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GREGORY J. MADDEN
(202) 789-7513

June 30, 1994

By Telecopy and Federal Express

Judith R. Hykel, Esq.
Assistant Regional Counsel (3RC-33)
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

RE: Rhône-Poulenc, Inc., Docket No. RCRA III-254

Dear Ms. Hykel:

Pursuant to your letter of June 10, 1994, and in anticipation of our July 7, 1994 meeting, Rhône-Poulenc is providing the information that you requested as part of our ongoing settlement discussions. Specifically, we are providing EPA with: (a) information concerning Rhône-Poulenc's analysis of the split samples taken on September 23, 1992;[1/] (b) a narrative description for the calculation of the hourly rolling averages (HRA) during and following steamout periods; and (c) a narrative explanation of the alarms associated with the Burner Management System (BMS).

Rhône-Poulenc is also providing additional information that we believe will facilitate settlement discussions. First, enclosed is the training module that is currently used for qualifying the Boiler Room Operators who are responsible for the BMS operation. You will see that the training module for the operators requires that they can operate the BMS as well as respond to other conditions that might impair the safety or efficiency of the boiler operation. Also provided below is an explanation of how the training is implemented and a description of some of the elements ensuring safe and efficient boiler operation. Second, with respect to the residue samples, provided below is Rhône-Poulenc's critique of EPA's residue sampling laboratory analysis results.

1/ The boiler hazardous waste feed was analyzed for metals by Technical Testing Laboratories and the ash for Boiler No. 3 was analyzed by an on-site laboratory.

A. Calculation of Hourly Rolling Averages During Steamout

The steamout of the hazardous waste/residue feed lines does not alter the calculation method for the HRA of the hazardous waste feed rate to the boilers. The system takes the data for the previous sixty minutes (including minutes when steamout is occurring) and calculates the HRA using that data. For the Institute plant, the calculation of the HRA was irrelevant during August and September of 1992, since the hazardous waste feed cutoff was on an instantaneous basis, and not on an HRA basis. That is, the system would shut off the hazardous waste feed if the established feed rate was exceeded for even one minute.

B. BMS Alarms and Boiler Operation Control Room Training

The BMS is designed specifically to prevent boiler explosions. It was installed at the same time as the boiler control system (1978) and has operated continuously since installation. It was designed in accordance with ANSI/NFPA 85C and Union Carbide Corporation's "Criteria for Flame Safety Systems for Gas and Oil-Fired Steam Generators" (Criteria 101). Interlocks are incorporated into the logic to ensure that the boilers are purged of all combustibles prior to lighting any ignitor or burner. During operation, the BMS will automatically trip individual burners, or all fuel sources (master trip) to the boiler if potentially unsafe conditions develop while the boiler is being fired. The boiler control system (i.e., the Total Distributed Control System (TDC-2000) that measures all boiler conditions) monitors the same parameters as the BMS and triggers alarms that must be acknowledged by the operator. Specific trips and/or alarms occur under the following conditions:

- Low Combustion Chamber Air Flow: Air flow must be at least 20% of the maximum possible air flow created by the operation of the boiler fans (200,000 lbs/hr), or a master fuel trip is initiated. An alarm is triggered on the TDC 2000 at 25% of maximum air flow. This control ensures an air-rich atmosphere while starting and establishes minimum velocities through the boiler to prevent hazardous accumulations of unburned fuel.

- High Furnace Pressure: Protects against abnormal furnace conditions such as a tube rupture or an air damper failure. The alarm set point is .05 inches of water (.0018 pound per square inch), and a master fuel trip occurs if the furnace pressure exceeds one inch of water for two minutes (.036 psig), or instantaneously at four inches of water (.144 psig).

- Low Drum Water Level: The purpose for a low drum level shutdown is to protect the steam drum and waterwall tubes from a waterside steam explosion, or damaging the metal of the boiler due to overheating. The drum level monitor alarms when the drum water level reaches three inches below the drum center line.[2/] A low drum water level initiates a master fuel trip where the reading is six inches below the drum center line for one minute.

- Loss Of Flame: If a flame is not detected at a burner, then all fuels to that burner are shut off to prevent the accumulation of an explosive mixture within the furnace. The loss of all flame results in a master fuel trip.

- Low Differential Pressure Between The Residue Atomizing Steam And Residue Pressure: A low differential pressure of 10 psig triggers an alarm and causes a residue fuel trip in order to prevent an unsafe condition caused by improper residue atomization. Proper atomization is necessary for complete combustion of the liquid residue and prevents residue from settling in the bottom of the furnace.

Operators are able to monitor the system through the use of an overhead mimic panel that shows which fuel valves (both control and trip) are open, which fans are on, and which ignitors and/or burners are on. When there is a BMS alarm condition there are three ways that the operator is alerted. First, there is a distinctive hi-pitched audible alarm. Second, there is a warning light on the panel which indicates which boiler is in alarm condition. Third, the Modicon CRT displays the alarm message, the boiler number, the date and time and a description of the alarm. The operator utilizes the information provided by the CRT display to identify the parameter triggering the alarm and to bring the boiler out of the alarm condition. The operator must physically acknowledge the alarm condition by pushing a button to discontinue the audio and warning light alarm. If the BMS is still in an upset condition when the operator releases the alarm acknowledgment button, then the distinctive audible alarm and warning light will remain. In addition, the alarm message remains displayed on the CRT until the operator has corrected the condition.

The operation of the BMS is a task for which each boiler room operator must become "qualified" in order to become certified for the job. Rhône-Poulenc provides BMS operation training for the boiler room operators as part of a comprehensive training module that is used to certify boiler room operators. The purpose of the training module is "to define the minimum knowledge and skills of an operator to safely operate the No. 1 Steam Plant boilers using the TDC-2000 Control System and auxiliary controls." (We have enclosed the current training module for boiler room operators.) A

2/ There is also a high drum water level alarm that initiates at six inches above the drum center line. The purpose of a high drum level shutdown is to avoid overheating damage to the superheating elements, and prevent water carryover into the header which could rupture the header or damage equipment downstream.

central part of the training module is that operators must demonstrate how to operate the boilers safely, efficiently, and in compliance with all applicable environmental regulations.

The boiler operation control room training module includes training of each control room operator in six job elements. The training module job elements are defined as Critical Operating Parameters, TDC-2000, Safety, Emission Equipment, Waste Minimization, and BIF Compliance. The trainee must pass written and physical performance examinations. The written examination requires that the trainee receive at least an 80% score, and that they score a 100% on any item marked critical on the written examination (this includes all Critical Operating Parameters). The standard for passing the physical performance examination is even more rigid, requiring performance of all tasks to 100% accuracy.

Many of the tasks that an operator must be qualified on relate specifically to ensuring that the boiler is operated safely and under combustion conditions that maximize the burning of all fuel sources and their constituents. As the training module explains, the operator must be able to understand exactly how the TDC 2000 Control System works. Thus, all of the operators understand the fundamentals behind the Control System's operation. Most important for purposes of ensuring safe and efficient combustion, the operator must be able to, inter alia: (a) respond to process upsets, including loss of a burner flame and boiler trips; (b) recognize and respond to alarms; (c) operate the BMS; and (d) understand how the fuel air control loop operates to ensure combustion in an air rich environment.

The training module puts special emphasis on the trainees ability to understand and respond to the Critical Operating Parameters. The operator must know each Critical Operating Parameter, identify the process hazards associated with each Critical Operating Parameter, know the "normal operation" and "never exceed" limits for each Critical Operating Parameter, and identify the corrective actions and immediate responses necessary when normal operation and never exceed limits are reached. Three of the Critical Operating Parameters (low air flow, high furnace pressure, and drum water level), are part of the BMS, and are explained above. The Critical Operating Parameters element of the training module helps ensure that the boiler room operators are fully trained to deal with conditions that could lead to boiler explosion.

A number of other portions of the training module also act to ensure that the boiler room operators are trained to operate the boilers safely and with maximum combustion. For instance, each operator, before becoming qualified for the job, must demonstrate their ability to identify, investigate, and respond to boiler alarms, including the BMS alarms described above. Through training of the boiler room operators, the Institute plant acts to ensure that any conditions giving rise to the danger of boiler explosion or unacceptable combustion levels do not arise, and should such conditions arise, that the operators have the training and knowledge needed to respond.

C. Residue Sampling Data

Count III of the Complaint alleges that the residue feedstream to the Institute boiler had detectable levels of lead and antimony and, therefore, Institute's failure to submit a certification that accounted for the presence of lead and antimony was a violation of 40 C.F.R. §§ 266.106(a) & (c). As paragraph 35 of the Complaint makes plain, certification of compliance is necessary only where the metal is "present in Respondent's hazardous waste at detectable levels using the analytical procedures specified in SW-846." However, EPA's test results revealing detectable levels of lead and antimony were biased high due to flaws in the sample analysis that was conducted.3/

Rhône-Poulenc's review of the QA/QC data for the laboratory analysis reveals that the results are unreliable. A number of flaws in the laboratory analysis results in the antimony and lead detections being biased high. The biases that occurred should have lead to a rerun of the sample analysis before the results were used as a basis for asserting Institute's noncompliance.

The detection of antimony in Institute's residue sample was based on: (a) a result that was not very much greater than that in the field blank; (b) a result that was greatly divergent from that obtained for the rerun of that same residue sample; and (c) a metals recovery rate greater than 110% of the spiked sample. The antimony detection level obtained for the residue sample cited in the CEI Report, SC1451, was not substantially higher than the antimony found in the field blank, SC1460. Page 000002 of the Inorganic Data Analysis Package provides the metals analysis result for SC1451 and that result is not even four percent greater than the field blank result (8.3 mg/kg for SC1451 to 8.0 mg/kg for SC1460). Given the levels detected in the field blank the antimony results should have either been disregarded or the samples should have been rerun. Perhaps even more telling, is the divergence in the results for SC1451 and a rerun of the same sample, SC1451D. SC1451 resulted in antimony detection of .0417 ppm, while SC1451D resulted in antimony detection of negative .0319 ppm. Inorganic Data Analysis Package, pp. 000074-75. These extremely divergent results reveal excessive instrument noise and the .0417 ppm data point should not have been reported as a real value. With this level of instrument noise it would be easy to obtain a false positive reading. Finally, the antimony recovery from the spiked sample was 115.4%. Inorganic Data Analysis Package, pp. 000019. While greater than 100% recovery is not unusual, it is good laboratory practice to rerun the sample where the

not in duplicate
This is LDCL not spike % recovery

3/ In addition, the analytical methods used by EPA for the liquid residue were not approved SW-846 methods. EPA Method 1311, the method EPA has indicated was utilized in analyzing the residue samples taken by EPA's contractor during the September 23, 1992 inspection, was not an approved SW-846 method, and the test results cannot be used as a basis for Count III of the Complaint. The test methods that were in effect on the date of the certification of compliance are identified in the Second Edition and Updates I and II of SW-846 and Method 1311 is not identified as an appropriate test method. See 40 C.F.R. § 260.11. Thus, in order to find detectable levels of lead and antimony, EPA's contractor may have utilized an inappropriate sampling analysis technique. If so, EPA may not assert a violation based on these test results.

recovery is greater than ±10%. Individually, each of these problems puts into question the antimony results; collectively they make the results fundamentally unsound.[4/]

The detection of lead in the residue sample taken by EPA's contractor is also flawed. The flaws in the lead detection analysis include: (a) the presence of lead in the field blank; (b) the fact that no lead was found in the duplicate sample, SC1454; and (c) a lead recovery of 116.7% from the spiked sample. Since the lead contamination in the field blank is at a level approximately twice the contract required detection limit (CRDL), and three times the method detection limit for lead, the qualitative lead identification is questionable. Second, despite the fact that EPA took a duplicate sample, SC1454, only ten minutes after the first sample, SC1451, the duplicate sample did not contain lead at detectable levels. Although the character of the waste stream may have changed some in ten minutes, in light of the large volume of material in the tank, it is very unlikely that the character of the residue would have changed as substantially as the results for SC1451 and SC1454 indicate. Thus, problems in the sample analysis are the most likely cause of such divergent results. Finally, the lead recovery rate of 116.7% is greater than that which is appropriate under good laboratory practices and the sample should have been rerun. These deficiencies in the lead sample analysis results were so significant that EPA's contractor should have, at a minimum, performed additional testing. More importantly, EPA should not have relied on lead detection in the single sample, SC1451, as a basis for asserting a regulatory violation where the data was suspect.

