NOV 05 1998

4 ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 623171

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Waste Management Laboratory		4. Related EDT No.: N/A	
5. Proj./Prog./Dept./Div.: Tank 241-S-102 Core/Waste Management/PPC/WML		6. Design Authority/ Design Agent/Cog. Engr.: Franciska H. Steen		7. Purchase Order No.: N/A	
8. Originator Remarks: This document is being released into the supporting document system for retrievability purposes.				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: 241-S-102	
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No For release.				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: 11/04/98	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-1649	N/A	0	Tank 241-S-102, Cores 232, Analytical Results for the Final Report	Q	2	1	1

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WMC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledge

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)								
(G) Reason	(H) Disposition	(J) Name	(K) Signature (M) MSIN	(L) Date	(G) Reason	(H) Disposition	(J) Name	(K) Signature (M) MSIN
		Design Authority						
		Design Agent						
2	1	Cog.Eng. F. H. Steen	<i>[Signature]</i>	11/4/98				
2	1	Cog. Mgr. D. B. Hardy	<i>[Signature]</i>	11/4/98				
2	1	QA T. L. Tung	<i>[Signature]</i>	11/4/98				
		Safety						
		Env.						
18. L. A. Diaz <i>[Signature]</i> 11/4/98 Signature of EDT Date Originator		19. N/A Authorized Representative Date for Receiving Organization		20. D. B. Hardy <i>[Signature]</i> 11/4/98 Design Authority Date Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments		

Tank 241-S-102, Core 232 Analytical Results for the Final Report

Franciska H. Steen

Waste Management of Hanford, Inc., Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: EDT-623171

UC: 2070

Org Code: 31B00

Charge Code: LC087

B&R Code: EW 3120074

Total Pages: 276

Key Words: Tank-241-S-102, S Farm, S-102, 241-S-102 Tank Characterization, Core, Analytical Results, Final Report

Abstract: N/A

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

Release Approval Date

Release Stamp

Approved for Public Release

HNF-1649 REV. 0

WASTE MANAGEMENT LABORATORY

**TANK 241-S-102, CORES 232,
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

**222-S Laboratory
Waste Management of Hanford, Inc.
P.O. Box 700
Richland, Washington**

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

Narrative	1
S-102 Sample Breakdown (Attachment 1)	17
Correspondence (Attachment 2)	22
Sample Data Summary	35
Chain of Custody Forms	40
Photographs	56
Sample Handling	63
Extrusion Worklist # 22919 (901)	65
Extrusion Worklist # 22920 (884)	66
Extrusion Worklist # 23024 (1041)	67
Extrusion Worklist # 23338 (1178)	68
Extrusion Worklist # 23339 (1180)	69
Inorganic Analysis	70
Differential Scanning Calorimetry (DSC)	
DSC Worklist # 25895 (2514)	72
DSC Worklist # 26515 (2514)	76
Thermogravimetric Analysis (TGA)	
TGA Worklist # 25897 (2514)	77
Specific Gravity Analysis (SpG)	
SpG Worklist # 25899 (2515)	81
pH Analysis	
pH Worklist # 25888	85
Hydroxide Analysis (OH)	
OH Worklist # 25887 (2514)	87
Ammonia Analysis (NH ₃)	
NH ₃ Analysis # 25889 (2516)	95
Ion Chromatographic Analysis (IC)	
IC Worklist # 22904 (902, 903)	121
IC Worklist # 25892 (2515)	130
IC Worklist # 25981 (2515)	139

TABLE OF CONTENTS (Continued)

Inductively Coupled Plasma Analysis (ICP)	
ICP Worklist # 22998 (902, 903)	148
ICP Worklist # 25960 (2515)	153
Inductive Coupled Plasma / Mass Spectrometer (ICP/MS)	
ICP/MS Worklist # 26075 (2514)	159
Total Inorganic Carbon/Total Organic Carbon Analysis (TICTOC)	
TICTOC Worklist # 25890 (2515)	183
Radiochemical Analysis	202
Gamma Energy Analysis (GEA)	
GEA Worklist # 25886 (2516)	204
Strontium 90 Analysis (Sr90)	
Sr90 Worklist # 25884 (2516)	222
Americium 241 Analysis (Am241)	
Am241 Worklist # 26365 (2679)	228
Plutonium 239 Analysis (Pu239)	
Pu239 Worklist # 26209 (2679)	247
Opportunistic Analytes (Appendix A)	266

This document consists of pages 1 to 270. Pages ii, 2, 18, 23, 36, 41, 57, 64, 71, 203 and 267 were intentionally left blank.

This document contains pages 159.1.

TRADEMARKS:

Perkin-Elmer is a Registered Trademark of Research and Manufacturing Company, Inc.

Dionex is a Trademark of Dionex Corporation.

NARRATIVE

THIS PAGE INTENTIONALLY LEFT BLANK

WASTE MANAGEMENT LABORATORY

TANK 241-S-102, CORE 232,
ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the analytical laboratory report for tank 241-S-102 push mode core segments collected between March 5, 1998 and April 2, 1998. The segments were subsampled and analyzed in accordance with the *Tank 241-S-102 Retained Gas Sampler System Sampling and Analysis Plan (TSAP)* (McCain, 1998), *Letter of Instruction for Compatibility Analysis of Samples from Tank 241-S-102 (LOI)* (Thompson, 1998) and the *Data Quality Objectives for Tank Farms Waste Compatibility Program (DQO)* (Mulkey and Miller, 1998). The analytical results are included in the data summary table (Table 1).

None of the samples submitted for Differential Scanning Calorimetry (DSC), Total Organic Carbon (TOC) and Plutonium 239 (Pu239) exceeded notification limits as stated in the TSAP (McCain, 1998). The statistical results of the 95% confidence interval on the mean calculations are provided by the Tank Waste Remediation Systems Technical Basis Group in accordance with the Memorandum of Understanding (Schreiber, 1997) and not considered in this report.

The TSAP (McCain, 1998) required the core samples to be extruded and archived. A separate LOI was received requesting analyses associated with the Compatibility DQO be performed on these samples. One segment contained sufficient liquid material to perform these analyses, core 232 segment 1.

Selected segments from core 232 (2, 4, 4R, 6, 7, 8 and 10) were sampled using the Retained Gas Sampler (RGS) and extruded by Chemistry, Analysis and Technical Support Group. During the RGS extrusion process, the samples were diluted with 300 mL of 0.04 M ammonium hydroxide solution. These samples were archived for possible future analyses.

Appearance and Sample Handling

Attachment 1 is a cross reference to relate the tank farm identification numbers to the 222-S Laboratory LabCore/LIMS sample numbers. The subsamples generated in the laboratory for analyses are identified in these diagrams with their sources shown.

Core 232

Twelve push mode core segments were removed from tank 241-S-102 riser 19 between March 5, 1998 and April 2, 1998. Segments were received by the 222-S Laboratory between March 6, 1998 and April 3, 1998. Eleven segments were expected to be taken from core 232. However, due to the poor sample recovery obtained during the sampling of segment 4, an additional segment was taken and identified as 4R.

HNF-1649, REV. 0

The TSAP (McCain, 1998) states the core samples should be transported to the laboratory within three calendar days from the time each segment is removed from the tank, this requirement was not met for some of the segments from core 232. Table 2 summarizes the extrusion information.

Field Blank

A field blank was provided to the 222-S laboratory with core 232 and was submitted to the laboratory for IC and ICP analyses.

Hydrostatic Head Fluid

A sample of the hydrostatic head fluid (HHF) lithium bromide solution was provided with core 232 and was submitted to the laboratory for IC and ICP analyses.

Table 2. Sample Receipt and Extrusion Information for 241-S-102, Core 232.

Container Segment Id	Date Sampled	Date Received	Date Extruded	Initial Extrusion	Liquid Residuals (g)	Solids Recovered (g)	Sample Description
232-01	03/05/98	03/09/98	03/16/98	0.0	350.6-Drainable	0.0	The liquid was yellow in color and clear. Collected 250 ml. of liquid. No organic layer was observed.
232-02	03/05/98	03/06/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-03	03/05/98	03/06/98	03/16/98	12.0	<0.6-Drainable	219.0-Upper half 186.4-Lower half	The solids were gray and white in color and resembled a wet ash. The liquid was dark gray in color, opaque and subsampled in with the upper half solids.
232-04	03/05/98	03/06/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-4R	03/06/98	03/06/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-05	03/06/98	03/17/98	03/18/98	0.0	0.0	0.0	Sampler empty.
232-06	03/06/98	03/30/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-07	03/18/98	03/30/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-08	03/18/98	03/30/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-09	04/02/98	04/03/98	04/14/98	17.0	0.0	257.0-Upper half 223.4-Lower half	The solids were gray in color and resembled a wet ash.
232-10	04/02/98	04/03/98	N/A	N/A	N/A	N/A	This segment was sampled using a retained gas sampler (RGS). Extrusion information is not included in this report.
232-11	04/02/98	04/03/98	04/14/98	13.0	0.0	170.9-Upper half 161.1-Lower half	The solids were black in color and resembled a moist ash.

