National Atmospheric Deposition Program

Mercury Deposition Network

Mercury Analytical Laboratory
2004 Annual Quality Assurance Report

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In 2005, scientists, students, educators, and others interested in the National Atmospheric Deposition Program (NADP) logged more than 310,000 sessions and viewed nearly 93,000 maps on the NADP Web site. Users downloaded 18,564 data files from this site, which now annually receives more than 1.2 million hits. These data are used to address important questions about the impact of the wet deposition of nutrients on eutrophication in coastal estuarine environments; the relationship between wet deposition, the health of unmanaged forests, and the depletion of base cations from forest soils; the impact of pollutant emissions changes on precipitation chemistry; and the rate at which precipitation delivers mercury to remote lakes and streams.

The NADP was organized in 1977 under State Agricultural Experiment Station (SAES) leadership to address the problem of atmospheric deposition and its effects on agricultural crops, forests, rangelands, surface waters, and other natural and cultural resources. In 1978, sites in the NADP precipitation chemistry network first began collecting one-week, wet-only deposition samples analyzed by the Central Analytical Laboratory (CAL) at the Illinois State Water Survey. The network was established to provide data on amounts, temporal trends, and geographic distributions of the atmospheric deposition of acids, nutrients, and base cations by precipitation. The NADP initially was organized as SAES North Central Regional Project NC-141, which all four SAES regions endorsed as Interregional Project IR-7 in 1982. A decade later, IR-7 was reclassified as National Research Support Project NRSP-3, which it remains.

In October 1981, the federally supported National Acid Precipitation Assessment Program (NAPAP) was established to increase understanding of the causes and effects of acidic precipitation. This program sought to establish a long-term precipitation chemistry network of sampling sites distant from point source influences. Because of its experience in organizing and operating a national-scale network, the NADP agreed to coordinate operation of NAPAP's National Trends Network (NTN). To benefit from identical siting criteria and operating procedures and a shared analytical laboratory, NADP and NTN merged with the designation NADP/NTN. Many NADP/NTN sites were supported by the U.S. Geological Survey, NAPAP's lead federal agency for deposition monitoring. Under Title IX of the federal Clean Air Act Amendments of 1990, NAPAP continues. Today there are more than 250 sites in the network, and the network designation has been shortened to NTN.

In October 1992, the Atmospheric Integrated Research Monitoring Network (AIRMoN), currently with seven sites, joined the NADP. AIRMoN sites collect samples daily when precipitation occurs. Samples are refrigerated until analysis at the CAL for the same constituents measured in NTN samples. The AIRMoN seeks to investigate pollutant source/receptor relationships and the effect of emissions changes on precipitation chemistry, combining measurements with atmospheric models. The AIRMoN also evaluates sample collection and preservation methods.

In January 1996, the Mercury Deposition Network (MDN), currently with more than 90 sites, joined the NADP. MDN sites collect wet-only deposition samples that are sent to the MDN analytical laboratory at Frontier Geosciences, Inc. The MDN was formed to provide data on the wet deposition of mercury to surface waters, forested watersheds, and other receptors. Forty-five states and eight Canadian provinces have advisories against consuming fish from lakes with high mercury concentrations in fish tissues. MDN data enable researchers to investigate the link between mercury in precipitation and this problem.

The NADP receives support from the U.S. Geological Survey; Environmental Protection Agency; National Park Service; National Oceanic and Atmospheric Administration; U.S. Department of Agriculture - Forest Service; U.S. Fish & Wildlife Service; Tennessee Valley Authority; Bureau of Land Management; and U.S. Department of Agriculture - Cooperative State Research, Education, and Extension Service under agreement 2002-39138-11964. Additional support is provided by other federal, state, local, and tribal agencies, State Agricultural Experiment Stations, universities, and nongovernmental organizations. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the U.S. Department of Agriculture or any other sponsor.

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Definitions of Acronyms and Abbreviations

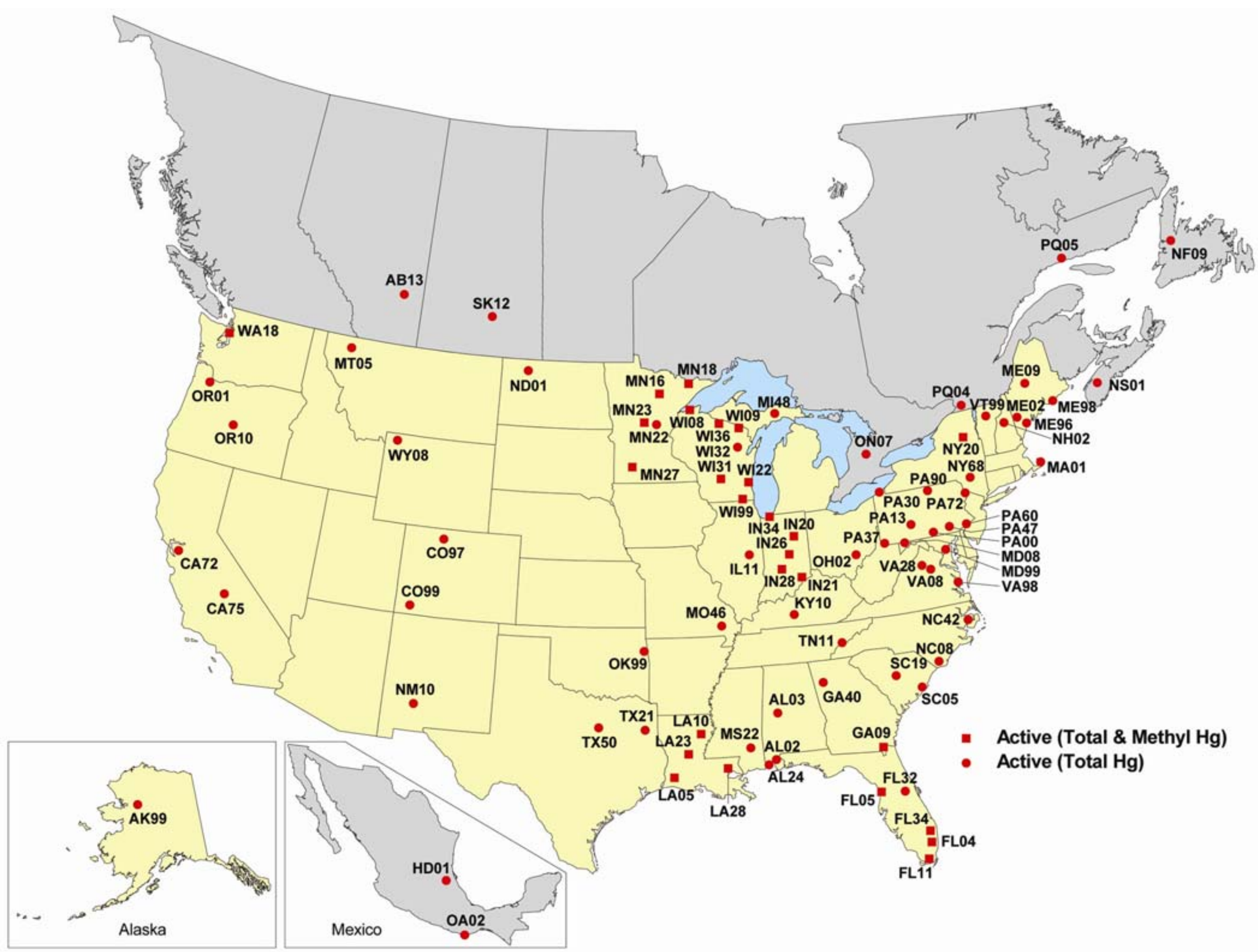
CAL	Central Analytical Lab
CCB	Continued Calibration Blank
CCV	Continued Calibration Verification
COC	Chain of Custody
CRM	Certified Reference Material
CVAFS	Cold Vapor Atomic Fluorescence Spectrometry
DQO	Data Quality Objectives
EMOF	Electronic Mercury Observer Form
HAL	Mercury (Hg) Analytical Lab
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
MD	Matrix Duplicate
MDL	Method Detection Limit
MDN	Mercury Deposition Network
MOF	Mercury Observer Form
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NADP	National Atmospheric Deposition Program
NED	Network Equipment Depot
PB	Preparation Blanks
PE	Performance Evaluation
PT	Proficiency Test
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Plan
QR	Quality Rating Code
RL	Reporting Limit
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SRM	Standard Reference Material

1. Introduction

Since January 1996, Frontier GeoSciences Inc. (FGS) has served as the Mercury Analytical Laboratory (HAL) and Site Liaison Center for the Mercury Deposition Network (MDN). MDN, coordinated through the National Atmospheric Deposition Program (NADP), was designed with the primary objective of quantifying the wet deposition of mercury in North America to determine long-term geographic and temporal distributions. MDN has grown to incorporate over 87 sites in the United States, Canada, and Mexico. In 2005, MDN is expected to incorporate 10-15 additional new sites.

As HAL, FGS receives weekly precipitation samples to be analyzed for total mercury. HAL also analyzes samples for methylmercury from selected sites participating in the methylmercury program. The analytical technique — Modified EPA Method 1631 Revision B — was developed by Nicolas S Bloom, one of FGS' founders. FGS also served as the referee lab for the Method 1631 final validation study.

Robert Brunette, Principle Investigator and HAL Director, oversees FGS's involvement in MDN. He serves as the HAL contact for the multiple agencies currently sponsoring MDN. His multiple roles require him to provide guidance and direction to all HAL staff and to maintain his proficiency in all aspects of HAL activities, including MDN site selection and equipment installation, MDN equipment troubleshooting, field and laboratory training, analysis and report writing, as well as research on new MDN initiatives including Trace Metals (in addition to mercury) in Wet Deposition.



Mr. Brunette is assisted by Gerard Van der Jagt - the MDN Group Leader, and an analytical laboratory staff skilled in processing incoming samples, analyzing sample sets, cleaning glassware, shipping weekly field equipment, and entering data. Senior Research Scientist, Eric M. Prestbo, serves as a Science Advisor for HAL, and helps support MDN related research initiatives. The Project Investigator also works closely with FGS' Laboratory Manager, Eric Wyse and FGS' Quality Assurance Program Director, Carl Hensman Ph.D., to ensure that all Quality Control (QC) parameters are consistently maintained, and that FGS' standards of professional and scientific quality are met.

FGS continued to maintain and demonstrate acceptable quality control in 2004. Due to the addition of new MDN sites, the number of quality control points increased from 1,214 in 2003, to more than 1,500 quality control measurements in 2004. FGS demonstrated consistency and reproducibility in bottle blanks, preparation blanks, certified reference materials, matrix duplicates, and matrix spikes. All of these parameters are plotted control charts in this report.

Outlook

The MDN continues to gain attention as the largest and longest-running national mercury wet deposition network in North America. Feedback from sponsors and other interested organizations indicates that MDN will experience significant growth in 2005-2006. With this growth, HAL will continue to look for ways to improve the program to ensure the highest quality. The following are goals HAL has set to maintain and improve quality throughout 2005-2006:

- HAL will continue to improve our database in 2005.
- HAL and the NADP Program Office incorporated dual data entry verification to all database operations.
- HAL will continue trace metals in wet deposition research in 2005. There is a strong indication that there are many sponsors that will want to participate in a combined mercury and trace metals program. In 2004, five MDN sites were collecting samples for trace metals following HAL's retrofit and trace metal standard operating procedures.
- HAL research in dry deposition of mercury and trace metals in sites in the southern U.S. will continue, likely through 2005. HAL expects this research to lay the groundwork for a potential non-NADP product for interested MDN sponsors.

2. Quality Assurance

2.1. Philosophy and Objectives

Frontier GeoSciences Inc. (FGS) is committed to a rigorous quality assurance program and philosophy. Quality control begins at the bench level. Process improvements are solicited from laboratory technicians and analysts. Management implements the improvements. The Quality Assurance program is a system for ensuring that all information, data, and interpretation resulting from an analytical procedure are technically sound, statistically valid, and appropriately documented.

HAL data quality is assessed against FGS' Data Quality Objectives (DQO). Our DQOs consist of five components: precision, accuracy, representativeness, comparability, and completeness.

- *Precision* is a measure of data reproducibility. HAL assesses analytical precision using matrix duplicates. The acceptance criterion for matrix duplicates is ≤ 25 RPD.
- *Accuracy* is a measure of how close experimental data is to a "true" value. HAL assesses accuracy using certified reference materials and matrix spikes. The acceptance criterion for reference materials and matrix spikes is 75-125% recovery.
- *Representativeness* is a measure of how typical a sample is compared to the sample population. It is achieved by accurate, artifact-free sampling procedures and appropriate sample homogenization.
- *Comparability* is a measure of how variable one set of data is to another. Control charts enable HAL to assess comparability over the course of an ongoing monitoring project such as MDN.
- *Completeness* is measured by the number of usable data points compared to the number of possible data points. HAL DQO for MDN project is at least 95% completeness.

2.2. Method Detection Limits

Method detection limit (MDL) studies are maintained for most matrix/analyte combinations available at FGS. Studies are performed using the protocols in 40 CFR, Section 136, Appendix A. Specifically; seven or more low-level, matrix-specific spikes are processed according to preparation and analytical method protocols. MDL is determined as t*SD of the replicates (where t is the Student's T-value for the number of replicates and SD is the standard deviation). The HAL updates MDL studies periodically for the MDN project. See Appendix A for the latest MDL study results.

2.3. Accreditations

FGS currently holds certifications through departments in eight states: the California Department of Health, the Florida Department of Health, the Louisiana Department of Environmental Quality, the Minnesota Department of Health, the New Jersey Department of Environmental Protection, the New York Department of Health, the Washington Department of Ecology, and the Wisconsin Department of Natural Resources. The Florida Department of Health acts as FGS' primary accreditor under the National Environmental Laboratory Accreditation Program (NELAP).

3. Quality Control

Quality Control (QC) samples each have an expected target value that can be used to objectively assess preparation and analytical method performance. If performance on these known samples is acceptable, client sample results and other *unknowns* are assumed to be acceptable, as well. Conversely, unacceptable QC results require immediate troubleshooting and re-assessment of affected sample results. The HAL utilizes eight types of QC samples for the MDN project: laboratory bottle blanks, preparation blanks, ongoing calibration standards, ongoing calibration blanks, matrix duplicates, matrix spikes, certified reference materials, field blanks, and system blanks.

3.1. Laboratory Bottle Blanks

3.1.1. Description

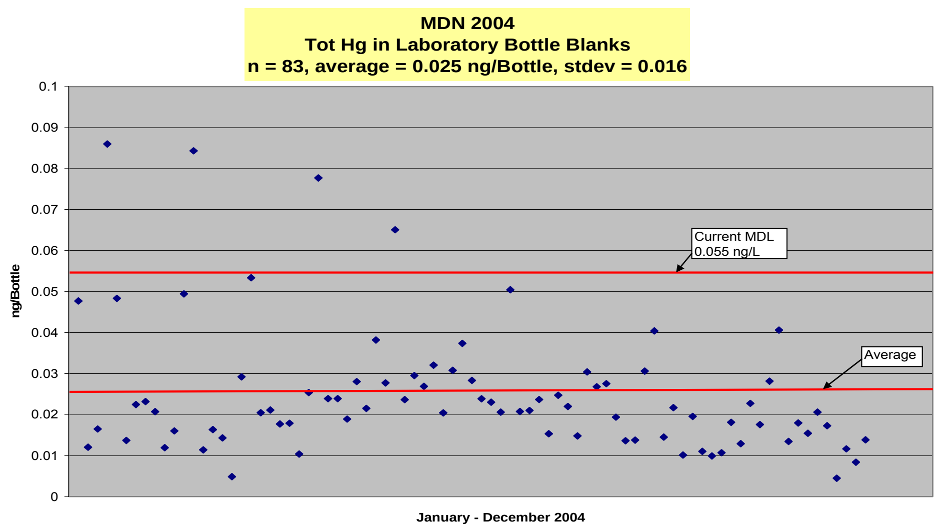
Following cleaning, HAL bottles are charged with 20mL of 1% hydrochloric acid. A random selection of these bottles is then analyzed for total mercury.

3.1.2. Purpose

Even in an ultra-clean laboratory, mercury exposure is inherent to the handling of MDN sample bottles. Because such contamination is inevitable, it must be analyzed and quantified so that it can be objectively subtracted from final sample results.

3.1.3. Discussion

In 2004, the mean of 83 laboratory bottle blanks was 0.025ng/bottle with a standard deviation of 0.016ng/bottle. In 2004, four laboratory bottle blanks were higher than MDL. Laboratory bottle blanks are expected to be at or near MDL. In cases where the blanks are significantly higher, the situation is investigated. Possible contamination sources are researched and identified. Once the contamination has been isolated and corrected, the run is continued.



