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Tank 241-S-304, Grab Samples, 304S-98-1, 304S-98-2 and 304S-98- 3 Analytical Results for the Final Report

Franciska H. Steen

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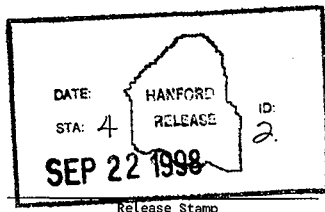
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HANFORD ANALYTICAL LABORATORY OPERATIONS

**TANK 241-S-304, GRAB SAMPLES,
304S-98-1, 304S-98-2, 304S-98-3 AND 304S-98-4
ANALYTICAL RESULTS FOR THE FINAL REPORT**

Project Coordinator: Franciska H. Steen

**Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management**

by

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NARRATIVE

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HANFORD ANALYTICAL LABORATORY OPERATIONS

**TANK 241-S-304, GRAB SAMPLES,
304S-98-1, 304S-98-2, 304S-98-3 and 304S-98-4
ANALYTICAL RESULTS FOR THE FINAL REPORT**

This document is the final report for tank 241-S-304 grab samples. Four grab samples were collected from riser 4 on July 30, 1998. Analyses were performed in accordance with the *Compatibility Grab Sampling and Analysis Plan* (TSAP) (Sasaki, 1998) and the *Data Quality Objectives for Tank Farms Waste Compatibility Program* (DQO) (Mulkey and Miller, 1998). The analytical results are presented in the data summary report (Table 1).

None of the subsamples submitted for differential scanning calorimetry (DSC), total organic carbon (TOC) and plutonium 239 (Pu239) analyses exceeded the notification limits as stated in TSAP (Sasaki, 1998).

Appearance and Sample Handling

The sample breakdown diagrams (Attachment 1) are provided as a cross-reference for relating the tank farm customer identification numbers with the 222-S Laboratory sample numbers and the portion of sample analyzed. Table 2 provides the appearance information.

The TSAP (Sasaki, 1998) stated that the four grab samples should be combined into a single composite sample and analyzed. After visual inspection of the samples, it was determined that one sample would provide enough material to perform all requested analyses. Per direction of the tank coordinator, sample 304S-98-1 was used.

304S-98-1

This sample was collected at a depth of 410 inches. Visual observation indicated that the sample was a clear yellow liquid with less than one percent rusty-brown solids. No organic layer was observed. This sample was submitted to the laboratory for analysis of inorganic analytes and radionuclides.

304S-98-2

This sample was collected at a depth of 410 inches. Visual observation indicated that the sample was a clear yellow liquid with five percent rusty-brown solids. No organic layer was observed. The entire sample was archived for future analyses.

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304S-98-3

This sample was collected at a depth of 410 inches. Visual observation indicated that the sample was a clear yellow liquid with less than one percent rusty-brown solids. No organic layer was observed. The entire sample was archived for future analyses.

304S-98-4

This sample was collected at a depth of 410 inches. Visual observation indicated that the sample was a clear yellow liquid with less than one percent rusty-brown solids. No organic layer was observed. The entire sample was archived for future analyses.

Table 2: Appearance Information for Tank 241-S-304 Grab Samples

Sample Number	Date Sampled	Date Received	Sampling Depth (in.)	% Settled Solids	Sample Description
304S-98-1	7/30/98	7/30/98	410	<1%	Clear yellow liquid; no organic layer.
304S-98-1	7/30/98	7/30/98	410	5%	Clear yellow liquid; no organic layer.
304S-98-1	7/30/98	7/30/98	410	<1%	Clear yellow liquid; no organic layer.
304S-98-1	7/30/98	7/30/98	410	<1%	Clear yellow liquid; no organic layer.

Analytical Results Summary

The data summary report (Table 1) included in this report compiles the analytical results that comply with the applicable DQO.

Differential Scanning Calorimetry (DSC)

The DSC analysis was performed in duplicate on direct subsamples. The exothermic energy based on dry weight of subsample was calculated for all subsamples. The average of the TGA results for each subsample was used in the dry weight correction for that subsample. Since the samples did not exhibit exothermic energy, the calculation for the Relative Percent Difference (RPD) is indeterminate because of the division by zero. Due to the way the database performs calculations, zero divided by zero is reported as "0.0". The standard recoveries were within the required limits of 80% - 120% and the RPDs were less than 30%.

TGA - Thermogravimetric Analysis

The TGA analysis was performed in duplicate on direct subsamples. Typically the TGA results are determined by summing the weight loss steps which occur below 250°C. More information may be obtained by examining the raw data. The standard recoveries were within the required limits of 80% - 120% and the RPDs were less than 20%.

Specific Gravity (Sp.G.)

Specific gravity analysis was performed in duplicate on direct liquid subsamples. The standard recoveries were within the control limits of the laboratory and the RPDs were less than 20%.

pH

The pH analysis was performed on in duplicate on direct liquid subsamples as indicated by a blank in the aliquot class (A#) column in Table 1. The results were as follows: sample 9.030 and duplicate 9.040. The standard values for this analysis were within the required limits and the RPDs were less than 20%.

OH

The OH analysis was performed on direct subsamples of liquid samples as indicated by a blank in the A# column in Table 1. The standard recoveries were within the required limits of 80% - 120% and the RPDs were less than 20%.

IC - Ion Chromatography

The IC analyses were performed in duplicate on direct subsamples as indicated by a blank in the aliquot class (A#) column in Table 1.

The required analytes were fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{3-}) and sulfate (SO_4^{2-}). The results for bromide (Br^-) and oxalate are considered "opportunistic" and are provided in Appendix A. There are no customer defined QC parameters for Br^- and oxalate and any anomalies in those results are not discussed.

The RPDs were less than 20%, the standard recoveries were within the required limits of 80%-120% and the spike recoveries were within the required limits of 75%-125%.

ICP - Inductively Coupled Plasma Spectrophotometry

The liquid subsamples were prepared for analysis by an acid adjustment of the direct subsample. This is indicated by a "D" in the A# column in Table 1. The results for the ICP analytes are included in Table 1. However, the QC review discussed in this report is limited to aluminum (Al), chromium (Cr), iron (Fe), manganese (Mn), sodium (Na) and zirconium (Zr). All other analyte results are presented in Appendix A. These results are considered "opportunistic" and do not have customer defined QC parameters. Therefore, any anomalies in those results are not discussed in this report.

Matrix spike recoveries outside of the 75% to 125% control limits as set by the TSAP (Sasaki, 1998) were reported for Na. This was attributed to the high concentration of this analyte in the samples with respect to the amount of spike standard added. A post digestion spike analysis was performed as an additional instrument performance check. The post digestion spike recovery was within the 75% to 125% control limits (101.8%). This recovery is presented in the raw data.

The Na results were more than four times the concentration of the spike added. This high Na concentration made it difficult to add sufficient spike to perform a meaningful analysis. Therefore, the assessment of the accuracy of the measurement for this analyte was also made by comparison of the sample results to those of a serial dilution of the sample. The serial dilution was performed by preparing and analyzing an additional five-fold dilution of the sample. The result obtained from this analysis should be within $\pm 10\%$ of the undiluted sample result. The results of this comparison are presented in Table 3 and indicate the accuracy of this analysis was acceptable.

Table 3: ICP Serial Dilution Results

Sample ID and Analyte	Sample Result ($\mu\text{g/mL}$)	Serial Dilution Result ($\mu\text{g/mL}$)	Percent Difference (%)
Na 304S-98-1 (S98T002346)	389.19	416.91	7.1

$$\text{Percent Difference} = [\text{ABS}(\text{Sample} - \text{Serial Dilution}) / \text{Sample}] \times 100$$

TIC/TOC - Total Inorganic/Organic Carbon

The TIC/TOC analysis was performed on direct sample aliquots using the persulfate oxidation method. None of the subsamples submitted for the TOC analysis exceeded the notification limit of $30,000 \mu\text{gC/mL}$.

For the TIC/TOC analysis, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1.

The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

A triplicate analysis was performed due to the large difference between the sample and duplicate results. The results are presented in Table 4.

Table 4. Triplicate Results for TIC/TOC Analyses

Analysis	Labcore ID	Sample Result	Triplicate Result	Relative Percent Difference
TIC TOC	S98T002346	1.63E+2 <4.0E+1	1.66E+2 <4.0E+1	1.824% 0.0%

The RPDs were less than 20%, the standard recoveries were within the required limits of 80%-120% and the spike recoveries were within the required limits of 75%-125%.

Inductively Coupled Plasma/Mass Spectroscopy (ICP/MS) - Uranium

The liquid subsamples were prepared for analysis by an acid adjustment of the direct subsample as indicated by an "A" in the A# column in Table 1. The results for the ICP/MS isotopic uranium are included in Table 1. The RPDs were less than 20%, the standard recoveries for U238 were within the required limits of 80%-120% and the spike recoveries were within the required limits of 75%-125%.

Radionuclide Analyses

GEA - Gamma Energy Analysis

The gamma energy (GEA) analyses were performed in duplicate on direct subsamples for the liquids as indicated by a blank in the A# column in Table 1.

The results for the GEA analytes are included in Table 1. However, the QC review discussed in this report is limited to ¹³⁷Cs. All other analyte results are presented in Appendix A. These results are considered "opportunistic" and do not have customer defined QC parameters. Therefore, any anomalies in those results are not discussed in this report.

Actual detection limits for GEA analytes are not currently available. The latest GEA software does not report a minimum detectable activity (MDA). If an analyte is reported as "less than", the value reported is the detection limit. The standard recoveries were within the required limits of 80%-120% and the RPDs were less than 20%.

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⁹⁰Sr - Strontium 90

⁹⁰Sr analysis was performed in duplicate on direct subsamples as indicated by a blank in the A# column in Table 1.

A small amount of ⁹⁰Sr contamination was found in the preparation blanks. The levels of contamination are inconsequential when compared to the results for the samples. These contaminants do not impact sample data quality. The standard recoveries were within the required limits of 80%-120% and the RPDs were less than 20%.

²⁴¹Am - Americium 241

²⁴¹Am analysis was performed in duplicate on direct subsamples for the liquids as indicated by a blank in the A# column in Table 1. The standard recoveries were within the required limits of 80%-120% and the RPDs were less than 20%.

^{239/240}Pu - Plutonium 239/240

^{239/240}Pu analysis was performed in duplicate on direct subsamples for the liquids as indicated by a blank in the A# column in Table 1. The standard recoveries were within the required limits of 70%-130% and the RPDs were less than 20%.

Compatibility Program Concerns

DSC - Differential Scanning Calorimetry - Energetics Decision Rule

For waste compatibility energetics decision concerns, the exotherm/endotherm ratio of the liquid samples is evaluated. This ratio must be less than one (1). The 304S-98-1 grab sample did not exhibit any exotherms (the results were zero), therefore, the calculated ratio will also be zero (less than one).

Nitrate (NO₃⁻), Hydroxide (OH⁻) and Nitrite (NO₂⁻) - Corrosion Decision Rule

The Corrosion Decision Rule does not apply to the samples from this tank.

Plutonium (^{239/240}Pu) - Criticality Decision Rule

^{239/240}Pu analysis was performed to evaluate criticality safety for waste transfers. This analysis was performed in duplicate on direct subsamples of the drainable liquids. The results for the subsamples were below the lower criticality prevention limit of 6.2 E-2 μ Ci/mL (0.001 g/L) stated in the compatibility DQO.

Uranium (U) - Criticality Decision Rule

U analysis was performed in duplicate on direct subsamples to evaluate criticality safety for waste transfers. No attempt was made to reconcile the U concentration with the ^{239}Pu equivalents.

Procedures

Table 5 lists the analytical procedures used for performing the sample analyses. Abbreviations for analyses are defined in the table notes.

Table 5. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
DSC	Liquid	N/A	LA-514-114 Rev. D-1
TGA	Liquid	N/A	LA-514-114 Rev. D-1
Sp.G.	Liquid	N/A	LA-510-112 Rev. D-1
IC	Liquid	N/A	LA-533-105 Rev. E-0
ICP	Liquid	LA-504-101 Rev. E-0	LA-505-161 Rev. C-2
ICP/MS	Liquid	LA-504-101 Rev. E-0	LA-506-101 Rev. A-1
TIC/TOC	Liquid	N/A	LA-342-100 Rev. F-1
pH	Liquid	N/A	LA-212-106 Rev. C-2
OH	Liquid	N/A	LA-211-102 Rev. D-0
GEA	Liquid	N/A	LA-548-121 Rev. F-0

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²³⁹ Pu	Liquid	N/A	LA-953-104 Rev. B-0
²⁴¹ Am	Liquid	N/A	LA-953-104 Rev. B-0
⁹⁰ Sr	Liquid	N/A	LA-220-101 Rev. E-3

Abbreviations:

N/A = not applicable (these are direct samples)
DSC = differential scanning calorimetry
TGA = thermogravimetric analysis
Sp.G. = specific gravity
OH = hydroxide
IC = ion chromatography
ICP = inductively coupled plasma
ICP/MS = inductively coupled plasma/mass spectroscopy
TOC = total organic carbon
TIC = total inorganic carbon
GEA = gamma energy analysis
⁹⁰Sr = strontium 90
²³⁹Pu = plutonium 239
²⁴¹Am = americium 241

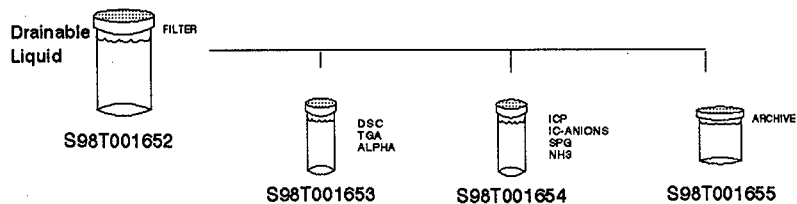
References

- Mulkey, C. H., 1998, *Data Quality Objectives for the Waste Compatibility Program*, HNF-SD-WM-DQO-001, Rev. 2, Lockheed Martin Hanford Corporation, Richland, WA 99352.
- Sasaki, L. M., 1998, *Compatibility Grab Sampling and Analysis Plan for Fiscal Year 1998*, HNF-SD-WM-TSAP-150, Rev. 1-A Lockheed Martin Hanford Corporation, Richland, WA 99352.
- Markel, L. P., 1997, *Quality Assurance Plan for the 222-S Laboratories*, HNF-SD-CP-QAPP-016, Rev. 2, Rust Federal Services of Hanford, Inc., Richland, WA 99352.

SX-103
Core:239
Seg: 3
S98T001514

Attachment 1

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SX-103 SAMPLE BREAKDOWN

(ATTACHMENT 1)

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Attachment 1

S-304 GRAB SAMPLE BREAKDOWN

304S-98-1
S98T002346



304S-98-2
S98T002347



ARCHIVE

304S-98-3
S98T002348



ARCHIVE

304S-98-4
S98T002349



ARCHIVE

DSC
TGA
TIC/TOC
ICP
IC-ANIONS
PH
OH
SPG
GEA
AM241
PU239
SR90
ICP/MS-U
VOL% SOLIDS

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SAMPLE DATA SUMMARY

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Table 1. Data Summary Report.
S-304 GRAB

IRISER: 4
SEGMENT #: 304S-98-1

SEGMENT PORTION: Supernate

Sample#	R#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98T002346		DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98T002346		DSC Exotherm on Perkin Elmer	Joules/g	99.16	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98T002346		OH- by Pot. Titration	ug/mL	97.67	< 42.00	42.00	< 42	n/a	n/a	n/a	42.00	n/a
S98T002346		pH Direct	pH	99.88	n/a	9.030	9.040	9.035	0.11	n/a	1.00e-02	n/a
S98T002346		Specific Gravity	Sp.G.	100.0	n/a	9.74e-01	9.88e-01	9.81e-01	1.43	n/a	1.00e-03	n/a
S98T002346		% Water by TGA on Perkin Elmer	%	98.62	n/a	99.54	99.27	99.41	0.27	n/a	n/a	n/a
S98T002346		TIC by Acid/Coulometry	ug/mL	93.85	2.800	1.63e+02	164.0	163.5	0.61	102.0	5.000	n/a
S98T002346		TOC by Persulfate/Coulometry	ug/mL	95.00	10.60	< 40.00	186.0	n/a	n/a	92.80	40.00	n/a
S98T002346		Strontium-89/90 High Level	uCi/mL	101.0	2.96e-06	1.40e-03	1.45e-03	1.43e-03	3.51	n/a	2.06e-06	1.64E+00
S98T002346		Pu-239/240 by TRU-SPEC Resin	uCi/mL	104.5	< 2.90e-06	5.43e-06	5.66e-06	5.55e-06	4.15	n/a	3.20e-06	5.82E+00
S98T002346	A	Uranium-233 by ICP/MS Acid/D159	ug/mL	n/a	< 3.19e-05	< 6.42e-03	< 6.42e-3	n/a	n/a	n/a	6.00e-03	n/a
S98T002346	A	Uranium-234 by ICP/MS Acid/D159	ug/mL	n/a	< 1.67e-05	< 3.35e-03	< 3.35e-3	n/a	n/a	n/a	3.00e-03	n/a
S98T002346	A	Uranium-235 by ICP/MS Acid/D159	ug/mL	n/a	< 1.42e-05	1.11e-01	1.07e-01	1.09e-01	3.67	n/a	3.00e-03	n/a
S98T002346	A	Uranium-236 by ICP/MS Acid/D159	ug/mL	n/a	< 1.62e-05	6.80e-03	6.80e-03	6.80e-03	0.00	n/a	3.00e-03	n/a
S98T002346	A	Uranium-238 by ICP/MS Acid/D159	ug/mL	104.5	< 2.52e-05	13.28	13.20	13.24	0.75	101.0	5.00e-03	n/a
S98T002346	B	Aluminum-ICP-Acid Dil.	ug/mL	98.00	< 5.00e-02	1.29e-01	1.28e-01	1.29e-01	0.78	94.60	5.00e-02	n/a
S98T002346	B	Chromium-ICP-Acid Dil.	ug/mL	97.80	< 1.00e-02	4.350	4.270	4.310	1.86	88.60	1.00e-02	n/a
S98T002346	B	Iron-ICP-Acid Dil.	ug/mL	95.60	< 5.00e-02	2.560	2.520	2.540	1.57	100.0	5.00e-02	n/a
S98T002346	B	Manganese-ICP-Acid Dil.	ug/mL	97.20	< 1.00e-02	5.90e-02	5.78e-02	5.84e-02	2.05	93.20	1.00e-02	n/a
S98T002346	B	Sodium-ICP-Acid Dil.	ug/mL	108.0	< 1.00e-01	3.89e-02	3.76e-02	3.82e-02	3.40	-3.33e-02	1.00e-01	n/a
S98T002346	D	Zirconium-ICP-Acid Dil.	ug/mL	99.00	< 1.00e-02	< 1.00e-02	< 1.00e-2	n/a	n/a	96.50	1.00e-02	n/a
S98T002346		Fluoride-IC-Dionex 4000/4500	ug/mL	97.50	< 1.20e-02	11.54	12.10	11.82	5.08	96.95	2.52e-01	n/a
S98T002346		Chloride-IC-Dionex 4000/4500	ug/mL	97.56	< 1.70e-02	8.476	8.300	8.388	2.15	100.5	3.57e-01	n/a
S98T002346		Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	< 1.08e-01	< 2.268	< 2.27e0	n/a	n/a	95.02	2.268	n/a
S98T002346		Nitrate by IC-Dionex 4000/4500	ug/mL	104.3	1.59e-01	1.14e+02	113.0	113.5	0.88	100.7	2.919	n/a
S98T002346		Phosphate-IC-Dionex 4000/4500	ug/mL	100.4	< 1.20e-01	7.114	6.830	6.972	4.02	89.21	2.520	n/a
S98T002346		Sulfate by IC-Dionex 4000/4500	ug/mL	97.00	< 1.38e-01	15.88	17.70	16.79	10.7	99.53	2.898	n/a
S98T002346		Cesium-137 by GEA	uCi/mL	97.12	< 7.41e-05	2.42e-02	2.47e-02	2.44e-02	2.04	n/a	n/a	1.15
S98T002346		Volume % Settled Solids	%	n/a	n/a	< 1.000	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98T002346		Am-241 by Extraction	uCi/mL	92.95	< 3.33e-06	9.41e-06	8.85e-06	9.13e-06	6.13	n/a	3.76e-06	5.98E+00

HNF-1644 REV. 0

HNF-1644 REV. 0

CHAIN OF CUSTODY

HNF-1644 REV. 0

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CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1644 REV. 0

Sample Number

3045-98-1

(2) Supervisor/Sampler

James Sickels

Tank

S-304

(4) Riser

4

(5) Cask/Pig Serial No.

TF 110

(7) Sampling Data

Y N

- Lithium Bromide

Amount

Concentration

- X-Ray

- Partial Sample

- Retrieved Partial Sample Stroke Length

A

N

12257

7-30-98

1042

WS-98-00062

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7

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number 3045-98-2		(2) Supervisor/Sampler James Sickels James Sickels		(9) Seal Intact Upon Release? ☒ Yes ☐ No
(3) Tank S-304	(4) Riser 4	(5) Cask/Pig Serial No. TF-4		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No
(6) Shipment Description:		(7) Sampling Date Y N		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No
A. Work Package Number WS-98-00062		Lithium Bromide ☐ ☐ Amount <u> </u> Concentration <u>14</u> X-Ray ☒ ☐ Partial Sample ☒ ☐ Retrieved Partial Sample Stroke Length <u> </u> A		(12) Laboratory Comments: S98T002347
B. Cask/Pig Seal Number 12258				
C. Date Sample Collected 7-30-98				
D. Time Sample Collected 1044				
(8) Field Comments:				
(13) Relinquished By (Sign and PRINT) Robert J. Ruzinski		(14) Received By (Sign and PRINT) Shirley B. Williams		(15) Date/Time 2:45 PM 7-30-98
(17) Relinquished By (Sign and PRINT) Shirley B. Williams		(18) Received By (Sign and PRINT) Richard L. Chambers		(19) Date/Time 1500 7-30-98
(21) Relinquished By (Sign and PRINT)		(22) Received By (Sign and PRINT)		(23) Date/Time
(25) Relinquished By (Sign and PRINT)		(26) Received By (Sign and PRINT)		(24) Receiver Comments
				(27) Date/Time
				(28) Receiver Comments

HNF-1644 REV. 0

DATE REC'D 06-01 FMA CT/20/TT

HNF-1644 REV.0

HNF-1644 REV. 0

22

HNF-1644 REV. 0

SAMPLE HANDLING

HNF-1644 REV. 0

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LABCORE Data Entry Template for Worklist# 25231

Analyst: JK Instrument: NONE Book # _____

Method: LA-519-151 Rev/Mod F-O

Worklist Comment: S304 GRAB, @BRKDWN1, tdm

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 DOSERATE	LIQUID	N/A	<u>20</u>		mrads/hour
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 SEALNUM	LIQUID	N/A	<u>12257</u>		
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 ETCHNUM	LIQUID	N/A	<u>5304-98-1</u>		
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 APPEAR02	LIQUID	N/A	<u>Clear</u>		
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 SAMPAMT2	LIQUID	N/A	<u>125</u>		ml
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 STLSLD01	LIQUID	N/A	<u>51% ; Rusty brown</u>		
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 COLOR-01	LIQUID	N/A	<u>Yellow</u>		
98000438	S-304 GRAB	1 SAMPLE	S98T002346	0	@BRKDWN1 ORGVOL02	LIQUID	N/A	<u>None</u>		ml
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 DOSERATE	LIQUID	N/A	<u>16</u>		mrads/hour
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 SEALNUM	LIQUID	N/A	<u>12258</u>		
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 ETCHNUM	LIQUID	N/A	<u>5304-98-2</u>		
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 APPEAR02	LIQUID	N/A	<u>Clear</u>		
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 SAMPAMT2	LIQUID	N/A	<u>100</u>		ml
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 STLSLD01	LIQUID	N/A	<u>51% Rusty Brown</u>		
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 COLOR-01	LIQUID	N/A	<u>Yellow</u>		
98000438	S-304 GRAB	2 SAMPLE	S98T002347	0	@BRKDWN1 ORGVOL02	LIQUID	N/A	<u>None</u>		ml
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDWN1 DOSERATE	LIQUID	N/A	<u>16</u>		mrads/hour
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDWN1 SEALNUM	LIQUID	N/A	<u>12259</u>		

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Data Entry Template for Worklist# 25231

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 ETCHNUM	LIQUID	N/A	<i>5304-98-3</i>		
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 APPEAR02	LIQUID	N/A	<i>Clear</i>		
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 SAMPAMT2	LIQUID	N/A	<i>125</i>		ml
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 STLSD01	LIQUID	N/A	<i>< 1% Rusty Brown</i>		
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 COLOR-01	LIQUID	N/A	<i>Yellow</i>		
98000438	S-304 GRAB	3 SAMPLE	S98T002348	0	@BRKDOWN1 ORGVOL02	LIQUID	N/A	<i>None</i>		ml
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 DOSERATE	LIQUID	N/A	<i>70 12</i>		mrads/hour
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 SEALNUM	LIQUID	N/A	<i>12260</i>		
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 ETCHNUM	LIQUID	N/A	<i>5304-98-4</i>		
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 APPEAR02	LIQUID	N/A	<i>Clear</i>		
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 SAMPAMT2	LIQUID	N/A	<i>125</i>		ml
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 STLSD01	LIQUID	N/A	<i>< 1% Rusty Brown</i>		
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 COLOR-01	LIQUID	N/A	<i>Yellow</i>		
98000438	S-304 GRAB	4 SAMPLE	S98T002349	0	@BRKDOWN1 ORGVOL02	LIQUID	N/A	<i>None</i>		ml

Final page for worklist # 25231

St Knight 8/5/98
Analyst Signature Date

Zaslow 8/12/98
Analyst Signature Date

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-1644 REV. 0

INORGANIC ANALYSIS

HNF-1644 REV. 0

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worklist Version 2.1 05/15/95
08/26/98 08:12

HNF-1644 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 25538Analyst: JIS Instrument: DSC0 3 Book # 12-N14-BMethod: LA-514-114 Rev/Mod D-1

Worklist Comment: S-304 GRAB, DSC-03, Run under nitrogen. skm

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			DSC-03	LIQUID	<u>28.45</u>	<u>28.21</u>	<u>N/A</u>	Joules/g
98000438	S-304 GRAB	2 SAMPLE	S98T002346	0	DSC-03	LIQUID	<u>N/A</u>	<u>0</u>		Joules/g
98000438	S-304 GRAB	3 DUP	S98T002346	0	DSC-03	LIQUID	<u>0</u>	<u>0</u>	<u>N/A</u>	Joules/g

Final page for worklist # 25538Analyst Signature [Signature] Date 8/26/98Analyst Signature [Signature] Date 9/18/98Validated 9/9/98 [Signature]

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number,
R = Replicate Number, A = Aliquot Code.

