance (Old News).
- Contamination from field exposure is low. Contamination concentrations in approx. 50% to 80% of samples are below analytical detection limits.



NADP-NOS Spring 2005 Attachment 1

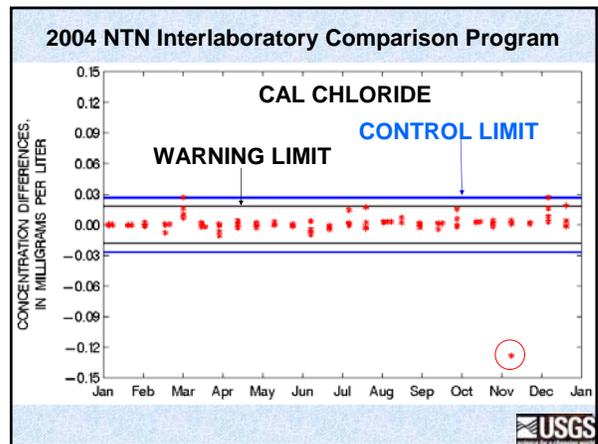
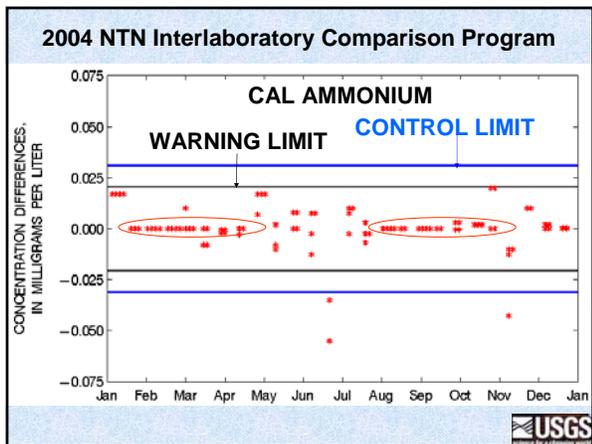
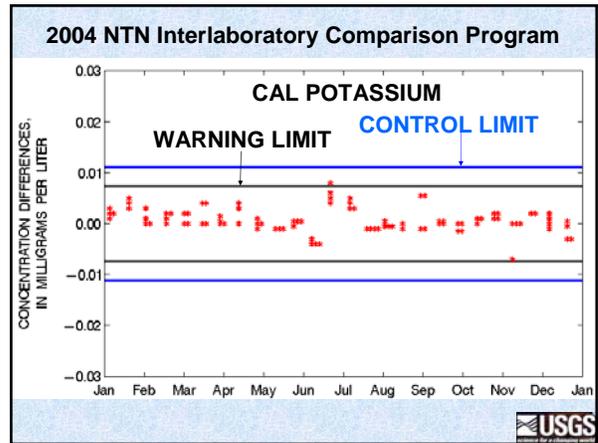
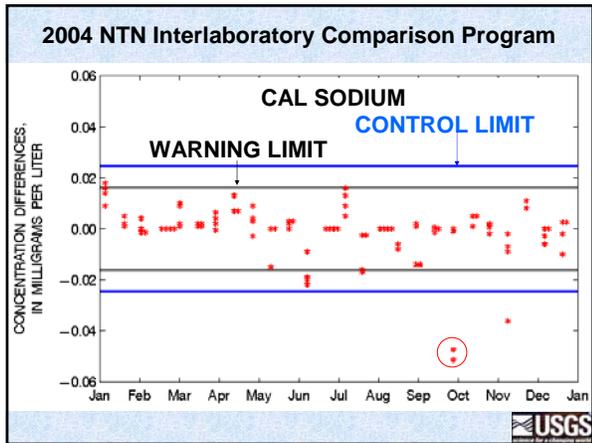
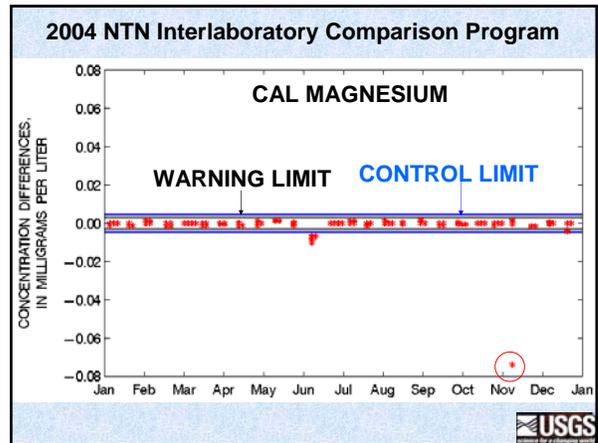
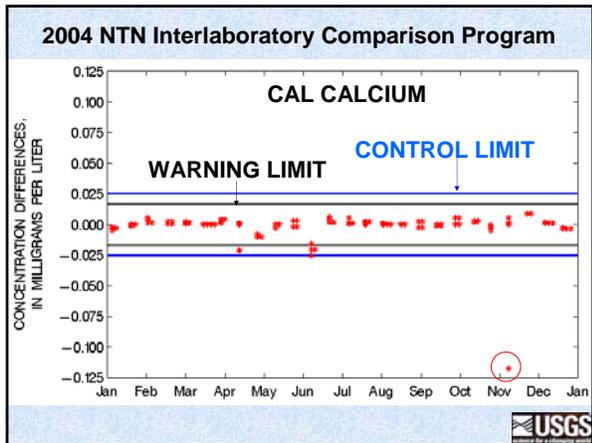


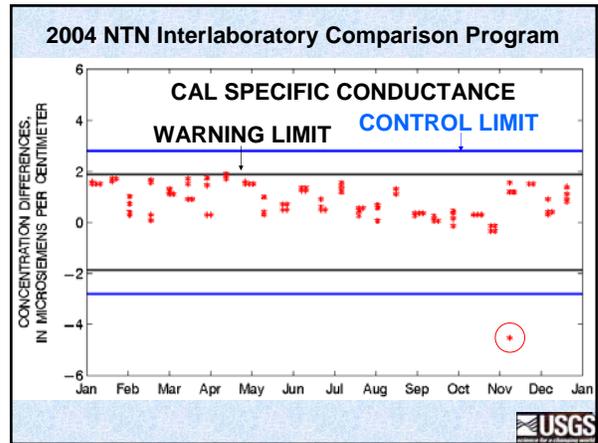
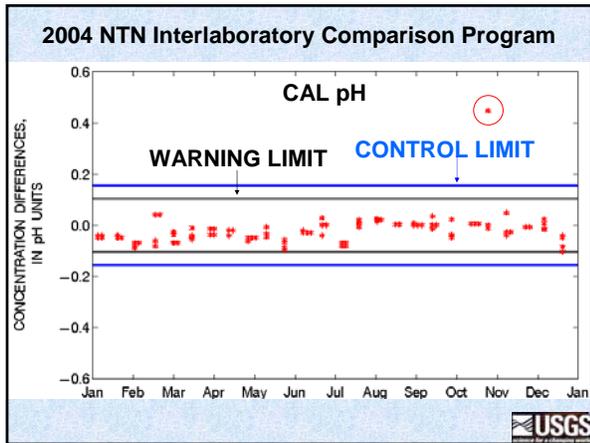
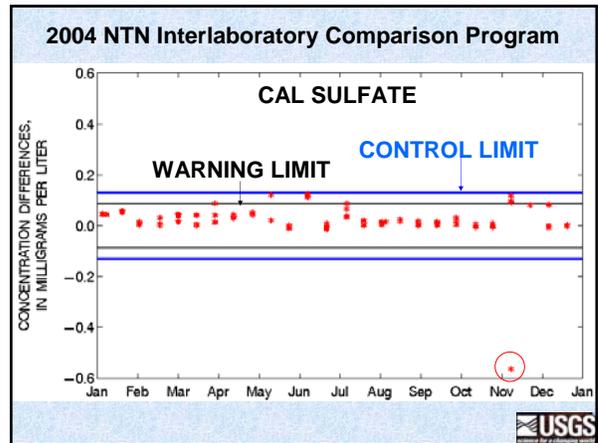
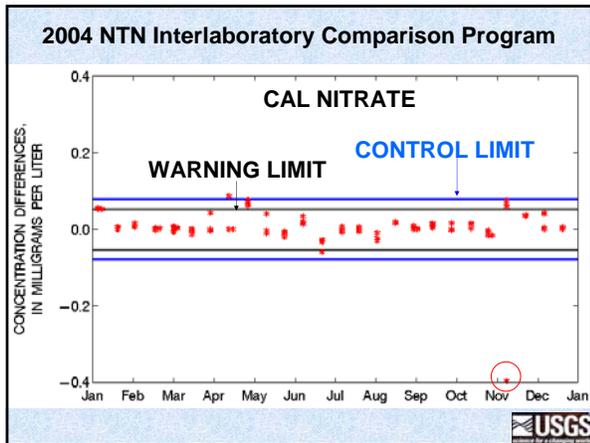
Summary and Conclusions

NTN COLLOCATED-SAMPLER

1. Low number of paired, replicate samples collected due to equipment malfunctions. Wet year at TX22 produced only 12 paired replicates. NM07 collector was out for several weeks.
2. Collection efficiency of collocated equipment exceeded that of original sites.
3. Combined median absolute percent differences for each parameter were between 5-15%, similar to previous collocated-sampler studies. However, many large percent differences too.