Analytical Results Summary

The data summary report (Table 1) compiles the analytical results that satisfy all applicable DQOs.

Inorganic Analyses

Differential Scanning Calorimetry (DSC)

The DSC analysis was performed in duplicate on direct subsamples. The exothermic energy based on the dry weight of the 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. More information may be obtained by examining the raw data.

The standard recovery for this analysis was within the required limits of 80%-120% and the Relative Percent Difference (RPD) was less than 20%.

Thermogravimetric Analysis (TGA)

The TGA analysis was performed in duplicate on direct subsamples. Typically TGA results are determined by summing the weight loss steps which occurred below 250°C; weight loss steps above this are not used to determine the result. More information may be obtained by examining the raw data. The standard recovery for this analysis was within the required limits of 80%-120% and the RPD was less than 20%.

Specific Gravity

Specific gravity analysis was performed in duplicate on direct subsamples. The results for this analyses are provided in Table 1. Although there were no quality control (QC) parameters stated in the TSAP (McCain, 1998) for standard recovery, it was within the control limits of the laboratory. The RPD was less than 20%.

pH

The pH analysis was performed on direct subsamples as indicated by a blank in the aliquot class (A#) column in Table 1. The results were 13.75 and 13.83. Results for pH that are greater than 12.5 are suspect and should be considered estimates because the highest calibration buffer available is 12.5 and pH electrode performance degrades at high pH. The standard values for this analysis were within the required limits.

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 recovery was within the required limits of 80% - 120%. The RPDs were less than 20%.

NH₃ - Ammonia

The NH₃ analysis was performed on a direct aliquots of the liquid subsamples as indicated by a blank in the A# column in Table 1. A RPD of 34.9% was reported for S98T002516. A triplicate analysis was performed but due to the small sample sized used for the analysis, a value less than the detection limit was reported. The triplicate results are presented in Table 3 and are included for informational purposes only.

Table 3. Triplicate Results for NH3 Analysis

Labcore ID	Sample Result	Duplicate Result	Triplicate Result
S98T002516	34.7	24.4	<20.0

A spike recovery outside of the required range (75%-125%) was reported for S98T002516. The spike failure was due to the high concentration of this analyte in the sample with respect to the amount of spike standard added. The standard recovery was within the required limits of 80%-120%.

Ion Chromatography (IC)

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

The required analyte for the field blank and lithium bromide blank was bromide (Br⁻). The required analytes for the liquid core sample (S98T002515) were fluoride (F⁻), chloride (Cl⁻), nitrate (NO₃⁻), nitrite (NO₂⁻), phosphate (PO₄⁻³) and sulfate (SO₄⁻²). All other analyte results are considered "opportunistic" and do not have customer defined QC parameters. Therefore, any anomalies in those results are not discussed in this report. The results for the opportunistic analytes are presented in Appendix A. The standard recoveries for this analysis were within the required limits of 80%-120%, the spike recoveries were within the required limits of 75%-125% and the RPDs were less than 20%.

Inductively Coupled Plasma Spectrophotometry (ICP)

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 required analyte for the field blank and lithium bromide blank was lithium (Li). The required analytes for the liquid core sample (S98T002515) were aluminum (Al), chromium (Cr), iron (Fe), manganese (Mn), sodium (Na), nickel (Ni) and zirconium (Zr). All other analyte results are considered "opportunistic" and do not have customer defined QC parameters. Therefore, any anomalies in those results are not discussed in this report. The results for the opportunistic analytes are presented in Appendix A.

Matrix spike recoveries outside of the 75% to 125% control limits as set by the TSAP (McCain, 1998) were reported for aluminum (Al) and sodium (Na). This was attributed to the high concentration of these analytes 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 recoveries were within the required limits. More information may be obtained by examining the raw data.

The Al and Na results were more than four times the concentration of the spike added. Typically, with analyte concentrations higher than 1000 µg/mL it is difficult to add sufficient spike to perform a meaningful analysis. Therefore, the assessment of the accuracy of the measurement for these analytes were 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 ±10% of the undiluted sample result. The results of this comparison are presented in Table 4 and indicate the accuracy of this analysis was acceptable.

Table 4. ICP Serial Dilution Results for Tank 241-S-102 Core Samples

Sample ID	Analyte	Undiluted Sample Results (mg/mL)	Serial Dilution Result	Percent Difference (%)
S98T002515	Al	26900	27800	3.5
S98T002515	Na	212000	228000	7.5

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

HNF-1649, REV. 0

The RPDs for these analytes were less than 20% and the standard recoveries were within the required limits of 80%-120%.

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

The liquid subsamples were prepared for analysis by an acid adjustment of the direct subsample. The results for the ICP/MS isotopic uranium are included in Table 1. The standard and spike recoveries for Uranium 238 were within the required limits. The RPDs were less than 20%.

TIC/TOC - Total Inorganic/Organic Carbon Persulfate

TIC/TOC analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples. None of the results exceeded the TOC notification limit of 30,000 $\mu\text{gC/mL}$. The results are included in Table 1.

For all TIC and TOC analyses, 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 was not used in the final calculations and had 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.

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

Radionuclide Analyses

GEA - Gamma Energy Analysis

Gamma energy analysis (GEA) was performed in duplicate on direct samples. The QC review discussed in this report is limited to ^{137}Cs . All other analyte results are considered "opportunistic" and do not have customer defined QC parameters. Therefore, any anomalies in those results are not discussed in this report. The results for the opportunistic analytes are presented in Appendix A.

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.

HNF-1649, REV. 0

For the GEA analysis some radionuclides have peak energies that are very close together and cannot always be separated. When this occurs most software will report all isotopes with an energy near the found peak energy. The chemist eliminates the data from the radionuclides that are not present by crossing-out the unused peaks.

The standard recovery was within the required limits of 80%-120%. The RPD was less than 20%.

⁹⁰Sr - Strontium 90

⁹⁰Sr analysis was performed in duplicate on direct subsamples as indicated by a blank in the A# column in Table 1. The standard recovery was within the required limits of 75% - 125%. The RPD was less than 20%.

²⁴¹Am - Americium 241

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

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

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

Compatibility Program Concerns

DSC - Differential Scanning Calorimetry - Energetics Decision Rule

For waste compatibility energetics decision concerns, the exotherm/endothrm ratio of the liquid samples is evaluated. This ratio must be less than one (1). The exotherm and endotherm results and the calculated ratios are presented Table 5.

Table 5. DSC Endotherm/Exotherm Results for Tank 241-S-102 Core Samples

Sample ID		Exothermic Energy (Joules/g)	Temp (°C)	Endothermic Energy (Joules/g)	Temp (°C)	Energy Ratio*
Core 232 Segment 1 Drainable Liquid						
S98T002514	Samp	44.66	234.17	1241.1	109.0	0.04
S98T002514	Dup	44.07	234.33	993.1	113.1	0.04

Energy Ratio = Exothermic Energy/Endothermic Energy

* - This ratio must be <1 for Compatibility Energetics

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

The results with respect to the waste compatibility corrosion rules are presented in Table 6. The NO₃⁻, OH⁻, and NO₂⁻ results are reported in µg/mL and molarity (M) units. The spreadsheet compares the results to the concentration ranges specified in the waste compatibility DQO. A "YES" will appear in the appropriate space for the condition that is met. Only one of three sets of conditions must be met for OH⁻ and NO₂⁻ based on the range that the NO₃⁻ concentration falls in. If "NO" appears in the space under a condition, that condition is not met and a notification is required. The hydroxide results for all of the samples analyzed were within the acceptable concentration ranges required for corrosion control.

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 µCi/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 ²³⁹Pu equivalents.

Table 6. Waste Compatibility Corrosion Rules for 241-S-102

Sample ID	Analyte	Result (ug/mL)	Result (M)	$1s [NO_3] \leq 1.0 M?$	$1s [OH] \leq 0.010 M \leq [OH] \leq 8.0 M?$	$1s [NO_3] \leq 0.011 M \leq [NO_3] \leq 5.5 M$	$1s [OH] + [NO_3] \leq [NO_3]/([OH] + [NO_3]) < 2.5?$
C232 S1 Liquid Sample	NO ₃	1.98E+05	3.194				
	OH	3.79E+04	2.229				
	NO ₂	1.01E+05	2.196				

Sample ID	Analyte	Result (ug/mL)	Result (M)	$1s [NO_3] \leq 1.0 M?$	$1s [OH] \leq 0.010 M \leq [OH] \leq 8.0 M?$	$1s [NO_3] \leq 0.011 M \leq [NO_3] \leq 5.5 M$	$1s [OH] + [NO_3] \leq [NO_3]/([OH] + [NO_3]) < 2.5?$
C232 S1 Liquid Duplicate	NO ₃	2.03E+05	3.274				
	OH	3.72E+04	2.188				
	NO ₂	1.00E+05	2.174				

Procedures

Table 7 lists the analytical procedures used for performing the sample analyses. Abbreviations for analyses are defined in the table notes.

