

Advanced Medical Systems, Inc.

121 North Eagle Street • Geneva, Ohio 44041
(216) 466-4671 FAX (216) 466-0186

April 17, 1995

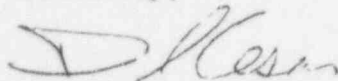
Mr. John A. Grobe, Chief
Nuclear Materials Inspection
Section II
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Mr. Grobe:

To follow-up on your March 31, 1995, correspondence regarding Advanced Medical Systems, Inc. submitting the Emergency Plan to off-site response organizations for an opportunity to comment, enclosed please find the signed, certified, return-receipts from each organization which received a copy of the plan.

If you should have any questions, please contact me.

Sincerely,



DAVID CESAR
Treasurer

DC/cs
Enclosures

9702060252 970127
PDR FOIA
ENGLISH96-444 PDR

RECEIVED

APR 21 1995

REGION III

B1134
APR 21 1995

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

CUYAHOGA EMERGENCY MGMT ASSISTANCE CENTER
1255 EUCLID AVE
CLEVELAND OH 44115-1307
ATTN: MR MICHAEL S KALSTROM SECRETARY
CUYAHOGA CTY LOCAL EMERGENCY PLANNING
COMMITTEE

5. Signature (Addressee)

1255 Euclid Ave #102

6. Signature (Agent)

M. Kalstrom

PS Form 3811, December 1991 • U.S.G.P.O. 1992-307-530

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address

2. ☐ Restricted Delivery

Consult postmaster for fee.

4a. Article Number

P 416 193 626

4b. Service Type

- ☐ Registered ☐ Insured
☐ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery

4/2/95

8. Addressee's Address (Only if requested and fee is paid)

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

OHIO EMERGENCY MANAGEMENT AGENCY INC
ATTN: MR JAMES WILLIAMS
RADIOLOGICAL BRANCH CHIEF
2825 WEST DUBLIN-GRANVILLE RD
COLUMBUS OH 43235-2206

5. Signature (Addressee)

[Signature]

6. Signature (Agent)

[Signature]

PS Form 3811, December 1991 • U.S.G.P.O. 1992-307-530

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address

2. ☐ Restricted Delivery

Consult postmaster for fee.

4a. Article Number

P 416 193 625

4b. Service Type

- ☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery

4/2/95

8. Addressee's Address (Only if requested and fee is paid)

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

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SENDER:

- Complete items 1 and/or 2 for additional services.
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- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

OHIO EMERGENCY RESPONSE COMM
P O BOX 163669
COLUMBUS OH 43216-3669
ATTN: MS. JAN HARF, CHAIRPERSON

5. Signature (Addressee)

[Signature]

6. Signature (Agent)

[Signature]

PS Form 3811, December 1991 • U.S.G.P.O. 1993-352-714

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address

2. ☐ Restricted Delivery

Consult postmaster for fee.

4a. Article Number

P 416 193 630

4b. Service Type

- ☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery

APR 11 1995

8. Addressee's Address (Only if requested and fee is paid)

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

UNIVERSITY HOSPITAL OF CLEVELAND
11100 EUCLID AVE
CLEVELAND OH 44106
ATTN DR RAO

4a. Article Number

P416 193 624

4b. Service Type

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

7. Date of Delivery

APR 4 1995

5. Signature (Addressee)

[Signature]

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, December 1991 U.S. GPO: 1992-352-714

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

CLEVELAND CITY POLICE DEPT
601 LAKESIDE PD
RM 230
CLEVELAND OH 44114
ATTN COMMANDER ROBERT CERMAK

4a. Article Number

P 416 193 628

4b. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

7. Date of Delivery

APR 03 1995

5. Signature (Addressee)

6. Signature (Agent)

Bobby G. Mitchell

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, December 1991 U.S.G.P.O.: 1992-307-530

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
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I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

ATTN MR LLOYD T ROOT CHIEF
FIRE MARSHAL
CITY OF CLEVELAND
1645 SUPERIOR AVE
CLEVELAND OH 44114

4a. Article Number

P 416 193 627

4b. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

7. Date of Delivery

APR 3 1995

5. Signature (Addressee)

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, December 1991 U.S.G.P.O.: 1992-307-530

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

April 24, 1995

Branch

Advanced Medical Systems, Inc.
ATTN: David Cesar
Treasurer
121 North Eagle Street
Geneva, OH 44041

Dear Mr. Cesar:

This refers to the special inspection conducted by Mr. Raymant L. Glinski of this office on March 28, 1995, of activities authorized by NRC Byproduct Material License No. 34-19089-01. The inspection was limited to a review of the radioanalytical services provided by your vendor, Quanterra Environmental Services, located in Earth City, MO. A copy of the inspection report is enclosed.

The inspection was an examination of activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and with the conditions of your license. Specifically, the inspector's activities included reviewing the following: (1) sample receipt, (2) sample preparation, (3) radioanalytical procedures, (4) quality control measures for the counting instruments, (5) internal quality assurance practices, (6) participation in external cross-check programs, (7) data review, and (8) organizational structure.

No violations of NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosure will be placed in the NRC Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

Original Signed By

James L. Caldwell, Deputy Director
Division of Radiation Safety and Safeguards

Docket No.: 030-16055
License No.: 34-19089-01

Enclosure: As stated

DOCUMENT NAME: G:\INSPRPTS\MTLS\030\03016055.953

ve a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

ur FICE	RIII	C	RIII	E	RIII	C	RIII
NAME	MWEBER <i>was for</i>		WSLAWINSKI <i>was</i>		MADERA <i>GRM</i>		JCALDWELL
DATE	04/17/95		04/17/95		04/19/95		04/19/95

OFFICIAL RECORD COPY

9505030036 ZAP

B/137

Distribution

Robert Meschter
Radiation Safety Officer
Advanced Medical Systems, Inc.
121 N. Eagle Street
Geneva, OH 44041

Michael R. White, Mayor
City of Cleveland
601 Lakeside Avenue
Cleveland, OH 44114

Lisa Mehringer
City of Cleveland Law Department
601 Lakeside Avenue, Room 106
Cleveland, OH 44114

Erwin J. Odeal, Executive Director
Northeast Ohio Regional Sewer District
3826 Euclid Avenue
Cleveland, OH 44115

Erv Ball, Deputy Director
Cuyahoga County Board of Health
1375 Euclid Avenue, Suite 524
Cleveland, OH 44115

Robert E. Owen, Administrator
Radiological Health Program
Department of Health
246 North High Street, 3rd Floor
P.O. Box 118
Columbus, OH 43266

Michael Kalstrom, Secretary
County of Cuyahoga
Cuyahoga Emergency Management
Assistance Center
1255 Euclid Avenue, Room 102
Cleveland, OH 44115-1807

Marian Zobler
U.S. Nuclear Regulatory Commission
Rockville, MD

bcc:

Cathy Haney, NMSS
PUBLIC IE07
AMS File

E-mail:

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Bill Brach (EWB)
Jim Caldwell (JLC1)
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Donald Cool (DAC)
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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-16055/95004(DRSS)

Docket No. 030-16055

License No. 34-19089-01

Licensee: Advanced Medical Systems, Inc. (AMS)
1020 London Road
Cleveland, OH 44110

Facility Inspected: Quanterra Environmental Services, Inc.
13715 Rider Trail North
Earth City, MO 63045

Inspection Conducted: March 28, 1995

Inspector: Wayne J. Glinski for
Raymond L. Glinski
Radiation Specialist

4/17/95
Date

Reviewed by: Wayne J. Glinski
Wayne Glinski
Senior Radiation Specialist

4/17/95
Date

Approved by: James L. Caldwell
James L. Caldwell, Deputy Director
Division of Radiation Safety
and Safeguards

4/24/95
Date

Inspection Summary

Inspection on March 28, 1995 (Report No. 030-16055/95004(DRSS))

Areas Inspected: This was an announced, limited scope inspection to evaluate the licensee's vendor for radioanalytical services. The specific areas examined included the following: sample receipt, sample preparation, radioanalytical procedures, quality control measures for the counting instruments, internal quality assurance practices, participation in external cross-check programs, data review, and organizational structure.

Results: The inspector did not identify any concerns in the areas examined. All laboratory practices and analytical procedures were found to be adequate.

4505030047 4SP

DETAILS

1. Persons Contacted

- * Allen Field, Project Manager
- * Margaret Winter, Quality Control Manager
- * Donald DiHel, Radiochemistry Group Leader
- # Larry Taake, Laboratory Director
- * Joseph Koch, Health and Safety Coordinator
- # Robert White, Project Manager

* Denotes individuals present during the entrance meeting, inspection, and exit meeting.

Denotes individuals present at the entrance meeting.

2. Purpose of Inspection

The purpose of this inspection was to evaluate the radioanalytical and quality control practices of Quanterra Environmental Services, Inc. (Quanterra). Quanterra has been contracted by Advanced Medical Systems, Inc. (AMS) to provide radiological analyses for samples of processed water. The radiological services consist of filtration studies to determine cobalt-60 (Co-60) solubility and gamma spectrometry analyses for Co-60 concentration in the samples. AMS has another vendor under contract, Diversified Technology Services, to process the wastewater containing cobalt-60.

3. Sample Receipt, Preparation and Storage

Samples are received from the clients at the Quanterra laboratory loading dock. The samples are surveyed with a GM detector as a screening procedure, as Quanterra only analyzes samples with low levels of radionuclides. The received samples are compared to the Chain-of-Custody document (See Attachment A, Page 1) that accompanies the samples and the samples are then logged into the laboratory. Each sample is given a characteristic laboratory number. Upon receipt, the laboratory staff also examine the condition of the samples and a "Condition Upon Receipt Variance Report" is completed and filed (See Attachment A, Page 2).

The samples are then taken to the sample preparation laboratory located in a controlled area. This room is equipped with drying ovens, soil grinders, a ball mill, and fumehoods. Sample preservation, such as acidification, is also conducted in the room.

The laboratory has several walk-in cold rooms located at the loading dock area for sample storage.

4. Description of the Counting Instruments and Quality Control

The gamma spectrometry, alpha spectrometry, liquid scintillation, and low background gas-flow proportional counters are located in one Counting Room, which is equipped with independent electrical circuitry. The gamma spectrometry detectors are calibrated for efficiency on an annual basis. NIST-traceable radionuclide standards are procured from commercial suppliers in liquid form. These calibration standard solutions are weighed on an analytical balance and diluted to the appropriate concentrations (See Attachment B, Pages 7-12).

The individual detector systems undergo a daily Quality Control (QC) count. The results of the QC counts are logged into a QC software system that plots the data on a control chart and flags any non-compliance. The QC chart plots are available to the Radiochemistry Group Leader via laboratory computer interface. A QC count within 2 sigma of the known value indicates that the system is functioning properly. Any detector in non-compliance, by having two consecutive counts outside 2 sigma, is tagged and taken out of service. The detector is then sent to the manufacturer for repair. The inspector observed a bank of alpha spectrometry detectors that were tagged as out of service. These detectors had been recently acquired and had not yet been calibrated.