NADP-NOS Spring 2005 Attachment 1

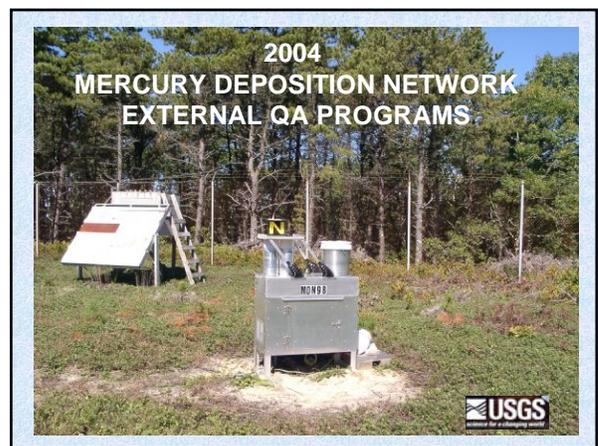


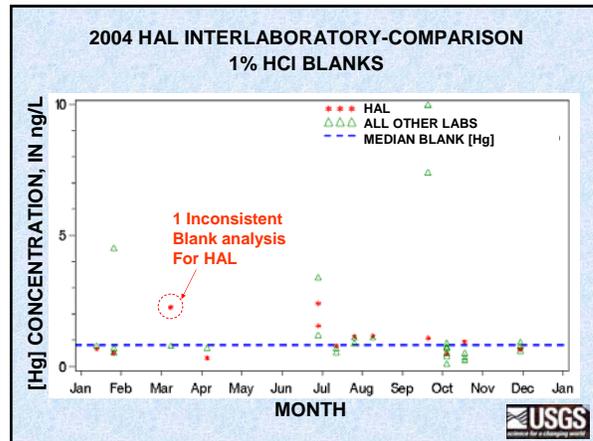
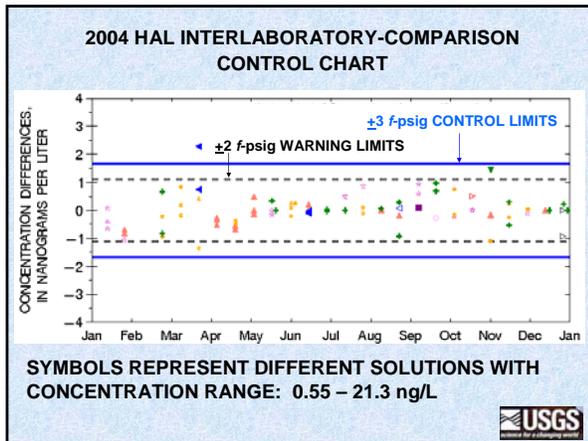


Summary and Conclusions
NTN INTERLABORATORY-COMPARISON

1. Less than 3% of analyses were outside of statistical control limits for: Mg, Na, NO₃, pH, and Specific Conductance.
2. Positive bias in CAL interlaboratory-comparison samples was identified for: Calcium (Jan-July) and Specific Conductance.
3. Negative bias in CAL interlaboratory-comparison samples was identified for pH for first 6 months.

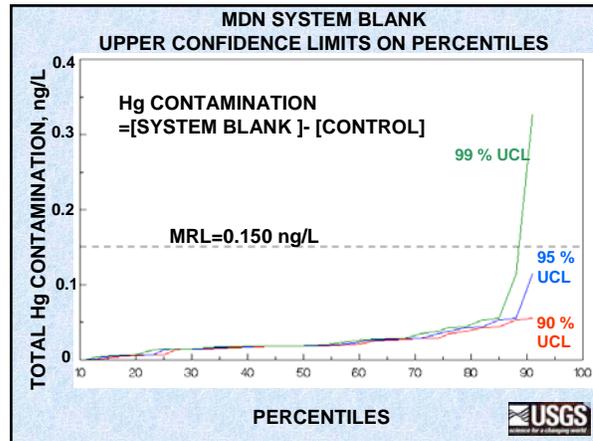
USGS





2004 MDN SYSTEM BLANK RESULTS

- 80 SAMPLES SHIPPED (20/QUARTER)
- 56 POSTCARDS RETURNED (70%)
- 44 SAMPLES PROCESSED (55%)
- MEDIAN DIFFERENCE:
[SYSTEM BLANK] - [CONTROL] = 0.018 ng/L



Summary and Conclusions

MDN

1. Laboratory variability typically is within statistical control.
2. No evidence of laboratory bias.
3. Laboratory Hg contamination appears to be minimal. - few blank samples with high [Hg]
4. Hg contamination due to field exposure, sample handling, and shipping in 90% of the samples is below the MRL with 95% confidence.

Accomplishments

- Completed first year of MDN QA program implementation.
- Expanded Field Audit by shipping to all NTN sites annually.
- Data interpretation and reporting through 2003 complete.

Accomplishments

- Collocated-sampler studies at: NM07, TX22, and Arvada Site, CO.
- Started long-term collocated-sampler operations at: AZ03, WI98, and VT99.
- Article: Wetherbee, Latysh, and Gordon, 2005, "Spatial and Temporal Variability of the Overall Error of NADP Measurements Determined by the USGS Collocated-Sampler Program, Water Years 1989-2001," in Environmental Pollution no. 135.



Changes We're Considering

1. Evaluate/discuss value of double-blind auditing of the CAL and HAL.
2. New studies at Arvada Site, CO?
3. MDN Collocated-Sampler Program?





Pending QA action items



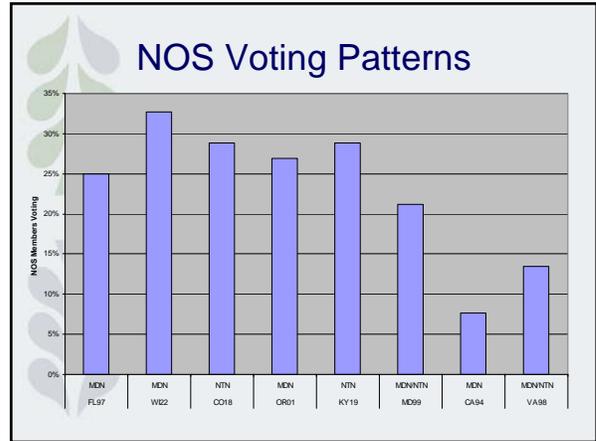
NOS QA Issues

- Voting on New Sites
- Recommendations for MDN Sample Archive & Reanalysis Program
- Site Operator Procedures for Field Calibration of Belfort Raingages
- Guidelines for Annual Laboratory QA Reports



Voting on New Sites

- NOS currently votes to grant “exception” to new NADP sites not meeting siting criteria guidelines



Proposal—New Site Approval

- Appoint NOS Chair, Vice Chair & QA manager to approve all future sites that do not meet NADP siting criteria guidelines



MDN Sample Archive and Reanalysis

- Issue raised at 2003 HAL Review
- Spring 2004 NADP Meeting:
 - A task group was appointed to create recommendations and determine the need for an MDN sample archive program and to explore sample re-analysis procedures and report back to NOS...

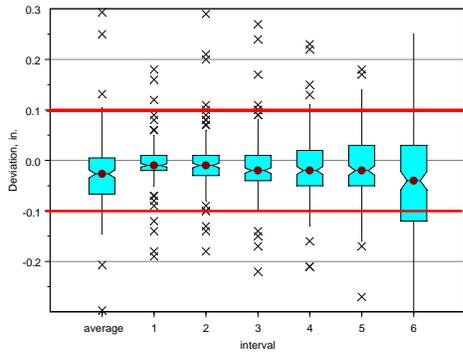
Field Calibration of Belfort Raingages

- Issue raised to address calibration/verification of Belfort Raingages between ~3-yr on-site Surveys
- Spring 2004 NADP Meeting:
 - A task group formed to develop site operator procedures and SOPs for calibrating rain gages and maintenance and to report these findings to NOS at the 2004 Fall Technical Meeting.

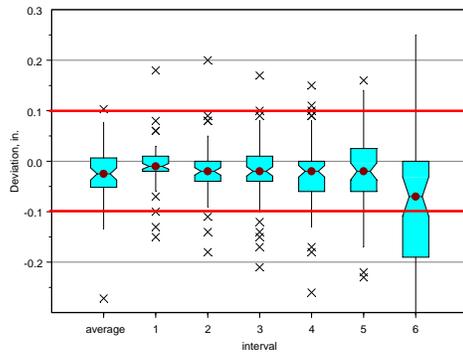
NTN & MDN Raingage Performance

- ATS verifies calibration of raingages using standardized weights at each 1" interval
- Gage tolerance = 0.1"
- Raingage performance, 2002-
 - 47% of NTN gages pass 0-6"
 - 33% of MDN gages pass 0-6"

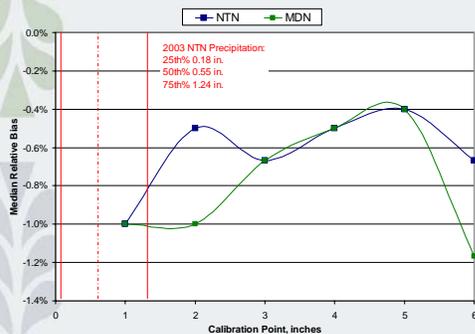
NTN Raingage Performance



MDN Raingage Performance

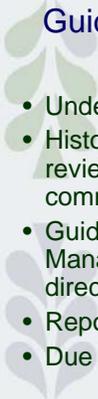


Median Bias



Field Calibration

- Should the NTN implement a field verification of raingages similar to MDN?



Guidelines for Annual Laboratory QA Reports

- Under development by QAAG
- Historically, laboratory QA reports reviewed by NOS members appointed by committee
- Guidelines have report reviewed by QA Manager and 2 others chosen by lab director
- Report approved by QAAG
- Due 18 mo after end of calendar year

On-Site Aliquot Removal

- ◆ This is NOT a subsampling protocol as defined by NADP.
- ◆ Review same

On-Site Aliquot Removal

- ◆ GOALS
 - ◆ Sample Quality
 - ◆ Transparency
 - ◆ Lack of confusion on the part of the operator

On-Site Aliquot Removal

- ◆ Major Components
 - ◆ No CAL/PO tracking of participants
 - ◆ No operational or materials support from CAL
 - ◆ Specific “one-shot” 20 mL procedure

On-Site Aliquot Removal

- ◆ From JAN 2005 protocol change note to all sites PAGE 1
- 3) This change does not effect anything else about your weekly “Every Tuesday Morning” routine. You will continue to remove the field bucket and raingage chart, pour your sample into the 1-liter sample bottle, and send the samples to CAL. You can even continue to do pH and conductance analysis if you choose (more about that later).

On-Site Aliquot Removal

- ◆ From JAN 2005 protocol change note to all sites PAGE 2
- 3) You may choose to continue field pH and conductance analysis. First, discuss this issue with your site supervisor, if you agree to continue field chemistry, read the attached procedure and call Scott with any questions. Remember, there will be no direct CAL support for probes, solutions, trouble-shooting, etc. after 12/31/2004.

On-Site Aliquot Removal

- ◆ From JAN 2005 protocol change note to all sites
- ◆ 6) The following pages provide step-by-step changes to the following procedures. You will.....
- C) Instructions for aliquot removal from the 1-liter sample bottle should you continue field chemistry (pH and conductance) measurements

Again, thank you, and please call Scott at 800-952-7353 with any questions.

On-Site Aliquot Removal

3-25b
1-05 addendum

REMOVING AN ALIQUOT TO CONDUCT ON-SITE pH AND CONDUCTANCE MEASUREMENTS STARTING JANUARY 2005

Insert this page in the NYS Site Operation Manual (July 1999 edition) in front of page 3-25.

1. Volume requirements

A) Up to 20 mL may be removed from any sample with a volume greater than 70 mL.

C) 70 grams Sample Weight from Block 6 of the FORP for on-site field chemistry measurements. The CAL requires at least 50 mL (grams) of sample for complete chemical analysis.

B) If you have less than 70 grams of liquid, do not remove any sample from the sample bottle.

NOTE: Sites requiring a larger volume must seek pre-approval from the NADP Program Office.

2. Filling your container

A) You must provide your own supplies to remove an aliquot for field chemistry. See supplies list (Appendix page A-3, 12/04) if you intend to continue field chemistry measurements.