Table 7. 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
pH	Liquid	N/A	LA-212-106 Rev. C-2
OH	Liquid	N/A	LA-211-102 Rev. D-0
IC	Liquid	N/A	LA-533-105 Rev. E-0
ICP	Liquid	N/A	LA-505-161 Rev. C-2
ICP/MS	Liquid	LA-504-101 Rev. E-0	LA-506-101 Rev. A-1
NH ₃	Liquid	N/A	LA-631-001 Rev. C-0
TICTOC	Liquid	N/A	LA-342-100 Rev. F-1

Table 7. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
²³⁹ Pu	Liquid	N/A	LA-953-104 Rev. B-0
²⁴¹ Am	Liquid	N/A	LA-953-104 Rev. B-0
GEA	Liquid	N/A	LA-548-121 Rev. F-0
Sr90	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

OH = hydroxide

pH = pH

Sp.G. = specific gravity

IC = ion chromatography

ICP = inductively coupled plasma

ICP/MS = inductively coupled plasma/mass spectroscopy

TIC/TOC = total inorganic/organic carbon

Sr90 = strontium 90

Pu239 = plutonium 239

Am241 = americium 241

HNF-1649, REV. 0

References

- McCain, D. J. , 1998, *Tank 241-S-102 Retained Gas Sampler System Sampling and Analysis Plan*, HNF-1907, Rev. 0, Lockheed Martin Hanford Corporation, Richland, WA 99352.
- Mulkey, C. H. and M. S. Miller, 1998, *Data Quality Objectives for the Waste Compatibility Program*, HNF-SD-WM-DQO-001, Rev. 2, Lockheed Martin Hanford Corporation, Richland, WA 99352.
- Schreiber, R. D., 1997, *Fiscal Year 1997 Memorandum of Understanding for the TWRS Characterization Project*, HNF-SD-WM-SD-023, Rev. 0, Lockheed Martin Hanford Corporation, Richland, WA 99352
- Markel, L. P., 1998, *Quality Assurance Plan for the 222-S Laboratories*, HNF-SD-CP-QAPP-016, Rev. 3, Rust Federal Services of Hanford, Inc., Richland, WA 99352.
- Thompson, R. R., 1998, *Letter of Instruction for Compatibility Analysis of Samples from Tank 241-S-102*, (interoffice memo 7A120-98-039 to C. M. Seidel, August 12), Lockheed Martin Hanford Company, Richland, WA 99352. (Included in Attachment 2, Correspondence).

THIS PAGE WAS INTENTIONALLY LEFT BLANK

SAMPLE BREAKDOWN
ATTACHMENT 1

THIS PAGE WAS INTENTIONALLY LEFT BLANK

S-102

Core:232

Seg: 1

S98T000901

Attachment 1

HNF-1649 REV. 0

S-102
Core:232
Seg: FB
S98T000902

Attachment 1

HNF-1649 REV. 0

S98T000902

S-102
Core:232
Seg: LiBr
S98T000903

Attachment 1

HNF-1649 REV. 0

**CORRESPONDENCE
ATTACHMENT 2**

THIS PAGE WAS INTENTIONALLY LEFT BLANK

INTEROFFICE MEMO

LOCKHEED MARTIN

From: Data Assessment and Interpretation 7A120-98-039
 Phone: 376-6914 R2-12
 Date: August 12, 1998
 Subject: LETTER OF INSTRUCTION FOR COMPATIBILITY ANALYSIS OF SAMPLES FROM
 TANK 241-S-102

To: C. M. Seidel S3-30

cc: V. C. Boyles R2-11
 J. G. Field R2-12
 K. M. Hall R2-12 *Krist*
 D. B. Hardy (WMH) T6-12
OK Kristofzski R2-12 *OK*
 D. J. McCain R2-12
 K. L. Powell (WMH) S3-30
 R. D. Schreiber R2-12
 F. H. Steen (WMH) T6-12
 A. E. Young R1-10
 RRT File/LB R2-12

The attached letter of instruction specifies the tests necessary for compatibility analysis of archive samples from tank 241-S-102.

Please call me at 376-6914 if there are any questions about this request.

R. R. Thompson
 Performance Lead

dmn

Attachment

**Letter of Instruction for Subsampling and
Compatibility Testing of Tank Samples**

1. Subject:

This letter of instruction (LOI) directs the 222-S Laboratory to: (1) create subsamples from archive samples from tank 241-S-102 and, (2) perform compatibility analyses as specified in Section 5 on subsamples from the tank listed.

2. References:

- 1) DOE, 1997, *Hanford Analytical Services Quality Assurance Requirement Document*, DOE/RL-96-68, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.
- 2) Ecology, EPA, and DOE, 1997, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U. S. Environmental Protection Agency, and U. S. Department of Energy, Olympia, Washington.
- 3) Markel, L. P., 1997, *222-S Laboratory Quality Assurance Plan*, HNF-SD-CP-QAPP-016, Rev. 2, Rust Federal Services of Hanford Inc., Richland, Washington.
- 4) McCain, D.J., 1998, *Tank 241-S-102 Retained Gas Sample System Sampling and Analysis Plan*, HNF-1907, Rev. 0A., Lockheed Martin Hanford Corporation, Richland, Washington.
- 5) Sasaki, L.M., 1998, *Compatibility Grab Sample and Analysis Plan for Fiscal Year 1998*, HNF-SD-TSAP-150, Rev. 1A, Lockheed Martin Hanford Corporation, Richland, Washington.
- 6) Schreiber, R. D., 1998, *Fiscal Year 1998 Memorandum of Understanding for the TWRS Characterization Project*, HNF-2245 Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

3. Task Objective:

This LOI directs the 222-S Laboratory to create subsamples from archive samples for tank 241-S-102. Compatibility analyses shall be performed on these samples at the 222-S laboratory. The data are needed to verify compatibility criteria are met for saltwell pumping as a part of Interim Stabilization.

4. Introduction and Overall Scope:

Core samples including drainable liquid were obtained and have been identified as being archived at the 222-S Laboratory from tank 241-S-102 sampling event in March 1998 (Reference 4). A full suite of the compatibility analysis (Reference 5) is requested for tank 241-S-102 and is included in this letter as Table 1.

5. Functional Requirements:

The S-102 liquid samples are to be analysed per Table 1 for compatibility requirements. If sample from the same tank, core, segment, and sample portion is available in a different jar, that material may be used instead of, or in addition to the jar indicated in Table 2.

Table 1. Compatibility Chemical, Radiological, and Physical Analytical Requirements

Project Name		Compatibility Samples		COMMENTS		REPORTING LEVELS	
		241-S-102		Homogenization Test - Not Required		FORMAT I	
				Field Blank - Not Required		FORMAT II	
PROGRAM		PROGRAM CONTACTS		Hot Cell Blank - Performed as Necessary		FORMAT III	
A. Compatibility		SST Compatibility		J. N. Dozier		FORMAT IV	
		TWRS Proc. Eng.		D. J.McCain		FORMAT V	
						FORMAT VI	
						Special	

Table 1. Compatibility Chemical, Radiological, and Physical Analytical Requirements

Notes:

- ¹ d-direct, f-fusion, a-acid, w-water
- ² DUP = duplicate, BLK = blank, STD = calibration standard, ea = each, smpl = sample, AB = analytical batch, PB = preparation blank, N/A = not applicable, SE = sample event
- ³ Units for notification limits and expected range are those listed in the "units" column.
- ⁴ Results should be reported for all IC analytes, however, only the analytes indicated here are required to meet the QC criteria in Tables 1 and 4.
- ⁵ Direct liquid samples may be diluted in acid or water to adjust to proper sample size and/or pH.
- ⁶ If exotherm is observed, both the endotherm and exotherm values must be reported.
- ⁷ Dry weight basis.
- ⁸ In order to preserve sample volume, bulk density measurement may be performed instead of specific gravity.
- ⁹ Results should be reported for all ICP analytes, however, only the analytes indicated here are required to meet the QC criteria in Tables 1 and 4.
- ¹⁰ Either serial dilutions or matrix spikes will be performed.
- ¹¹ Tracer or carrier may be used in place of a spike and results corrected for recovery.
- ¹² Notification required if Cs > 3.28E+05 µCi/L.
- ¹³ Notification required if Sr > 2.30E+05 µCi/L.
- ¹⁴ Corrected from weight basis to volumetric basis assuming a liquid density of 1.0 g/mL.
- ¹⁵ This notification limit applies to TOC only.
- ¹⁶ Analysts may not be necessary if the amount of solids is small. Under these circumstances, the project and tank coordinators shall determine if the analysis is to be performed.
- ¹⁷ Micrograms ammonia per milliliter.
- ¹⁸ To be performed if hydride is less than 0.01 M.