We hope this information will assist EPA in understanding and evaluating Rhône-Poulenc's settlement position. We look forward to discussing this information and the possibility of settlement at our July 7, 1994 meeting.

Sincerely,

Gregory J. Madden

Enclosure
cc: George Goodridge (Rhône-Poulenc, Inc.)

4/ Rhône-Poulenc notes that while sample SC1458S was not a residue sample, it did reveal a antimony recovery rate of negative 67.9% for a spiked sample. This result is so far off the scale that it raises questions about all of the sample analysis.

TECHNICAL TESTING LABORATORIES

A DIVISION OF COMMERCIAL TESTING & ENGINEERING CO.

LABORATORY ANALYSIS REPORT

Steve Graves
RHONE POULENC AG COMPANY INSTITUTE

Laboratory Number 292-11-0288-000

Respectfully Submitted:

GRAB 1021 TANK RESIDUE
BIF SAMPLING

Date Sampled 09/23/92 12:00
Date Received 11/12/92

Sampled by CLIENT

R121492 1233

ANALYSIS FOR REQUESTED PARAMETERS
ALL RESULTS ARE ON AN AS RECEIVED BASIS

REVISED REPORT

PARAMETER	RESULT	MDL	UNITS	METHOD	ANALYZED DATE/TIME/ANALYST
Ash	0.33	0.01	%	EPA160.4	12/09/92 16:00 MHS
Chloride	1000	500	mg/Kg	SW9252	11/19/92 15:00 SM

METHOD REFERENCE EPA: Methods For Chemical Analysis Of Water And Wastes; March, 1983.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; SW-846, 3rd Edition; Nov 1986.

1258 GREENBRIER STREET, CHARLESTON, WEST VIRGINIA 25311 — TELEPHONE 304-346-0725
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4440 GLEN ESTE-WITHAMSVILLE ROAD, SUITE 900, CINCINNATI, OHIO 45245 — TELEPHONE 513-752-9696

LABORATORY ANALYSIS REPORT

Steve Graves
RHONE POULENC AG COMPANY INSTITUTE

Laboratory Number 292-11-0288-000

Respectfully Submitted:

GRAB 1021 TANK RESIDUE
BIF SAMPLING

Date Sampled 09/23/92 12:00
Date Received 11/12/92

Sampled by CLIENT

R120492 1031

ANALYSIS FOR REQUESTED PARAMETERS
ALL RESULTS ARE ON AN AS RECEIVED BASIS

REVISED REPORT

PARAMETER	RESULT	MDL	UNITS	METHOD	ANALYZED DATE/TIME/ANALYST
Ash	3.6	0.01	%	EPA160.4	11/24/92 14:00 MMS
Chloride	1000	500	mg/Kg	SW9252	11/19/92 15:00 SM

METHOD REFERENCE EPA: Methods For Chemical Analysis Of Water And Wastes; March, 1983.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; SW-846, 3rd Edition; Nov 1986.

LABORATORY ANALYSIS REPORT

Steve Graves
RHONE POULENC AG COMPANY INSTITUTE

Laboratory Number 292-09-0500-001 Respectfully Submitted:

1021 TANK RESIDUE - GRAB
EPA SPLIT

Date Sampled 09/25/92 12:00
Date Received 09/25/92

Sampled by CLIENT

100692 1713

ANALYSIS FOR REQUESTED PARAMETERS
ALL RESULTS ARE ON AN AS RECEIVED BASIS

PARAMETER	RESULT	MDL	UNITS	METHOD	ANALYZED DATE/TIME/ANALYST
Arsenic [As] (total)	ND	5.0	mg/Kg	SW6010	10/04/92 11:15 SEP
Barium [Ba] (total)	3.1	0.5	mg/Kg	SW6010	10/04/92 11:15 SEP
Cadmium [Cd] (total)	ND	0.5	mg/Kg	SW6010	10/04/92 11:15 SEP
Chromium [Cr] (total)	14	1.5	mg/Kg	SW6010	10/04/92 11:15 SEP
Lead [Pb] (total)	ND	5.0	mg/Kg	SW6010	10/04/92 11:15 SEP
Selenium [Se] (total)	ND	10	mg/Kg	SW6010	10/04/92 11:15 SEP
Silver [Ag] (total)	ND	0.5	mg/Kg	SW6010	10/04/92 11:15 SEP
Mercury [Hg] (total)	ND	0.1	mg/Kg	SW7470	10/05/92 17:00 TBS
Nickel [Ni] (total)	6	2.0	mg/Kg	SW6010	10/04/92 11:15 SEP
Beryllium [Be] (total)	ND	0.05	mg/Kg	SW6010	10/04/92 11:15 SEP
Antimony [Sb] (total)	ND	3.0	mg/Kg	SW6010	10/04/92 11:15 SEP
Thallium [Tl] (total)	ND	12	mg/Kg	SW6010	10/04/92 11:15 SEP

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; SW-846, 3rd Edition; Nov 1986.

ND: Not detected at a concentration greater than or equal to the MDL - Method Detection Limit.

TECHNICAL TESTING LABORATORIES
A DIVISION OF COMMERCIAL TESTING & ENGINEERING CO.

1256 GREENBRIER STREET
CHARLESTON, WV 25311
TELEPHONE: (304) 346-0725
FAX: (304) 346-0761

May 25, 1993

Mr. Steve Graves/Mr. John Young
Rhone Poulenc Ag Company
P.O. Box 2831
Charleston, WV 25330

Dear Steve:

As per our conversation, we have evaluated Inductively the analytical data for the 1021 Tank residue split sample taken on 09/25/92. This residue sample was digested in accordance with SW-846 method 3030 (Block Digestion - 1 gram digested brought to 50 ml) and analyzed by method 6010 (ICP). The ICP underwent initial calibration and this calibration was verified using an independent verification standard. In addition to the sample analysis, a spike analysis was also performed and a summary has been enclosed for your review. As indicated on the QC summary, two of the three elements in question yielded excellent spike recovery. Antimony was not included in the spiking solution and therefore spike data is not available. I have also enclosed copies of the pertinent raw data which includes the instrument calibration, calibration verification, a reagent blank analysis, the sample analysis, the spike analysis and a distilled water blank.

Should you have any questions or require additional information, please do not hesitate to call.

Sincerely,

Jon Pauley

Jon Pauley
QA/QC Officer

RHÔNE POULENC AG COMPANY
Institute, WV

CHAIN OF CUSTODY RECORD & DATA SHEET

Project No.: 004100
Project Name, Code or Description: BIF
Sampler: (Signature)
Tests Required: Total Metals
Reason for Analysis: 9-0500-001

P. No.	Date	Time	Comp.	Grab	Sample Identification	Number of Containers						Remarks / Minimum Detection Limit
	9/25/92	1200 pm		X	1021 Tank Residue (EPA Split)	1						As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Ni, Be, Sb, Tl
												Results needed by 10/9/92. Please include all QA/QC with results. Thanks Steve Graves

Disposal Instructions:
Hazards: Flammable
Analyzed By:
Special Handling: Makewell before sampling

Relinquished By:	Date	Time	Received For By: (Signature)	Date	Time	Remarks:
[signature]	9/25/92	1140	C Balcher	9/25/92	1420	
Chuck Balcher	9/25/92	1455	Evelyn F. Norman	9-25-92	1455	Remarks:

NRM: 512-B002-(MJJ-7/91)

Rhone Poulenc AG Company

Metals Analysis QA/QC Summary

Sample Description : 1021 Tank Residue - Grab
TTL Laboratory Number : 292-09-0500-001
Date Sampled : 09/25/92

Metals

Parameter	Sample Result (mg/Kg)	Spike Level(mg/Kg)	Method Spike Result (mg/Kg)	% Rec
Arsenic	ND	100	94	94.0
Barium	3.1	30	33.1	100.0
Cadmium	ND	30	27	90.0
Chromium	14	30	42.5	95.0
Lead	ND	100	93.5	93.5
Selenium	ND	50	56.5	113.0
Silver	ND	30	29	96.7
Mercury	ND	0.15	0.075	50.0
Nickel	5.0	30	34.5	95.0
Beryllium	ND	10	10	100.0
Antimony	ND	—	ND	—
Thallium	ND	100	106	106.0

TECHNICAL TESTING LABORATORIES

Init. Calib.

Standardization Report Sun 10-04-92 10:58:16 AM page 1

Method: TCP25 Slope = Conc(SIR)/IR

Element	Wavelen	High std	low std	Slope	Y-intercept	Date Standardized
As	193.696	Multiple	Standards	1.61181	.009291	10/04/92 10:46:15
Ba	493.409	Multiple	Standards	2.02151	.000003	10/04/92 10:46:15
Cd	226.502	Multiple	Standards	.456827	.000103	10/04/92 10:46:15
Cr	267.716	Multiple	Standards	4.24544	-.001335	10/04/92 10:46:15
Pb	220.353	Multiple	Standards	2.59906	.004898	10/04/92 10:46:15
Se	196.026	Multiple	Standards	2.24798	-.003749	10/04/92 10:46:15
Ag	328.068	Multiple	Standards	1.33353	.039906	10/04/92 10:46:15
Tl	324.754	Multiple	Standards	4.07515	-.007462	10/04/92 10:46:15
Zn	231.604	Multiple	Standards	3.14185	-.002812	10/04/92 10:46:15
Cu	213.856	Multiple	Standards	1.32274	-.001689	10/04/92 10:46:15
Mn	257.610	Multiple	Standards	3.58755	.010882	10/04/92 10:46:15
Co	228.616	Multiple	Standards	1.33560	.000202	10/04/92 10:46:15
Ni	190.864	Multiple	Standards	5.67871	.032728	10/04/92 10:46:15
Be	313.042	Multiple	Standards	1.92524	-.001391	10/04/92 10:46:15
	292.402	Multiple	Standards	1.22314	.000394	10/04/92 10:46:15
Fe	259.940	Multiple	Standards	.965311	-.005073	10/04/92 10:56:09
	308.215	Multiple	Standards	9.53581	-.006981	10/04/92 10:56:09
Al	317.933	Multiple	Standards	4.35033	.000027	10/04/92 10:56:09
Mg	279.078	Multiple	Standards	12.5994	-.018291	10/04/92 10:56:09
Sb	206.838	Multiple	Standards	7.52834	-.013668	10/04/92 10:46:15
	249.678	Multiple	Standards	3.20561	-.000908	10/04/92 10:46:15
Sn	203.030	Multiple	Standards	2.71829	-.001341	10/04/92 10:46:15
Ti	288.158	Multiple	Standards	4.71192	-.027012	10/04/92 10:46:15
V	334.941	Multiple	Standards	1.67192	-.004667	10/04/92 10:46:15
	766.491	Multiple	Standards	41.8862	-.217445	10/04/92 10:46:15
Na	588.995	Multiple	Standards	10.6893	.313227	10/04/92 10:56:09