5. Quality Assurance Practices

A complete Quality Assurance (QA) package is assembled and included with each batch of results for client samples. This package contains calibration data for efficiency, energy, and resolution (Full Width Half Max - FWHM). Information on the calibration standards and verification of the calibrations is also included (See Attachment B). The package also presents the results of all blanks, spikes and duplicates that were analyzed as QA samples for that specific batch of samples. On average, the QA analyses comprise 10% of the total number of analyses.

The laboratory participates in the Intercomparison/Performance Evaluation Study programs sponsored by the Environmental Protection Agency (EPA) and the Department of Energy Environmental Measurements Laboratory (EML). The inspector examined the results from the previous two EML analyses, and the results were adequate. The inspector also examined the results for EPA Intercomparison analyses from October 1991 to November 1994. Most of the results were adequate. However, the results from the June 1994 Gamma in Water analysis were determined to be an outlier, and were therefore unacceptable (See Attachment C, Page 1).

In accordance with the Quanterra QA practices, a "Laboratory Nonconformance Memo" was generated which described the item of nonconformance. A review board then determined the root cause for the problem and corrective action to prevent recurrence (See Attachment D). The review board determined that the unacceptable data resulted from a dilution error. Dilution is infrequently used in procedures for radiological analyses, therefore this error does not indicate an inability to analyze water samples for Co-60 concentration.

6. Data Review

The initial technical review of the data is conducted by the analyst upon completion of the analysis. The analyst uses a checklist (See Attachment E) to review the calibration, sample analysis, QC analyses, and other aspects of the overall analysis. A second technical review is conducted by an individual designated as a technical reviewer. A third review which emphasizes the client's requirements for the analysis, such as the Minimum Detectable Activity and appropriate reporting units, is conducted by the specific project manager for that batch of samples.

7. Organizational Structure

The organizational structure of the vendor laboratory is presented in Attachment F. The facility has a Health and Safety Coordinator and a Director of Total Quality that operate independently.

8. Conclusion

The inspector did not identify any areas of concern or weakness. The areas examined were determined to be adequate.

- Attachments:
- A. Analysis Request and Chain of Custody Record
 - B. Germanium Detector Calibration Data
 - C. 1991-1994 Radiological Intercomparison Study Results
 - D. Laboratory Nonconformance Memo
 - E. Radiochemistry
 - F. Quanterra, Inc. St. Louis Laboratory Organization Chart

CHAIN OF CUSTODY RECORD

Client Name <u>Advanced Medical Systems/IEM</u>	(7) Samples Shipment Date <u>3/27/95</u>	(5) Bill to: <u>Brian Kelly/IEM</u>
Sample Team Leader <u>Alan Duff</u>	(8) Lab Destination <u>Quanterra St. Louis</u>	<u>9040 Executive Park Dr., Ste. 205, P.O. Box 50785</u>
Task No. <u>94009.02</u>	(9) Lab Contact <u>Allen Fields</u>	<u>Knoxville, TN 37950-0785</u>
Project Manager <u>Alan Duff</u>	(12) Technical Contact/Phone <u>Alan Duff (216) 492-3270</u>	(10) Report to: <u>Carol Berger/IEM</u>
Purchase Order No.	(13) Carrier/Waybill No. <u>UPS/FEDEX -</u>	<u>1680 East Gude Drive, Ste. 305</u>
Required Report Date <u>Verbal to Alan Duff w/in 24 hrs.</u> <u>Final Report to Carol Berger</u>	<u>2473377244</u>	<u>Rockville, Md. 20850</u> Phone (301) 762-0502 Fax (301) 762-0638

ONE CONTAINER PER LINE

(1) Sample Number	(15) Sample Description/Type	(16) Date/Time Collected	(17) Container Type	(18) Sample Volume /cc/μl	(19) Preservative pH	(20) Requested Testing Program
032795-001	Water Tank # 299	3/27/95 1111	Plastic Bottle	500ml	None	Gross α/β & Solubility
032795-002	Water Tank # 299	3/27/95 1112		1l	HNO ₃ 1	Gamma Spec.
032795-003	Water Tank # 302	3/27/95 1113		500ml	None	Gross α/β & Solubility
032795-004	Water Tank # 302	3/27/95 1114		1l	HNO ₃ 1	Gamma Spec.
032795-005	Water Tank # 296	3/27/95 1430		500ml	None	Gross α/β & Solubility
032795-006	Water Tank # 296	3/27/95 1431		1l	HNO ₃ 1	Gamma Spec.
032795-007	Water Tank # 883	3/27/95 1432		500ml	None	Gross α/β & Solubility
032795-008	Water Tank # 883	3/27/95 1433	✓	1l	HNO ₃ 1	Gamma Spec.

Ins Potential Cobalt-60 contamination

Identification flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/>	(25) Sample Disposal Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive <u>1</u> months	Contact Client for final disposition
Required: Normal <input type="checkbox"/> Rush <input checked="" type="checkbox"/> <u>Verbal to Alan Duff w/in 24 hrs.</u>	(27) QC Level: <input checked="" type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> Project Specific	
Id by: (signature, date, time): <u>Ronald Alan Duff 3/27/95 1530</u>	Received by: (signature, date, time): <u>2nd unit full 3-28-95 09:30</u>	
Id by: (signature, date, time):	Received by: (signature, date, time):	
Id by: (signature, date, time):	Received by: (signature, date, time):	

(See Reverse for Instructions)





Environmental
Services

C.U.R. and C.O.C.
COPIED TO: BW & AF
TE: 3-28-95
ME: 9955
BY: Jm

Work Order No.: _____

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: _____

Date: 3-28-95 0930

Project No: _____

Initiated by: 2nd Miltut

Analysis Requested: Refer to RFA/COC

RFA/COC Numbers: AMS-327

Client Sample Numbers Affected: Entire Login

Condition/Variance (Check all that apply): Circle Number to Denote that Item was Evaluated. "NA" = "Not Applicable".

1. NA	Not enough sample received for proper analysis. Received approximately: _____	8. <input type="checkbox"/>	Custody tape disturbed/broken/missing.
2. <input type="checkbox"/>	Sample received broken/leaking.	9. NA	Sample splits performed by lab.
3. <input type="checkbox"/>	Sample received without proper preservative. <input type="checkbox"/> Cooler temperature not within $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Record temperature: <u>18°C</u>	10. NA	Volatile sample received with approximately _____ mm headspace.
<input type="checkbox"/>	pH _____	11. <input type="checkbox"/>	Sample ID on container does not match sample ID on paperwork. Explain: _____
<input type="checkbox"/>	other: _____	12. <input type="checkbox"/>	All coolers on airbill not received with shipment.
<input type="checkbox"/>	Sample received in improper container.	13. <input type="checkbox"/>	Other (explain below): <u>Shipping containers not rad surveyed.</u> <u>247 3327 244</u>
<input type="checkbox"/>	Sample received without proper paperwork. Explain: _____		
6. <input type="checkbox"/>	Paperwork received without sample.		
7. <input type="checkbox"/>	No sample ID on sample container.		

Notes: No Ice

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____
☐ Client's Name: _____ Informed in writing on: _____ By: _____
☐ Sample(s) processed "as is". Comments: _____
☐ Sample(s) on hold until: _____ If released, notify: _____

Control Supervisor Review: (or designate) 2nd Miltut Date: 3-28-95

Project Management Review: _____ Date: _____

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE



ATTACHMENT A

Page 2 of 2 Pages

**Germanium Detector
Calibration Data**

for

Detector 4

with

1.0 L MARINELLI
Geometry

EFFICIENCY CALIBRATION

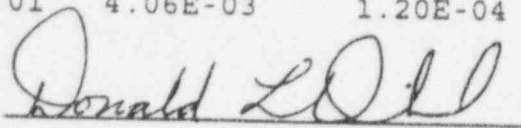
Efficiency Calibration Report (continued)

Sample ID :

Page : 2
Acquisition date : 28-SEP-1994 16:06:18

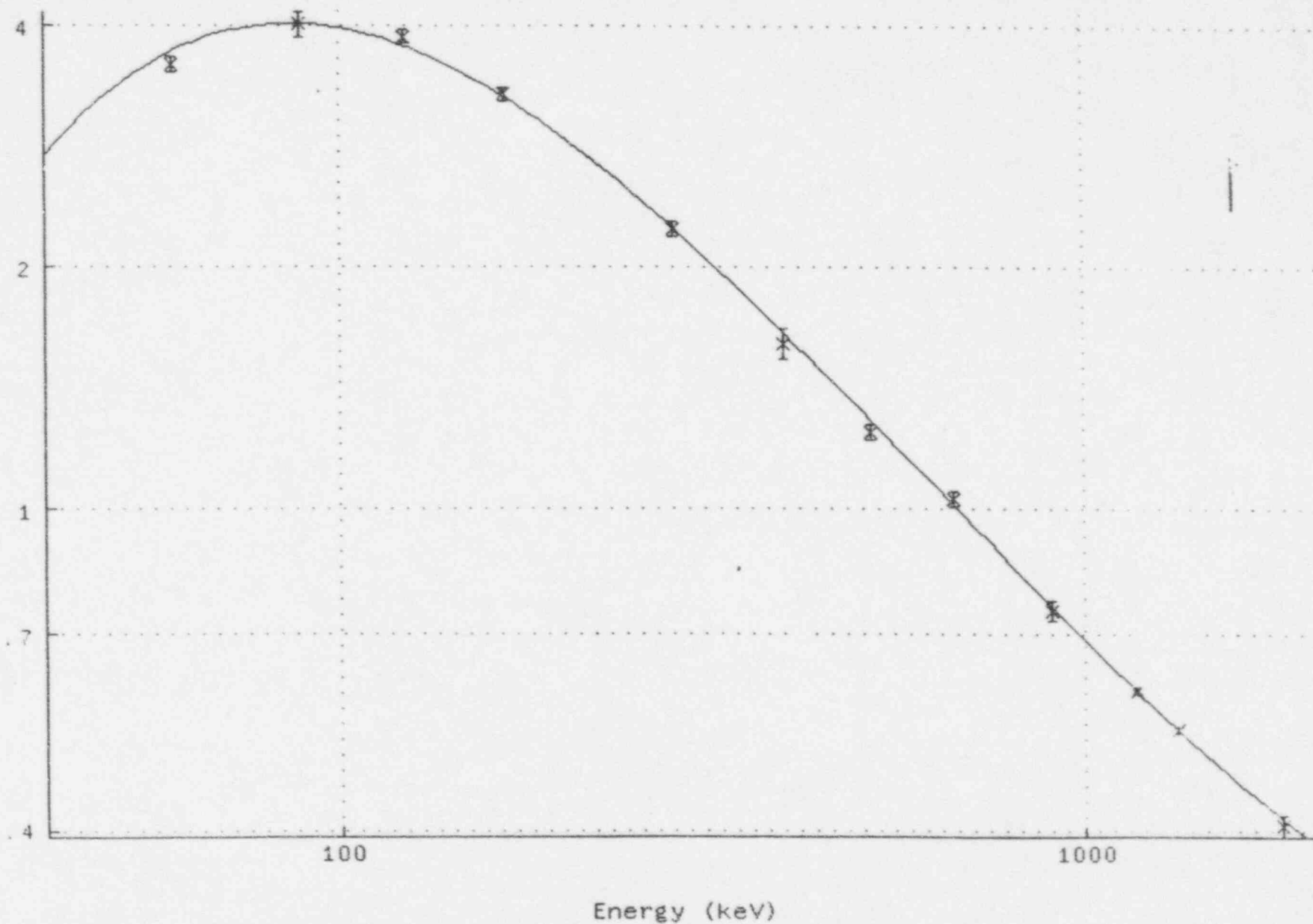
Nbr	Energy (keV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ Error	% Diff
2	59.54	3.57E-02	7.63E-04	3.70E-02	-1.71	-3.66
3	88.03	3.99E-02	1.46E-03	4.00E-02	-0.09	-0.32
4	122.06	3.86E-02	7.76E-04	3.76E-02	1.29	2.59
5	165.85	3.28E-02	6.39E-04	3.26E-02	0.34	0.65
6	279.19	2.23E-02	5.19E-04	2.24E-02	-0.09	-0.20
7	391.69	1.60E-02	7.27E-04	1.66E-02	-0.76	-3.45
8	513.98	1.24E-02	2.57E-04	1.28E-02	-1.53	-3.17
9	661.65	1.03E-02	2.23E-04	1.01E-02	0.86	1.87
10	898.02	7.48E-03	2.19E-04	7.55E-03	-0.34	-1.01
11	1173.22	5.96E-03	4.91E-05	5.94E-03	0.41	0.34
12	1332.49	5.33E-03	4.43E-05	5.33E-03	0.02	0.02
13	1836.01	4.06E-03	1.20E-04	4.14E-03	-0.68	-2.00