3.2. Preparation Blanks

3.2.1. Description

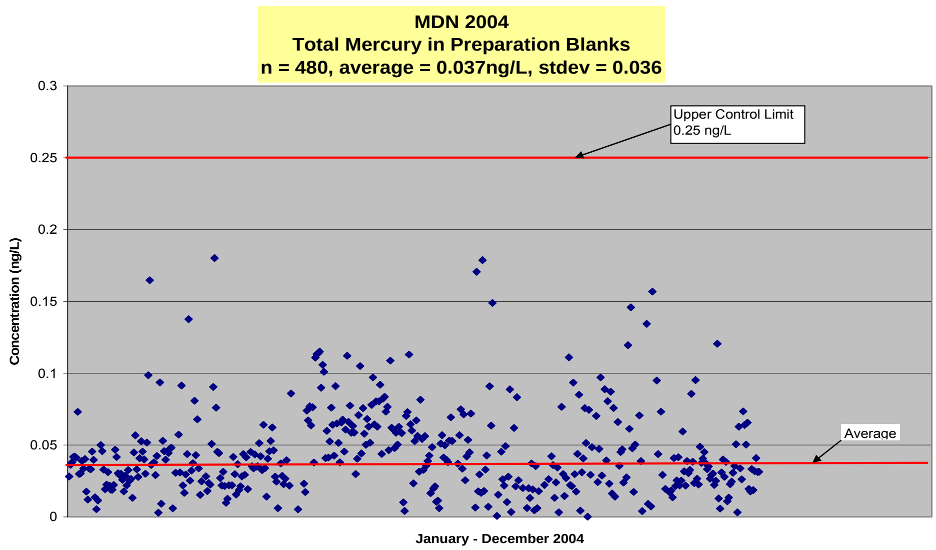
Preparation blanks for total mercury consist of 1% (v/v) 0.2N bromine monochloride, 0.2mL 20% hydroxylamine hydrochloride, and 0.3mL 20% stannous chloride in 100mL of reagent water. Preparation blanks for methylmercury consist of hydrochloric acid, APDC solution, ethylating agent, acetate buffer, and reagent water.

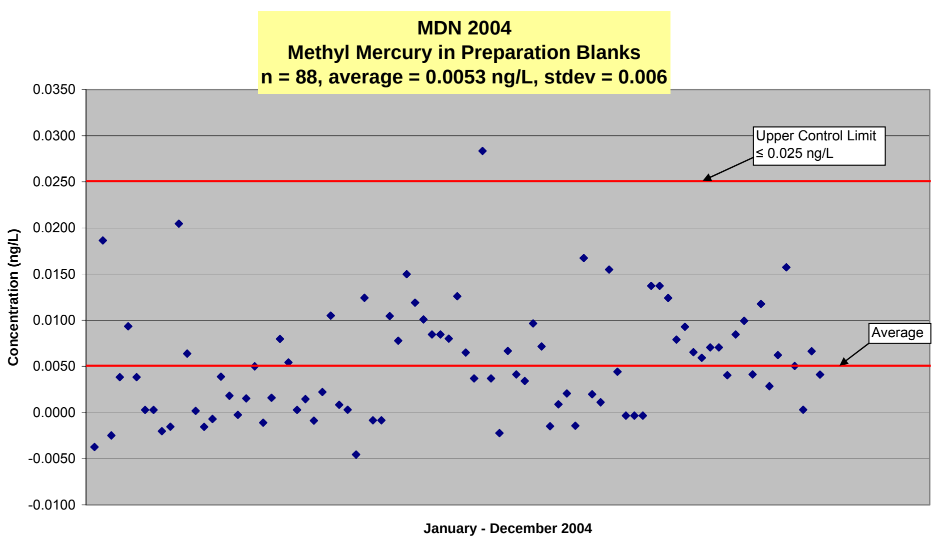
3.2.2. Purpose:

Mercury content is inherent even in FGS' preparatory and analytical reagents. Preparation blanks are a measure of how much of each sample result can be attributed to these necessary reagents. Preparation Blanks also help when investigating possible sources of contamination.

3.2.3. Discussion

In 2004, the mean for total mercury of 480 preparation blanks was 0.037ng/L with a standard deviation of 0.036ng/L. In 2004, no preparation blanks for total mercury were above the control limit of 0.25ng/L. In 2004, the mean for methylmercury of 87 preparation blanks was 0.0053ng/L with a standard deviation of 0.006ng/L. In 2004, one preparation blank for methylmercury was above the control limit of 0.025ng/L.





3.3. Ongoing Calibration Standards

3.3.1. Description

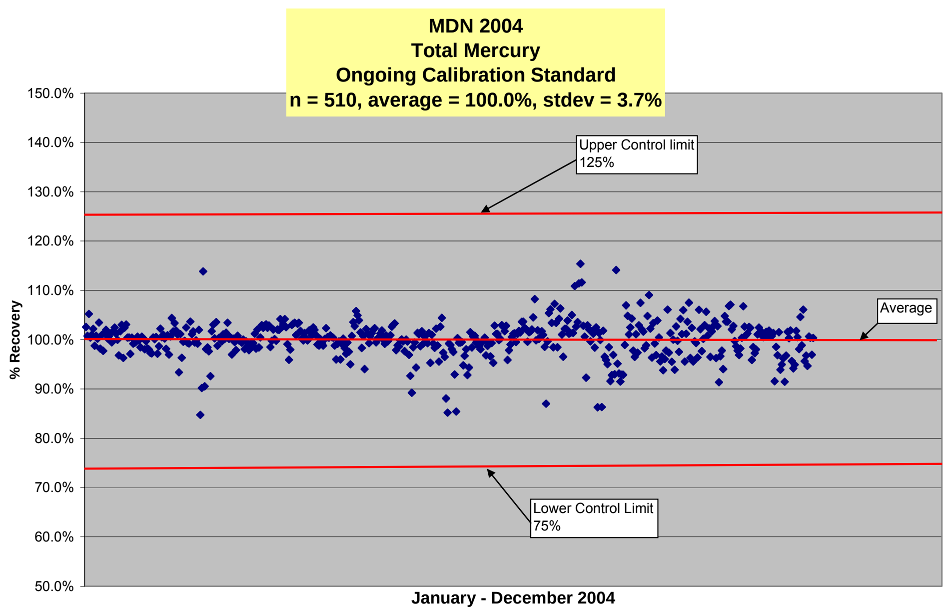
Ongoing calibration standards are continuously analyzed during the course of sample analysis, typically after a suite of ten samples and at the end of each analytical day. A 1.0ng standard for total mercury and a 0.1ng standard for methylmercury are typically analyzed as an ongoing calibration standard.

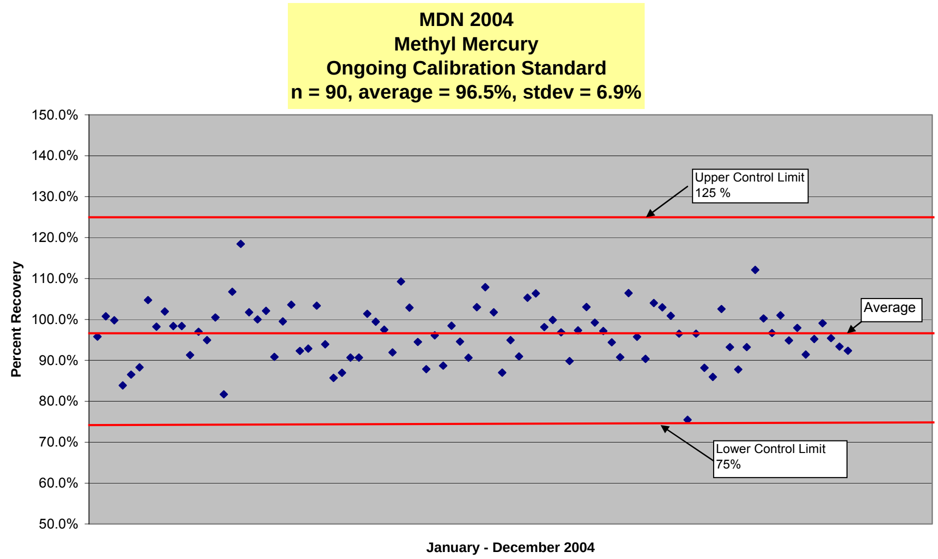
3.3.2. Purpose

Ongoing calibration standards verify that the analytical system is in control. All total mercury standard solutions are traceable to certified standards or manufacturer lot number. Currently there is no commercial available methylmercury standard. All raw data references a unique laboratory ID number for associated standards. This ID may then be traced through the standards logbooks to the original shipment, container, and certification.

3.3.3. Discussion

In 2004, the mean of 510 ongoing calibration standard recoveries for total mercury was 100.0% with a standard deviation of 3.7%. In 2004, no ongoing calibration standards were out statistical control. In 2004, the mean of 90 ongoing calibration standard recoveries for methylmercury was 96.5% with a standard deviation of 6.9 %. There were no ongoing calibration standard recoveries for the MDN project in 2004 that were out of statistical control.





3.4. Ongoing Calibration Blanks

3.4.1. Description

Ongoing calibration blanks are continuously analyzed during the course of sample analysis, typically after a suite of ten samples and at the end of each analytical day.

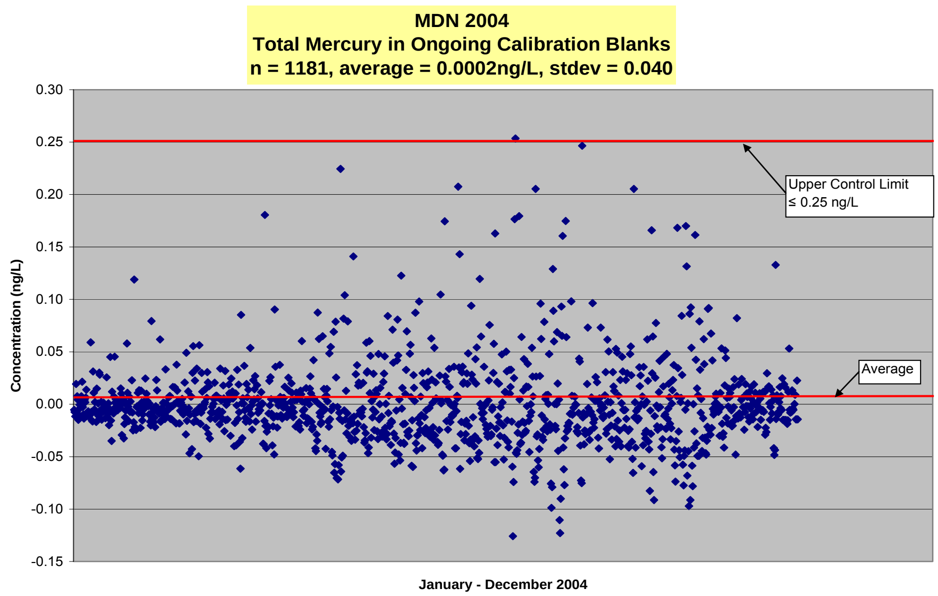
3.4.2. Purpose

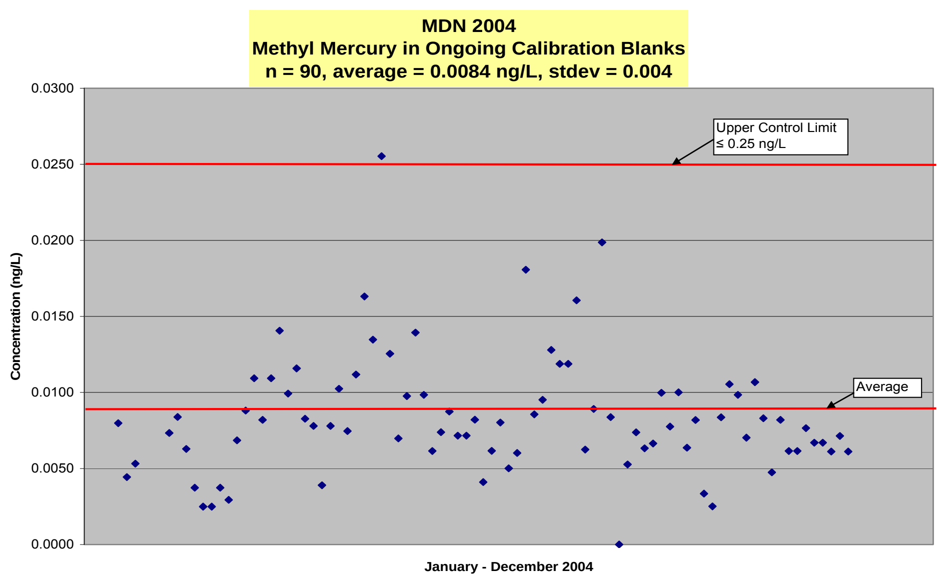
Instrument blanks are used to demonstrate freedom from system contamination, carryover, and to monitor baseline drift.

3.4.3. Discussion

In 2004, the mean concentration of 1181 ongoing calibration blanks for total mercury was 0.0002ng/L with a standard deviation of 0.040. There was one ongoing calibration blank for the MDN project in 2004 that was above the upper control limit (0.25ng/L). In 2004, the mean concentration of 90 ongoing calibration blanks for methylmercury was 0.0084ng/L with a standard deviation of 0.004. There was one ongoing calibration blank for methylmercury that was above the upper control limit (0.025ng/L).

Ongoing calibration blanks are expected to be at or near MDL. In cases where the blanks are significantly higher, the situation is investigated. Possible contamination sources are researched and identified. Once the contamination has been isolated and corrected, the run is continued.





3.5. Matrix Duplicates

3.5.1. Description

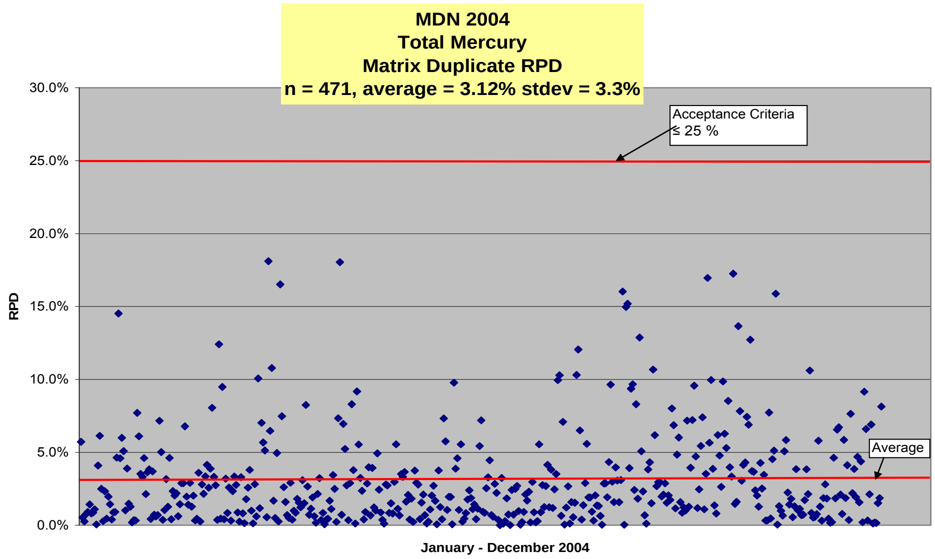
Matrix duplicates are created when an existing sample is split into two portions that can then be compared analytically.

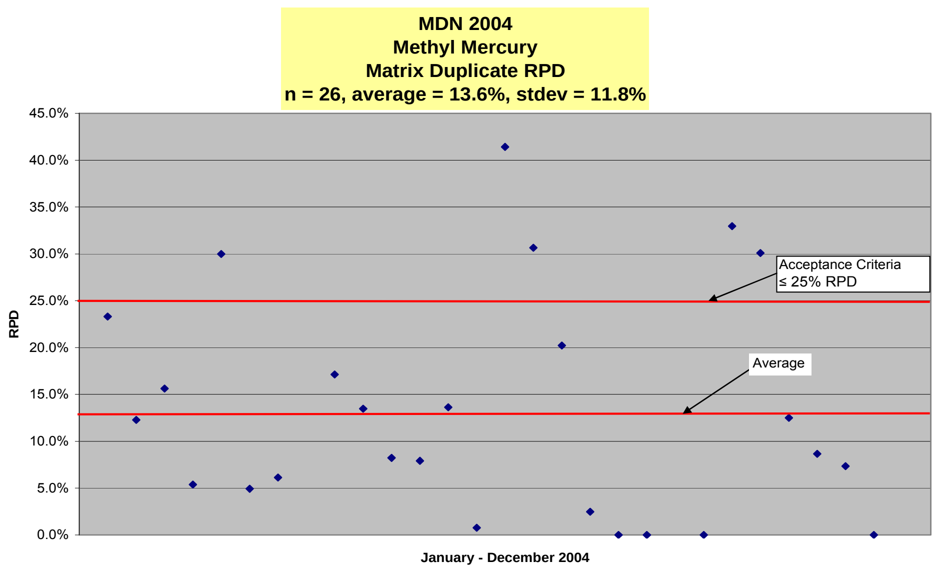
3.5.2. Purpose

As there is no theoretical difference between a pair of matrix duplicates, their relative percent difference (RPD) is expected to be less than 25%. Out of control results are indicative of a heterogeneous sample matrix and/or poor analytical precision.