B) If you have 70 grams of sample or more, pour up to 20 mL from the 1-liter sample bottle into your container.

C) Ensure that there is no rim-to-rim contact between the 1-liter sample bottle and your container.

D) Do not attempt to replace samples which are spilled in this transfer.

NEW NTN FORF for 2005

- * Elimination of field chemistry support
- * New supplies for Four In One shipping procedure
- * Other updates as prudent

Run-Up

- * Discussion at Nova Scotia, this draft had a block for routine field aliquot removal

Those in attendance were mixed as to the advisability of this format.

Internal Drafting

- * Dialog with lab staff, Program Office staff
 - Consensus NO ALIQUOT REMOVE BLOCK
 - Better contact information needed
 - Four In One procedure changes fairly straight forward
 - Block required for Bottle use

Internal Drafting

- * Contact Information
 - Full CAL address added

**NATIONAL TRENDS NETWORK
FIELD OBSERVER REPORT FORM (FORF)**

Send Completed Form with Each Sample to:
Central Analytical Laboratory, 2204 Griffith Drive, Champaign, IL 61820

Problems? Call the CAL at 1-800-952-7353
e-mail: ntn@sws.uiuc.edu or fax: 217-333-0249

Internal Drafting

5. SAMPLE CONDITION

Check type of contamination for all field buckets before and after decanting. Describe all contamination in Block 10, including any not listed here.

	YES	NO
1.	2	1
2.	2	1

1. Bird droppings
2. Cloudy or discolored

After decanting into sample

After decanting into sample bottle,

look closely at sample and field bucket and double-check your entry.

Internal Drafting

- * Four in One Shipping changes
 - Block 6 Weights

6. BUCKET SAMPLE WEIGHT

Weigh ALL sample buckets.

Bucket = Lit + Sample

CAL Bucket

CAL Lit

Sample Weight (grams)

9. SUPPLIES Request early. 10. RE

NADP/NOS Spring 2005 Attachment 4

Internal Drafting

* Bottle Use

8. SAMPLE BOTTLE USE

Pour **ANY** and **ALL** liquid up to 1-liter into the sample bottle.

Did you pour anything into the bottle?

YES NO

Internal Drafting

* Four in One Shipping changes
– Block 9 Supplies

Sample Weight (grams)

9. SUPPLIES Request early, Circle if needed, until received.

CAL Address Labels
Used Material Labels
Packing Tape
Field Forms
Rainage Charts
Rainage Ink
Gloves (S, M, L)
Disinfect Fluid
Lid Seal Pad

Final product to field

3-11
1-05 addendum

NEW NTN FIELD OBSERVER REPORT FORM (FOR) FOR USE STARTING JANUARY 2005

Insert this page in the NTN Site Operation Manual (July 1999 edition) in front of page 3-11. The new FORF is shown below. Use this FORF (with a revision date of 11/04 or newer) for the first sample with a 2005 date off (01/04-2005) and dispose of any previous FORF versions.

Note the following changes:

- The heading now includes the CAL mailing address.
- Block 5 SAMPLE CONDITION contains a note to remind you to check the field bucket and sample bottle for contamination and to record ALL sample comments in Block 10 REMARKS.
- Block 6 BUCKET SAMPLE WEIGHT requires that you enter the bucket weight and the lid weight separately. Always use and record the weight CAL has written on the lid and the bucket.
- Block 8 SAMPLE CHEMISTRY is removed.
- Block 9 is now SAMPLE BOTTLE USE.
- Block 9 SUPPLIES has been updated to remove field chemistry supplies. Supplies have been added for the new shipping procedure in which your samples will be returned to CAL in a small cardboard box. All sites will be converted to this procedure by December 2005.

Final product to field

**NATIONAL TRENDS NETWORK
FIELD OBSERVER REPORT FORM (FOR)**

Center for Global Change Science
National Center for Air Quality Studies
California Air Resources Board
1000 North First Street, Suite 100
P.O. Box 350000
Sacramento, CA 95835-0000
Phone: (916) 227-2300
Fax: (916) 227-2301
E-mail: ntn@calair.org

1. SITE

2. SAMPLE

3. SAMPLE CONDITION

4. BUCKET SAMPLE WEIGHT

5. SAMPLE BOTTLE USE

6. SUPPLIES

7. FIELD OBSERVATIONS

8. REMARKS

9. SIGNATURE

OTT PLUVIO

* Summary - Halifax South



OTT PLUVIO

* "NADP" or NEW vs. "USGS" or OLD



OTT PLUVIO

* ISWS Backyard site



OTT PLUVIO

* ISWS Backyard site



OTT PLUVIO

* Test Design

- Data retrieval post event
- Stick gage weighed for measurement
- Common winterization protocol
- Roger does OTT OLD (USGS), ETI IV
- Van does Stick
- Scott does OTT NEW (NADP-Halifax)
- Roger checks for false positives using local condition summaries (radar, surface observations) and summaries data
- No accompanying Belfort gage
- Data collection started 12/2/2004

OTT PLUVIO

OLD





OTT PLUVIO

* Operational notes

- Cabling confusing, lack of manual
- The gage must be oriented correctly as the IRDA port is sensitive to low sun angles in the winter. IRDA to North.
- The case does not slide easily off the internal mechanism. Firm mounting should take care of this.
- The cabling for serial connection is not weather rugged.
- AC to DC power supply(PS) not hard to make or install.
- PS plus serial cables adds \$300 to the cost of gage

OTT PLUVIO

* Test Results OLD vs. NEW

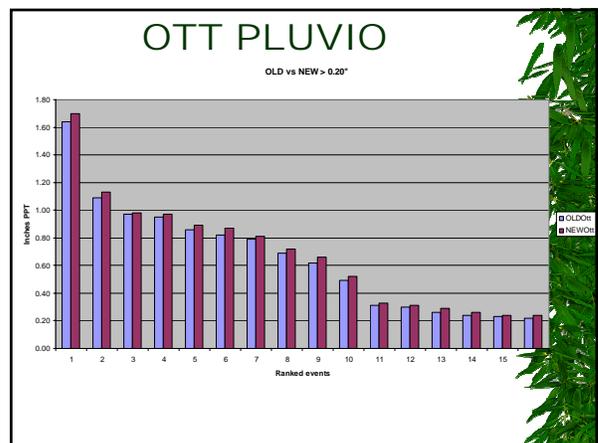
- Ott (OLD) recorded 3.08" of false positives or 27%.
- Ott (NEW) recorded 0.16" of false positives or 1%.

OTT PLUVIO

* Test Results OLD vs. NEW

* AFTER TRIMMING FOR FALSE POSITIVES

Statistic	Ott (OLD)	Ott (NEW)
Number of Events	28	28
Mean Precipitation (inches)	0.40(0)	0.42(0)
Median Precipitation (inches)	0.23(0)	0.25(0)
Total Precipitation (inches)	11.21	11.77
Paired t-Test		Hyp: Mean Difference = 0
	Mean Difference	p-value
Ott (OLD) vs. Ott (NEW)	-0.02(0) ± 0.00(6)	0.0000
		Reject
Wilcoxon signed-rank test		Hyp: Mean Difference = 0
	p-value	
Ott (OLD) vs. Ott (NEW)		0.0000
		Reject



OTT PLUVIO

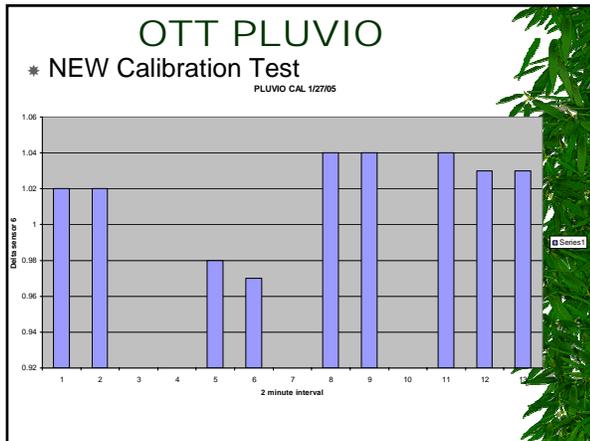
* Test Results **Stick vs. OLD**

Statistic	NWS Stick	Ott (OLD)	
Number of Events	28	28	
Mean Precipitation (inches)	0.40(0)	0.40(0)	
Median Precipitation (inches)	0.24(1)	0.23(0)	
Total Precipitation (inches)	11.19	11.21	
Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0
NWS Stick vs. Ott (OLD)	-0.00(1) ± 0.00(7)	0.8603	Do Not Reject
Wilcoxon signed-rank test		p-value	Hyp: Mean Difference = 0
NWS Stick vs. Ott (OLD)		0.6903	Do Not Reject

OTT PLUVIO

* Test Results **Stick vs. NEW**

Statistic	NWS Stick	Ott (NEW)	
Number of Events	28	28	
Mean Precipitation (inches)	0.40(0)	0.42(0)	
Median Precipitation (inches)	0.24(1)	0.25(0)	
Total Precipitation (inches)	11.19	11.77	
Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0
NWS Stick vs. Ott (NEW)	-0.02(1) ± 0.00(9)	0.0000	Reject
Wilcoxon signed-rank test		p-value	Hyp: Mean Difference = 0
NWS Stick vs. Ott (NEW)		0.0002	Reject



- ### OTT PLUVIO
- * Halifax South-Future
- New Pluvio has very little false positives
 - The IRDA download system works well routinely.
 - Calibration instructions received at the PO on 4/7/2005
 - SRD will calibrate NEW
 - SRD will check NEW vs. OLD calibrations
 - Continue to operate and report
 - Work with OTT and Infrastructure Committee on outstanding issues

- ### OTT PLUVIO
- * Scott's Advise
- Stick with HACH/OTT good things may happen
 - * Use Pluvio data system or CR10X?
 - * AWPAG algorithms?
 - * Cost?