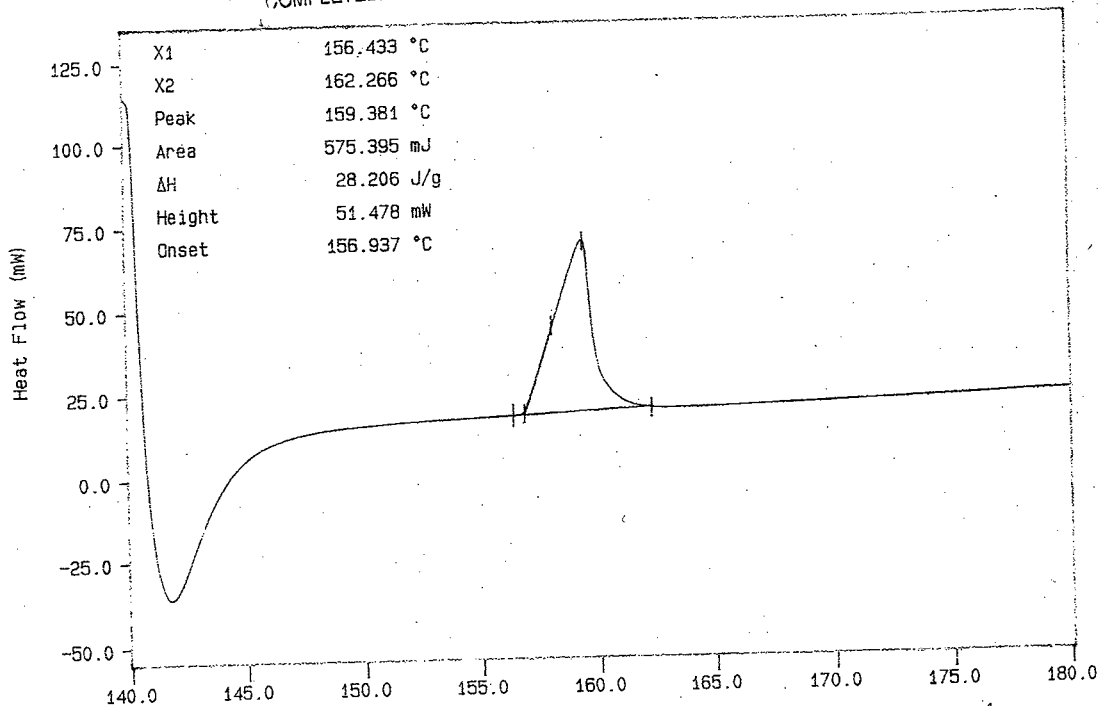
Curve 1: DSC

File info: IND052601 Wed Aug 26 06: 40: 33 1998

Sample Weight: 20.400 mg

STD 12N14-B

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 30 TO 32



N2, EXOTHERM DOWN

TEMP1: 160.0 °C TIME1: 0.0 min RATE1: 10.0 °C/min
TEMP2: 160.0 °C

Temperature (°C)

JI SOLBRACK *Jeff Solbrack*
PERKIN-ELMER
7 Series Thermal Analysis System
Wed Aug 26 06: 54: 55 1998

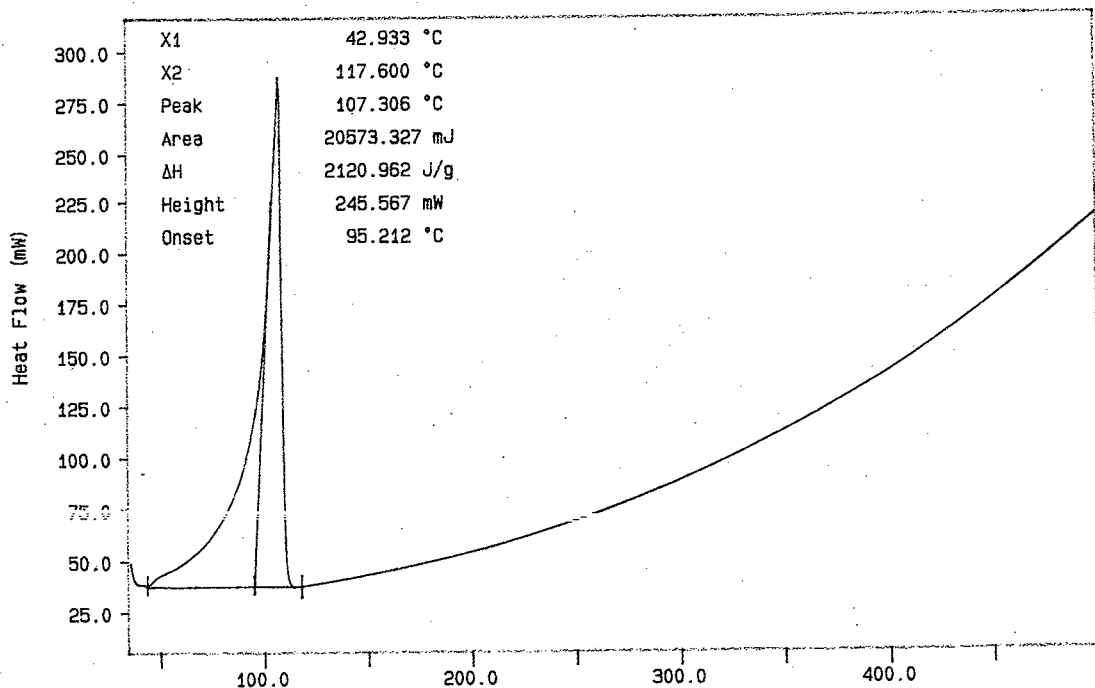
HNF-1644 REV.0

08/31/98 08:34 FAX 3721143

2B HALL

002

Curve 1: DSC
 File info: SAM082606 Wed Aug 26 14:36:38 1998
 Sample Weight: 9.700 mg
 S98T002346



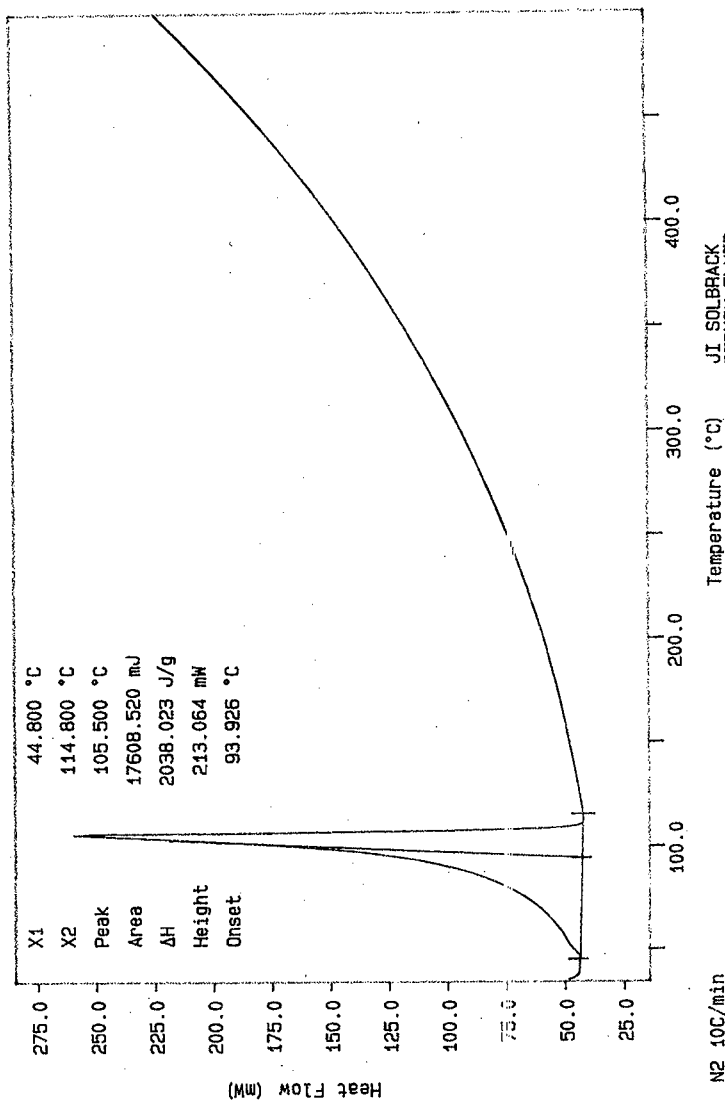
N2 10C/min
 TEMP1: 35.0 °C
 TEMP2: 500.0 °C
 TIME1: 0.0 min RATE1: 10.0 °C/min

JI SOLBRACK
 PERKIN-ELMER
 7 Series Thermal Analysis System
 Wed Aug 26 14:40:42 1998

HNF-1644 REV. 0

HNF-1644 REV. 0

Curve 1: DSC
File Info: SAM082607 Wed Aug 26 15:31:58 1998
Sample Weight: 8.640 mg
S98T002346DUP



JI SOLBRACK
PERKIN-ELMER
7 Series Thermal Analysis System
Wed Aug 26 15:35:04 1998

N2 10C/min
TEMP: 35.0 °C
TIME: 0.0 min
RATE: 10.0 °C/min

LABCORE Completed Worklist Report for Worklist# 26200

Analyst: ppb

Instrument: DSC0

Book#: NA

Method: LA-514-113 Rev/Mod D-1

Worklist Comment: S304 DRYDSC LIQUID JRO

Seq	Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	SAMPLE	S98T002346	0	DSC-02	LIQUID	N/A	0		Joules/g Dry
2	DUP	S98T002346	0	DSC-02	LIQUID	0	0	0.000	RPD

Final page for worklist# 26200

B. Michels 9/15/98
Analyst Signature Date

[Signature] 9-15-98
Analyst Signature Date

Reviewer Signature Date

LABCORE Completed Worklist Report for Worklist# 25539

Analyst: jis

Instrument: TGA03

Book#: 103N8A

Method: LA-514-114 Rev/Mod D-1

Worklist Comment: S-304 GRAB, TGA-03, Run under nitrogen. skm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD		0	TGA-03	LIQUID	5.94e01	58.58*	98.620 %	Recovery
2 SAMPLE	S98T002346	0	TGA-03	LIQUID	N/A	99.54		%
3 DUP	S98T002346	0	TGA-03	LIQUID	99.54	99.27	0.272 RPD	

Final page for worklist# 25539

J. D. Spelman 9/8/98
Analyst Signature Date

Analyst Signature Date

J. D. Spelman 9/15/98
Reviewer Signature Date

LABCORE Data Entry Template for Worklist# 25539

Analyst: 215 Instrument: TGA0 3 Book # 103811-AMethod: LA-514-114 Rev/Mod D-1

Worklist Comment: S-304 GRAB, TGA-03, Run under nitrogen. skm

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	STD				TGA-03	LIQUID	<u>59.4</u>	<u>58.58</u>	<u>N/A</u>	%
98000438	S-304 GRAB	2	SAMPLE	S98T002346	0		TGA-03	LIQUID	<u>N/A</u>	<u>99.54</u>		%
98000438	S-304 GRAB	3	DUP	S98T002346	0		TGA-03	LIQUID	<u>99.54</u>	<u>99.27</u>	<u>N/A</u>	%

Final page for worklist # 25539

Analyst Signature

Date

Analyst Signature

Date

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number,
R = Replicate Number, A = Aliquot Code.

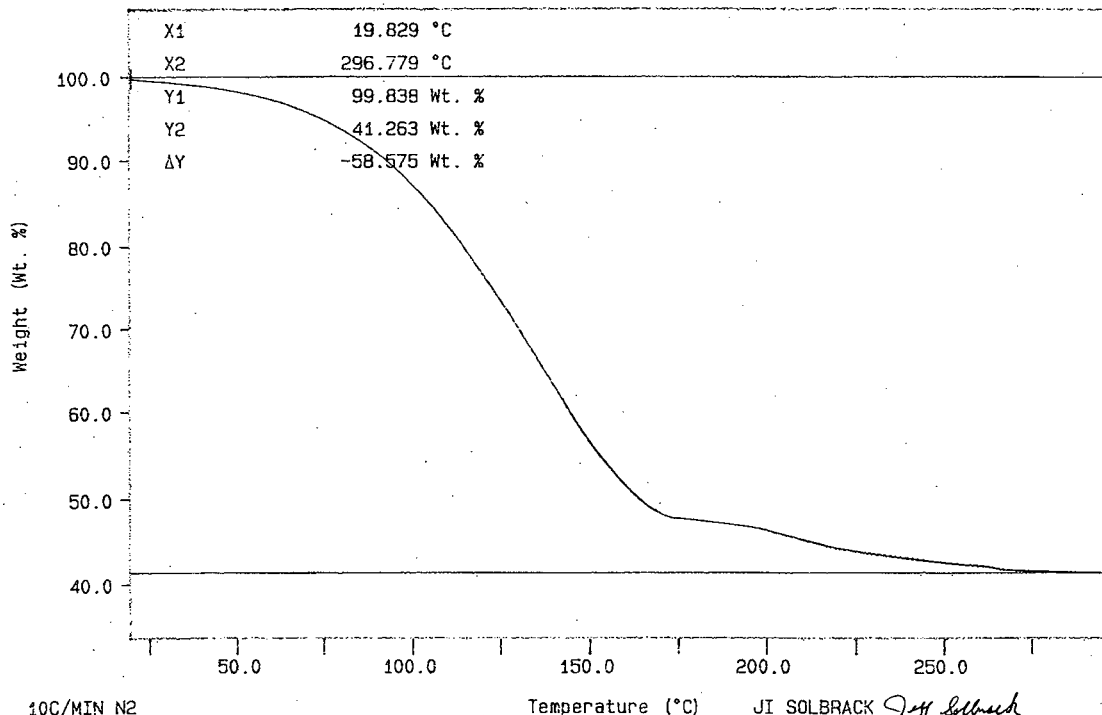
Curve 1: TGA

File info: TER082601 Wed Aug 26 06:59:34 1998

Sample Weight: 13.612 mg

103N8-A STD

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 36 TO 38.



10C/MIN N2

TEMP1: 35.0 C TIME1: 0.0 min RATE1: 10.0 C/min
TEMP2: 300.0 C

Temperature (°C)

JI SOLBRACK *Jeff Solbrack*
PERKIN-ELMER
7 Series Thermal Analysis System
Wed Aug 26 07:05:38 1998

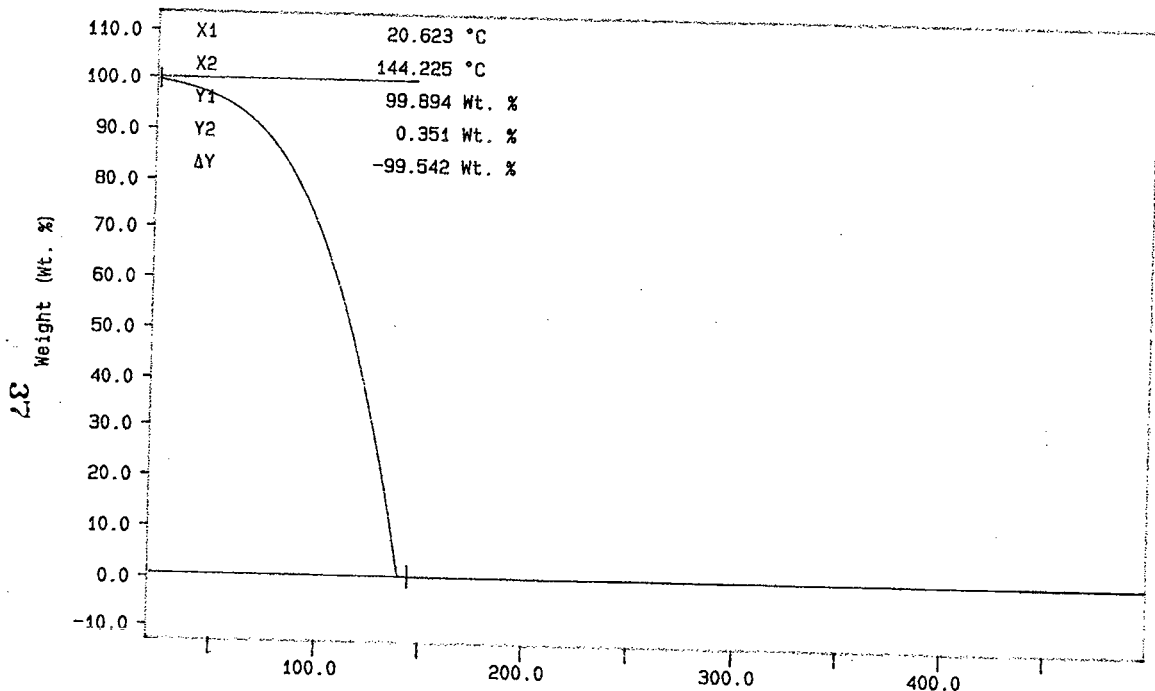
HNF-1644 REV.0

Curve 1: TGA

File info: SAM082606 Wed Aug 26 14:29:38 1998

Sample Weight: 10.108 mg

S98T002346



10C/MIN N2

TEMP1: 35.0 °C
TEMP2: 500.0 °C

TIME1: 0.0 min RATE1: 10.0 C/min

Temperature (°C)

JI SOLBRACK
PERKIN-ELMER
7 Series Thermal Analysis System
Wed Aug 26 14:31:11 1998

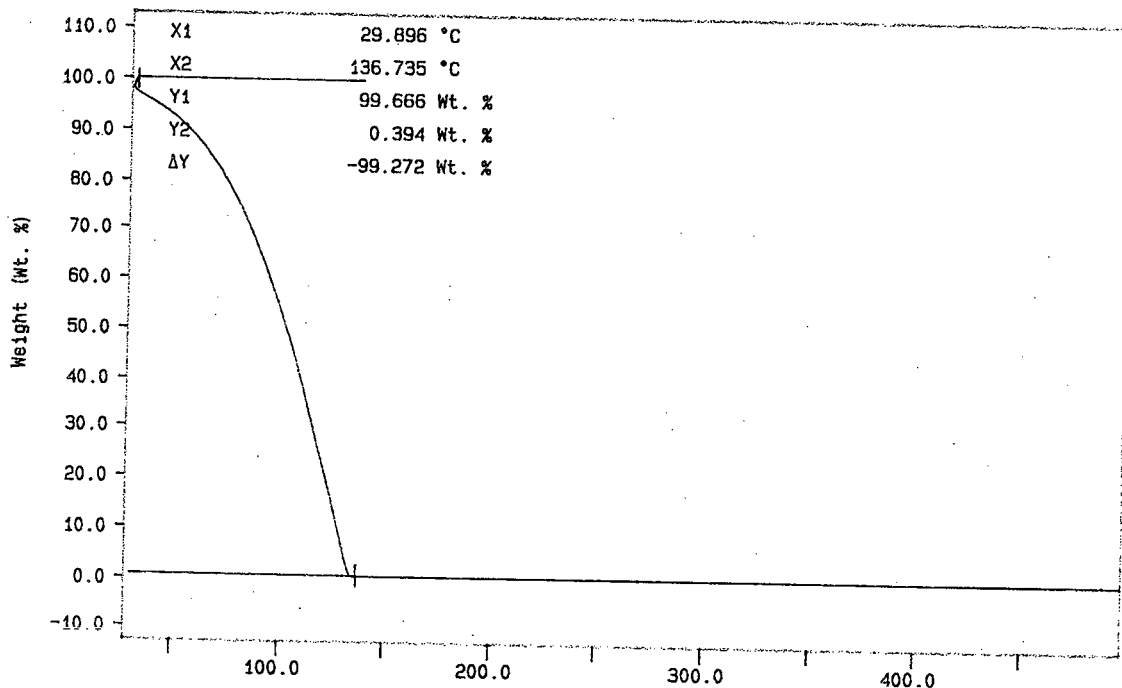
HNF-1644 REV. 0

Curve 1: TGA

File info: SAM082607 Wed Aug 26 15:37:03 1998

Sample Weight: 10.023 mg

S98T002346DUP



10C/MIN N2

TEMP: 35.0 °C
TEMP: 500.0 °C

TIME: 0.0 min RATE: 10.0 C/min

Temperature (°C)

JI SOLBRACK
PERKIN-ELMER
7 Series Thermal Analysis System
Wed Aug 26 15:54:35 1998

HMF-1644 REV. 0

LABCORE Data Entry Template for Worklist# 25540

Analyst: KRm Instrument: BA001 Book # 134N16C

Method: LA-510-112 Rev/Mod D-1

Worklist Comment: S-304 GRAB, SPG-01 skm

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			SPG-01	LIQUID	<u>1.378</u>	<u>1.378</u>	N/A	Sp.G.
98000438	S-304 GRAB	2 SAMPLE	S98T002346	0	SPG-01	LIQUID	N/A	<u>5.0774</u>	<u>9.1158</u>	Sp.G.
98000438	S-304 GRAB	3 DUP	S98T002346	0	SPG-01	LIQUID	<u>5.0774</u>	<u>5.0774</u>	N/A	Sp.G.

Final page for worklist # 25540

[Signature]
Analyst Signature Date 8-16-98

[Signature] 5 7/14/98
Analyst Signature Date

[Signature] 9/9/98
REVIEWER SIGNATURE DATE

Data Entry Comments:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type		STD	REPLICATE
STD	Gross Weight (W2)	1.4681	
Work List	Tare Weight (W1)	1.3303	
25540	Weight of Solution (W2-W1)	0.1378	0
Test Code	Volume of Solution μ L	100.0000	
SPG-01	Specific Gravity	1.3780	NA
Matrix			
LIQUID			
Sample #			
STD			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
KRM	Specific Gravity = $[(W2-W1) * 1000 \mu\text{L/mL}] / [\text{Vol. of Solution } \mu\text{L} * 1.000 \text{ g/mL}]$		
Date			
08/16/98	v RESULT v		
Time	Specific Gravity =	1.378	
03:00 PM			

Data Entry by:

Date: 09/09/98

Approved by:

Date: 9/15/98

Form 510112L1 Rev. 1.1

Page 1 of 1

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 40 TO 42.

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type		SAM	REPLICATE
SAM	Gross Weight (W2)	1.4007	
Work List	Tare Weight (W1)	1.3033	
25540	Weight of Solution (W2-W1)	0.0974	0
Test Code	Volume of Solution μ L	100.0000	
SPG-01	Specific Gravity	0.9740	NA
Matrix			
LIQUID			
Sample #			
S98T002346			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
KRM	Specific Gravity = $[(W2-W1) * 1000 \mu\text{L/mL}] / [\text{Vol. of Solution } \mu\text{L} * 1.000 \text{ g/mL}]$		
Date	v RESULT v		
08/16/98			
Time	Specific Gravity =	0.974	
03:00 PM			

Data Entry by:	Date:	09/09/98
Approved by:	Date:	

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type		DUP	REPLICATE
DUP	Gross Weight (W2)	1.4730	
Work List	Tare Weight (W1)	1.3742	
25540	Weight of Solution (W2-W1)	0.0988	0
Test Code	Volume of Solution μ L	100.0000	
SPG-01	Specific Gravity	0.9880	NA
Matrix			
LIQUID			
Sample #			
S98T002346			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
KRM	Specific Gravity = $[(W2-W1) * 1000 \mu\text{L/mL}] / [\text{Vol. of Solution } \mu\text{L} * 1.000 \text{ g/mL}]$		
Date			
08/16/98	$\sqrt{\text{RESULT}}$		
Time	Specific Gravity =	0.988	
03:00 PM			

Data Entry by:	Date: 09/09/98
Approved by:	Date:

LABCORE Data Entry Template for Worklist# 25543

Analyst: SMV Instrument: PH01 Book # 11118

Method: LA-211-102 Rev/Mod D-O

Worklist Comment: S-304 GRAB, OH-01, STD: 0.050mL skm

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 BLNK			OH-01	LIQUID	<u>1</u>	<u>242</u> 1.68E+4	<u>N/A</u>	ug/mL
		2 STD			OH-01	LIQUID	<u>1.72E+4</u>	<u>1.68E+4</u>	<u>N/A</u>	ug/mL
98000438	S-304 GRAB	3 SAMPLE	S98T002346	0	OH-01	LIQUID	<u>N/A</u>	<u>242</u>	<u>41.7</u>	ug/mL
98000438	S-304 GRAB	4 DUP	S98T002346	0	OH-01	LIQUID	<u>242</u>	<u>242</u>	<u>N/A</u>	ug/mL

Final page for worklist # 25543

Adam L. Smith 8-16-98
Analyst Signature Date

SA SA 9/9/98
Analyst Signature Date

SMV SA 9/6/98
REVIEWER SIGNATURE DATE

Ph Too low to run worklist

Data Entry Comments:

calibration data
 date 98-08-17 time 07:00
 pH(S) 1 7.00
 pH(S) 2 18.00
 t.col. 23.0 °C
 slope(rel) .994
 U(as)
 electr. input 1
 .3 mV
 =====

date 98-08-17 time 07:38
 GET pH 12 # 340
 Id.#1 .0001
 Id.#2 .1934
 pH(limit) 11.63
 W/ml
 EP1 .255 9.88 pH
 EP2 .313 8.05
 stop volt.reached
 =====

date 98-08-17 time 07:13
 GET pH 12 # 338
 Id.#1 .2306
 Id.#2 .1934
 pH(limit) 7.41
 W/ml .009
 EP1
 stop volt.reached
 =====

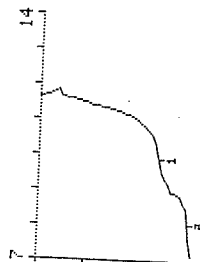
44

date 98-08-17 time 07:51
 GET pH 12 # 341
 Id.#1 .2346
 Id.#2 .1934
 pH(limit) 7.92
 stop volt.reached
 =====

rep. 5
 date 98-08-17 time 07:51
 GET pH 12 # 341
 .18ml/div dPH=1/div
 start V .000 ml



rep. 5
 rep. 5
 date 98-08-17 time 07:41
 GET pH 12 # 340
 .18ml/div dPH=1/div
 start V .000 ml



PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

		STD
Type	Sample Size (mL) SS	0.050
STD	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	0.255
25543	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	9.86E-01
OH-01	OH in Sample in µg/mL (PPM)	1.68E+04
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
STD		
Instrument Code	Detection Limit (µg/mL)	2.50E+03
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
JMV		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/16/98		
Time		STD
09:00 AM	Concentration of OH in Sample (Molarity)	9.86E-01
	OH in Sample in µg/mL (PPM)	1.68E+04

Data Entry by:	Date: 09/08/98
Approved by: <i>[Signature]</i>	Date: 9/15/98
Form 211102-1 Rev. 1.3	Page: 1 of 1

NO MATERIAL ABOVE REPRESENTS CHEMICAL TECHNOLOGISTS/SEMIST
 NO MATERIAL ABOVE REPRESENTS THE CALIBRATION ANALYSIS ON PAGES 45 TO 48

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

		BLK
Type	Sample Size (mL) SS	3.000
BLK	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	0.009
25543	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	5.80E-04
OH-01	OH in Sample in µg/mL (PPM)	9.86E+00
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
BLK		
Instrument Code	Detection Limit (µg/mL)	4.17E+01
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
JMV		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/16/98		
Time		BLK
09:00 AM	Concentration of OH in Sample (Molarity)	5.80E-04
	OH in Sample in µg/mL (PPM)	<42
The Result is < Detection Limit		

Data Entry by:	Date:	09/08/98
Approved by:	Date:	

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

		SAM
Type	Sample Size (mL) SS	3.000
SAM	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	0.000
25543	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	0.00E+00
OH-01	OH in Sample in µg/mL (PPM)	0.00E+00
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
S98T002346		
Instrument Code	Detection Limit (µg/mL)	4.17E+01
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
JMV		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/16/98		
Time		SAM
09:00 AM	Concentration of OH in Sample (Molarity)	0.00E+00
	OH in Sample in µg/mL (PPM)	<42

The Result is < Detection Limit

Data Entry by:	Date: 09/08/98
Approved by:	Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

		DUP
Type	Sample Size (mL) SS	3.000
DUP	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	0.000
25543	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	0.00E+00
OH-01	OH in Sample in µg/mL (PPM)	0.00E+00
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
S98T002346		
Instrument Code	Detection Limit (µg/mL)	4.17E+01
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
JMV		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/16/98		
Time		DUP
09:00 AM	Concentration of OH in Sample (Molarity)	0.00E+00
	OH in Sample in µg/mL (PPM)	<42

The Result is < Detection Limit

Data Entry by:	Date: 09/08/98
Approved by:	Date:

worklistrpt Version 2.1 05/15/95
08/12/98 11:01

HNF-1644 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 25545

Analyst: RM Instrument: PH01 Book # 18N19G

Method: LA-212-106 Rev/Mod C2

Worklist Comment: S-304 GRAB, pH-01 skm

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STDPH			PH-01	LIQUID	<u>8.00</u>	<u>7.99</u>	<u>N/A</u>	pH
98000438	S-304 GRAB	2 SAMPLE	S98T002346	0	PH-01	LIQUID	<u>N/A</u>	<u>9.03</u>		pH
98000438	S-304 GRAB	3 DUP	S98T002346	0	PH-01	LIQUID		<u>9.04</u>	<u>N/A</u>	pH

Final page for worklist # 25545

RM 8/14/98
Analyst Signature Date

Ch. Oliver 8/17/98
Analyst Signature Date

Reviewed By MP
8/18/98

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Completed Worklist Report for Worklist# 25541

Analyst: adp

Instrument: IC40S1

Book# 149220C

Method: 14-533-105 Rev/Mod E-0

Worklist Comment: S-304 GRAB, @IC-01 skm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 CCB	0		@IC-QC F	QC	1	<1.20e-2		ug/mL
1 CCB	0		@IC-QC CL	QC	1	<1.70e-2		ug/mL
1 CCB	0		@IC-QC NO2	QC	1	<1.08e-1		ug/mL
1 CCB	0		@IC-QC BR	QC	1	<1.25e-1		ug/mL
1 CCB	0		@IC-QC NO3	QC	1	1.59e-01	0.159	ug/mL
1 CCB	0		@IC-QC PO4	QC	1	<1.20e-1		ug/mL
1 CCB	0		@IC-QC SO4	QC	1	<1.38e-1		ug/mL
1 CCB	0		@IC-QC OXALATE2	QC	1	<1.05e-1		ug/mL
2 ICV	0		@IC-QC F	QC	5.90e1	5.60e+01	94.915 % Recovery	
2 ICV	0		@IC-QC CL	QC	8.00e1	7.57e+01	94.625 % Recovery	
2 ICV	0		@IC-QC NO2	QC	5.42e2	5.19e+02	95.756 % Recovery	
2 ICV	0		@IC-QC BR	QC	5.86e2	5.71e+02	97.440 % Recovery	
2 ICV	0		@IC-QC NO3	QC	5.92e2	5.83e+02	98.480 % Recovery	
2 ICV	0		@IC-QC PO4	QC	5.47e2	5.02e+02	91.773 % Recovery	
2 ICV	0		@IC-QC SO4	QC	6.38e2	6.13e+02	96.082 % Recovery	
2 ICV	0		@IC-QC OXALATE2	QC	5.29e2	5.15e+02	97.353 % Recovery	
3 SAMPLE	S98T002346	0	@IC-01 F-02	LIQUID	N/A	1.154e+01	0.252	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 CL-02	LIQUID	N/A	8.476e+00	0.357	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 NO2-02	LIQUID	N/A	< 2.268e+00	2.268	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 BR-02	LIQUID	N/A	< 2.625e+00	2.625	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 NO3-02	LIQUID	N/A	1.140e+02	2.919	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 PO4-02	LIQUID	N/A	7.114e+00	2.520	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 SO4-02	LIQUID	N/A	1.588e+01	2.898	ug/mL
3 SAMPLE	S98T002346	0	@IC-01 OXALATE2	LIQUID	N/A	< 2.205e+00	2.205	ug/mL
4 DUP	S98T002346	0	@IC-01 F-02	LIQUID	1.15e+01	1.21e+01	5.085 RPD	
4 DUP	S98T002346	0	@IC-01 CL-02	LIQUID	8.48e+00	8.30e+00	2.145 RPD	
4 DUP	S98T002346	0	@IC-01 NO2-02	LIQUID	<2.27e0	<2.27e0	RPD	
4 DUP	S98T002346	0	@IC-01 BR-02	LIQUID	<2.62e0	<2.62e0	RPD	
4 DUP	S98T002346	0	@IC-01 NO3-02	LIQUID	1.14e+02	1.13e+02	0.881 RPD	
4 DUP	S98T002346	0	@IC-01 PO4-02	LIQUID	7.11e+00	6.83e+00	4.017 RPD	
4 DUP	S98T002346	0	@IC-01 SO4-02	LIQUID	1.59e+01	1.77e+01	10.714 RPD	
4 DUP	S98T002346	0	@IC-01 OXALATE2	LIQUID	<2.21e0	<2.21e0	RPD	
5 SPK	S98T002346	0	@IC-01 F-02	LIQUID	5.90e1	5.72e+01	96.949 % Recovery	
5 SPK	S98T002346	0	@IC-01 CL-02	LIQUID	8.00e1	8.04e+01	100.500 % Recovery	
5 SPK	S98T002346	0	@IC-01 NO2-02	LIQUID	5.42e2	5.15e+02	95.018 % Recovery	
5 SPK	S98T002346	0	@IC-01 BR-02	LIQUID	5.86e2	5.76e+02	98.294 % Recovery	
5 SPK	S98T002346	0	@IC-01 NO3-02	LIQUID	5.92e2	5.96e+02	100.676 % Recovery	
5 SPK	S98T002346	0	@IC-01 PO4-02	LIQUID	5.47e2	4.88e+02	89.214 % Recovery	
5 SPK	S98T002346	0	@IC-01 SO4-02	LIQUID	6.38e2	6.35e+02	99.530 % Recovery	
5 SPK	S98T002346	0	@IC-01 OXALATE2	LIQUID	5.29e2	5.10e+02	96.408 % Recovery	
6 CCV	0		@IC-QC F	QC	6.40e1	6.24e+01	97.500 % Recovery	

Units shown for QC (BLK/BKC) may not reflect the actual units.