3.5.3. Discussion

In 2004, the mean RPD of 471 matrix duplicate pairs for total mercury was 3.12% with a standard deviation of 3.3%. This low mean reflects the homogeneous nature of the MDN sample matrix, as well as the analytical precision of HAL. In 2004, the mean RPD of 26 matrix duplicate pairs for methylmercury was 13.6 % with a standard deviation of 11.8%. Several RPDs were above the 25% RPD acceptance level. However, all of these matrix duplicates concentrations were less than or equal to five times MDL. At such low concentrations, variability is expected to increase. Therefore, the larger RPD values at low concentrations are not of concern. No corrective action was taken.





3.6. Matrix Spikes

3.6.1. Description

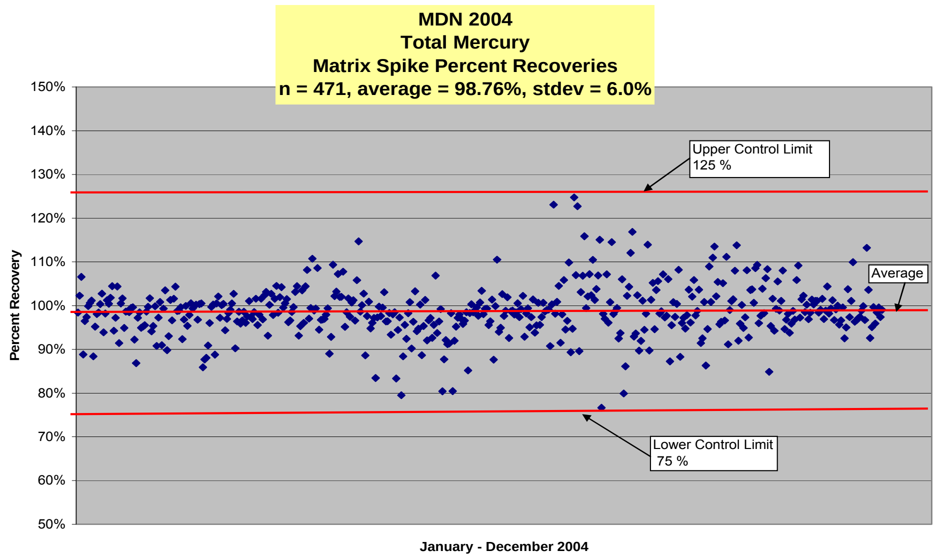
A matrix spike is created when an MDN sample with known mercury content is supplemented with an additional 1.00ng of mercury standard.

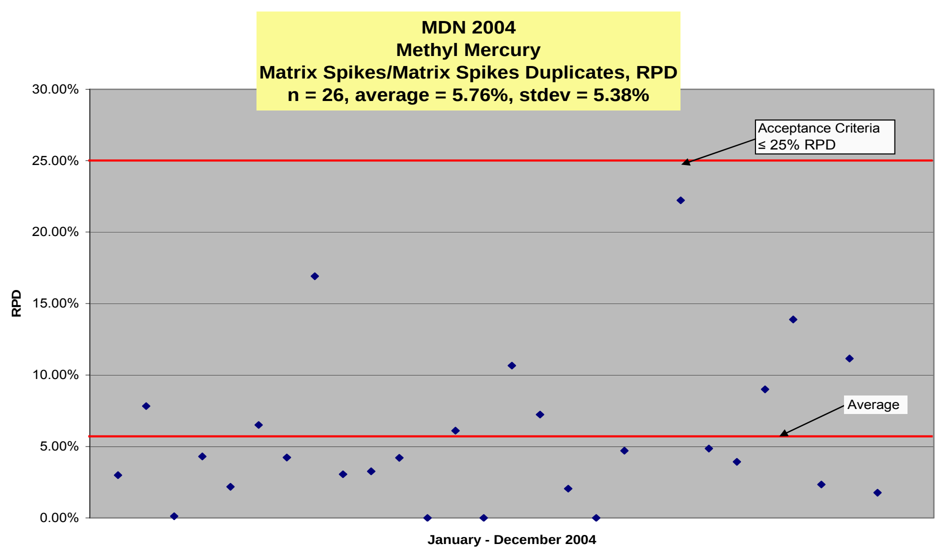
3.6.2. Purpose

As the combined mercury content of the matrix spike sample is known in theory, matrix spike recoveries are expected to be within 75% and 125% of this theoretical value. Matrix spike recoveries determine if, and how, the sample matrix interferes with target analyte recovery. They also ensure that HAL's preparation and analytical procedures do not result in significant analyte losses.

3.6.3. Discussion

In 2004, the mean of 471 matrix spike recoveries for total mercury was 98.76% with a standard deviation of 6.0%. There were no unacceptable matrix spike recoveries for the MDN project in 2004. This is indicative of a chemically passive sample matrix, as well as good analytical accuracy. Had any Matrix Spikes fallen outside the 75%-125% control limits, involved samples would have been rerun to investigate possible matrix interference. In 2004, the mean RPD of 26 matrix spike/matrix spike duplicates for methyl mercury was 5.76% with a standard deviation of 5.38%. No matrix spike/matrix spike duplicate RPD was above the acceptance criteria.





3.7. Certified Reference Materials

3.7.1. Description

Certified reference materials are commercially available samples containing known quantities of analyte in a specific matrix. Currently, there is no available Reference Material matching the MDN rainwater matrix. Instead, HAL uses National Institute of Standards and Technology

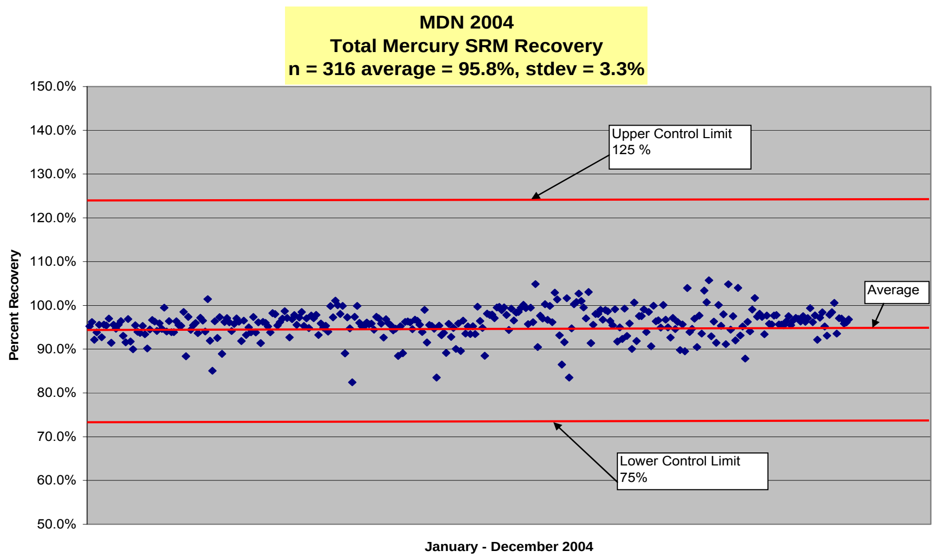
Reference Material 1641d – Total Mercury in Water. For methylmercury, HAL uses National Research Council Canada Reference Material DORM-2.

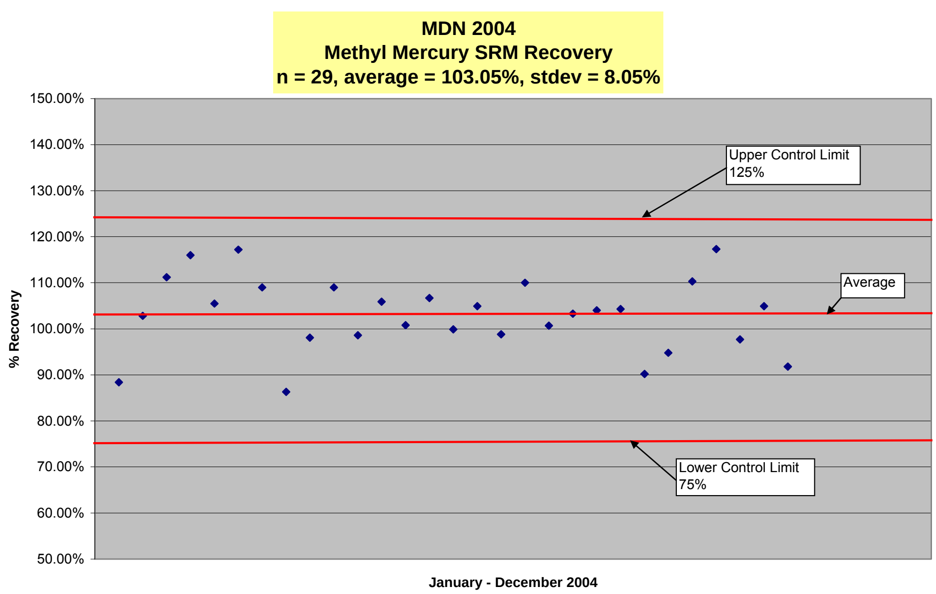
3.7.2. Purpose

Certified reference materials are used to demonstrate HAL's ability to recover a target analyte from a specific matrix. They are also a secondary source for verifying the validity of the analytical curve.

3.7.3. Discussion

In 2004, the mean of 316 certified reference material recoveries for total mercury was 95.8% with a standard deviation of 3.5%. For methylmercury, the mean of 29 certified reference material recoveries was 103.05% with a standard deviation of 8.05%. In 2004, there were no recoveries outside the control limits for total and methylmercury. Failing recoveries are immediately rerun to ensure that the analytical failure is isolated rather than systemic.





4. Calculations

Calculations have been color-coded in instances where results become variables in subsequent calculations.

4.1. Calculation: Gross MDN Sample Concentration

{(Sample PA - Ave BB) / Slope} - {(Aliquot * BrCl RB) / 100} = ng Hg/aliquot (mL)

Sample PA = sample peak area (PA units)
Ave BB = average bubbler blank (PA units)
Slope = slope (PA units/ng)
Aliquot = volume of sample analyzed (mL)
BrCl RB = BrCl reagent blank value (ng/mL of preservative)
1/100 = correction for 1% preservation concentration

4.2. Calculation: Net MDN Sample Concentration

ng Hg/aliquot (mL) * mL / Sample Bottle = ng Hg/Sample Bottle

ng Hg/Sample Bottle – ng Hg/Quarterly Bottle Blank = net ng Hg/Sample Bottle

net ng Hg/Sample Bottle * (Sample Bottle / mL) * 1000 = net ng Hg/L

4.3. Calculation: MDN Deposition

(net ng Hg/L) * (precip vol (mL) / 120.0cm^2) * (1/1000mL) * (10000cm^2/m^2) = (ng/m^2)

Alternatively, because there are 10000 cm^2 in 1m^2:

(net ng Hg/L) * (precip vol (mL) / 120.0cm^2)*10 = (ng/m^2)

120.0cm^2 = Area of MDN Funnel
Precip volume (mL) = Precipitation Volume — see below

The standard rain gauge (Belfort) is used for the precipitation volume when the rain gauge data has passed Quality Assurance.

Precip volume (Rain Gauge (mL)) = Inches of Rain (rain gauge) * (825mL / Inch Belfort)

When the standard rain gauge (Belfort) has not passed Quality Assurance, we use the Bottle Catch to calculate deposition (as long as the Event Recorder shows that the collector worked properly).

Precip volume (Bottle Catch (mL)) = Total mL of sample captured in MDN Sample Bottle minus 20mL preservative

5. Analytical Run Sequence

HAL routinely includes the aforementioned QC samples in all of its analyses for the MDN project. The following bench sheet shows how these samples are arranged within a typical analysis day. For every set of ten samples analyzed, the sample set is preceded and superceded with a matrix duplicate, a matrix spike, ongoing calibration standard, and an ongoing calibration blank. In addition, after the twentieth sample an additional reference material sample is analyzed.

MDN Precipitation Sample Analysis Lab Sheet

FGS DATA SET ID:
MDN LAB DATA SET CODE:
Analysis Date:
Analyzer:
Analyst:
REVIEWER:
DATE:

Analytical Run
D=Duplicate Analysis
Trap Set:
S=Sample Spike @ 1.00ng

Run	Tp	Bub	HAL Code	Sample ID	PA	% BrCl	Aliquot Volume	THg per Aliquot	THg Conc (Net)	Remarks
1	1	1		4.00 ng						
2	2	2		2.00 ng						
3	3	3		1.00 ng						
4	4	4		0.50 ng						
5	5	1		0.05 ng						
6	6	2		BB-1						
7	7	3		BB-2						
8	8	4		BB-3						
9	9	1		NIST1641d		2				
10	10	2		BrCl-1						
11	1	3		BrCl-2						
12	2	4		BrCl-3						
13	3	1		BB-4						
14	4	2		Sample #1						
15	5	3		Sample #1 D						
16	6	4		Sample #1 S						
17	7	1		Sample #2						
18	8	2		Sample #3						
19	9	3		Sample #4						
20	10	4		Sample #5						
21	1	1		Sample #6						
22	2	2		Sample #7						
23	3	3		Sample #8						
24	4	4		Sample #9						
25	5	1		Sample #10						
26	6	2		1.00						
27	7	3		BB-5						
28	8	4		Sample #11						
29	9	3		Sample #12						
30	10	4		Sample #13						
31	1	1		Sample #14						
32	2	2		Sample #15						
33	3	3		Sample #16						
34	4	4		Sample #17						
35	5	1		Sample #18						
36	6	2		Sample #19						
37	7	3		Sample #20						
38	8	4		Sample #11 D						
39	9	3		Sample #11 S						
40	10	4		1.00						
41	1	1		BB-6						
42	2	2		NIST1641d						
43	3	3		Sample #21						
44	4	4		Sample #22						
45	5	1		Sample #23						
46	6	2		etc…						
47	7	3								
48	8	4								
49	9	1								
50	10	2								
51	1	3								
52	2	4								
53	3	1		Sample #21 D						
54	4	2		Sample #21 S						
55	5	3		1.00						
56	6	4		BB-7						

Key
Reference materials
Preparation blanks
Matrix duplicates
Matrix spikes
Ongoing calibration
Ongoing calibration

6. Proficiency Tests and Laboratory Intercomparisons

Proficiency tests (PT) and laboratory intercomparisons are an important part of the Quality Assurance Program. Each year, FGS completes at least four PTs representing a suite of trace metals in wastewater and solid waste matrices. While these studies are a requirement of accreditation, they are also a valuable tool for internal quality control.

6.1. Proficiency Tests

The following proficiency tests were completed by HAL during 2004. Results for these tests are available upon request.

Table 1

Non-Potable Water / Solid and Hazardous Waste Proficiency Study	New York Department of Health	01/2004
Water Pollution January 2004	Analytical Products Group	01/2004
Water Pollution June 2004	Analytical Products Group	06/2004
Water Pollution August 2004/DMR-QA 24	Analytical Products Group	08/2004
Non-Potable Water / Solid and Hazardous Waste Proficiency Study	New York Department of Health	07/2004

6.2. Laboratory Intercomparisons

HAL participates in a U.S. Geological Survey PE sample laboratory intercomparison program. This program is coordinated by the USGS.

FGS is also an invited participant in several domestic and international laboratory intercomparisons each year. Many intercomparison participants are fellow world leaders in mercury and trace metals analysis. While functionally similar to PTs, these studies often involve more complex matrices or additional analytes and while project-specific intercomparison studies are helpful for assessing interlaboratory comparability, they do not necessarily address individual laboratory accuracy, and are not designed to function as third party validation. For these reasons although FGS does provide proficiency test study results, clients are not provided with intercomparison study results.

The following laboratory intercomparison studies were completed by HAL during 2004.