Standardization Readback Report Sun 10-04-92 10:58:17 AM Page 1

Method: ICP25

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
As	193.696	BLANK	.000000	.000065	-.000065
		STND 2	.625000	.616233	.008767
		STND 3	2.50000	2.53144	-.031442
		STND 4	5.00000	5.03045	-.030455
		STND 5	10.0000	9.95359	.046407

CorCoef: 0.99998

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Ba	493.409	BLANK	.000000	.000010	-.000010
		STND 2	.187500	.185870	.001630
		STND 3	.750000	.759931	-.009931
		STND 4	1.50000	1.50506	-.005057
		STND 5	3.00000	2.97625	.023753

CorCoef: 0.99997

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Cd	226.502	BLANK	.000000	-.000000	.000000
		STND 2	.187500	.186916	.000584
		STND 3	.750000	.760710	-.010710
		STND 4	1.50000	1.50587	-.005867
		STND 5	3.00000	2.95477	.045228

CorCoef: 0.99994

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Cr	267.716	BLANK	.000000	.000010	-.000010
		STND 2	.187500	.185966	.001534
		STND 3	.750000	.759230	-.009230
		STND 4	1.50000	1.50679	-.006788
		STND 5	3.00000	2.97404	.025955

CorCoef: 0.99997

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Pb	220.353	BLANK	.000000	-.000223	.000223
		STND 2	.625000	.649454	-.024454
		STND 3	2.50000	2.49685	.003147
		STND 4	5.00000	4.94205	.057951
		STND 5	10.0000	9.73723	.262772

CorCoef: 0.99996

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Se	196.026	BLANK	.000000	-.000036	.000036
		STND 2	.312500	.316746	-.004246
		STND 3	1.25000	1.24036	.009645
		STND 4	2.50000	2.51008	-.010083
		STND 5	5.00000	4.95047	.049531

CorCoef: 0.99997

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Hg	328.068	BLANK	.000000	.000008	-.000008
		STND 2	.187500	.185767	.001733
		STND 3	.750000	.766487	-.016487
		STND 4	1.50000	1.50090	-.000901
		STND 5	3.00000	2.95997	.040025

CorCoef: 0.99994

Init Calib

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
U	324.754	BLANK	.000000	.000002	-.000002
		STND 2	.187500	.186795	.000705
		STND 3	.750000	.759066	-.009066
		STND 4	1.50000	1.50490	-.004901
		STND 5	3.00000	2.96522	.034778

orCoef: 0.99996

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
i	231.601	BLANK	.000000	-.000002	.000002
		STND 2	.187500	.187189	.000311
		STND 3	.750000	.758611	-.008611
		STND 4	1.50000	1.50524	-.005243
		STND 5	3.00000	2.96005	.039951

orCoef: 0.99995

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
n	213.856	BLANK	.000000	-.000001	.000001
)		STND 2	.187500	.187169	.000331
		STND 3	.750000	.757625	-.007625
		STND 4	1.50000	1.50939	-.009393
		STND 5	3.00000	2.95601	.043992

orCoef: 0.99993

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
n	257.610	BLANK	.000000	-.000047	.000047
		STND 3	.500000	.506156	-.006156
		STND 4	1.00000	1.00044	-.000441
		STND 5	2.00000	1.97449	.025507

orCoef: 0.99996

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
O	228.616	BLANK	.000000	.000009	-.000009
		STND 2	.187500	.185814	.001686
		STND 3	.750000	.762585	-.012585
)		STND 4	1.50000	1.50693	-.006932
		STND 5	3.00000	2.96278	.037220

orCoef: 0.99994

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
l	190.864	BLANK	.000000	-.000114	.000114
		STND 2	.635000	.635915	-.010915
		STND 3	2.50000	2.52250	-.022503
		STND 4	5.00000	5.01800	-.017997
		STND 5	10.0000	9.69936	.300638

orCoef: 0.99983

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
e	313.042	BLANK	.000000	.000003	-.000003
		STND 2	.062500	.061975	.000525
		STND 3	.250000	.253454	-.003454
		STND 4	.500000	.501964	-.001964
		STND 5	1.00000	.990659	.009341

orCoef: 0.99996

Init Calib

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
V	292.402	BLANK	.000000	.000014	-.000014
		STND 2	.187500	.185423	.002077
		STND 3	.750000	.761409	-.011409
		STND 4	1.50000	1.50682	-.006824
		STND 5	3.00000	2.97394	.026055

CorCoef: 0.99996

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Fe	259.940	BLANK	.000000	.000067	-.000067
		RFW 2	.250000	.242851	.007149
		RFW 3	1.00000	1.00361	-.003611
		RFW 4	5.00000	5.10197	-.101977
		RFW 5	50.0000	50.2294	-.229446

CorCoef: 1.00000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Al	308.215	BLANK	.000000	.000057	-.000057
		RFW 3	.240000	.233685	.006315
		RFW 4	1.20000	1.21292	-.012922
		RFW 5	12.0000	12.1866	-.186552

CorCoef: 1.00000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Ca	317.933	BLANK	.000000	.000037	-.000037
		RFW 3	1.20000	1.19468	.005320
		RFW 4	6.00000	6.04179	-.041792
		RFW 5	60.0000	59.8481	.151933

CorCoef: 1.00000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Mg	279.078	BLANK	.000000	-.000022	.000022
		RFW 2	.150000	.153391	-.003391
		RFW 3	.600000	.579552	.020448
		RFW 4	3.00000	3.02471	-.024714
		RFW 5	30.0000	30.0970	-.096979

CorCoef: 1.00000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Sb	206.838	BLANK	.000000	.001080	-.001080
		STND 2	1.25000	1.12747	.122535
		STND 3	5.00000	5.01931	-.019311
		STND 4	10.0000	10.5617	-.561657

CorCoef: 0.99983

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
[illegible]	249.678	BLANK	.000000	.000012	-.000012
		STND 2	.625000	.621972	.003028
		STND 3	2.50000	2.53234	-.032343
		STND 4	5.00000	5.00976	-.009767
		STND 5	10.0000	9.89956	.100411

CorCoef: 0.99997

Init Calib

tandardization Readback Report Sun 10-04-92 10:58:17 AM page 4

lement	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
n	202.030	BLANK	.000000	-.000072	.000072
		STND 3	1.50000	1.50703	-.007031
		STND 4	3.00000	3.01543	-.015427
		STND 5	6.00000	5.94102	.058978

orCoef: 0.99996

lement	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
i	288.158	BLANK	.000000	.000265	-.000265
		STND 3	1.15000	1.12682	.023176
		STND 4	2.30000	2.22720	.072803
		STND 5	4.60000	4.83831	-.238309

orCoef: 0.99903

lement	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
i	334.941	BLANK	.000000	.000197	-.000197
		STND 2	1.25000	1.22654	.023460
		STND 3	5.00000	5.03820	-.038202
		STND 4	10.0000	10.0645	-.064471
		STND 5	20.0000	20.0936	-.093613

orCoef: 1.00000

lement	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
	766.491	BLANK	.000000	.002690	-.002690
		STND 2	12.5000	12.1803	.319738
		STND 3	50.0000	50.5249	-.524868
		STND 4	100.000	100.786	-.786346
		STND 5	200.000	201.444	-1.44363

orCoef: 1.00000

lement	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
a	588.995	BLANK	.000000	-.000022	.000022
		RFW 4	1.00000	1.00243	-.002435
		RFW 5	10.0000	9.97565	.024346

orCoef: 1.00000

Check [illegible]

Analysis Report QC Standard Sun 10-04-92 11:09:01 AM Page 1

Method: ICP25 Sample Name: RFW5 Operator: [illegible]
Run Time: 10/04/92 11:06:05
Comment:
Mode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0.0000	0.0007	0.0000	0.0000	0.0127	0.0000	0.0000
Sdev	.0070	.0001	.0003	.0029	.0068	.0238	.0101
%RSD	3.017	15.52	19.72	112.2	53.39	6.015	247.5
#1	0.0000	0.0008	0.0000	0.0000	0.0068	0.0000	0.0000
#2	0.0000	0.0006	0.0000	0.0000	0.0153	0.0000	0.0000
#3	0.0000	0.0006	0.0000	0.0000	0.0072	0.0000	0.0061
#4	0.0000	0.0008	0.0000	0.0000	0.0205	0.0000	0.0000

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0.0000	0.0024	0.0075	0.0000	0.0000	0.0000	0.0000
Sdev	.0011	.0028	.0004	.0004	.0010	.0194	.0002
%RSD	2.533	118.0	6.005	8.615	161.2	73.77	125.2
#1	0.0000	0.0002	0.0076	0.0000	0.0000	0.0000	0.0001
#2	0.0000	0.0065	0.0081	0.0000	0.0000	0.0000	0.0000
#3	0.0000	0.0019	0.0073	0.0000	0.0005	0.0000	0.0000
#4	0.0000	0.0010	0.0071	0.0000	0.0000	0.0000	0.0000

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0.0044	048.97	011.83	58.03	29.18	0.0000	0.0000
Sdev	.0005	.15	.03	.15	.04	.0405	.0020
%RSD	12.32	.3030	.2810	.2549	.1494	26.79	5.354
#1	0.0050	048.95	011.82	58.07	29.14	0.0000	0.0000
#2	0.0042	049.12	011.85	58.21	29.23	0.0000	0.0000
#3	0.0046	048.77	011.79	57.86	29.14	0.0000	0.0000
#4	0.0037	049.03	011.86	57.98	29.19	0.0000	0.0000

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	0.0000	0.0000	0.0000	0.0200	09.743
Sdev	.0027	.0032	.0004	.0842	.031
%RSD	4.743	2.685	8.851	421.2	.2129
#1	0.0000	0.0000	0.0000	0.0000	09.726
#2	0.0000	0.0000	0.0000	0.1158	09.767
#3	0.0000	0.0000	0.0000	0.0000	09.735
#4	0.0000	0.0000	0.0000	0.0612	09.752

Verification Std

Analysis Report QC Standard Sun 10-04-92 11:05:48 AM Page 1

Method: ICP05 Sample Name: ICVS Operator: WHJ
Run Time: 10/04/92 11:03:01
Comment:
Mode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.009	2.059	.0483	.1960	.5234	2.066	.0539
Sdev	.021	.019	.0003	.0022	.0126	.021	.0028
%RSD	1.034	.9233	.5507	1.122	2.408	1.040	5.160
#1	2.022	2.085	.0483	.1997	.5403	2.056	0.0557
#2	2.022	2.061	.0487	.1966	.5211	2.056	.0498
#3	1.992	2.047	.0481	.1951	.5098	2.053	.0546
#4	1.991	2.047	.0483	.1931	.5225	2.098	0.0554