ETI NOAH IV



ETI NOAH IV

- * Test Design
 - Data retrieval post event
 - Stick gage weighed for measurement
 - Common winterization protocol
 - Roger does OTT OLD (USGS), **ETI IV**
 - Van does Stick
 - Scott does OTT NEW (NADP-Halifax)
 - Roger checks for false positives using local condition summaries (radar, surface observations) and summaries data
 - No accompanying Belfort gage
 - Data collection started 12/2/2004

ETI NOAH IV



ETI NOAH IV

- * Operational notes
 - Hard to get cover off, so download is always by PALM PDA
 - No external serial cable
 - AC/DC power supply provided
 - Beta test unit
 - Infrared "eyeballs" are within the orifice, is this a good idea

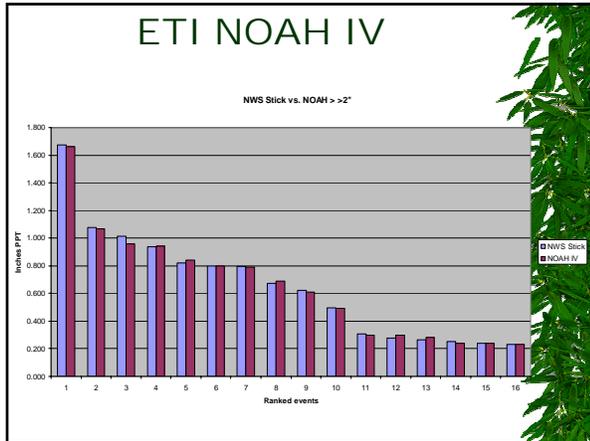
ETI NOAH IV

- * Test Results False positives
 - For the period of record (10/14/2004 to current) the gage has shown no false positives

ETI NOAH IV

- * Test Results **Stick vs. NOAH**

Statistic	NWS Stick	NOAH IV	
Number of Events	49	49	
Mean Precipitation (inches)	0.46(4)	0.46(1)	
Median Precipitation (inches)	0.25(2)	0.24(0)	
Total Precipitation (inches)	22.73	22.61	
Paired t-Test	Mean Difference	p-value	Hyp: Mean Difference = 0
NWS Stick vs. NOAH IV	0.00(2) ± 0.00(7)	0.4697	Do Not Reject
Wilcoxon signed-rank test		p-value	Hyp: Mean Difference = 0
NWS Stick vs. NOAH IV		0.2004	Do Not Reject

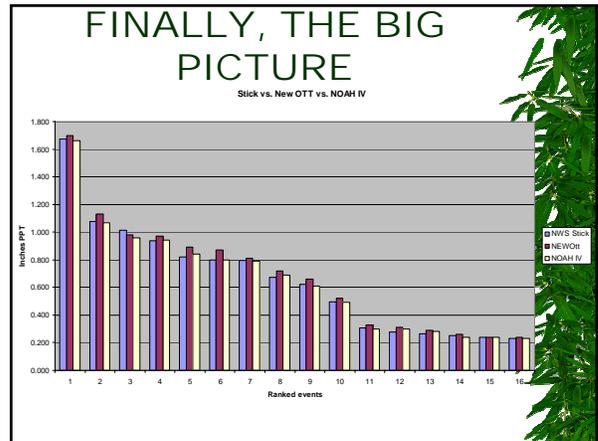


ETI NOAH IV

- * Calibration Test
 - Needs to be done

ETI NOAH IV

- * NOAH Future
 - Test for Pocket PC 2003 compatibility
 - Calibration check
 - Continue to operate and report
 - "Open" CR10X data logger is good
 - Work with ETI and Infrastructure Committee on outstanding issues



Ott Pluvio - NADP version

Baseline – Version demonstrated at Halifax - Additional modifications?

- Rectify the calibration offset?
- Documented field calibration capability and instructions?
- Capability to accept and record/log up to four digital input signals from external devices?
- Customized version of PDA software?
- PDA software code segments to incorporate into a NADP custom-written PDA software package?
- Decreased data transmission time (during data download from Pluvio)?
- Modifications to the PDA software data file structure?



Baseline – Version demonstrated at Halifax. Additional modifications?

- PDA purchase through Hach Environmental?
- Separate cable connections for RS232 signal and digital input signal(s)?
- Weatherproof / more robust cable connectors?
- Pulse output signal?
- 110VAC power supply (or supply of an external 110VAC / 12VDC transformer)?
- Provide a complete installation and operating instruction manual?

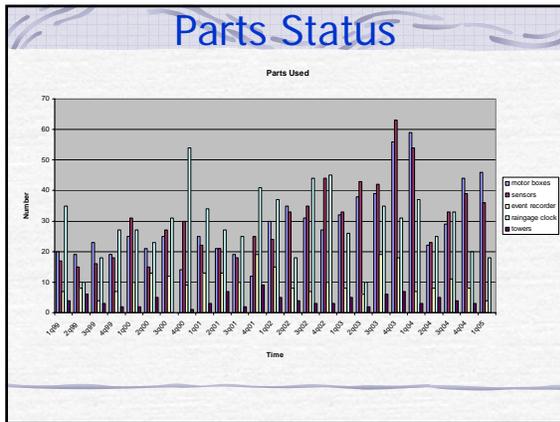


Network Equipment Depot Update to NOS Savannah, GA 4/2005

- ▣ Parts status
- ▣ News Items
- ▣ Complaints

Parts Status

PART	AVAILABLE	REPLACED last 12 mos						
▣ motor boxes	47	141 down 17%						
▣ sensors	59	131 down 28%						
▣ event recorders	24	31 down 37%						
▣ gage clocks	48	98 down 21%						
▣ gage mechanisms	21	12 down 43%						
====								
413								
YEAR	1999	2000	2001	2002	2003	2004		
▣ motor boxes	76	96	77	122	171	154		
▣ Sensors	62	104	80	135	188	149		
▣ event recorders	23	37	61	40	49	34		
▣ gage clocks	84	102	143	143	101	115		
▣ gages	14	9	22	16	19	15		
====			====			====		
TOTAL	259	348	383	456	528	467		



Parts Status

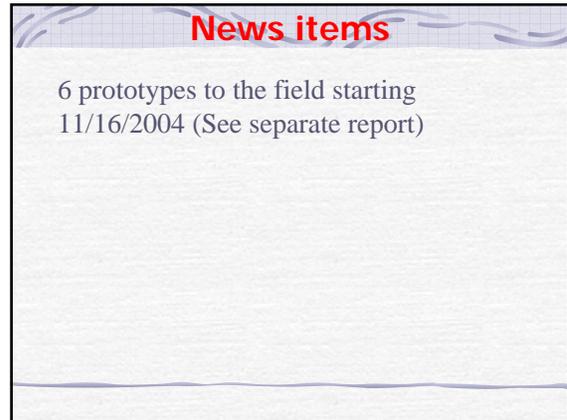
GOOD NEWS

parts requests are down

News items

David Gay took over on 1/1/2005





New Sampler Idea/Prototype

Ideas

- Started as a way to save NED money
 - Broken gears with ice and the like
 - Weak motors in the motor box
 - Costs associated with repair (\$200 plus)

- LODA has been talking about this sampler for years

Good About This Design

- No motor box
 - Stronger, with screw arm (less ice damage)
 - No broken gears (repair)
 - No clutch (repair)
 - Should save NED money

- Simpler, fewer moving parts
 - Hardy/Robust
 - Less shipping of parts (\$)

More.....

- Fewer parts
 - Less repair
 - Easier repair
 - Cheaper to buy new arm than repair motor box

- All electronics on 2 boards
 - Pull out and ship back when there is a problem

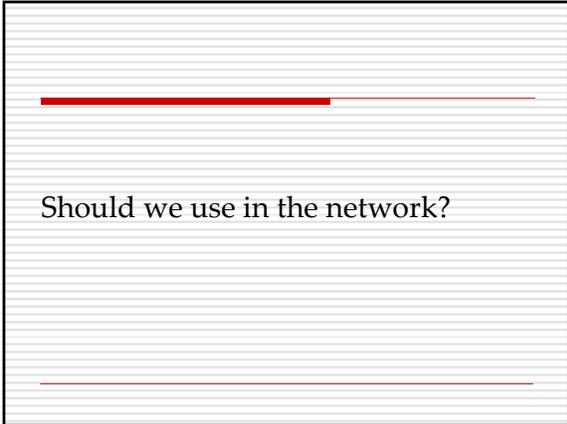
More.....

- Rain sees no difference
 - Rain/no rain decision is no different
 - Same sampler profile

- Works with Scott's new sensor
 - Easier to repair
 - saves NED money

What will be added beyond this version

- Adjustable for different bucket heights (NTN)
- PULL OUT BOARD
 - Save \$
 - Simplify troubleshooting
 - Possibly cheap enough to have two onsite
 - Repair ourselves at NED (save \$)
 - Key fitting so it only goes in one way
 - Inside watertight box
- Replaceable fuses
- Extra room in box for Data logger (future?)
- Troubleshooting System
 - Lights and warnings



ATS Advanced Technology Systems, Inc.

Performance Audits Surveys of National Atmospheric Deposition Sites

Presented To:
National Atmospheric Deposition Program
2005 Spring Meeting
Savannah, Georgia
April 12-13, 2005

ATS
Advanced Technology Systems, Inc.

How to Conduct a NADP Field Survey 101

or

How I spent my last Eight years touring the country

ATS
Advanced Technology Systems, Inc.

When conducting a field SURVEY

ATS
Takes a FRIENDLY approach

ATS
Advanced Technology Systems, Inc.

The lengths *ATS* will go to keep the audit friendly



Danny is a raving STEELER fan

ATS
Advanced Technology Systems, Inc.

Surveys are planned up to two months in advance



ATS
Advanced Technology Systems, Inc.

After a decision is made on sites to be surveyed....

ATS notifies via email the EPA Project Officer, NADP QA Manager, all Site Liaison personnel, and other parties that have been designated on a need to know basis.

ATS
Advanced Technology Systems, Inc.

Email provides a list of sites, dates for the survey, a request from the QA Mgr. for up dated "Adobe" site sketches, and a request for a date to conduct a pre audit telephone conversation with the site Liaison people.



ATS decides on where to fly into and what order the surveys should be conducted, attempting to keep driving to a minimum.



ATS then accesses the NADP Data Base to obtain the following information:

Site Sponsor
Site Supervisor
Site Operator

for phone numbers and mailing address.



The Project Manager then starts to make phone calls to the operators to set up a schedule.

This is the fun part of leaving phone messages and playing phone tag. It has sometimes taken ATS up to a week of calls in order to set up a survey schedule.



Now the FIELD Team leader goes to work

First they make flight and hotel reservations

Next they inventory all the survey gear and check operations and charge batteries



All tools are calibrated



All field boxes are packed

Approximately 120 pounds of gear



PROJECT 02-054				
PRE AUDIT FIELD FOLDER CHECK SHEET				
SITE ID:				
MON:		MON:		ARRIVAL:
BUSINESS CARDS NETWORK LABON & FIELD TEAM LEADER				
RESERVATION DATA (INTERNET OR RESERVATION.XLS)				
COPY RESERVATIONS FOR TEAM ASSISTANT				
COPY RESERVATIONS FOR OFFICE				
TRIP PLANNER MAP AND DIRECTIONS				
PRE AUDIT SITE REVIEW SHEET (PREAUDIT.XLS)				
EWS SITE INFORMATION SHEET				
FIELD SITE PERFORMANCE SURVEY SHEETS (WITH 00101 DATA)				
(WHITE = NW, GREEN = MON, YELLOW = ARRIVAL)				
COPY 30 METER SKETCH FROM LAST AUDIT W/ DATA SHEET				
COPY PROGRAM ADOBE SITE SKETCH				
LETTER HEAD W/ 2ND SHEET, 3 SHEETS PAPER				
BLANK 30 METER SKETCH SHEET				
COPY TATS CONFIRMATION LETTER				
BLANK COPY FIELD AUDIT EXIT CHECK SHEET (EXIT_CHECK.XLS)				
PREPARED BY:				DATE COMPLETED:
MS:00	0000			

The field team leader now starts to complete a Pre Audit Field Folder Check Sheet



Resulting in a field folder for a site visit



As many as 17 folders have been prepared for a trip.