Approved by:

Approval Date: 10 / 5 / 94

Spec 1 : \$1\$DIA2:[GAMMA.SCUSR.ARCHIVE]CAL 4_MARN1L4_51.CNF;1
Calib date: 28-SEP-1994 18:53
Detector : GE4 Geometry : MARN1L4
Fit type : 4 Deg. Empirical

Percent Efficiency



EFFICIENCY CALIBRATION STANDARDS

\$1\$DIA2:[GAMMA.SCUSR.CER]MARN1L.CER;1

30-SEP-1994 14:37

Title : MARN1L

Entity : 1

Assay date : 1-AUG-1994 12:00:00.

Nuclide Name	Half Life	Energy (keV)	Rate	% Err	% Abn	CAL/INIT?
I-129	1.57E+07Y	39.6	278.	2.20	7.5	No
AM-241	432.00Y	59.5	346.	2.10	35.9	Yes
CD-109	464.00D	88.0	195.	3.60	3.7	No
CO-57	271.00D	122.1	178.	1.80	85.5	No
CE-139	138.00D	165.9	209.	1.70	80.3	No
HG-203	46.60D	279.2	608.	2.20	77.3	No
SN-113	115.00D	391.7	639.	4.50	64.9	No
SR-85	64.80D	514.0	1196.	2.00	99.3	No
CS-137	30.20Y	661.7	761.	2.10	85.1	Yes
Y-88	107.00D	898.0	1891.	2.90	93.4	No
CO-60	5.27Y	1173.2	1036.	0.60	100.0	No
CO-60	5.27Y	1332.5	1036.	0.60	100.0	Yes
Y-88	107.00D	1836.0	2005.	2.90	99.4	No



CERTIFICATE OF GAMMA STANDARD SOLUTION

Radionuclide: I-129 Half-life: $(1.57 \pm 0.04) \times 10^7$ YRS
Customer: METATRACE INC P.O. No.: 21910
Solution No.: 344-51-1 Catalog No.: 7129-1

Description of Standard Solution

a. Mass of solution: 5.00073 gm
b. Chemical form: NaI in 0.1 N NaOH
c. Carrier content: NONE ADDED
d. Solution density: 1.0095 g/ml

Radioimpurities

NONE DETECTED

Radioactive Daughters

NONE

Radionuclide Concentration

a. The concentration was 0.2019 g/gm (Term. Activity = 1.009 g)
b. Reference Date: SEPT. 1, 1989

Method of Calibration

Weight aliquots of the solution were assayed by gamma spectrometry, integrating under the _____ Mev peak(s). The branching ratio(s) used was/were _____ gamma rays per decay.

Uncertainty of Measurement

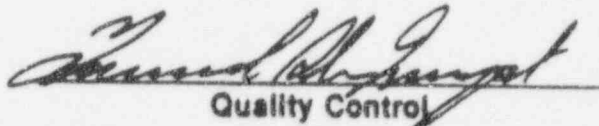
- a. Systematic uncertainty in instrument calibration: \pm 2.2 %
b. Random uncertainty
1. In assay: \pm 0.8 %
2. In weighing(s): \pm _____ %
c. Total Uncertainty: \pm 3.0 % at the 99% confidence level.

NBS Traceability

This calibration is implicitly traceable to the National Bureau of Standards.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by C. Michael Lederer et al.
2. IPL participates in an NBS measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NBS certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)


Quality Control

ISOTOPE PRODUCTS LABORATORIES
1800 No. Keystone St., Burbank, California 91504
(818) 843-7000



OBTAINED I-129, FROM ISOTOPE PRODUCTS LABORATORY, WITH AN ACTIVITY CONCENTRATION OF 0.2019 $\mu\text{Ci/gm}$ AS OF SEPT. 1, 1984. THE HALF LIFE OF I-129 IS 1.57×10^7 YEARS. THERE IS NO SIGNIFICANT DECAY CORRECTION AT THIS TIME. DILUTED TO 50 ml WITH 1N HNO_3 .

GROSS WT 42.9404
FLASK WT - 37.9893
Amount TRANSFERRED 4.9511

4.9511
(5.00078) (0.2019 $\mu\text{Ci/gm}$) (1 $\times 10^6$ $\mu\text{Ci/g}$)
(1.0005 g/ml) (50 ml) = 19992.5
344-51-1
03-09-84

(2.22 dpm/g) (19992.5 μCi) = 44383.4
03-09-84

44383.4 dpm/g
739.72 Bq/ml
732.76 Bq/ml
03-09-84

Continued on Page

Read and Understood By

Signed

Date

Signed

Description Product code: QCY.48

Solution number: R4/215/40

This mixed radionuclide gamma-ray reference standard consists of a solution in 4M HCl of the ten radionuclides listed below.

Measurement and Accuracy

Reference time

1200 GMT on 1 August 1994

Mass of solution: 5.3096

grams

Density: 1.073 g/ml at 20 °C

Parent radionuclide	Gamma-ray energy (keV)	Gamma-rays per second per gram of solution	Random uncertainty	Systematic uncertainty	Overall uncertainty
Americium-241	59.54	1099	± 0.2 %	± 1.9 %	± 2.1 %
Cadmium-109	88.03	619	± 0.3 %	± 3.3 %	± 3.6 %
Cobalt-57	122.1	564	± 0.2 %	± 1.6 %	± 1.8 %
Cerium-139	165.9	664	± 0.3 %	± 1.4 %	± 1.7 %
Mercury-203	279.2	1929	± 0.2 %	± 2.0 %	± 2.2 %
Tin-113	391.7	2078	± 0.1 %	± 4.4 %	± 4.5 %
Strontium-95	514.0	3193	± 0.3 %	± 1.7 %	± 2.0 %
Caesium-137	661.7	2414	± 0.2 %	± 1.9 %	± 2.1 %
Yttrium-88	896.0	5939	± 0.4 %	± 2.5 %	± 2.9 %
Cobalt-60	1173	3285	± 0.2 %	± 0.4 %	± 0.6 %
Cobalt-60	1333	3287	± 0.2 %	± 0.4 %	± 0.6 %
Yttrium-88	1836	6358	± 0.4 %	± 2.5 %	± 2.9 %

Purity

At the reference time the solution also contained the following impurities:

Chlorine-36 less than 3 becquerels (0.1 nanocuries) per gram.

Iron-55 equal to 4.8 becquerels (0.13 nanocuries) per gram.

Remarks

Further details including composition of the solution, methods of measurement, decay scheme assumptions, and definitions of uncertainties, are given in the data sheet accompanying this certificate.

This product meets the quality assurance requirements of NRC Regulatory Guide 4.15 for achieving explicit NIST traceability as defined in NCRP58 (1985).

Approved Signatory

B D D Singleton

Page 1 of 1

Amersham

This certificate is issued in accordance with the conditions of accreditation granted by the National Measurement Accreditation Scheme and has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. Copying of this certificate is permitted for internal use only and may not be reproduced other than in full except with the prior written approval of the issuing authority.



ATTACHMENT B
PAGE 9 of 30 pages

ALLOWED mixed Gases Available From Atmospheric Inhalation, 24/215/46
 PRESSURE RATE 0.01-94 1200 GALT THIS ANALYSIS WAS DIRECTED
 WITH 0.4% IN INACTIVE ELEMENT AND 4% H₂ TO KGO MIXED
 GASES IN SOLUTION

Glass wt 47.1026 g
 TARE 27 37.8459 g
 5.2547 g Analyt TRANSFERED

$$\frac{(24/4) \left(\frac{1/500}{g} \right) \left(\frac{60 \text{ sec}}{\text{min}} \right) (5.2547 \text{ g})}{(0.8512 \text{ } \frac{1}{\text{decim}}) (50 \text{ ml})} = 17883 \text{ decim } \text{C.S.-137}$$

ISOTOPIC	$\frac{1}{500}$	$\frac{1}{\text{decim}}$	$\frac{\text{decim}}{\text{ml}}$	value (70)
Am-241	1099	0.359	19303	2.1
Co-109	619	0.072	104924	3.6
Ca-57	564	0.8551	4159	1.8
Ca-139	664	0.8035	5211	1.7
Hg-203	1729	0.7780	15786	2.2
SH-113	2028	0.6449	19704	4.5
Si-85	3793	0.9927	24093	2.0
Cs-137	2444	0.8512 *	17883	2.1
Y-88	5999	0.9340	10501	2.9
Co-60	3285	1.0	20714	0.6
Co-60	3287	1.0	20727	0.6
Y-88-	6358	0.9940	40333	2.9