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2610	.5164	.5040	.5145	.5111	Q2.316	.0544
Sdev	.0021	.0059	.0013	.0029	.0039	.022	.0003
%RSD	.8020	1.150	.2490	.5734	.7605	.9608	.5776
#1	.2622	.5214	.5047	.5186	.5168	Q2.313	.0548
#2	.2620	.5137	.5039	.5147	.5104	Q2.327	.0544
#3	.2604	.5171	.5052	.5122	.5079	Q2.287	.0540
#4	.2584	.5105	.5023	.5125	.5095	Q2.339	.0544

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5179	1.056	2.006	.0113	<.0000	.5107	.0107
Sdev	.0035	.021	.012	.0018	.0112	.0541	.0046
%RSD	.6729	1.952	.6136	15.85	168.3	10.60	43.25
#1	.5219	1.085	2.018	.0106	<.0000	.4952	.0159
#2	.5197	1.057	1.993	.0098	.0004	.4591	.0116
#3	.5150	1.042	2.016	.0108	<.0000	.5014	.0107
#4	.5150	1.040	1.999	.0139	<.0000	0.5869	.0046

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	.0011	<.0000	.0054	.0088	.0423
Sdev	.0026	.0025	.0008	.1503	.0083
%RSD	238.2	37.52	14.48	1705.	19.65
#1	.0016	<.0000	.0065	.1139	.0336
#2	.0024	<.0000	.0053	<.0000	.0445
#3	.0030	<.0000	.0050	.1499	.0524
#4	<.0000	<.0000	.0047	<.0000	.0399

nalysis Report Sun 10-04-92 11:12:01 AM page 1

ethod: ICP25 Sample Name: BLANK FOR 500-1 Operator: WHJ
un Time: 10/04/92 11:09:16
omment:
ode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	<.0000	.0380	<.0000	.0158	.0340	<.0000	.0015
SDev	.0038	.0003	.0008	.0024	.0124	.0170	.0126
%RSD	39.59	.9085	581.6	14.98	36.39	501.9	843.3
#1	<.0000	.0376	<.0000	.0129	.0289	<.0000	<.0000
#2	<.0000	.0381	<.0000	.0167	.0225	.0109	<.0000
#3	<.0000	.0380	.0004	.0185	.0513	<.0000	.0067
#4	<.0000	.0382	.0004	.0151	.0334	.0060	.0165

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0021	.0164	.0219	.0032	.0008	.0131	<.0000
SDev	.0020	.0018	.0006	.0003	.0003	.0274	.0002
%RSD	97.50	11.11	2.818	10.31	43.28	209.7	119.7
#1	<.0000	.0141	.0219	.0031	.0004	.0082	<.0000
#2	.0010	.0162	.0215	.0035	.0010	<.0000	<.0000
#3	.0044	.0185	.0228	.0035	.0012	.0411	<.0000
#4	.0031	.0169	.0215	.0028	.0008	.0258	<.0000

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0776	.0950	.9847	5.786	.3053	.0022	.8561
SDev	.0009	.0037	.0123	.026	.0182	.0332	.0098
%RSD	1.143	3.901	1.246	.4430	5.966	1500.	1.140
#1	.0775	.1000	.9733	5.794	.2971	.0249	.8491
#2	.0766	.0956	.9982	5.804	.2840	<.0000	.8645
#3	.0774	.0922	.9920	5.748	.3244	<.0000	.8644
#4	.0788	.0921	.9754	5.799	.3157	.0363	.8462

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	.0045	.6448	.2048	.3224	2.377
SDev	.0013	.0210	.0035	.1390	.014
%RSD	29.23	3.260	1.701	43.11	.6081
#1	.0049	.6263	.2092	.2042	2.398
#2	.0062	.6578	.2057	.2039	2.365
#3	.0038	.6275	.2010	.4099	2.369
#4	.0032	.6675	.2034	.4717	2.378

1021 1K

Analysis Report Sun 10-04-92 11:15:02 AM page 1

Method: ICP05 Sample Name: 9-500-1 1:50 Operator: sep
Run Time: 10/04/92 11:12:16
Comment: :
Mode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	<.0000	.0624	<.0000	.2695	.0323	<.0000	<.0000
SDev	.0087	.0004	.0003	.0014	.0125	.0084	.0047
%RSD	39.62	.6335	49.36	.5387	38.65	67.92	72.82
#1	<.0000	.0624	<.0000	.2703	.0495	<.0000	<.0000
#2	<.0000	.0627	<.0000	.2687	.0229	<.0000	<.0000
#3	<.0000	.0627	<.0000	.2620	.0332	<.0000	.0005
#4	<.0000	.0618	<.0000	.2711	.0234	<.0000	<.0000

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2789	.1214	.0628	.0140	.0007	.0129	<.0000
SDev	.0015	.0023	.0010	.0007	.0007	.0104	.0000
%RSD	.5385	1.883	1.579	4.809	94.36	80.89	.0000
#1	.2799	.1234	.0633	.0142	.0013	.0279	<.0000
#2	.2791	.1193	.0631	.0149	.0002	.0111	<.0000
#3	.2767	.1196	.0613	.0135	.0013	.0037	<.0000
#4	.2799	.1234	.0634	.0135	.0001	.0089	<.0000

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0040	1.320	1.027	7.661	.3819	<.0000	1.082
SDev	.0010	.006	.026	.036	.0155	.0109	.047
%RSD	24.91	.4628	2.489	.4717	4.046	76.61	4.360
#1	.0030	1.323	1.017	7.689	.4036	<.0000	1.057
#2	.0036	1.321	1.052	7.666	.3751	<.0000	1.134
#3	.0040	1.311	1.044	7.609	.3811	<.0000	1.107
#4	.0054	1.324	.9958	7.680	.3679	<.0000	1.030

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.8765	.1211	.8856	41.00
SDev	.0021	.0443	.0007	.0182	.18
%RSD	493.0	5.059	.5771	2.057	.4343
#1	<.0000	.9413	.1214	.8805	40.92
#2	.0018	.9587	.1212	.8766	41.14
#3	.0030	.8648	.1207	.9136	40.79
#4	<.0000	.8412	.1221	.8728	41.16

Spike

ethod: ICP25 Sample Name: 9-500-1 1mL SPIKE1 Operator: sep
un Time: 10/04/93 11:15:17
omment: :
ode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.880	.6653	.5420	.8360	1.867	1.135	.5847
SDev	.026	.0027	.0022	.0040	.042	.015	.0073
%RSD	1.400	.4024	.4018	.4833	2.259	1.295	1.244
#1	1.874	.6691	.5443	.8311	1.852	1.150	.5798
#2	1.918	.6652	.5435	.8377	1.883	1.124	.5952
#3	1.869	.6632	.5404	.8405	1.915	1.121	.5797
#4	1.858	.6636	.5399	.8346	1.816	1.144	.5843

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.8612	.6860	.5852	.3967	.5640	2.118	.1965
SDev	.0026	.0042	.0016	.0002	.0038	.057	.0007
%RSD	.3063	.6165	.2776	.0435	.6753	2.696	.3529
#1	.8650	.6896	.5845	.3966	.5666	2.099	.1974
#2	.8604	.6868	.5847	.3969	.5633	2.046	.1967
#3	.8588	.6878	.5840	.3966	.5589	2.170	.1961
#4	.8605	.6799	.5876	.3966	.5672	2.157	.1959

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5963	1.308	1.041	7.987	.3943	<.0000	.8881
SDev	.0019	.002	.052	.019	.0090	.0172	.0761
%RSD	.3264	.1416	4.991	.2425	2.284	219.9	8.570
#1	.5957	1.310	.9708	7.983	.3861	<.0000	.7815
#2	.5989	1.310	1.040	8.006	.3886	<.0000	.8898
#3	.5942	1.307	1.062	7.961	.4061	.0043	.9248
#4	.5963	1.307	1.094	7.996	.3962	.0029	.9564

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	.0021	.9122	.1315	39.17	40.58
SDev	.0031	.0679	.0008	.13	.09
%RSD	161.1	7.443	.5973	.3316	.2114
#1	<.0000	.8809	.1316	39.35	40.69
#2	.0010	.9383	.1321	39.16	40.56
#3	.0062	.8369	.1304	39.05	40.48
#4	.0030	.9929	.1321	39.11	40.61

Deionized H2O

Analysis Report Sun 10-04-92 11:31:03 AM Page 1

Method: ICP25 Sample Name: DISTILLED WATER1 Operator: sap
Run Time: 10/04/92 11:18:18
Comment: :
Mode: CONC Corr. Factor: 1

Elem	As	Ba	Cd	Cr	Pb	Se	Ag
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	<.0000	.0001	<.0000	.0005	.0063	.0018	<.0000
SDev	.0037	.0004	.0003	.0025	.0122	.0243	.0105
%RSD	41.30	337.6	1281.	521.1	192.4	1354.	731.0
#1	<.0000	.0004	.0001	.0027	<.0000	.0322	.0084
#2	<.0000	.0004	.0000	.0013	.0225	.0080	.0050
#3	<.0000	<.0000	.0003	<.0000	.0071	<.0000	<.0000
#4	<.0000	.0000	<.0000	.0011	.0027	<.0000	<.0000

Elem	Cu	Ni	Zn	Mn	Co	Tl	Be
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	<.0000	<.0000	.0012	<.0000	.0002	.0216	.0000
SDev	.0021	.0027	.0002	.0005	.0011	.0256	.0004
%RSD	255.3	486.0	19.60	110.5	473.2	118.6	950.0
#1	.0007	.0012	.0009	<.0000	.0015	.0367	<.0000
#2	.0007	<.0000	.0015	<.0000	.0009	<.0000	.0005
#3	<.0000	<.0000	.0011	<.0000	<.0000	.0053	.0001
#4	<.0000	.0012	.0012	<.0000	<.0000	.0494	<.0000

Elem	V	Fe	Al	Ca	Mg	Sb	B
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	<.0000	.0076	.0072	<.0000	.0115	.0755
SDev	.0013	.0007	.0142	.0019	.0138	.0305	.0055
%RSD	185.5	16.31	187.6	26.87	164.5	265.9	7.294
#1	.0022	<.0000	.0090	.0087	.0052	.0110	.0760
#2	.0013	<.0000	.0256	.0079	.0010	.0546	.0767
#3	<.0000	<.0000	<.0000	.0044	<.0000	<.0000	.0680
#4	<.0000	<.0000	.0015	.0080	<.0000	<.0000	.0812

Elem	Mo	Si	Ti	K	Na
Units	ppm	ppm	ppm	ppm	ppm
Avge	.0026	.0199	<.0000	<.0000	.1930
SDev	.0034	.0131	.0010	.1740	.0195
%RSD	132.2	65.51	146.9	376.5	10.12
#1	.0060	.0336	.0005	.1633	.1817
#2	.0038	.0242	<.0000	<.0000	.2309
#3	.0027	.0024	<.0000	<.0000	.1761
#4	<.0000	.0195	<.0000	<.0000	.1907

RHONE POULENC ENVIRONMENTAL PROTECTION DEPARTMENT QA/QC (page 1)