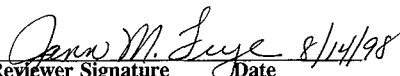
LABCORE Completed Worklist Report for Worklist# 25541

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
6 CCV	0	0	0IC-QC	CL	QC	9.00e1	8.78e+01	97.556 % Recovery
6 CCV	0	0	0IC-QC	N02	QC	5.43e2	5.31e+02	97.790 % Recovery
6 CCV	0	0	0IC-QC	BR	QC	5.30e2	5.31e+02	100.159 % Recovery
6 CCV	0	0	0IC-QC	N03	QC	6.98e2	7.28e+02	104.298 % Recovery
6 CCV	0	0	0IC-QC	PO4	QC	6.32e2	6.36e+02	100.633 % Recovery
6 CCV	0	0	0IC-QC	SO4	QC	6.99e2	6.78e+02	96.996 % Recovery
6 CCV	0	0	0IC-QC	OXALATE2	QC	5.30e2	5.10e+02	96.226 % Recovery

Final page for worklist# 25541

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____


Reviewer Signature _____ Date 8/14/98

08/12/98 10:54
A-0004-1

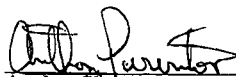
Page: 1

LABCORE Data Entry Template for Worklist# 25541Analyst: ADP Instrument: IC 4051 Book# 149N20-CMethod: LA-533-105 Rev/Mod E-0

Worklist Comment: S-304 GRAB, @IC-01 skm

S Type	Sample#	R	Test	Matrix	Group#	Project
1 CCB			@IC-QC	QC		
2 ICV			@IC-QC	QC		
3 SAMPLE	S98T002346 0		@IC-01	LIQUID	98000438	S-304 GRAB
	Analytes Requested: BR-02 , CL-02 , P-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02					
4 DUP	S98T002346 0		@IC-01	LIQUID		
5 SPK	S98T002346 0		@IC-01	LIQUID		
6 CCV			@IC-QC	QC		

Final page for worklist # 25541

 8-13-98
 Analyst Signature Date

 Analyst Signature Date

Validated Janin Lye 8/14/98

Data Entry Comments:

uploaded 8-13-98
John Wavell
25541AUG.CSV

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Data Reprocessed On 08/13/1998 06:59:45

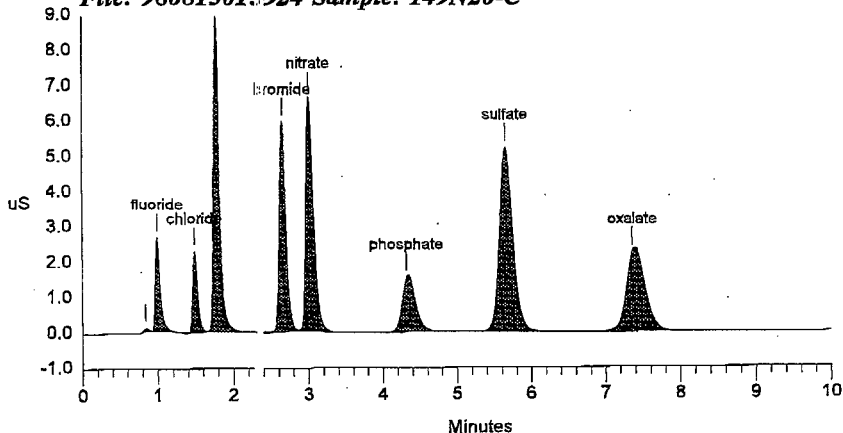
Sample Name: 149N20-C Date: 08/13/1998 06:56:06
 Data File : C:\DX\DATA\98081301.D24
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 24 Detector: CDM-1
 Analyst : *Anthony Parv...* Column: AG4A/AS4A anion column

Calibration Volume Dilution Points Rate Start Stop Area Reject
 External 1 101 3000 5Hz 0.00 10.00 30

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.84		0.000	.89	350	2	
2	0.99	fluoride	55.970	94.54	11589	2	-1.65
3	1.49	chloride	75.726	95.01	10238	1	-3.04
4	1.77	nitrite	518.654	95.69	46217	1	-3.62
5	2.65	bromide	570.555	97.36	35352	1	-4.21
6	3.01	nitrate	583.025	98.48	47590	1	-0.11
7	4.32	phosphate	502.140	91.30	19970	1	-5.88
8	5.65	sulfate	613.066	96.09	65391	1	-6.25
9	7.36	oxalate	514.829	97.32	40661	1	-6.72
Totals			3433.966	35485	277356		

File: 98081301.D24 Sample: 149N20-C



SS .100-10.

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
 COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 53 TO 58.

```

=====
Sample Name: BLANK                      Date: 08/13/1998 06:42:54
Data File  : C:\DX\DATA\98081301.D23
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System 1 Inject#: 23      Detector: CDM-1
Analyst    :                          Column: AG4A/AS4A anion column
=====

```

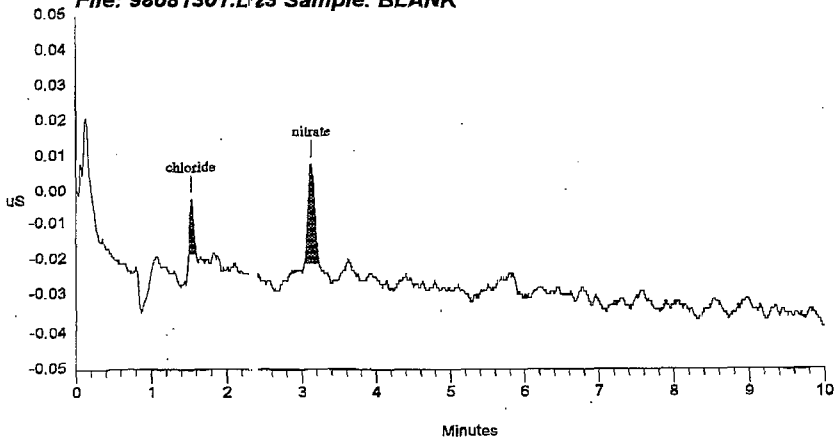
Calibration Volume Dilution Points Rate Start Stop Area Reject

External 1 1 3000 5Hz 0.00 10.00 30

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	1.53	chloride	0.004	15	48	1	-0.43
2	3.13	nitrate	0.159	28	166	1	-0.74
Totals			0.162	43	214		

File: 98081301.D23 Sample: BLANK



SS1

```

=====
Sample Name: S98T002346 SAM                               Date: 08/13/1998 09:34:19
Data File  : C:\DX\DATA\98081301.D28
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 28                      Detector: CDM-1
Analyst    :                               Column: AG4A/AS4A anion column
=====

```

```

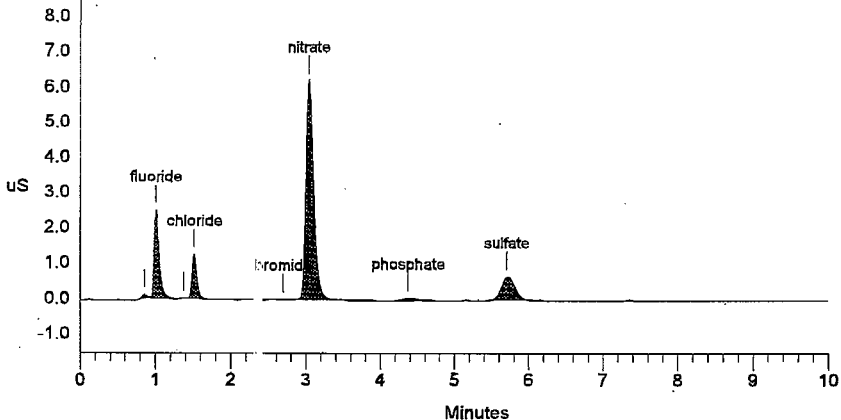
=====
Calibration Volume Dilution Points Rate Start Stop Area Reject
=====
External          1          21    3000  5Hz   0.00 10.00          30
=====

```

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.85		0.000	94	396	2	
2	1.01	fluoride	11.535	2496	11484	2	-0.33
3	1.37		0.000	29	119	1	
4	1.51	chloride	8.476	1259	5488	1	-1.30
5	2.69	bromide	2.420	12	59	1	-2.77
6	3.03	nitrate	114.006	6231	44661	1	-3.70
7	4.37	phosphate	7.114	75	956	1	-4.72
8	5.71	sulfate	15.879	676	8787	1	-5.36
Totals			159.430	10872	71950		

File: 98081301.D28 Sample: S98T002346 SAM



SS.500-10

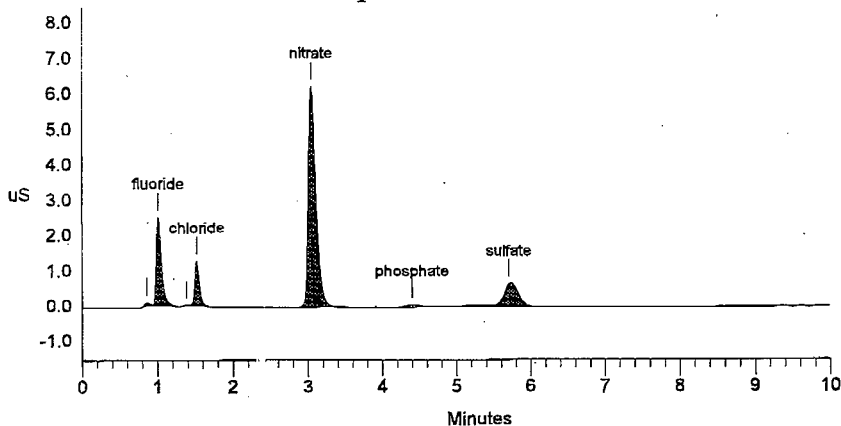
Sample Name: S98T002346 DUP Date: 08/13/1998 09:45:36
 Data File : C:\DX\DATA\98081301.D29
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 29 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	21	3000	5Hz	0.00	10.00		30

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.86		0.000	96	398	2	
2	1.01	fluoride	12.107	2518	12069	2	0.33
3	1.39		0.000	27	122	1	
4	1.52	chloride	8.304	1267	5375	1	-0.87
5	3.05	nitrate	113.499	6252	44456	1	-3.28
6	4.40	phosphate	6.831	75	902	1	-4.14
7	5.71	sulfate	17.748	651	9723	1	-5.36
Totals			158.489	10887	73045		

File: 98081301.D29 Sample: S98T002346 DUP



SS.500-10

Data Reprocessed On 08/13/1998 10:43:47

```

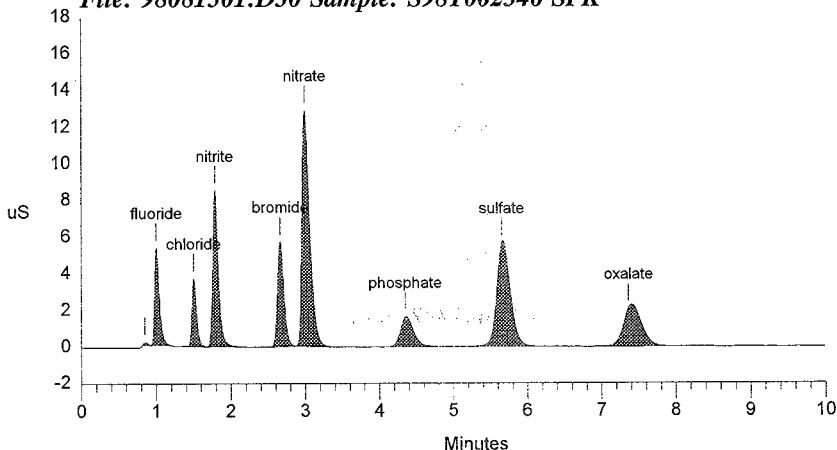
=====
Sample Name: S98T002346 SPK                      Date: 08/13/1998 09:56:34
Data File  : F:\DATA\98081301.D30
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 30              Detector: CDM-1
Analyst    :                      Column: AG4A/AS4A anion column
=====

```

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	21	3000	5Hz	0.00	10.00		30

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.85		0.000	162	630	2	
2	1.00	fluoride	22.970	5297	23222	2	-0.99
3	1.50	chloride	24.557	3722	16054	1	-2.17
4	1.79	nitrite	103.056	8496	44130	1	-2.90
5	2.66	bromide	115.299	5719	34327	1	-3.97
6	2.99	nitrate	233.120	12847	93430	1	0.11
7	4.35	phosphate	104.797	1608	20048	1	-5.30
8	5.65	sulfate	142.935	5680	73351	1	-6.25
9	7.36	oxalate	101.969	2098	38714	1	-6.72
Totals			848.703	45630	343905		

File: 98081301.D30 Sample: S98T002346 SPK

```

=====
Sample Name: 148N20-C                      Date: 08/13/1998 10:08:30
Data File  : C:\DX\DATA\98081301.D31
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 31        Detector: CDM-1
Analyst    :                               Column: AG4A/AS4A anion column
=====

```

```

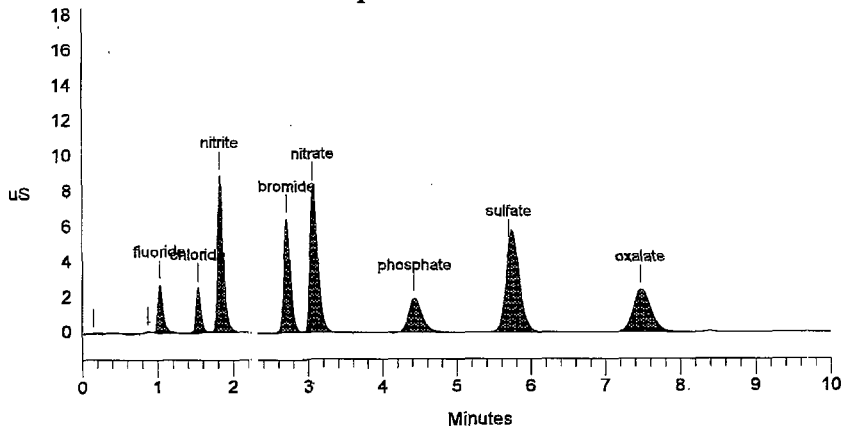
=====
Calibration Volume Dilution Points Rate Start Stop Area Reject
=====
External          1          101 3000 5Hz 0.00 10.00          30
=====

```

***** Peak Report: All Peaks *****

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.15		0.000	32	180	1	
2	0.87		0.000	96	426	2	
3	1.03	fluoride	62.373	2742	12952	2	1.65
4	1.53	chloride	87.785	2588	11887	1	0.00
5	1.83	nitrite	530.800	8939	47319	1	-0.72
6	2.71	bromide	630.973	6457	39224	1	-2.05
7	3.06	nitrate	728.432	8278	59894	1	-2.86
8	4.43	phosphate	635.589	1982	25480	1	-3.56
9	5.71	sulfate	677.770	5029	72313	1	-5.36
10	7.47	oxalate	510.089	2430	40283	1	-5.37
Totals			3863.811	38573	309956		

File: 98081301.D31 Sample: 148N20-C



SS 100-10

File # 980828C.TXT

08/14/98 15:15

A-0004-1

HNF-1644 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 25647

Analyst: JK 5610 Instrument: ICP01 L MS 8-17-98 Book# 73848B
 Method: LA-505-151/161 Rev/Mod C-2
~~8-17-98~~
 Worklist Comment: ICP S-304 (DIRECT)

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 ICV			@ICP-QC	QC		
2 ICP			@ICP-QC	QC		
3 SERDIL	<u>8-17-98</u> S98T002346	0 D	@ICP-D01	LIQUID		
4 SAMPLE	S98T002346	0 D	@ICP-D01	LIQUID	98000438	S-304 GRAB
Analytes Requested: AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01						
5 DUP	S98T002346	0 D	@ICP-D01	LIQUID		
6 SPK	<u>10ppm</u> S98T002346	0 D	@ICP-D01	LIQUID		
7 ICSA	<u>Sample X</u> <u>SPK GR (10ppm)</u> <u>8-18-98</u>		@ICP-QC	QC		
8 ICSAB			@ICP-QC	QC		
9 CCV			@ICP-QC	QC		
10 CCB			@ICP-QC	QC		

Final page for worklist # 25647

JK 5610 08-18-98
 Analyst Signature Date
 5987001346-L, 2-8, 1-9, 10
 5987001346 direct 1
 5987001346-D direct 1
 5987001346-Q direct 1.25

Analyst Signature Date
 5987001346-X, 1-9, 10
 5987001346-QX, 1-9, 10

Data Entry Comments:

Validated by:
Sam H. Pung
8/31/98

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	980828C	ICP2	08/28/98	13:24	DKS	Q	CONC
2	ICB	980828C	ICP2	08/28/98	13:28	DKS	Q	CONC
3	LLS	980828C	ICP2	08/28/98	13:31	DKS	Q	CONC
4	ICSA	980828C	ICP2	08/28/98	13:34	DKS	Q	CONC
5	ICSA B	980828C	ICP2	08/28/98	13:36	DKS	Q	CONC
6	S98T002346--L	980828C	ICP2	08/28/98	13:40	DKS	S	CONC
7	S98T002346--D	980828C	ICP2	08/28/98	13:43	DKS	S	CONC
8	S98T002346--A	980828C	ICP2	08/28/98	13:46	DKS	S	CONC
9	S98T002346--X	980828C	ICP2	08/28/98	13:49	DKS	S	CONC
10	S98T002346--AX	980828C	ICP2	08/28/98	13:55	DKS	S	CONC
11	ICSA	980828C	ICP2	08/28/98	13:58	DKS	S	CONC
12	ICSA B	980828C	ICP2	08/28/98	14:09	DKS	Q	CONC
13	ICSA B	980828C	ICP2	08/28/98	14:12	DKS	Q	CONC
14	CCV	980828C	ICP2	08/28/98	14:15	DKS	Q	CONC
15	CCB	980828C	ICP2	08/28/98	14:19	DKS	Q	CONC

OK dcd

5-304

08-28-98

5987003346

Worklist #25647

$$\text{Post spike } \% \text{ Na} = \frac{\left(\frac{494.44}{10} \right) - \left(\frac{392.66}{10} \right)}{10} \times 100 = 101.8\%$$

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 60 TO 65.

$$\text{Al spike recovery \%} = \frac{1.3117 - 0.129}{1.25 \times 1} \times 100\% = 94.6\%$$

9/16/98

Analysis Report

Averages

Fri 08-28-98 02:22:47 PM

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#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.8564	4.8980	4.9971	4.9235	4.9399	5.0501
2	ICB	.00012	.00748	-.00403	.00369	.00002	.00027
3	LLS	.02247	.11204	.21005	.10669	.09809	.01083
4	ICSA	.00464	244.89	-.00103	-.00380	.00032	.00054
5	ICSA B	.94406	241.90	.00622	-.00184	.45903	.47972
6	S98T002346 L	.02568	.12189	.01040	.12802	.00160	.00067
7	S98T002346 D	.03028	.12931	.07834	.11093	.00190	.00017
8	S98T002346 D	.02920	.12813	.07803	.10622	.00181	.00010
9	S98T002346 A	.99675	1.3117	1.4299	1.2952	1.1836	1.2588
10	S98T002346 X	.05146	.11544	.09105	.09106	.00146	-.00019
11	S98T002346 AX	94.954	95.278	100.32	98.399	97.452	98.454
12	ICSA	.00406	234.56	-.01110	-.01112	.00043	.00036
13	ICSA B	.93560	236.13	.05154	-.01568	.44599	.46972
14	CCV	4.8486	4.8423	5.0236	4.9124	4.8847	5.0550
15	CCB	-.00026	.00048	.00141	.00184	.00000	.00027

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	4.9787	4.8895	4.9780	5.0412	4.9317	4.8857
2	ICB	-.01721	-.01578	.00033	-.00594	.00035	-.00053
3	LLS	.21767	Q.22025	.00994	.20594	.04108	.01971
4	ICSA	-.02754	251.89	.00534	.00208	.00130	-.00294
5	ICSA B	-.01920	249.49	.93762	-.01153	.45910	.46146
6	S98T002346 L	.09549	2.7431	-.00583	-.07869	.01129	4.4178
7	S98T002346 D	.04691	2.4313	-.00193	-.01828	.00529	4.3548
8	S98T002346 D	.04542	2.4681	-.00224	-.01357	.00534	4.2721
9	S98T002346 A	1.1453	3.9238	1.2040	1.2196	1.1976	5.4624
10	S98T002346 X	.05127	2.6635	-.00424	-.06704	.00109	4.3969
11	S98T002346 AX	97.873	101.38	97.921	98.353	98.157	102.31
12	ICSA	-.00621	250.34	.00575	.00768	.00169	-.00058
13	ICSA B	-.02997	248.45	.93050	.00129	.45522	.45997
14	CCV	4.9048	4.9124	5.0015	4.9980	4.9311	4.8986
15	CCB	-.01074	-.01419	.00000	-.00856	-.00060	-.00062

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.8271	.00564	4.7767	5.4072	5.0234	5.2101
2	ICB	.00041	-.00024	.00100	.12908	-.00020	-.00020
3	LLS	.01740	-.00022	.09920	Q.73448	.10213	.02061
4	ICSA	.00222	.01490	93.165	.19384	-.00376	.00175
5	ICSA B	.46856	.01759	92.016	.21546	-.00586	1.0015
6	S98T002346 L	-.02717	-.00276	2.7217	10.999	-.00821	-.00070
7	S98T002346 D	-.02840	-.00102	2.5640	10.111	-.00027	.00124
8	S98T002346 D	-.02752	-.00051	2.5164	9.6481	-.00007	.00157
9	S98T002346 A	1.1376	.00095	3.8182	11.132	1.2197	1.1930
10	S98T002346 X	-.03552	.00582	2.6878	11.436	-.00903	.00962
11	S98T002346 AX	92.548	.12537	96.904	107.19	97.946	96.361
12	ICSA	.00314	.00515	90.684	.37018	.00370	.00330
13	ICSA B	.45376	.01204	90.687	.40931	-.00420	.94431
14	CCV	4.7707	.00687	4.7637	4.9594	4.9709	4.9825
15	CCB	-.00052	-.00004	.00013	.00513	-.00022	-.00020

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Analysis Report

Averages

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#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	5.0457	4.8616	4.9654	5.3955	5.0579	4.9295
2	ICB	-.00221	-.00011	.00218	.03172	-.00009	.00010
3	LLS	.21582	.01999	.09791	.21275	.19871	.04256
4	ICSA	252.32	-.00555	-.01615	195.54	.00038	-.01135
5	ICSAB	248.99	.43957	-.01558	194.45	-.00068	.90120
6	S98T002346 L	.30869	.06314	.60470	416.91	-.00473	.20528
7	S98T002346	.29314	.05895	.60496	389.19	.00005	.18818
8	S98T002346 D	.28677	.05785	.58766	376.27	.00118	.18932
9	S98T002346 A	1.4987	1.2235	1.8112	385.04	1.1983	1.3851
10	S98T002346 X	.32339	.06534	.58819	392.66	-.02900	.20307
11	S98T002346 AX	101.27	97.513	98.823	494.44	95.690	97.881
12	ICSA	242.72	-.00442	-.01410	180.78	.00160	-.01103
13	ICSAB	243.82	.43461	-.01588	185.61	.00175	.91021
14	CCV	4.9877	4.8514	4.9724	5.1637	4.9843	4.9406
15	CCB	-.00321	-.00002	-.00062	.03282	-.00140	-.00353

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	4.9373	4.7931	4.8536	4.9811	4.7561	4.8980
2	ICB	-.00322	-.00421	-.00739	.00356	-.00309	.00277
3	LLS	.39119	.19871	.20538	.10423	.20555	Q.13041
4	ICSA	.01304	.01472	-.03201	.00587	.05278	-.00671
5	ICSAB	.02685	.96875	-.03484	-.00361	.05636	-.00502
6	S98T002346 L	2.2660	-.01138	6.4075	.03623	.35129	2.1886
7	S98T002346	2.3926	-.01163	6.0720	.05198	.29883	2.1454
8	S98T002346 D	2.3901	.00177	5.8507	.05094	.33450	2.0857
9	S98T002346 A	3.6049	1.1470	7.1038	1.2445	1.8269	3.3970
10	S98T002346 X	2.2216	-.16905	6.4457	.05053	.49195	2.3099
11	S98T002346 AX	102.07	97.909	102.67	99.020	103.04	102.53
12	ICSA	.04157	.03719	-.02247	.00308	.07790	.00446
13	ICSAB	.02896	.97532	-.03816	.00408	.08077	.00039
14	CCV	4.9682	4.8084	4.8673	4.9854	4.7230	4.8956
15	CCB	.00540	-.00385	-.00673	.00714	.01251	.00145

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	5.0093	4.9678	.22800	4.9879	4.8154	9.7640
2	ICB	-.00241	-.00008	.00098	.00000	.01001	-.01138
3	LLS	.19595	.02007	.01476	.01942	.39583	.46780
4	ICSA	-.02554	.00194	.01083	.00071	.02174	-.05209
5	ICSAB	-.02053	.00194	-.00424	.00088	.00721	-.04961
6	S98T002346 L	-.04197	.00374	.17343	.00188	.07482	13.016
7	S98T002346	-.02225	.00369	.20670	.00330	.00660	13.215
8	S98T002346 D	-.01738	.00381	.19499	.00369	-.00020	12.812
9	S98T002346 A	1.1735	1.2261	.25745	1.1171	1.1245	15.093
10	S98T002346 X	.08762	.00485	.14573	-.00361	.04741	12.829
11	S98T002346 AX	95.083	97.345	4.5340	98.439	96.214	199.41
12	ICSA	-.00083	.00173	.00229	.00229	.00256	-.03121
13	ICSAB	-.01036	.00180	-.00299	.00226	.01477	-.03271
14	CCV	4.9537	4.9205	.23413	4.9765	4.8111	9.6035
15	CCB	.00010	-.00004	-.00408	-.00024	.00279	-.00427

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Analysis Report

Averages

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#	Sample Name	V	Y	Zn	Zr
1	ICV	4.9160	.01481	4.6518	4.9452
2	ICB	-.00103	-.00023	-.00013	-.00101
3	LLS	.09893	-.00004	.01917	.01846
4	IGSA	-.00003	.00707	-.00403	-.00510
5	IGSAB	.46352	.00730	.91119	-.00368
6	S98T002346 L	-.00851	-.00239	.06053	-.01781
7	S98T002346	-.00102	-.00122	.05191	-.01535
8	S98T002346 D	.00011	-.00089	.05072	-.01414
9	S98T002346 A	1.2430	.00063	1.2349	1.2067
10	S98T002346 X	.01912	.00473	.05088	.00027
11	S98T002346 AX	97.721	.15507	92.733	97.371
12	IGSA	.00436	.00832	-.00333	-.00154
13	IGSAB	.45705	.00761	.90790	-.00243
14	CCV	4.9077	.01488	4.6694	4.9243
15	CCB	-.00050	-.00007	.00010	.00000

KLD

08-18-98

HNF-1644 REV. 0

Analysis Report

Summary

Fri 08-28-98 02:22:47 PM

page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	980828C	ICP2	08/28/98	13:24	DKS	Q	CONC
2	ICB	980828C	ICP2	08/28/98	13:28	DKS	Q	CONC
3	LLS	980828C	ICP2	08/28/98	13:31	DKS	Q	CONC
4	ICSA	980828C	ICP2	08/28/98	13:34	DKS	Q	CONC
5	ICSAB	980828C	ICP2	08/28/98	13:36	DKS	Q	CONC
6	S98T002346 L	980828C	ICP2	08/28/98	13:40	DKS	S	CONC
7	S98T002346	980828C	ICP2	08/28/98	13:43	DKS	S	CONC
8	S98T002346 D	980828C	ICP2	08/28/98	13:46	DKS	S	CONC
9	S98T002346 A	980828C	ICP2	08/28/98	13:49	DKS	S	CONC
10	S98T002346 X	980828C	ICP2	08/28/98	13:55	DKS	S	CONC
11	S98T002346 AX	980828C	ICP2	08/28/98	13:58	DKS	S	CONC
12	ICSA	980828C	ICP2	08/28/98	14:09	DKS	Q	CONC
13	ICSAB	980828C	ICP2	08/28/98	14:12	DKS	Q	CONC
14	CCV	980828C	ICP2	08/28/98	14:15	DKS	Q	CONC
15	CCB	980828C	ICP2	08/28/98	14:19	DKS	Q	CONC

DK lead

5.304

08-28-98

5987002346

Worklist #25647

$$\text{Post fpk. } \gamma \text{ Na} = \frac{\left(\frac{494.44}{10} \right) - \left(\frac{392.66}{10} \right)}{10} \times 100 = 101.8\%$$

HNF-1644 REV. 0

Analysis Report

Averages

Fri 08-28-98 02:22:47 PM

page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.8564	4.8980	4.9971	4.9235	4.9399	5.0501
2	ICB	.00012	.00748	-.00403	.00369	.00002	.00027
3	LLS	.02247	.11204	.21005	.10669	.09809	.01083
4	ICSA	.00464	244.89	-.00103	-.00380	.00032	.00054
5	IC SAB	.94406	241.90	.00622	-.00184	.45903	.47972
6	S98T002346 L	.02568	.12189	.01040	.12802	.00160	.00067
7	S98T002346 -	.03028	.12931	.07834	.11093	.00190	.00017
8	S98T002346 D	.02920	.12813	.07803	.10622	.00181	.00010
9	S98T002346 A	.99675	1.3117	1.4299	1.2952	1.1836	1.2588
10	S98T002346 X	.05146	.11544	.09105	.09106	.00146	-.00019
11	S98T002346 AX	94.954	95.278	100.32	98.399	97.452	98.454
12	ICSA	.00406	234.56	-.01110	-.01112	.00043	.00036
13	IC SAB	.93560	236.13	.05154	-.01568	.44599	.46972
14	CCV	4.8486	4.8423	5.0236	4.9124	4.8847	5.0550
15	CCB	-.00026	.00048	.00141	.00184	.00000	.00027

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	4.9787	4.8895	4.9780	5.0412	4.9317	4.8857
2	ICB	-.01721	-.01578	.00033	-.00594	.00035	-.00053
3	LLS	.21767	Q.22025	.00994	.20594	.04108	.01971
4	ICSA	-.02754	251.89	.00534	.00208	.00130	-.00294
5	IC SAB	-.01920	249.49	.93762	-.01153	.45910	.46146
6	S98T002346 L	.09549	2.7431	-.00583	-.07869	.01129	4.4178
7	S98T002346 -	.04691	2.4313	-.00193	-.01828	.00529	4.3548
8	S98T002346 D	.04542	2.4681	-.00224	-.01357	.00534	4.2721
9	S98T002346 A	1.1453	3.9238	1.2040	1.2196	1.1976	5.4624
10	S98T002346 X	.05127	2.6635	-.00424	-.06704	.00109	4.3969
11	S98T002346 AX	97.873	101.38	97.921	98.353	98.157	102.31
12	ICSA	-.00621	250.34	.00575	.00768	.00169	-.00058
13	IC SAB	-.02997	248.45	.93050	.00129	.45522	.45997
14	CCV	4.9048	4.9124	5.0015	4.9980	4.9311	4.8986
15	CCB	-.01074	-.01419	.00000	-.00856	-.00060	-.00062

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.8271	.00564	4.7767	5.4072	5.0234	5.2101
2	ICB	.00041	-.00024	.00100	.12908	-.00020	-.00020
3	LLS	.01740	-.00022	.09920	Q.73448	.10213	.02061
4	ICSA	.00222	.01490	93.165	.19384	-.00376	.00175
5	IC SAB	.46856	.01759	92.016	.21546	-.00386	1.0015
6	S98T002346 L	-.02717	-.00276	2.7217	10.999	-.00821	-.00070
7	S98T002346 -	-.02840	-.00102	2.5640	10.111	-.00027	.00124
8	S98T002346 D	-.02752	-.00051	2.5164	9.6481	-.00007	.00157
9	S98T002346 A	1.1376	.00095	3.8182	11.132	1.2197	1.1930
10	S98T002346 X	-.03552	.00582	2.6878	11.436	-.00903	.00962
11	S98T002346 AX	92.548	.12537	96.904	107.19	97.946	96.361
12	ICSA	.00314	.00515	90.684	.37018	-.00370	.00330
13	IC SAB	.45376	.01204	90.687	.40931	-.00420	.94431
14	CCV	4.7707	.00687	4.7637	4.9594	4.9709	4.9825
15	CCB	-.00052	-.00004	.00013	.00513	-.00022	-.00020

LABCORE Completed Worklist Report for Worklist# 25653

Analyst: bjb Instrument: ICPMS1 Book#: _____

Method: LA-506-101 Rev/Mod _____

Worklist Comment: ICP/MS S-304 (DIRECT)

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	ICV	0	QMSU238 U238	QC	0.020	2.09e-02	104.500 % Recovery	
2	ICB	0	QMSU-A1 U233-A1	L1QUID	1	<3.19e-5		ug/mL
2	ICB	0	QMSU-A1 U234-A1	L1QUID	1	<1.67e-5		ug/mL
2	ICB	0	QMSU-A1 U235-A1	L1QUID	1	<1.42e-5		ug/mL
2	ICB	0	QMSU-A1 U236-A1	L1QUID	1	<1.62e-5		ug/mL
2	ICB	0	QMSU-A1 U238-A1	L1QUID	1	<2.52e-5		ug/mL
3	SAMPLE	S98T002346 0 A	QMSU-A1 U233-A1	L1QUID	N/A	6.416e-03	6.42e-003	ug/mL
3	SAMPLE	S98T002346 0 A	QMSU-A1 U234-A1	L1QUID	N/A	3.348e-03	3.35e-003	ug/mL
3	SAMPLE	S98T002346 0 A	QMSU-A1 U235-A1	L1QUID	N/A	1.110e-01	2.86e-003	ug/mL
3	SAMPLE	S98T002346 0 A	QMSU-A1 U236-A1	L1QUID	N/A	6.797e-03	3.26e-003	ug/mL
3	SAMPLE	S98T002346 0 A	QMSU-A1 U238-A1	L1QUID	N/A	1.328e+01	5.07e-003	ug/mL
4	DUP	S98T002346 0 A	QMSU-A1 U233-A1	L1QUID	<6.42e-3	<6.42e-3		RPD
4	DUP	S98T002346 0 A	QMSU-A1 U234-A1	L1QUID	<3.35e-3	<3.35e-3		RPD
4	DUP	S98T002346 0 A	QMSU-A1 U235-A1	L1QUID	1.11e-01	1.07e-01	3.670	RPD
4	DUP	S98T002346 0 A	QMSU-A1 U236-A1	L1QUID	6.80e-03	6.80e-03	0.000	RPD
4	DUP	S98T002346 0 A	QMSU-A1 U238-A1	L1QUID	1.33e+01	1.32e+01	0.755	RPD
5	SPK	S98T002346 0 A	QMSU-A1 U233-A1	L1QUID	?	2.16e-7		% Recovery
5	SPK	S98T002346 0 A	QMSU-A1 U234-A1	L1QUID	?	8.43e-06		% Recovery
5	SPK	S98T002346 0 A	QMSU-A1 U235-A1	L1QUID	?	1.50e-04		% Recovery
5	SPK	S98T002346 0 A	QMSU-A1 U236-A1	L1QUID	?	3.59e-06		% Recovery
5	SPK	S98T002346 0 A	QMSU-A1 U238-A1	L1QUID	0.020	2.02e-02	101.000 % Recovery	
6	CCV	0	QMSU238 U238	QC	0.020	2.03e-02	101.500 % Recovery	
7	CCB	0	QMSU-A1 U233-A1	L1QUID	1	<3.19e-5		ug/mL
7	CCB	0	QMSU-A1 U234-A1	L1QUID	1	<1.67e-5		ug/mL
7	CCB	0	QMSU-A1 U235-A1	L1QUID	1	<1.42e-5		ug/mL
7	CCB	0	QMSU-A1 U236-A1	L1QUID	1	<1.62e-5		ug/mL
7	CCB	0	QMSU-A1 U238-A1	L1QUID	1	<2.52e-5		ug/mL

Final page for worklist# 25653

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

Reviewer Signature *Debra Dyer for SP 9/18/98* Date _____

FILE# U0908A.TXT

HNF-1644 REV. 0

Page: 1

08/17/98 07:11

A-0004-J

LABCORE Data Entry Template for Worklist# 25653

Analyst: B. GORNE Instrument: ICPMS1 _____ Book# 71110-PMethod: LA-506-101 Rev/Mod A-1

Worklist Comment: ICP/MS S-304 (DIRECT)

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 ICV			@MSU238	QC		
2 ICB			@MSU-A1	LIQUID		
3 SAMPLE	S98T002346 0 A		@MSU-A1	LIQUID	98000438	S-304 GRAB
	Analytes Requested: U233-A1 , U234-A1 , U235-A1 , U236-A1 , U238-A1					
4 DUP	S98T002346 0 A		@MSU-A1	LIQUID		
5 SPK	S98T002346 0 A		@MSU-A1	LIQUID		
6 CCV			@MSU238	QC		
7 CCB			@MSU-A1	LIQUID		

Final page for worklist # 25653

[Signature] 2-8-98
 Analyst Signature Date

 Analyst Signature Date

S98T002346 105-10-1
 2346-D
 2346-A

DE

201

* Split = 1020-1 of 20 pp - 0.5066 (20 pp)

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

ISO_U Method -Definitions and Calculations

Data file requirements:

The method in each section is identified by the line:

Method=ISO_U

The background is identified by the line:

Comment=background

or

Comment=BACKGROUND

The first two sections of the file will contain the background information.