* BLENDING RATIO FOR CS-137 IS THE PRODUCT OF THE RATIOS FOR
 Ba-137m AND CS-137 $(0.9998)(0.8516) = 0.8512 \text{ } \frac{1}{\text{decim}}$

Continued on Page

Read and Understood By

9-12-94

Signed

Date

Signed

Date



DILUTION 3.0 ml of R4/215/40 (STA LOG BOOK 627 pg 21)
AND 5.0 ml of 344-51-1 (STA LOG BOOK 352 pg 83) TO
1000 ml, ADJUSTED TO pH < 2

$$\left(\frac{44383 \text{ dpm/ml I-129}}{1000 \text{ ml}} \right) (5.0 \text{ ml}) = 221.9 \text{ dpm/ml I-129}$$

$$\left(\frac{17883 \text{ dpm/ml Cs-137}}{1000 \text{ ml}} \right) (3.0 \text{ ml}) = 53.6 \text{ dpm/ml Cs-137}$$

IS-TO-PE

Activity From
STD (dpm/ml)Activity Factor
Sample (dpm/ml)

I-129

44383

221.9

Am-241

19303

57.9

Cd-109

104924

314.8

Co-57

4159

12.5

Co-139

5211

15.6

K-40

15736

47.2

Sr-90

19704

59.1

Sr-85

24093

72.8

Cs-137

17883

53.6

Y-88

40501

121.5

Co-60

20714

62.1

Co-60

20727

62.2

Y-88

40333

121.0

9-12-94

Continued on Page

Read and Understood By

[Signature]

9-12-94

Signed

Date

Signed

Date



**Activity of Radioactive Calibration Standard
Solution #R4/215/40-1**

One Liter Marinelli Beaker

<u>Isotope</u>	<u>Standard y/sec*g</u>	<u>Total y/sec</u>	<u>Branching Ratio</u>	<u>dpm/ml</u>	<u>Total Becquerels</u>	<u>pCi/liter</u>
I-129	N/A	278	0.0752	221.9	3698	99955
Am-241	1099	343	0.359	57.9	965	26086
Cd-109	819	195	0.0372	314.8	5246	141790
Co-57	564	178	0.8551	12.5	208	5620
Ce-139	664	209	0.8035	15.6	261	7042
Hg-203	1929	608	0.773	47.2	787	21264
Sn-113	2028	639	0.649	59.1	985	26627
Sr-85	3793	1196	0.9927	72.3	1205	32558
Cs-137	2414	761	0.8512	53.6	894	24166
Y-88	5999	1891	0.934	121.5	2025	54731
Co-60	3285	1036	1.0	62.1	1036	27992
Co-60	3287	1036	1.0	62.2	1036	28009
Y-88	6358	2005	0.994	121.0	2017	54504

Calibrated on:
01-AUG-94 at 12:00 GMT

EFFICIENCY CALIBRATION COUNT DATA

Quanterra Environmental Services -- St. Louis Laboratory

---- Sample Information ----

Project Number : Calibration
Sample ID : R4/215/40-1
Batch Number : 0

Sample Quantity : 1.00000E+00 Liter
Sample Type : Liquid
Sample Analyst : DEFAULT

---- Sample Decay/Count Information ----

Sample Date	: 1-AUG-1994 12:00:00.	Elapsed live time:	0 02:00:00.00
Acquisition date	: 28-SEP-1994 16:06:18	Elapsed real time:	0 02:01:30.70
Decay time	: 58 04:06:18.90	% dead time	: 1.2%

---- Detector Parameters ----

Detector name	: GE4	Counting geometry:	MARN1L4
Energy cal. time	: 28-SEP-1994 18:53:05	Energy cal. type	: POLY
Effic. cal. time	: 28-SEP-1994 18:53:05	FWHM cal. type	: SQRT

---- Processing Parameters ----

Start channel	: 80	End channel	: 4096
Sensitivity	: 5.00000	Gaussian Sens.	: 10.00000
Critical level?	: No	Propagate Errors?	: No
Empirical Eff?	: Yes	Library-based eff:	: No
Energy tolerance	: 2.00000	Half life ratio	: 8.00000
Abundance limit	: 75.00000	WTM error limit	: 3.00000
MDA Width (FWHM)	: 3.00000	MDA Confid Level	: 5.00000 %



It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
	50.01	4230	39818	1.79	99.89	97	9	17.3		
4	59.48	88374	34982	0.89	118.84	114	9	1.0		AM-241
4	70.82	3256	18571	0.99	141.53	138	12	13.7	1.69E+00	
4	72.84	5286	15130	0.88	145.57	138	12	7.6		
9	82.58	3606	27647	1.94	165.07	160	21	17.4	8.60E+00	
9	85.26	3811	35227	2.13	170.42	160	21	23.1		TH-228
9	88.03	51438	15686	0.96	175.96	160	21	1.2		CD-109
0	122.09	42594	27425	0.96	244.13	239	11	1.8		CO-57
0	136.51	5140	21576	0.93	272.98	269	9	10.7		CO-57
0	165.90	36719	21199	1.03	331.79	327	10	1.8		CE-139
0	199.12	429	14624	0.96	398.26	396	7	94.0		
0	255.23	2502	12167	1.14	510.54	507	8	15.8		SN-113
0	279.23	41111	14393	1.16	558.57	553	11	1.5		HG-203
0	391.72	51982	9202	1.22	783.65	779	11	1.1		SN-113
0	514.01	57435	8410	1.31	1028.35	1023	12	1.1		SR-85
0	661.64	56019	8138	1.44	1323.73	1317	14	1.1		CS-137
0	814.01	1549	3704	1.63	1628.58	1623	11	16.0		
0	898.01	69805	6142	1.65	1796.65	1789	16	0.9		Y-88
0	1173.18	43532	3236	1.80	2347.18	2339	17	1.1		CO-60
0	1324.70	1635	2038	2.78	2650.32	2642	16	13.3		
0	1332.45	38928	2157	1.94	2665.82	2658	17	1.2		CO-60
0	1836.04	40190	694	2.34	3673.22	3664	22	1.1		Y-88



Summary of Nuclide Activity
Sample ID : R4/215/40-1

Page : 3
Acquisition date : 28-SEP-1994 16:06:18

Total number of lines in spectrum 22
Number of unidentified lines 1
Number of lines tentatively identified by NID 21 95.45%

Nuclide Type : fission

Nuclide	Hlife	Decay	Uncorrected pCi/Liter	Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.00D	1.16	4.977E+03	5.776E+03	0.104E+03	1.79	
Total Activity :			4.977E+03	5.776E+03			

Nuclide Type : activation

Nuclide	Hlife	Decay	Uncorrected pCi/Liter	Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.02	2.742E+04	2.800E+04	0.032E+04	1.15	
Y-88	106.60D	1.46	3.666E+04	5.353E+04	0.057E+04	1.06	
CD-109	464.00D	1.09	1.296E+05	1.414E+05	0.017E+05	1.18	
SN-113	115.10D	1.42	1.814E+04	2.576E+04	0.029E+04	1.13	
CE-139	137.66D	1.34	5.271E+03	7.066E+03	0.128E+03	1.82	
Total Activity :			2.171E+05	2.557E+05			

Nuclide Type : fallout

Nuclide	Hlife	Decay	Uncorrected pCi/Liter	Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
5	64.84D	1.86	1.693E+04	3.155E+04	0.033E+04	1.06	
CS-137	30.20Y	1.00	2.453E+04	2.462E+04	0.027E+04	1.09	
HG-203	46.60D	2.38	8.926E+03	2.122E+04	0.032E+04	1.50	
Total Activity :			5.039E+04	7.739E+04			

Nuclide Type : Th Series

Nuclide	Hlife	Decay	Uncorrected pCi/Liter	Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-228	1.91Y	1.06	2.951E+04	3.126E+04	0.722E+04	23.10	
Total Activity :			2.951E+04	3.126E+04			

Nuclide Type : Np Series

Nuclide	Hlife	Decay	Uncorrected pCi/Liter	Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AM-241	432.00Y	1.00	2.497E+04	2.498E+04	0.025E+04	1.01	
Total Activity :			2.497E+04	2.498E+04			

Grand Total Activity : 3.269E+05 3.951E+05

;; "K" = Keyline not found
"E" = Manually edited

"M" = Manually accepted
"A" = Nuclide specific abn. limit

---- Identified Nuclides ----

Nuclide	Activity (pCi/Liter)	Act error	MDA (pCi/Liter)	MDA error	Act/MDA
CO-57	5.776E+03	1.036E+02	7.642E+01	0.000E+00	75.586
CO-60	2.800E+04	3.228E+02	1.499E+02	0.000E+00	186.861
SR-85	3.155E+04	3.329E+02	1.967E+02	0.000E+00	160.391
Y-88	5.353E+04	5.655E+02	1.351E+02	0.000E+00	396.306
CD-109	1.414E+05	1.663E+03	1.549E+03	0.000E+00	91.283
SN-113	2.576E+04	2.917E+02	1.875E+02	0.000E+00	137.366
CS-137	2.462E+04	2.676E+02	1.506E+02	0.000E+00	163.471
CE-139	7.066E+03	1.283E+02	1.025E+02	0.000E+00	68.930
HG-203	2.122E+04	3.184E+02	2.349E+02	0.000E+00	90.320
TH-228	3.126E+04	7.223E+03	4.604E+03	0.000E+00	6.790
AM-241	2.498E+04	2.516E+02	1.773E+02	0.000E+00	140.894