				USEPA CLP FORM 2A						USEPA CLP FORM 3		
				INITIAL AND CONTINUING CALIBRATION VERIFICATION						BLANKS		
SAMPLE NAME	SAMPLE DATE	QA/QC * SAMPLE	ANALYTE	INITIAL CALIBRATION CHECK TRUE	INITIAL CALIBRATION CHECK FOUND	% R	CONTINUING CALIBRATION CHECK TRUE	CONTINUING CALIBRATION CHECK FOUND	% R	INITIAL CALIBRATION BLANK	CONTINUING CALIBRATION BLANK	PREPARATION BLANK
	09/23/92	L920827-1	ANTIMONY	10.00	9.89	98.90			ERR			0.30
L920923-1		L921013-1	*ARSENIC	5.00	4.98	99.60	5.00	4.97	99.40	0.05	0.02	0.02
L920923-2		L920914-1	BARIUM	1.00	1.02	102.00			ERR	0.01		-0.01
L920827-1		L920914-1	BERYLLIUM	1.00	1.02	102.00	1.00	1.02	102.00	0.01	0.00	-0.01
L920827-2		L920914-1	CADMIUM	1.00	0.94	94.30	1.00	0.95	94.50	0.003	0.001	0.003
L920914-1		L920914-1	CHROMIUM	2.50	2.58	103.20	2.50	2.54	101.60	0.05	0.02	0.01
		L920914-1	COPPER	2.00	1.93	96.50	2.00	1.91	95.50	0.00	0.00	0.00
		L920914-1	LEAD	2.00	2.02	101.00	2.00	2.00	100.00	0.01	0.01	0.01
		L920914-1	*MERCURY	10.00	7.80	78.00			ERR		-	0.15
		L920914-1	NICKEL	2.00	2.13	106.50	2.00	2.10	105.00	0.00	0.01	0.00
		L921013-1	*SELENIUM	5.00	5.33	106.60	5.00	4.93	98.60	0.10		0.14
		L920914-1	SILVER	1.00	1.01	101.30			ERR			0.005
		L920914-1	VANADIUM	10.00	9.95	99.50	10.00	9.41	94.10	0.13	0.13	-0.12
		L920914-1	THALLIUM	5.00	4.85	97.00	5.00	4.93	98.60	0.09	0.08	0.08

* Arsenic, selenium, and mercury reported in ppb, all others in ppm.
"ERR" - Indicated division by zero.
Calibration Standard Source - Fisher Scientific.
Continuing Calibration Source - NIST.

L92023-1 = Split of EPA Sample - SC1458 or SC1459
L92023-2 = Split of EPA Sample - SC1458 or SC1459

RHONE POULENC ENVIRONMENTAL PROTECTION DEPARTMENT QA/QC (page 2)

				USEPA CLP FORM 5A				USEPA CLP FORM 6			USEPA CLP FORM 7				
				SPIKE SAMPLE RECOVERY				DUPLICATES			LABORATORY CONTROL SAMPLE				
SAMPLE NAME	SAMPLE DATE	QA/QC SAMPLE	ANALYTE	SPIKED SAMPLE RESULT	SAMPLE RESULT	SPIKE ADDED	% R	SAMPLE RESULT	DUPLICATE RESULT	RPD	TRUE	FOUND	% R	DATE ANALYZED	HOLDING TIME BEFORE ANALYSIS
	09/23/92	L920827-1	ANTIMONY	0.99	0.19	1.00	80.00	0.81	0.99	-20.00			ERR	10/17/92	24
L920923-1		L921013-1	* ARSENIC	18.25	6.12	5.00	102.60	16.66	11.25	3.58			ERR	11/09/92	47
L920923-2		L920914-1	BARIUM	13.92	3.15	10.00	107.70	9.62	9.80	-1.85			ERR	10/15/92	22
L920827-1		L920914-1	BERYLLIUM	0.95	0.01	1.00	94.00	0.88	0.95	-7.65			ERR	10/15/92	22
L920827-2		L920914-1	CADMIUM	0.96	0.00	1.00	96.20	0.92	0.96	-4.35			ERR	10/14/92	21
L920914-1		L920914-1	CHROMIUM	2.51	0.62	2.00	94.50	2.39	2.51	-4.90			ERR	10/15/92	22
		L920914-1	COPPER	2.66	0.71	2.00	97.50	2.56	2.66	-3.83			ERR	10/14/92	21
		L920914-1	LEAD	1.21	0.23	1.00	98.00	1.15	1.21	-5.00			ERR	10/14/92	21
		L920914-1	* MERCURY	6.75	0.78	5.00	119.40	6.42	6.75	-5.01			ERR	10/02/92	15
		L920914-1	NICKEL	2.64	0.66	2.00	99.00	2.58	2.64	-2.30			ERR	10/14/92	21
		L921013-1	* SELENIUM	5.37	0.16	5.00	104.20	8.10	7.68	5.32			ERR	10/19/92	26
		L920914-1	SILVER	0.72	ND	1.00	72.10	0.65	0.72	-9.90			ERR	10/17/92	24
		L920914-1	VANADIUM	9.96	0.71	10.00	92.50	9.31	9.96	-6.75			ERR	10/15/92	22
		L920914-1	THALLIUM	4.80	0.07	5.00	94.60	4.57	4.80	-4.91			ERR	10/14/92	21

* Arsenic, selenium, and mercury reported in ppb, all others in ppm.
"ERR" - Indicated division by zero.
Calibration Standard Source - Fisher Scientific.
Confirming Calibration Source - HST.

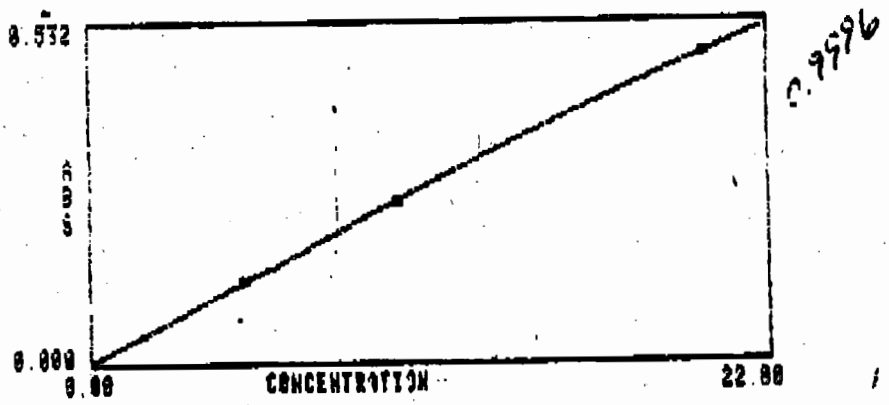
Varian SpectrAA 10/20 System Report

OPERATOR 71837
DATE 10.17.92
BATCH NO.

PROGRAM 4 Sb

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	4
LAMP CURRENT (mA)	10
SLIT WIDTH (nm)	0.2
WAVELENGTH (nm)	217.6
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.000	-0.000	0.002	-0.000
STANDARD 1	5.00	1.2	0.128	0.129	0.126	0.128
STANDARD 2	10.00	0.4	0.254	0.257	0.253	0.254
STANDARD 3	20.00	0.3	0.457	0.455	0.462	0.453



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MPLE	CONC	%RSD	MEAN ABS	READINGS			
~~MPLE 1~~	~~0.83~~	27.0	0.021	0.028	0.019	0.017	
MPLE 1	0.30	12.4	0.008	0.007	0.008	0.009	
MPLE 2	9.89	0.8	0.252	0.252	0.249	0.253	
~~MPLE 3~~	~~0.17~~	17.4	0.012	0.014	0.012	0.010	
MPLE 3	<0.19	23.0	0.005	0.006	0.004	0.005	
MPLE 4	0.81	3.7	0.021	0.021	0.020	0.021	
~~MPLE 4~~	~~0.77~~	6.2	0.020	0.019	0.021	0.019	
MPLE 5	0.99	2.3	0.025	0.025	0.025	0.026	
MPLE 6	<0.21	22.9	0.005	0.004	0.007	0.005	
MPLE 7	0.64	4.0	0.016	0.016	0.017	0.016	
MPLE 8	0.67	1.2	0.017	0.017	0.017	0.017	
MPLE 9	<0.33	12.1	0.009	0.008	0.010	0.008	
MPLE 9	<0.26	16.6	0.007	0.008	0.006	0.006	

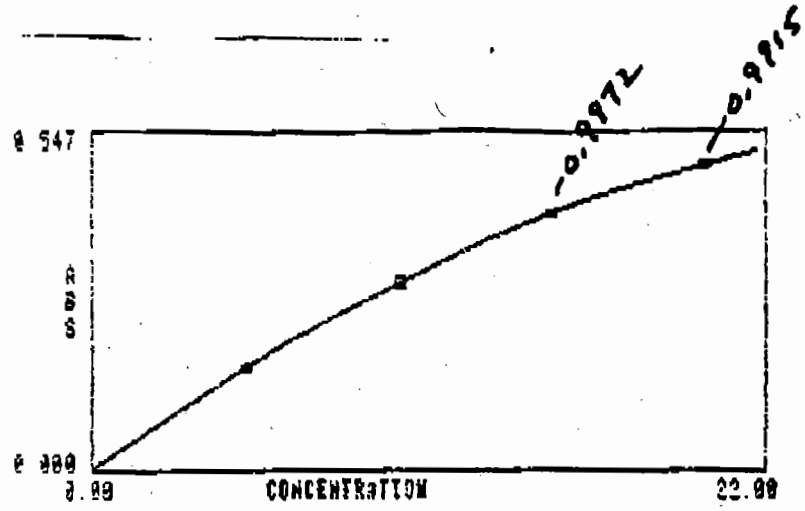
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 11.09.92
BATCH NO.

PROGRAM 21 As

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	1
LAMP CURRENT (mA)	10
SLIT WIDTH (nm)	1.0
WAVELENGTH (nm)	193.7
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	45
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.001	0.001	0.001	0.001
STANDARD 1	5.00	1.0	0.165	0.166	0.163	0.166
STANDARD 2	10.00	1.2	0.303	0.307	0.301	0.300
STANDARD 3	15.00	27.6	0.362	0.419	0.421	0.247
STANDARD 3	15.00	0.2	0.420	0.420	0.419	0.420
STANDARD 4	20.00	0.3	0.498	0.498	0.496	0.499



$\frac{11.66 - 6.12}{5} =$

$\frac{11.25 - 6.12}{5} =$

SAMPLE	CONC	%RSD	MEAN ABS	READINGS			
SAMPLE 1	4.99	0.9	0.165	0.165	0.166	0.163	ICV
SAMPLE 2	0.05	35.3	0.002	0.002	0.001	0.001	ICB
SAMPLE 1	0.02	72.6	0.001	0.001	0.000	0.001	
SAMPLE 2	6.12	2.8	0.198	0.202	0.200	0.192	$\times 5 = \frac{30.6}{1000} = .030$
SAMPLE 3	11.66	0.5	0.343	0.342	0.343	0.345	
SAMPLE 4	11.25	1.8	0.334	0.337	0.337	0.327	
SAMPLE 5	1.51	1.3	0.050	0.049	0.050	0.050	
SAMPLE 6	1.37	3.4	0.045	0.046	0.046	0.044	
SAMPLE 7	1.35	0.8	0.045	0.045	0.045	0.044	
SAMPLE 8	1.39	1.4	0.046	0.047	0.045	0.046	
SAMPLE 9	0.28	0.7	0.009	0.009	0.009	0.009	
SAMPLE 10	0.28	15.5	0.009	0.009	0.011	0.008	
SAMPLE 11	0.39	11.0	0.013	0.011	0.014	0.013	
SAMPLE 1	4.93	1.1	0.163	0.164	0.164	0.161	CCV
SAMPLE 2	0.05	75.4	0.002	0.003	0.000	0.002	CCB
SAMPLE 12	0.34	7.4	0.011	0.011	0.012	0.011	
SAMPLE 13	0.32	4.4	0.011	0.011	0.011	0.010	
SAMPLE 14	9.57	1.2	0.292	0.289	0.296	0.291	$\times 5 = .048$
SAMPLE 15	8.99	1.7	0.277	0.282	0.275	0.273	$\times 5$ .045
SAMPLE 16	0.24	18.9	0.008	0.008	0.009	0.006	
SAMPLE 17	0.13	30.2	0.004	0.004	0.005	0.003	
SAMPLE 18	15.43	0.6	0.428	0.430	0.425	0.429	
SAMPLE 19	14.75	0.9	0.414	0.411	0.415	0.418	
SAMPLE 20	7.97	6.0	0.236	0.247	0.241	0.220	
SAMPLE 21	1.33	1.0	0.051	0.050	0.051	0.051	
SAMPLE 22	4.97	0.9	0.164	0.164	0.166	0.163	CK CCV
SAMPLE 23	0.02	79.4	0.001	0.001	0.000	0.000	BK CCB