Table 2

Trace Elements in Surface Waters and Total Mercury Study 83 Winter 2003	National Water Research Institute	01/2004
17th Intercomparison for Metals in Marine Sediments & Biological Tissues	National Research Council — Canada	06/2004
Standard Reference Sample Spring 2004	United States Geological Survey	02/2004
Trace Elements in Surface Waters: Study FP84	National Water Research Institute — Canada	06/2004
Mercury Round Robin HgRR5	Florida Department of Environmental Protection	08/2004
Standard Reference Sample Fall 2004	United States Geological Survey	10/2004
Trace Elements in Surface Waters and Total Mercury Study 85 Winter 2004	National Water Research Institute	12/2004

7. Field Quality Control

7.1. Field Bottle Blanks

7.1.1. Description

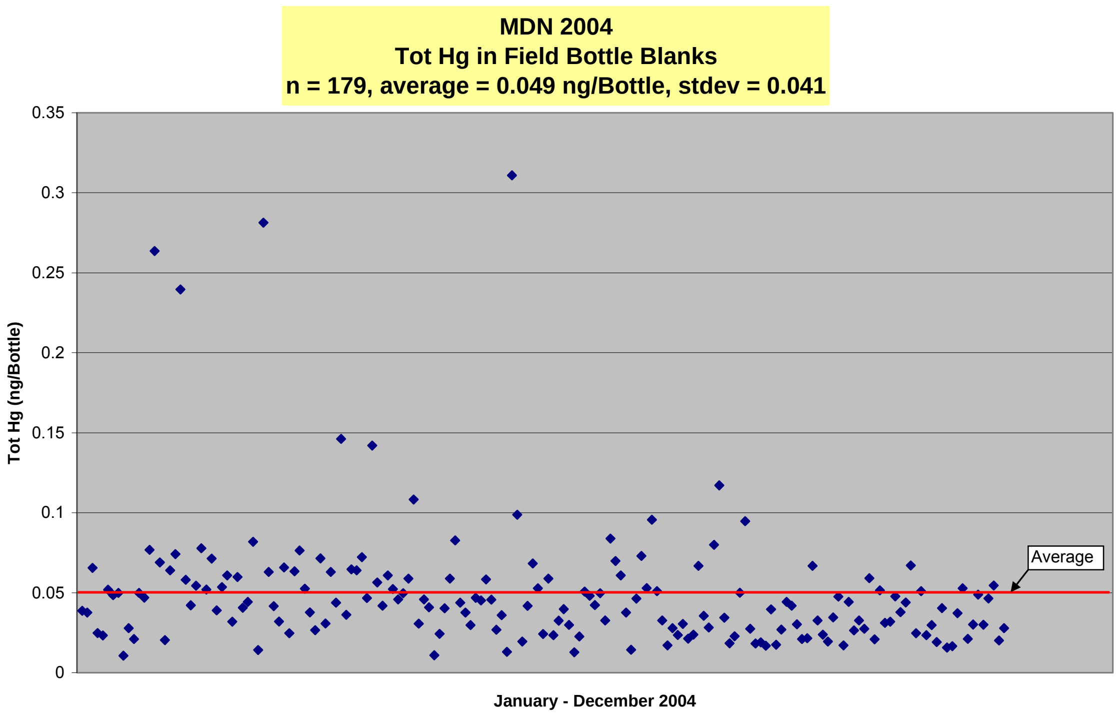
A field bottle blank has the same contents as a laboratory bottle blank. However, this blank is left exposed at the sampling site for the entire collection period without any collector openings. All field bottle blanks that maintain at least 15mL of the initial 20mL1% hydrochloric acid charge are then analyzed for total mercury.

7.1.2. Purpose

Outside of the controlled laboratory environment, ambient mercury levels increase and additional sample handling occurs. Because such contamination sources are inevitable, their contributions must be quantified so that they can be objectively subtracted from final sample results.

7.1.3. Discussion

In 2004, the mean of 179 Field Bottle Blanks was 0.049ng/bottle with a standard deviation of 0.041ng/bottle. This suggests that the MDN aerochem collector protects the sample train and bottle well and the field exposure is minimal.



7.2. Field System Blanks

7.2.1. Description

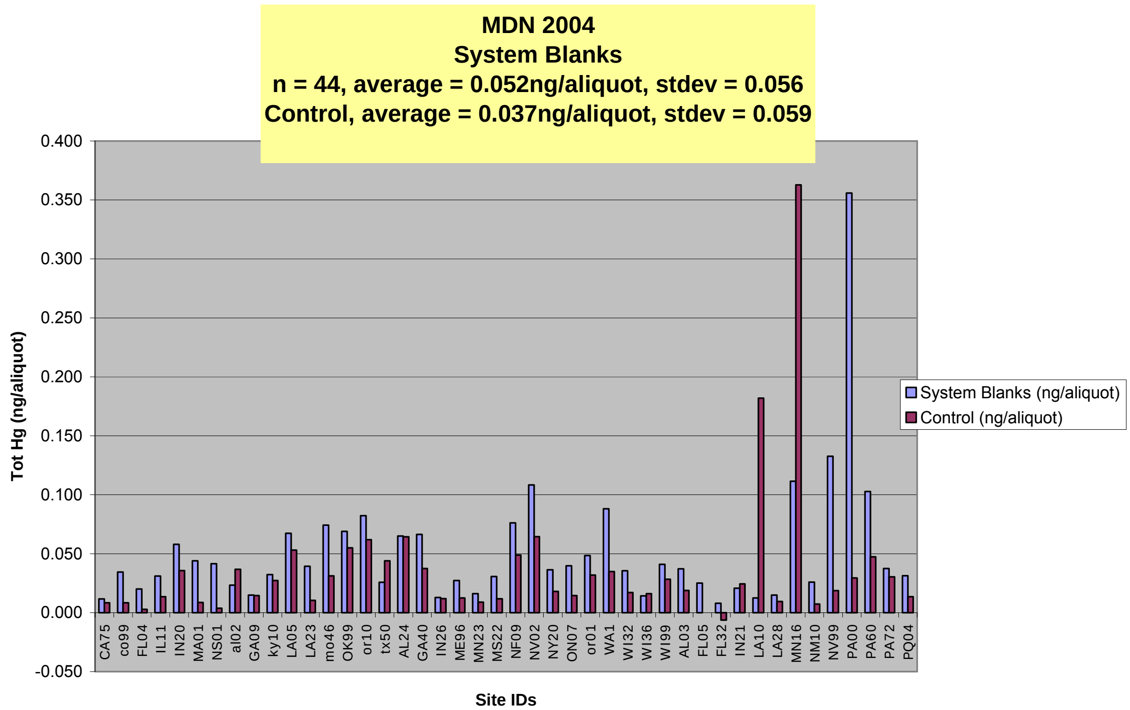
A field system blank is essentially a field bottle blank in which a solution is poured through the wet side collection sample train that was installed in the field for an entire week with no precipitation.

7.2.2. Purpose

This quality assurance program, conducted jointly by the U.S. Geological Survey and FGS, is intended to measure the effects of field exposure, handling, and processing on the chemistry of MDN precipitation samples.

7.2.3. Discussion

In 2004, the mean of 44 system blanks was 0.052ng/aliquot with a standard deviation of 0.056ng/aliquot. This again suggests that the MDN sample train is well protected.



8. Quality Rating Codes

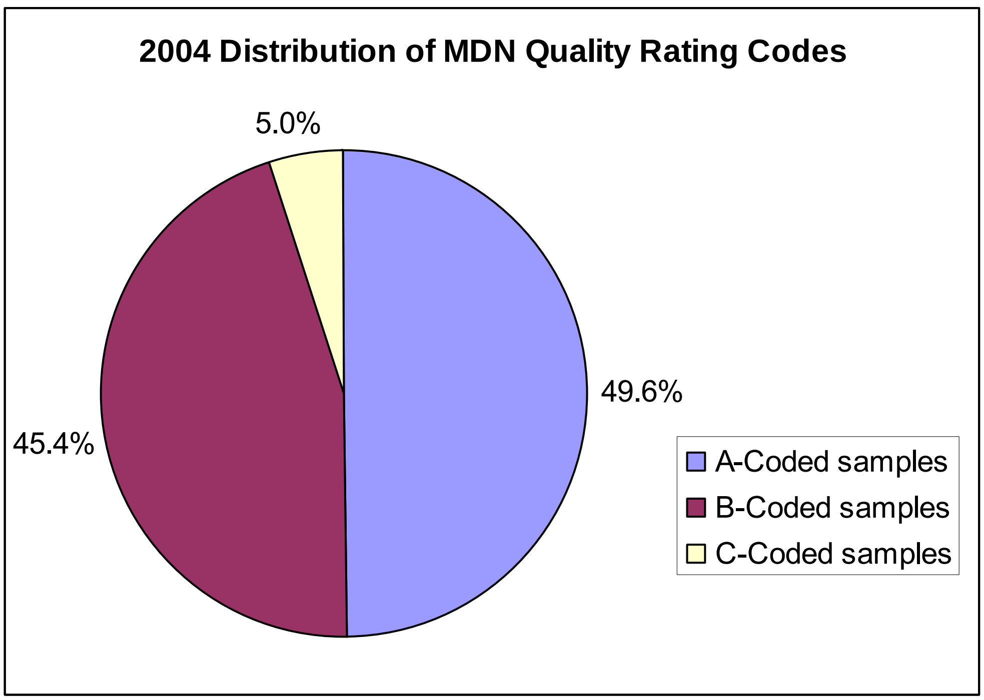
The quality rating code (QR) is designed as a user-friendly method to indicate the overall quality of each individual MDN data value. The MDN QR is modeled directly from the NADP AirMon QR. The QR code is what the general user of the final database will use in the evaluation of MDN data. This QR code is assigned by the computer program based on the results of the notes codes given to each MDN sample. A general description of each code follows.

A. Valid samples with no problems; contained only water; all sampling and laboratory protocols were followed; all required equipment was installed and operating properly.

B. Valid samples with minor problems; may have contaminants such as insects or other debris; there may be an exception to approved sampling or laboratory methods; required equipment may be lacking or not operating properly. The laboratory does not consider these problems sufficient to invalidate the data, but there is more uncertainty than for A data. These data are used along with A data to calculate average concentrations and deposition.

C. Invalid samples; major problems occurred; the laboratory does not have confidence in the data.

The HAL processed 4628 samples in 2004. 2297 samples received a QR code of A, 2100 received a B QR code, and 231 received a C QR code. FGS continued to maintain and demonstrate acceptable quality control in 2004.



Appendix A

Matrix Specific MDL Studies

Matrix Specific MDL Study 1

Objective Determine the method detection limit (MDL) for total mercury in water using preservation method FGS 012 and analysis method FGS 069, and following the protocols outlined in 40 CFR 136. As detailed below, the MDL for total mercury in water was determined to be 0.096ng/L.

Analytical Method A calibration was performed according to FGS 069. Briefly, this method incorporates oxidation with the addition of BrCl, reduction of mercury in the sample aliquot with $SnCl_2$, analysis by purge and trap and dual amalgamation CVAFS. The MDL study consisted of the analysis of nine replicates of a waters sample spiked with 0.5ng/L mercury oxidized with 1% BrCl. The results of these measurements are found in the table below, as well in the raw data sheets (ID # THg9-050331-1). All results are reported uncorrected for the method blanks.

MDL Calculation Using 40 CFR 136, the MDL was calculated using the standard deviation of the spiked samples, with n=10 replicates (9 degrees of freedom). In this case, the t value of 2.821 was used in the following equation, where s is the standard deviation of the results obtained on samples spiked at a level near the MDL.

$$MDL = t*s$$

The MDL calculated from these data is (2.821)*(0.034), or 0.096ng/L.

Total Mercury in Water (THg) MDL Study (CVAFS #9)
March 31, 2005

Sample		**THg (ng/L)**	**%Rec**
method blank #1		0.039	-
method blank #2		0.018	-
method blank #3		0.030	-
	Mean	0.029	-
	SD	0.011	-
IPR-1(5.0 ng/L)		5.044	100.9
IPR-2(5.0 ng/L)		4.995	99.9
IPR-3(5.0 ng/L)		5.173	103.5
IPR-4(5.0 ng/L)		5.144	102.9
	Mean	5.089	101.8
	SD	0.084	1.7
MDL-1 (0.5 ng/L)		0.510	102.0
MDL-2 (0.5 ng/L)		0.601	120.2
MDL-3 (0.5 ng/L)		0.480	96.0
MDL-4 (0.5 ng/L)		0.511	102.2
MDL-5 (0.5 ng/L)		0.521	104.2
MDL-6 (0.5 ng/L)		0.524	104.8
MDL-7 (0.5 ng/L)		0.492	98.4
MDL-8 (0.5 ng/L)		0.479	95.8
MDL-9 (0.5 ng/L)		0.478	95.6
MDL-10 (0.5 ng/L)		0.511	102.2
	Mean	**0.511**	**102.1**
	SD	**0.034**	**6.9**
NIST 1641d		**16.167**	**101.0**
certified value NIST 1641 d		16.010	-

Matrix Specific MDL Study 2

Objective Determine the method detection limit (MDL) for total mercury in water using preservation method FGS 012 and analysis method FGS 069, and following the protocols outlined in 40 CFR 136. As detailed below, the MDL for total mercury in water was determined to be 0.055ng/L.

Analytical Method A calibration was performed according to FGS 069. Briefly, this method incorporates oxidation with the addition of BrCl, reduction of mercury in the sample aliquot with $SnCl_2$, analysis by purge and trap and dual amalgamation CVAFS. The MDL study consisted of the analysis of nine replicates of a waters sample spiked with 0.5ng/L mercury oxidized with 1% BrCl. The results of these measurements are found in the table below, as well in the raw data sheets (ID # THg9-050331-1). All results are reported uncorrected for the method blanks.

MDL Calculation Using 40 CFR 136, the MDL was calculated using the standard deviation of the spiked samples, with n=10 replicates (9 degrees of freedom). In this case, the t value of 2.896 was used in the following equation, where s is the standard deviation of the results obtained on samples spiked at a level near the MDL.

$$MDL = t*s$$

The MDL calculated from these data is (2.896)*(0.019), or 0.055ng/L.

Total Mercury in Water (THg) MDL Study (CVAFS #10)
March 31, 2005

Sample		**THg (ng/L)**	**%Rec**
method blank #1		0.040	-
method blank #2		0.062	-
method blank #3		0.035	-
	Mean	0.046	-
	SD	0.014	-
IPR-1(5.0 ng/L)		5.020	100.4
IPR-2(5.0 ng/L)		5.186	103.7
IPR-3(5.0 ng/L)		5.129	102.6
IPR-4(5.0 ng/L)		5.122	102.4
	Mean	5.114	102.3
	SD	0.069	1.4
MDL-1 (0.5 ng/L)		0.542	108.4
MDL-2 (0.5 ng/L)		0.480	96.0
MDL-3 (0.5 ng/L)		0.533	106.6
MDL-4 (0.5 ng/L)		0.510	102.0
MDL-5 (0.5 ng/L)		0.517	103.4
MDL-6 (0.5 ng/L)		0.514	102.8
MDL-7 (0.5 ng/L)		0.547	109.4
MDL-8 (0.5 ng/L)		0.524	104.8
MDL-9 (0.5 ng/L)		0.515	103.0
	Mean	0.520	104.0
	SD	0.019	3.8
NIST 1641d		15.853	99.0
certified value NIST 1641 d		16.010	-

Matrix Specific MDL Study 3

Objective Determine the method detection limit (MDL) for methyl mercury in water, using distillation method FGS 013, and following the protocols outlined in 40 CFR 136. As detailed below, the MDL for methylmercury in water was determined to be 0.015ng/L.

Analytical Method A calibration was performed according to FGS 070. Briefly, this method incorporates distillation followed by analysis utilizing aqueous phase ethylation, CV purge and trap, thermal desorption, GC separation, pyrolytic decomposition, and detection using CVAFS. The MDL study consisted of the distillation and analysis of nine waters spiked with 0.111ng/L of MHg. The results of these measurements are found in the table below, as well in the raw data sheets (ID # MHg1-050616-1). All results are reported uncorrected for the method blanks.

MDL Calculation Using 40 CFR 136, the MDL was calculated using the standard deviation of the spiked samples, with n=9 replicates (8 degrees of freedom). In this case, the t value of 2.896 was used in the following equation, where s is the standard deviation of the results obtained on samples spiked at a level near the MDL.

$$MDL = t*s$$

The MDL calculated from these data is (2.896)*(0.005), or 0.015ng/L.