If Mode=IR then the avg column in the Results section contains isotopic ratio values. If Mode=CONC, then the avg column contains concentration values for U235 and U238 in ppb; the rest are IR values.

Dilution factors (if not equal to 1.0) are on the comment line for each tray slot.

Comment= x df(or DF) where x is the dilution factor

If the comment is blank, the dilution factor is 1.0.

Concentration calculation:

If the analyte is not U235 or U238, then the calculation for each analyte is as follows:

$$\text{concentration(analyte)} = \frac{\text{concentration(U235)} * [\text{IR(analyte)} - \text{BackgroundIR(analyte)}]}{[\text{IR(U235)} - \text{BackgroundIR(U235)}] * 1000}$$

U235 and U238 results are divided by 1000 to convert the units to ppm.

Detection Limit calculation :

If the result is less than the detection limit, then the result is replaced by the detection limit and the range field is set to '<'.

The detection limit for all analytes is:

$$\text{Detection Limit} = \frac{15 * \text{Background stddev(analyte x)} * [\text{ICV Concentration(U235)}]}{(\text{analyte x}) ([\text{ICV IR(U235)}] - [\text{BackgroundIR(U235)}]) * 1000}$$

In addition, all calculations are corrected for digest and dilution factors.

Spikes:

Spike results will only be calculated for U238.

The sample contribution to the spike is calculated by the same method used for the Actinide method.

Lysis Report

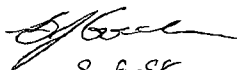
09/08/98 13:29:53

page 1

Method: MS_TUNE Sample Name: ms-tune Operator: bjg
Instrument:
Time: 09/08/98 13:28 Type: Unk Mode: INT Corr.Fact: 1.000000

am In[115]
me 115/pulse
its Cts/S
g 96540.
ddev 1023.
SD 1.060

- 98220.
1 97790.
3 96660.
1 96900.
3 95570.
6 96430.
7 95580.
8 94820.
9 96540.
10 96860.



9-8-98

S-304

58870 2346

FILED 00208A. 727

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 68 TO 86.

Analysis Report

09/08/98 13:32:33

page 1

Method: MS_TUNE Sample Name: ms-tune

Operator: bjg

Comment:

Run Time: 09/08/98 13:31 Type: Unk

Mode: INT

Corr.Fact: 1.000000

Elem	In[115]
Line	115/pulse
Units	Cts/S
Avg	98960.
Stddev	797.
SRSD	.8054

#1	99840.
#2	98650.
#3	99270.
#4	98550.
#5	98000.
#6	98770.
#7	98130.
#8	100600.
#9	99360.
#10	98500.

Analysis Report

09/08/98 13:46:30

page 1

Method: ISO_U Sample Name: blank

Operator: bjg

Comment: background

Run Time: 09/08/98 13:45 Type: Unk

Mode: IR

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	2.557	2.245	2.437	2.761	3.504
Stddev	.816	.426	.364	.414	.645
%RSD	31.91	18.97	14.94	15.01	18.40
#1	2.639	2.233	2.571	2.774	4.127
#2	2.977	2.368	1.962	2.847	3.722
#3	1.224	2.177	2.789	3.401	2.449
#4	2.549	2.817	2.146	2.343	3.823
#5	3.396	1.630	2.717	2.445	3.396

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.3889
Stddev	.0406
%RSD	.54988

#1	7.3899
#2	7.3889
#3	7.3501
#4	7.4545
#5	7.3608

Analysis Report

09/08/98 13:50:10

page 1

HNF-1644 REV. 0

Method: ISO_U

Sample Name: iso_u std

Operator: bjg

Concentration: 100 ppb

Scan Time: 09/08/98 13:48 Type: Unk

Mode: IR

Corr. Fact: 1.000000

	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	2.626	5.392	275.4	8.837	35130.
Stddev	.615	.463	8.4	.894	1662.
%RSD	23.41	8.581	3.054	10.12	4.730

#1	2.941	6.210	281.7	9.609	34310.
#2	2.580	5.089	283.8	8.296	37380.
#3	1.915	5.151	262.5	8.916	33960.
#4	2.212	5.252	272.7	9.745	36410.
#5	3.482	5.256	276.2	7.621	33610.

Int. Std.	Ir [193]
Line	193/pulse
Units	Cts/S
Avg	7.4476
Stddev	.2258
%RSD	3.0324

#1	7.6494
#2	7.1717
#3	7.5710
#4	7.2348
#5	7.6109

Analysis Report

HNF-1644 REV. 0

09/08/98 13:51:00

page 1

Method: ISO_U Sample Name: iso_u std Operator: bjg
 Comment: 100 ppb
 Run Time: 09/08/98 13:48 Type: Unk Mode: CONC Corr.Fact: 1.000000

Line	U_ [233] 233/pulse	U_ [234] 234/pulse	U_ [235] 235/pulse	U_ [236] 236/pulse	U_ [238] 238/pulse
Units	ppb	ppb	ppb	ppb	ppb
avg	2.626	5.392	.7197	8.837	101.5
stddev	.615	.463	.0222	.894	4.8
RSD	23.41	8.581	3.084	10.12	4.730
#1	2.941	6.210	.7363	9.609	99.09
#2	2.580	5.089	.7418	8.296	108.0
#3	1.915	5.151	.6858	8.916	98.09
#4	2.212	5.252	.7127	9.745	105.2
#5	3.482	5.256	.7220	7.621	97.07

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.4476
Stddev	.2258
%RSD	3.0324

#1	7.6494
#2	7.1717
#3	7.5710
#4	7.2348
#5	7.6109

Analysis Report

09/08/98 13:56:14

page: 1

Method: ISO_U Sample Name: icv
 Comment: sst-6
 Run Time: 09/08/98 13:54 Type: Unk

HNF-1644 REV. 0 Operator: bjg

Mode: IR

Corr.Fact: 1.000000

Item	U [233] 233/pulse Cts/S	U [234] 234/pulse Cts/S	U [235] 235/pulse Cts/S	U [236] 236/pulse Cts/S	U [238] 238/pulse Cts/S
Avg	4.120	2.781	25.79	5.225	7224.
Stddev	.376	.415	.95	.582	183.
%RSD	9.135	14.91	3.677	11.14	2.539
#1	4.375	2.808	25.92	4.375	7135.
#2	4.397	2.100	24.87	5.710	7423.
#3	4.411	2.850	25.11	4.886	7271.
#4	3.698	3.227	27.30	5.446	7336.
#5	3.718	2.921	25.76	5.709	6955.

Int. Std. Ir[193]
 Line 193/pulse
 Units Cts/S
 Avg 7.5224
 Stddev .1213
 %RSD 1.6126

#1 7.6573
 #2 7.6186
 #3 7.3678
 #4 7.4363
 #5 7.5319

analysis Report

HNF-1644 REV.0

09/08/98 13:56:21

page 1

Method: ISO_U

Sample Name: icv

Operator: sjg

Comment: sst-6

Run Time: 09/08/98 13:54 Type: Unk

Mode: CONC

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	4.120	2.781	.0609	5.225	20.86
Stddev	.376	.415	.0025	.582	.53
%RSD	9.135	14.91	4.111	11.14	2.540
#1	4.375	2.808	.0612	4.375	20.60
#2	4.397	2.100	.0585	5.710	21.43
#3	4.411	2.850	.0591	4.886	20.99
#4	3.698	3.227	.0649	5.446	21.18
#5	3.718	2.921	.0608	5.709	20.08

Int. Std.

Ir[193]

Line	193/pulse
Units	Cts/S
Avg	7.5224
Stddev	.1213
%RSD	1.6126

#1	7.6573
#2	7.6186
#3	7.3678
#4	7.4363
#5	7.5319

analysis Report

HNF-1644 REV.0

09/08/98 14:09:37

page 1

Method: ISO_U Sample Name: icb

Operator: bjg

Comment: 2% hno3

Run Time: 09/08/98 14:03 Type: Unk

Mode: IR

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	2.209	2.653	2.873	2.546	3.543
Stddev	.343	.312	.800	.213	.371
%RSD	15.54	11.78	27.85	8.354	10.47
#1	1.928	3.192	3.325	2.726	3.258
#2	2.473	2.473	3.847	2.740	3.092
#3	2.315	2.451	1.702	2.247	4.017
#4	2.557	2.488	2.695	2.419	3.732
#5	1.773	2.659	2.796	2.591	3.614

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.3416
Stddev	.1086
%RSD	1.4792

#1	7.5193
#2	7.2775
#3	7.3432
#4	7.2347
#5	7.3330

Analysis Report

HNF-1644 REV. 0

09/08/98 14:09:43

page 1

Method: ISO_U Sample Name: icb
Comment: 2% hno3
Run Time: 09/08/98 14:03 Type: Unk

Operator: bjg

Mode: CONC

Corr.Fact: 1.000000

Elem	U_ [233]	U_ [234]	U_ [235]	U_ [236]	U_ [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	2.209	2.653	.0004	2.546	.0014
Stddev	.343	.312	.0021	.213	.0011
%RSD	15.54	11.78	543.3	8.354	78.82
#1	1.928	3.192	.0016	2.726	.0005
#2	2.473	2.473	.0030	2.748	.0001
#3	2.315	2.451	-.0027	2.247	.0027
#4	2.557	2.488	-.0001	2.419	.0019
#5	1.773	2.659	.0002	2.591	.0016

Int. Std. Ir [193]
Line 193/pulse
Units Cts/S
Avg 7.3416
Stddev .1086
%RSD 1.4792

#1	7.5193
#2	7.2775
#3	7.3432
#4	7.2347
#5	7.3330

Analysis Report

HNF-1644 REV.0

09/08/98 14:21:22

page: 1

Method: ISO_U

Sample Name: s98t002346

Operator: kjg

Comment: 201 df

Run Time: 09/08/98 14:19 Type: Unk

Mode: IR

Corr.Fact: 1.000000

Item	U [233] 233/pulse Cts/S	U [234] 234/pulse Cts/S	U [235] 235/pulse Cts/S	U [236] 236/pulse Cts/S	U [238] 238/pulse Cts/S
Avg	2.411	4.918	211.9	15.59	22870.
Stddev	.092	.239	7.8	1.13	1181.
%RSD	3.837	4.858	3.692	7.273	5.161
#1	2.426	5.216	200.4	14.25	20990.
#2	2.443	4.818	207.7	16.76	23880.
#3	2.533	4.866	219.6	15.73	22660.
#4	2.370	4.605	214.5	16.59	23860.
#5	2.283	5.087	217.4	14.61	22990.

Int. Std.	Ir [193] 193/pulse Cts/S
Avg	7.6327
Stddev	.3619
%RSD	4.7420

#1	8.2440
#2	7.3679
#3	7.5014
#4	7.3840
#5	7.6661

Method: ISO_U Sample Name: s98t002346 Operator: bjg
 Comment: 201 df
 Run Time: 09/08/98 14:19 Type: Unk Mode: CONC Corr.Fact: 1.000000

Elem	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	2.411	4.918	.5522	15.59	66.06
Stddev	.092	.239	.0207	1.13	3.41
%RSD	3.837	4.858	3.740	7.273	5.162

#1	2.426	5.216	.5219	14.25	60.63
#2	2.443	4.818	.5411	16.76	68.97
#3	2.533	4.866	.5726	15.73	65.44
#4	2.370	4.605	.5589	16.59	68.90
#5	2.283	5.087	.5666	14.61	66.38

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.6327
Stddev	.3619
%RSD	4.7420

#1	8.2440
#2	7.3679
#3	7.5014
#4	7.3840
#5	7.6661

Analysis Report

HNF-1644 REV. 0

09/08/98 14:24:39

page 1

Method: ISO_U Sample Name: s98t002346_d Operator: bjg
 Comment: 201 df
 Run Time: 09/08/98 14:23 Type: Unk Mode: IR Corr.Fact: 1.000000

Elem	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	2.362	4.849	204.1	15.60	22700.
Stddev	.632	.511	6.9	1.02	1089.
%RSD	26.78	10.54	3.379	6.511	4.798
#1	1.825	4.805	193.1	14.41	20980.
#2	1.871	4.968	203.9	16.45	22560.
#3	3.106	4.457	204.9	16.75	23850.
#4	2.991	5.650	212.1	15.62	22750.
#5	2.015	4.366	206.3	14.78	23370.

Int. Std. Ir[193]
 Line 193/pulse
 Units Cts/S
 Avg 7.6685
 Stddev .3366
 %RSD 4.3896

#1 8.2211
 #2 7.7497
 #3 7.4042
 #4 7.5227
 #5 7.4445

Method: ISO_U Sample Name: s98t002346_d Operator: bjg
 Comment: 201 df
 Run Time: 09/08/98 14:23 Type: Unk Mode: CONC Corr.Fact: 1.000000

Item	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	2.362	4.849	.5315	15.60	65.56
Stddev	.632	.511	.0182	1.02	3.15
RSD	26.78	10.54	3.425	6.511	4.799
#1	1.825	4.805	.5025	14.41	60.58
#2	1.871	4.968	.5312	16.45	65.15
#3	3.106	4.457	.5336	16.75	68.87
#4	2.991	5.650	.5527	15.62	65.70
#5	2.015	4.366	.5373	14.78	67.48

Int. Std.	Ir [193]
Line	193/pulse
Units	Cts/S
Avg	7.6685
Stddev	.3366
RSD	4.3896

#1	8.2211
#2	7.7497
#3	7.4042
#4	7.5227
#5	7.4445

Analysis Report

HNF-1644 REV. 0

09/08/98 14:28:17

page 1

Method: ISO_U

Sample Name: s98t002346_a

Operator: kjg

Comment: 201 df

Run Time: 09/08/98 14:26 Type: Unk

Mode: IR

Corr.Fact: 1.000000

Item	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
avg	2.476	5.441	268.8	16.95	29880.
stddev	.408	.535	12.9	.96	891.
%RSD	16.47	9.826	4.801	5.667	2.981
#1	2.059	4.517	256.3	17.40	28990.
#2	2.253	5.793	264.6	15.71	28900.
#3	3.096	5.787	288.1	16.35	30300.
#4	2.317	5.453	275.2	18.20	30320.
#5	2.657	5.654	259.9	17.10	30900.

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
avg	7.4802
stddev	.1788
%RSD	2.3904

#1	7.5271
#2	7.7678
#3	7.4298
#4	7.3357
#5	7.3403

Method: ISO_U

Sample Name: s98t002346_a

Operator: bjg

Comment: 201 df

Run Time: 09/08/98 14:26 Type: Unk

Mode: CONC

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	233/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	2.476	5.441	.7024	16.95	86.30
Stddev	.408	.535	.0341	.96	2.57
CRSD	16.47	9.826	4.850	5.667	2.982
#1	2.059	4.517	.6693	17.40	83.73
#2	2.253	5.793	.6912	15.71	83.46
#3	3.096	5.787	.7533	16.35	87.52
#4	2.317	5.453	.7191	18.20	87.56
#5	2.657	5.654	.6790	17.10	89.25

Int. Std.

Line	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.4802
Stddev	.1788
CRSD	2.3904

#1	7.5271
#2	7.7678
#3	7.4298
#4	7.3357
#5	7.3403

$$\text{Spikes: } U_{238} = \frac{(86.30) - \left(\frac{128}{101}\right)}{20} \times 100 \%$$

SP
9/8/98

$$\text{Spikes: } U_{238} = \frac{86.30 - 66.06}{20} \times 100 = 101.2\%$$

Analysis Report

HNF-1644 REV.0

09/08/98 14:34:31

page 1

Method: ISO_U

Sample Name: ccv

Operator: bjg

Comment: sst6

Scan Time: 09/08/98 14:33 Type: Unk

Mode: IR

Corr.Fact: 1.000000

	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
avg	3.843	2.837	26.64	5.339	7039.
stddev	.859	.364	1.38	.504	273.
RSD	22.35	12.85	5.175	9.443	3.881
1	3.804	2.536	26.03	5.273	7149.
2	3.196	3.063	26.44	4.861	6991.
3	5.299	2.409	26.77	5.024	7046.
4	3.693	2.888	25.12	5.372	6628.
5	3.220	3.288	28.84	6.166	7378.

Int. Std.

Ir[193]

	193/pulse
Line	193/pulse
Units	Cts/S
avg	7.4019
stddev	.1124
RSD	1.5192

1	7.4913
2	7.5087
3	7.2656
4	7.4456
5	7.2984

Method: ISO_U Sample Name: ccv
Comment: sst6
Run Time: 09/08/98 14:33 Type: Unk

Operator: bjg

Mode: CONC Corr.Fact: 1.000000

Elem	U [233]	U [234]	U [235]	U [236]	U [238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	233/pulse
Units	ppb	ppb	ppb	ppb	ppb
avg	3.843	2.837	.0631	5.339	20.32
Stddev	.859	.364	.0036	.504	.79
RSD	22.35	12.85	5.765	9.443	3.883
#1	3.804	2.536	.0615	5.273	20.64
#2	3.196	3.063	.0626	4.861	20.18
#3	5.299	2.409	.0635	5.024	20.34
#4	3.693	2.888	.0591	5.372	19.14
#5	3.220	3.288	.0689	6.166	21.30

Int. Std.	Ir [193]
Line	193/pulse
Units	Cts/S
avg	7.4019
Stddev	.1124
RSD	1.5192

1	7.4913
2	7.5087
3	7.2656
4	7.4456
5	7.2984

Method: ISO_U Sample Name: ccb

Operator: bjg

Comment: 2% nitire

Run Time: 09/08/98 14:52 Type: Unk

Mode: IR

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
avg	2.938	2.482	2.370	2.774	4.653
Stddev	.227	.430	.254	.298	.740
=RSD	7.716	17.35	10.70	10.73	15.89
=1	2.845	3.116	2.032	2.371	5.352
=2	2.674	2.006	2.741	3.142	4.345
=3	3.142	2.206	2.340	2.875	3.544
4	3.206	2.661	2.320	2.592	5.253
5	2.822	2.419	2.419	2.889	4.771

nt. Std.	Ir[193]
ine	193/pulse
nits	Cts/S
avg	7.4216
Stddev	.0655
RSD	.88274

1	7.3807
2	7.4793
3	7.4781
4	7.3289
5	7.4408

HNF-1644 REV.0

Method: ISO_U Sample Name: ccb

Operator: bjg

Comment: 2% nitirc

Run Time: 09/08/98 14:52 Type: Unk

Mode: CONC

Corr.Fact: 1.000000

Elem	U_[233]	U_[234]	U_[235]	U_[236]	U_[238]
Line	233/pulse	234/pulse	235/pulse	236/pulse	238/pulse
Units	ppb	ppb	ppb	ppb	ppb
Avg	2.938	2.482	-.0009	2.774	.0046
Stddev	.227	.430	.0007	.298	.0021
RSD	7.716	17.35	71.39	10.73	46.78
F1	2.845	3.116	-.0018	2.371	.0066
F2	2.674	2.006	.0000	3.142	.0037
F3	3.142	2.206	-.0010	2.875	.0014
F4	3.206	2.661	-.0011	2.592	.0063
F5	2.822	2.419	-.0008	2.889	.0049

nt. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.4216
Stddev	.0655
RSD	.88274

1	7.3807
2	7.4793
3	7.4781
4	7.3289
5	7.4408

LABCORE Completed Worklist Report for Worklist# 25537

Analyst: slh

Instrument: CARB2

Book#: _____

Method: LA-342-100 Rev/Mod _____

Worklist Comment: S-304 GRAB, @TICTOC1, STD: TIC=1.0mL, TOC=.200mL skm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 BLNK	0		@TICTOC1 TIC-02	LIQUID	1	2.80E+0	2.800	ug/mL
1 BLNK	0		@TICTOC1 TOC-02	LIQUID	1	1.06E+1	10.600	ug/mL
2 STD	0		@TICTOC1 TIC-02	LIQUID	6.02E+02	5.65E+2	93.854	% Recovery
2 STD	0		@TICTOC1 TOC-02	LIQUID	3.00E+03	2.85E+3	95.000	% Recovery
3 SAMPLE	S98T002346	0	@TICTOC1 TIC-02	LIQUID	N/A	1.63E+02	5.000	ug/mL
3 SAMPLE	S98T002346	0	@TICTOC1 TOC-02	LIQUID	N/A	4.00E+01	40.000	ug/mL
4 DUP	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.63E+2	1.64E+2	0.612	RPD
4 DUP	S98T002346	0	@TICTOC1 TOC-02	LIQUID	<4.00E+1	1.86E+2		RPD
5 TRIPL	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.63E+2	1.65E+2	0.000	RPD
5 TRIPL	S98T002346	0	@TICTOC1 TOC-02	LIQUID	<4.00E+1	<4.00E+1		RPD
6 SPK	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.00E+02	1.02E+02	102.000	% Recovery
6 SPK	S98T002346	0	@TICTOC1 TOC-02	LIQUID	1.00E+02	9.28E+01	92.800	% Recovery

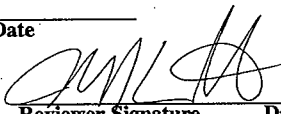
Final page for worklist# 25537

Analyst Signature

Date

Analyst Signature

Date


Reviewer Signature

9/16/98
Date

LABCORE Completed Worklist Report for Worklist# 25537

Analyst: slh

Instrument: CARB2

Book#: _____

Method: LA-342-100 Rev/Mod _____

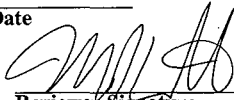
Worklist Comment: S-304 GRAB, @TICTOC1, STD: TIC=1.0mL, TOC=.200mL skm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 BLNK	0		@TICTOC1 TIC-02	LIQUID	1	2.80E+0	2.800	ug/mL
1 BLNK	0		@TICTOC1 TOC-02	LIQUID	1	1.06E+1	10.600	ug/mL
2 STD	0		@TICTOC1 TIC-02	LIQUID	6.02E+02	5.65E+2	93.854	% Recovery
2 STD	0		@TICTOC1 TOC-02	LIQUID	3.00E+03	2.85E+3	95.000	% Recovery
3 SAMPLE	S98T002346	0	@TICTOC1 TIC-02	LIQUID	N/A	1.63E+02	5.000	ug/mL
3 SAMPLE	S98T002346	0	@TICTOC1 TOC-02	LIQUID	N/A	4.00E+01	40.000	ug/mL
4 DUP	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.63E+2	1.64E+2	0.612	RPD
4 DUP	S98T002346	0	@TICTOC1 TOC-02	LIQUID	<4.00E+1	1.86E+2		RPD
5 TRIPL	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.63E+2	1.66E+2	1.824	RPD
5 TRIPL	S98T002346	0	@TICTOC1 TOC-02	LIQUID	<4.00E+1	<4.00E+1		RPD
6 SPK	S98T002346	0	@TICTOC1 TIC-02	LIQUID	1.00E+02	1.02E+02	102.000	% Recovery
6 SPK	S98T002346	0	@TICTOC1 TOC-02	LIQUID	1.00E+02	9.28E+01	92.800	% Recovery

Final page for worklist# 25537

Analyst Signature

Date


9/9/98

Reviewer Signature

Date

Analyst Signature

Date

08/12/98 10:34

A-0004-1

HNF-1644 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 25537

Analyst: SLH Instrument: CARB2 _____ Book# TIC 25N12-D
TOC 26N12-EMethod: LA-342-100 Rev/Mod F1

Worklist Comment: S-304 GRAB, @TICTOC1, STD: TIC=1.0mL, TOC=.200mL skm

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 BLNK			@TICTOC1	LIQUID		
2 STD			@TICTOC1	LIQUID		
3 SAMPLE	S98T002346 0		@TICTOC1	LIQUID	98000438	S-304 GRAB
	Analytes Requested: TIC-02 , TOC-02					
4 DUP	S98T002346 0		@TICTOC1	LIQUID		
5 SPK	S98T002346 0		@TICTOC1	LIQUID		

Final page for worklist # 25537

Analyst Signature Shandra M. Beaty
Date 9-1-98Analyst Signature SLH SLH
Date 9/9/98

Data Entry Comments:

S98T002346 → Ran Trp

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

WORKBOOK PAGE: BLANK1

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

		TIC	TOC
Type	Sample Size in mL (SS)	0.0000	0.0000
BLNK	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	11.2	25
25537	µg of Carbon from Baseline (C2)	8.4	35.6

Test Code	µg of Carbon = [C1-C2]
@TIC/TOC1	
Matrix	
LIQUID	
Batch Number	
98004066	
Rerun	
0	
Sample Prep	
N/A	
Sample #	
BLK	
Instrument Code	
CARB2	
Prepared By	
JDS	
Chemist	
MJL	
Analyst	
SLH	
Date Complete	
09/09/98	
Analysis Date	
09/01/98	
Analysis Time	Method Detection Limit in µg/mL
03:00 PM	
Sample Point	µg of Carbon
S-304 GRAB	

TIC	TOC
5	40
2.80E+00	1.06E+01

Data Entered By:

Signature of Chemist:

JDS

Date: 09/09/98

Date:

BLANK.WB1 REV 1.0

342100ML

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 89 TO 110.

WORKBOOK PAGE: STD2

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

		TIC	TOC
Type	Sample Size in mL (SS)	1.0000	0.2000
STD	Dilution Factor (DF)	1	1
Work List	Final Coulometer Reading in µg (C1)	573.7	604.6
25537	µg of Carbon from Baseline (C2)	8.4	35.6
Test Code	Standard Book Number	25N12D	26N12E
@TICTOC1	Standard Value (µg/ml)	602	3000
Matrix			
LIQUID			
Batch Number			
98004066			
Rerun			
0	QC Actual in µg/mL = Standard Value (µg/mL)		
Sample Prep	QC Found in µg/mL = (C1 - C2) * DF / SS		
N/A	QC Found in µg/mL for TIC = 5 if C1 < C2		
Sample #	QC Found in µg/mL for TOC = 40 if C1 < C2		
STD			
Instrument Code	% Recovery = QC Found / QC Actual * 100		
CARB2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
SLH			
Date Complete			
09/09/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in µg/mL	5	40
03:00 PM	QC Actual in µg/mL	6.02E+02	3.00E+03
Sample Point	QC Found in µg/mL	5.65E+02	2.85E+03
S-304 GRAB	Percent Standard Recovery	93.9	94.8

Data Entered By:	JDS	Date:	09/09/98
Signature of Chemist:		Date:	

STANDARD.WB1 REV 1.0

342100ML

WORKBOOK PAGE: SAM3

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

			TIC	TOC
Type	Sample Size in mL	(SS)	1.0000	1.0000
SAMPLE	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	171.6	52.2
25537	µg of Carbon from Baseline	(C2)	8.4	35.6
Test Code				
@TICTOC1				

Matrix
LIQUID
Batch Number
98004066
Rerun
0
Sample Prep
N/A
Sample #
S98T002346
Instrument Code
CARB2
Prepared By
JDS
Chemist
MJL
Analyst
SLH
Date Complete
09/09/98
Analysis Date
09/01/98
Analysis Time
03:00 PM
Sample Point
S-304 GRAB

$\mu\text{g of Carbon/mL} = (C1 - C2) * DF / SS$
 $\mu\text{g of Carbon/mL for TIC} = 5 \text{ if } C1 < C2$
 $\mu\text{g of Carbon/mL for TOC} = 40 \text{ if } C1 < C2$

NOTE: FOR TOC: The Reported Result is < 40.