Spike = 5.0 µg/L

As Samples		
1	ICV	
2	ICB	
1	PB	
2	L921013-1	
3	L921013-1 Spike	
4	L921013-Spike Dup	
5	L920915-1	
6	L920916-2	
7	L920917-1	
8	L920924-1	
9	L920930-1	
10	L920927-1	
11	L920928-1	
1	CCV	
2	CCB	
12	L920929-1	
13	L921001-1	
14	L921026-1	
15	L921102-1	
16	L920916-1	
17	L920928-2	
18	L920928-1	0.2518 gm/50mL
19	L920928-2	0.2517 gm/50mL
20	L920927-1	0.1086 gm/50mL
21	L920927-2	0.1093 gm/50mL
22	CCV	
23	CCB	

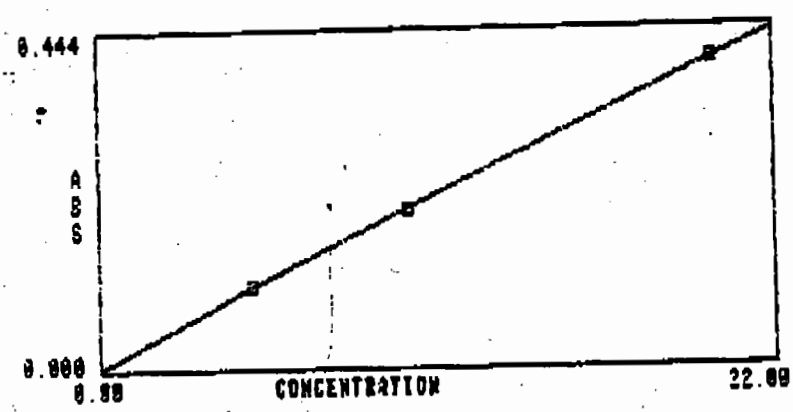
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.15.92
BATCH NO.

PROGRAM 17 Ba

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	2
LAMP CURRENT (mA)	20
SLIT WIDTH (nm)	0.5
WAVELENGTH (nm)	553.6
FLAME	N2O-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	3
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	4.0
REPLICATES	3
BACKGROUND CORRECTION	OFF

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.000	0.000	0.000	0.000
STANDARD 1	5.00	2.3	0.107	0.105	0.110	0.106
STANDARD 2	10.00	1.1	0.209	0.211	0.207	0.210
STANDARD 3	20.00	1.3	0.404	0.400	0.410	0.402



0.9990

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
SAMPLE 1	1.08	0.3	0.023	0.023	0.023	0.023
SAMPLE 2	0.01	99.9	0.000	0.000	0.000	-0.000
SAMPLE 1	-0.01	24.5	-0.000	-0.000	-0.000	-0.000
~~SAMPLE 2~~	~~3.06~~	~~0.5~~	~~0.065~~	~~0.065~~	~~0.066~~	~~0.065~~
SAMPLE 3	9.62.	1.2	0.201	0.203	0.203	0.199
SAMPLE 4	9.80.	1.0	0.205	0.203	0.207	0.205
SAMPLE 2	3.15.	2.0	0.067	0.068	0.068	0.066
SAMPLE 5	1.30.	1.3	0.028	0.028	0.027	0.028
SAMPLE 6	1.51.	2.0	0.032	0.032	0.032	0.033
SAMPLE 7	0.12.	5.2	0.003	0.003	0.002	0.003
SAMPLE 8	0.15.	4.3	0.003	0.003	0.003	0.003
SAMPLE 9	6.96	0.8	0.147	0.147	0.149	0.147 Post Digestion Spit

6.96 ÷ 2 = 13.92

Spike = 10 mg/L

Ba

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm / 100 mL
3	L920914-1 Spike	2.1416 gm / 100 mL
4	L920914-1 Spike Dup	2.1350 gm / 100 mL
5	L920827-2	2.0062 gm / 100 mL
6	L920827-1	2.0052 gm / 100 mL
7	L920923-1	2.0017 gm / 100 mL
8	L920923-2	2.0076 gm / 100 mL
9	L920914-1 Post Digest Spike (10 mL spl + 10 mL 10 mg/L)	

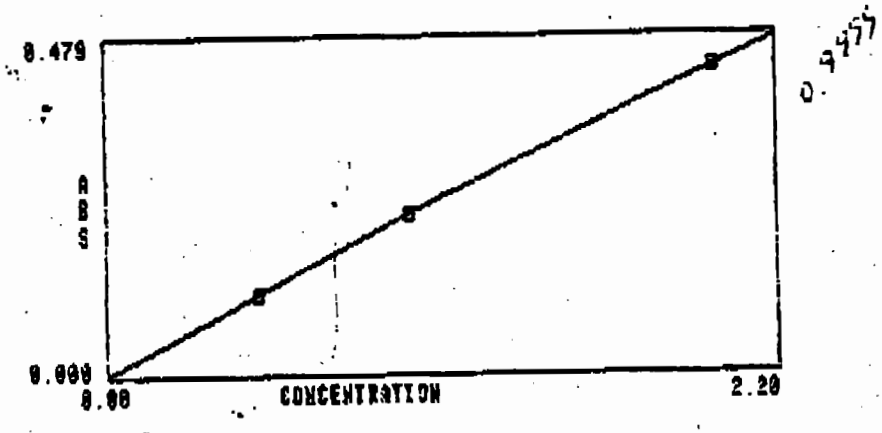
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.15.92
BATCH NO.

PROGRAM 11 Be

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	1
LAMP CURRENT (mA)	5
SLIT WIDTH (nm)	1.0
WAVELENGTH (nm)	234.9
FLAME	N2O-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.003	0.002	0.003	0.004
STANDARD 1	0.50	3.2	0.113	0.117	0.112	0.110
STANDARD 2	1.00	1.9	0.224	0.229	0.221	0.222
STANDARD 3	2.00	0.5	0.435	0.437	0.433	0.434



AMPLE	CONC	%RSD	MEAN ABS	READINGS		
SAMPLE 1	1.02	0.2	0.230	0.230	0.229	0.230
SAMPLE 2	0.01	12.6	0.002	0.002	0.002	0.002
SAMPLE 1	-0.01	12.7	-0.003	-0.003	-0.003	-0.003
SAMPLE 2	-0.01*	43.6	0.002	0.001	0.003	0.003
SAMPLE 3	0.88*	1.4	0.197	0.194	0.198	0.200
SAMPLE 4	0.95*	3.7	0.214	0.211	0.207	0.223
~~SAMPLE 3~~	~~0.86~~	~~1.3~~	~~0.193~~	~~0.190~~	~~0.195~~	~~0.194~~
SAMPLE 5	0.02*	3.5	0.003	0.003	0.003	0.004
SAMPLE 6	0.02*	17.3	0.004	0.003	0.004	0.004
SAMPLE 7	<-0.01	12.8	-0.001	-0.001	-0.001	-0.001
SAMPLE 8	< 0.00	99.9	0.000	-0.000	0.001	-0.000
SAMPLE 9	1.02	2.0	0.228	0.226	0.225	0.233
SAMPLE 10	-0.00	99.9	-0.000	-0.001	0.000	-0.000

Spike = 1.0 mg/L

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1750 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0076 gm/100mL
9	CCV	
10	CCB	

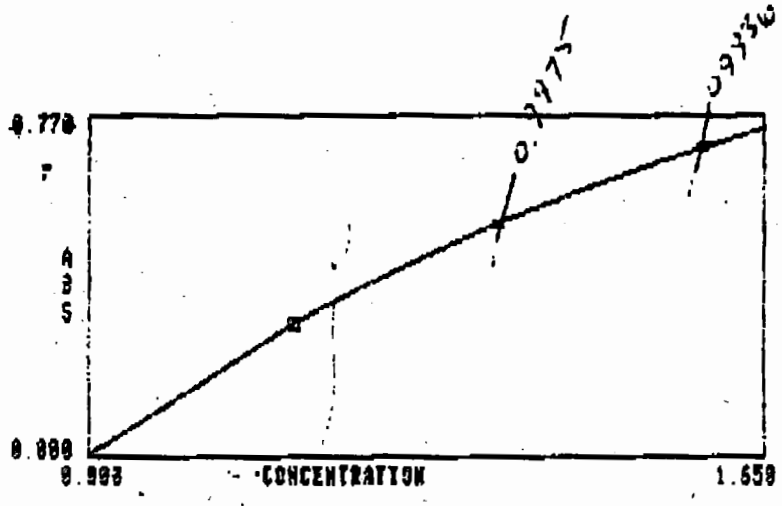
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.14.92
BATCH NO.

PROGRAM 7 Cd

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	4
LAMP CURRENT (mA)	4
SLIT WIDTH (nm)	0.5
WAVELENGTH (nm)	228.8
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	4.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.000		-0.000	-0.000	-0.001	-0.001
STANDARD 1	0.500	1.1	0.294	0.291	0.296	0.296
STANDARD 2	1.000	0.4	0.524	0.521	0.525	0.525
STANDARD 3	1.500	0.2	0.700	0.698	0.700	0.701



AMPLE	CONC	%RSD	MEAN ABS	READINGS		
AMPLE 1	0.943	1.2	0.500	0.496	0.498	0.507
AMPLE 2	0.003	56.2	0.002	0.001	0.003	0.002
AMPLE 1	0.003	15.8	0.002	0.002	0.001	0.002
AMPLE 2	*0.002	54.7	0.001	0.002	0.001	0.001
AMPLE 3	0.923	1.1	0.492	0.487	0.491	0.498
AMPLE 4	0.964	0.7	0.509	0.506	0.508	0.513
AMPLE 5	*0.001	58.9	0.001	0.000	0.001	0.001
AMPLE 6	*0.002	19.6	0.001	0.001	0.001	0.001
AMPLE 7	*0.004	16.9	0.003	0.003	0.003	0.002
AMPLE 8	*0.006	14.5	0.003	0.003	0.004	0.004
AMPLE 9	0.945	0.6	0.501	0.498	0.504	0.503
AMPLE 10	0.001	99.9	0.000	0.001	-0.001	0.001

Spike = 1.0 mg/L

Col Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0076 gm/100mL
9	CCV	
10	CCB	

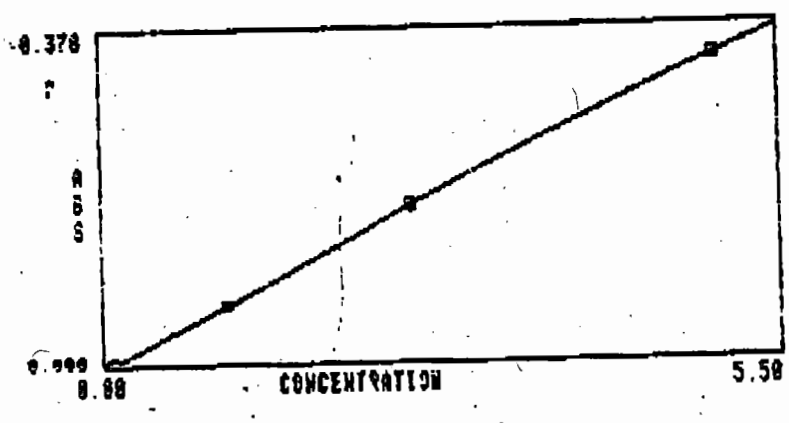
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.15.92
BATCH NO.