Methyl Mercury in Water (MHg) MDL Study (CV-GC-AFS #1)
June 16, 2005

Sample		**MeHg (ng/L)**	**%Rec**
method blank #1		0.019	-
method blank #2		0.017	-
method blank #3		0.014	-
	Mean	0.017	-
	SD	0.003	-
MDL #1+ 0.111 ng/L		0.116	104.6
MDL #2+ 0.111 ng/L		0.110	99.3
MDL #3+ 0.111 ng/L		0.113	102.0
MDL #4+ 0.111 ng/L		0.119	107.3
MDL #5+ 0.111 ng/L		0.100	90.4
MDL #6+ 0.111 ng/L		0.114	102.8
MDL #7+ 0.111 ng/L		0.110	99.3
MDL #8+ 0.111 ng/L		0.111	100.2
MDL #9+ 0.111 ng/L		0.110	99.3
	Mean	0.112	100.6
	SD	0.005	0.0
DORM-2 (4470ug/L)		4415	98.8

Appendix B

QC Summary Tables

MDN Quarterly Analysis QC Summary, Quarter 1 of 2004

Analysis	Calibration		BrCl Blk	SRM (Nist 1641-d)		Duplicates		Spikes		Bottle Blanks	
		R	Conc	TV=8.005 ng/mL	%Rec	Bottle ID	RPD	Bottle ID	Rec.	Bottle ID	Conc
	CVAFS-10										
2004-001	1/20/2004	0.99988	0.034 ng/L	7.62 ng/mL	95.2%	MDN2113	5.7%	MDN2113	102.3%	MDN0135	0.014 ng/Bottle
	CVAFS-9			7.70 ng/mL	96.2%	MDN2203	0.5%	MDN2203	98.4%		
						MDN2439	0.3%	MDN2439	106.6%		
2004-002	1/20/2004	0.99989	0.042 ng/L	7.38 ng/mL	92.1%	MDN0774	0.8%	MDN0774	96.4%	MDN2498	0.020 ng/Bottle
	CVAFS-10			7.51 ng/mL	93.8%	MDN0952	0.9%	MDN0952	97.4%	MDN2115	0.100 ng/Bottle
						MDN2418	1.4%	MDN2418	88.9%		
2004-003	1/22/2004	0.99987	0.044 ng/L	7.65 ng/mL	95.6%	MDN0183	0.8%	MDN0183	101.1%		
	CVAFS-9			7.42 ng/mL	92.7%	MDN2321	0.9%	MDN2321	99.9%		
						MDN2443	1.1%	MDN2443	100.6%		
2004-004	1/22/2004	0.99996	0.038 ng/L	7.65 ng/mL	95.6%	MDN2014	0.1%	MDN2014	95.2%		
	CVAFS-10			7.64 ng/mL	95.4%	MDN2069	4.1%	MDN2069	98.1%		
						MDN2145	6.1%	MDN2145	88.4%		
2004-005	1/26/2004	0.99996	0.021 ng/L	7.76 ng/mL	97.0%	MDN0597	65.1%	MDN0597	258.7%	MDN2001	0.016 ng/Bottle
	CVAFS-9			7.32 ng/mL	91.4%	MDN0819	2.5%	MDN0819	102.7%	MDN0283	0.059 ng/Bottle
						MDN2048	0.3%	MDN2048	98.4%		
						MDN2275	2.3%	MDN2275	100.3%		
2004-006	1/26/2004	0.99999	0.039 ng/L	7.65 ng/mL	95.6%	MDN0680	0.5%	MDN0680	98.2%	MDN0943	0.027 ng/Bottle
	CVAFS-10			7.58 ng/mL	94.7%	MDN2316	2.0%	MDN2316	93.9%		
						MDN2497	1.4%	MDN2497	101.2%		
2004-007	2/3/2004	0.99985	0.010 ng/L	7.65 ng/mL	95.6%	MDN0145	0.4%	MDN0145	101.8%		
	CVAFS-9			7.72 ng/mL	96.4%	MDN2127	0.9%	MDN2127	104.4%		
						MDN2402	0.9%	MDN2402	100.4%		
2004-008	2/2/2004	0.99998	0.026 ng/L	7.45 ng/mL	93.0%	MDN0156	4.6%	MDN0156	94.3%	MDN1943	0.027 ng/Bottle
	CVAFS-10			7.33 ng/mL	91.6%	MDN2361	14.5%	MDN2361	97.2%	MDN0187	0.023 ng/Bottle
						MDN2375	4.6%	MDN2375	104.4%		
2004-009	2/3/2004	0.99950	0.025 ng/L	7.75 ng/mL	96.9%	MDN1739	6.0%	MDN1739	100.5%		
	CVAFS-10			7.34 ng/mL	91.7%	MDN2383	5.1%	MDN2383	101.7%		
						MDN2401	1.0%	MDN2401	91.4%		
2004-010	2/4/2004	0.99898	0.024 ng/L	7.20 ng/mL	90.0%	MDN2122	3.9%	MDN2122	98.6%		
	CVAFS-9			7.64 ng/mL	95.4%	MDN2352	1.5%	MDN2352	98.7%		
						MDN3009	1.3%	MDN3009	94.9%		
2004-011	2/10/2004	0.99999	0.029 ng/L	7.52 ng/mL	93.9%	MDN1969	0.2%	MDN1969	99.6%	MDN0141	0.014 ng/Bottle
	CVAFS-9			7.50 ng/mL	93.7%	MDN2028	0.3%	MDN2028	98.5%	MDN2115	0.021 ng/Bottle
						MDN2534	0.3%	MDN2534	99.5%		
2004-012	2/10/2004	0.99998	0.034 ng/L	7.63 ng/mL	95.3%	MDN0163	7.7%	MDN0163	92.2%		
	CVAFS-10										
2004-013	2/16/2004	0.99968	0.025 ng/L	7.48 ng/mL	93.4%	MDN0915	6.1%	MDN0915	97.2%		
	CVAFS-10			7.22 ng/mL	90.2%	MDN2049	3.5%	MDN2049	86.9%		
						MDN2523	3.3%	MDN2523	98.4%		
2004-014	2/18/2004	0.99997	0.028 ng/L	7.56 ng/mL	94.5%	MDN2246	4.6%	MDN2246	95.5%	MDN2395	0.020 ng/Bottle

	CVAFS-9			7.74 ng/mL	96.6%	MDN2313	2.1%	MDN2313	95.2%		
						MDN2397	3.6%	MDN2397	95.0%		
2004-015	2/18/2004	0.99997	0.022 ng/L	7.71 ng/mL	96.3%	MDN0910	3.8%	MDN0910	99.8%		
	CVAFS-10			7.54 ng/mL	94.2%	MDN2358	0.4%	MDN2358	98.6%		
						MDN2430	3.7%	MDN2430	101.7%		
2004-016	2/20/2004	0.99999	0.045 ng/L	7.68 ng/mL	95.9%	MDN0177	0.7%	MDN0177	94.1%	MDN2391	0.057 ng/Bottle
	CVAFS-9			7.58 ng/mL	94.7%	MDN1913	0.6%	MDN1913	95.3%	MDN0425	0.095 ng/Bottle
						MDN1996	0.7%	MDN1996	99.9%		
2004-017	2/20/2004	0.99989	0.040 ng/L	7.96 ng/mL	99.5%	MDN0683	7.2%	MDN0683	97.2%	MDN2028	0.013 ng/Bottle
	CVAFS-10			7.53 ng/mL	94.0%	MDN2085	5.0%	MDN2085	100.8%		
						MDN2370	0.4%	MDN2370	90.8%		
2004-018	2/25/2004	0.99998	0.038 ng/L	7.72 ng/mL	96.4%	MDN0487	1.0%	MDN0487	99.3%		
	CVAFS-9			7.52 ng/mL	93.9%	MDN0976	3.2%	MDN0976	103.5%		
						MDN2107	1.3%	MDN2107	91.0%		
						MDN2470	4.6%				
2004-019	2/27/2004	0.99912	0.105 ng/L	7.51 ng/mL	93.9%	MDN2105	0.4%	MDN2105	89.8%		
	CVAFS-9			7.72 ng/mL	96.4%	MDN2324	2.3%	MDN2324	93.0%		
						MDN2421	2.0%	MDN2421	101.3%		
2004-020	2/27/2004	0.99958	0.037 ng/L	7.64 ng/mL	95.5%	MDN2158	2.2%	MDN2158	96.6%	MDN0735	0.020 ng/Bottle
	CVAFS-10			7.63 ng/mL	95.3%	MDN2263	0.6%	MDN2263	104.3%		
						MDN2400	1.4%	MDN2400	101.6%		
2004-021	3/2/2004	0.99972	0.025 ng/L	7.88 ng/mL	98.5%	MDN0266	2.9%	MDN0266	99.6%		
	CVAFS-9			7.07 ng/mL	88.4%	MDN2195	2.9%	MDN2195	98.8%		
						MDN2514	6.8%	MDN2514	98.8%		
2004-022	3/2/2004	0.99982	0.052 ng/L	7.80 ng/mL	97.4%	MDN2153	2.0%	MDN2153	96.8%	MDN1910	0.016 ng/Bottle
	CVAFS-10			7.56 ng/mL	94.4%	MDN2457	1.4%	MDN2457	92.4%		
						MDN3003	2.9%	MDN3003	99.9%		
2004-023	3/10/2004	0.99899	0.021 ng/L	7.64 ng/mL	95.4%	MDN0832	1.3%	MDN0832	100.5%		
	CVAFS-10			7.68 ng/mL	96.0%	MDN0909	2.0%	MDN0909	97.9%		
						MDN2438	0.3%	MDN2438	95.4%		
2004-024	3/16/2004	0.99911	0.047 ng/L	7.50 ng/mL	93.7%	MDN2142	0.4%	MDN2142	99.3%		
	CVAFS-9			7.78 ng/mL	97.2%	MDN2321	3.6%	MDN2321	99.9%		
						MDN2399	0.3%	MDN2399	100.2%		
2004-025	3/18/2004	0.99949	0.012 ng/L	7.72 ng/mL	96.5%	MDN2192	2.8%	MDN2192	100.5%	MDN0925	0.035 ng/Bottle
	CVAFS-10			7.53 ng/mL	94.0%	MDN2277	2.2%	MDN2277	100.4%	MDN2292	0.006 ng/Bottle
						MDN2295	3.3%	MDN2295	96.8%		
2004-026	3/17/2004	0.99956	0.029 ng/L	8.12 ng/mL	101.4%	MDN2280	4.1%	MDN2280	85.9%		
	CVAFS-10										
2004-027	3/21/2004	0.99940	0.043 ng/L	7.36 ng/mL	91.9%	MDN0437	2.6%	MDN0437	90.9%		
	CVAFS-9			6.81 ng/mL	85.1%	MDN2331	3.9%	MDN2331	87.7%		
						MDN2553	8.1%	MDN2553	88.1%		
2004-028	3/21/2004	0.99937	0.070 ng/L	7.71 ng/mL	96.4%	MDN2110	3.3%	MDN2110	96.0%	MDN2520	0.064 ng/Bottle
	CVAFS-10			7.41 ng/mL	92.5%	MDN2353	2.7%	MDN2353	100.3%		
						MDN2451	0.4%	MDN2451	99.7%		
2004-029	3/29/2004	0.99990	0.032 ng/L	7.79 ng/mL	97.3%	MDN0739	12.4%	MDN0739	100.5%		

	CVAFS-9			7.12 ng/mL	88.9%	MDN2275	0.5%	MDN2275	88.8%		
						MDN2522	9.5%	MDN2522	102.1%		
2004-030	3/29/2004	0.99916	0.064 ng/L	7.70 ng/mL	96.2%	MDN0862	0.4%	MDN0862	97.2%	MDN0146	0.025 ng/Bottle
	CVAFS-10			7.77 ng/mL	97.1%	MDN2086	3.2%	MDN2086	100.1%		
						MDN2201	0.8%	MDN2201	100.4%		
2004-031	3/31/2004	0.99985	0.025 ng/L	7.69 ng/mL	96.1%	MDN1756	2.6%	MDN1756	97.0%		
	CVAFS-10			7.54 ng/mL	94.1%	MDN2409	0.3%	MDN2409	98.3%		
						MDN2439	2.3%	MDN2439	94.4%		
2004-032	3/30/2004	0.99967	-0.050 ng/L	7.66 ng/mL	95.7%	MDN0783	3.3%	MDN0783	100.5%		
	CVAFS-10			7.77 ng/mL	97.0%	MDN2261	2.8%	MDN2261	99.1%		
						MDN2308	0.9%	MDN2308	102.7%		
2004-033	3/31/2004	0.99998	0.021 ng/L	7.71 ng/mL	96.3%	MDN0405	0.3%	MDN0405	96.4%		
	CVAFS-9			7.35 ng/mL	91.9%	MDN1987	3.3%	MDN1987	90.3%		
						MDN2103	0.8%	MDN2103	98.6%		
2004-158	1/3/2004	0.99998	0.034 ng/L	7.77 ng/mL	97.1%	MDN0677	2.1%	MDN0677	92.6%	MDN2697	0.010 ng/Bottle
	CVAFS-9			7.76 ng/mL	97.0%	MDN2103	6.9%	MDN2103	95.1%		
						MDN2170	0.1%	MDN2170	99.7%		
3004-012	2/16/2004	0.99998	0.028 ng/L	7.67 ng/mL	95.8%	MDN0132	0.2%	MDN0132	98.4%		
	CVAFS-9			7.69 ng/mL	96.1%	MDN2437	0.2%	MDN2437	95.9%		
						MDN2545	1.5%	MDN2545	99.6%		
3004-026	3/19/2004	0.99990	0.034 ng/L	7.75 ng/mL	96.8%	MDN0419	1.9%	MDN0419	99.0%		
	CVAFS-10					MDN0731	8.1%	MDN0731	97.4%		
	Quarterly Mean:	0.99974	0.032 ng/L		95.0%		3.4%		99.5%		0.036 ng/Bottle
	Std Dev:	±0.00029	±0.021		±2.6%		±6.2%		±14.9%		±0.031

MDN Quarterly Analysis QC Summary, Quarter 2 of 2004

Analysis		Calibration	BrCl Blk	SRM (Nist 1641-d)		Duplicates		Spikes		Bottle Blanks	
		R	Conc	TV=8.005 ng/mL	%Rec	Bottle ID	RPD	Bottle ID	Rec.	Bottle ID	Conc
2004-034	4/4/2004	0.99984	0.107 ng/L	7.73 ng/mL	96.5%	MDN0716	0.1%	MDN0716	98.6%		
	CVAFS-9			7.46 ng/mL	93.2%	MDN0750	1.8%	MDN0750	96.6%		
						MDN2099	2.6%	MDN2099	95.9%		
2004-035	4/4/2004	0.99952	0.055 ng/L	7.60 ng/mL	95.0%	MDN0683	3.8%	MDN0683	96.1%	MDN2284	0.024 ng/Bottle
	CVAFS-10			7.51 ng/mL	93.9%	MDN1928	1.0%	MDN1928	97.5%	MDN0953	0.021 ng/Bottle
						MDN2269	0.1%	MDN2269	101.0%		
								MDN2319	194.8%		
2004-036	4/8/2004	0.99995	0.027 ng/L	7.79 ng/mL	97.3%	MDN0847	2.8%	MDN0847	101.6%	MDN0427	0.021 ng/Bottle
	CVAFS-9			7.51 ng/mL	93.8%	MDN1981	0.6%	MDN1981	98.5%		
						MDN2317	10.1%	MDN2317	96.9%		
2004-037	4/8/2004	0.99975	0.015 ng/L	7.69 ng/mL	96.1%	MDN2344	1.2%	MDN2344	101.6%	MDN2206	0.012 ng/Bottle
	CVAFS-10			7.31 ng/mL	91.4%	MDN2358	7.0%	MDN2358	98.0%		
						MDN2481	5.7%	MDN2481	95.6%		
2004-038	4/20/2004	0.99997	0.011 ng/L	7.70 ng/mL	96.2%	MDN0896	5.1%	MDN0896	103.1%		
	CVAFS-9			7.69 ng/mL	96.0%	MDN1759	0.5%	MDN1759	96.8%		
						MDN2129	18.1%	MDN2129	102.4%		
2004-039	4/19/2004	0.99976	0.029 ng/L	7.62 ng/mL	95.2%	MDN0795	6.5%	MDN0795	93.1%	MDN0898	0.032 ng/Bottle
	CVAFS-10			7.51 ng/mL	93.8%	MDN0899	10.8%	MDN0899	102.7%		
						MDN2181	1.7%	MDN2181	100.2%		
2004-040	4/20/2004	0.99939	0.025 ng/L	7.86 ng/mL	98.2%	MDN0267	0.5%	MDN0267	104.5%		
	CVAFS-10			7.84 ng/mL	98.0%	MDN2051	4.9%	MDN2051	101.6%		
						MDN2131	0.3%	MDN2131	97.9%		
2004-041	4/22/2004	0.99987	0.034 ng/L	7.64 ng/mL	95.4%	MDN1929	16.5%	MDN1929	104.2%	MDN1742	0.093 ng/Bottle
	CVAFS-9			7.70 ng/mL	96.1%	MDN2463	7.5%	MDN2463	102.0%		
						MDN2555	2.6%	MDN2555	98.4%		
2004-042	4/22/2004	0.99969	0.012 ng/L	7.76 ng/mL	97.0%	MDN0640	1.6%	MDN0640	99.6%		
	CVAFS-10			7.90 ng/mL	98.7%	MDN0844	0.7%	MDN0844	100.6%		
						MDN2524	0.5%	MDN2524	101.5%		
2004-043	4/29/2004	0.99993	0.036 ng/L	7.77 ng/mL	97.1%	MDN1953	2.9%	MDN1953	96.6%		
	CVAFS-9			7.42 ng/mL	92.7%	MDN2379	0.4%	MDN2379	98.5%		
						MDN2443	1.0%	MDN2443	96.2%		
2004-044	4/23/2004	0.99993	0.038 ng/L	7.75 ng/mL	96.8%	MDN0492	0.9%	MDN0492	104.4%	MDN2143	0.028 ng/Bottle
	CVAFS-9			7.83 ng/mL	97.8%	MDN0802	1.8%	MDN0802	99.7%		
						MDN1921	1.5%	MDN1921	103.2%		
2004-045	4/23/2004	0.99998	0.042 ng/L	7.65 ng/mL	95.5%	MDN0225	1.2%	MDN0225	95.3%		
	CVAFS-10			7.79 ng/mL	97.3%	MDN2043	3.1%	MDN2043	93.1%		
						MDN2490	1.5%	MDN2490	103.5%		
2004-046	4/29/2004	0.99955	0.037 ng/L	7.88 ng/mL	98.5%	MDN0255	8.2%	MDN0255	104.4%		
	CVAFS-10			7.63 ng/mL	95.3%	MDN2445	2.7%	MDN2445	108.2%		
						MDN2509	0.7%	MDN2509	96.1%		