After everything is checked again

WE ARE OFF



Types of terrain we have traversed




Driving with the Doggies....




To extremes like this....




Which ended up like this....



And THIS...

One summer in Montana



Day of survey...

Welcome to the Operator



We start with checking AC to ground
For some reason the HR Department of
ATS thinks it's good idea to protect
the survey crew...



We next
check the
motor box out
put to the
event recorder



The distance of the bucket to mother
earth is also obtained



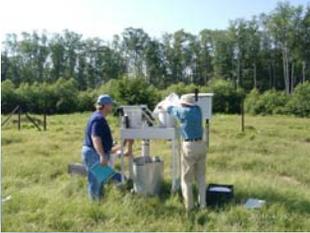
The lid distance with bucket in is taken
to the frame..



This is used
to determine
the
compression
of the lid to
bucket..



We have the operator open the collector



And demonstrate the proper technique to remove the sample



At the same time start a data logger and record the time to open the lid



We now start reviewing siting criteria



Sometimes during the review we pick up information that can be passed to the Program Office



Such as this environmentally friendly approach to vegetation control



While waiting for the data logger to finish

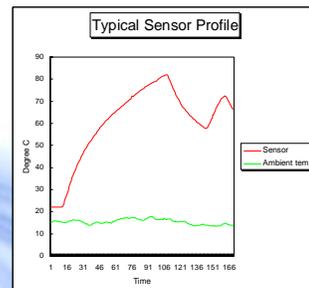


It's the ATS comedy hour..

Another way to keep the survey friendly...



When the data logger is finished recording, it is down loaded and the resulting data is displayed



An algorithm then processes the data to provide the following:

Ambient Temp
Start Temp
Max Temp
Time to max Temp

The algorithm then decides if the sensor needs replaced



Is wet bucket facing magnetic west...



Checking for a 45 degree violation...



Is the wet dry collector level?

Is it stable ?



How far apart is the wet / dry collector and the Belfort ?



Checking delta height with laser level...



Lasers work very well when the Belfort is surrounded by a Wyoming snow shield



Two checks with one operation
Can the collector open with a 1600 gram load ?



What is the resistance of the sensor to open the lid?



Alright what is the condition of this lid seal ?



Do we have the correct fuses installed in the motor box



Battery inspection - LOW on water
Pass load test ?



Instructing operators on how to perform routine maintenance on equipment



Review deficiencies with collector...



We now move on to the...

BELFORT



First we start out taking physical measurements..



Remember this..



When Van and Scotty found this out they started another **BACK YARD** study and contracted for services...

Well the best laid plans of Beaver and Man, sometimes doesn't quite work out for the best..

Notice the additional expense of installing a **BEAVER** guard...



Back to the Belfort

We start out by checking the calibration as we found it



And the old story applies, if it ain't broke don't fix it !



Regardless of the calibration we still perform a cleaning of the gage.



And instruct the operator on requirements for maintaining the gage



We clean all components



We inspect the dash pot for proper oil level



If necessary, add oil, clean dash pot and replace oil. Or in some cases fill with oil as some new gages have been operating without.



Make adjustments to the clock orientation so the operator can wind it without difficulty.



We again review with the operator requirements for maintaining the BELFORT



We also review winter protocol.



We obtain a GPS fix (GARMAN 76S) for the site from atop the wet bucket



Data for the site sketch is now obtained with a (SUUNTO) Siting Compass /Clinometer



Lastly we document the site with digital images



These images can be found on the NADP web site



This covers what we do for an NTN or MDN survey

For an AIRMoN survey two additional area's are covered:

A stick gage is evaluated via fixed volumes of water

Field chemistry is still performed



And the last thing we do before departing the site is to issue a two page exit report and review it with the operator...



Feedback to the NED also comes from the field surveys



Such as a new dual event recorder



By documenting the problem ATS was able to report back on the area that needed to be corrected, in order to make the device work properly.



Answer:
Close the air gap between the solenoid and clapper arm



Some of the perks with this project, seeing a lot of wild life.



Or getting a moments to play with new born



Last, an image of an MDN collector

What caused the insulation to fail?

We were informed by the park ranger that this is a bear bite.

Hey, has anyone seen Yogi ?



ATS
Advanced Technology Systems, Inc.

ATS Advanced Technology Systems, Inc.

Review of some of the findings from the external site visit program for 2004

Presented To:

National Atmospheric Deposition Program
2005 Spring Meeting
Savannah, Georgia
April 12-13, 2005

ATS
Advanced Technology Systems, Inc.

Results from the external site visitation program conducted at NADP sites in 2004

Tom Jones and Jim Kertis - ATS

ATS
Advanced Technology Systems, Inc.

Reference

2004 Summary Report (Draft) submitted to Messrs.

Michael Kolian – U.S. EPA
Christopher Lehmann – ISWS
In March 2005

ATS
Advanced Technology Systems, Inc.

Background

ATS conducted systems and performance surveys at 102 NADP sites in 2004

77 NTN sites
22 MDN sites
3 AIRMon sites

ATS
Advanced Technology Systems, Inc.

During each site visit (survey), ATS collects more than 300 “pieces of information” -

Included are Y, N, X, physical measurements, digital images, and azimuth, distance and description for site sketches

ATS
Advanced Technology Systems, Inc.

Considering the 102 sites surveyed in 2004 -

300 data entries per site x 102 sites = 30,600 “pieces of information” -

That’s a lot of data every year

ATS
Advanced Technology Systems, Inc.

In an attempt to consolidate the data into an easily understandable summary report (that's the goal)

ATS organized the survey data into the following 3 broad categories:



Field Equipment Performance (includes the precipitation collector, rain gauges and pertinent field laboratory equipment)

Site Operator Performance

Adherence of Sites to NADP Siting Criteria



Within each of the 3 broad categories, ATS subdivided the data (where appropriate) that are:

Common to all three NADP networks

Unique or pertinent to NTN and AIRMoN only

Unique or pertinent to MDN only

Unique or pertinent to AIRMoN only



As such, there are potentially 12 data groups that can be examined –

We'll examine a few selected data groups during this presentation

Later we will look at select data that will have criteria changed for 2005 surveys



All problems were addressed during the survey and / or by follow-up action by the site and the NADP Program Office. These results are similar to the results from the surveys conducted in calendar year 2003



Field Equipment Performance

Overall Statement

Few sites (< 13%) have serious mechanical problems with:

The precipitation collectors

The integrity of the stick gauges

The pH and specific conductance measurement probes

The mass balances



However, there are some exceptions –

MDN Max / Min Thermometers

More than 65% of the sites had max / min thermometers that failed a simple performance check (the HAL supplies the thermometers). These results show an increase to the results from the surveys conducted in calendar year 2003.

We will return to this later



AIRMoN Stick Gauges

Seven of the eight stick gauges examined since 2002 failed a simple calibration check at one or more of the target depths tested (error > 3% of the target depth).

This is the Primary gage for the network

Remember – there are no mechanical linkages with the stick gauges!

Are there any recent updates from the Program Office?



Some sites (47%) have rain gauges that failed a calibration check at the 1, 2, 3, 4 or 5-inch equivalent depth.

Nearly all non-compliant gauges were recalibrated during the survey.

Replacement gauges (3% of the total examined) were requested from the NADP Program Office for gauges that could not be repaired during the survey.

These results are greater than the results from the surveys conducted in calendar year 2003.



Site Operator Performance

Data that is Unique to NTN and AIRMoN Only:

(particular emphasis with regards to the Site Operator demonstrating acceptable field laboratory procedures)



Let's examine the following for NTN and AIRMoN sites that conduct field chemistry measurements:



Did the Site Operator demonstrate acceptable specific conductance measurement techniques?

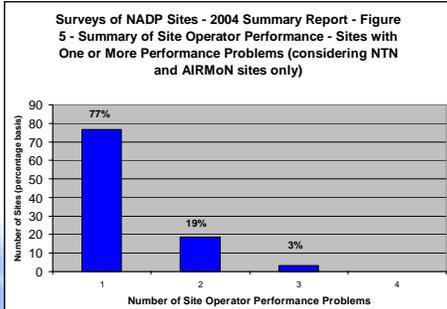
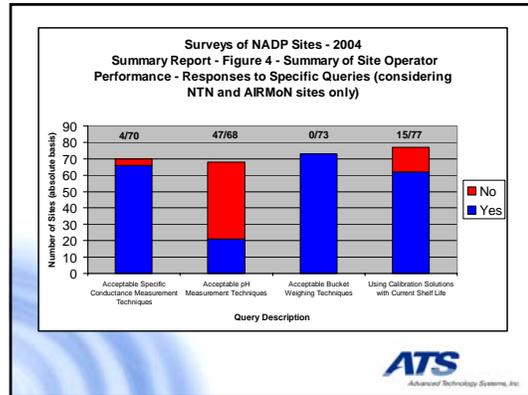
Did the Site Operator demonstrate acceptable pH measurement techniques?

Did the Site Operator demonstrate acceptable collection bucket weighing techniques?

Did the Site Operator use calibration solutions with a current shelf life (i.e., use non-expired calibration solutions)?



The results are summarized in the following histograms:



Conclusions

Most sites (77%) had at least one site performance problem related to the techniques used in conducting field chemistry measurements, in particular conducting pH measurements.

This findings suggest that the quality of field chemistry data provided by the site operators may be suspect.



Conclusions (cont)

All problems related to the techniques used in conducting field chemistry measurements were addressed during the survey in an attempt to improve the quality of these data.

These results are slightly higher results from the surveys conducted in calendar year 2003.



Adherence of Sites to NADP Siting Criteria

Data that is common to All 3 Networks

(particular emphasis with regards to the location of the precipitation collection equipment and its relation to the immediate surroundings)



Let's examine the following siting criteria questions:

Are there objects with a height greater than 1 meter within a 5 meter radius of the precipitation collector?

Are there objects with a height greater than 1 meter within a 5 meter radius of the Belfort collector?



Let's examine the following siting criteria questions: (cont)

Are there objects that violate the 45-degree rule with respect to the precipitation collector?