PROGRAM 3 Cr

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	3
LAMP CURRENT (mA)	7
SLIT WIDTH (nm)	0.2
WAVELENGTH (nm)	357.9
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	5.0
REPLICATES	3
BACKGROUND CORRECTION	OFF

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.000	0.000	-0.000	0.001
STANDARD 1	1.00	0.9	0.069	0.069	0.068	0.070
STANDARD 2	2.50	2.4	0.179	0.174	0.183	0.180
STANDARD 3	5.00	0.8	0.344	0.344	0.341	0.347



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AMPLE	CONC	%RSD	MEAN ABS	READINGS		
AMPLE 1	2.58	1.7	0.185	0.188	0.186	0.181
AMPLE 2	0.05	15.8	0.004	0.003	0.004	0.004
AMPLE 1	0.01	41.5	0.001	0.000	0.001	0.000
AMPLE 2	0.62	3.0	0.043	0.041	0.043	0.044
AMPLE 3	2.39	1.1	0.171	0.172	0.172	0.169
AMPLE 4	2.51	1.0	0.180	0.180	0.178	0.182
AMPLE 5	0.13	1.9	0.009	0.009	0.009	0.009
AMPLE 6	0.12	5.8	0.008	0.009	0.008	0.009
AMPLE 7	OVER	0.5	1.476	1.484	1.472	1.471 2.5/50
AMPLE 7	1.45	1.0	0.101	0.102	0.101	0.100
AMPLE 8	1.36	1.8	0.094	0.094	0.093	0.096
AMPLE 9	2.54	1.4	0.182	0.185	0.181	0.180
AMPLE 10	0.06	16.8	0.004	0.004	0.004	0.005
AMPLE ~~10~~	0.08	5.4	0.006	0.005	0.006	0.006

Cr

Spike = 2.0 mg/L

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0096 gm/100mL
9	CCV	
10	CCB	

Cr

Spike = 2.0 mg/L

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0096 gm/100mL
9	CCV	
10	CCB	

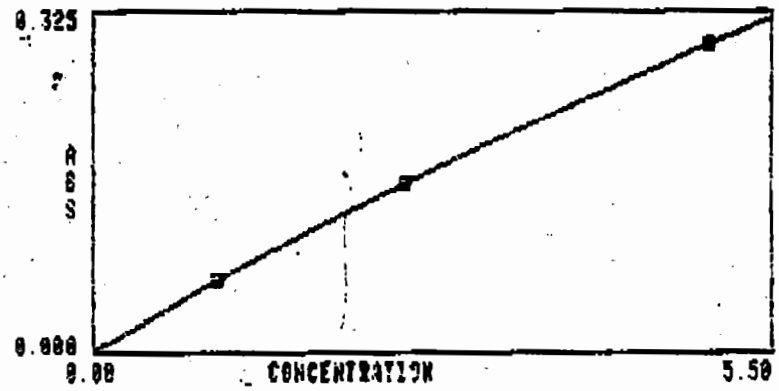
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.14.92
BATCH NO.

PROGRAM 6 Pb

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	1
LAMP CURRENT (mA)	5
SLIT WIDTH (nm)	1.0
WAVELENGTH (nm)	217.0
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	4
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.002	0.001	0.002	0.001
STANDARD 1	1.00	1.9	0.068	0.066	0.068	0.069
STANDARD 2	2.50	0.9	0.160	0.160	0.161	0.158
STANDARD 3	5.00	1.2	0.295	0.292	0.295	0.299



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MPLE	CONC	%RSD	MEAN ABS	READINGS		
MPLE 1	2.02	0.8	0.131	0.131	0.131	0.133
MPLE 2	0.01	99.9	0.001	0.002	0.001	-0.000
MPLE 1	0.01	99.9	0.000	0.001	-0.000	0.001
MPLE 2	0.23*	5.8	0.016	0.016	0.015	0.017
MPLE 3	1.15*	2.1	0.077	0.075	0.077	0.079
MPLE 4	1.21*	1.1	0.081	0.081	0.081	0.082
MPLE 5	-0.00	99.9	-0.000	-0.000	-0.001	0.000
MPLE 6	-0.00	99.9	-0.000	-0.001	0.001	-0.001
MPLE 7	0.49*	2.0	0.033	0.034	0.034	0.033
MPLE 8	0.49*	2.0	0.033	0.032	0.034	0.033
MPLE 9	2.00	1.2	0.130	0.128	0.131	0.131
MPLE 10	0.01	99.9	0.000	0.001	-0.000	0.001

Spike: 1.0 mg/L

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0076 gm/100mL
9	CCV	
10	CCB	

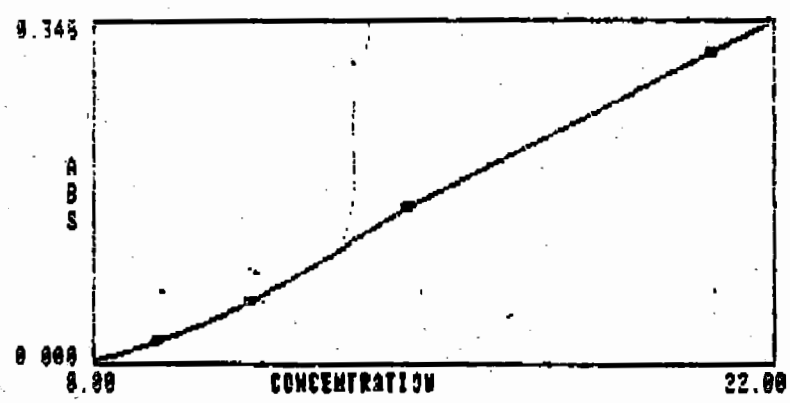
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.8.92
BATCH NO.

PROGRAM 5 Hg

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	1
LAMP CURRENT (mA)	4
SLIT WIDTH (nm)	0.5
WAVELENGTH (nm)	253.7
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	60
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	5.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.003	0.003	0.003	0.003
STANDARD 1	2.00	0.0	0.021	0.021	0.021	0.021
STANDARD 2	5.00	0.6	0.063	0.063	0.064	0.064
STANDARD 3	10.00	0.4	0.159	0.158	0.159	0.159
STANDARD 4	20.00	0.3	0.316	0.315	0.317	0.317



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SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
SAMPLE 1	7.80	0.5	0.115	0.115	0.115	0.114
~~SAMPLE 2~~	~~0.42~~	5.0	0.004	0.005	0.004	0.004
SAMPLE 2	0.15	23.5	0.002	0.002	0.001	0.001
SAMPLE 10	0.78	7.4	0.008	0.009	0.008	0.008
SAMPLE 11	6.42	0.4	0.088	0.088	0.088	0.088
SAMPLE 12	6.75	0.2	0.094	0.094	0.094	0.094
SAMPLE 13	-0.13	34.4	-0.001	-0.001	-0.002	-0.002
SAMPLE 14	-0.38	11.0	-0.004	-0.003	-0.004	-0.004
SAMPLE 15	-0.20	22.7	-0.002	-0.002	-0.003	-0.002
SAMPLE 16	-0.23	0.0	-0.002	-0.002	-0.002	-0.002

Spike = 5.0 µg/L

No Sample		
1	ICV	
2	PB	
10	L920914-1	0.2370 gm/100mL
11	L920914-1 Spike	0.2296 gm/100mL
12	L920914-1 Spike Dup	0.2357 gm/100mL
13	L920827-2	0.2265 gm/100mL
14	L920827-1	0.2300 gm/100mL
15	L920923-1	0.2063 gm/100mL
16	L920923-2	0.2036 gm/100mL

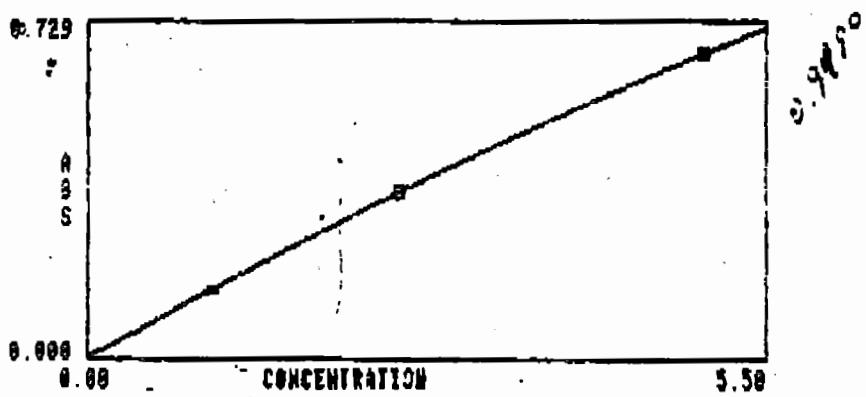
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.14.92
BATCH NO.

PROGRAM 2 Ni

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	3
LAMP CURRENT (mA)	4
SLIT WIDTH (nm)	0.2
WAVELENGTH (nm)	232.0
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		-0.005	-0.005	-0.004	-0.006
BLANK	0.00		0.002	0.003	0.001	0.003
STANDARD 1	1.00	1.6	0.149	0.148	0.152	0.148
STANDARD 2	2.30	1.0	0.358	0.360	0.360	0.353
STANDARD 3	5.00	1.0	0.662	0.653	0.668	0.664



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SAMPLE	CONC	%RSD	MEAN ABS	READINGS			
SAMPLE 1	2.13	0.4	0.308	0.307	0.308	0.309	
SAMPLE 2	-0.00	99.9	-0.000	0.001	-0.002	0.000	
SAMPLE 1	0.01	99.9	0.001	-0.001	0.001	0.002	
SAMPLE 2	0.66	1.7	0.099	0.097	0.100	0.099	
SAMPLE 3	2.58	1.7	0.369	0.362	0.374	0.371	
SAMPLE 4	2.64	1.5	0.376	0.370	0.376	0.381	
SAMPLE 5	0.25	5.7	0.037	0.035	0.036	0.039	
SAMPLE 6	0.25	4.1	0.037	0.037	0.035	0.038	
SAMPLE 7	OVER	0.2	0.927	0.927	0.929	0.926	2.5/50
SAMPLE 7	0.59	1.3	0.087	0.087	0.087	0.089	
SAMPLE 8	0.50	0.9	0.074	0.074	0.073	0.075	
SAMPLE 9	2.10	1.2	0.304	0.306	0.305	0.300	
SAMPLE 10	-0.00	99.9	-0.000	-0.000	0.000	-0.000	

Spike = 2.0 mg/L

Ni Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0076 gm/100mL
9	CCV	
10	CCB	

KA

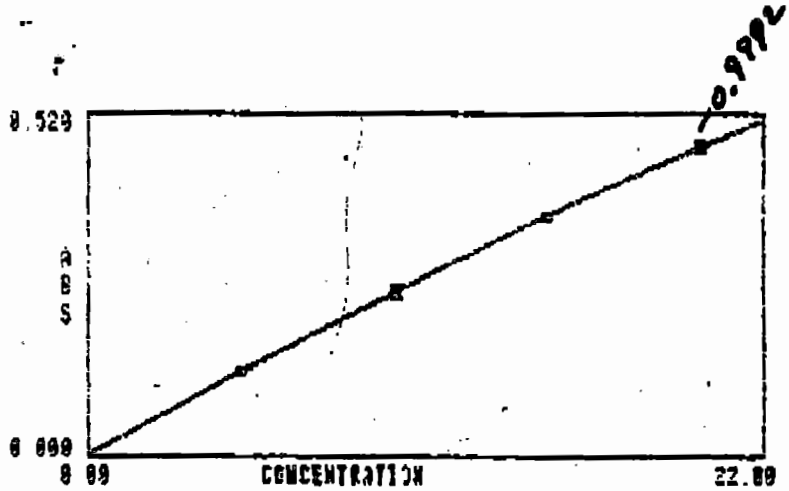
Varian SpectrAA 10/20 System Report

OPERATOR 71837
DATE 10.19.92
BATCH NO.