2004-047	5/3/2004 CVAFS-9	0.99999	0.046 ng/L	7.77 ng/mL 7.59 ng/mL	97.0% 94.8%	MDN0656 1.1% MDN0740 1.9% MDN2049 0.6%	MDN0656 99.5% MDN0740 97.0% MDN2049 110.7%	MDN1974 0.028 ng/Bottle
2004-048	5/3/2004 CVAFS-10	0.99960	0.046 ng/L	7.82 ng/mL 7.77 ng/mL	97.7% 97.1%	MDN0633 0.2% MDN2310 2.1% MDN3007 3.2%	MDN0633 99.4% MDN2310 108.6% MDN3007 98.9%	MDN2263 0.022 ng/Bottle
2004-049	5/6/2004 CVAFS-9	0.99998	0.010 ng/L	7.83 ng/mL 7.46 ng/mL	97.8% 93.2%	MDN0120 0.4% MDN2295 0.8% MDN2529 0.1%	MDN0120 94.5% MDN2295 96.7% MDN2529 96.8%	
2004-050	5/13/2004 CVAFS-9	0.99996	0.030 ng/L	7.67 ng/mL 7.60 ng/mL	95.9% 94.9%	MDN0085 0.4% MDN2127 0.4% MDN2195 1.7%	MDN0085 97.0% MDN2127 99.4% MDN2195 97.9%	
2004-051	5/13/2004 CVAFS-10	0.99998	0.015 ng/L	7.63 ng/mL 7.52 ng/mL	95.3% 94.0%	MDN0448 1.1% MDN2275 3.4% MDN2527 2.5%	MDN0448 109.4% MDN2275 92.9% MDN2527 89.0%	MDN2234 0.034 ng/Bottle
2004-052	5/20/2004 CVAFS-9	0.99992	0.035 ng/L	7.99 ng/mL 7.79 ng/mL	99.8% 97.3%	MDN1931 0.2% MDN2137 7.3% MDN2334 18.0%	MDN1931 102.2% MDN2137 103.2% MDN2334 107.2%	
2004-053	5/20/2004 CVAFS-10	0.99958	-0.009 ng/L	8.09 ng/mL 8.01 ng/mL	101.1% 100.1%	MDN1996 0.7% MDN2121 7.0% MDN2302 5.2%	MDN1996 102.0% MDN2121 102.0% MDN2302 107.8%	
2004-054	5/21/2004 CVAFS-9	0.99989	-0.008 ng/L	7.85 ng/mL 8.00 ng/mL	98.0% 99.9%	MDN0735 2.7% MDN0847 0.3% MDN2454 2.9%	MDN0735 98.5% MDN0847 101.6% MDN2454 95.1%	
2004-055	5/21/2004 CVAFS-10	0.99974	0.011 ng/L	7.13 ng/mL 7.79 ng/mL	89.0% 97.3%	MDN0256 8.3% MDN2202 3.8% MDN2227 0.1%	MDN0256 100.7% MDN2202 97.5% MDN2227 101.2%	MDN2473 0.027 ng/Bottle
2004-056	5/25/2004 CVAFS-9	0.99980	0.073 ng/L	7.58 ng/mL 6.60 ng/mL 7.79 ng/mL	94.7% 82.4% 97.4%	MDN2031 9.2% MDN2319 5.5% MDN2358 3.2%	MDN2031 105.8% MDN2319 114.7% MDN2358 96.6%	
2004-057	5/25/2004 CVAFS-10	0.99995	0.059 ng/L	7.99 ng/mL 7.68 ng/mL	99.9% 96.0%	MDN0020 2.4% MDN0493 0.4% MDN2364 0.9%	MDN0020 102.7% MDN0493 100.1% MDN2364 98.6%	MDN2441 0.077 ng/Bottle
2004-058	5/27/2004 CVAFS-10	0.99998	0.113 ng/L	7.62 ng/mL 7.63 ng/mL	95.2% 95.3%	MDN2129 2.9% MDN2342 4.0% MDN2482 0.7%	MDN2129 88.6% MDN2342 97.6% MDN2482 100.9%	MDN1972 0.045 ng/Bottle MDN2277 0.033 ng/Bottle MDN0448 0.027 ng/Bottle
2004-059	6/2/2004 CVAFS-9	0.99991	0.104 ng/L	7.69 ng/mL 7.66 ng/mL	96.1% 95.7%	MDN0289 3.9% MDN0421 1.2% MDN1989 1.0%	MDN0289 97.2% MDN0421 94.8% MDN1989 96.1%	
2004-060	6/2/2004 CVAFS-10	0.99997	0.067 ng/L	7.67 ng/mL 7.56 ng/mL	95.8% 94.5%	MDN2160 4.9% MDN2530 2.4% MDN2546 0.9%	MDN2160 83.5% MDN2530 99.8% MDN2546 97.3%	
2004-061	6/3/2004 CVAFS-9	0.99986	0.057 ng/L	7.79 ng/mL 7.77 ng/mL	97.4% 97.0%	MDN0716 0.4% MDN2184 0.1% MDN2523 2.8%	MDN0716 97.6% MDN2184 103.1% MDN2523 99.6%	

2004-062	6/8/2004	0.99994	0.066 ng/L	7.67 ng/mL	95.8%	MDN0861	2.7%	MDN0861	98.3%		
	CVAFS-9			7.42 ng/mL	92.7%	MDN0954	0.8%	MDN0954	96.4%		
						MDN2539	1.5%	MDN2539	96.4%		
2004-063	6/8/2004	0.99994	0.051 ng/L	7.75 ng/mL	96.8%	MDN0494	0.8%	MDN0494	93.3%		
	CVAFS-10			7.68 ng/mL	95.9%	MDN0689	3.0%	MDN0689	98.0%		
						MDN0822	5.5%	MDN0822	98.5%		
2004-064	6/14/2004	0.99996	0.060 ng/L	7.64 ng/mL	95.4%	MDN0187	1.1%	MDN0187	97.3%	MDN2254	0.036 ng/Bottle
	CVAFS-10			7.55 ng/mL	94.3%	MDN0292	0.7%	MDN0292	94.4%	MDN2048	0.035 ng/Bottle
						MDN1927	3.5%	MDN1927	83.3%		
2004-065	6/15/2004	0.99981	0.080 ng/L	7.58 ng/mL	94.7%	MDN0945	3.3%	MDN0945	79.5%	MDN2246	0.024 ng/Bottle
	CVAFS-9			7.08 ng/mL	88.4%	MDN2157	3.7%	MDN2157	95.6%	MDN1964	0.037 ng/Bottle
						MDN2158	1.6%	MDN2158	88.4%		
2004-066	6/15/2004	0.99998	0.066 ng/L	7.62 ng/mL	95.2%	MDN0661	2.1%	MDN0661	100.8%	MDN2640	0.050 ng/Bottle
	CVAFS-10			7.13 ng/mL	89.1%	MDN1760	0.4%	MDN1760	98.3%		
						MDN2163	1.8%	MDN2163	92.4%		
2004-067	6/16/2004	0.99997	0.043 ng/L	7.70 ng/mL	96.2%	MDN0816	0.2%	MDN0816	96.3%		
	CVAFS-10			7.71 ng/mL	96.3%	MDN1913	3.7%	MDN1913	103.3%		
						MDN2408	2.9%	MDN2408	90.2%		
2004-068	6/18/2004	0.99996	0.073 ng/L	7.69 ng/mL	96.1%	MDN0199	2.8%	MDN0199	94.1%		
	CVAFS-10			7.57 ng/mL	94.6%	MDN0288	0.4%	MDN0288	94.7%		
						MDN2490	1.6%	MDN2490	100.2%		
2004-069	6/22/2004	0.99996	0.061 ng/L	7.74 ng/mL	96.7%	MDN0663	2.1%	MDN0663	101.3%	MDN1989	0.036 ng/Bottle
	CVAFS-10			7.72 ng/mL	96.5%	MDN0741	0.7%	MDN0741	88.6%		
						MDN0774	0.1%	MDN0774	95.3%		
2004-070	6/23/2004	0.99995	0.061 ng/L	7.65 ng/mL	95.6%	MDN0676	0.2%	MDN0676	96.6%	MDN2382	0.046 ng/Bottle
	CVAFS-10			7.52 ng/mL	93.9%	MDN2301	1.1%	MDN2301	97.2%		
						MDN2422	2.0%	MDN2422	92.1%		
	Quarterly Mean:	0.99986	0.045 ng/L		95.7%		2.8%		99.3%		0.036 ng/Bottle
	Std Dev:	±0.00015	±0.029		±2.8%		±3.4%		±10.5%		±0.018

MDN Quarterly Analysis QC Summary, Quarter 3 of 2004

Analysis		Calibration R	BrCl Blk Conc	SRM (Nist 1641-d) TV=8.005 ng/mL	%Rec	Duplicates Bottle ID	RPD	Spikes Bottle ID	Rec.	Bottle Blanks Bottle ID	Conc
2004-071	7/1/2004	0.99948	0.080 ng/L	7.92 ng/mL	99.0%	MDN0638	2.7%	MDN0638	92.6%		
	CVAFS-9			7.33 ng/mL	91.5%	MDN0640	1.7%	MDN0640	95.6%		
						MDN0655	0.1%	MDN0655	106.9%		
2004-072	7/1/2004	0.99992	0.075 ng/L	7.64 ng/mL	95.5%	MDN1950	3.8%	MDN1950	99.2%		
	CVAFS-10			7.63 ng/mL	95.3%	MDN2329	1.2%	MDN2329	96.4%		
						MDN2379	0.4%	MDN2379	93.7%		
2004-073	7/2/2004	0.99997	0.073 ng/L	7.58 ng/mL	94.7%	MDN1924	7.3%	MDN1924	87.7%	MDN2523	0.033 ng/Bottle
	CVAFS-9			6.68 ng/mL	83.5%	MDN2055	5.8%	MDN2055	92.1%		
						MDN2148	1.0%	MDN2148	80.4%		
2004-074	7/2/2004	0.99993	0.078 ng/L	7.63 ng/mL	95.3%	MDN0122	1.9%	MDN0122	91.3%	MDN2069	0.037 ng/Bottle
	CVAFS-10			7.46 ng/mL	93.2%	MDN1962	1.9%	MDN1962	91.2%		
						MDN2117	0.1%	MDN2117	98.3%		
2004-075	7/8/2004	0.99994	0.072 ng/L	7.50 ng/mL	93.7%	MDN2001	9.8%	MDN2001	80.5%	MDN3011	0.029 ng/Bottle
	CVAFS-9			7.14 ng/mL	89.1%	MDN2388	3.9%	MDN2388	95.2%		
						MDN2549	4.6%	MDN2549	92.0%		
2004-076	7/7/2004	0.99995	0.056 ng/L	7.67 ng/mL	95.8%	MDN0085	1.0%	MDN0085	97.2%	MDN0698	0.022 ng/Bottle
	CVAFS-10			7.43 ng/mL	92.8%	MDN2584	5.5%	MDN2584	195.4%	MDN2540	0.027 ng/Bottle
						MDN2643	0.3%	MDN2643	98.0%		
2004-077	7/8/2004	0.99999	0.057 ng/L	7.59 ng/mL	94.9%	MDN0983	0.5%	MDN0983	96.6%		
	CVAFS-10			7.21 ng/mL	90.0%	MDN1976	0.8%	MDN1976	98.5%		
						MDN2438	1.8%	MDN2438	95.8%		
2004-078	7/19/2004	0.99989	0.024 ng/L	7.67 ng/mL	95.9%	MDN0445	2.4%	MDN0445	98.3%	MDN0956	0.060 ng/Bottle
	CVAFS-9			7.17 ng/mL	89.6%	MDN1916	1.9%	MDN1916	85.2%		
						MDN2429	1.1%	MDN2429	100.3%		
2004-079	7/13/2004	0.99999	0.085 ng/L	7.73 ng/mL	96.5%	MDN0405	1.4%	MDN0405	98.9%		
	CVAFS-10			7.49 ng/mL	93.6%	MDN0735	0.4%	MDN0735	99.6%		
						MDN2616	1.1%	MDN2616	98.5%		
2004-080	7/19/2004	1.00000	0.049 ng/L	7.62 ng/mL	95.2%	MDN0421	5.4%	MDN0421	100.7%		
	CVAFS-10			7.48 ng/mL	93.5%	MDN2507	7.2%	MDN2507	103.4%		
						MDN2602	0.9%	MDN2602	97.7%		
2004-081	7/20/2004	0.99998	0.059 ng/L	7.62 ng/mL	95.2%	MDN0646	0.9%	MDN0646	98.1%	BB20	0.025 ng/Bottle
	CVAFS-10			7.48 ng/mL	93.4%	MDN2395	2.5%	MDN2395	99.3%		
						MDN2621	3.3%	MDN2621	99.3%		
2004-082	7/24/2004	0.99977	0.056 ng/L	7.98 ng/mL	99.7%	MDN0952	4.5%	MDN0952	101.4%	MDN2103	0.026 ng/Bottle
	CVAFS-10			7.72 ng/mL	96.4%	MDN1921	0.7%	MDN1921	95.5%		
						MDN2478	0.6%	MDN2478	96.4%		
2004-083	7/20/2004	0.99989	0.041 ng/L	7.59 ng/mL	94.9%	MDN0276	2.8%	MDN0276	110.5%		
	CVAFS-9			7.08 ng/mL	88.5%	MDN2628	2.2%	MDN2628	99.9%		
						MDN2639	0.4%	MDN2639	87.7%		
2004-084	7/28/2004	0.99988	0.033 ng/L	7.85 ng/mL	98.1%	MDN0666		MDN0666	94.9%		
	CVAFS-10			7.83 ng/mL	97.8%	MDN0833	3.2%	MDN0833	94.0%		