Table 2 provides a list of the archive sample to be subsampled and analyzed as requested. If there is insufficient material to perform the required analyses, contact the tank coordinator for prioritizing analyses.

Table 2. Samples for Compatibility Analyses						
Tank	Core	Segment	Portion	Sample #	Archive Jar #	Archive Amount (g)
241-S-102	232	1	drainable liquid	S98T001052	13582	350

6. Schedule:

A letter reporting the results of the analyses (see Section 11) shall be issued by 90 days from the issuance of the LOI. The data are needed to verify compatibility criteria are met for saltwell pumping as a part of Interim Stabilization. All analyses will be reported respectively on Format I, II, or IV reporting schedule requirements (Section 11). The data package shall be issued 120 days from the issuance of the LOI. Additional information regarding reporting formats is given in Reference 6.

7. Cost:

The costs for the subsampling, analyses, and reporting shall be charged to normal characterization charge codes.

8. Procurement:

N/A

9. Permits:

N/A

10. Specific Services and special Instructions:

N/A

11. Deliverables:

When the activities identified in Table 2 have been completed, subsampling information shall be provided to the tank coordinator. This information shall include the date that the activities were completed, the weight of material in each jar prior to subsampling, the weight of each subsample, the final weight of material in each jar, and all jar numbers.

All analyses will be reported as Format I, II, or IV as indicated in Table 1. Additional information regarding reporting formats is given in (Reference 6).

FORMAT I REPORTING

Table 1 contains the notification limits for each analyte. Any results exceeding their notification limits shall be reported via telephone by the 222-S Laboratory Facility Planning Team to the Single-Shell Tank Farm Operations shift manager as soon as the data are obtained and reviewed by the responsible scientist. This verbal notification must be followed within one hour by electronic notification to the tank farm operations shift manager, the Tank Waste Remediation System (TWRS) Process Engineering Data Assessment and Interpretation manager, and the tank coordinator responsible for the tank. Additional analyses for verification purposes may be contracted between the performing laboratory and the tank coordinator by either a SAP or by a letter.

FORMAT II REPORTING

A letter report documenting the results of the analyses shall be issued to the key personnel listed in Table 4, except the single-shell tank farm operations shift manager within 90 calendar days of the issuance of this LOI. The format II report is not required to contain supporting raw data, QC results or associated analytical procedure numbers. However, the results require review and approval by the cognizant scientist or manager of the laboratory operation. The raw data shall be accessible to Process Engineering or its representatives.

FORMAT IV REPORTING

The format IV report shall be a data package reporting the results of analyses performed and will resemble a regulatory data package without third party validation. The data package should be prepared by tank and include the data for all samples, including (as applicable) composites, segments, subsegments, drainable liquids, and associated blanks taken and analyzed for this sampling event. The recommended reporting format and the raw data that shall be included are given in detail in Section A5.1 of (Reference 6). The data package shall be issued 120 days from the issuance of the LOI. The raw data shall be accessible to the program in accordance with the laboratory's Records Inventory and Disposition Schedule and until the respective waste tank is closed or the waste is treated.

In addition to this data package, an electronic version of the analytical results shall be provided to the Tank Characterization Database representative on the same day that the final data package is issued. The data must be available to the Washington State Department of Ecology within 7 days of release of the data package. The electronic version shall be in the standard electronic format.

12. Meetings, Reports and Activities:

N/A

13. Quality Assurance Requirements:

The laboratory performing this work shall have implemented quality assurance programs. *222-S Laboratory Quality Assurance Plan* (Reference 3) specifies the requirements for assuring quality of sample analysis conducted at the 222-S Laboratory. The quality assurance plan meets the *Hanford Analytical Services Quality Assurance Requirements Document* (Reference 1) minimum requirements as the baseline for laboratory quality systems. The *222-S Laboratory Quality Assurance Plan* (Reference 3) specifies the requirements for assuring the quality of sample analysis conducted at the 222-S Laboratory. Quality control testing shall be done in accordance with Table 1. Quality control precision and accuracy requirements are detailed in Table 3.

The laboratory shall also use calibration and calibration check standards appropriate for the analytical instrumentation being used (see Reference 1 for definitions of QC samples and standards). The criteria presented are goals for demonstrating reliable method performance. It is understood that the laboratory will follow its internal QC system for required actions whenever QC failures occur. If sample QC failures occur or if all analyses cannot be performed (e.g., insufficient sample), analysts shall consult with supervisors/customers to determine the proper action. The laboratory should provide a suggested course of action at that time. All sample QC failures and limitations on the associated data shall be discussed in the narrative of the data report. Proper notification of all data not meeting QC requirements shall be included with the data.

Table 3: QC Precision and Accuracy Requirements for the Analyses

Analysis/Method	Duplicate Criteria (RPD) ¹	Spike Criteria (% recovery) ²	Preparation Blank Criteria ³	LCS Criteria (% recovery) ⁴
Liquids				
DSC	≤ 20	N/A	N/A	80 - 120
TGA	≤ 20	N/A	N/A	80 - 120
Bulk density	N/A	N/A	N/A	N/A
Specific gravity	≤ 20	N/A	N/A	N/A
ICP/AES	≤ 20	75 - 125	< EQL	70 - 120
ICP/ MS	≤ 20	75 - 125	< EQL	80 - 120
IC	≤ 20	75 - 125	< EQL	80 - 120
TIC/TOC	≤ 20	75 - 125	< EQL	80 - 120
OH	≤ 20	N/A	< EQL	80 - 120
pH	≤ 20	N/A	N/A	±0.1 pH unit
^{239/240} Pu	≤ 20	75 - 125 ⁵	< MDA	70 - 130
²⁴¹ Am	≤ 20	75 - 125 ⁵	< MDA	80 - 120
¹³⁷ Cs	≤ 20	N/A	< MDA	80 - 120
⁹⁰ Sr	≤ 20	75 - 125 ⁵	< MDA	75 - 125
Ammonia	≤ 20	75 - 125	< 5% of sample	80 - 120
Caustic demand	N/A	N/A	N/A	N/A

Notes:

N/A = not applicable
 MDA = minimum detectable activity
 EQL = estimated quantitation limit
 LCS = laboratory control standard

¹For the calculation of the relative percent difference (RPD), both the sample and duplicate results must exceed the EQL or MDA. Failures are permissible if the requirements in the QA section are followed.

²The criteria are recommended. Failures are permissible if the requirements in the QA section are followed.

³When a blank exceeds the EQL or MDA, sample results that exceed the contribution from the blank twenty-fold or more are reportable. See also the QA section of this LOI.

⁴For some analyses, this could be a method spike or a blank spike. Ranges are percent recovery of theoretical.

⁵A tracer or carrier may be substituted for the spike.

14. Safety Requirements:

There are no special safety requirements to perform the work described in this LOI.

15. Task Management:

The list of key personnel is provided in Table 4.