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/Liter) Ided	Act error	MDA (pCi/Liter)	MDA error	Act/MDA
BE-7	-1.639E+01	1.223E+03	1.993E+03	0.000E+00	-0.008
NA-22	6.946E+00	7.265E+01	1.211E+02	0.000E+00	0.057
K-40	1.164E+03	8.069E+02	1.360E+03	0.000E+00	0.856
Q 1	-3.167E+01	2.114E+03	3.544E+03	0.000E+00	-0.009
K 4	-3.589E+01	8.664E+01	1.422E+02	0.000E+00	-0.252
CO-58	1.809E+02	1.516E+02	2.218E+02	0.000E+00	0.816
FE-59	-1.570E+02	4.232E+02	6.782E+02	0.000E+00	-0.232
ZN-65	-1.297E+01	2.231E+02	3.586E+02	0.000E+00	-0.036
SE-75	-1.645E+01	1.042E+02	1.766E+02	0.000E+00	-0.093
RB-83	-3.342E+01	2.049E+02	3.311E+02	0.000E+00	-0.101
NB-94	3.627E+01	8.198E+01	1.354E+02	0.000E+00	0.268
NB-95	-2.147E+02	2.273E+02	3.734E+02	0.000E+00	-0.575
ZR-95	-3.753E+01	2.461E+02	4.084E+02	0.000E+00	-0.092
RH-101	-4.079E+01	4.755E+01	7.813E+01	0.000E+00	-0.522
RH-102	1.958E+01	2.187E+02	3.636E+02	0.000E+00	0.054
RH-102M	3.017E+01	2.110E+02	3.534E+02	0.000E+00	0.085
RU-103	5.187E+01	1.858E+02	3.026E+02	0.000E+00	0.171
RH-106	6.716E+02	8.116E+02	1.307E+03	0.000E+00	0.516
AG-110M	1.763E+02	1.095E+02	1.636E+02	0.000E+00	1.078
SB-124	5.872E+01	1.369E+02	2.201E+02	0.000E+00	0.267
SB-125	-3.319E+01	1.932E+02	3.169E+02	0.000E+00	-0.105
I-126	1.167E+04	4.743E+03	7.085E+03	0.000E+00	1.647
SB-126	4.256E+02	2.231E+03	3.270E+03	0.000E+00	0.130
I-129	9.868E+04	1.170E+03	2.295E+03	0.000E+00	43.002
I-131	-3.374E+03	9.240E+03	1.531E+04	0.000E+00	-0.220
BA-133	1.880E+01	8.234E+01	1.373E+02	0.000E+00	0.137
CS-134	3.247E+01	7.436E+01	1.195E+02	0.000E+00	0.272
CS-136	-8.030E+02	2.492E+03	4.014E+03	0.000E+00	-0.200
B 40	-1.206E+03	5.584E+03	8.996E+03	0.000E+00	-0.134
Q 1	-2.837E+01	2.577E+02	4.221E+02	0.000E+00	-0.067
CE 44	5.218E+02	4.147E+02	6.173E+02	0.000E+00	0.845
ND-147	4.385E+02	4.806E+03	7.256E+03		

EFFICIENCY CALIBRATION VERIFICATION

Gamma Spectroscopy Efficiency Verification

Geometry: MARN1L

Date: 9/30/94

Detector: GE4

Calibration Standard: R4/215/40-1

Isotope	Certified Activity	Observed Activity	Difference
I-129	99955	N/A	N/A
Am-241	26086	24980	4%
Cd-109	141790	141400	0%
Co-57	5620	5776	3%
Ce-139	7042	7066	0%
Hg-203	21264	21220	0%
Sn-113	26627	25760	3%
Sr-85	32558	31550	3%
Cs-137	24166	24620	2%
Y-88	54616	53530	2%
Co-60	28001	28000	0%

Reviewed By

Donald L. Dill

Date:

10-5-94



Quanterra Environmental Services -- St. Louis Laboratory

---- Sample Information ----

Project Number : Cal Verf
Sample ID : R4/215/40-1
Batch Number : 0

Sample Quantity : 1.00000E+00 Liter
Sample Type : Liquid
Sample Analyst : DEFAULT

---- Sample Decay/Count Information ----

Sample Date	: 1-AUG-1994 12:00:00.	Elapsed live time:	0 00:30:00.00
Acquisition date	: 30-SEP-1994 16:01:31	Elapsed real time:	0 00:30:22.44
Decay time	: 60 04:01:31.20	% dead time	: 1.2%

---- Detector Parameters ----

Detector name	: GE4	Counting geometry:	MARN1L4
Energy cal. time	: 28-SEP-1994 18:53:05	Energy cal. type	: POLY
Effic. cal. time	: 28-SEP-1994 18:53:05	FWHM cal. type	: SQRT

---- Processing Parameters ----

Start channel	: 80	End channel	: 4096
Sensitivity	: 5.00000	Gaussian Sens.	: 10.00000
Critical level?	: No	Propagate Errors?	: No
Empirical Eff?	: Yes	Library-based eff:	: No
Energy tolerance	: 1.00000	Half life ratio	: 8.00000
Abundance limit	: 75.00000	WTM error limit	: 3.00000
MDA Width (FWHM)	: 3.00000	MDA Confid Level	: 5.00000 %



It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	49.40	1598	10963	1.93	98.67	93	16	27.3	2.33E+00	
0	50.95	787	10519	1.77	101.76	93	16	51.9		
0	52.77	296	6109	1.01	105.41	93	16	83.9		
0	59.50	22781	7983	0.88	118.88	114	9	1.9		
4	70.85	744	4640	1.08	141.59	137	13	29.8	1.47E+00	AM-241
4	72.86	1149	3814	0.84	145.62	137	13	17.3		
0	82.24	212	3892	0.78	164.39	163	5	89.2		
0	88.04	12703	7322	0.86	175.99	171	10	3.1		
0	122.12	10616	6684	0.98	244.19	239	11	3.6		CD-109
0	136.48	1096	5522	0.89	272.93	269	9	25.2		CO-57
0	165.89	9075	5158	1.06	331.78	327	10	3.6		CO-57
0	255.41	571	3096	1.01	510.90	507	8	34.8		CE-139
0	279.25	10015	2922	1.15	558.61	554	9	2.8		SN-113
0	391.76	12980	2607	1.22	783.73	778	13	2.4		HG-203
0	514.03	14020	2285	1.32	1028.38	1023	13	2.2		SN-113
0	661.66	14106	1922	1.43	1323.76	1317	14	2.1		SR-85
0	813.95	302	899	1.52	1628.48	1624	10	38.8		CS-137
0	898.04	17411	1466	1.60	1796.71	1789	17	1.8		
0	1173.23	10898	655	1.82	2347.29	2341	16	2.2		Y-88
0	1324.53	302	467	2.66	2649.97	2642	14	32.5		CO-60
0	1332.46	9675	631	1.99	2665.83	2658	19	2.4		
0	1836.02	10107	138	2.31	3673.19	3661	24	2.1		CO-60
										Y-88

Summary of Nuclide Activity

Sample ID : R4/215/40-1

Page : 3

Acquisition date : 30-SEP-1994 16:01:31

Total number of lines in spectrum 22
 Number of unidentified lines 5
 Number of lines tentatively identified by NID 17 77.27%

Nuclide Type : fission

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/Liter	Wtd Mean Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.00D	1.17	4.946E+03	5.769E+03	0.204E+03	3.53	
Total Activity :			4.946E+03	5.769E+03			

Nuclide Type : activation

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/Liter	Wtd Mean Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.02	2.742E+04	2.802E+04	0.045E+04	1.62	
Y-88	106.60D	1.48	3.699E+04	5.470E+04	0.075E+04	1.37	
CD-109	464.00D	1.09	1.280E+05	1.401E+05	0.043E+05	3.09	
SN-113	115.10D	1.44	1.812E+04	2.604E+04	0.062E+04	2.39	
CE-139	137.66D	1.35	5.210E+03	7.054E+03	0.256E+03	3.63	
Total Activity :			2.158E+05	2.559E+05			

Nuclide Type : fallout

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/Liter	Wtd Mean Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
Y-90	64.84D	1.90	1.653E+04	3.146E+04	0.070E+04	2.21	
CS-137	30.20Y	1.00	2.471E+04	2.480E+04	0.053E+04	2.14	
MG-203	46.60D	2.45	8.698E+03	2.129E+04	0.059E+04	2.79	
Total Activity :			4.994E+04	7.756E+04			

Nuclide Type : Np Series

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/Liter	Wtd Mean Decay Corr pCi/Liter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AM-241	432.00Y	1.00	2.574E+04	2.575E+04	0.050E+04	1.94	
Total Activity :			2.574E+04	2.575E+04			

Grand Total Activity : 2.964E+05 3.650E+05

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit



---- Identified Nuclides ----

Nuclide	Activity (pCi/Liter)	Act error	MDA (pCi/Liter)	MDA error	Act/MDA
CO-57	5.769E+03	2.036E+02	1.528E+02	0.000E+00	37.742
CO-60	2.802E+04	4.532E+02	2.929E+02	0.000E+00	95.667
SR-85	3.146E+04	6.958E+02	4.035E+02	0.000E+00	77.965
Y-88	5.470E+04	7.504E+02	2.699E+02	0.000E+00	202.694
CD-109	1.401E+05	4.327E+03	3.253E+03	0.000E+00	43.059
SN-113	2.604E+04	6.225E+02	3.752E+02	0.000E+00	69.411
CS-137	2.480E+04	5.306E+02	2.989E+02	0.000E+00	82.986
CE-139	7.054E+03	2.561E+02	2.051E+02	0.000E+00	34.388
HG-203	2.129E+04	5.939E+02	4.822E+02	0.000E+00	44.149
AM-241	2.575E+04	4.990E+02	3.526E+02	0.000E+00	73.042

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/Liter) Ided	Act error	MDA (pCi/Liter)	MDA error	Act/MDA
BE-7	1.212E+03	2.531E+03	4.161E+03	0.000E+00	0.291
NA-22	2.010E+01	1.430E+02	2.392E+02	0.000E+00	0.084
K-40	-6.138E+02	1.569E+07	2.544E+03	0.000E+00	-0.241
CR-51	-3.188E+03	4.428E+03	7.346E+03	0.000E+00	-0.434
MM-54	-1.252E+02	1.708E+02	2.766E+02	0.000E+00	-0.453
(8	2.163E+02	3.040E+02	4.466E+02	0.000E+00	0.484
59	-2.389E+02	8.704E+02	1.392E+03	0.000E+00	-0.172
ZN-65	-5.858E+01	4.460E+02	7.147E+02	0.000E+00	-0.082
SE-75	3.226E+01	2.079E+02	3.535E+02	0.000E+00	0.091
RB-83	1.401E+02	4.141E+02	6.752E+02	0.000E+00	0.207
NB-94	1.782E+01	1.655E+02	2.726E+02	0.000E+00	0.065
NB-95	3.157E+01	4.750E+02	7.901E+02	0.000E+00	0.040
ZR-95	-6.379E+02	4.943E+02	7.971E+02	0.000E+00	-0.800
RH-101	-2.568E+01	9.458E+01	1.557E+02	0.000E+00	-0.165
RH-102	1.816E+02	4.378E+02	7.339E+02	0.000E+00	0.247
RH-102M	-2.018E+02	4.226E+02	7.006E+02	0.000E+00	-0.286
RU-103	-1.871E+02	3.911E+02	6.294E+02	0.000E+00	-0.297
RH-106	8.627E+02	1.626E+03	2.625E+03	0.000E+00	0.329
AG-110M	1.907E+02	2.207E+02	3.301E+02	0.000E+00	0.578
SB-124	-1.310E+02	2.815E+02	4.457E+02	0.000E+00	-0.294
SB-125	2.002E+02	3.811E+02	6.322E+02	0.000E+00	0.317
I-126	1.383E+04	1.041E+04	1.559E+04	0.000E+00	0.887
SB-126	-6.252E+03	5.060E+03	7.152E+03	0.000E+00	-0.874
I-129	9.922E+04	2.333E+03	4.588E+03	0.000E+00	21.627
I-131	-1.754E+04	2.169E+04	3.556E+04	0.000E+00	-0.493
BA-133	1.195E+01	1.624E+02	2.706E+02	0.000E+00	0.044
CS-134	1.683E+01	1.500E+02	2.406E+02	0.000E+00	0.070
CS-136	2.300E+03	5.371E+03	8.788E+03	0.000E+00	0.262
BA-140	-3.000E+02	1.263E+04	2.038E+04	0.000E+00	-0.015
CE-141	3.098E+00	5.356E+02	8.780E+02	0.000E+00	0.004
C 44	5.018E+02	8.321E+02	1.238E+03	0.000E+00	0.405
N 47	5.128E+03	1.079E+04	1.640E+04	0.000E+00	0.313
EU-152	3.262E+02	7.592E+02	1.273E+03	0.000E+00	0.256