						MDN2592	0.1%	MDN2592	102.6%		
2004-085	7/30/2004	0.99986	0.030 ng/L	7.84 ng/mL	97.9%	MDN0827	0.3%	MDN0827	97.6%		
	CVAFS-9			7.77 ng/mL	97.1%	MDN2170	1.8%	MDN2170	98.8%		
						MDN2470	0.7%	MDN2470	101.9%		
2004-086	7/30/2004	0.99988	0.009 ng/L	7.97 ng/mL	99.5%	MDN2113		MDN2113	92.6%	MDN1984	0.028 ng/Bottle
	CVAFS-10			7.98 ng/mL	99.7%	MDN2342	2.4%	MDN2342	98.9%	MDN0116	0.019 ng/Bottle
						MDN2573	0.7%	MDN2573	98.7%		
2004-087	7/31/2004	0.99995	0.050 ng/L	7.92 ng/mL	98.9%	MDN0836	2.5%	MDN0836	98.5%	MDN1991	0.032 ng/Bottle
	CVAFS-10			7.97 ng/mL	99.5%	MDN2197	2.7%	MDN2197	100.5%		
						MDN2260	1.0%	MDN2260	98.0%		
2004-088	8/3/2004	0.99966	0.043 ng/L	7.83 ng/mL	97.8%	MDN2310		MDN2310	97.3%		
	CVAFS-9			7.56 ng/mL	94.4%	MDN2541	0.2%	MDN2541	102.2%		
						MDN2647	0.9%	MDN2647	99.2%		
2004-089	8/3/2004	0.99998	0.058 ng/L	7.95 ng/mL	99.3%	MDN1732	2.1%	MDN1732	92.9%	MDN2619	0.026 ng/Bottle
	CVAFS-10			7.73 ng/mL	96.5%	MDN2087	1.7%	MDN2087	99.4%		
						MDN3016	2.3%	MDN3016	98.2%		
2004-090	8/4/2004	0.99997	-0.002 ng/L	7.87 ng/mL	98.3%	MDN0126	0.2%	MDN0126	97.4%	MDN2233	0.017 ng/Bottle
	CVAFS-10			7.88 ng/mL	98.5%	MDN2289	3.0%	MDN2289	101.4%		
						MDN2435	0.9%	MDN2435	95.1%		
2004-091	8/13/2004	0.99981	0.056 ng/L	7.96 ng/mL	99.4%	MDN0678	0.2%	MDN0678	95.5%		
	CVAFS-10			8.01 ng/mL	100.1%	MDN2349	0.3%	MDN2349	93.8%		
						MDN2509	5.6%	MDN2509	100.6%		
2004-092	8/17/2004	0.99994	0.043 ng/L	7.95 ng/mL	99.4%	MDN0114	0.9%	MDN0114	97.4%		
	CVAFS-10			7.66 ng/mL	95.7%	MDN2498	2.8%	MDN2498	100.6%		
						MDN2645	1.2%	MDN2645	95.6%		
2004-093	8/16/2004	0.99992	0.047 ng/L	7.96 ng/mL	99.5%	MDN0075	2.7%	MDN0075	98.7%	MDN2635	0.032 ng/Bottle
	CVAFS-10			7.70 ng/mL	96.2%	MDN0492	4.1%	MDN0492	99.1%	MDN2234	0.036 ng/Bottle
						MDN2436	1.2%	MDN2436	99.0%		
2004-094	8/17/2004	0.99989	-0.048 ng/L	8.39 ng/mL	104.9%	MDN0831	3.8%	MDN0831	100.3%		
	CVAFS-9			7.24 ng/mL	90.5%	MDN2134	1.2%	MDN2134	123.1%		
						MDN3009	2.5%	MDN3009	90.8%		
2004-095	8/18/2004	0.99992	0.065 ng/L	7.82 ng/mL	97.6%	MDN0297	3.5%	MDN0297	98.2%		
	CVAFS-10			7.76 ng/mL	97.0%	MDN2026	9.9%	MDN2026	104.5%		
						MDN2615	10.3%	MDN2615	100.9%		
2004-096	8/25/2004	0.99986	0.075 ng/L	8.03 ng/mL	100.3%	MDN0871	0.6%	MDN0871	98.0%		
	CVAFS-10			7.74 ng/mL	96.7%	MDN1741	7.1%	MDN1741	105.9%		
						MDN2092		MDN2092	91.5%		
2004-097	8/26/2004	0.99975	0.031 ng/L	8.00 ng/mL	99.9%	MDN2097	1.2%	MDN2097	96.5%	MDN0836	0.023 ng/Bottle
	CVAFS-10			7.70 ng/mL	96.1%	MDN2213	2.7%	MDN2213	109.9%	MDN2342	0.033 ng/Bottle
						MDN2263	0.1%	MDN2263	94.6%		
2004-098	8/30/2004	0.99961	0.054 ng/L	8.24 ng/mL	102.9%	MDN2069	1.6%	MDN2069	89.3%	MDN0102	0.024 ng/Bottle
	CVAFS-10			8.11 ng/mL	101.4%	MDN2077	0.6%	MDN2077	124.7%		
						MDN2451	1.5%	MDN2451	94.7%		
2004-099	8/30/2004	0.99768	0.039 ng/L	7.46 ng/mL	93.1%	MDN1924	10.3%	MDN1924	89.6%	MDN2330	0.017 ng/Bottle
	CVAFS-9			6.92 ng/mL	86.5%	MDN2501	12.1%	MDN2501	107.0%		

						MDN2503	6.5%	MDN2503	118.7%		
2004-100	8/31/2004	0.99989	0.001 ng/L	7.33 ng/mL	91.6%	MDN0183	0.4%	MDN0183	103.1%		
	CVAFS-10			8.14 ng/mL	101.6%	MDN0439	1.4%	MDN0439	106.8%		
						MDN0934	2.9%	MDN0934	115.9%		
2004-101	9/3/2004	0.99989	0.031 ng/L	6.69 ng/mL	83.5%	MDN0144	5.6%	MDN0144	102.1%		
	CVAFS-10			7.58 ng/mL	94.7%	MDN1958	1.9%	MDN1958	107.2%		
						MDN2372	1.9%	MDN2372	99.4%		
2004-102	9/7/2004	0.99990	0.029 ng/L	8.03 ng/mL	100.3%	MDN0481	0.9%	MDN0481	110.5%		
	CVAFS-10			8.06 ng/mL	100.7%	MDN0925	0.3%	MDN0925	102.4%		
						MDN2206	2.0%	MDN2206	101.3%		
2004-103	9/9/2004	0.99795	0.015 ng/L	8.22 ng/mL	102.7%	MDN2059	1.4%	MDN2059	115.1%	MDN0896	0.037 ng/Bottle
	CVAFS-9			8.09 ng/mL	101.0%	MDN2317	1.3%	MDN2317	103.8%	MDN2310	0.017 ng/Bottle
						MDN2397	0.6%	MDN2397	106.9%		
2004-104	9/13/2004	0.99961	0.056 ng/L	7.97 ng/mL	99.5%	MDN0751		MDN0751	76.7%	MDN0155	0.049 ng/Bottle
	CVAFS-10			7.77 ng/mL	97.0%	MDN0845	2.9%	MDN0845	98.1%		
						MDN2561	2.9%	MDN2561	192.3%		
2004-105	9/13/2004	0.99642	-0.024 ng/L	8.25 ng/mL	103.1%	MDN0843	1.9%	MDN0843	107.1%		
	CVAFS-9										
2004-106	9/17/2004	0.99885	-0.014 ng/L	7.32 ng/mL	91.4%	MDN1927	4.3%	MDN1927	100.8%		
	CVAFS-9			7.65 ng/mL	95.6%	MDN2131	9.6%	MDN2131	114.5%		
						MDN2324	3.0%	MDN2324	96.1%		
2004-107	9/17/2004	0.99993	0.013 ng/L	7.85 ng/mL	98.0%	MDN0398	1.6%	MDN0398	99.4%		
	CVAFS-10			7.85 ng/mL	98.0%	MDN2358	4.0%	MDN2358	98.1%		
						MDN3000	3.1%	MDN3000	98.7%		
2004-108	9/22/2004	0.99997	0.020 ng/L	7.92 ng/mL	99.0%	MDN0225	1.6%	MDN0225	93.7%	MDN2328	0.027 ng/Bottle
	CVAFS-10			7.74 ng/mL	96.7%	MDN0405	3.1%	MDN0405	92.5%	MDN2168	0.018 ng/Bottle
						MDN2338	16.0%	MDN2338	106.0%		
2004-109	9/21/2004	0.99871	0.020 ng/L	7.92 ng/mL	98.9%	MDN1736		MDN1736	79.9%		
	CVAFS-9			7.90 ng/mL	98.6%	MDN2578	15.0%	MDN2578	102.2%		
						MDN2646	15.2%	MDN2646	86.1%		
2004-110	9/22/2004	0.99979	-0.039 ng/L	7.72 ng/mL	96.4%	MDN1972	3.9%	MDN1972	104.3%	MDN3008	0.012 ng/Bottle
	CVAFS-9			7.64 ng/mL	95.4%	MDN2080	9.4%	MDN2080	116.9%		
						MDN2535	9.7%	MDN2535	112.1%		
2004-111	9/23/2004	0.99999	0.005 ng/L	7.94 ng/mL	99.1%	MDN0483	2.4%	MDN0483	92.9%		
	CVAFS-9			7.34 ng/mL	91.7%	MDN1935	8.3%	MDN1935	102.4%		
						MDN2406	1.8%	MDN2406	93.6%		
2004-112	9/24/2004	0.99963	0.022 ng/L	7.60 ng/mL	95.0%	MDN0197	12.9%	MDN0197	101.1%		
	CVAFS-9			7.39 ng/mL	92.3%	MDN2223	5.1%	MDN2223	92.0%		
						MDN2608	2.3%	MDN2608	89.7%		
2004-113	9/24/2004	0.99959	0.024 ng/L	7.95 ng/mL	99.3%	MDN0487	0.7%	MDN0487	113.9%		
	CVAFS-10			7.45 ng/mL	93.0%	MDN2160	0.1%	MDN2160	94.5%		
						MDN2468	3.8%	MDN2468	98.2%		
2004-115	9/28/2004	0.99994	0.040 ng/L	8.06 ng/mL	100.6%	MDN0799	6.2%	MDN0799	103.6%		
	CVAFS-9			7.35 ng/mL	91.9%	MDN0816	2.7%	MDN0816	105.6%		

				MDN0848 3.0%		MDN0848 94.6%	
Quarterly Mean:	**0.99964**	**0.036 ng/L**	**96.3%**		**3.0%**	**102.9%**	**0.028 ng/Bottle**
Std Dev:	**±0.00070**	**±0.031**	**±4.1%**		**±3.4%**	**±21.9%**	**±0.011**

MDN Quarterly Analysis QC Summary, Quarter 4 of 2004

Analysis		Calibration R	BrCl Blk Conc	SRM (Nist 1641-d) TV=8.005 ng/mL	%Rec	Duplicates Bottle ID	RPD	Spikes Bottle ID	Rec.	Bottle Blanks Bottle ID	Conc
2004-114	10/5/2004	0.99909	0.010 ng/L	7.67 ng/mL	95.9%	MDN0699	4.3%	MDN0699	105.2%		
	CVAFS-9			7.21 ng/mL	90.1%	MDN1913	1.5%	MDN1913	89.7%		
						MDN2143	10.7%	MDN2143	101.3%		
2004-116	10/5/2004	0.99993	0.044 ng/L	7.81 ng/mL	97.5%	MDN2336	3.0%	MDN2336	98.7%		
	CVAFS-10			7.81 ng/mL	97.6%	MDN2385	2.0%	MDN2385	98.2%		
						MDN2445	2.1%	MDN2445	107.1%		
2004-117	10/14/2004	0.99995	0.046 ng/L	7.93 ng/mL	99.1%	MDN0954	2.9%	MDN0954	106.1%		
	CVAFS-10			7.52 ng/mL	93.9%	MDN1755	1.5%	MDN1755	97.3%		
						MDN2071	2.0%	MDN2071	97.7%		
2004-118	10/14/2004	0.99936	0.030 ng/L	7.89 ng/mL	98.5%	MDN0640	1.7%	MDN0640	100.8%		
	CVAFS-9			7.26 ng/mL	90.7%	MDN2027	8.0%	MDN2027	87.3%		
						MDN2129	6.9%	MDN2129	95.5%		
2004-119	10/15/2004	0.99968	0.040 ng/L	8.00 ng/mL	99.9%	MDN0492	1.2%	MDN0492	108.2%		
	CVAFS-9			7.71 ng/mL	96.4%	MDN2058	4.8%	MDN2058	100.4%		
						MDN2505	6.0%	MDN2505	97.4%		
2004-120	10/18/2004	0.99995	0.056 ng/L	7.73 ng/mL	96.6%	MDN0734	1.6%	MDN0734	96.0%	MDN0283	0.024 ng/Bottle
	CVAFS-10			6.00 ng/mL	74.9%	MDN2272	0.9%	MDN2272	97.2%		
				7.60 ng/mL	94.9%	MDN2449	1.2%	MDN2449	88.3%		
2004-121	10/21/2004	0.99984	0.035 ng/L	8.01 ng/mL	100.1%	MDN2175	1.0%	MDN2175	103.7%		
	CVAFS-10			7.74 ng/mL	96.7%	MDN2367	7.2%	MDN2367	94.8%		
						MDN2542	1.3%	MDN2542	97.8%		
2004-122	10/18/2004	0.99987	0.002 ng/L	7.60 ng/mL	95.0%	MDN2064	3.9%	MDN2064	105.9%	MDN2470	0.014 ng/Bottle
	CVAFS-9			7.42 ng/mL	92.6%	MDN2117	7.2%	MDN2117	102.1%		
						MDN2548	9.6%	MDN2548	96.1%		
2004-123	10/28/2004	0.99984	0.047 ng/L	7.77 ng/mL	97.1%	MDN0796	4.7%	MDN0796	98.8%		
	CVAFS-9			7.57 ng/mL	94.6%	MDN2049	1.2%	MDN2049	97.8%		
						MDN2331	2.5%	MDN2331	103.6%		
2004-124	10/27/2004	0.99985	0.033 ng/L	7.70 ng/mL	96.2%	MDN0142	5.4%	MDN0142	91.5%		
	CVAFS-9			7.19 ng/mL	89.8%	MDN0155	7.4%	MDN0155	92.5%		
						MDN3000	1.1%	MDN3000	100.8%		
2004-125	11/4/2004	0.99989	0.070 ng/L	7.66 ng/mL	95.6%	MDN0419	3.5%	MDN0419	94.6%	MDN2690	0.013 ng/Bottle
	CVAFS-9			7.16 ng/mL	89.5%	MDN2190	17.0%	MDN2190	86.3%	MDN0739	0.012 ng/Bottle
						MDN2539	5.7%	MDN2539	109.0%		
2004-126	11/4/2004	0.99985	0.042 ng/L	8.32 ng/mL	104.0%	MDN0123	10.0%	MDN0123	100.8%		
	CVAFS-10			7.52 ng/mL	93.9%	MDN1740	3.9%	MDN1740	113.5%		
						MDN2453	1.4%	MDN2453	111.0%		
2004-127	10/21/2004	0.99946	0.006 ng/L	7.57 ng/mL	94.6%	MDN2174	0.8%	MDN2174	105.4%		
	CVAFS-10					MDN2235	6.2%	MDN2235	102.1%		
2004-128	11/8/2004	0.99992	0.049 ng/L	7.76 ng/mL	97.0%	MDN0397	4.8%	MDN0397	105.1%	MDN2152	0.022 ng/Bottle
	CVAFS-9			7.24 ng/mL	90.5%	MDN2413	2.6%	MDN2413	95.7%	MDN0199	0.016 ng/Bottle