		TIC	TOC
Method Detection Limit in µg/mL		5	40
µg of Carbon/mL	Note: <	1.63E+02	1.66E+01

Data Entered By:	JDS	Date:	09/09/98
Signature of Chemist:		Date:	

WORKBOOK PAGE: DUP4

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

		TIC	TOC
Type	Sample Size in mL (SS)	1.0000	1.0000
DUP	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	172.4	221.6
25537	µg of Carbon from Baseline (C2)	8.4	35.6
Test Code	Known µg of C from Original Sample	1.63E+2	<1.66E+1
@TIC/TOC1			
Matrix			
LIQUID			
Batch Number			
98004066			
Rerun	µg of Carbon/mL = (C1-C2) * DF / SS		
0	µg of Carbon/mL for TIC = 5 if C1 < C2		
Sample Prep	µg of Carbon/mL for TOC = 40 if C1 < C2		
N/A			
Sample #			
S98T002346			
Instrument Code			
CARB2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
SLH			
Date Complete			
09/09/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in µg/mL	5	40
03:00 PM			
Sample Point	µg of Carbon/mL	1.64E+02	1.86E+02
S-304 GRAB			

Data Entered By:	JDS	Date:	09/09/98
Signature of Chemist:		Date:	

WORKBOOK PAGE: TRIPL5

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

		TIC	TOC
Type	Sample Size in mL (SS)	1.0000	1.0000
TRIPL	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	171.6	52.2
25537	µg of Carbon from Baseline (C2)	8.4	35.6
Test Code	Known µg of C from Original Sample	1.63E+2	<1.66E+1
@TIC/TOC1	Duplicate Result	1.64E+2	1.86E+2

Matrix
LIQUID
Batch Number
98004066
Rerun
0
Sample Prep
N/A
Sample #
S98T002346
Instrument Code
CARB2
Prepared By
JDS
Chemist
MJL
Analyst
SLH
Date Complete
09/09/98
Analysis Date
09/01/98
Analysis Time
03:00 PM
Sample Point
S-304 GRAB

$\mu\text{g of Carbon/mL} = (C1 - C2) * DF / SS$
 $\mu\text{g of Carbon/mL for TIC} = 5 \text{ if } C1 < C2$
 $\mu\text{g of Carbon/mL for TOC} = 40 \text{ if } C1 < C2$

NOTE: FOR TOC: The Reported Result is < 40.

	TIC	TOC
Method Detection Limit in µg/mL	5	40
µg of Carbon/mL Note: <	1.63E+02	1.66E+01

Data Entered By:

JDS

Date: 09/09/98

Signature of Chemist:

Date:

WORKBOOK PAGE: SPIKE6

TIC/TOC : LA-342-100 (F-1)

LIQUIDS

Type	Sample Vial Data	TIC	TOC
SPK	Sample Volume in mL (SS)	1.0000	1.0000
Work List	Final Coulometer Reading in µg (C1)	171.6	52.2
25537	Spiked Vial Data		
Test Code	Sample Volume in mL (SPK SS)	1.0000	1.0000
@TIC/TOC1	Amount of Spike Std. in mL (SPK VOL)	0.500	0.100
Matrix	Final Coulometer Reading in µg (C2)	477.9	330.7
LIQUID	Spike Book Number	25N12D	24N12E
Batch Number	Spike Standard Value in µg/ml (SPK CONC)	602	3000
98004066	µg C in baseline (BL)	8.4	35.6
Rerun			
0			
Sample Prep			
N/A			
Sample #	Percent Spike Recovery = ((C2-BL) - (C1-BL) * (SPK SS) / SS) / ((SPK CONC) * (SPK VOL)) * 100		
S98T002346			
Instrument Code	QC Actual in µg/mL = Spike Value (µg/mL)		
CARB2	QC Found in µg/mL = (Percent Spike Recovery)*(QC Actual) / 100		
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
SLH			
Date Complete			
09/09/98			
Analysis Date			
09/01/98			
Analysis Time		TIC	TOC
03:00 PM	QC Actual in µg/mL	6.02E+02	3.00E+03
Sample Point	QC Found in µg/mL	6.13E+02	2.79E+03
S-304 GRAB	Percent Spike Recovery	101.8	92.8

Data Entered By:	JDS	Date:	09/09/98
Signature of Chemist:		Date:	

SPIKE.WB1 REV 1.3

342100ML

HNF-1644 REV.0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT

TICTOC REV 2.0

<<< BLANK ANALYSIS >>>

Sample: BASE 2

Date: 09/01/98

Time: 23:46:34

Sample Size = 1 uL

Dil Factor = 1

Blank ID # = BASE 2

Blank Value = N/A

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading	== Analysis Time	== Coulometer	== % Difference ==
1	0.01	0.00	0.00
2	0.50	0.30	100.00
3	1.00	0.60	50.00
4	1.50	1.50	60.00
5	2.00	2.90	48.28
6	2.50	3.50	17.14
7	3.00	4.00	12.50
8	3.50	4.40	9.09
9	4.00	4.90	10.20
10	4.50	5.20	5.77
11	5.00	5.50	5.45
12	5.50	5.80	5.17
13	6.00	6.00	3.33
14	6.50	6.40	6.25
15	7.00	6.60	3.03
16	7.50	6.90	4.35
17	8.00	7.10	2.82
18	8.50	7.40	4.05
19	9.00	7.70	3.90
20	9.50	7.90	2.53
21	10.00	8.10	2.41
22	10.50	8.40	3.57

BLANK VALUE = 8.4 micrograms carbon

BLANK FACTOR = 8.4 / 10.49561 =

+8.0E-01

ug/min Carbon

Sample Run By:

SL HOOD

00000

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV:2.0
<<< BLANK ANALYSIS >>>

Sample: BASE 2

Date: 09/01/98

Time: 23:58:56

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE 2
Blank Value = N/AAnalyst : SL HOOD
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.30	0.00
2	1.01	0.50	40.00
3	1.50	1.50	66.67
4	2.00	6.20	75.81
5	2.50	13.50	54.07
6	3.00	19.30	30.05
7	3.50	23.70	18.57
8	4.00	26.40	10.23
9	4.50	28.00	5.71
10	5.00	29.50	5.08
11	5.50	30.00	1.67
12	6.00	30.90	2.91
13	6.50	31.50	1.90
14	7.00	32.20	2.17
15	7.50	32.40	0.62
16	8.00	32.90	1.52
17	8.50	33.20	0.90
18	9.00	33.60	1.11
19	9.50	34.00	1.18
20	10.00	34.50	1.47
21	10.50	34.90	1.17
22	11.00	35.60	1.97

BLANK VALUE = 35.6 micrograms carbon

BLANK FACTOR = 35.6 / 10.99878 = +3.24E+00 ug/min Carbon

<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

SL HOOD

00002

HNF-1644 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD

Date: 09/02/98

Time: 00:25:16

Sample Size = 1000 uL
 Dil Factor = 1
 Blank ID # =
 Blank Value = .8 ug/minute C

Analyst : SL HOOD
 Min Readings = 22
 Max Readings = 22
 % Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.90	0.00
2	1.01	1.40	35.71
3	1.51	13.30	89.47
4	2.01	102.80	87.06
5	2.51	228.90	55.09
6	3.00	338.10	32.30
7	3.50	417.60	19.04
8	4.00	472.40	11.60
9	4.50	508.40	7.08
10	5.00	531.40	4.33
11	5.50	544.90	2.48
12	6.00	553.60	1.57
13	6.50	559.30	1.02
14	7.00	563.20	0.69
15	7.50	566.10	0.51
16	8.00	567.90	0.32
17	8.50	569.50	0.28
18	9.00	570.70	0.21
19	9.50	571.70	0.17
20	10.00	572.50	0.14
21	10.50	573.10	0.10
22	11.00	573.70	0.10

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878 = +8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(573.7 - 8.799868) (1) / (1000) = +5.649E-01 g/L Carbon
 (573.7 - 8.799868) (1) / (1000) (12) = +4.708E-02 Molar Carbon

Sample Run By: *SL Hood*

SL HOOD

00002

Incl = 25N12-D

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD 2

Date: 09/02/98

Time: 00:38:19

Sample Size = 200 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.24 ug/minute C

Analyst: SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.40	0.00
2	1.00	0.70	42.86
3	1.50	2.50	72.00
4	2.00	16.20	84.57
5	2.50	61.50	73.66
6	3.00	158.20	61.13
7	3.50	295.00	46.37
8	4.00	411.70	28.35
9	4.50	484.90	15.10
10	5.00	527.50	8.08
11	5.50	555.30	5.01
12	6.00	571.70	2.87
13	6.50	581.50	1.69
14	7.00	588.30	1.16
15	7.50	592.60	0.73
16	8.00	596.00	0.57
17	8.50	598.50	0.42
18	9.00	600.30	0.30
19	9.50	601.90	0.27
20	10.00	603.00	0.18
21	10.50	604.20	0.20
22	11.00	604.60	0.07

USER INPUT BLANK VALUE

BLANK VALUE = 35.63604 micrograms carbon

BLANK FACTOR = 35.63604 / 10.99878 = +3.2E+00 ug/min Carbon

SAMPLE RESULTS:

(604.6 - 35.63027) (1)/(200) = +2.845E+0 g/L Carbon
 (604.6 - 35.63027) (1)/(200) (12) = +2.371E-01 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

SL HOOD *SL HOOD*

00002

.200ml = 26 N12-E

HNF-1644 REV.0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK 2

Date: 09/02/98

Time: 00:50:45

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .8 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.60	0.00
2	1.01	1.10	45.45
3	1.51	2.50	56.00
4	2.00	4.10	39.02
5	2.50	5.00	18.00
6	3.00	5.80	13.79
7	3.50	6.30	7.94
8	4.00	6.70	5.97
9	4.50	7.10	5.63
10	5.00	7.50	5.33
11	5.50	7.90	5.06
12	6.00	8.20	3.66
13	6.50	8.50	3.52
14	7.00	8.80	3.41
15	7.50	9.10	3.30
16	8.00	9.50	4.21
17	8.50	9.70	2.06
18	9.00	10.00	3.00
19	9.50	10.30	2.91
20	10.00	10.60	2.83
21	10.50	11.00	3.64
22	11.00	11.20	1.79

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878 = +8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(11.2 - 8.798401) (1)/(1) = +2.40E+00 g/L Carbon
 (11.2 - 8.798401) (1)/(1) (12) = +2.00E-01 Molar Carbon

Sample Run By:

SL HOOD

00001

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV. 2.0

Sample: BLK 2

Date: 09/02/98

Time: 01:03:36

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.24 ug/minute.C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.40	0.00
2	1.01	0.70	42.86
3	1.51	2.20	68.18
4	2.01	5.90	62.71
5	2.51	10.20	42.16
6	3.01	13.90	26.62
7	3.50	16.10	13.66
8	4.00	17.60	8.52
9	4.50	18.70	5.88
10	5.00	19.70	5.08
11	5.50	20.30	2.96
12	6.00	21.00	3.33
13	6.50	21.50	2.33
14	7.00	22.00	2.27
15	7.50	22.50	2.22
16	8.00	22.90	1.75
17	8.50	23.20	1.29
18	9.00	23.60	1.69
19	9.50	24.00	1.67
20	10.00	24.30	1.23
21	10.50	24.60	1.22
22	11.00	25.00	1.60

USER INPUT BLANK VALUE

BLANK VALUE = 35.63604 micrograms carbon

BLANK FACTOR = 35.63604 / 10.99878 = +3.2E+00 ug/min Carbon

SAMPLE RESULTS:

(25 - 35.63892) (1)/(1) = < 5.00 E-3 g/L Carbon

(25 - 35.63892) (1)/(1) (12) = < 4.17 E-4 Molar Carbon

<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>

Sample Run By:

SL HOOD

00002

HNF-1644 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002346

Date: 09/02/98

Time: 01:23:13

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .8 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.20	0.00
2	1.00	0.50	60.00
3	1.50	2.80	82.14
4	2.00	22.30	87.44
5	2.50	58.00	61.55
6	3.00	94.40	38.56
7	3.50	122.80	23.13
8	4.00	140.80	12.78
9	4.50	151.10	6.82
10	5.00	157.80	4.25
11	5.50	161.40	2.23
12	6.00	163.80	1.47
13	6.50	165.80	1.21
14	7.00	167.10	0.78
15	7.50	168.20	0.65
16	8.00	168.80	0.36
17	8.50	169.50	0.41
18	9.00	170.00	0.29
19	9.50	170.40	0.23
20	10.00	170.90	0.29
21	10.50	171.30	0.23
22	11.00	171.60	0.17

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878

+8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(171.6 - 8.799872) (1)/(1) =

(171.6 - 8.799872) (1)/(1) (12) =

+1.628E+03 g/L Carbon

+1.357E+01 Molar Carbon

Sample Run By:

SL HOOD

00002

SS = 1ml = .9955g

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002346

Date: 09/02/98

Time: 01:36:20

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.24 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.30	0.00
2	1.01	0.60	50.00
3	1.50	3.10	80.65
4	2.00	12.90	75.97
5	2.50	24.00	46.25
6	3.00	32.80	26.83
7	3.50	37.90	13.46
8	4.00	41.60	8.89
9	4.50	43.50	4.37
10	5.00	45.20	3.76
11	5.50	46.60	3.00
12	6.00	47.40	1.69
13	6.50	48.20	1.66
14	7.00	48.70	1.03
15	7.50	49.30	1.22
16	8.00	49.80	1.00
17	8.50	50.30	0.99
18	9.00	50.70	0.79
19	9.50	51.10	0.78
20	10.00	51.40	0.58
21	10.50	51.80	0.77
22	11.00	52.20	0.77

USER INPUT BLANK VALUE

BLANK VALUE = 35.63604 micrograms carbon

BLANK FACTOR = 35.63604 / 10.99878 = +3.2E+00 ug/min Carbon

SAMPLE RESULTS:

(52.2 - 35.63029) (1) / (1) = +1.66E+01 g/L Carbon
 (52.2 - 35.63029) (1) / (1) (12) = +1.38E+00 Molar Carbon
 <<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>

Sample Run By:

SL HOOD

00002

SS = 1ml = .9955

HNF-1644 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T02346 DUP Date: 09/02/98 Time: 01:53:31

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .8 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time	==== Coulometer ==	% Difference ==
1	0.51	0.30	0.00
2	1.01	0.60	50.00
3	1.51	3.10	80.65
4	2.00	23.80	86.97
5	2.50	59.80	60.20
6	3.00	95.70	37.51
7	3.50	123.90	22.76
8	4.00	142.00	12.75
9	4.50	152.50	6.89
10	5.00	158.30	3.66
11	5.50	162.00	2.28
12	6.00	164.70	1.64
13	6.50	166.30	0.96
14	7.00	167.80	0.89
15	7.50	168.60	0.47
16	8.00	169.40	0.47
17	8.50	170.20	0.47
18	9.00	170.70	0.29
19	9.50	171.30	0.39
20	10.00	171.70	0.23
21	10.50	172.00	0.17
22	11.00	172.40	0.23

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878 =

+8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(172.4 - 8.797602) (1)/(1) =

+1.636E+03 g/L Carbon

(172.4 - 8.797602) (1)/(1) (12) =

+1.363E+01 Molar Carbon

Sample Run By:

SL HOOD

00002

ss = 1ml = .9959g

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T02346 DUP

Date: 09/02/98

Time: 02:07:55

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .324 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==== Analysis Time ==== Coulometer ==== % Difference ==

1	0.51	0.30	0.00
2	1.00	0.90	66.67
3	1.50	7.20	87.50
4	2.00	36.60	80.33
5	2.50	79.80	54.14
6	3.00	115.50	30.91
7	3.50	141.90	18.60
8	4.00	161.00	11.86
9	4.50	173.60	7.26
10	5.00	183.90	5.60
11	5.50	191.90	4.17
12	6.00	198.30	3.23
13	6.50	203.20	2.41
14	7.00	207.20	1.93
15	7.50	210.30	1.47
16	8.00	212.60	1.08
17	8.50	214.30	0.79
18	9.00	216.30	0.92
19	9.50	217.80	0.69
20	10.00	219.20	0.64
21	10.50	220.30	0.50
22	11.00	221.60	0.59

USER INPUT BLANK VALUE

BLANK VALUE = 3.563605 micrograms carbon

BLANK FACTOR = 3.563605 / 10.99878 = +3.2E-01 ug/min Carbon

SAMPLE RESULTS:

(221.6 - 3.563894) (1) / (1) = +2.180E+02 g/L Carbon
 (221.6 - 3.563894) (1) / (1) (12) = +1.817E+01 Molar Carbon

Sample Run By:

SL HOOD

00002

HNF-1644 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T02346 TRP

Date: 09/02/98

Time: 02:24:42

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .8 ug/minute C

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==== Analysis Time ==== Coulometer ==== % Difference ==

1	0.51	0.40	0.00
2	1.00	1.10	63.64
3	1.50	3.00	63.33
4	2.00	24.50	87.76
5	2.50	64.60	62.07
6	3.00	102.00	36.67
7	3.50	130.10	21.60
8	4.00	146.20	11.01
9	4.50	156.00	6.28
10	5.00	160.90	3.05
11	5.50	164.60	2.25
12	6.00	166.70	1.26
13	6.50	168.10	0.83
14	7.00	169.30	0.71
15	7.50	170.30	0.59
16	8.00	171.10	0.47
17	8.50	171.80	0.41
18	9.00	172.20	0.23
19	9.50	172.70	0.29
20	10.00	173.20	0.29
21	10.50	173.50	0.17
22	11.00	173.90	0.23

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878 = +8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(173.9 - 8.797607) (1)/(1) =

+1.651E+02 g/L Carbon

(173.9 - 8.797607) (1)/(1) (12) =

+1.376E+01 Molar Carbon

Sample Run By:

SL HOOD

00002

SS = 1 ml = 1.0071g

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC-REV 2.0

Sample: S98T02346 TRP

Date: 09/02/98

Time: 02:48:19

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.24 ug/minute C.

Analyst : SL HOOD

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	== Analysis Time ==	== Coulometer ==	== % Difference ==
1	0.51	0.20	0.00
2	1.01	0.60	66.67
3	1.50	2.30	73.91
4	2.00	9.30	75.27
5	2.50	20.40	54.41
6	3.00	31.20	34.62
7	3.50	38.70	19.38
8	4.00	43.40	10.83
9	4.50	47.30	8.25
10	5.00	50.00	5.40
11	5.50	51.90	3.66
12	6.00	53.10	2.26
13	6.50	54.10	1.85
14	7.00	55.00	1.64
15	7.50	55.70	1.28
16	8.00	56.40	1.24
17	8.50	57.00	1.05
18	9.00	57.50	0.87
19	9.50	58.20	1.20
20	10.00	58.60	0.68
21	10.50	59.20	1.02
22	11.00	59.70	0.84

USER INPUT BLANK VALUE

BLANK VALUE = 35.63604 micrograms carbon

BLANK FACTOR = 35.63604 / 10.99878 = +3.2E+00 ug/min Carbon

SAMPLE RESULTS:

(59.7 - 35.63352) (1)/(1) = +2.41E+01 g/L Carbon
 (59.7 - 35.63352) (1)/(1) (12) = +2.01E+00 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

SL HOOD

00002

SS = 1ml = 1.007g

HNF-1644 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T02346 SPK Date: 09/02/98 Time: 03:05:54

Sample Size = 1 uL Analyst : SL HOOD
 Dil Factor = 1 Min Readings = 22
 Blank ID # = Max Readings = 22
 Blank Value = .8 ug/minute C % Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference
1	0.51	0.00	0.00
2	1.01	0.30	100.00
3	1.50	7.50	96.00
4	2.00	70.80	89.41
5	2.50	182.20	61.14
6	3.00	282.20	35.44
7	3.50	353.90	20.26
8	4.00	399.90	11.50
9	4.50	428.20	6.61
10	5.00	445.30	3.84
11	5.50	455.50	2.24
12	6.00	461.60	1.32
13	6.50	465.80	0.90
14	7.00	468.80	0.64
15	7.50	471.20	0.51
16	8.00	472.80	0.34
17	8.50	474.20	0.30
18	9.00	475.00	0.17
19	9.50	475.90	0.15
20	10.00	476.50	0.11
21	10.50	477.10	0.11
22	11.00	477.90	0.11

USER INPUT BLANK VALUE

BLANK VALUE = 8.799024 micrograms carbon

BLANK FACTOR = 8.799024 / 10.99878 = +8.0E-01 ug/min Carbon

SAMPLE RESULTS:

(477.9 - 8.798401) (1)/(1) = +4.691E+02 g/L Carbon
 (477.9 - 8.798401) (1)/(1) (12) = +3.909E+01 Molar Carbon

Sample Run By:

SL HOOD

00062

SS = 1ml = 1.0094g + .500ml opt 25N/2.5

HNF-1644 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T02346SPK

Date: 09/02/98

Time: 03:18:31

Sample Size = 1 uL

Analyst : SL HOOD

Dil Factor = 1

Min Readings = 22

Blank ID # =

Max Readings = 22

Blank Value = 3.24 ug/minute C

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.60	0.00
2	1.01	1.20	50.00
3	1.50	9.40	87.23
4	2.00	44.60	78.92
5	2.50	119.50	62.68
6	3.00	198.10	39.68
7	3.50	250.20	20.82
8	4.00	280.90	10.93
9	4.50	298.80	5.99
10	5.00	308.60	3.18
11	5.50	314.10	1.75
12	6.00	318.30	1.32
13	6.50	321.10	0.87
14	7.00	323.40	0.71
15	7.50	324.90	0.46
16	8.00	326.10	0.37
17	8.50	327.10	0.31
18	9.00	328.00	0.27
19	9.50	328.60	0.18
20	10.00	329.50	0.27
21	10.50	330.10	0.18
22	11.00	330.70	0.18

USER INPUT BLANK VALUE

BLANK VALUE = 35.63604 micrograms carbon

BLANK FACTOR = 35.63604 / 10.99878 = +3.2E+00 ug/min Carbon

SAMPLE RESULTS:

(330.7 - 35.63619) (1)/(1) = +2.951E+02 g/L Carbon
 (330.7 - 35.63619) (1)/(1) (12) = +2.459E+01 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

SL HOOD

00002

SS = 1ml = 1.0094g + .100ml spk 26N12-E

HNF-1644 REV. 0

RADIOCHEMICAL ANALYSIS

HNF-1644 REV. 0

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HNF-1644 REV. 0

LABCORE Completed Worklist Report for Worklist# 25550

Analyst: akl Instrument: GEA03 Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: S-304 GRAB, @GEA-01, SS= See traveler. STD: 1.0mL skm

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0	@GEA-01 C060-02 LIQUID		4.681e-03	4.85e-03	103.610 % Recovery	
1 STD	0	@GEA-01 C060-02E LIQUID		1	2.80	2.800 % Ct Error	
1 STD	0	@GEA-01 CS13702 LIQUID		7.496e-03	7.28e-03	97.118 % Recovery	
1 STD	0	@GEA-01 CS13702E LIQUID		1	2.83	2.830 % Ct Error	
2 BLNK	0	@GEA-01 C060-02 LIQUID		1	<2.88e-5	uCi/mL	
2 BLNK	0	@GEA-01 CS13702 LIQUID		1	<7.41e-5	uCi/mL	
3 SAMPLE	S98T002346 0	@GEA-01 C060-02 LIQUID		N/A	< 3.220e-05	3.22e-005 uCi/mL	
3 SAMPLE	S98T002346 0	@GEA-01 C060-02E LIQUID		N/A	n/a	% Ct. Error	
3 SAMPLE	S98T002346 0	@GEA-01 CS13702 LIQUID		N/A	2.420e-02	uCi/mL	
3 SAMPLE	S98T002346 0	@GEA-01 CS13702E LIQUID		N/A	1.15	% Ct. Error	
4 DUP	S98T002346 0	@GEA-01 C060-02 LIQUID		<3.22e-5	<2.84e-5	RPD	
4 DUP	S98T002346 0	@GEA-01 C060-02E LIQUID		1	n/a	% Ct Error	
4 DUP	S98T002346 0	@GEA-01 CS13702 LIQUID		2.42e-02	2.47e-02	2.045 RPD	
4 DUP	S98T002346 0	@GEA-01 CS13702E LIQUID		1	1.14	1.140 % Ct Error	

Comments Section:

Comments for sample# S98T002346 and test @GEA-01 .
DL=0 => n/a.

Final page for worklist# 25550

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

John Relyea 18 Aug 98
Reviewer Signature _____ Date _____

LABCORE Data Entry Template for Worklist# 25550

Analyst: AKL Instrument: GEA00 3 Book# 28357

Method: LA-548-121 Rev/Mod F-0

Worklist Comment: S-304 GRAB, @GEA-01, SS= See traveler. STD: 1.0mL skm

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@GEA-01	LIQUID		
2 BLNK			@GEA-01	LIQUID		
3 SAMPLE	S98T002346 0		@GEA-01	LIQUID	98000438	S-304 GRAB
Analytes Requested: CO60-02 , CO60-02E, CS13702 , CS13702E						
4 DUP	S98T002346 0		@GEA-01	LIQUID		

Final page for worklist # 25550

Alita Henden 8/13/98
Analyst Signature Date

Kevin Light 8/14/98
Analyst Signature Date

Data Entry Comments:

 * 222-S Laboratory Counting Room 13-AUG-1998 15:50:36.62 *

>>>>>>>> SAMPLE INFORMATION <<<<<<<<<

Worklist #: 25550
 Sample ID: WL25550-STD
 Sample Size: 1.00000E-03 L
 Dilution Factor: 1.00000E+00

Removed by:



>>>>>>>> COUNT INFORMATION <<<<<<<<<

Detector ID: GEA3
 File Number: dka300:[spec.GEA3]3g3281.cnf
 Geometry: 42
 Count Time: 0 00:50:00.00 sec
 Real Time: 0 00:50:02.73 sec
 Dead Time: 0.1%

Verified by:



>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<

Sample Count Time: 13-AUG-1998 15:00:04.76
 Decayed to: 13-AUG-1998 15:00:04.76
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: SZC
 Background Subtract: DKA300:[SPEC.GEA3]3GBACK

>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<

Date of last energy calibration: 6-JAN-1998 15:35:32.20
 Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw %Err	Fit	Nuclides	Activity uCi/L
0	59.77	58	1.10	121.05	118	7109.1		AM-241	0.261
0	661.61*	6440	1.54	1324.12	1315	18 2.8		CS-137	7.28
0	1172.91	3205	1.96	2346.29	2336	19 3.8		CO-60	5.06
0	1332.13	2654	2.06	2664.62	2654	20 4.1		CO-60	4.64
0	1460.32*	39	2.22	2920.91	2912	16 70.6		K-40	0.689

Summary of Nuclide Activity

Page : 2

Sample ID : WL25550-STD

Acquisition date : 13-AUG-1998 15:00:04

Total number of lines in spectrum 5
 Number of unidentified lines 0
 Number of lines tentatively identified by NID 5 100.00%

Nuclide Type :

Nuclide	Hliffe	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	2-Sigma	Flags
			Uncorrected	Decay Corr				
			uCi/L	uCi/L				
K-40	1.28E+09Y	1.00	6.892E-01	6.892E-01	4.868E-01	70.64	70.64	BK
CO-60	5.27Y	1.00	4.848E+00	4.848E+00	0.136E+00	2.80	2.80	2CF
CS-137	30.00Y	1.00	7.278E+00	7.278E+00	0.206E+00	2.83	2.83	8/11/98
AM-241	432.20Y	1.00	2.607E-01	2.607E-01	2.843E-01	109.06	109.06	
Total Activity :			1.308E+01	1.308E+01				

Grand Total Activity : 1.308E+01 1.308E+01

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report

Page : 3

Sample ID : WL25550-STD

Acquisition date : 13-AUG-1998 15:00:04

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	322.	477.59	6.1029E-01
NA-22	27.	1274.53	4.5619E-02
NA-24	7.	1368.55	2.7004E-02
AR-41	32.	1293.60	5.8329E-02
SC-46	140.	1120.55	8.7575E-02
CR-51	354.	320.08	4.8072E-01
MN-54	192.	834.83	7.9016E-02
CO-56	170.	846.76	7.5331E-02
CO-57	430.	122.06	3.6892E-02
CO-58	157.	810.78	7.0359E-02
FE-59	154.	1099.25	1.5952E-01
ZN-65	137.	1115.55	1.6980E-01
SE-75	398.	264.66	7.6221E-02
KR-85	240.	514.00	1.3401E+01
SR-85	240.	514.01	6.0565E-02
Y-88	2.	1836.06	2.1116E-02
Y-91	44.	1204.67	1.8002E+01
NB-94	169.	871.09	7.6983E-02
NB-95	138.	765.78	6.2812E-02
ZR-95	126.	756.73	1.0890E-01
ZRNB-95	144.	724.18	2.7943E-01
RU-103	228.	497.08	6.0595E-02
RURH-106	160.	621.93	1.1325E+00
AG-108m	142.	722.94	6.6554E-02
CD-109	394.	88.03	1.1715E+00
AG-110M	309.	657.76	8.5476E-02
SN-113	346.	391.69	8.7227E-02
TE-123m	406.	159.00	3.6912E-02
SB-124	171.	602.73	5.7753E-02
SB-125	358.	427.89	2.0687E-01
TE-125m	383.	109.27	1.1353E+01
I-129	360.	39.60	0.0000E+00
I-131	337.	364.48	6.4370E-02
XE-131m	432.	163.93	1.6545E+00
BA-133	308.	356.02	7.9085E-02
CS-134	175.	604.70	5.8751E-02
CS-136	173.	818.51	7.4138E-02
CS-138	11.	1435.86	7.1591E-02
CE-139	427.	165.85	4.0549E-02
BA-140	182.	537.31	2.1679E-01
LA-140	11.	1596.21	3.8489E-02
CE-141	430.	145.44	6.4467E-02
CE-144	447.	133.51	2.8471E-01
CEPR-144	447.	133.51	5.6891E-01
EU-152	438.	121.78	1.1274E-01
EU-154	27.	1274.51	1.3218E-01
EU-155	398.	86.54	1.3343E-01
HF-181	291.	482.18	7.5314E-02
TA-182	342.	67.75	1.8620E-01
HG-203	411.	279.20	5.7743E-02
BI-207	170.	569.70	5.4904E-02

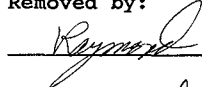
Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
TL-208	426.	277.36	7.5473E-01
PB-210	361.	46.50	0.0000E+00
BI-212	132.	727.18	8.8108E-01
PB-212	494.	238.63	1.0536E-01
BI-214	208.	609.31	1.4004E-01
PB-214	361.	351.92	2.6190E-01
RA-224	479.	240.99	1.1521E+00
RA-226	505.	186.10	1.0798E+00
AC-228	201.	911.21	3.2726E-01
TH-228	373.	84.37	3.5107E+00
TH-229	383.	88.47	1.6743E-01
U-232	361.	57.78	9.1678E+01
PA-233	358.	312.17	1.2380E-01
UTH-233	403.	245.34	3.8609E+01
PA-234M	163.	1001.03	1.3140E+01
TH-234	347.	63.29	2.7053E+00
U-235	508.	185.71	6.5776E-02
NP-237	398.	86.48	3.5351E-01
U-237	381.	59.54	4.3934E-01
NP-238	155.	984.45	2.9713E-01
NP-239	381.	106.12	1.4363E-01
PU-239	403.	129.30	4.7043E+02
AM-243	360.	74.67	9.6428E-02

 * 222-S Laboratory Counting Room 13-AUG-1998 18:24:28.01 *

>>>>>>> SAMPLE INFORMATION <<<<<<<<<

Worklist #: 25550
 Sample ID: WL25550-BLK
 Sample Size: 5.00000E-04 L
 Dilution Factor: 1.00000E+00

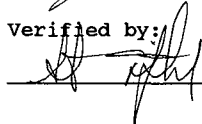
Removed by:



>>>>>>> COUNT INFORMATION <<<<<<<<<

Detector ID: GEA3
 File Number: dka300:[spec.GEA3]3g3282.cnf
 Geometry: 42
 Count Time: 0 02:30:00.00 sec
 Real Time: 0 02:30:02.03 sec
 Dead Time: 0.0%

Verified by:



>>>>>>> ANALYSIS INFORMATION <<<<<<<<<

Sample Count Time: 13-AUG-1998 15:53:56.07
 Decayed to: 13-AUG-1998 15:53:56.07
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: EMB
 Background Subtract: DKA300:[SPEC.GEA3]3GBACK

>>>>>>> CALIBRATION INFORMATION <<<<<<<<<

Date of last energy calibration: 6-JAN-1998 15:35:32.20
 Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw %Err	Fit	Nuclides	Activity uCi/L
0	351.99*	71	1.58	705.18	699	11 83.6			
0	583.18*	27	1.13	1167.34	1163	9124.0			
0	609.51*	88	1.37	1219.97	1213	13 52.2			
0	970.32*	38	1.94	1941.28	1931	20 99.1			
0	1764.15*	16	2.93	3528.39	3522	13109.9			

Summary of Nuclide Activity

Page : 2

Sample ID : WL25550-BLK

Acquisition date : 13-AUG-1998 15:53:56

Total number of lines in spectrum	5
Number of unidentified lines	0
Number of lines tentatively identified by NID	5
	100.00%

**** There are no nuclides meeting summary criteria ****

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report

Sample ID : WL25550-BLK

Page : 3

Acquisition date : 13-AUG-1998 15:53:56

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	121.	477.59	2.5421E-01
NA-22	38.	1274.53	3.5090E-02
NA-24	19.	1368.55	2.8649E-02
K-40	358.	1460.75	1.0645E+00
AR-41	26.	1293.60	4.6879E-02
SC-46	72.	1120.55	4.2589E-02
CR-51	179.	320.08	2.3113E-01
MN-54	42.	834.83	2.5810E-02
CO-56	60.	846.76	3.0680E-02
CO-57	258.	122.06	1.9198E-02
CO-58	51.	810.78	2.7699E-02
FE-59	39.	1099.25	5.5906E-02
CO-60	22.	1332.50	2.8822E-02
ZN-65	45.	1115.55	6.7058E-02
SE-75	216.	264.66	3.7832E-02
KR-85	126.	514.00	6.5613E+00
SR-85	126.	514.01	2.9614E-02
Y-88	6.	1836.06	2.1343E-02
Y-91	41.	1204.67	1.1680E+01
NB-94	48.	871.09	2.8364E-02
NB-95	58.	765.78	2.7818E-02
ZR-95	55.	756.73	4.9288E-02
ZRNB-95	51.	724.18	1.1401E-01
RU-103	99.	497.08	2.7122E-02
RURH-106	55.	621.93	4.5746E-01
AG-108m	49.	722.94	2.6857E-02
CD-109	264.	88.03	6.4321E-01
AG-110M	75.	657.76	2.9072E-02
SN-113	131.	391.69	3.6408E-02
TE-123m	223.	159.00	1.8411E-02
SB-124	72.	602.73	2.5617E-02
SB-125	131.	427.89	8.4959E-02
TE-125m	229.	109.27	5.8996E+00
I-129	175.	39.60	0.0000E+00
I-131	155.	364.48	2.9583E-02
XE-131m	264.	163.93	8.6998E-01
BA-133	138.	356.02	3.5900E-02
CS-134	69.	604.70	2.5214E-02
CS-136	41.	818.51	2.5062E-02
CS-137	423.	661.66	7.4095E-02
CS-138	14.	1435.86	1.1059E-01
CE-139	248.	165.85	2.0777E-02
BA-140	83.	537.31	9.9603E-02
LA-140	11.	1596.21	2.5767E-02
CE-141	262.	145.44	3.3823E-02
CE-144	239.	133.51	1.3997E-01
CEPR-144	239.	133.51	2.7967E-01
EU-152	256.	121.78	5.7879E-02
EU-154	38.	1274.51	1.0194E-01
EU-155	261.	86.54	7.2449E-02
HF-181	108.	482.18	3.1246E-02

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : WL25550-BLK

Acquisition date : 13-AUG-1998 15:53:56

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
TA-182	224.	67.75	1.0114E-01
HG-203	156.	279.20	2.4180E-02
BI-207	83.	569.70	2.6088E-02
TL-208	179.	277.36	3.3117E-01
PB-210	180.	46.50	0.0000E+00
BI-212	56.	727.18	3.9317E-01
PB-212	297.	238.63	5.4832E-02
BI-214	208.	609.31	9.3164E-02
PB-214	277.	351.92	3.4102E-01
RA-224	285.	240.99	6.0117E-01
RA-226	265.	186.10	5.2616E-01
AC-228	93.	911.21	1.5107E-01
TH-228	236.	84.37	1.8758E+00
TH-229	262.	88.47	9.2856E-02
U-232	213.	57.78	4.7368E+01
PA-233	179.	312.17	5.9173E-02
UTH-233	236.	245.34	1.9863E+01
PA-234M	40.	1001.03	4.5187E+00
TH-234	205.	63.29	1.3992E+00
U-235	264.	185.71	3.1930E-02
NP-237	260.	86.48	1.9151E-01
U-237	188.	59.54	2.0917E-01
NP-238	44.	984.45	1.1075E-01
NP-239	229.	106.12	7.5727E-02
PU-239	258.	129.30	2.5279E+02
AM-241	188.	59.54	1.9990E-01
AM-243	275.	74.67	5.6388E-02

 * 222-S Laboratory Counting Room 13-AUG-1998 21:05:51.26 *

>>>>>>>> SAMPLE INFORMATION <<<<<<<<<

Worklist #: 25550
 Sample ID: S98T002346-SAM
 Sample Size: 5.00000E-04 L
 Dilution Factor: 1.00000E+00

Removed by:

Raymond

>>>>>>>> COUNT INFORMATION <<<<<<<<<

Detector ID: GEA3
 File Number: dka300:[spec.GEA3]3g3283.cnf
 Geometry: 42
 Count Time: 0 02:30:00.00 sec
 Real Time: 0 02:30:05.99 sec
 Dead Time: 0.1%

Verified by:

[Signature]

>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<

Sample Count Time: 13-AUG-1998 18:35:16.23
 Decayed to: 13-AUG-1998 18:35:16.23
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: VR
 Background Subtract: DKA300:[SPEC.GEA3]3GBACK

>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<

Date of last energy calibration: 6-JAN-1998 15:35:32.20
 Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.62*	32062	1.59	1324.15	1316	16	1.2		CS-137	24.2

Summary of Nuclide Activity
 Sample ID : S98T002346-SAM

Page : 2
 Acquisition date : 13-AUG-1998 18:35:16

Total number of lines in spectrum	1
Number of unidentified lines	0
Number of lines tentatively identified by NID	1 100.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.00	2.416E+01	2.416E+01	0.028E+01	1.15	
Total Activity :			2.416E+01	2.416E+01			

Grand Total Activity : 2.416E+01 2.416E+01

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

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

Minimum Detectable Activity Report

Page : 3

Sample ID : S98T002346-SAM

Acquisition date : 13-AUG-1998 18:35:16

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	1103.	477.59	7.4264E-01
NA-22	32.	1274.53	3.2514E-02
NA-24	23.	1368.55	3.1408E-02
K-40	346.	1460.75	1.0471E+00
AR-41	27.	1293.60	4.7548E-02
SC-46	62.	1120.55	3.9685E-02
CR-51	974.	320.08	5.2597E-01
MN-54	55.	834.83	2.9183E-02
CO-56	53.	846.76	2.9046E-02
CO-57	1116.	122.06	3.9217E-02
CO-58	46.	810.78	2.6408E-02
FE-59	30.	1099.25	4.9588E-02
CO-60	29.	1332.50	3.2197E-02
ZN-65	36.	1115.55	6.0761E-02
SE-75	1103.	264.66	8.3699E-02
KR-85	662.	514.00	1.4615E+01
SR-85	662.	514.01	6.6082E-02
Y-88	10.	1836.06	2.5863E-02
Y-91	41.	1204.67	1.1637E+01
NB-94	50.	871.09	2.8872E-02
NB-95	67.	765.78	2.9862E-02
ZR-95	70.	756.73	5.5068E-02
ZRNB-95	66.	724.18	1.2858E-01
RU-103	720.	497.08	7.0754E-02
RURH-106	263.	621.93	9.5962E-01
AG-108m	61.	722.94	2.9794E-02
CD-109	1004.	88.03	1.2328E+00
AG-110M	1017.	657.76	1.0198E-01
SN-113	1040.	391.69	9.9504E-02
TE-123m	1175.	159.00	4.1384E-02
SB-124	270.	602.73	4.8031E-02
SB-125	1133.	427.89	2.4231E-01
TE-125m	1007.	109.27	1.2139E+01
I-129	875.	39.60	0.0000E+00
I-131	1006.	364.48	7.3414E-02
XE-131m	1076.	163.93	1.7267E+00
BA-133	935.	356.02	9.0663E-02
CS-134	263.	604.70	4.7656E-02
CS-136	71.	818.51	3.2505E-02
CS-138	19.	1435.86	1.2545E-01
CE-139	1055.	165.85	4.2098E-02
BA-140	415.	537.31	2.1537E-01
LA-140	14.	1596.21	2.8806E-02
CE-141	1147.	145.44	6.9471E-02
CE-144	1216.	133.51	3.0969E-01
CEPR-144	1216.	133.51	6.1877E-01
EU-152	1123.	121.78	1.1906E-01
EU-154	32.	1274.51	9.4402E-02
EU-155	1019.	86.54	1.4084E-01
HF-181	957.	482.18	8.9745E-02
TA-182	969.	67.75	2.0639E-01

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : S98T002346-SAM

Acquisition date : 13-AUG-1998 18:35:16

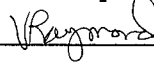
Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
HG-203	1030.	279.20	6.0351E-02
BI-207	299.	569.70	4.8011E-02
TL-208	1054.	277.36	7.8373E-01
PB-210	886.	46.50	0.0000E+00
BI-212	79.	727.18	4.5971E-01
PB-212	1301.	238.63	1.1285E-01
BI-214	349.	609.31	1.1971E-01
PB-214	1061.	351.92	6.5706E-01
RA-224	1272.	240.99	1.2477E+00
RA-226	1414.	186.10	1.1921E+00
AC-228	73.	911.21	1.3505E-01
TH-228	1020.	84.37	3.8267E+00
TH-229	1011.	88.47	1.7926E-01
U-232	892.	57.78	9.5008E+01
PA-233	974.	312.17	1.3471E-01
UTH-233	1220.	245.34	4.4275E+01
PA-234M	33.	1001.03	4.1225E+00
TH-234	918.	63.29	2.8980E+00
U-235	1400.	185.71	7.2096E-02
NP-237	1021.	86.48	3.7338E-01
U-237	904.	59.54	4.4849E-01
NP-238	50.	984.45	1.1752E-01
NP-239	1045.	106.12	1.5846E-01
PU-239	1162.	129.30	5.2652E+02
AM-241	904.	59.54	4.2866E-01
AM-243	1019.	74.67	1.0682E-01

 * 222-S Laboratory Counting Room 13-AUG-1998 23:58:41.89 *

>>>>>>>> SAMPLE INFORMATION <<<<<<<<<

Worklist #: 25550
 Sample ID: S98T002346-DUP
 Sample Size: 5.00000E-04 L
 Dilution Factor: 1.00000E+00

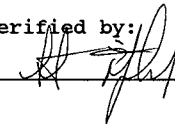
Removed by:



>>>>>>>> COUNT INFORMATION <<<<<<<<<

Detector ID: GEA3
 File Number: dka300:[spec.GEA3]3g3284.cnf
 Geometry: 42
 Count Time: 0 02:30:00.00 sec
 Real Time: 0 02:30:06.10 sec
 Dead Time: 0.1%

Verified by:



>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<

Sample Count Time: 13-AUG-1998 21:27:41.17
 Decayed to: 13-AUG-1998 21:27:41.17
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: VR
 Background Subtract: DKA300:[SPEC.GEA3]3GBACK

>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<

Date of last energy calibration: 6-JAN-1998 15:35:32.20
 Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.67*	32777	1.57	1324.24	1317	16	1.1		CS-137	24.7
0	1376.74	30	2.20	2753.80	2748	14	45.4			

Summary of Nuclide Activity

Page : 2

Sample ID : S98T002346-DUP

Acquisition date : 13-AUG-1998 21:27:41

Total number of lines in spectrum	2	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	1	50.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.00	2.470E+01	2.470E+01	0.028E+01	1.14	
Total Activity :			2.470E+01	2.470E+01			

Grand Total Activity : 2.470E+01

2.470E+01

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
 Sample ID : S98T002346-DUP

Page : 3
 Acquisition date : 13-AUG-1998 21:27:41

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	1168.	477.59	7.6380E-01
NA-22	39.	1274.53	3.5543E-02
NA-24	26.	1368.55	3.3373E-02
K-40	383.	1460.75	1.0999E+00
AR-41	33.	1293.60	5.1926E-02
SC-46	74.	1120.55	4.3139E-02
CR-51	985.	320.08	5.2870E-01
MN-54	56.	834.83	2.9287E-02
CO-56	53.	846.76	2.9010E-02
CO-57	1193.	122.06	4.0522E-02
CO-58	56.	810.78	2.8874E-02
FE-59	36.	1099.25	5.4079E-02
CO-60	22.	1332.50	2.8370E-02
ZN-65	31.	1115.55	5.6671E-02
SE-75	1175.	264.66	8.6346E-02
KR-85	710.	514.00	1.5117E+01
SR-85	708.	514.01	6.8321E-02
Y-88	4.	1836.06	1.7535E-02
Y-91	38.	1204.67	1.1260E+01
NB-94	57.	871.09	3.0742E-02
NB-95	64.	765.78	2.9224E-02
ZR-95	51.	756.73	4.7638E-02
ZRNB-95	63.	724.18	1.2582E-01
RU-103	703.	497.08	6.9930E-02
RURH-106	258.	621.93	9.5118E-01
AG-108m	67.	722.94	3.1134E-02
CD-109	1061.	88.03	1.2670E+00
AG-110M	925.	657.76	9.7340E-02
SN-113	1039.	391.69	9.9484E-02
TE-123m	1195.	159.00	4.1736E-02
SB-124	290.	602.73	4.9670E-02
SB-125	1153.	427.89	2.4440E-01
TE-125m	1115.	109.27	1.2761E+01
I-129	966.	39.60	0.0000E+00
I-131	983.	364.48	7.2582E-02
XE-131m	1112.	163.93	1.7551E+00
BA-133	1030.	356.02	9.5080E-02
CS-134	297.	604.70	5.0539E-02
CS-136	66.	818.51	3.1331E-02
CS-138	11.	1435.86	9.9933E-02
CE-139	1161.	165.85	4.4127E-02
BA-140	464.	537.31	2.2740E-01
LA-140	12.	1596.21	2.7232E-02
CE-141	1216.	145.44	7.1495E-02
CE-144	1075.	133.51	2.9147E-01
CEPR-144	1076.	133.51	5.8249E-01
EU-152	1187.	121.78	1.2236E-01
EU-154	38.	1274.51	1.0301E-01
EU-155	1055.	86.54	1.4319E-01
HF-181	941.	482.18	8.8971E-02
TA-182	934.	67.75	2.0270E-01

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : S98T002346-DUP

Acquisition date : 13-AUG-1998 21:27:41

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
HG-203	1036.	279.20	6.0522E-02
BI-207	312.	569.70	4.9012E-02
TL-208	1057.	277.36	7.8513E-01
PB-210	905.	46.50	0.0000E+00
BI-212	65.	727.18	4.2192E-01
PB-212	1311.	238.63	1.1331E-01
BI-214	381.	609.31	1.2489E-01
PB-214	1057.	351.92	6.5569E-01
RA-224	1277.	240.99	1.2502E+00
RA-226	1554.	186.10	1.2487E+00
AC-228	86.	911.21	1.4532E-01
TH-228	1016.	84.37	3.8185E+00
TH-229	1075.	88.47	1.8475E-01
U-232	924.	57.78	9.6669E+01
PA-233	1039.	312.17	1.3909E-01
UTH-233	1230.	245.34	4.4441E+01
PA-234M	50.	1001.03	5.0053E+00
TH-234	931.	63.29	2.9178E+00
U-235	1516.	185.71	7.4965E-02
NP-237	1053.	86.48	3.7906E-01
U-237	931.	59.54	4.5505E-01
NP-238	43.	984.45	1.0965E-01
NP-239	1052.	106.12	1.5895E-01
PU-239	1219.	129.30	5.3903E+02
AM-241	931.	59.54	4.3493E-01
AM-243	1040.	74.67	1.0790E-01

LABCORE Completed Worklist Report for Worklist# 25549

Analyst: crj Instrument: AB12 Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: S-304 GRAB, @SR90-01, SS by Ludlum. STD: 1.0mL skm

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0	@SR90-01 SR90-01	LIQUID	1.05E-03	1.06E-3	100.952 %	Recovery
1 STD	0	@SR90-01 SR90-01C	LIQUID	100	8.93E+01	89.300 %	Recovery
1 STD	0	@SR90-01 SR90-01E	LIQUID	1.00	1.90E+00	1.900 %	Ct. Err
2 BLNK	0	@SR90-01 SR90-01	LIQUID	1	2.96E-6	2.960e-006	uCi/mL
2 BLNK	0	@SR90-01 SR90-01C	LIQUID	100	8.88E+01	88.800 %	Recovery
2 BLNK	0	@SR90-01 SR90-01E	LIQUID	1.00	6.06E+01	60.600	uCi/mL
3 BLNK/BKG	0	@SR90-01 SR90-01	LIQUID	1	2.07E+00	2.070	BLNK/BKG
4 SAMPLE	S98T002346 0	@SR90-01 SR90-01	LIQUID	N/A	1.40E-03	2.06e-006	uCi/mL
4 SAMPLE	S98T002346 0	@SR90-01 SR90-01C	LIQUID	N/A	8.89E+01		% Recovery
4 SAMPLE	S98T002346 0	@SR90-01 SR90-01E	LIQUID	N/A	1.64E+00		% Ct. Error
5 DUP	S98T002346 0	@SR90-01 SR90-01	LIQUID	1.40E-3	1.45E-3	3.509	RPD
5 DUP	S98T002346 0	@SR90-01 SR90-01C	LIQUID	100	8.83E+01	88.300 %	Recovery
5 DUP	S98T002346 0	@SR90-01 SR90-01E	LIQUID	1.00	1.62E+00	1.620 %	Cnt Err

Final page for worklist# 25549

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____


Reviewer Signature _____ Date 19 Aug 98

Units shown for QC (BLK/BKG) may not reflect the actual units.

08/12/98 13:11
A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 25549Analyst: C.R.S. Instrument: AB00 12 Book# 28B57Method: LA-220-101 Rev/Mod E-3

Worklist Comment: S-304 GRAB, @SR90-01, SS by Ludlum. STD: 1.0mL skm

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@SR90-01	LIQUID		
2 BLNK			@SR90-01	LIQUID		
3 BLNK/BKG			@SR90-01	LIQUID		
4 SAMPLE	S98T002346 0		@SR90-01	LIQUID	98000438	S-304 GRAB
Analytes Requested: SR90-01 , SR90-01C, SR90-01E						
5 DUP	S98T002346 0		@SR90-01	LIQUID		

Final page for worklist # 25549

[Signature] 8/13/98 [Signature]
 Analyst Signature Date

[Signature] 8/14/98
 Analyst Signature Date
Sylvia L. Carmon 8/17/98

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

WORKBOOK PAGE: STD1

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5) LIQUIDS

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5) LIQUIDS					STANDARD
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL (CVA)	1.000
STD	TOTAL COUNTS (TC)		10720	GROSS WEIGHT (W2)	7.7314
Work List	COUNT TIME in MINUTES (CT)		10	TARE WEIGHT (W1)	7.6421
25549	BACKGROUND in cpm (BKG)		2.8	NET WEIGHT (W3)	0.0893
Test Code	SAMPLE VOLUME in mL (SS)		1.000	DELTA TIME (HOURS) (DT)	20.42
@SR90-01	DILUTION FACTOR (DF)		1		
Matrix	DIGEST DILUTION FACTOR DDF		1		
LIQUID	SAMPLE COUNT RATE (Rs)		1069.20	SR-90 EFFICIENCY FACTO (C1)	0.4180
Batch Number	CRITICAL LEVEL (Lc)		1.01	Y-90 EFFICIENCY FACTOR (C2)	0.4660
98004079	TIME OF SEPARATION (ST)		14:22	Rmax	N/A
Rerun	DATE OF SEPARATION (SD)		08/13/98	DETECTION LIMIT (Ld)	2.11
0	TIME OF COUNT (TOC)		10:47	Sr-89/90 CONC. in µCi/L	1.0571E+00
Sample Prep	DATE OF COUNT (DOC)		08/14/98		
N/A	STANDARD BOOK #		28B57		
Sample #	STANDARD VALUE in µCi/mL		1.0493E-03		
WL25549-STD					
Instrument Code					
WB27811	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)				
Prepared By	Sr-89/90 CONC in µCi/mL REPLACE RS WITH RMAX IF RS<=LcAND RS>=0 OR REPLACE RS WITH Lc IF RS<0				
MCB	RS*DF*DDF*1000/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)				
Chemist	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))				
SAC	Relative Counting Error = The Square Root of ((TC + BKG * CT) / (TC - BKG * CT)*1.96)				
Analyst	Percent Carrier Recovery = (Net Weight / Expected weight) * 100				
CRJ	NOTE: Expected weight = CVA * 0.1				
Date Complete	Detection Levels and Less Than Values are determined from Procedure LA-508-002.				
08/14/98	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100				
Analysis Date					
08/14/98	Sr-89/90 CONCENTRATION		1.06E-03	µCi/mL	
Analysis Time					
08:50 AM	RELATIVE COUNTING ERROR		1.9%		
Sample Point					
S-304 GRAB	PERCENT CARRIER RECOVERY		89.3%		
					DETECTION LEVEL 2.08E-06 µCi/L

Analyst:	CRJ	Date:	14-Aug-98
Signature of Chemist:	<i>SAC</i>	Date:	19 Aug 98

STANDARD WB1 REV 2.0

22010NML

WORKBOOK PAGE: BLANK2

LA-220-101 / E-3 Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

					BLNK	
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
BLNK	TOTAL COUNTS	(TC)	58	GROSS WEIGHT	(W2)	7.7116
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.6228
25549	BACKGROUND in cpm	(BKG)	2.8	NET WEIGHT	(W3)	0.0888
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	21.30
@SR90-01	DILUTION FACTOR	DF	1			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	3.00	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.01	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98004079	TIME OF SEPARATION	(ST)	14:22	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	08/13/98	DETECTION LIMIT	(Ld)	2.11
0	TIME OF COUNT	(TOC)	11:40	Sr-89/90 CONC in µCi/L 2.9622E-03		
Sample Prep	DATE OF COUNT	(DOC)	08/14/98			
N/A						
Sample #						
WL25549-BLNK						
Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)					
WB27811	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0					
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))**SS*REC*2220000)					
MCB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))					
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96					
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100					
Analyst	NOTE: Expected weight = CVA * 0.1					
CRJ	Detection Levels and Less Than Values are determined from Procedure LA-508-002.					
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100					
08/14/98						
Analysis Date						
08/14/98	Sr-89/90 CONCENTRATION				2.96E-06	µCi/mL
Analysis Time						
08:50 AM	RELATIVE COUNTING ERROR				60.6%	
Sample Point						
S-304 GRAB	PERCENT CARRIER RECOVERY				88.8%	
						DETECTION LEVEL
						2.08E-06 µCi/mL

Analyst:	CRJ	Date:	14-Aug-98
Signature of Chemist:	SAC	Date:	18 Aug 98

BLANK.WB1 REV 2.0

22010NML

WORKBOOK PAGE: SAM4

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

				SAMPLE	
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA) 1.000
SAMPLE	TOTAL COUNTS	(TC)	14311	GROSS WEIGHT	(W2) 7.1534
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1) 7.0645
25549	BACKGROUND in cpm	(BKG)	2.8	NET WEIGHT	(W3) 0.0889
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT) 22.55
@SR90-01	DILUTION FACTOR	DF	1		
Matrix	DIGEST DILUTION FACTOR	(DDF)	1		
LIQUID	SAMPLE COUNT RATE	(Rs)	1428.30	Sr-90 EFFICIENCY FACTOR	(C1) 0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.01	Y-90 EFFICIENCY FACTOR	(C2) 0.4660
98004079	TIME OF SEPARATION	(ST)	14:22	Rmax	N/A
Rerun	DATE OF SEPARATION	(SD)	08/13/98	DETECTION LIMIT	(Ld) 2.11
0	TIME OF COUNT	(TOC)	12:55	Sr-89/90 CONC in $\mu\text{Ci/L}$	1.3952E+00
Sample Prep	DATE OF COUNT	(DOC)	08/14/98		
N/A					
Sample #					
S98T002346					
Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)				
WB27811	Sr-89/90 CONC in $\mu\text{Ci/L}$ Replace RS with RMAX if $RS \leq Lc$ and $RS > 0$ or Replace RS with Lc if $RS < 0$				
Prepared By	$RS * DF * DDF / ((C1 + C2 * (1 - e \text{ to the power of } ((- \text{natural log } 2) / 64.2 * DT)))) * SS * REC * 22200000$				
MCB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery $((W2 - W1) / (CVA * 0.1000))$				
Chemist	Relative Counting Error = (The Square Root of $(TC + BKG * CT) / (TC - BKG * CT)$) * 1.96				
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100				
Analyst	NOTE: Expected weight = CVA * 0.1				
CRJ	Detection Levels and Less Than Values are determined from Procedure LA-508-002.				
Date Complete	Delta Time (hours) = $((DOC - SD) * 24) + (TOC - ST) / 100$				
08/14/98					
Analysis Date					
08/14/98	Sr-89/90 CONCENTRATION	1.40E-03	$\mu\text{Ci/mL}$	DETECTION LEVEL	
Analysis Time					
08:50 AM	RELATIVE COUNTING ERROR	1.6%		2.06E-06	
Sample Point					
S-304 GRAB	PERCENT CARRIER RECOVERY	88.9%		$\mu\text{Ci/mL}$	

Analyst:	CRJ	Date:	14-Aug-98
Signature of Chemist:	SAC	Date:	9/2/98
SAMPLE.WB1 REV 2.0		22010NML	

WORKBOOK PAGE: DUP5

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)						DUP	
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000	
DUP	TOTAL COUNTS	(TC)	14797	GROSS WEIGHT	(W2)	7.1133	
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.0250	
25549	BACKGROUND in cpm	(BKG)	2.8	NET WEIGHT	(W3)	0.0883	
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	22.80	
@SR90-01	DILUTION FACTOR	DF	1				
Matrix	DIGEST DILUTION FACTOR	(DDF)	1				
LIQUID	SAMPLE COUNT RATE	(Rs)	1476.90	Sr-90 EFFICIENCY FACTOR	(C1)	0.4180	
Batch Number	CRITICAL LEVEL	(Lc)	1.01	Y-90 EFFICIENCY FACTOR	(C2)	0.4660	
98004079	TIME OF SEPARATION	(ST)	14:22	Rmax		N/A	
Rerun	DATE OF SEPARATION	(SD)	08/13/98	DETECTION LIMIT	(Ld)	2.11	
0	TIME OF COUNT	(TOC)	13:10	Sr-89/90 CONC in $\mu\text{Ci/L}$		1.4498E+00	
Sample Prep	DATE OF COUNT	(DOC)	08/14/98				
N/A							
Sample #							
S98T002346							
Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)						
WB27811	Sr-89/90 CONC in $\mu\text{Ci/L}$ Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0						
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)						
MCB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))						
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96						
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100						
Analyst	NOTE: Expected weight = CVA * 0.1						
CRJ	Detection Levels and Less Than Values are determined from Procedure LA-508-002.						
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100						
08/14/98							
Analysis Date						DETECTION LEVEL	
08/14/98	Sr-89/90 CONCENTRATION		1.45E-03	$\mu\text{Ci/mL}$			
Analysis Time						2.07E-06 $\mu\text{Ci/mL}$	
08:50 AM	RELATIVE COUNTING ERROR		1.6%				
Sample Point							
S-304 GRAB	PERCENT CARRIER RECOVERY		88.3%				

Analyst:	CRJ	Date:	14-Aug-98
Signature of Chemist:	SAC	Date:	18 Aug 98

SAMPLE.WB1 REV 2.0

22010NML

LABCORE Completed Worklist Report for Worklist# 25547

Analyst: ak1

Instrument: AB15

Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: S-304 GRAB, @AM24101, SS by Ludlum. STD: 1.0mL skm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1. STD	0		@AM24101 AM24101 LIQUID		2.27E-04	2.11E-4	92.952	% Recovery
1. STD	0		@AM24101 AM24101T LIQUID		100.	9.58E+01	95.800	% Recovery
1. STD	0		@AM24101 AM24101E LIQUID		1.0	1.61E+00	1.610	% Ct Error
2. BLNK	0		@AM24101 AM24101 LIQUID		1	<3.33E-6		uCi/mL
2. BLNK	0		@AM24101 AM24101T LIQUID		100.0	8.19E+01	81.900	% Recovery
2. BLNK	0		@AM24101 AM24101E LIQUID		1.0	1.00E+02	100.000	% Ct Error
3. SAMPLE	S98T002346	0	@AM24101 AM24101 LIQUID		N/A	9.41E-06	3.76e-006	uCi/mL
3. SAMPLE	S98T002346	0	@AM24101 AM24101E LIQUID		N/A	5.98E+00		% Ct. Error
3. SAMPLE	S98T002346	0	@AM24101 AM24101T LIQUID		N/A	8.62E+01		% Recovery
4. DUP	S98T002346	0	@AM24101 AM24101 LIQUID		9.41E-6	8.85E-6	6.134	RPD
4. DUP	S98T002346	0	@AM24101 AM24101T LIQUID		100.0	8.87E+01	88.700	% Recovery
4. DUP	S98T002346	0	@AM24101 AM24101E LIQUID		1.0	4.76E+00	4.760	% Ct Error

Final page for worklist# 25547

Analyst Signature _____

Date _____

Analyst Signature _____

Date _____

John Relyea 18 Aug 98
 Reviewer Signature _____ Date _____

Units shown for QC (BLK/BKG) may not reflect the actual units.