PROGRAM 22 Se

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	3
LAMP CURRENT (mA)	10
SLIT WIDTH (nm)	1.0
WAVELENGTH (nm)	196.0
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	45
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	3.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		-0.000	0.001	-0.000	-0.001
STANDARD 1	5.00	0.8	0.131	0.131	0.131	0.133
STANDARD 2	10.00	0.9	0.251	0.254	0.250	0.250
STANDARD 3	15.00	0.6	0.366	0.369	0.366	0.365
STANDARD 4	20.00	0.6	0.472	0.476	0.471	0.470



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SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
SAMPLE 1 Blank	0.10	64.9	0.003	0.002	0.001	0.004
SAMPLE 2 ICV	~~4.49~~	0.6	0.118	0.119	0.118	0.117
SAMPLE 3 ICV	5.33	1.5	0.140	0.137	0.141	0.141
~~SAMPLE 1~~	~~4.10~~	1.2	0.108	0.106	0.108	0.109
~~SAMPLE 1~~	~~4.17~~	1.4	0.110	0.112	0.108	0.110
SAMPLE 1 PB	0.14	37.9	0.004	0.003	0.005	0.003
SAMPLE 2	4.05	0.2	0.106	0.106	0.106	0.107
SAMPLE 3	8.10	1.0	0.207	0.204	0.208	0.208
SAMPLE 4	7.68	1.3	0.197	0.198	0.194	0.198
SAMPLE 5	4.30	1.5	0.113	0.113	0.115	0.112
SAMPLE 6	4.50	2.1	0.118	0.121	0.116	0.118
SAMPLE 7	3.97	0.9	0.104	0.106	0.104	0.104
SAMPLE 8	3.70	4.5	0.097	0.101	0.098	0.093
SAMPLE 9	3.61	2.5	0.095	0.098	0.093	0.094
SAMPLE 10	3.64	0.7	0.096	0.095	0.096	0.096
SAMPLE 11	4.13	1.1	0.109	0.109	0.107	0.110
SAMPLE 12	4.00	1.8	0.105	0.104	0.107	0.105
SAMPLE 13	3.89	1.2	0.102	0.103	0.101	0.103
SAMPLE 14	4.04	0.9	0.106	0.105	0.107	0.107
SAMPLE 15	5.81 SKS	0.7	0.152	0.152	0.152	0.150
SAMPLE 16	2.98	2.4	0.078	0.076	0.080	0.079
SAMPLE 17	11.74	1.1	0.291	0.292	0.288	0.294
SAMPLE 18	10.86	0.7	0.271	0.269	0.273	0.272
SAMPLE 20 5 SKL	4.93	1.3	0.130	0.128	0.129	0.131

Spike = 5.0 µg/L

Sample		
1	PB	
2	L921013-1	
3	L921013-1 Spike	
4	L921013-1 Spike Dup	
5	L920914-1	
6	L920915-1	
7	L920916-2	
8	L920917-1	
9	L920924-1	
10	L920930-1	
11	L920927-1	
12	L920928-1	
13	L920929-1	
14	L921001-1	
15	L920923-1	1.0274 gm/100mL
16	L920923-2	1.0147 gm/100mL
17	L920927-1	1.0136 gm/100mL
18	L920927-2	
20	CCV	

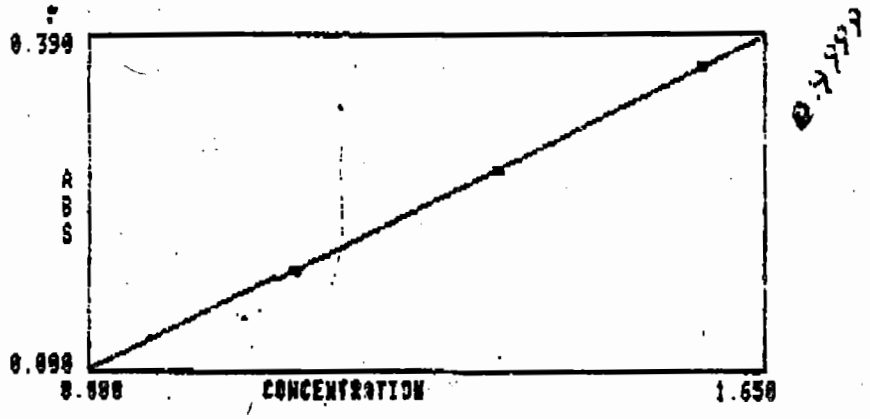
Varian SpectrAA 10/20 System Report

OPERATOR 71837
DATE 10.17.92
BATCH NO.

PROGRAM 8 Ag

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	1
LAMP CURRENT (mA)	2
SLIT WIDTH (nm)	0.5
WAVELENGTH (nm)	328.1
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	6
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	5.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.000		-0.000	-0.000	0.000	-0.000
STANDARD 1	0.500	0.6	0.119	0.119	0.119	0.120
STANDARD 2	1.000	0.4	0.238	0.239	0.237	0.237
STANDARD 3	1.500	0.4	0.355	0.356	0.353	0.356



SAMPLE	CONC	%RSD	MEAN ABS	READINGS			
SAMPLE 10	0.005	70.3	0.001	0.002	0.002	0.000	
SAMPLE 11	1.013	0.7	0.241	0.239	0.242	0.241	
SAMPLE 12	-0.000	99.9	-0.000	0.000	-0.000	-0.000	
SAMPLE 13	-0.005	20.9	-0.001	-0.001	-0.001	-0.001	
SAMPLE 14	0.633	0.4	0.156	0.156	0.156	0.155	spike
SAMPLE 15	0.721	0.2	0.172	0.171	0.172	0.172	spike dup
SAMPLE 16	-0.007	0.0	-0.002	-0.002	-0.002	-0.002	
SAMPLE 17	-0.006	19.8	-0.002	-0.001	-0.002	-0.002	

EM

Ag

Spike = 1.0 mg/L

Sample		
10	PB	
11	ICV	
12	L920827-1	1.0060 gm/50mL
13	L920827-2	1.0057 gm/50mL
14	L920827-2 Spike	1.0141 gm/50mL
15	L920827-2 Spike Dup	1.0066 gm/50mL
16	L920923-1	1.0102 gm/50mL
17	L920923-2	1.0798 gm/50mL

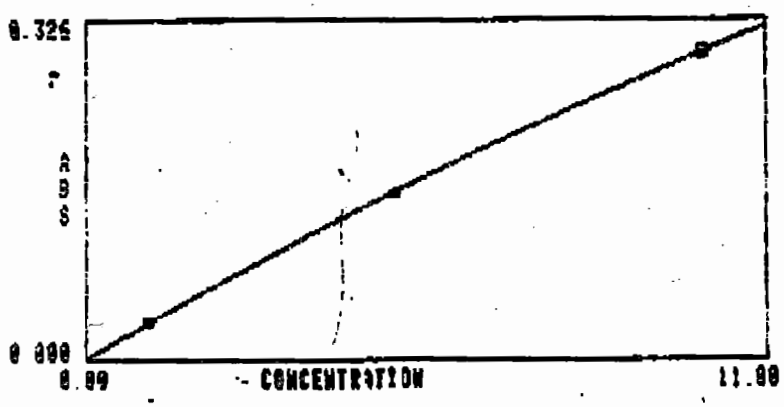
Varian SpectrAA 10/20 System Report

OPERATOR 99472
DATE 10.14.92
BATCH NO.

PROGRAM 20 T1

INSTRUMENT MODE	ABSORBANCE
CALIBRATION MODE	CONCENTRATION
MEASUREMENT MODE	INTEGRATION
LAMP POSITION	2
LAMP CURRENT (mA)	10
SLIT WIDTH (nm)	0.5
WAVELENGTH (nm)	276.8
FLAME	AIR-ACETYLENE
SAMPLE INTRODUCTION	MANUAL
DELAY TIME	5
TIME CONSTANT	0.05
MEASUREMENT TIME (sec)	5.0
REPLICATES	3
BACKGROUND CORRECTION	ON

SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
BLANK	0.00		0.000	0.001	0.000	0.000
STANDARD 1	1.00	1.9	0.033	0.033	0.034	0.033
STANDARD 2	5.00	0.8	0.159	0.158	0.159	0.160
STANDARD 3	10.00	0.9	0.296	0.294	0.299	0.295



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SAMPLE	CONC	%RSD	MEAN ABS	READINGS		
SAMPLE 1	4.85	1.6	0.154	0.152	0.154	0.157
SAMPLE 2	0.09	36.9	0.003	0.004	0.002	0.003
SAMPLE 2	0.08	34.4	0.003	0.004	0.002	0.002
SAMPLE 1	<0.05	63.2	0.002	0.001	0.002	0.003
SAMPLE 2	<0.07	33.7	0.002	0.002	0.002	0.003
SAMPLE 3	4.57	1.0	0.146	0.144	0.146	0.147
SAMPLE 4	4.80	0.7	0.153	0.152	0.154	0.153
SAMPLE 5	<0.08	8.4	0.003	0.002	0.003	0.003
SAMPLE 6	<0.07	22.7	0.002	0.003	0.003	0.002
SAMPLE 7	<0.08	21.3	0.003	0.002	0.003	0.003
SAMPLE 8	0.10	21.0	0.003	0.004	0.003	0.003
SAMPLE 9	4.93	0.3	0.157	0.157	0.157	0.157
SAMPLE 10	0.08	14.0	0.003	0.003	0.002	0.003

II

Spike = 5.0 mg/L

Sample		
1	ICV	
2	ICB	
1	PB	
2	L920914-1	2.0972 gm/100mL
3	L920914-1 Spike	2.1416 gm/100mL
4	L920914-1 Spike Dup	2.1350 gm/100mL
5	L920827-2	2.0062 gm/100mL
6	L920827-1	2.0052 gm/100mL
7	L920923-1	2.0017 gm/100mL
8	L920923-2	2.0076 gm/100mL
9	CCV	
10	CCB	