						MDN2474	9.9%	MDN2474	96.3%		
2004-129	11/9/2004	0.99990	0.021 ng/L	7.82 ng/mL	97.7%	MDN0494	6.3%	MDN0494	111.2%		
	CVAFS-9			7.49 ng/mL	93.6%	MDN2378	5.3%	MDN2393	96.6%		
						MDN2393	8.5%				
2004-130	11/9/2004	0.99991	0.069 ng/L	8.28 ng/mL	103.4%	MDN0811	4.0%	MDN0811	99.0%		
	CVAFS-10			8.06 ng/mL	100.7%	MDN1975	3.3%	MDN1975	91.1%		
						MDN2577	17.2%	MDN2577	101.0%		
2004-131	11/16/2004	0.99984	0.070 ng/L	8.46 ng/mL	105.7%	MDN0141	1.5%	MDN0141	113.8%		
	CVAFS-10			7.44 ng/mL	92.9%	MDN2276	1.6%	MDN2276	101.5%		
						MDN2553	13.7%	MDN2553	108.0%		
2004-132	11/10/2004	0.99993	0.006 ng/L	7.71 ng/mL	96.3%	MDN2358	7.8%	MDN2358	95.9%	MDN2523	0.028 ng/Bottle
	CVAFS-9			7.32 ng/mL	91.5%	MDN2658	3.1%	MDN2658	100.2%		
						MDN2660	4.1%	MDN2660	92.0%		
2004-133	11/16/2004	0.99991	0.038 ng/L	8.01 ng/mL	100.1%	MDN2110	4.3%	MDN2110	94.9%	MDN0953	0.022 ng/Bottle
	CVAFS-9			7.63 ng/mL	95.3%	MDN2659	7.4%	MDN2659	97.3%		
						MDN2720	6.9%	MDN2720	108.1%		
2004-134	11/11/2004	0.99993	0.032 ng/L	7.84 ng/mL	97.9%	MDN0111	12.7%	MDN0111	103.6%		
	CVAFS-9			7.30 ng/mL	91.1%	MDN0666	3.7%	MDN0666	92.7%		
						MDN1761	3.7%	MDN1761	103.7%		
2004-135	11/11/2004	0.99989	0.093 ng/L	8.39 ng/mL	104.8%	MDN2391	2.4%	MDN2391	109.3%		
	CVAFS-10			7.56 ng/mL	94.4%	MDN2439	2.0%	MDN2439	100.7%		
						MDN2666	1.3%	MDN2666	108.6%		
2004-136	11/12/2004	0.99925	0.029 ng/L	7.81 ng/mL	97.5%	MDN0633	4.3%	MDN0633	103.9%		
	CVAFS-9			7.36 ng/mL	92.0%	MDN0668	2.5%	MDN0668	96.0%		
						MDN0853	3.5%	MDN0853	97.7%		
2004-137	11/10/2004	0.99983	0.039 ng/L	8.32 ng/mL	104.0%	MDN0146	0.3%	MDN0146	98.3%	MDN2641	0.035 ng/Bottle
	CVAFS-10			7.46 ng/mL	93.1%	MDN0823	0.3%	MDN0823	106.3%		
								MDN1954	108.3%		
2004-138	11/18/2004	0.99988	0.032 ng/L	7.62 ng/mL	95.2%	MDN1928	7.7%	MDN1928	95.3%		
	CVAFS-9			7.03 ng/mL	87.8%	MDN2477	0.5%	MDN2477	101.6%		
						MDN2694	4.5%	MDN2694	84.9%		
2004-139	11/22/2004	0.99990	0.002 ng/L	7.70 ng/mL	96.2%	MDN0799	5.1%	MDN0799	99.3%		
	CVAFS-9			7.53 ng/mL	94.0%	MDN2635	15.9%	MDN2635	105.5%		
						MDN2676		MDN2676	94.3%		
2004-140	12/8/2004	0.99870	0.016 ng/L	7.93 ng/mL	99.0%	MDN0678	1.3%	MDN0678	108.0%	MDN1914	0.047 ng/Bottle
	CVAFS-10			8.14 ng/mL	101.7%	MDN2395	1.0%	MDN2395	98.9%		
						MDN2582	0.7%	MDN2582	101.1%		
2004-141	12/7/2004	0.99990	0.029 ng/L	7.80 ng/mL	97.4%	MDN0949	5.1%	MDN0949	96.8%		
	CVAFS-10			7.85 ng/mL	98.1%	MDN2583	5.8%	MDN2583	94.6%		
						MDN2606	2.2%	MDN2606	98.1%		
2004-142	12/2/2004	0.99977	0.030 ng/L	7.80 ng/mL	97.4%	MDN2600	1.4%	MDN2600	95.9%	MDN1761	0.014 ng/Bottle
	CVAFS-9			7.48 ng/mL	93.4%	MDN2685	1.8%	MDN2685	93.8%	MDN1970	0.016 ng/Bottle
						MDN2701	0.5%	MDN2701	98.8%		
2004-143	12/2/2004	0.99979	0.038 ng/L	7.82 ng/mL	97.7%	MDN0757	1.3%	MDN0757	109.2%		
	CVAFS-10			7.67 ng/mL	95.8%	MDN0772	3.9%	MDN0772	96.8%		

						MDN2308	1.0%	MDN2308	105.9%		
2004-144	12/13/2004	0.99995	0.034 ng/L	7.66 ng/mL	95.6%	MDN2054	1.1%	MDN2054	101.5%	MDN0483	0.022 ng/Bottle
	CVAFS-10			7.82 ng/mL	97.7%	MDN2569	0.7%	MDN2569	102.3%	MDN2080	0.013 ng/Bottle
						MDN2587	0.7%	MDN2587	97.2%	MDN2059	0.012 ng/Bottle
2004-145	12/15/2004	0.99983	0.049 ng/L	7.83 ng/mL	97.8%	MDN2213	1.7%	MDN2213	100.2%		
	CVAFS-9			7.66 ng/mL	95.6%	MDN2217	3.8%	MDN2217	98.5%		
2004-146	12/14/2004	0.99999	0.048 ng/L	7.65 ng/mL	95.6%	MDN0761	2.1%	MDN0761	96.9%		
	CVAFS-9			7.64 ng/mL	95.4%	MDN2487	10.6%	MDN2487	101.4%		
						MDN2608	0.8%	MDN2608	98.4%		
2004-147	12/14/2004	0.99985	0.042 ng/L	7.71 ng/mL	96.3%	MDN0183	0.5%	MDN0183	101.1%	MDN0969	0.019 ng/Bottle
	CVAFS-10			7.81 ng/mL	97.5%	MDN0425	0.6%	MDN0425	101.1%		
						MDN2382	0.8%	MDN2382	100.3%		
2004-148	12/15/2004	0.99981	0.038 ng/L	7.64 ng/mL	95.5%	MDN0113	5.8%	MDN0113	101.5%		
	CVAFS-10			7.73 ng/mL	96.6%	MDN0392	1.3%	MDN0392	98.4%		
						MDN2053	0.3%	MDN2053	99.1%		
2004-149	12/21/2004	0.99981	0.030 ng/L	7.78 ng/mL	97.1%	MDN0123	1.9%	MDN0123	96.9%	MDN2093	0.025 ng/Bottle
	CVAFS-10			7.76 ng/mL	96.9%	MDN0923	2.8%	MDN0923	98.9%		
						MDN2130	1.8%	MDN2130	104.4%		
2004-150	12/22/2004	0.99987	0.026 ng/L	7.71 ng/mL	96.3%	MDN2148	0.5%	MDN2148	98.2%		
	CVAFS-10			7.81 ng/mL	97.5%	MDN2498	0.2%	MDN2498	99.3%		
						MDN2524	0.2%	MDN2524	101.2%		
2004-151	12/30/2004	0.99996	0.046 ng/L	7.70 ng/mL	96.2%	MDN0489	4.6%	MDN0489	100.0%	MDN2365	0.022 ng/Bottle
	CVAFS-9			7.77 ng/mL	97.1%	MDN0758	1.8%	MDN0758	96.7%		
						MDN2189	6.6%	MDN2189	99.1%		
2004-152	12/27/2004	0.99970	0.033 ng/L	7.96 ng/mL	99.4%	MDN0283	6.7%	MDN0283	99.6%		
	CVAFS-9			7.70 ng/mL	96.1%	MDN2262	2.1%	MDN2262	96.6%		
						MDN3011	0.8%	MDN3011	95.7%		
2004-153	12/28/2004	0.99992	0.021 ng/L	7.82 ng/mL	97.7%	MDN0125	5.9%	MDN0125	95.0%		
	CVAFS-9			7.38 ng/mL	92.1%	MDN1933	1.9%	MDN1933	92.5%		
						MDN2725	4.1%	MDN2725	103.8%		
2004-154	12/28/2004	0.99993	0.026 ng/L	7.78 ng/mL	97.2%	MDN2030	0.4%	MDN2030	101.1%		
	CVAFS-10			7.88 ng/mL	98.4%	MDN2516	7.6%	MDN2516	109.9%		
						MDN2566	2.2%	MDN2566	97.4%		
2004-155	12/29/2004	0.99964	0.030 ng/L	7.62 ng/mL	95.2%	MDN1927	3.9%	MDN1927	96.3%	MDN1931	0.006 ng/Bottle
	CVAFS-9			7.45 ng/mL	93.1%	MDN1959	1.9%	MDN1959	97.1%	MDN0938	0.005 ng/Bottle
						MDN2555	4.7%	MDN2555	96.6%		
2004-156	12/27/2004	0.99991	0.041 ng/L	7.83 ng/mL	97.8%	MDN1759	1.6%	MDN1759	98.8%		
	CVAFS-10			7.88 ng/mL	98.4%	MDN2451	4.4%	MDN2451	97.4%		
						MDN2491	0.2%	MDN2491	99.9%		
2004-157	12/29/2004	0.99949	0.063 ng/L	8.05 ng/mL	100.6%	MDN1973	9.2%	MDN1973	108.7%	MDN2413	0.014 ng/Bottle
	CVAFS-10			7.49 ng/mL	93.6%	MDN2011	6.6%	MDN2011	94.9%		
						MDN2657	0.3%	MDN2657	103.6%		
Quarterly Mean:		0.99978	0.037 ng/L		96.1%		3.9%		103.0%		0.019 ng/Bottle
Std Dev:		±0.00024	±0.019		±4.1%		±3.5%		±18.6%		±0.009

Methylmercury Quarterly Analysis QC Summary, Quarter 1 of 2004

DataSetID		Calibration	Prep Blk	Dorm - 2		Duplicates		Spikes		
		R	Conc. (ng/L)	TV=4470 ng/L	%Rec	Comp ID	RPD	Comp ID	%Rec	RPD
MHG7-040106-1	1/6/2004	0.99848	0.050	3856.686	86.3	WA1820031209	23.3	NS0120031202 MS	78.21	3.0
CVAFS-7	Batch#100							NS0120031202 MSD	80.77	
MHG1-040108-1	1/8/2004	0.99937	0.040	3951.369	88.4	OR10 COMP 013	12.3	OR10 COMP 013 MS	84.29	7.8
CVAFS-1	Batch#101							OR10 COMP 013 MSD	92.99	
MHG7-040129-1	1/29/2004	0.99993	0.000	4385.717	98.1	OR10 COMP 014	15.6	OR10 COMP 014 MS	92.08	0.1
CVAFS-7	Batch#103							OR10 COMP 014 MSD	91.95	
MHG7-040212-1	2/12/2004	0.99999	0.050	4871.615	109.0	LA2320040203	5.4	LA2320040127 MS	103.19	4.3
CVAFS-7	Batch#104							LA2320040127 MSD	107.82	
MHG1-040302-1	3/2/2004	0.99985	0.060	4595.395	102.8	LA0520040217	30.0	LA1020040217 MS	94.26	2.2
CVAFS-1	Batch#105							LA1020040217 MSD	92.06	
MHG7-040309-1	3/9/2004	0.99943	0.030	4407.775	98.6	IN2120040203	4.9	OR10 COMP 015 MS	99.04	6.5
CVAFS-7	Batch#106							OR10 COMP 015 MSD	91.76	
MHG7-040316-1	3/16/2004	0.99989	0.030	4734.368	105.9	LA2320040302	6.1	LA2820040225 MS	105.23	4.2
CVAFS-7	Batch#107							LA2820040225 MSD	100.71	
MHG7-040324-1	3/24/2004	0.99893	0.120	4506.614	100.8	FL04 COMP 034	300.0	OR10 COMP 016 MS	102.33	16.9
CVAFS-7	Batch#108							OR10 COMP 016 MSD	83.85	
MHG7-040331-1	3/31/2004	0.99997	0.090	4770.290	106.7	LA1020040309	17.1	LA0520040316 MS	101.97	3.1
CVAFS-7	Batch#109							LA0520040316 MSD	98.74	

Methylmercury Quarterly Analysis QC Summary, Quarter 2 of 2004

DataSetID		Calibration	Prep Blk	Dorm - 2		Duplicates		Spikes		
		R	Conc (ng/L)	TV=4470 ng/L	%Rec	Comp ID	RPD	Comp ID	%Rec	RPD
MHG7-040409-1	4/9/2004	0.99954	0.090	4464.019	99.9	IN3420040330	13.5	WA1820040330 MS	94.39	3.3
CVAFS-7	Batch#110							WA1820040330 MSD	90.57	
MHG1-040414-1	4/14/2004	0.99981	0.000	4971.940	111.2	IN3920040406	8.2	NS0120040406 MS	97.70	4.2
CVAFS-1	Batch#111							NS0120040406 MSD	93.08	
MHG7-040423-1	4/23/2004	0.99997	0.120	4687.644	104.9			LA0520040413 MSD	83.85	0.0
CVAFS-7	Batch#112							LA0520040413 MS	83.85	
MHG7-040519-1	5/19/2004	0.99995	0.030	4417.574	98.8	NS0120040420	7.9	FL04 COMP 037 MS	95.77	6.1
CVAFS-7	Batch#113							FL04 COMP 037 MSD	102.01	
MHG7-040521-1	5/21/2004	0.99999	0.070	4916.858	110.0	LA1020040505	13.6	LA2820040504 MS	101.29	0.0
CVAFS-7	Batch#114							LA2820040504 MSD	101.29	
MHG1-040609-1	6/9/2004	0.99995	0.080	5183.158	116.0	WI22 COMP 016	0.8	WI22 COMP 016 MS	93.13	10.7
CVAFS-1	Batch#115							WI22 COMP 016 MSD	82.56	
MHG1-040617-1	6/17/2004	0.99514	-0.010	4716.470	105.5	WI31 COMP 029	41.4	WI99 COMP 097 MS	80.86	7.2
CVAFS-1	Batch#116							WI99 COMP 097 MSD	87.78	

Methylmercury Quarterly Analysis QC Summary, Quarter 3 of 2004

DataSetID		Calibration R	Prep Blk Conc (ng/L)	Dorm - 2 TV=4470 ng/L	Dorm - 2 %Rec	Duplicates Comp ID	Duplicates RPD	Spikes Comp ID	Spikes %Rec	Spikes RPD
MHG7-040709-1	7/9/2004	0.99969	0.000	4501.024	100.7	LA0520040622	30.7	NS0120040629 MS 101	0.60	2.0
CVAFS-7	Batch#117							NS0120040629 MSD	103.96	
MHG7-040722-1	7/22/2004	0.99976	0.060	4617.126	103.3	FL32 COMP 010	20.2	GA09 COMP 022 MS	98.68	0.0
CVAFS-7	Batch#118							GA09 COMP 022 MSD	98.68	
MHG7-040805-1	8/5/2004	0.99840	0.070	4649.854	104.0	LA2820040706	2.5	LA2320040706 MS	88.90	4.7
CVAFS-7	Batch#119							LA2320040706 MSD	84.70	
MHG7-040820-1	8/20/2004	0.99986	0.000	4662.252	104.3	MD98 COMP 002	0.0	GA09 COMP 023 MS	95.40	143.4
CVAFS-7	Batch#120							GA09 COMP 023 MSD	9.86	
MHG7-040909-1	9/9/2004	0.99993	0.130	4029.792	90.2	FL3220040814	0.0			
CVAFS-7	Batch#121									
MHG7-040916-1	9/16/2004	0.99982	0.080	4235.328	94.8	GA0920040813	100.0	SC0520040817 MS	107.40	22.2
CVAFS-7	Batch#122							SC0520040817 MSD	85.12	
MHG7-040930-1	9/30/2004	0.99989	0.070	4930.021	110.3	FL04 COMP 041	0.0	FL11 COMP 041 MS	94.40	4.9
CVAFS-7	Batch#123							FL11 COMP 041 MSD		

Methylmercury Quarterly Analysis QC Summary, Quarter 4 of 2004

DataSetID		Calibration R	Prep Blk Conc (ng/L)	Dorm - 2 TV=4470 ng/L	Dorm - 2 %Rec	Duplicates Comp ID	Duplicates RPD	Spikes Comp ID	Spikes %Rec	Spikes RPD
MHG7-041007-1	10/7/2004	0.99837	0.030	5242.942	117.3	NS0120040921	33.0	FL05 COMP 025 MS	114.24	3.9
CVAFS-7	Batch#124							FL05 COMP 025 MSD	109.82	
MHG7-041021-1	10/21/2004	0.99953	0.060	4368.177	97.7	MN23 COMP 104	30.1	FL32 COMP 013 MS	97.87	9.0
CVAFS-7	Batch#125							FL32 COMP 013 MSD	89.35	
MHG1-041104-1	11/4/2004	0.99990	0.020	5240.390	117.2	NS0120041005	12.5	MN16 COMP 104 MS	119.89	13.9
CVAFS-1	Batch#126							MN16 COMP 104 MSD	103.28	
MHG7-041111-1	11/11/2004	0.99974	0.090	4688.745	104.9	LA2820040831	8.7			
CVAFS-7	Batch#127									
MHG7-041202-1	12/2/2004	0.99577	0.040	4101.590	91.8	WA1820040914	7.3	NS0120041109 MS	95.10	11.2
CVAFS-7	Batch#128							NS0120041109 MSD	84.60	
MHG1-041218-1	12/18/2004	0.99928	0.020	4870.871	109.0	FL04 COMP 044	0.0	LA232009411003 MS	97.42	1.8
CVAFS-1	Batch#129							LA232009411003 MSD	99.16	