08/12/98 13:09
A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 25547

Analyst: AKL Instrument: AM01 15 Book# 28657Method: LA-953-104 Rev/Mod B-0

Worklist Comment: S-304 GRAB, @AM24101, SS by Ludlum. STD: 1.0mL skm

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@AM24101	LIQUID		
2 BLNK			@AM24101	LIQUID		
3 SAMPLE	S98T002346 0		@AM24101	LIQUID	98000438	S-304 GRAB
	Analytes Requested: AM24101 , AM24101E, AM24101T					
4 DUP	S98T002346 0		@AM24101	LIQUID		

Final page for worklist # 25547

Alita Hansen
Analyst Signature Date10/26/98 8/17/98
Analyst Signature Date
Sylvia Z. Chan

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

WORKBOOK PAGE: STD1

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0))

LIQUID

STD

Type	Date Counted	AUG-14-98	Am 241 AEA Frac. (C241)	0.625
STD	Sample Volume in mL (SS)	1.000	Am 243 AEA Frac. (C243)	0.276
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0
25547	Tracer Volume in mL (SPKV)	0.200	Total AT Counts	6241
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.23
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	100.46
LIQUID	Detector Number	15	Am 243 cpm	44.4
Batch Number	Detector Efficiency (DetEff)	0.2894	Cm 243/244 cpm	0
98004076	Standard Book No	28B57	AEA Count Time (min)	480
Rerun	Standard Value in $\mu\text{Ci/mL}$	2.270E-04	Am 241 $\mu\text{Ci/L}$ =	2.1094E-01
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 1.7609E-02
Sample Prep				
N/A				
Sample Number	Am-241 $\mu\text{Ci/L}$ = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))			
WL25547-STD	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))			
Instrument Code	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100			
WB26872	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV			
Prepared By				
MCB				
Chemist				
JFR	Am 241 $\mu\text{Ci/mL}$ =	2.11E-04	DETECTION LEVELS in $\mu\text{Ci/mL}$	
Analyst	Relative Counting Error =	1.6%		
AKL				
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.			
08/17/98	Cm 243/244 $\mu\text{Ci/mL}$ <	1.76E-05	Am 241	
Analysis Date	Relative Counting Error =	100.0%	1.76E-05	
08/14/98	Am 243 Tracer Recovery =	95.8%	Cm 243/244	
Analysis Time			1.76E-05	
03:00 PM				
Sample Point				
S-304 GRAB				

Analyst:	AKL	Date:	08/17/98
Signature of Chemist:	JFR	Date:	18 Aug 98

STANDARD.WB1 REV 1.2

953103ML

WORKBOOK PAGE: BLANK2

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0))

LIQUID / SO

BLNK

Type	Date Counted	AUG-14-98	Am 241 AEA Frac. (C241)	0	
BLNK	Sample Volume in mL (SS)	1.000	Am 243 AEA Frac. (C243)	0.854	
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0	
25547	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	868	
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30	
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.23	
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	0	
LIQUID	Detector Number	15	Am 243 cpm	19.76	
Batch Number	Detector Efficiency (DetEff)	0.2894	Cm 243/244 cpm	0	
98004076			AEA Count Time (min)	480	
Rerun			Am 241 $\mu\text{Ci/L}$ =	< 3.3290E-03	
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 3.3290E-03	
Sample Prep					
N/A					
Sample Number	Am-241 $\mu\text{Ci/L}$ = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
WL25547-BLNK	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
Instrument Code	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100				
WB26872	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV				
Prepared By	NOTE: Am-241 Result is a LESS THAN Value.				
MCB					
Chemist					
JFR	Am 241 $\mu\text{Ci/mL}$ =	< 3.33E-06	DETECTION LEVELS in $\mu\text{Ci/mL}$		
Analyst	Relative Counting Error =	100.0%			
AKL					
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.				
08/17/98	Cm 243/244 $\mu\text{Ci/mL}$	< 3.33E-06	Am 241		
Analysis Date	Relative Counting Error =	100.0%	3.33E-06		
08/14/98	Am 243 Tracer Recovery =	81.9%	Cm 243/244		
Analysis Time	3.33E-06				
03:00 PM					
Sample Point					
S-304 GRAB					

Analyst:	AKL	Date:	08/17/98
Signature of Chemist:	JFR	Date:	18 Aug 98

BLANK.WB1 REV 1.2

John Relyea
953103ML

WORKBOOK PAGE: SAM3

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0))

LIQUID / SO

SAMPLE

Type	Date Counted	AUG-14-98	Am 241 AEA Frac. (C241)	0.145
SAMPLE	Sample Volume in mL (SS)	1.000	Am 243 AEA Frac. (C243)	0.718
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0
25547	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	1085
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.23
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	2.69
LIQUID	Detector Number	15	Am 243 cpm	13.29
Batch Number	Detector Efficiency (DetEff)	0.2894	Cm 243/244 cpm	0
98004076			AEA Count Time (min)	480
Rerun			Am 241 $\mu\text{Ci/L}$ =	9.4061E-03
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 3.7616E-03
Sample Prep				
N/A				
Sample Number	Am-241 $\mu\text{Ci/L}$ = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))			
S98T002346	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))			
Instrument Code	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100			
WB26872	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV			
Prepared By				
MCB				
Chemist				
JFR	Am 241 $\mu\text{Ci/mL}$ =	9.41E-06	DETECTION LEVELS in $\mu\text{Ci/mL}$	
Analyst	Relative Counting Error =	6.0%		
AKL				
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.			Am 241
08/17/98	Cm 243/244 $\mu\text{Ci/mL}$	< 3.76E-06	3.76E-06	
Analysis Date	Relative Counting Error =	100.0%	Cm 243/244	
08/14/98	Am 243 Tracer Recovery =	86.2%	3.76E-06	
Analysis Time				
03:00 PM				
Sample Point				
S-304 GRAB				

Analyst:	AKL	Date:	08/17/98
Signature of Chemist:	JFR	Date:	18 Aug 98
SAMPLE.WB1 REV 1.2	953103ML		

WORKBOOK PAGE: DUP4

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0)

LIQUID / SO

DUP

Type	Date Counted	AUG-14-98	Am 241 AEA Frac. (C241)	0.15	
DUP	Sample Volume in mL (SS)	1.000	Am 243 AEA Frac. (C243)	0.789	
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0.017	
25547	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	1016	
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30	
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.23	
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	4.2	
LIQUID	Detector Number	15	Am 243 cpm	22.07	
Batch Number	Detector Efficiency (DetEff)	0.2894	Cm 243/244 cpm	0.48	
98004076			AEA Count Time (min)	480	
Re-run			Am 241 $\mu\text{Ci/L}$ =	8.8549E-03	
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 3.3280E-03	
Sample Prep					
N/A					
Sample Number	Am-241 $\mu\text{Ci/L}$ = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
S98T002346	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
Instrument Code	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100				
WB26872	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV				
Prepared By					
MCB					
Chemist					
JFR	Am 241 $\mu\text{Ci/mL}$ =	8.85E-06	DETECTION LEVELS in $\mu\text{Ci/mL}$		
Analyst	Relative Counting Error =	4.8%			
AKL					
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.				
08/17/98	Cm 243/244 $\mu\text{Ci/mL}$	< 3.33E-06	Am 241	3.33E-06	
Analysis Date	Relative Counting Error =	13.1%	Cm 243/244	3.33E-06	
08/14/98	Am 243 Tracer Recovery =	88.7%			
Analysis Time					
03:00 PM					
Sample Point					
S-304 GRAB					

Analyst:	AKL	Date:	08/17/98
Signature of Chemist:	JFR	Date:	18 Aug 98
SAMPLE.WB1 REV 1.2	953103ML		

222-S Analytical Laboratory
 GENERAL ALPHA ENERGY ANALYSIS
 Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
 WL25547-STD-AM
 File ID: 1a1064.CNF

Counted on: 8/14/98 @19:18
 Detector: AEA1
 Geometry number: 1
 Count time: 28805. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	3445.9	3445.9	299.869	299.869	12.000	5.291	6.000	2.655
2	1486.9	1486.9	254.275	254.264	12.000	5.033	6.000	2.324
3?	15.4	15.4	121.002	121.002	240.000	1.000	120.000	0.100
4?	4.6	4.6	97.432	93.126	24.000	44.634	12.000	17.932
5?	5.8	5.8	74.700	74.066	10.000	1.508	5.000	1.170
6?	6.0	6.0	63.424	62.867	10.000	1.819	5.000	0.276

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err	d/m	Activity
			Exp.	Obs. Diff.	c/m	@95		uCi/ea
1	Pu238 Am241	0.625	5.487	5.470	0.0170.02	100.46	0.9	567.2
			5.479	5.470	0.009			434.5
2	Am243	0.276	5.266	5.261	0.0050.02	44.40	1.4	182.3
3		????		4.648		1.19	8.2	
4		????		4.519		0.31	35.3	
5		????		4.432		0.10	65.9	
6		????		4.380		0.32	22.3	
Totals:			0.901 <--valid peaks only-->			144.86		

DETECTOR CALIBRATION

Energy (MEV) = 4.091 + (0.0046)*Channel
 Energy range (MeV): 4.091 TO 6.446
 Efficiency = 0.2460 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	77176.0	100.000
Smoothed	77175.8	100.000
Composite fit	70468.4	91.309
Residuals	6707.6	8.691

Spectrum 1a1064.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc Display Max.: 22850.9

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Raw Data Dump for AEA Spectrum: 1a1064.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	7.	6.
21	10.	6.	8.	10.	6.	2.	8.	4.	2.
31	5.	8.	5.	3.	10.	5.	5.	5.	7.
41	5.	4.	12.	6.	6.	4.	5.	5.	5.
51	9.	4.	9.	8.	6.	4.	7.	6.	12.
61	7.	10.	14.	9.	10.	10.	5.	5.	6.
71	12.	7.	11.	12.	11.	11.	7.	12.	7.
81	5.	9.	7.	12.	3.	17.	9.	12.	8.
91	13.	10.	11.	14.	9.	12.	14.	11.	13.
101	6.	10.	10.	10.	16.	15.	12.	13.	19.
111	10.	14.	15.	19.	13.	10.	16.	16.	13.
121	18.	14.	16.	11.	13.	14.	14.	18.	12.
131	17.	13.	19.	15.	7.	11.	24.	13.	14.
141	17.	25.	19.	20.	16.	23.	21.	17.	17.
151	24.	18.	28.	13.	17.	20.	21.	15.	38.
161	14.	31.	18.	28.	24.	25.	22.	25.	23.
171	27.	34.	33.	28.	30.	30.	27.	27.	34.
181	24.	40.	30.	34.	39.	27.	35.	45.	37.
191	49.	45.	39.	37.	51.	53.	40.	56.	54.
201	59.	60.	41.	51.	68.	51.	50.	59.	69.
211	61.	62.	72.	91.	70.	77.	90.	91.	91.
221	94.	100.	91.	98.	97.	114.	132.	137.	152.
231	177.	173.	173.	217.	200.	201.	216.	246.	289.
241	342.	397.	465.	472.	573.	608.	700.	723.	865.
251	1185.	1418.	1610.	1715.	1805.	1548.	1072.	702.	381.
261	277.	240.	229.	220.	224.	259.	242.	223.	216.
271	205.	221.	221.	218.	253.	293.	286.	355.	333.
281	425.	423.	459.	452.	599.	650.	771.	883.	1024.
291	1335.	1403.	1606.	1678.	2081.	2413.	2758.	3437.	3805.
301	3877.	3097.	2096.	1366.	994.	761.	656.	557.	489.
311	245.	195.	131.	82.	34.	20.	5.	2.	5.
321	3.	4.	0.	1.	5.	3.	3.	3.	1.
331	1.	1.	4.	1.	4.	1.	2.	1.	2.
341	0.	3.	1.	2.	2.	3.	3.	1.	2.
351	0.	2.	0.	1.	0.	1.	1.	1.	1.
361	1.	0.	0.	0.	0.	0.	1.	0.	0.
371	2.	0.	0.	0.	0.	0.	1.	1.	0.
381	0.	0.	1.	1.	1.	1.	0.	2.	1.
391	0.	1.	1.	2.	0.	0.	0.	0.	0.
401	0.	1.	0.	1.	1.	0.	0.	0.	0.
411	0.	0.	1.	0.	0.	0.	1.	0.	1.
421	0.	1.	0.	0.	0.	1.	0.	0.	0.
431	0.	1.	0.	2.	0.	2.	1.	2.	0.
441	0.	1.	0.	0.	0.	1.	0.	0.	0.
451	0.	0.	0.	0.	1.	2.	0.	1.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	1.
471	3.	0.	0.	0.	2.	0.	4.	2.	0.
481	0.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.							

222-S Analytical Laboratory
 G E N E R A L A L P H A E N E R G Y A N A L Y S I S
 Rev. 2.10

DATA REDUCTION REPORT

SAMPLE ~~Am~~
 WL25547BLNK-DUP-1 5-15-98
 File ID: 2a2058.CNF

Counted on: 8/14/98 @19:18
 Detector: AEA2
 Geometry number: 1
 Count time: 28802. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	671.4	671.4	255.840	255.840	12.000	4.586	6.000	2.076
2	13.8	13.8	194.008	193.959	88.000	1.000	44.000	0.100

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate	%err c/m	%95	d/m	Activity uCi/ea
1	Am243	0.854	Exp.	Obs.	Diff.	FWHM				
			5.266	5.262	0.0040	0.02	19.76	2.0	85.1	0.383E-04
2		0.048		4.977		0.00	1.10	8.6	4.7	0.212E-05

Totals: 0.902 <--valid peaks only--> 20.87

DETECTOR CALIBRATION

Energy(MEV) = 4.085 + (0.0046)*Channel
 Energy range (MeV): 4.085 TO 6.440
 Efficiency = 0.2347 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	11108.0	100.000
Smoothed	11108.0	100.000
Composite fit	10017.4	90.182
Residuals	1090.6	9.818

Analyzed by: _____
 SLH2

Display Max.: 3959.2

145

Raw Data Dump for AEA Spectrum: 2a2058.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
21	3.	0.	1.	0.	0.	1.	0.	1.	0.	1.
31	1.	0.	1.	1.	0.	2.	0.	2.	2.	1.
41	1.	1.	2.	1.	0.	0.	1.	1.	1.	1.
51	1.	2.	4.	1.	1.	4.	2.	0.	1.	2.
61	5.	1.	0.	0.	4.	1.	2.	2.	1.	2.
71	0.	2.	1.	0.	3.	2.	2.	2.	2.	2.
81	1.	2.	1.	2.	2.	1.	3.	4.	1.	3.
91	3.	2.	1.	1.	2.	1.	1.	2.	2.	0.
101	0.	1.	5.	3.	1.	1.	0.	4.	0.	1.
111	3.	1.	4.	4.	1.	1.	2.	3.	5.	5.
121	2.	2.	2.	2.	9.	3.	1.	1.	3.	3.
131	2.	1.	4.	3.	4.	3.	5.	3.	4.	5.
141	3.	7.	2.	3.	5.	7.	1.	7.	2.	8.
151	5.	2.	7.	8.	1.	6.	5.	6.	4.	6.
161	2.	6.	7.	12.	11.	6.	6.	9.	6.	4.
171	3.	6.	6.	3.	7.	4.	12.	7.	7.	8.
181	13.	10.	9.	6.	7.	9.	5.	12.	11.	11.
191	9.	13.	12.	16.	21.	8.	8.	12.	14.	10.
201	12.	17.	10.	13.	8.	22.	13.	18.	25.	22.
211	7.	23.	19.	18.	16.	20.	21.	22.	33.	33.
221	26.	33.	33.	29.	35.	40.	32.	52.	47.	48.
231	54.	60.	61.	69.	77.	73.	82.	90.	107.	102.
241	129.	124.	165.	205.	195.	262.	267.	311.	355.	373.
251	443.	416.	600.	647.	766.	773.	782.	586.	440.	251.
261	138.	89.	61.	52.	70.	56.	37.	51.	39.	25.
271	28.	18.	16.	13.	7.	5.	3.	2.	1.	3.
281	1.	1.	1.	2.	5.	0.	0.	1.	2.	1.
291	1.	1.	1.	6.	2.	1.	10.	1.	4.	3.
301	4.	8.	3.	3.	4.	2.	1.	1.	1.	1.
311	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
321	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.
331	0.	0.	3.	0.	0.	2.	0.	1.	0.	0.
341	0.	0.	1.	0.	0.	0.	1.	2.	3.	1.
351	2.	0.	1.	0.	0.	1.	0.	0.	0.	1.
361	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
381	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	1.	2.	1.	0.	0.	0.	0.	1.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	1.	3.	0.	1.	1.	3.
481	1.	3.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

222-S Analytical Laboratory
 G E N E R A L A L P H A E N E R G Y A N A L Y S I S
 Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
 S98T2346-SAM-AM
 File ID: 3a3250.CNF

Counted on: 8/14/98 @19:23
 Detector: AEA3
 Geometry number: 1
 Count time: 28807. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	70.3	70.3	298.672	298.672	14.000	7.623	7.000	2.637
2	411.9	411.9	253.046	253.042	12.000	4.902	6.000	1.917

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate	%err c/m @95	d/m	Activity uCi/ea
		Exp.	Obs.	Diff.	FWHM				
1	Am241	0.145	5.479	5.467	0.0120.04	2.69	5.5	12.2	0.551E-05
	Pu238m		5.487	5.467	0.020			16.0	0.719E-05
2	Am243	0.718	5.266	5.257	0.0090.02	13.29	2.5	57.4	0.259E-04

Totals: 0.863 <---valid peaks only--> 15.98

DETECTOR CALIBRATION

Energy (MEV) = 4.093 + (0.0046)*Channel
 Energy range (MeV): 4.093 TO 6.448
 Efficiency = 0.2338 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	8890.0	100.000
Smoothed	8890.0	100.000
Composite fit	7670.4	86.281
Residuals	1219.6	13.719

Analyzed by: _____

SLH2

Display Max.: 2916.4

[illegible]

Raw Data Dump for AEA Spectrum: 3a3250.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	2.	1.
21	0.	0.	0.	1.	0.	1.	3.	1.	0.
31	2.	1.	1.	0.	0.	2.	0.	0.	0.
41	2.	5.	0.	1.	0.	2.	0.	0.	1.
51	1.	1.	5.	2.	4.	1.	2.	0.	2.
61	1.	1.	1.	2.	1.	0.	0.	1.	0.
71	2.	2.	1.	1.	1.	0.	1.	1.	2.
81	2.	0.	0.	0.	3.	1.	3.	1.	0.
91	3.	1.	0.	1.	1.	1.	4.	0.	1.
101	1.	1.	2.	1.	1.	3.	4.	1.	1.
111	0.	2.	5.	1.	0.	1.	0.	1.	1.
121	1.	1.	2.	2.	2.	3.	1.	5.	2.
131	0.	2.	1.	4.	2.	4.	3.	1.	2.
141	1.	4.	3.	4.	2.	4.	7.	1.	2.
151	1.	5.	5.	4.	3.	7.	3.	3.	4.
161	2.	5.	7.	2.	0.	7.	8.	6.	8.
171	7.	5.	8.	3.	4.	10.	6.	7.	6.
181	12.	5.	11.	5.	5.	8.	6.	8.	3.
191	4.	8.	8.	11.	7.	10.	13.	7.	6.
201	17.	10.	14.	14.	12.	15.	16.	18.	21.
211	16.	23.	14.	17.	28.	25.	21.	19.	24.
221	32.	19.	28.	30.	35.	38.	36.	38.	42.
231	47.	68.	51.	78.	68.	62.	81.	77.	114.
241	135.	130.	181.	170.	207.	221.	250.	324.	293.
251	408.	439.	454.	475.	404.	327.	178.	80.	68.
261	44.	42.	30.	27.	35.	37.	36.	23.	16.
271	14.	10.	7.	6.	8.	14.	8.	13.	11.
281	12.	18.	20.	16.	24.	21.	35.	29.	40.
291	45.	43.	55.	51.	49.	69.	72.	73.	74.
301	51.	49.	41.	29.	19.	14.	16.	18.	8.
311	2.	2.	4.	0.	0.	0.	0.	0.	0.
321	1.	1.	0.	0.	0.	0.	0.	0.	0.
331	1.	1.	0.	0.	1.	0.	0.	1.	2.
341	1.	0.	2.	2.	2.	1.	3.	1.	3.
351	0.	2.	1.	4.	7.	2.	6.	8.	5.
361	5.	7.	5.	7.	9.	7.	12.	6.	17.
371	2.	3.	1.	0.	0.	1.	0.	0.	0.
381	0.	0.	0.	1.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	1.	0.	0.	0.
431	0.	0.	0.	0.	0.	1.	0.	0.	1.
441	0.	0.	0.	0.	0.	0.	1.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	1.	0.	0.	0.
471	0.	0.	0.	1.	3.	0.	0.	1.	0.
481	2.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.							

222-S Analytical Laboratory
 GENERAL ALPHA ENERGY ANALYSIS
 Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
 S98T2346-DUP-AM
 File ID: 4a4251.CNF

Counted on: 8/14/98 @19:23
 Detector: AEA4
 Geometry number: 1
 Count time: 28807. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	17.2	17.2	366.576	366.576	10.000	3.442	5.000	1.534
2	142.7	142.7	298.059	298.059	12.000	5.706	6.000	2.941
3	765.5	765.5	252.258	252.257	10.000	4.943	5.000	2.435

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err	d/m	Activity
			Exp.	Obs. Diff.	c/m	@95		uCi/ea
1	Pu238 Cm243	0.017	5.755	5.775 -0.020	0.02	0.48	13.0	2.1 0.956E-06
2	Am241	0.150	5.479	5.459 0.020	0.03	4.20	4.4	2.8 0.128E-05
3	Am243	0.789	5.266	5.249 0.017	0.02	22.07	1.9	19.5 0.879E-05
Totals:		0.957	<--valid peaks only-->		26.75			

DETECTOR CALIBRATION

Energy (MEV) = 4.088 + (0.0046)*Channel
 Energy range (MeV): 4.088 TO 6.444
 Efficiency = 0.2293 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	13423.0	100.000
Smoothed	13423.0	100.000
Composite fit	12844.4	95.690
Residuals	578.6	4.310

Analyzed by: _____

SLH2

LABCORE Completed Worklist Report for Worklist# 25548

Analyst: akl Instrument: AB16 Book#

Method: Rev/Mod

Worklist Comment: S-304 GRAB, @PU23901, SS by Ludlum. STD: 1.0mL skm

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0	@PU23901 PU23901 LIQUID		1.12E-04	1.17E-4	104.464 % Recovery	
1 STD	0	@PU23901 PU23901E LIQUID		1.00	1.82E+00	1.820 % Ct Error	
1 STD	0	@PU23901 PU23901T LIQUID		100	9.88E+01	98.800 % Recovery	
2 BLNK	0	@PU23901 PU23901 LIQUID		1	<2.90E-6	uCi/mL	
2 BLNK	0	@PU23901 PU23901T LIQUID		100	1.04E+02	104.000 % Recovery	
2 BLNK	0	@PU23901 PU23901E LIQUID		1.00	1.00E+02	100.000 uCi/mL	
3 SAMPLE	S98T002346 0	@PU23901 PU23901 LIQUID	N/A	5.43E-06	3.20e-006	uCi/mL	
3 SAMPLE	S98T002346 0	@PU23901 PU23901T LIQUID	N/A	1.02E+02		% Recovery	
3 SAMPLE	S98T002346 0	@PU23901 PU23901E LIQUID	N/A	5.82E+00		% Ct. Error	
4 DUP	S98T002346 0	@PU23901 PU23901 LIQUID		5.43E-6	5.66E-6	4.148 RPD	
4 DUP	S98T002346 0	@PU23901 PU23901T LIQUID		100	1.05E+02	105.000 % Recovery	
4 DUP	S98T002346 0	@PU23901 PU23901E LIQUID		1.00	5.72E+00	5.720 % Ct Error	

Final page for worklist# 25548

Analyst Signature Date

Analyst Signature Date

John Relyea 18 Aug 98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 25548

Analyst: AKL Instrument: PU01 16 Book# 28B57

Method: LA-953-104 Rev/Mod B-Ø

Worklist Comment: S-304 GRAB, @PU23901, SS by Ludlum. STD: 1.0mL skm

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@PU23901	LIQUID		
2 BLNK			@PU23901	LIQUID		
3 SAMPLE	S98T002346 0		@PU23901	LIQUID	98000438	S-304 GRAB
	Analytes Requested: PU23901 , PU23901E, PU23901T					
4 DUP	S98T002346 0		@PU23901	LIQUID		

Final page for worklist # 25548

Alita Huxen 8/14/98
Analyst Signature Date

M. B. ... 8/17/98
Analyst Signature Date
Sylvia Z. Charn 8/17/98

Data Entry Comments:

WORKBOOK PAGE: STD1

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0))**LIQUID**

				STD
Type	DATE COUNTED	AUG-14-98		Pu 236 AEA FRAC (C236)
STD	SAMPLE VOLUME in mL	SS	1.000	Pu 238 AEA FRAC (C238)
Work List	SAMPLE DILUTION FACTOR	DF	1.000	Pu 239 AEA FRAC (C239)
25548	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS
Test Code	DIGEST DILUTION FACTOR	DDF	1.000	AT COUNT TIME (MIN)
@PU23901	TRACER BOOK NO		145B43	BACKGROUND in cpm (Bkg)
Matrix	DETECTOR NUMBER		16	Pu 236 cpm
LIQUID	EFFICIENCY FACTOR	EFF	0.272	Pu 238 cpm
Batch Number	TRACER PREPARATION DATE		01/19/98	Pu 239 cpm
98004078	TRACER PREPARATION VALUE (dpm/mL)		2270.000	AEA COUNT TIME
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)		1977.716	Pu 239/240 µCi/L
0	Pu-238 TRACER VALUE (dpm/mL)		0.000	
Sample Prep	STANDARD BOOK NO		28B57	
N/A	STANDARD VALUE in µCi/mL		1.120E-04	
Sample #				
WL25548-STD				
Instrument Code	Decay Time = Date Counted - Tracer Preparation Date			
WB27806	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value * [e to the power of {(-ln2 * Decay Time/1040.95)}]			
Prepared By	Pu 236 Tracer Recovery = (Total AT Counts / TC - Bkg) * 1/EFF * C236 * 100 / Pu-236 Decay Corr'd Value * SPKV			
MCB	Pu 239/240 µCi/L = (C239) / (Pu 236 Decay Corr'd Value) * (SPKV) / (1000mL/L) * (DF) * (DDF) / [(C236) * (SS) * (2220000 dpm/µCi)]			
Chemist	Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value * SPKV * Pu 236 Tracer Recovery / 100)			
JFR	Pu 238 µCi/L = [(Pu 238 dpm) * (DF) * (DDF) * (1000mL/L)] / [(Pu-236 Tracer Recovery / 100) * (2220000 dpm/µCi) * (D g/L) * (SS)]			
Analyst	Relative Counting Error = Square Root of {(1 / (Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))} * 1.96 * 100			
AKL				
Date Complete	Pu 239/240 µCi/mL		1.17E-04	DETECTION LEVELS in µCi/mL Pu 239/240 6.58E-06
Analysis Date	Relative Counting Error =		1.8%	
08/14/98				
Analysis Time				
03:05 PM				
Sample Point				
S-304 GRAB	Pu 236 Tracer Recovery =		98.8%	

Analyst:	AKL	Date:	17-Aug-98
Signature of Chemist:	<i>John Relyea</i>	JFR	Date: 18 Aug 98

STANDARD.WB1 REV 1.0

943128ML

WORKBOOK PAGE: BLANK2

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0)

L BLNK

Type	DATE COUNTED	AUG-14-98	PU 236 AEA FRAC (C236)	0.921
BLNK	SAMPLE VOLUME in mL	SS	1.000 PU 238 AEA FRAC (C238)	0.011
Work List	SAMPLE DILUTION FACTOR	DF	1.000 PU 239 AEA FRAC (C239)	0.000
25548	TRACER VOLUME in mL	SPKV	0.100 TOTAL AT COUNTS	1826
Test Code	DIGEST DILUTION FACTOR	DDF	1.0000 AT COUNT TIME (MIN)	30
@PU23901	TRACER BOOK NO	145B43	BACKGROUND in cp (Bkg)	0.100
Matrix	DETECTOR NUMBER	16	PU 236 cpm	41.770
LIQUID	EFFICIENCY FACTOR	EFF	0.2717 PU 238 cpm	0.500
Batch Number	TRACER PREPARATION DATE	01/19/98	PU 239 cpm	0.000
98004078	TRACER PREPARATION VALUE (dpm/mL)	2270.00	AEA COUNT TIME	480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1977.72	Pu 239/240 $\mu\text{Ci/L}$ =	< 2.902E-03
0	PU-238 TRACER VALUE (dpm/mL)	0.00		

Sample Prep

N/A

Sample #

WL25548-BLNK

Instrument Code

WB27806

Prepared By

MCB

Chemist

JFR

Analyst

AKL

Date Complete

08/17/98

Analysis Date

08/14/98

Analysis Time

03:05 PM

Sample Point

S-304 GRAB

Decay Time = Date Counted - Tracer Preparation Date

Pu-236 Decay Corr'd Value = Pu-236 Preparation Value * [e to the power of $\{-\ln 2 * \text{Decay Time}/1040.95\}$]

Pu 236 Tracer Recovery = (Total AT Counts / TC - Bkg) * C236 * 100 / (Pu-236 Decay Corr'd Value * SPKV * EFF)

Pu 239/240 $\mu\text{Ci/L}$ = (C239) / (Pu 236 Decay Corr'd Value) * (SPKV) / (1000 mL/L) / (DF) / (DDF) / $\{[(C236)(SS)(D \text{ g/L}) / (2220000 \text{ dpm}/\mu\text{Ci})]\}$

Pu 238 dpm = $\{[(\text{Total AT Counts} / \text{TC}) - \text{Bkg} * 1/\text{EFF} * \text{C238}] - (\text{Pu-238 Tracer Value} * \text{SPKV} * \text{Pu 236 Tracer Recovery} / 100)\}$

Pu 238 $\mu\text{Ci/L}$ = $\{[(\text{Pu 238 dpm}) / (\text{DF})(\text{DDF})(1000 \text{ mL/L})] / [(\text{Pu-238 Tracer Recovery} / 100)(2220000 \text{ dpm}/\mu\text{Ci})(D \text{ g/L})(\text{SS})]\}$

Relative Counting Error = Square Root of $\{[1/(\text{Pu 236 cpm} * \text{min})] + [1/(\text{Pu 238 or 239/240 cpm} * \text{min})]\} * 1.96 * 100$

Pu 239/240 $\mu\text{Ci/mL}$	< 2.90E-06	DETECTION LEVELS in $\mu\text{Ci/mL}$
Relative Counting Error	= 100.0%	
NOTE: Pu 238 Result is a LESS THAN Value.		
Pu 238 $\mu\text{Ci/mL}$	< 2.90E-06	
Relative Counting Error	= 12.7%	
Pu 236 Tracer Recovery	= 104.2%	

Analyst:	AKL	Date:	17-Aug-98
Signature of Chemist:	<i>John Belyea</i>	Date:	18 Aug 98

BLANK.WB1 REV 1.0

9431281

WORKBOOK PAGE: SAM3

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0))

LIQUID /

SAMPLE

Type	DATE COUNTED	AUG-14-98	PU 238 AEA FRAC (C236)	0.836
SAMPLE	SAMPLE VOLUME in mL	SS 1.000	PU 238 AEA FRAC (C238)	0.043
Work List	SAMPLE DILUTION FACTOR	DF 1.000	PU 239 AEA FRAC (C239)	0.051
25548	TRACER VOLUME in mL	SPKV 0.100	TOTAL AT COUNTS	1970
Test Code	DIGEST DILUTION FACTOR	DDF 1.0000	AT COUNT TIME (MIN)	30
@PU23901	TRACER BOOK NO	145B43	BACKGROUND in cpm (Bkg)	0.100
Matrix	DETECTOR NUMBER	16	PU 236 cpm	41.290
LIQUID	EFFICIENCY FACTOR	EFF 0.272	PU 238 cpm	2.120
Batch Number	TRACER PREPARATION DATE	01/19/98	PU 239 cpm	2.510
98004078	TRACER PREPARATION VALUE (dpm/mL)	2270.000	AEA COUNT TIME	480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1977.716	Pu 239/240 μ Ci/L	5.4347E-03
0	PU-238 TRACER VALUE (dpm/mL)	0.000		
Sample Prep				
N/A				
Sample #	Decay Time = Date Counted - Tracer Preparation Date			
S98T002346	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value * [e to the power of {(-ln2 * Decay Time/1040.95)}]			
Instrument Code	Pu 236 Tracer Recovery = (Total AT Counts / TC - Bkg) * C236 * 100 / (Pu-236 Decay Corr'd Value * SPKV * EFF)			
WB27806	Pu 239/240 μ Ci/L = (C239)/(Pu 236 Decay Corr'd Value)(SPKV)(1000mL/L)(DF)(DDF) / [(C236)(SS)(D g/L)(2220000 dpm/ μ Ci)]			
Prepared By	Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value * SPKV * Pu 236 Tracer Recovery / 100)			
MCB	Pu 238 μ Ci/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-236 Tracer Recovery / 100)(2220000 dpm/ μ Ci)(D g/L)(SS)]			
Chemist	Relative Counting Error = Square Root of [(1/(Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100			
JFR				
Analyst				
AKL				
Date Complete				
08/17/98	Pu 239/240 μ Ci/mL	5.43E-06	DETECTION LEVELS in μ Ci/mL	
Analysis Date	Relative Counting Error	= 5.8%		
08/14/98				
Analysis Time				
03:05 PM	Pu 238 μ Ci/mL	4.58E-06		
Sample Point	Relative Counting Error	= 6.3%	Pu 238	3.20E-06
S-304 GRAB	Pu 236 Tracer Recovery	= 102.0%	Pu 239/240	3.20E-06