ENERGY AND FWHM CALIBRATION

Configuration : MCAC:[NDSCOUNT]GE4\$1

Analyses by : SCRCAL V1.1

Detector Name :

Energy Calib Time: 28-SEP-1994 18:53:05

Efficiency type : Empirical

Effncy Calib Time: 28-SEP-1994 18:53:05

Detector Geometry: MARN1L4

Shelf :

Energy Calibration Report

$$\text{Energy} = 9.1545\text{E-}02 + 0.4997 * \text{Channel} + 2.5149\text{E-}08 * (\text{Channel} ** 2)$$

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	78.85	39.58	39.49	0.087
2	118.88	59.54	59.50	0.036
3	175.97	88.03	88.03	0.005
4	244.13	122.06	122.09	-0.030
5	331.79	165.85	165.90	-0.050
6	558.57	279.19	279.23	-0.042
7	783.66	391.69	391.72	-0.034
8	1028.35	513.98	514.01	-0.034
9	1323.73	661.65	661.64	0.011
10	1796.65	898.02	898.01	0.013
11	2347.18	1173.22	1173.18	0.036
12	2665.82	1332.49	1332.45	0.032
13	3673.22	1836.01	1836.04	-0.031

(FWHM Calibration Report

$$\text{FWHM} = 0.5565 + 3.7672\text{E-}02 * (\text{Energy} ** 1/2)$$

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	39.58	0.89	0.79	0.096
2	59.54	0.91	0.85	0.062
3	88.03	0.96	0.91	0.051
4	122.06	0.96	0.97	-0.014
5	165.85	1.03	1.04	-0.008
6	279.19	1.16	1.19	-0.025
7	391.69	1.22	1.30	-0.080
8	513.98	1.31	1.41	-0.102
9	661.65	1.44	1.53	-0.084
10	898.02	1.65	1.69	-0.034
11	1173.22	1.80	1.85	-0.046
12	1332.49	1.95	1.93	0.014
13	1836.01	2.34	2.17	0.168

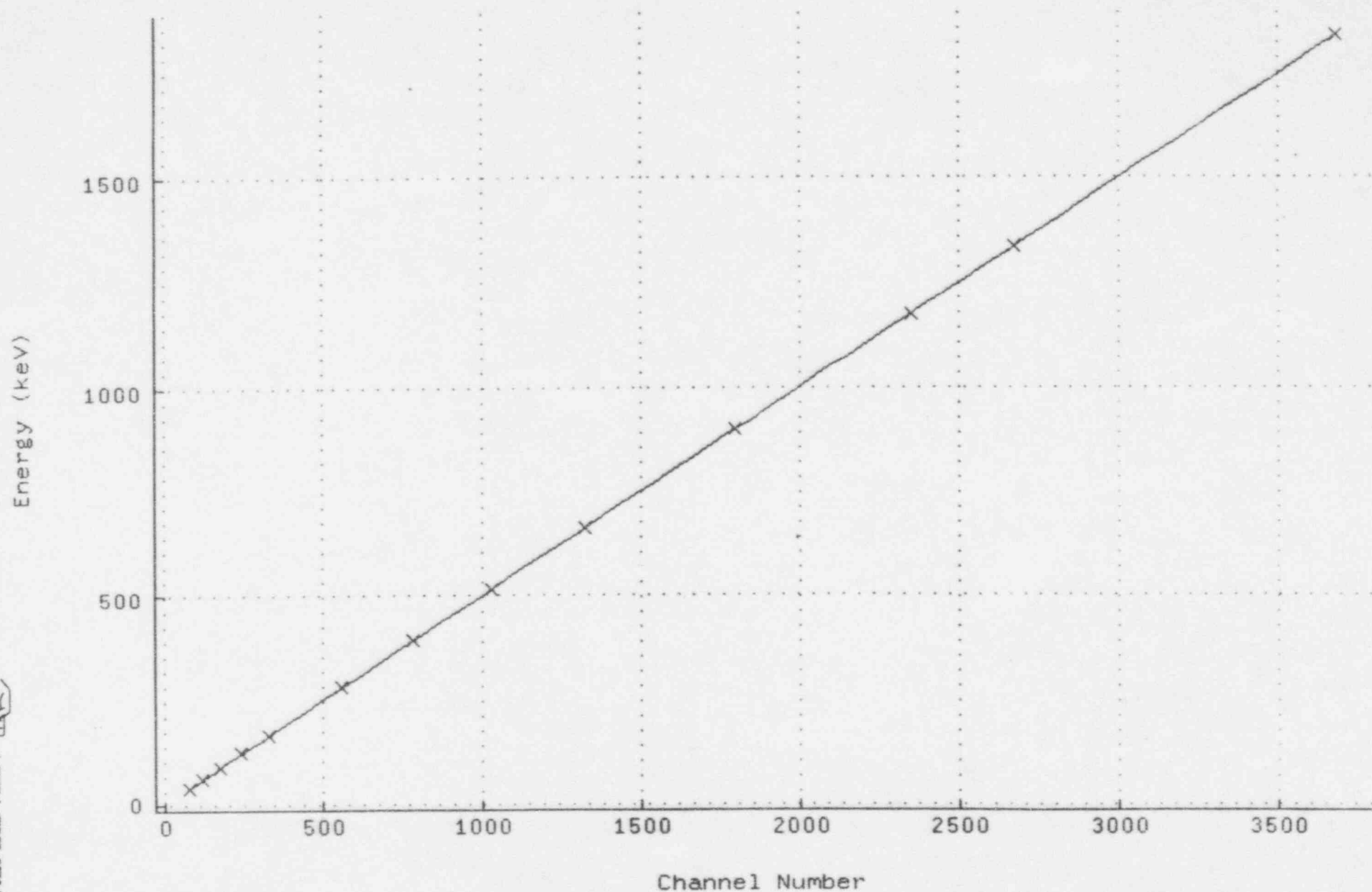
Efficiency Calibration Report

$$\text{Eff} = \exp(a2 + a3 * x + a4 * x ** 2 + a5 * x ** 3 + a6 * x ** 4 + a7 * x ** 5), \quad x = \ln(a1 / \text{energy})$$

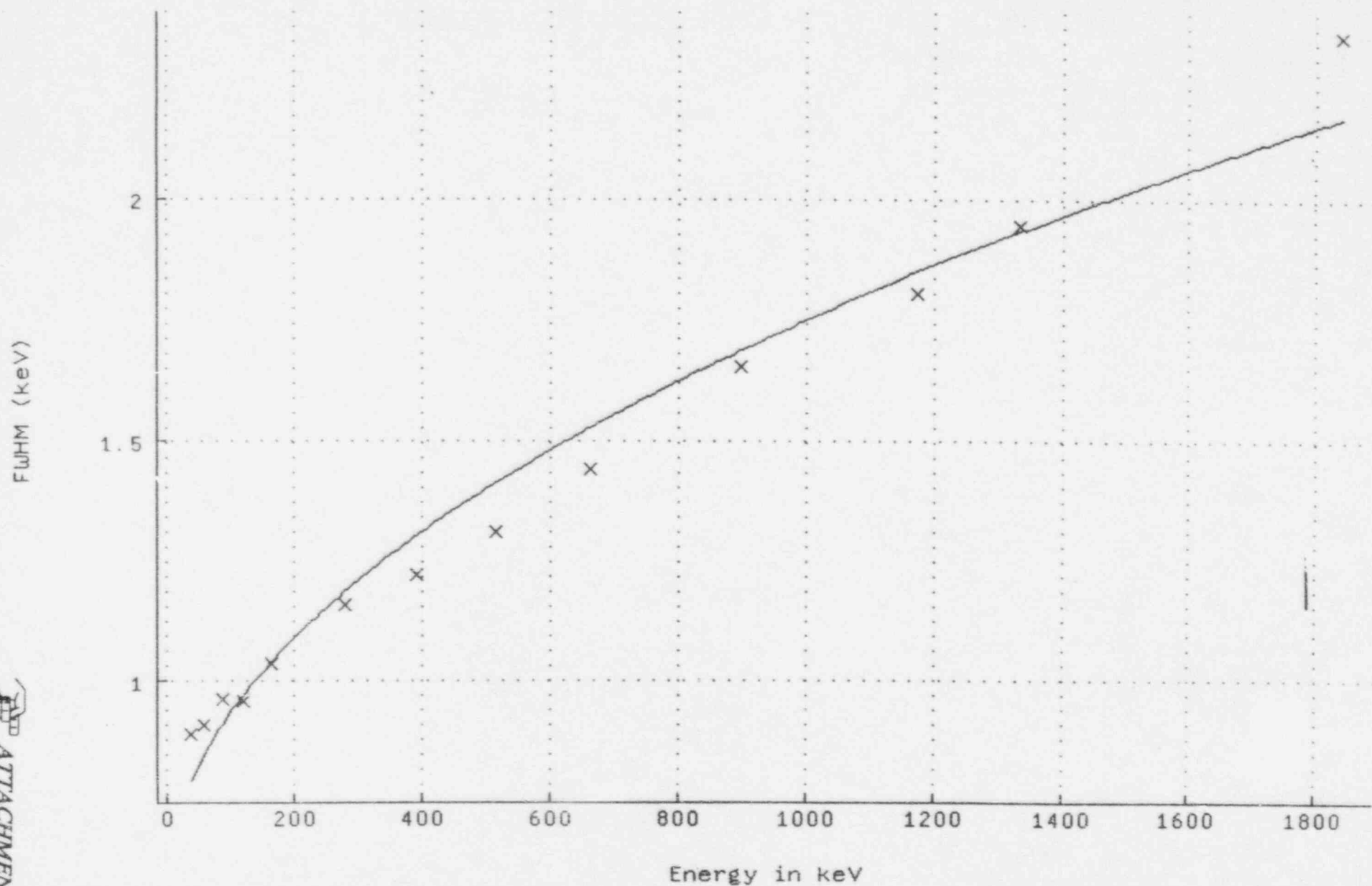
a1 a2 a3 a4 a5 a6 a7
 937.8 -4.926 0.9160 8.7415E-02 -5.4321E-02 -7.