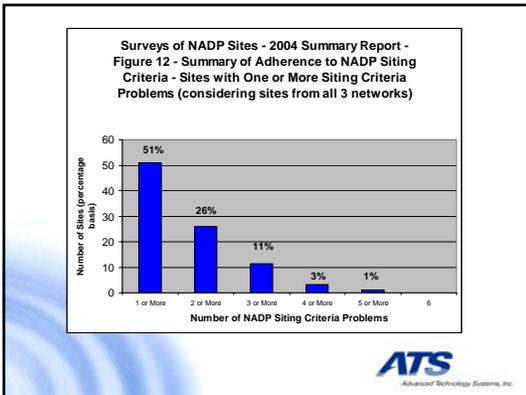
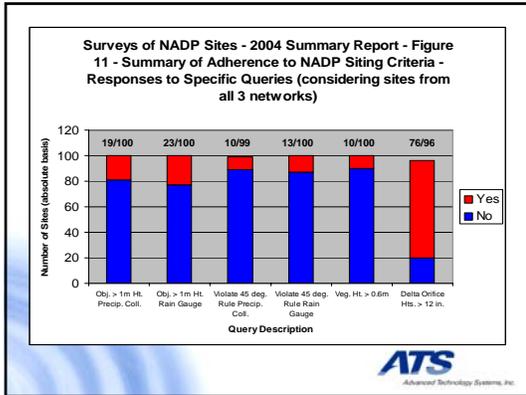
Are there objects that violate the 45-degree rule with respect to the Belfort rain gage?



Let's examine the following siting criteria questions: (cont)

Is the vegetation greater than 0.6 meters height within a 5 meter radius of the precipitation collector?

Is the difference between the orifice heights of the precipitation collector and Belfort rain gauge less than or equal to 12 inches?

Conclusions

A many of sites (51%) are not fully compliant with selected NADP siting criteria that pertain to the location of the precipitation collection equipment and its relation to the immediate surroundings – the NADP Program Office is working with the sites to address these issues.



Conclusions (cont)

For each siting criterion, the percentage of non-compliant sites is approximately the same among NTN, MDN, and AIRMoN (i.e., no network had appreciably better or worse results) with the following exception:



Conclusions (cont)

MDN Sites – Delta orifice heights – precipitation collector and Belfort rain gage

MDN sites were appreciably worse as compared with NTN and AIRMoN sites

(more regarding this later)



Conclusions (cont)

The 2004 results are more favorable as compared with the results from the surveys conducted in calendar year 2003, perhaps suggesting that recent actions undertaken by the NADP Program Office to reduce the number of known siting criteria problems at NADP sites may be effective.



Adherence of Sites to NADP Siting Criteria

Data that is Unique or Pertinent MDN only:

(particular emphasis with regards to the location of the precipitation collection equipment and its relation to the immediate surroundings)



Let's examine the following siting criteria questions:

Are there sources of treated lumber within a 5 meter radius of the precipitation collector (potential sources of target metals)?

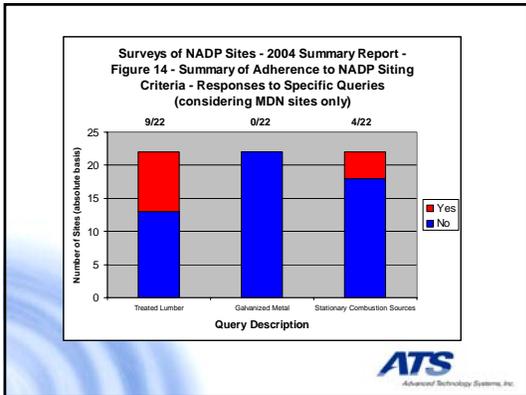
Are there sources of galvanized metal within a 5 meter radius of the precipitation collector (potential source of target metals)?



Let's examine the following siting criteria questions: (cont)

Are there stationary combustion sources within a 500 meter radius of the precipitation collector (in particular, fireplaces and garbage "incinerators" are potential sources of target metals)?





Conclusions

Most sites (76%) are not fully compliant with selected NADP siting criteria that pertain to the proximity of the precipitation collection equipment to treated lumber, galvanized metal and stationary combustion sources, in particular fireplaces and garbage “incinerators” (e.g., burn barrels – potential sources of target metals) – the NADP Program Office is working with the sites to address these issues.

ATS
Advanced Technology Systems, Inc.

Conclusions (cont)

These results are less favorable as compared with the results from the surveys conducted in calendar year 2002, perhaps suggesting that since many of the MDN sites were recently installed, the installers of MDN sites need to be better informed of these siting criteria.

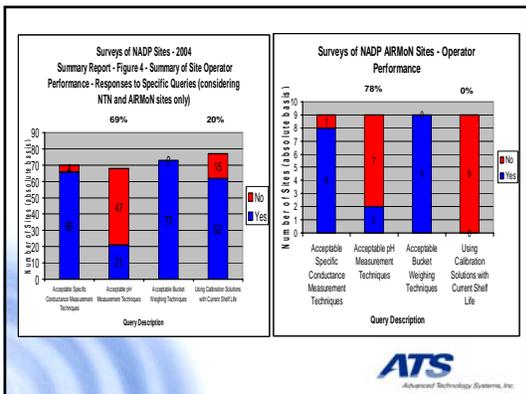
Are there any comments from the HAL?

ATS
Advanced Technology Systems, Inc.

Starting in 2005 AIRMoN sites will still be required to perform Field Chemistry.

Let us reexamine the same NTN / AIRMoN criteria but look at AIRMoN sites only.

ATS
Advanced Technology Systems, Inc.

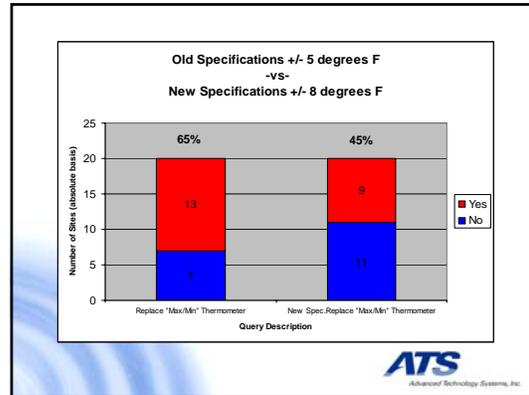


Starting in 2005 ATS will start revisiting AIRMoN sites. We will see if training operators in performing field chemistry pays off, this will also apply to replacement operators who should have been trained by the outgoing operator.

ATS
Advanced Technology Systems, Inc.

Starting in 2005, the PO has instituted a new set of specifications for evaluating the “max / min” thermometers.

An evaluation of thermometers surveyed in 2004 compared to the new specifications for 2005 indicate that 45% would still fail performance checks.



The Program Office and the MDN staff are investigating a replacement thermometer

Any comments from MDN ?



That's all Folks



ATS Advanced Technology Systems, Inc.

ATS External Site Survey Audit Report

Presented To:

National Atmospheric Deposition Program
2005 Spring Meeting
Savannah, Georgia
April 12-13, 2005

ATS
Advanced Technology Systems, Inc.

ATS External Site Survey Audit Report

Jim Kertis and Tom Jones - ATS

or

Where in the world is ATS

ATS
Advanced Technology Systems, Inc.



AND ALL THE SITES IN BETWEEN

21,500,000 Square Miles

ATS
Advanced Technology Systems, Inc.

The effort to conduct surveys in 2004 took the following to accomplish:

- 41,662 Flying miles
- 25,559 Driving miles
- 1,253 Gallons of gasoline

We continue to tabulate the gallons of beer

ATS
Advanced Technology Systems, Inc.

For 2005
ATS is looking to audit 104 NADP sites

From the proposed schedule of states we have a potential of 153 NADP sites

This will leave 49 NADP sites to carry over into 2006 surveys

ATS
Advanced Technology Systems, Inc.

Plans for 2005 remaining audits can include the following 14 States

Alabama, Colorado, Ohio, Maryland, Mississippi, Nebraska, New York, North Carolina, North Dakota, Pennsylvania, South Carolina, South Dakota, Virginia, Wyoming

ATS
Advanced Technology Systems, Inc.

NADP/NOS Spring 2005 Attachment 11

Including the sites already audited for this year (2005) **ATS** is still looking for 83 sites to complete the target of 104 sites

We hope this schedule will be flexible to accommodate new sites that come on line for this year.

With this flexibility lies the potential for more than 49 sites to be carried into 2006 for surveys. A frequency of 3 ½ years between visits



ATS has audited as of today 21 sites for 2005

14 NTN

7 MDN



Geographic locations of these sites

Alabama
Mississippi
North Carolina
Ohio



Of the 14 NTN sites surveyed in 2005

All were revisited sites

Of the 7 MDN sites surveyed in 2005



5 were revisited sites

2 were first visited sites

OH02 start up 01-04-05

Almost 5 months after startup

AL03 start up date 06-20-00

Almost 5 years after startup



Recurring problems for revisited sites:

Replacement operator training

Siting Criteria





CAL 4-in-1 shipping update

Number of sites activated - ~150
Estimated completion - late 2005



CAL 4-in-1 shipping update

Hardware



CAL 4-in-1 shipping Instructions

29 March 2005

To: NYS Site Operator
From: Scott Dawson, NYS Site Liaison and Karen Harlin, CAL Director
Subject: New "4-in-1" Shipping Protocol for your site

GENERAL INTRODUCTION

WHAT HAPPENS NEXT

CAL 4-in-1 shipping Instructions

- When you have depleted your inventory of black markers and bags, call any available NYS Site Operator for the large cardboard boxes to ship your weekly samples to CAL and return the used markers and bags. You will keep one marker at your site to reserve the weekly samples.
- Each week you will use a clean field bucket and fill from the large "NEW 4-IN-1 SHIPPING MATERIAL" box to fill your black marker and return your site.
- After your site visit you will return the 3-liter sample bottle, field form and shipping chart to CAL in the small "USED SAMPLING MATERIAL" box. You will label and store the used marker and fill the large "NEW 4-IN-1 SHIPPING MATERIAL" box.
- The **field work** will return the large "NEW 4-IN-1 SHIPPING MATERIAL" cardboard box to CAL, and ship your 3-liter sample bottle with a monthly supply of materials within a few days following the next visit.

SUPPLIES NOTE
Because of the new shipping procedure from CAL to your site, it may take longer for supplies to get to you. Please pay careful attention to your consumable supplies (field forms, range charts, tape) and order them in plenty of time. Please plan ahead.

Complete instructions with pictures are attached.
Please call 800-952-7353 if you have any questions or concerns.

CAL 4-in-1 shipping Instructions

Detailed 4-in-1 Shipping Instructions

I. USE ALL BUT ONE OF YOUR OLD MAILERS

II. ORGANIZING SUPPLIES

III. PREPARING TO GO TO THE FIELD SITE

IV. PROCESSING SAMPLES/RETURNING USED MATERIAL

SUMMARY

- Each week you will return the 3-liter sample bottle (with field forms and shipping chart) to CAL using the small "USED SAMPLING MATERIAL" box.
- Your used buckets and lids will accumulate on site, labeled to prevent reuse.
- On the fourth week you will ship the four sets of USED SAMPLING MATERIAL boxes using a large box.