Analyst:	AKL	Date:	17-Aug-98
Signature of Chemist:	JFR	Date:	18 Aug 98

SAMPLE WB1 REV 1.0

943128ML

WORKBOOK PAGE: DUP4

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0))

LIQUID /

DUP

Type	DATE COUNTED	AUG-14-98	Pu 236 AEA FRAC (C236)	0.850
DUP	SAMPLE VOLUME in mL SS	1.000	Pu 238 AEA FRAC (C238)	0.038
Work List	SAMPLE DILUTION FACTOR DF	1.000	Pu 239 AEA FRAC (C239)	0.054
25548	TRACER VOLUME in mL SPKV	0.100	TOTAL AT COUNTS	1988
Test Code	DIGEST DILUTION FACTOR DDF	1.0000	AT COUNT TIME (MIN)	30
@PU23901	TRACER BOOK NO	145B43	BACKGROUND in cpm (Bkg)	0.100
Matrix	DETECTOR NUMBER	16	Pu 236 cpm	40.780
LIQUID	EFFICIENCY FACTOR EFF	0.272	Pu 238 cpm	1.800
Batch Number	TRACER PREPARATION DATE	01/19/98	Pu 239 cpm	2.600
98004078	TRACER PREPARATION VALUE (dpm/mL)	2270.000	AEA COUNT TIME	480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1977.716	Pu 239/240 µCi/L	5.6596E-03
0	PU-238 TRACER VALUE (dpm/mL)	0.000		
Sample Prep				
N/A				
Sample #	Decay Time = Date Counted - Tracer Preparation Date			
S98T002346	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value * [e to the power of {(ln2 * Decay Time/1040.95)}]			
Instrument Code	Pu 236 Tracer Recovery = (Total AT Counts / TC - Bkg) * C236 * 100 / (Pu-236 Decay Corr'd Value * SPKV * EFF)			
WB27806	Pu 239/240 µCi/L = (C239 / (Pu 236 Decay Corr'd Value) * (SPKV / (1000mL/L)) * (DF) * (DDF) / ((C236) * (SS) * (D g/L) * (2220000 dpm/µCi))			
Prepared By	Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value * SPKV * Pu 238 Tracer Recovery / 100)			
MCB	Pu 238 µCi/L = [(Pu 238 dpm) * (DF) * (DDF) * (1000mL/L)] / [(Pu-236 Tracer Recovery / 100) * (2220000 dpm/µCi) * (D g/L) * (SS)]			
Chemist	Relative Counting Error = Square Root of [(1 / (Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100			
JFR				
Analyst				
AKL				
Date Complete				
08/17/98	Pu 239/240 µCi/mL	5.66E-06	DETECTION LEVELS in µCi/mL	
Analysis Date	Relative Counting Error =	5.7%	Pu 239/240	
08/14/98			3.14E-06	
Analysis Time			Pu 238	
03:05 PM	Pu 238 µCi/mL	3.98E-06	3.14E-06	
Sample Point	Relative Counting Error =	6.8%		
S-304 GRAB	Pu 236 Tracer Recovery =	104.7%		

Analyst:	AKL	Date:	17-Aug-98
Signature of Chemist:	JFR	Date:	18 Aug 98
SAMPLE WB1 REV 1.0	943128ML		

222-S Analytical Laboratory
 GENERAL ALPHA ENERGY ANALYSIS
 Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
 WL25548-STD-PU
 File ID: 5a5196.CNF

Counted on: 8/14/98 @19:31
 Detector: AEA5
 Geometry number: 1
 Count time: 28804. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1829.0	1829.0	364.388	364.388	8.000	2.506	4.000	1.339
2?	38.1	38.1	304.443	304.413	10.000	2.788	5.000	1.236
3	85.5	85.5	289.575	289.480	8.000	2.431	4.000	2.928
4?	25.8	25.8	271.794	271.706	8.000	2.378	4.000	1.531
5	2826.2	2826.2	230.995	230.995	10.000	2.697	5.000	2.123

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate	%err c/m @95	d/m	Activity uCi/ea
1	Pu236	0.411	Exp.	Obs.	Diff.	FWHM			
2		????	5.755	5.759	-0.0040.01	42.74	1.4	178.9	0.806E-04
3	Th228	0.014		5.483		1.01	9.0		
4		????	5.400	5.414	-0.0140.01	1.44	8.4	8.3	0.375E-05
5	Pu239	0.540		5.333		0.54	13.3		
	Pu240		5.147	5.145	0.0020.01	56.19	1.2	230.6	0.104E-03
			5.144	5.145	-0.001			230.6	0.104E-03

Totals: 0.965 <--valid peaks only--> 100.37

DETECTOR CALIBRATION

Energy(MEV) = 4.083 + (0.0046)*Channel
 Energy range (MeV): 4.083 TO 6.438
 Efficiency = 0.2437 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	49938.0	100.000
Smoothed	49937.6	99.999
Composite fit	48929.8	97.981
Residuals	1008.2	2.019

Analyzed by:

SLH2

Spectrum 5a5196.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc

Display Max.: 15740.3

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Raw Data Dump for AEA Spectrum: 5a5196.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	1.	0.	1.	0.	0.	0.	2.	1.
31	1.	0.	0.	1.	0.	0.	2.	0.	0.
41	1.	0.	0.	1.	0.	0.	0.	0.	3.
51	2.	0.	0.	2.	0.	1.	1.	0.	1.
61	1.	0.	0.	3.	3.	1.	3.	0.	1.
71	1.	1.	0.	1.	3.	1.	1.	0.	0.
81	1.	1.	1.	1.	2.	2.	1.	1.	1.
91	3.	0.	1.	1.	1.	1.	1.	2.	3.
101	0.	1.	1.	1.	1.	0.	2.	2.	2.
111	0.	1.	1.	0.	1.	0.	0.	1.	0.
121	0.	3.	2.	1.	1.	1.	0.	0.	1.
131	0.	0.	2.	0.	1.	3.	2.	1.	1.
141	4.	3.	2.	1.	1.	2.	2.	3.	2.
151	4.	0.	1.	3.	1.	4.	1.	1.	3.
161	2.	4.	1.	2.	1.	1.	1.	1.	3.
171	3.	0.	3.	1.	1.	4.	3.	2.	0.
181	6.	5.	2.	7.	3.	6.	2.	6.	3.
191	3.	3.	5.	8.	11.	5.	10.	8.	8.
201	14.	14.	19.	20.	21.	26.	27.	33.	38.
211	47.	67.	79.	90.	118.	178.	222.	293.	429.
221	575.	596.	652.	681.	883.	1132.	1511.	2139.	2623.
231	3564.	3404.	2575.	1393.	431.	104.	18.	5.	2.
241	4.	3.	2.	3.	2.	1.	6.	5.	3.
251	4.	1.	7.	6.	4.	8.	9.	8.	8.
261	1.	1.	6.	5.	9.	10.	10.	11.	19.
271	25.	38.	34.	16.	9.	4.	5.	12.	12.
281	7.	16.	23.	20.	34.	55.	67.	105.	117.
291	101.	68.	34.	14.	15.	13.	12.	14.	10.
301	13.	16.	41.	25.	34.	25.	26.	19.	13.
311	4.	3.	5.	4.	2.	7.	2.	2.	2.
321	3.	2.	8.	5.	3.	4.	4.	4.	7.
331	7.	7.	10.	8.	13.	11.	19.	18.	19.
341	26.	25.	37.	54.	57.	70.	105.	122.	168.
351	306.	387.	613.	707.	820.	805.	738.	659.	708.
361	1113.	1432.	1857.	2268.	2376.	2013.	1097.	366.	67.
371	6.	0.	4.	3.	3.	0.	3.	1.	0.
381	2.	2.	1.	2.	1.	0.	1.	0.	1.
391	0.	1.	0.	1.	0.	1.	1.	0.	3.
401	0.	0.	0.	0.	0.	0.	1.	2.	0.
411	0.	1.	0.	0.	0.	1.	1.	1.	2.
421	0.	0.	1.	0.	1.	0.	0.	0.	1.
431	0.	1.	0.	2.	0.	0.	0.	1.	0.
441	0.	0.	0.	1.	0.	0.	0.	1.	0.
451	0.	0.	2.	0.	0.	0.	0.	0.	0.
461	0.	0.	1.	0.	2.	0.	1.	3.	0.
471	2.	1.	1.	5.	6.	1.	2.	5.	4.
481	6.	8.	0.	0.	0.	1.	0.	1.	0.
491	1.	0.	1.	2.	0.	0.	0.	0.	1.
511	0.	0.							

222-S Analytical Laboratory
 GENERAL ALPHA ENERGY ANALYSIS
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DATA REDUCTION REPORT

SAMPLE
 WL25548-BLNK-PU
 File ID: 6a6198.CNF

Counted on: 8/14/98 @19:32
 Detector: AEA6
 Geometry number: 1
 Count time: 28810. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1936.6	1936.6	359.366	359.366	10.000	2.233	5.000	1.317
2	23.5	23.5	300.024	300.000	10.000	1.719	5.000	0.938
3	93.7	93.7	284.423	284.391	10.000	2.035	5.000	2.525
4	26.7	26.7	267.695	267.612	10.000	2.786	5.000	2.177

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate	%err c/m @95	d/m	Activity uCi/ea
		Exp.	Obs.	Diff.	FWHM				
1	Pu236	0.921	5.755	5.745	0.0100.01	41.77	1.4	182.4 0.822E-04	
2	Pu238	0.011	5.487	5.472	0.0150.01	0.50	12.7	3.0 0.134E-05	
	Am241		5.479	5.472	0.007			2.3 0.103E-05	
3	Th228	0.032	5.400	5.400	0.0000.01	1.46	7.7	8.8 0.398E-05	
4		0.012		5.323	0.01	0.54	13.6	2.3 0.104E-05	
Totals:		0.976	<---valid peaks only-->			44.27			

DETECTOR CALIBRATION

Energy(MEV) = 4.092 + (0.0046)*Channel
 Energy range (MeV): 4.092 TO 6.447
 Efficiency = 0.2336 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	21781.0	100.000
Smoothed	21781.0	100.000
Composite fit	21256.0	97.590
Residuals	525.0	2.410

Analyzed by:

SLH2

Spectrum 6a6198.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc

Display Max.: 10141.6

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4
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Raw Data Dump for AEA Spectrum: 6a6198.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
21	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
41	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.	0.
51	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.	0.
61	0.	1.	0.	0.	0.	0.	0.	1.	1.	0.	0.
71	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
81	0.	0.	0.	1.	0.	0.	0.	0.	2.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
101	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.
111	1.	2.	0.	0.	0.	0.	0.	0.	0.	0.	1.
121	1.	0.	1.	1.	1.	2.	0.	0.	2.	0.	0.
131	0.	0.	0.	0.	1.	0.	0.	0.	1.	1.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
151	0.	1.	0.	0.	0.	0.	0.	0.	1.	0.	1.
161	0.	0.	2.	1.	1.	1.	0.	0.	0.	1.	0.
171	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
181	0.	0.	2.	1.	1.	2.	0.	1.	0.	0.	0.
191	3.	0.	0.	0.	1.	3.	0.	1.	0.	0.	0.
201	0.	0.	0.	1.	1.	2.	1.	3.	1.	1.	1.
211	0.	3.	1.	3.	2.	0.	4.	2.	2.	3.	3.
221	1.	3.	2.	1.	3.	5.	3.	3.	2.	2.	2.
231	1.	0.	3.	0.	2.	0.	2.	3.	0.	2.	2.
241	0.	3.	2.	2.	2.	1.	0.	2.	2.	2.	6.
251	2.	8.	8.	7.	3.	2.	2.	3.	4.	2.	2.
261	9.	9.	8.	23.	15.	23.	31.	45.	19.	23.	23.
271	9.	9.	5.	9.	10.	14.	9.	17.	24.	23.	23.
281	37.	57.	108.	139.	123.	99.	47.	24.	7.	6.	6.
291	5.	9.	3.	10.	6.	7.	6.	17.	13.	24.	24.
301	19.	11.	14.	5.	3.	4.	0.	3.	2.	2.	2.
311	3.	3.	3.	3.	3.	3.	5.	2.	10.	10.	10.
321	10.	6.	11.	12.	13.	17.	10.	21.	15.	21.	21.
331	13.	19.	14.	18.	27.	29.	31.	51.	43.	67.	67.
341	64.	100.	95.	166.	208.	279.	427.	620.	728.	870.	870.
351	809.	643.	628.	596.	822.	1039.	1383.	1908.	2558.	2558.	2558.
361	2056.	992.	256.	40.	6.	2.	4.	1.	3.	0.	0.
371	2.	1.	4.	0.	1.	1.	1.	0.	1.	1.	1.
381	0.	0.	0.	2.	1.	0.	1.	0.	1.	0.	0.
391	0.	0.	0.	0.	1.	2.	0.	0.	1.	0.	0.
401	0.	0.	0.	0.	0.	1.	0.	0.	2.	0.	0.
411	0.	1.	0.	0.	0.	0.	1.	0.	1.	2.	2.
421	0.	0.	1.	0.	2.	0.	0.	0.	0.	0.	0.
431	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	1.	0.	0.	1.	0.	0.	0.	1.	0.	0.	0.
451	1.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.
461	0.	1.	2.	2.	0.	0.	3.	0.	3.	7.	7.
471	3.	5.	4.	2.	4.	6.	4.	1.	0.	0.	0.
481	1.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
491	0.	0.	0.	1.	0.	0.	0.	1.	1.	2.	2.
511	0.	0.									

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DATA REDUCTION REPORT

SAMPLE
S98T2346-SAM-PU
File ID: 7a7224.CNF

Counted on: 8/14/98 @19:33
Detector: AEA7
Geometry number: 1
Count time: 28809. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1696.2	1696.2	362.623	362.623	8.000	2.373	4.000	1.155
2	67.3	67.3	304.191	304.174	10.000	3.311	5.000	1.171
3	77.1	77.1	287.853	287.667	8.000	2.183	4.000	1.947
4	22.6	22.6	270.704	270.342	10.000	3.394	5.000	1.535
5	101.8	101.8	229.870	229.866	10.000	3.137	5.000	1.671

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate	%err c/m @95	d/m	Activity uCi/ea
1	Pu236	0.836	5.755	5.760	-.0050	0.01	41.29	1.4	172.5	0.777E-04
	Cm243		5.779	5.760	0.019				231.6	0.104E-03
2	Pu238	0.043	5.487	5.491	-.0040	0.02	2.12	6.2	12.1	0.544E-05
	Am241		5.479	5.491	-.012				9.3	0.417E-05
3	Th228	0.028	5.400	5.415	-.0150	0.01	1.37	9.6	7.9	0.356E-05
4		0.013		5.336		0.02	0.62	14.2	2.5	0.114E-05
5	Pu239	0.051	5.147	5.149	-.0020	0.01	2.51	5.7	10.3	0.463E-05
	Pu240		5.144	5.149	-.005				10.3	0.463E-05

Totals:			0.970	<--valid peaks only-->			47.92			

DETECTOR CALIBRATION

Energy(MEV) = 4.092 + (0.0046)*Channel

Energy range (MeV): 4.092 TO 6.447

Efficiency = 0.2442 CPM/DPM

(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	23712.0	100.000
Smoothed	23711.9	99.999
Composite fit	23007.1	97.027
Residuals	704.9	2.973

9145.1

166

Raw Data Dump for AEA Spectrum: 7a7224.CNF

HNF-1644 REV.0

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
21	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.
31	0.	2.	0.	0.	0.	0.	0.	0.	0.	1.	0.
41	0.	1.	2.	1.	1.	1.	0.	0.	0.	0.	1.
51	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	2.
61	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.
71	0.	1.	0.	0.	1.	0.	0.	0.	0.	0.	0.
81	0.	0.	0.	0.	0.	2.	0.	0.	0.	1.	0.
91	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.
101	0.	1.	1.	0.	0.	0.	1.	0.	1.	1.	1.
111	0.	1.	0.	1.	2.	0.	0.	1.	1.	0.	0.
121	0.	0.	1.	1.	0.	0.	1.	0.	0.	1.	1.
131	1.	0.	0.	0.	1.	0.	0.	1.	2.	1.	1.
141	0.	0.	2.	1.	1.	3.	1.	2.	1.	0.	0.
151	0.	0.	0.	0.	0.	4.	0.	0.	0.	0.	0.
161	1.	0.	1.	0.	1.	2.	2.	1.	3.	3.	3.
171	0.	2.	2.	0.	1.	1.	1.	0.	3.	3.	3.
181	3.	0.	1.	2.	2.	3.	1.	1.	2.	1.	1.
191	1.	1.	1.	2.	0.	7.	5.	4.	1.	4.	4.
201	4.	2.	4.	6.	5.	4.	7.	5.	13.	4.	4.
211	6.	12.	15.	9.	15.	14.	28.	27.	26.	29.	29.
221	33.	51.	31.	44.	63.	54.	84.	93.	117.	125.	125.
231	118.	94.	46.	21.	13.	6.	1.	0.	6.	2.	2.
241	4.	2.	2.	4.	2.	2.	6.	7.	7.	1.	1.
251	10.	9.	9.	8.	6.	3.	9.	9.	8.	4.	4.
261	6.	4.	4.	12.	12.	16.	23.	24.	29.	28.	28.
271	31.	34.	19.	15.	17.	9.	18.	18.	17.	22.	22.
281	31.	31.	37.	36.	71.	79.	100.	132.	98.	67.	67.
291	40.	32.	27.	25.	38.	34.	45.	28.	34.	42.	42.
301	40.	49.	62.	88.	91.	52.	43.	17.	9.	10.	10.
311	10.	7.	10.	8.	11.	14.	15.	13.	12.	15.	15.
321	17.	14.	25.	29.	19.	33.	27.	33.	33.	41.	41.
331	36.	48.	45.	57.	59.	65.	61.	67.	95.	93.	93.
341	94.	111.	132.	146.	207.	188.	200.	269.	306.	429.	429.
351	567.	720.	812.	850.	689.	639.	605.	749.	952.	1168.	1168.
361	1548.	1978.	2248.	1965.	1161.	445.	87.	8.	3.	2.	2.
371	0.	2.	1.	1.	1.	1.	0.	1.	2.	1.	1.
381	2.	0.	2.	0.	0.	0.	0.	1.	2.	0.	0.
391	0.	0.	1.	2.	0.	0.	0.	0.	1.	0.	0.
401	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.	0.
411	0.	0.	2.	2.	0.	0.	0.	0.	1.	0.	0.
421	0.	0.	0.	1.	0.	0.	2.	0.	0.	1.	1.
431	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.	0.
441	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	1.	0.	1.	0.	0.	1.	1.
461	0.	1.	0.	0.	0.	1.	0.	0.	3.	1.	1.
471	2.	4.	6.	2.	7.	8.	5.	3.	2.	1.	1.
481	2.	1.	1.	1.	0.	0.	0.	0.	1.	1.	1.
491	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
511	0.	0.									

222-S Analytical Laboratory
GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98T2346-DUP-PU
File ID: 8a8180.CNF

Counted on: 8/14/98 @19:34
Detector: AEA8
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1892.8	1892.8	364.055	364.055	10.000	2.231	5.000	1.318
2	76.9	76.9	305.670	305.667	8.000	2.209	4.000	1.118
3	88.3	88.3	289.254	289.141	10.000	2.126	5.000	2.746
4	23.5	23.5	271.758	271.669	10.000	3.264	5.000	2.365
5	121.3	121.3	231.460	231.460	10.000	3.418	5.000	2.691

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err c/m @95	d/m	Activity uCi/ea
		Exp.	Obs.	Diff.	FWHM			
1	Pu236	0.850	5.755	5.754	0.0010.01	40.78	1.4	185.4 0.835E-04
2	Pu238	0.038	5.487	5.485	0.0020.01	1.80	6.7	11.2 0.503E-05
	Am241		5.479	5.485	-0.006			8.6 0.385E-05
3	Th228	0.029	5.400	5.409	-0.0090.01	1.39	8.7	8.7 0.393E-05
4		0.011		5.329	0.02	0.51	14.4	2.3 0.103E-05
5	Pu239	0.054	5.147	5.144	0.0030.02	2.60	5.5	11.6 0.522E-05
	Pu240		5.144	5.144	0.000			11.6 0.522E-05

Totals:		0.981	<--valid peaks only-->			47.09		

DETECTOR CALIBRATION

Energy(MEV) = 4.079 + (0.0046)*Channel
Energy range (MeV): 4.079 TO 6.434
Efficiency = 0.2245 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	23042.0	100.000
Smoothed	23041.8	99.999
Composite fit	22604.6	98.102
Residuals	437.4	1.898

Analyzed by: _____

Spectrum 8a8180.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc

Display Max.: 11091.9

5
 ...5
 .5

 4
 4
 4
 3
 23.
 .2
 .2

 .1
1
1
1
1
 ...1.....

Raw Data Dump for AEA Spectrum: 8a8180.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
31	1.	1.	0.	0.	0.	0.	0.	0.	2.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	1.	0.	0.	1.	1.	0.	0.	1.
61	2.	0.	0.	0.	0.	2.	1.	1.	0.	1.
71	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.
91	0.	0.	0.	1.	0.	2.	1.	0.	1.	1.
101	0.	1.	0.	0.	1.	0.	0.	0.	1.	0.
111	0.	0.	0.	1.	0.	0.	0.	1.	1.	0.
121	1.	0.	0.	0.	0.	0.	0.	0.	1.	1.
131	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
141	0.	0.	1.	0.	2.	0.	0.	2.	1.	0.
151	2.	0.	0.	1.	0.	1.	0.	0.	0.	1.
161	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
171	0.	0.	0.	1.	0.	1.	0.	1.	3.	0.
181	2.	0.	1.	1.	0.	1.	2.	0.	0.	1.
191	0.	0.	2.	1.	1.	1.	1.	0.	2.	4.
201	1.	1.	0.	0.	3.	3.	3.	0.	2.	1.
211	1.	5.	3.	2.	4.	7.	4.	13.	22.	12.
221	23.	19.	25.	41.	37.	55.	60.	85.	103.	131.
231	142.	156.	127.	82.	60.	22.	15.	2.	1.	1.
241	3.	2.	1.	2.	2.	1.	2.	3.	0.	4.
251	1.	3.	2.	2.	4.	1.	6.	9.	3.	6.
261	5.	3.	2.	5.	9.	7.	9.	13.	16.	23.
271	29.	33.	30.	14.	11.	10.	5.	11.	10.	12.
281	11.	19.	22.	21.	24.	50.	83.	103.	125.	138.
291	90.	34.	21.	21.	28.	38.	29.	30.	38.	33.
301	36.	34.	51.	58.	86.	112.	83.	52.	15.	4.
311	2.	2.	2.	5.	0.	3.	5.	2.	4.	1.
321	4.	3.	6.	8.	7.	5.	10.	5.	10.	5.
331	14.	11.	18.	11.	15.	12.	7.	14.	25.	26.
341	36.	32.	39.	46.	71.	85.	113.	110.	161.	227.
351	326.	471.	668.	751.	863.	738.	577.	552.	677.	806.
361	1104.	1552.	2064.	2510.	2379.	1703.	700.	165.	27.	3.
371	0.	4.	4.	0.	0.	1.	0.	0.	0.	1.
381	2.	0.	1.	1.	0.	2.	0.	0.	0.	0.
391	1.	0.	0.	0.	1.	0.	0.	0.	0.	1.
401	0.	0.	1.	1.	1.	0.	0.	0.	0.	0.
411	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	1.	0.	1.	1.	1.	3.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
461	0.	0.	0.	0.	0.	1.	2.	1.	4.	0.
471	0.	1.	1.	2.	5.	4.	8.	12.	5.	3.
481	0.	3.	1.	0.	1.	0.	0.	1.	1.	0.
491	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
511	0.	0.								

HNF-1644 REV. 0

OPPORTUNISTIC ANALYTES

APPENDIX A

HNF-1644 REV. 0

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Appendix A. Opportunistic Analyte Results.
S-304 GRAB

RISE: 4

SEGMENT #: 304S-98-1

SEGMENT PORTION: Supernate

Sample#	RM#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk	Rec %	Det Limit	Count Err%
S981002344	D	Silver-ICP-Acid Dil.	ug/mL	97.20	<1.00e-02	3.10e-02	2.92e-02	2.97e-02	3.70	77.30	1.00e-02	n/a	n/a
S981002344	D	Arsenic-ICP-Acid Dil.	ug/mL	100.0	<1.00e-01	<1.00e-01	<1.00e-1	n/a	n/a	114.0	5.00e-01	n/a	n/a
S981002344	D	Boron-ICP-Acid Dil.	ug/mL	98.40	<5.00e-02	1.11e-01	1.00e-01	1.08e-01	4.61	94.70	5.00e-02	n/a	n/a
S981002344	D	Barium-ICP-Acid Dil.	ug/mL	98.80	<5.00e-02	<5.00e-02	<5.00e-2	n/a	n/a	94.70	5.00e-02	n/a	n/a
S981002344	D	Beryllium-ICP-Acid Dil.	ug/mL	101.0	<5.00e-03	<5.00e-03	<5.00e-3	n/a	n/a	101.0	5.00e-03	n/a	n/a
S981002344	D	Bismuth-ICP-Acid Dil.	ug/mL	99.60	<1.00e-01	<1.00e-01	<1.00e-1	2.470	1.63	91.60	1.00e-01	n/a	n/a
S981002344	D	Calcium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-03	<5.00e-03	<5.00e-3	2.450	1.63	91.60	1.00e-01	n/a	n/a
S981002344	D	Cadmium-ICP-Acid Dil.	ug/mL	100.8	<1.00e-01	<1.00e-01	<1.00e-1	n/a	n/a	96.30	5.00e-03	n/a	n/a
S981002344	D	Cerium-ICP-Acid Dil.	ug/mL	98.60	<2.00e-02	<2.00e-02	<2.00e-2	n/a	n/a	95.80	2.00e-02	n/a	n/a
S981002344	D	Cobalt-ICP-Acid Dil.	ug/mL	98.60	<1.00e-02	<1.00e-02	<1.00e-2	n/a	n/a	91.70	2.00e-02	n/a	n/a
S981002344	D	Copper-ICP-Acid Dil.	ug/mL	108.2	<5.00e-01	<5.00e-02	9.650	9.875	4.56	81.70	5.00e-01	n/a	n/a
S981002344	D	Fluorine-ICP-Acid Dil.	ug/mL	100.4	<5.00e-02	<5.00e-02	<5.00e-2	n/a	n/a	97.60	5.00e-02	n/a	n/a
S981002344	D	Lithium-ICP-Acid Dil.	ug/mL	104.2	<1.00e-02	<1.00e-02	<1.00e-2	n/a	n/a	95.40	1.00e-02	n/a	n/a
S981002344	D	Magnesium-ICP-Acid Dil.	ug/mL	99.10	<1.00e-01	2.93e-01	2.87e-01	2.90e-01	2.07	96.40	1.00e-01	n/a	n/a
S981002344	D	Molybdenum-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	6.00e-01	5.88e-01	5.97e-01	2.85	96.50	5.00e-02	n/a	n/a
S981002344	D	Nickel-ICP-Acid Dil.	ug/mL	99.12	<1.00e-01	<1.00e-01	<1.00e-1	n/a	n/a	95.90	1.00e-01	n/a	n/a
S981002344	D	Niobium-ICP-Acid Dil.	ug/mL	98.80	<2.00e-02	1.68e-01	1.69e-01	1.89e-01	0.53	95.80	2.00e-02	n/a	n/a
S981002344	D	Lead-ICP-Acid Dil.	ug/mL	98.80	<2.00e-01	2.590	2.590	2.590	0.00	97.00	2.00e-01	n/a	n/a
S981002344	D	Silver-ICP-Acid Dil.	ug/mL	97.20	<1.00e-01	<1.00e-01	<1.00e-1	n/a	n/a	91.80	1.00e-01	n/a	n/a
S981002344	D	Antimony-ICP-Acid Dil.	ug/mL	99.00	<1.00e-02	6.070	5.850	5.960	3.69	82.50	1.00e-01	n/a	n/a
S981002344	D	Selenium-ICP-Acid Dil.	ug/mL	98.20	<6.00e-02	<6.00e-02	<6.00e-2	n/a	n/a	99.60	6.00e-02	n/a	n/a
S981002344	D	Silicon-ICP-Acid Dil.	ug/mL	98.60	<1.00e-01	2.99e-01	3.59e-01	3.77e-01	11.4	122.0	1.00e-01	n/a	n/a
S981002344	D	Samarium-ICP-Acid Dil.	ug/mL	100.9	<1.00e-02	2.730	2.690	2.120	2.83	100.0	5.00e-02	n/a	n/a
S981002344	D	Strontium-ICP-Acid Dil.	ug/mL	99.12	<1.00e-02	<1.00e-01	<1.00e-1	n/a	n/a	93.90	1.00e-01	n/a	n/a
S981002344	D	Titanium-ICP-Acid Dil.	ug/mL	99.80	<1.00e-02	<1.00e-02	<1.00e-2	n/a	n/a	98.10	1.00e-02	n/a	n/a
S981002344	D	Thallium-ICP-Acid Dil.	ug/mL	94.40	<1.00e-02	<1.00e-02	<1.00e-2	n/a	n/a	89.40	1.00e-02	n/a	n/a
S981002344	D	Vanadium-ICP-Acid Dil.	ug/mL	97.40	<2.00e-01	<2.00e-01	<2.00e-1	n/a	n/a	90.00	2.00e-01	n/a	n/a
S981002344	D	Zinc-ICP-Acid Dil.	ug/mL	98.40	<2.00e-02	<5.00e-02	12.80	13.00	3.08	75.00	5.00e-01	n/a	n/a
S981002344	D	Bromide by Ion Chromatograph	ug/mL	100.9	<1.00e-02	5.19e-02	5.07e-02	5.13e-02	2.34	94.60	5.00e-02	n/a	n/a
S981002344	D	Oxalate-IC-Dioxyn 4000/450	ug/mL	96.25	<1.00e-01	<1.00e-01	<1.00e-1	n/a	n/a	96.40	2.605	n/a	n/a
S981002344	D	Cobalt-60 by BEA	uCi/mL	103.6	<2.88e-05	<3.22e-05	<2.84e-5	n/a	n/a	n/a	3.22e-05	n/a	n/a

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		ECN NO.: N/A			
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