Spec n : \$1\$DIA2:[GAMMA.SCUSR.ARCHIVE]CA 4_MARN1L4_51.CNF;1
Calib Date: 28-SEP-1994 18:53
Detector : GE4 Geometry: MARN1L4
Energy = $0.092 + 0.4997 * ch + 2.5149E-08 * ch^2$



Spect : \$1\$DIA2:[GAMMA.SCUSR.ARCHIVE]CAL I_MARN1L4_51.CNF;1
Calib Date: 28-SEP-1994 18:53
Detector : GE4 Geometry: MARN1L4
FWHM = $0.557 + 0.03767 * \text{SQRT}(\text{Energy})$



ENERGY AND FWHM CALIBRATION STANDARDS

*This is identical to the
Efficiency Calibration Standards*

ENERGY AND FWHM CALIBRATION COUNT DATA

*This is the same count data
used for Efficiency Calibration.*

ENERGY AND FWHM CALIBRATION VERIFICATION

*This is the same count used for
efficiency verification.*

QUANTERRA ST. LOUIS ———
1991-1994 EPA RADIOLOGICAL INTERCOMPARISON STUDY RESULTS*
UPDATED 3/24/95

GAMMA IN WATER

	DATE	KNOWN VALUE	RESULT (pCi/L)	NORM.DEV. (pCi/L)	FLAG
⁶⁰ Co	10/91	29.0	33.67	1.62	
	02/92	40.0	45.67	1.96	
	06/92	20.0	24.33	1.50	
	10/92	10.0	14.33	1.50	
	06/93	15.0	15.67	0.23	
	11/93	30.0	30.67	0.23	
	06/94	50.0	50.00	0.00	
	11/94	59.0	31.00	-9.70	x
⁶⁵ Zn	10/91	73.0	81.33	2.06	
	02/92	148.0	166.67	2.16	
	06/92	99.0	105.67	1.15	
	10/92	148.0	154.67	0.77	
	06/93	103.0	113.33	1.79	
	11/93	150.0	162.67	1.46	
	06/94	134.0	141.00	0.93	
	11/94	100.0	53.33	-8.08	x
¹⁰⁶ Ru	10/91	199.0	214.67	1.36	
	02/92	203.0	188.67	-1.24	
	06/92	141.0	135.33	-0.70	
	10/92	175.0	154.00	-2.02	
	06/93	119.0	99.33	-2.84	
	11/93	201.0	171.00	-2.60	
	06/94	216.56	198.00	-1.29	(Based on Grand Average)

QUANTERRA ST. LOUIS
1991-1994 EPA RADIOLOGICAL INTERCOMPARISON STUDY RESULTS*
UPDATED 3/24/95

GAMMA IN WATER (continued)

	DATE	KNOWN VALUE (pCi/L)	RESULT (pCi/L)	NORM.DEV.	FLAG
¹³⁴ Cs	10/91	10.0	10.33	0.12	
	02/92	31.0	29.0	-0.69	
	06/92	15.0	14.0	-0.35	
	10/92	8.0	6.33	-0.58	
	06/93	5.0	6.00	0.35	
	11/93	59.0	57.67	-0.46	
	06/94	40.0	37.35	-0.92	
	11/94	24.0	12.00	-4.16	x
¹³⁷ Cs	10/91	10.0	12.33	0.81	
	02/92	49.0	50.67	0.58	
	06/92	15.0	18.00	1.04	
	10/92	8.0	10.67	0.92	
	06/93	5.0	6.33	0.46	
	11/93	40.0	42.67	0.92	
	06/94	49.0	54.67	1.96	
	11/94	49.0	25.67	-8.08	x
¹³³ Ba	10/91	98.0	5.00	-16.11	x
	02/92	76.0	59.33	-3.61	↓
	06/92	98.0	93.33	-0.81	
	10/92	74.0	71.67	-0.58	
	06/93	99.0	100.00	0.17	
	11/93	79.0	79.00	0.00	
	06/94	98.0	87.33	-1.85	
	11/94	73.0	31.67	-10.23	x



QUANTERRA ST. LOUIS
1991-1994 EPA RADIOLOGICAL INTERCOMPARISON STUDY RESULTS*
UPDATED 3/24/95

PERFORMANCE SAMPLE B

	DATE	KNOWN VALUE (pCi/L)	RESULT (pCi/L)	NORM.DEV.	FLAG
Gross β	10/91	65.0	54.0	-1.91	
	04/92	140.0	140.0	0.00	
	10/92	53.0	46.67	-1.10	
	04/93	177.0	142.00	-2.25	
	10/93	58.0	46.33	-2.02	
	04/94	117.0	97.00	-1.92	
	10/94	142.0	92.00	-4.12	↓
⁸⁹ Sr	10/91				
	04/92	15.0	9.33	-1.96	
	10/92	8.0	11.33	0.95	
	04/93	41.0	41.00	0.00	
	10/93	15.0	5.67	-3.23	↓
	04/94	20.0	36.00	5.54	x
	10/94	25.0	20.67	-1.50	
⁹⁰ Sr	10/91				
	04/92	17.0	19.0	0.69	
	10/92	10.0	9.67	-0.29	
	04/93	29.0	29.00	0.00	
	10/93	10.0	14.33	1.50	
	04/94	14.0	18.33	1.50	
	10/94	15.0	13.33	-0.58	
⁶⁰ Co	10/91	20.0	23.0	1.04	
	04/92	56.0	56.0	0.00	
	10/92	15.0	19.67	1.51	
	04/93	39.0	36.67	-0.81	
	10/93	10.0	8.67	-0.46	
	04/94	20.0	20.67	0.23	
	10/94	40.0	41.33	0.46	



QUANTERRA ST. LOUIS
1991-1994 EPA RADIOLOGICAL INTERCOMPARISON STUDY RESULTS*
UPDATED 3/24/95

PERFORMANCE SAMPLE B (continued)

	DATE	KNOWN VALUE (pCi/L)	RESULT (pCi/L)	NORM.DEV.	FLAG
¹³⁴ Cs	10/91	10.0	9.0	-0.35	
	04/92	24.0	20.33	-1.27	
	10/92	5.0	5.33	0.12	
	04/93	27.0	27.33	0.12	
	10/93	12.0	10.00	-0.69	
	04/94	34.0	32.67	-0.46	
	10/94	20.0	20.0	0	
¹³⁷ Cs	10/91	11.0	13.0	0.69	
	04/92	22.0	18.67	-1.15	
	10/92	8.0	11.67	1.27	
	04/93	32.0	34.33	0.81	
	10/93	10.0	10.00	0.00	
	04/94	29.0	32.67	1.27	
	10/94	39.0	44.00	1.73	



QUANTERRA ST. LOUIS
1991-1994 EPA RADIOLOGICAL INTERCOMPARISON STUDY RESULTS*
UPDATED 3/24/95

AIR FILTER

	DATE	KNOWN VALUE (pCi/F)	RESULT (pCi/F)	NORM.DEV.	FLAG
α	03/92	7.0	8.33	0.46	
	08/92	30.0	32.67	0.58	
	08/93	19.0	21.33	0.81	
	08/94	35.0	44.0	1.73	
β	03/92	41.0	41.0	0.00	
	08/92	69.0	75.00	0.52	
	08/93	47.0	51.33	1.50	
	08/94	56.0	53.0	-0.52	
^{90}Sr	03/92	15.0	14.33	-0.23	
	08/92	25.0	25.00	0.00	
	08/93	19.0	19.00	0.00	
	08/94	20.0	20.00	0.00	
^{137}Cs	03/92	10.0	9.33	0.23	
	08/92	18.0	22.67	1.62	
	08/93	9.0	9.0	0.00	
	08/94	15.0	19.00	1.39	

TAG SYMBOLS

· = No data submitted

Ø = Insufficient data

× = Determined to be an outlier

↑ = Above control limit

↓ = Below control limit

* Individual EMSL reports are available for review by request (Quanterra St. Louis Reporting Code = "SI").



ITAS-St. Louis

LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): 404.12 EMSL Crosscheck

NCM INITIATED BY (Name/Date): Kleszczewski 102-13-95

PARAMETER(S): Gamm

SAMPLE NUMBER(S) AFFECTED: 6916-001

AREA:	<input type="checkbox"/> SHIP/REC	<input type="checkbox"/> GC	<input type="checkbox"/> GEN CHEM	<input type="checkbox"/> BIOASSAY	<input type="checkbox"/> IH
	<input type="checkbox"/> ORG EXT	<input type="checkbox"/> HPLC	<input type="checkbox"/> METALS	<input checked="" type="checkbox"/> RADIOCHEM	<input type="checkbox"/> DATA VERIFICATION
	<input type="checkbox"/> INORG PREP	<input type="checkbox"/> GCMS	<input type="checkbox"/> GEO	<input type="checkbox"/> COUNTING	<input type="checkbox"/> REPORTING
	<input type="checkbox"/> OTHER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
 2. ☐ Holding time exceeded by _____ days due to:
 - 2.1 ☐ CATEGORY I: Out of Laboratory Control
 - ☐ Holding time expired at receipt.
 - 2.2 ☐ CATEGORY II: Laboratory Dependent
 - ☐ work backlog ☐ instrument failure
 - ☐ communication ☐ other (see #10)
 - 2.3 ☐ CATEGORY III: Laboratory Reruns
 - 2.3.1 ☐ QA/QC:
 - ☐ surrogates ☐ internal standards
 - ☐ spike recoveries ☐ blank contamination
 - 2.3.2 ☐ CONFIRMATION:
 - ☐ second column ☐ contamination check
 - ☐ other (see #10)
 - 2.3.3 ☐ DILUTION:
 - ☐ over calibration ☐ under calibration
 - ☐ other (see #10)
 - 2.3.4 ☐ OTHER: (see #10)
 3. ☐ Sample lost during extraction/analysis; no re-prep or re-analysis possible.
 4. ☐ QC data reported to client outside of:
 - ☐ method limits ☐ internal limits
 - ☐ QAPP limits ☐ contract limits
 - ☐ regulatory limits ☐ blank criteria
 5. ☐ Incorrect procedure(s) used. (See #10)
 6. ☐ Invalid instrument calibration. (See #10)
 7. ☒ Incorrect/incomplete data reported to client. (See #10)
 8. ☐ Reported detection limit(s) higher than:
 - ☐ method limits ☐ QAPP limits
 - ☐ contract limits ☐ other (see #10)

Due to:

 - ☐ sample matrix ☐ insufficient sample
 - ☐ instrumentation ☐ other (see #10)

9. ☐ Other (specify): _____
10. ☒ Comments/Explanation: Reported values are approximately $1/2$ of EMSL's true values.

NOTIFICATION [check appropriate item(s)]:

1. ☐ Client notified by (name and date): _____
- ☐ in writing ☐ by FAX ☐ procedure
- ☐ by phone ☐ Other (explain) ☐ on hold

PROJECT MANAGER (signature & date):

ATTACHMENT D

PAGE 1 of 2 PAGES

CORRECTIVE ACTION☒ **ROOT CAUSE:**

Samples were diluted 1:16 versus 1:8
as required. This resulted in all results
being 1/2 of true value. Analyst used instructions
Sorbless which was in same batch. Error was
not caught in data review.