CAL 4-in-1 shipping Instructions

NOTE: It is extremely important that buckets and lids not be reused to collect samples. Be certain that all used materials are labeled and placed into the "used sampling materials" box each week.

III. PREPARING TO GO TO THE FIELD SITE

IV. PROCESSING SAMPLES/RETURNING USED MATERIAL

SUMMARY

- Each week you will return the 3-liter sample bottle (with field forms and shipping chart) to CAL using the small "USED SAMPLING MATERIAL" box.
- Your used buckets and lids will accumulate on site, labeled to prevent reuse.
- On the fourth week you will ship the four sets of USED SAMPLING MATERIAL boxes using a large box.

CAL 4-in-1 shipping Instructions

STEP 1
To prepare the bagged 4-in-1 bucket and support 10 for storage, place the bag in a plastic bag and place a "CAL 4-in-1 Shipping Material" sticker on the outside of the bag. Then place the bagged bucket in a sturdy box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

STEP 2
Place the locally supplied bagged 4-in-1 bucket and support 10 in the box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

V. SHIPPING 4-LITER SAMPLE BOTTLE, CHART, AND FORMS IN WEEKLY BOXES

STEP 1
Prepare a 4-liter sample bottle, sample chart, and other and other copies of the 4-liter box for shipping. Label the sample bottle bag as usual. **NOTE: About the 4-liter bottle bag to make lighter.**

STEP 2
Place the sample 4-liter bottle in the box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

STEP 3
Pack the 4-liter bottle and support 10 in the box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

STEP 4
Attach the required shipping label to the outside of the box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.




CAL 4-in-1 shipping Instructions

VI. WEEK FOUR SHIPPING USED MATERIALS

STEP 1
In order to make the "USED SHIPPING MATERIALS" box will contain used 4-in-1 buckets, 4-liter sample bags, and the shipping labels. Place these items in a box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

STEP 2
Attach your regular shipping label to the outside of the box. The box must be 5' x 5' x 5' (height, length, and width) to fit the bag. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board. The box must be made of 1/2" plywood or 1/2" particle board.

NOTE: About 2 weeks since the conversion, and once each month thereafter, you will receive another bag in a box containing 4 weeks of supplies. Upon it when received, and check it for notes or supplies.

VII. SUPPLY MATERIALS

- The container used for the "Used Materials Box" every 2 weeks.
- Make certain to report any supplies or items in the box before you will send them. This is the distance in shipping frequency from the US, we require more time to get you what you need.
- If you get very low on a supply, please call us at 800-452-7333 or email info@cal.com.

Thank you for your cooperation.

CAL 4-in-1 shipping lab processing

- CAL is on its 5th iteration of the box hardware- now optimized (coated, double walled, 300 lb burst strength)
- shipments appear to be arriving a day or two faster to the CAL in the 5x5x9" boxes
- hoping for increase in durability, so far we have removed 104 large boxes from inventory due to poor condition

CAL 4-in-1 shipping problems

- conversion to latest box version will be ongoing for quite some time
- difficult to determine rate of large box usage
- unable to get box dimensions beneath UPS and FEDX overage limits (girth + ht. = 92", UPS max. = 84) so Billable Weight = 30 lbs.

Ion Chromatography-new instrument

- **Background**
 - CAL has used ion chromatography with carbonate/bicarbonate eluant for the anions (Cl, NO₃, SO₄) since 1985
 - Dionex instruments (DX-500) are now ~ 10 yrs old & need to be replaced with new systems
- **Dionex ICS-2000**
 - Replacement instruments (ICS-2000) were purchased June 2004
 - Potassium hydroxide eluant method investigated
 - Eluant generation, low signal/noise, no negative peak for chloride
- **Method comparison study needed**

ICS-2000 Method Development

1. Bias/Accuracy (known conc. solns)
2. Precision (control charts)
3. Recovery (spiked precipitation samples)
4. Detection limits (FR10 & low level standard)
5. Working range (calibration range)
6. Performance evaluation samples (external QA)
7. Differences between DX-500 and ICS-2000 (real samples)

June 2004—Dionex Ion Chromatography system purchased to replace 10 year old Dionex 500 systems for nitrate, sulfate, & chloride

Lab Operations (cont)



Dionex ICS 2000, Reagent-free IC

Hydroxide chemistry will improve signal to noise & chloride resolution
New data reduction software

Dionex 500 systems ~ 10 yrs old
Will be back-up & research instrument

ICS-2000 Method Development
Differences between DX-500 and ICS-2000

DX-500

AS4A Column
Isocratic Method

Eluent: 1.75 mM NaHCO₃/
1.80 mM Na₂CO₃
Detection: Suppressed conductivity
Flow Rate: 2.0 mL/minute
Injection Volume: 250 µL
Run Time: ~ 9.5 minutes

ICS-2000

AS18 Column
Isocratic Method

Eluent: 35 mM KOH
Detection: Suppressed conductivity
Flow Rate: 1.0 mL/minute
Injection Volume: 25 µL
Run Time: ~ 9.5 minutes

High Purity Standard One Comparison For ICS 2000 IC

	CL		NO ₃		SO ₄		
	Target (0.25 mg/L) ?? ±/ 0.01	SD	Target (0.50 mg/L) ±/ 0.02	SD	Target (2.47 mg/L) ±/ 0.10	SD	N
DX-500	0.211	0.004	0.499	0.009	2.484	0.017	6
ICS-2000	0.217	0.003	0.499	0.005	2.505	0.019	10
SWS1 DX-500	0.215	0.004	0.501	0.002	2.521	0.008	4

Interlaboratory Comparison vs. ICS2000 Ion Chromatograph

Interlaboratory Comparison Study	Cl(mg/L)			NO ₃ (mg/L)			SO ₄ (mg/L)		
	ICS2000	Original	Target	ICS2000	Original	Target	ICS2000	Original	Target
NWRI FR84 sample #8	0.095	0.091	0.09	0.784	0.871	0.872	0.671	0.676	0.69
NWRI FR85 sample #5	0.975	0.976	0.944	1.018	1.039	1.018	3.300	3.348	3.24
WMO 20040 sample #3	0.399	0.388	0.398	0.740	0.733	0.730	1.139	1.131	1.126
USGS samples 2004341010 2004341013	0.593	0.596/0.607	0.590	2.127	2.114/2.112	2.100	3.863	3.881/3.880	3.850
USGS samples 2004355002 2004355013	1.112	1.104/1.119	1.100	0.339	0.342/0.340	0.339	0.562	0.567/0.563	0.566
n	13			13			13		

NADP/NOS Spring 2005 Attachment 13

Standard Comparison for ICS2000 Ion Chromatograph

	ICS-2000		DX-500		Target
	mean (mg/L)	precision (mg/L)	mean (mg/L)	precision (mg/L)	
Cl⁻					
Standard 1	0.026	0.0009	0.026	0.003	0.025
Standard 7	1.495	0.0053	1.501	0.010	1.500
NO₃⁻					
Standard 1	0.051	0.0019	0.057	0.003	0.050
Standard 7	5.992	0.0189	6.017	0.027	6.000
SO₄⁻					
Standard 1	0.053	0.0021	0.058	0.004	0.050
Standard 7	5.994	0.0247	6.012	0.022	6.000

Recovery--Spiked natural precipitation samples

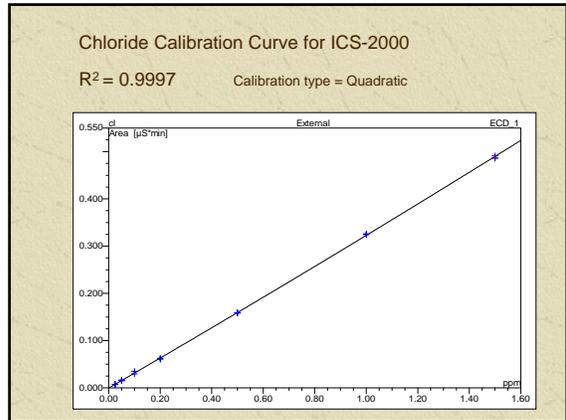
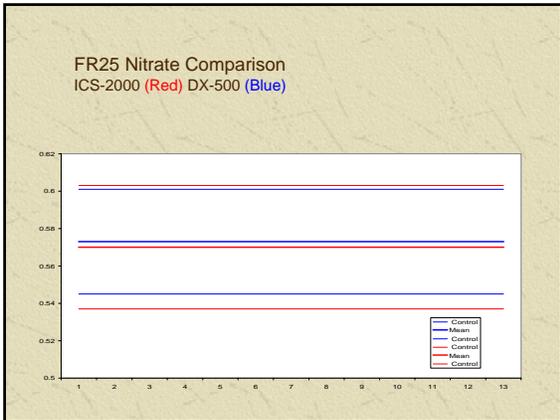
mg/L	Cl	mg/L	NO ₃	mg/L	SO ₄
0.027 to 1.18	86-105%	0.349 to 0.531	96.2-104.6%	0.378 to 0.869	95.9 to 102.8%

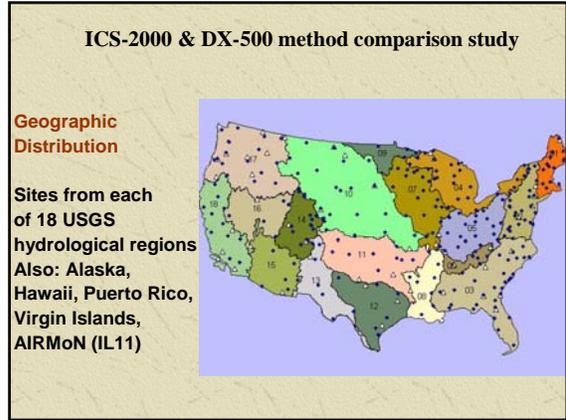
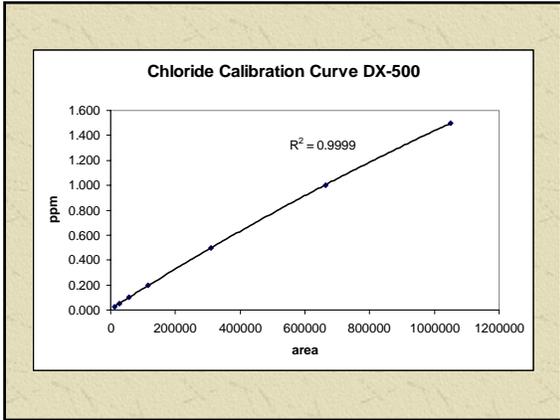
Method Detection Limits

	DX-500	ICS-2000	n
➤ Chloride	0.008	0.008	11
➤ Nitrate	0.009	0.014	12
➤ Sulfate	0.013	0.005	12