Table 4. Key Personnel

Individual and Phone Number	Organization	Responsibility
N. W. Kirch, 373-2380	TWRS Process Engineering (LMHC)	Manager, Process Control
K. M. Hall, 376-5029	TWRS Process Engineering (LMHC)	Manager, Data Assessment and Interpretation
J. N. Doeler, 373-6024	Single-Shell Tank Farms: Stabilization (LMHC)	Single-Shell Tank Farm Compatibility Program Contact
Single-Shell Tank Farm Operations Shift Manager, 373-3475	Tank Farm Operations	Single-Shell Tank Farm Point of Contact
D. J. McCain, 373-1023	TWRS Process Engineering (LMHC)	Tank S-102, Technical Contact, Data Assessment and Interpretation

16. Other:

N/A

17. Approvals:

K. M. Hall, Manager

LMHC TWRS Process Engineering: Data Assessment and Interpretation

D. B. Hardy, Manager
WMH Production
D. C. Board, 8-12-98
LMHC Quality Assurance

SAMPLE DATA SUMMARY

THIS PAGE WAS INTENTIONALLY LEFT BLANK

Table 1. Data Summary Report.
S-102 CNF1

CORE NUMBER: 232
SEGMENT #: 1

SEGMENT PORTION: Drainable Liquid

Sample#	R#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S981002514		USC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	91.19	89.98	90.59	1.34	n/a	n/a	n/a
S981002514		USC Exotherm Dry Perkin Elmer	Joules/g	100.2	n/a	71.19	89.98	90.59	1.34	n/a	n/a	n/a
S981002514		OH- by Pot. Titration	ug/mL	101.2	<500.0	3.79e-04	3.77e-04	3.78e-04	1.86	n/a	125.0	n/a
S981002514		PH Direct	PH	n/a	n/a	51.23	50.52	50.88	0.58	n/a	1.00e-02	n/a
S981002514		A Water by TOA on Perkin Elmer	%	99.25	n/a	51.23	50.52	50.88	1.98	n/a	7.39e-01	n/a
S981002514		A Uranium-235 by ICP/MS Act100150	ug/mL	n/a	<1.82e-05	4.73e-01	4.73e-01	4.73e-01	n/a	n/a	6.51e-01	n/a
S981002514		A Uranium-235 by ICP/MS Act100150	ug/mL	n/a	<1.61e-05	3.31e-01	3.31e-01	3.31e-01	n/a	n/a	6.51e-01	n/a
S981002514		A Uranium-235 by ICP/MS Act100150	ug/mL	n/a	<2.10e-05	8.27e-01	8.27e-01	8.27e-01	n/a	n/a	6.51e-01	n/a
S981002514		A Uranium-235 by ICP/MS Act100150	ug/mL	n/a	<1.55e-05	8.27e-01	8.27e-01	8.27e-01	n/a	n/a	6.51e-01	n/a
S981002514		A Uranium-235 by ICP/MS Act100150	ug/mL	99.35	<3.26e-05	1.382	1.450	1.411	5.4	99.50	1.00e-02	n/a
S981002514		Specific Gravity	SP.G.	99.35	n/a	1.382	1.450	1.411	2.92	n/a	1.00e-02	n/a
S981002514		TIC by Acid/Coulometry	ug/mL	99.67	5.10e-01	4.21e-03	4.23e-03	4.22e-03	0.47	13.0	5.000	n/a
S981002514		TIC by Per sulfate/Coulometry	ug/mL	94.60	4.300	3.09e-03	3.09e-03	3.09e-03	4.6	95.90	40.00	n/a
S981002514		A Aluminum-ICP-Acid Dil.	ug/mL	98.60	<5.10e-02	2.45e-04	2.70e-04	2.57e-04	2.91	206.0	30.10	n/a
S981002514		D Chromium-ICP-Acid Dil.	ug/mL	98.60	<5.10e-02	2.45e-04	2.70e-04	2.57e-04	2.91	206.0	30.10	n/a
S981002514		D Iron-ICP-Acid Dil.	ug/mL	95.20	<5.10e-02	3.9.10	<3.01e0	463.5	2.80	96.40	30.10	n/a
S981002514		D Manganese-ICP-Acid Dil.	ug/mL	97.60	<5.10e-02	6.010	<6.010	6.010	n/a	96.40	30.10	n/a
S981002514		D Sodium-ICP-Acid Dil.	ug/mL	101.8	<1.00e-01	2.12e+05	2.14e+05	2.14e+05	1.87	814.0	60.10	n/a
S981002514		D Zirconium-ICP-Acid Dil.	ug/mL	99.20	<2.00e-02	6.010	<6.010	6.010	n/a	97.80	12.00	n/a
S981002514		D Fluoride-ICP-Acid Dil.	ug/mL	97.60	<1.00e-02	6.010	<6.010	6.010	n/a	99.20	6.010	n/a
S981002514		D Chloride-ICP-Acid Dil.	ug/mL	107.5	<1.20e-02	6.010	<6.010	6.010	n/a	95.59	61.81	n/a
S981002514		Chromium-ICP-Acid Dil.	ug/mL	105.0	<1.20e-02	9.08e-03	9.10e-03	9.09e-03	0.22	105.2	1.73e-01	n/a
S981002514		Chromium-ICP-Acid Dil.	ug/mL	102.2	<1.08e-01	1.01e+05	1.00e+05	1.00e+05	1.00	105.2	1.10e+03	n/a
S981002514		Nitrate by IC-Dioxex 4000/7500	ug/mL	102.1	<1.20e-01	1.98e+05	2.03e+05	2.01e+05	2.49	99.16	1.42e+03	n/a
S981002514		Phosphate by IC-Dioxex 4000/7500	ug/mL	100.2	<1.20e-01	3.13e+03	3.15e+03	3.14e+03	0.44	91.41	618.1	n/a
S981002514		Sulfate by IC-Dioxex 4000/7500	ug/mL	100.9	<1.38e-01	4.65e+03	4.67e+03	4.66e+03	0.43	95.30	710.8	n/a
S981002514		Ammonia by ISE-Std Additions	ug/mL	99.22	<5.000	34.70	24.40	29.55	34.9	98.94	5.000	n/a
S981002514		Strontium by 89/90 High Level	ug/mL	104.8	<1.44e-02	2.92e-01	2.96e-01	2.94e-01	1.36	n/a	2.90e-02	1.43e+01
S981002514		Cesium 137 by GEA	ug/mL	103.4	2.00e-03	3.08e-02	3.07.0	3.07.5	0.33	n/a	n/a	0.100
S9810026279		Pic-239/240 by TEL-SPEC Resin	ug/mL	109.8	<2.97e-05	3.13e-05	3.44e-05	3.28e-05	n/a	n/a	3.13e-05	7.98e+00
S9810026279		Am-241 by Extraction	ug/mL	88.99	<1.59e-05	2.81e-04	2.81e-04	2.81e-04	0.00	n/a	3.31e-05	2.72e+00

26-oct-1998 13:16:32
A-0002-1

Table 1. Data Summary Report.
S-102

CORE NUMBER: 232

SEGMENT #: FB

SEGMENT PORTION: Field Blank

Sample#	R #	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count	Err%
S98T000902	D	Lithium-ICP-Acid Dil.	ug/mL	100.2	<1.00e-02	<1.00e-02	<1.00e-2	n/a	n/a	n/a	1.00e-02	n/a	n/a
S98T000902		Bromide by Ion Chromatograph	ug/mL	103.1	<1.25e-01	<1.25e-01	<1.25e-1	n/a	n/a	n/a	1.25e-01	n/a	n/a

Table 1. Data Summary Report.
S-102

CODE NUMBER: 232
SEGMENT #: HNF

SEGMENT PORTION: Hydrostatic Head Fluid

Sample#	R#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
3981006903	D	Lithium-CP-Acid Dil.	ug/mL	103.2	<1.00e-02	1.90e-03	1.94e-03	1.92e-03	2.08	N/A	1.00e-01	N/A
3981006903		Bromide by Ion Chromatograph	ug/mL	103.1	<1.25e-01	2.63e-04	2.70e-04	2.67e-04	2.63	N/A	138.9	N/A

CHAIN OF CUSTODY FORMS

THIS PAGE WAS INTENTIONALLY LEFT BLANK

94600175

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number 232-01		(2) Supervisor/Sampler R. Frank West		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank S-102		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Shipment Description: 13G		(6) Shipment Data 1500 ml		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
(7) Sampling Data		(8) Field Comments: ① universal sampler (probe) ③ sampler clean (X-rayed) = 18 3/4"		(12) Laboratory Comments: 5987000901	
A. Work Package Number WS-97-00284		Lithium Bromide ☒ Y ☐ N			
B. Cask/Pig Seal Number 10191		Amount 9.3 ml			
C. Date Sample Collected 3-5-98		Concentration ☒ X-Ray ☐ Partial Sample			
D. Time Sample Collected 1350		Retrieved Partial Sample Stroke Length 44			
(13) Relinquished By (Sign and PRINT) James Schick James Schick		(14) Received By (Sign and PRINT) Richard West		(15) Date/Time 1357 3-9-98	
(17) Relinquished By (Sign and PRINT) James Schick James Schick		(18) Received By (Sign and PRINT) Richard West		(19) Date/Time 1405 3-9-98	
(21) Relinquished By (Sign and PRINT) James Schick James Schick		(22) Received By (Sign and PRINT) Richard West		(24) Receiver Comments	
(25) Relinquished By (Sign and PRINT)		(26) Received By (Sign and PRINT)		(28) Receiver Comments	