☒ **CORRECTIVE ACTION:**

Check results with correction for
dilution error.

RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☒ **ACTIONS TO PREVENT RECURRENCE:**

1. All dilutions of TE shall be performed by
Rad Prep Team leader or a person under the
Team leader's direct supervision.
2. Rad Data Review must review dilutions.

FIRST LEVEL SUPERVISOR:

RESPONSIBLE MANAGER:

DATE:

DATE:

QC REVIEW☒ **NONCONFORMANCE**☐ **DEFICIENCY**☐ **RERUN**☐ **FURTHER ACTION REQUIRED:**

ASSIGNED TO:

QC COORDINATOR:

DATE: 02-13-95

CORRECTIVE ACTION VERIFICATION☐ **VERIFIED**☐ **CANNOT VERIFY (specify reason)**

REASON:

NCM CLOSURE

QC COORDINATOR:

DATE: 02-20-95

ATTACHMENT D

PAGE 2 of 2 PAGES

St. Louis Laboratory
Data Review Checklist
RADIOCHEMISTRY

Project No :	589.02 248.33
Batch No :	62299
SDG/Login No :	7730 7734 7737 7754 7765
Parameter :	ATBT

Review Items	Yes (✓)	No (✓)	N/A (✓)	2nd Level Review (✓)
A. Calibration				
1. Is all result documentation included per the QAS?	✓			✓
B. Sample Analysis				
1. Are all sample chemical yields within acceptance criteria?			✓	✓
2. Were all samples analyzed within the holding times?	✓			✓
C. QC Sample Analysis				
1. Is the blank chemical yields within acceptance criteria?			✓	✓
2. Is the blank activity \leq MDA?	✓			✓
3. Is the blank MDA (or activity) \leq the CRDL per the QAS?	✓			✓
Is the sample activity $>$ 10X the blank activity?	✓		✓	✓
4. Is the LCS % recovery within acceptance criteria?	✓			✓
6. Is the LCS chemical yields within acceptance criteria?			✓	✓
7. Is the duplicate(s) RPD(s) within acceptance criteria?	✓		3-21-95	✓
8. Is the MS/MSD(s) % recovery within acceptance criteria?			✓	✓
D. Other				
1. Are all nonconformances included and noted?	✓			✓
2. Are all required forms complete and reviewed?	✓			✓
3. Was the correct methodology used?	✓			✓
4. Were all manual calculations checked at the required frequency?	✓			✓
5. Were forms checked for transcription errors?	✓			✓
6. Were the correct units reported?	✓			✓

Comments on a "No" response

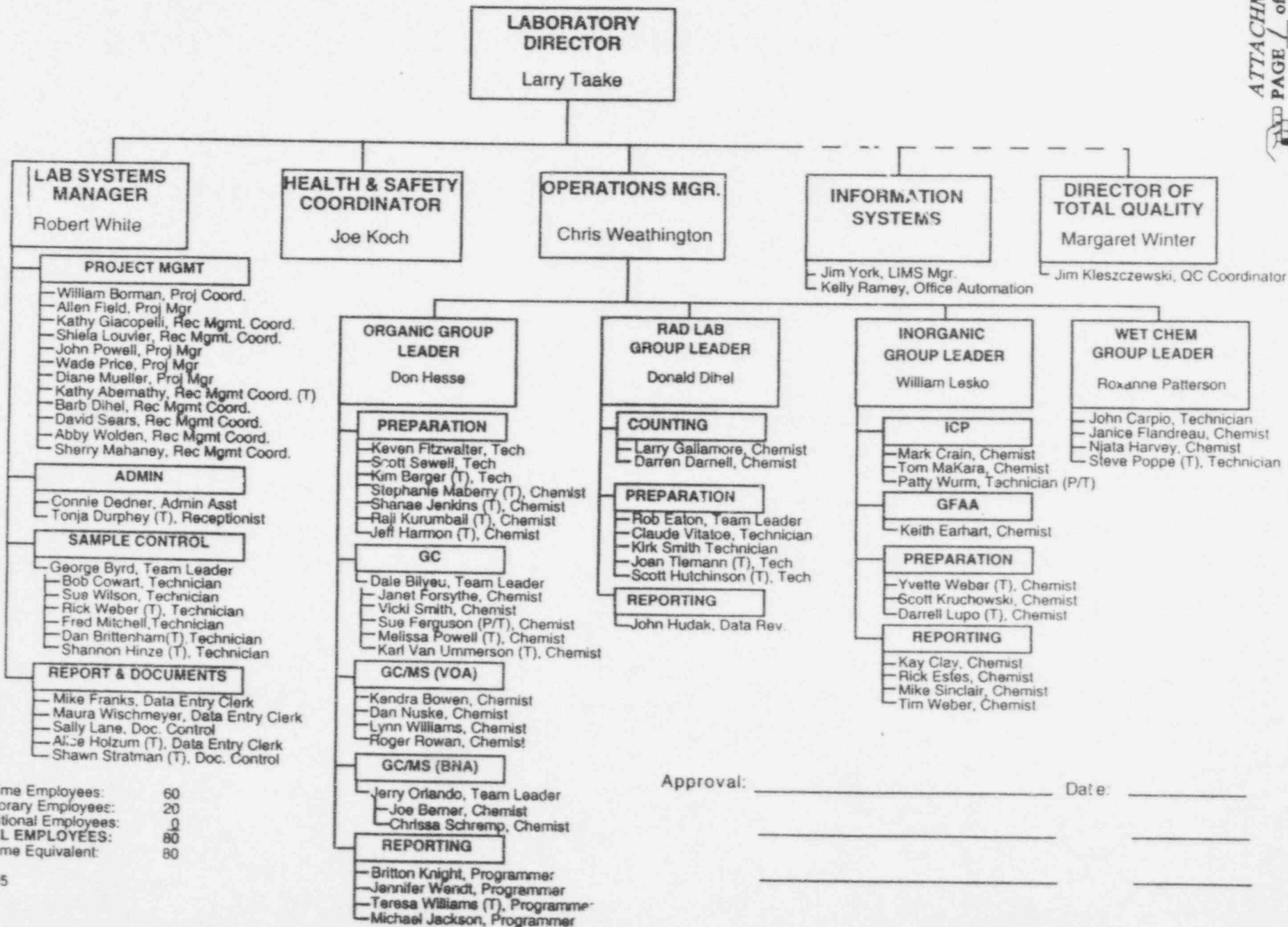
7730-001, 2, 3, 4 7765-001, 2, 3, 4 7734-006, 7, 8 7737-001, 2 7754-001
MDA > CRDL due to high TDS. See NCR
solids
3-21-95

ATTACHMENT E
PAGE 1 of 1 pages

Analysts/Reviewer : [Signature]
Second Level Review : [Signature]

Date: 03-21-95
Date: 3-21-95

QUANTERRA INCORPORATED ST. LOUIS LABORATORY



Full Time Employees: 60
 Temporary Employees: 20
 Transitional Employees: 0
TOTAL EMPLOYEES: 80
 Full Time Equivalent: 80

3/06/95

Approval: _____ Date: _____

J. Cron
April 24, 1995 *Reg. III*

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING OFFICER

In the Matter of)	
)	Docket No. 30-16055-ML-REN
ADVANCED MEDICAL SYSTEMS,)	
INC.)	ASLBP No. 95-707-02-ML-REN
(Cleveland, Ohio))	
)	(Material License
)	No. 34-19089-01)

NRC STAFF'S RESPONSE TO REQUEST TO PARTICIPATE IN HEARING

The Staff of the Nuclear Regulatory Commission hereby responds to the April 11, 1995 request from the Village of Newburgh Heights to participate in the above-captioned proceeding as an interested municipality, pursuant to 10 C.F.R. § 2.1211(b). The Staff has no objection to the Village of Newburgh Heights' request.

Respectfully submitted,

Marian L. Zabler
Marian L. Zabler
Counsel for NRC Staff

Dated at Rockville, Maryland
this 24th day of April, 1995

B/138

9505040057 3PP

APR 25 1995

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING OFFICER

In the Matter of

ADVANCED MEDICAL SYSTEMS,
INC.
(Cleveland, Ohio)

)
) Docket No. 30-16055-ML-REN
)
) ASLBP No. 95-707-02-ML-REN
)
) (Material License
) No. 34-19089-01)

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC STAFF'S RESPONSE TO REQUEST TO PARTICIPATE IN HEARING" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or through deposit in the Nuclear Regulatory Commission's internal mail system as indicated by asterisk this 24th day of April, 1995:

Marshall E. Miller
Presiding Officer
1920 South Creek Boulevard
Spruce Creek Fly-In
Daytona Beach, FL 32124

Dr. Harry Foreman
Special Assistant
1564 Burton Avenue
St. Paul, MN 55108

Adjudicatory File (2)*
Atomic Safety and Licensing Board
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Office of Commission Appellate
Adjudication*
Mail Stop: 16-G-15 OWFN
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Office of the Secretary*
ATTN: Docketing and Service Branch
Mail Stop: 16-G-15 OWFN
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Kathleen M. Edwards, Mayor
John K. Moroney,
Village Solicitor
Village of Newburgh Heights
4000 Washington Park Boulevard
Newburgh Heights, Ohio 44105

Sharon Sobol Jordan, Esq.
Martha R. McCorkle, Esq.
Department of Land
City of Cleveland
Room 106-City Hall
601 Lakeside Avenue
Cleveland, Ohio 44114

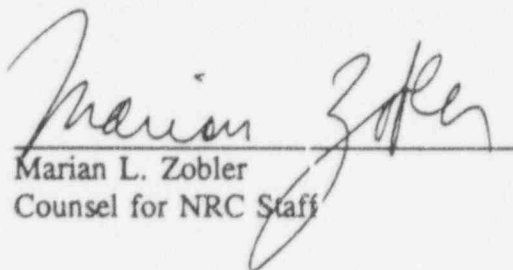
Michael S. Kalstrom
Secretary
Cuyahoga County Local
Emergency Planning Committee
1255 Euclid Ave., Room 102
Cleveland, Ohio 44115

Atomic Safety and Licensing Board
Panel*
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Thomas E. Lenhart, Esq.
Assistant General Counsel
Northeast Ohio Regional Sewer
District
3826 Euclid Avenue
Cleveland, Ohio 44115-2504

Henry E. Billingsley, II, Esq.
Counsel for the Licensee
Arter & Hadden
1100 Huntington Building
925 Euclid Avenue
Cleveland, Ohio 44115-1475

Robert Pierce*
Senior Attorney
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555


Marian L. Zobler
Counsel for NRC Staff