Working Calibration Range (mg/L)

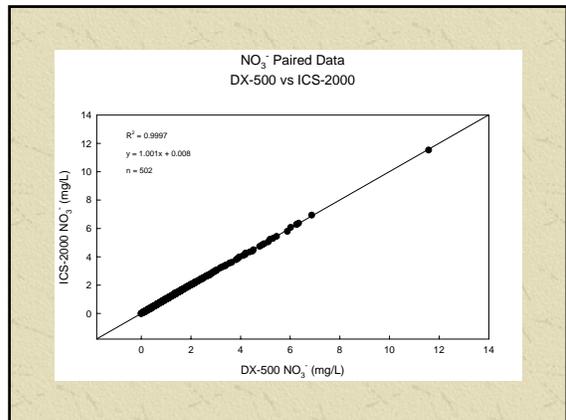
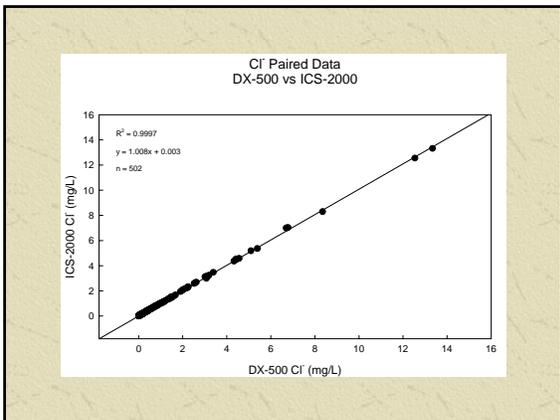
	DX-500	ICS-2000
➤ Chloride	0-1.50	0-1.50
➤ Nitrate	0-6.00	0-6.00
➤ Sulfate	0-6.00	0-6.00



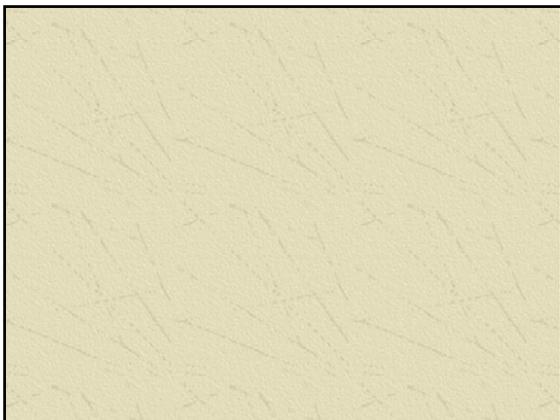
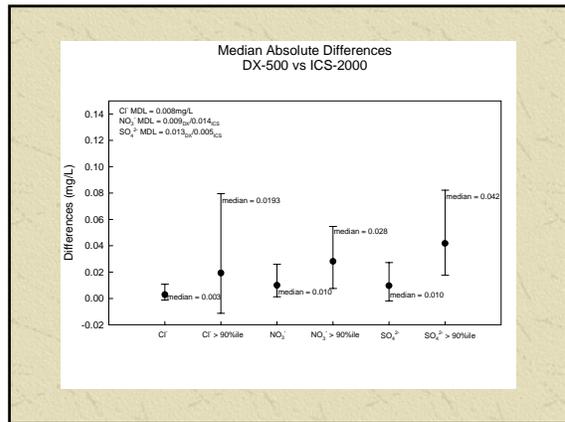
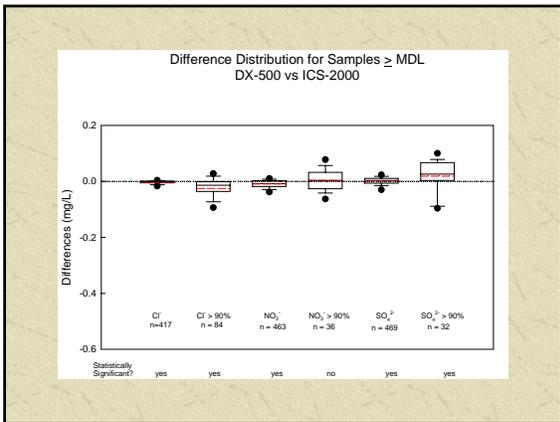
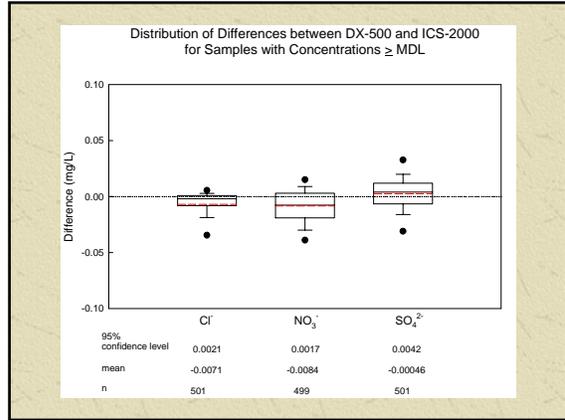
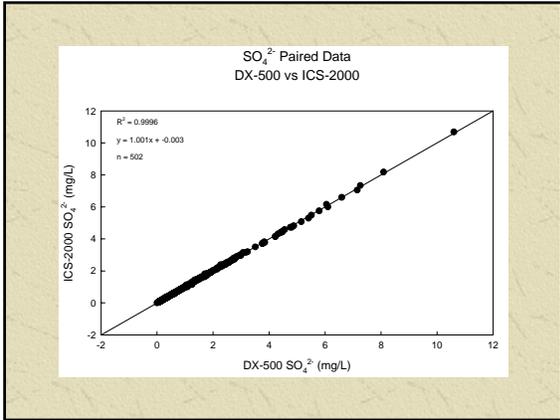


- ICS-2000 & DX-500 method comparison study**
- **Chemical Distribution**
 - Sites from each of the 4 NADP site classifications
 - Isolated, Rural, Suburban, and Urban
 - Also: Coastal and non-coastal
 - **Seasonal Distribution**
 - Sites selected above pulled from each meteorological season (summer, winter, spring, fall) 7/1/03 to 6/30/04
 - archived (all 4 seasons) and recent (early spring) samples
 - **Statistical Tests**

- DX-500 & ICS-2000 method comparison study**
- Statistical Tests**
- 502 samples analyzed by DX-500 and ICS-2000 (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?
 - Paired T test for differences of means
 - Median absolute differences
 - Regression analysis for DX-500 vs. ICS-2000



NADP/NOS Spring 2005 Attachment 13



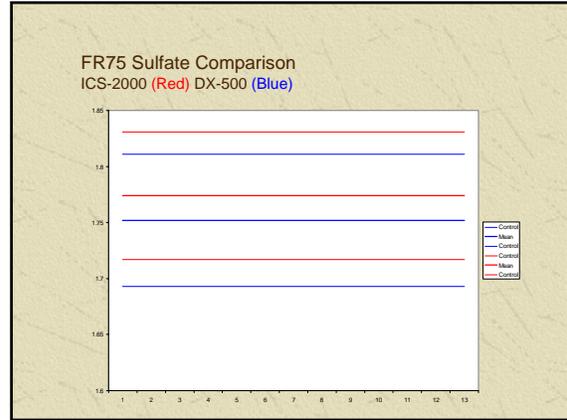
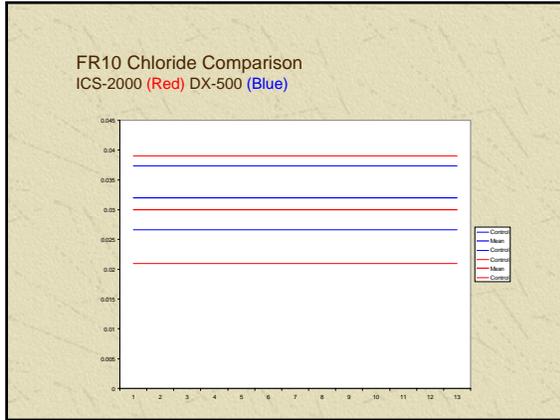
FR Control Charts for ICS-2000

05FR25 - new ICS2000						
Parameter	-Control	-Warning	Mean	+Warning	+Control	s
Cl ⁻	0.044	0.046	0.650	0.054	0.056	0.002
NO ₃ ⁻	0.537	0.548	0.570	0.592	0.603	0.011
SO ₄ ²⁻	0.476	0.483	0.497	0.511	0.518	0.007
n						20
n						21
n						21

05FR75 - new ICS2000						
Parameter	-Control	-Warning	Mean	+Warning	+Control	s
Cl ⁻	0.218	0.221	0.227	0.233	0.236	0.003
NO ₃ ⁻	1.751	1.766	1.796	1.826	1.841	0.015
SO ₄ ²⁻	1.717	1.736	1.774	1.812	1.831	0.019
n						20
n						20
n						20

05FR10 - new ICS2000						
Parameter	-Control	-Warning	Mean	+Warning	+Control	s
Cl ⁻	0.021	0.024	0.030	0.036	0.039	0.003
NO ₃ ⁻	0.264	0.269	0.279	0.289	0.294	0.005
SO ₄ ²⁻	0.213	0.215	0.219	0.223	0.225	0.002
n						11
n						12
n						12

NADP/NOS Spring 2005 Attachment 13



Percent Recovery for the ICS-2000

Sample ID	Measured Concentration DX-500/ICS-2000 (mg/L)	Calculated Concentration (mg/L)	Recovery	Recovery Range
			%	%
Cl⁻				
NZ9692SWMA08	0.252/0.251	0.264	105.2	101-111
NZ9748SWA21	1.155/1.178	1.181	100.3	99-101
NZ9784SWNC29	0.531/0.542	0.557	102.7	98-114
NZ9821SWTN11	0.031/0.032	0.027	85.8	63-110
NO₃⁻				
NZ9692SWMA08	0.531/0.528	0.552	104.6	101-108
NZ9748SWA21	0.346/0.352	0.366	103.8	97-108
NZ9784SWNC29	0.350/0.357	0.381	106.6	100-114
NZ9821SWTN11	0.372/0.389	0.374	96.2	91-104
SO₄²⁻				
NZ9692SWMA08	0.695/0.702	0.721	102.8	101-105
NZ9748SWA21	0.383/0.392	0.395	100.7	95-107
NZ9784SWNC29	0.845/0.869	0.890	102.4	101-105
NZ9821SWTN11	0.403/0.417	0.400	95.9	91-102

Organic and total nitrogen in NADP precipitation samples

NADP- CAL measures inorganic nitrogen (as nitrate and ammonium) in precipitation

Total nitrogen & organic nitrogen measured in selected samples since 2002 . Method involves an in-line digestion, and FIA analysis for N_{total}

$$(N_{total} - N_{inorganic} = DON)$$

Continuing to run TN on selected samples

SOPs, control charts, MDL established.

Ready for white paper or sites wanting to do special research projects.