HNF-1649 REV. 0

130-91 008
130-16

GP 98000175

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

(1) Sample Number 232-02		(2) Supervisor/Sampler M.C. Jones		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank S-102		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Shipment Description: WS-97-00284				(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
(6) Field Comments: X-RAY showed 11" in sampler SAMPLER is a RGS sampler				(12) Laboratory Comments: 5987000 884 134400	
(7) Sampling Data		(8) Field Comments:			
A. Work Package Number 11735 B. Cask/Pig Seal Number 3-5-98 C. Date Sample Collected 1753 D. Time Sample Collected 11735		Y N Lithium Bromide ☒ ☐ Amount 1500 ML Concentration 0.3 X-Ray ☒ ☐ Partial Sample ☒ ☐ Retrieved Partial Sample Stroke Length 114			
(13) Relinquished By (Sign and PRINT) M.C. Jones		(14) Received By (Sign and PRINT) M.C. Jones		(15) Date/Time 3/6/88	
(17) Relinquished By (Sign and PRINT) M.C. Jones		(18) Received By (Sign and PRINT) M.C. Jones		(19) Date/Time 0947	
(21) Relinquished By (Sign and PRINT) M.C. Jones		(22) Received By (Sign and PRINT) M.C. Jones		(20) Receiver Comments 36.98	
(25) Relinquished By (Sign and PRINT)		(26) Received By (Sign and PRINT)		(23) Date/Time 01/09/2000	
				(24) Receiver Comments	
				(27) Date/Time	
				(28) Receiver Comments	

CP 94000175

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

598T000884

X-RAY showed 18" in sampler

(1) Sample Number 232-03		(2) Supervisor/Sampler M.C. Jones		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank No. 5-102		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Cask/Pig Serial No. SN-7-C				(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6) ☒ Yes ☐ No	
(6) Shipment Description:				(12) Laboratory Comments:	
(7) Sampling Date		(8) Field Comments:			
A. Work Package Number WS-97-00284 B. Cask/Pig Seal Number 11736 C. Deep Sample Collected 3-5-98 D. Time Sample Collected 1910		Y N ☒ ☐ Lithium Bromide Amount 1500 mL Concentration 0.3 X-Ray ☒ ☐ Partial Sample ☐ ☒ Retrieved Partial Sample Stroke Length N/A			
(13) Relinquished By (Sign and PRINT) M.C. Jones		(14) Received By (Sign and PRINT) [Signature]		(15) Date/Time 3/6/98	
(16) Relinquished By (Sign and PRINT) [Signature]		(17) Received By (Sign and PRINT) [Signature]		(18) Date/Time 3/6/98	
(19) Relinquished By (Sign and PRINT) [Signature]		(20) Received By (Sign and PRINT) [Signature]		(21) Date/Time 10/10	
(22) Relinquished By (Sign and PRINT)		(23) Received By (Sign and PRINT)		(24) Date/Time	
(25) Relinquished By (Sign and PRINT)		(26) Received By (Sign and PRINT)		(27) Date/Time	
				(28) Receiver Comments	

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number <u>238-04</u>	(2) Supervisor/Sampler <u>(Living) 3-5-98 (days) 3-6-98</u> <u>Mike Jones per R. Knight</u>	(9) Seal Intact Upon Release? ☒ Yes ☐ No
(3) Tank <u>S-102</u>	(4) Riser <u>16</u>	(10) Seal Intact Upon Receipt? ☒ Yes ☐ No
(5) Cask/Pig Seal No. <u>10102-98</u>		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No
(6) Shipment Description: A. Work Package Number <u>WS-97-00284</u> B. Cask/Pig Seal Number <u>10101</u> C. Date Sample Collected <u>3-5-98</u> D. Time Sample Collected <u>2010</u>		(12) Laboratory Comments:
(7) Sampling Data Y N - Lithium Bromide ☒ ☐ Amount <u>1500ml</u> Concentration <u>0.3ml/L</u> - X-Ray ☒ ☐ - Partial Sample ☐ ☒ - Retrieved Partial Sample Stroke Length <u>114</u>		
(8) Field Comments: ① RBS sampler - problem with ball valve ② sampler empty ③ remanded from the #1 on 3-6-98 one day shift. PH ④ RBS# 085		
(13) Relinquished By (Sign and PRINT) <u>James S. Sicks</u>	(14) Received By (Sign and PRINT) <u>James S. Sicks</u>	(17) Receiver Comments <u>130</u>
(17) Relinquished By (Sign and PRINT) <u>James S. Sicks</u>	(18) Received By (Sign and PRINT) <u>James S. Sicks</u>	(20) Receiver Comments <u>1350</u>
(21) Relinquished By (Sign and PRINT) <u>James S. Sicks</u>	(22) Received By (Sign and PRINT) <u>James S. Sicks</u>	(24) Receiver Comments <u>1350</u>
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Receiver Comments

HNF-1649 REV. 0

598700885

130 97 00

CP 98000113

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number 232-04R	(2) Supervisor/Sampler R. Frank Frost	(3) Seal Intact Upon Release? ☒ Yes ☐ No
(3) Tank 5-102	(4) Riser 116	(10) Seal Intact Upon Receipt? ☒ Yes ☐ No
(8) Shipment Description: C-2000		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No
(7) Sampling Data Y N - Lithium Bromide ☒ ☐ Amount 1500 ml Concentration 0.3 molar - X-Ray ☒ ☐ - Partial Sample ☒ ☐ - Retrieved Partial Sample Stroke Length NA		(12) Laboratory Comments:
(8) Field Comments: (1) R.G. 5-sampler, segment #04R (2) 1500 ml Li.Br. added - liquid on bottom of sampler (3) X-rayed = 18" of waste		
(24) Relinquished By (Sign and PRINT) James S. Sikes	(14) Received By (Sign and PRINT) James S. Sikes	(16) Date/Time 1/31/98
(25) Relinquished By (Sign and PRINT) James S. Sikes	(18) Received By (Sign and PRINT) James S. Sikes	(19) Date/Time 1/31/98
(21) Relinquished By (Sign and PRINT) James S. Sikes	(22) Received By (Sign and PRINT) James S. Sikes	(23) Date/Time 1/31/98
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Date/Time

HNF-1649 REV. 0

LAD 3/14/98
5987000883
886

2 30 97 JAL

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

REUTION: Original - Laboratory Copy - Sampling Operations

BC-6001-326 (07/87)

Sample Number 232-05		(2) Supervisor/Sampler M.C. JONES		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
Tank 5-102		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Cask/Pig Serial No. SN-66		(7) Sampling Data		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
Aligent Description:		Y N		(12) Laboratory Comments:	
Work Package Number WS-97-00284		Lithium Bromide ☒ Y ☐ N		5987001041	
Cask/Pig Seal Number 11733		Amount 0.3			
Date Sample Collected 3-6-98		Concentration ☒ X ☐ N			
Time Sample Collected 1800		X-Ray ☐ X ☒ N			
		Partial Sample ☐ X ☒ N			
		Retrieved Partial Sample Stroke Length N/A			
Field Comments: liquid on top of the piston, SW is 3/4 of the way up the sampler there is some mud in sampler.					
Relinquished By (Sign and PRINT) M.C. Jones		(14) Received By (Sign and PRINT) [Signature]		(15) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(16) Received By (Sign and PRINT) [Signature]		(16) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(17) Received By (Sign and PRINT) [Signature]		(17) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(18) Received By (Sign and PRINT) [Signature]		(18) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(19) Received By (Sign and PRINT) [Signature]		(19) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(20) Received By (Sign and PRINT) [Signature]		(20) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(21) Received By (Sign and PRINT) [Signature]		(21) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(22) Received By (Sign and PRINT) [Signature]		(22) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(23) Received By (Sign and PRINT) [Signature]		(23) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(24) Received By (Sign and PRINT) [Signature]		(24) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(25) Received By (Sign and PRINT) [Signature]		(25) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(26) Received By (Sign and PRINT) [Signature]		(26) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(27) Received By (Sign and PRINT) [Signature]		(27) Date/Time 3-17-98	
Relinquished By (Sign and PRINT) [Signature]		(28) Received By (Sign and PRINT) [Signature]		(28) Date/Time 3-17-98	

CHAIN-OF-CUSTODY RECORD FOR CPO

175		(2) Supervisor/Sampler M.C. Jones		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
232-06		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
S-102		(5) Cask/Pkg Serial No. SN-67		(11) Seal Number AND Cask/Pkg SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
(6) Shipment Description:				(12) Laboratory Comments:	
A. Work Package Number WS-97-00284		(7) Sampling Data Y N ☒ Y ☐ N Amount 1500 ML		598T001157	
B. Cask/Pkg Seal Number 11734		Concentration 0.3			
C. Date Sample Collected 3-6-98		X-Ray ☐ ☒			
D. Time Sample Collected 1915		Partial Sample ☐ ☒			
(8) Field Comments: There is liquid on top of the piston. The piston is at the bottom of the sampler and the piston rod is still hooked to the piston. The sample was pushed but didn't have whole of the piston rod. This is a RES sampler.					
(13) Relinquished By (Sign and PRINT) M.C. Jones		(14) Received By (Sign and PRINT) James P. Knight		(15) Date/Time 3-30-98	
(17) Relinquished By (Sign and PRINT) M.C. Jones		(16) Received By (Sign and PRINT) James P. Knight		(18) Receiver Comments	
(21) Relinquished By (Sign and PRINT) M.C. Jones		(19) Received By (Sign and PRINT) James P. Knight		(20) Receiver Comments	
(25) Relinquished By (Sign and PRINT)		(23) Received By (Sign and PRINT)		(22) Date/Time 3-20-98	
		(26) Received By (Sign and PRINT)		(24) Receiver Comments	
		(28) Received By (Sign and PRINT)		(27) Date/Time	
				(28) Receiver Comments	

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

(1) Sample Number 232-07	(2) Supervisor/Sampler M.C. Jones	(9) Seal Intact Upon Release? ☒ Yes ☐ No
(3) Tank 5-102	(4) Riser 14	(10) Seal Intact Upon Receipt? ☒ Yes ☐ No
(5) Shipment Description: W5-97-00284		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6) ☒ Yes ☐ No

(6) Work Package Number W5-97-00284	(7) Sampling Date 10/16/98	(12) Laboratory Comments: 598001158
(8) Cask/Pig Seal Number 11722	(9) Lithium Bromide ☒ Y ☐ N	
(10) Date Sample Collected 3-18-98	(11) Amount 1500 mL	
(12) Time Sample Collected 1830	(13) Concentration 0.3 mol/L	
	(14) X-Ray ☒ Y ☐ N	
	(15) Partial Sample ☒ Y ☐ N	
	(16) Retrieved Partial Sample Stroke Length 11/4	

(17) Field Comments:
 (a) X-rayed, sample # 232-07 on 3-27-98, seeing shift @ 1912 hrs. 1/2 of sample - peanut butter texture. 3-27-98
 AGS Sampler per Telcom w/ Frank Frost 3-30-98

(18) Relinquished By (Sign and PRINT) James Scheckel James Scheckel	(19) Received By (Sign and PRINT) James Scheckel James Scheckel	(20) Date/Time 1415 3-30-98	(21) Receiver Comments
(22) Relinquished By (Sign and PRINT) James Scheckel James Scheckel	(23) Received By (Sign and PRINT) James Scheckel James Scheckel	(24) Date/Time 1415 3-30-98	(25) Receiver Comments
(26) Relinquished By (Sign and PRINT)	(27) Received By (Sign and PRINT)	(28) Date/Time	(29) Receiver Comments

49

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number 232-08		(2) Supervisor/Sampler M.C. Jones		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank S-102		(4) Rear 14		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Shipment Description: 1006-C				(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
(6) Sampling Data				(12) Laboratory Comments: S98T001159	
(7) Sampling Data		(8) Field Comments:			
(13) Cask/Pig Serial No. (14) Risk (15) Amount (16) Concentration (17) K-Ray (18) Partial Sample (19) Retrieved Partial Sample Stroke Length		(20) Lithium Bromide (21) Amount (22) Concentration (23) K-Ray (24) Partial Sample (25) Retrieved Partial Sample Stroke Length			
A. Work Package Number 45-97-00284		B. Cask/Pig Seal Number 11729			
C. Date Sample Collected 3-18-98		D. Time Sample Collected 2115			
(26) Field Comments: (a) X-rayed sample #232-08 on 3-27-98 at 1930 hrs - 12" of solid waste. RHT. 3-27-98 50 RGS Sampler per Telecon w/Frank Frost 3-30-98					
(27) Relinquished By (Sign and PRINT)		(28) Received By (Sign and PRINT)		(29) Date/Time	
Dennis Dicks Jones Sicks 3-27-98		Frank Frost 3-30-98		1414 3-30-98	
(30) Relinquished By (Sign and PRINT)		(31) Received By (Sign and PRINT)		(32) Date/Time	
Frank Frost 3-27-98		Frank Frost 3-30-98		1450 3-30-98	
(33) Relinquished By (Sign and PRINT)		(34) Received By (Sign and PRINT)		(35) Date/Time	
Frank Frost 3-27-98		Frank Frost 3-30-98		1450 3-30-98	
(36) Relinquished By (Sign and PRINT)		(37) Received By (Sign and PRINT)		(38) Date/Time	
Frank Frost 3-27-98		Frank Frost 3-30-98		1450 3-30-98	

HNF-1649 REV. 0

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

(1) Sample Number <u>MS-97-00284</u> <u>5-102</u> 832-09		(2) Supervisor/Sampler <u>Mr. C. Jones</u> <i>[Signature]</i>		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank <u>5-102</u>		(4) Risk <u>16</u>		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Shipment Description: A. Work Package Number <u>MS-97-00284</u> B. Cask/Pig Seal Number <u>11741</u> C. Date Sample Collected <u>4-2-98</u> D. Time Sample Collected <u>1500</u>		(6) Cask/Pig Serial No. <u>C-2001</u>		(11) Seal Number AND Cask/Pig SERIAL Number consistent with this record? (Block 5 & 6b) ☒ Yes ☐ No	
(7) Sampling Data - Lithium Bromide Amount <u>1700</u> Concentration <u>0.3</u> - X-ray ☒ ☐ - Partial Sample ☒ ☐ - Retained Partial Sample Stroke Length <u>21/4</u>		(8) Field Comments: (1) X-rayed sample -> 13" of sample (waste), 4-3-98, day 1216 hrs. 4-3-98		(12) Laboratory Comments:	

(13) Relinquished By (Sign and PRINT) <i>[Signature]</i> <u>W. J. Piaznik</u>	(14) Received By (Sign and PRINT) <i>[Signature]</i> <u>V.P. Matthews</u>	(15) Date/Time <u>4-3-98</u>	(16) Receiver Comments <u>730-0-6-1-000</u>
(17) Relinquished By (Sign and PRINT) <i>[Signature]</i> <u>V.P. Matthews</u>	(18) Received By (Sign and PRINT) <i>[Signature]</i> <u>Richmond Richmonds</u>	(19) Date/Time <u>1502</u>	(20) Receiver Comments
(21) Relinquished By (Sign and PRINT)	(22) Received By (Sign and PRINT)	(23) Date/Time <u>4-3-98</u>	(24) Receiver Comments
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Date/Time	(28) Receiver Comments

51

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number. 232-10		(2) Supervisor/Sampler M.C. Jones		(9) Seal Intact Upon Release? ☒ Yes ☐ No	
(3) Tank 5-102		(4) Riser 16		(10) Seal Intact Upon Receipt? ☒ Yes ☐ No	
(5) Shipment Description:		(6) Changing Serial No. C2002		(11) Seal Number AND Cask/Pg SERIAL Number consistent with this record? (Block 5 & 6) ☒ Yes ☐ No	
(7) Sampling Date		(8) Sampling Date		(12) Laboratory Comments:	
A. Work Package Number 465-97-80284		Y N ☒ ☐		5985000179	
B. Cask/Pg Seal Number 11738		Amount 1700			
C. Date Sample Collected 4-2-98		Concentration 0.3			
D. Time Sample Collected 1845		X-Ray ☒ ☐			
		Partial Sample ☒ ☐			
(13) Field Comments: This is a RGS sample. O full 19" of sample (waste), signed on top of picture, waste on bottom of samples. X-ray sample (4-3-98) at 1100 hrs. (day shift) R/R 4-3-98.		(14) Received By (Sign and PRINT) J.P. Matthews		(15) Date/Time 4-3-98	
(16) Relinquished By (Sign and PRINT) J.P. Matthews		(17) Received By (Sign and PRINT) J.P. Matthews		(18) Receiver Comments	
(19) Relinquished By (Sign and PRINT) J.P. Matthews		(20) Received By (Sign and PRINT) J.P. Matthews		(21) Receiver Comments	
(22) Relinquished By (Sign and PRINT)		(23) Received By (Sign and PRINT)		(24) Receiver Comments	
(25) Relinquished By (Sign and PRINT)		(26) Received By (Sign and PRINT)		(27) Date/Time	
(28) Relinquished By (Sign and PRINT)		(29) Received By (Sign and PRINT)		(30) Receiver Comments	

CHAIN-OF-CUSTODY RECORD FOR CPO

(1) Sample Number 2360 232-11	(2) Supervisor/Sampler M.C. JONES	(3) Seal Intact Upon Release? ☒ Yes ☐ No
(3) Tank S-102	(4) Riser 16	(10) Seal Intact Upon Receipt? ☒ Yes ☐ No
(5) Shipment Description: C-1055		(11) Seal Number AND Cast/Pig SERIAL Number consistent with this record? (Block 6 & 8b) ☒ Yes ☐ No

(6) Work Package Number WS-9700284	(7) Sampling Date 11/12/12	(12) Laboratory Comments:
(8) Cast/Pig Seal Number 4-2-98 4-298	(9) Lithium Bromide 1700	
(9) Date Sample Collected 4-2-98	(10) Amount Q.3	
(10) Time Sample Collected 2000	(11) Concentration X-Ray	
	(12) Perforated Sample 2"	

HNF-1649 REV. 0

(18) Field Comments:

SAMPLE WAS RUSH ONLY 2" DEEP HDB WENT OFF.
 ① X-rayed 4-3-98 at 1800 hrs, 13" of sample (upside) (days)
 Piff 4-3-98

S098T001180

53

(13) Relinquished By (Sign and PRINT) V.P. Matthews	(14) Received By (Sign and PRINT) V.P. Matthews V.P. MATTHEWS	(15) Date/Time 4-3-98	(16) Receiver Comments
(17) Relinquished By (Sign and PRINT) V.P. Matthews	(18) Received By (Sign and PRINT) R. Chondry	(19) Date/Time 4-3-98	(20) Receiver Comments
(21) Relinquished By (Sign and PRINT)	(22) Received By (Sign and PRINT)	(23) Date/Time	(24) Receiver Comments
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Date/Time	(28) Receiver Comments

6p 08000175

HNF-1649 REV. 0

CHAIN-OF-CUSTODY RECORD FOR CPO									
(1) Sample Number Black	(2) Supervisor/Sampler R. Frank Frost	(3) Tank 5-102	(4) Riser 16	(5) Shipment Description: NA (Black)	(6) Sampling Data Y N Lithium Bromide ☒ ☐ Amount NA Concentration NA X-Ray ☒ ☐ Partial Sample ☒ ☐ Retrieved Partial Sample Stroke Length NA	(7) Seal Intact Upon Release? ☒ Yes ☐ No	(8) Seal Intact Upon Receipt? ☒ Yes ☐ No	(9) Seal Number and Consistent with this receipt (Block 5 & 6b) ☒ Yes ☐ No	(10) Laboratory Comments: 598T000902
(8) Field Comments: ① glass container (Black) designed H2O for 3-102, will #16. RH 3-9-98						(11) Date/Time 12:45	(12) Receiver Comments 230 P2 SW		
(14) Relinquished By (Sign and PRINT) James Sichel James Sichel						(15) Date/Time 3-10-98	(16) Receiver Comments		
(17) Relinquished By (Sign and PRINT) Mark S. Sichel						(18) Date/Time 13:15	(19) Receiver Comments		
(20) Relinquished By (Sign and PRINT) Mark S. Sichel						(21) Date/Time 3:10-98	(22) Receiver Comments		
(23) Relinquished By (Sign and PRINT)						(24) Date/Time	(25) Receiver Comments		
(26) Relinquished By (Sign and PRINT)						(27) Date/Time	(28) Receiver Comments		

GP 940001W

CHAIN-OF-CUSTODY RECORD FOR CPO

HNF-1649 REV. 0

598T 000903

55

(1) Sample Number
Lithium Bromide

(2) Supervisor/Sampler
R. Frank East

(3) Tank
102-S

(4) Rise
16

(5) Sealing Container
Yellow Bottle

(6) Shipment Description:
WLS-97-00384

(7) Sampling Data
10106

(8) Field Comments:
① Lithium Bromide sample for 5-102, rise #6 3-9-98

(9) Seal Intact Upon Release?
☒ Yes ☐ No

(10) Seal Intact Upon Receipt?
☒ Yes ☐ No

(11) Seal Number AND Serial Number consistent with this receipt (Block 5 & 6b)
☒ Yes ☐ No

(12) Laboratory Comments:

(13) Amount
100mL

(14) Concentration
0.3 MCL/L

(15) X-Ray
☒

(16) Partial Sample
☒

(17) Retrieved Partial Sample Stroke Length
NA

(18) Date/Time
3-10-98

(19) Receiver Comments
3-10-98

(20) Date/Time
3-10-98

(21) Receiver Comments

(22) Date/Time

(23) Receiver Comments

(24) Date/Time

(25) Receiver Comments

(26) Date/Time

(27) Receiver Comments

(28) Date/Time

(29) Receiver Comments

(30) Date/Time

(31) Receiver Comments

(32) Date/Time

(33) Receiver Comments

(34) Date/Time

(35) Receiver Comments

(36) Date/Time

(37) Receiver Comments

(38) Date/Time

(39) Receiver Comments

(40) Date/Time

(41) Receiver Comments

(42) Date/Time

(43) Receiver Comments

(44) Date/Time

(45) Receiver Comments

(46) Date/Time

(47) Receiver Comments

(48) Date/Time

(49) Receiver Comments

(50) Date/Time

(51) Receiver Comments

(52) Date/Time

(53) Receiver Comments

PHOTOGRAPHS

THIS PAGE WAS INTENTIONALLY LEFT BLANK

2-102 C232 Seg 1

S-102 C232 509 5

S-102 C232 545

S-102 C232 SFG.9

4/19/88

S-102 C232 SGC.11

4/19/98

SAMPLE HANDLING

THIS PAGE WAS INTENTIONALLY LEFT BLANK

LABCORE Data Entry Template for Worklist# 22919

Analyst: ABC Instrument: BA000 Book # NA

Method: LO-160-103 Rev/Mod C-O

Worklist Comment: S-102 C232 Seg.#1 Extrusion

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	INSTCHK01				EXTRUD01	SOLID	<u>20.00</u>	<u>20.00</u>	<u>N/A</u>	
		2	INSTCHK02				EXTRUD01	SOLID	<u>500.00</u>	<u>500.04</u>	<u>N/A</u>	
98000175	S-102	3	SAMPLE	S98T000901	0		DLIQVOL1	SOLID	<u>N/A</u>	<u>0</u>		ml
98000175	S-102	4	SAMPLE	S98T000901	0		DLIQWT01	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	5	SAMPLE	S98T000901	0		EST.G/ML	SOLID	<u>N/A</u>	<u>0</u>		g/ml
98000175	S-102	6	SAMPLE	S98T000901	0		EXTRUD01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	7	SAMPLE	S98T000901	0		LLIQWT01	SOLID	<u>N/A</u>	<u>350.6</u>		g
98000175	S-102	8	SAMPLE	S98T000901	0		NOTEBOOK	SOLID	<u>N/A</u>	<u>N-1204</u>		
98000175	S-102	9	SAMPLE	S98T000901	0		SLDVOL01	SOLID	<u>N/A</u>	<u>0</u>		ml
98000175	S-102	10	SAMPLE	S98T000901	0		SLDWT-01	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	11	SAMPLE	S98T000901	0		APPEAR01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	12	SAMPLE	S98T000901	0		ORGVOL01	SOLID	<u>N/A</u>	<u>0</u>		ml

Final page for worklist # 22919

Alan B Campbell 3/14/98
Analyst Signature Date

Alan B Campbell 3/16/98
Analyst Signature Date
ABC 3.17.98

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 Data Entry Template for Worklist# 22920

Analyst: EC Instrument: BA000 Book # NA

Method: LO-160-103 Rev/Mod C-0

Worklist Comment: S-102 C232 Seg.#3 Extrusion

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	INSTCHK01				EXTRUD01	SOLID	<u>20.00</u>	<u>20.00</u>	<u>N/A</u>	
		2	INSTCHK02				EXTRUD01	SOLID	<u>500.00</u>	<u>500.00</u>	<u>N/A</u>	
98000175	S-102	3	SAMPLE	S98T000884	0		DLIQVOL1	SOLID	<u>N/A</u>	<u>Q</u>		ml
98000175	S-102	4	SAMPLE	S98T000884	0		DLIQWT01	SOLID	<u>N/A</u>	<u>Q</u>		g
98000175	S-102	5	SAMPLE	S98T000884	0		EST.G/ML	SOLID	<u>N/A</u>	<u>Q</u>		g/ml
98000175	S-102	6	SAMPLE	S98T000884	0		EXTRUD01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	7	SAMPLE	S98T000884	0		LLIQWT01	SOLID	<u>N/A</u>	<u>Q</u>		g
98000175	S-102	8	SAMPLE	S98T000884	0		NOTEBOOK	SOLID	<u>N/A</u>	<u>N-1204</u>		
98000175	S-102	9	SAMPLE	S98T000884	0		SLDVOL01	SOLID	<u>N/A</u>	<u>NA</u>		ml
98000175	S-102	10	SAMPLE	S98T000884	0		SLDWT-01	SOLID	<u>N/A</u>	<u>405.4</u>		g
98000175	S-102	11	SAMPLE	S98T000884	0		APPEAR01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	12	SAMPLE	S98T000884	0		ORGVOL01	SOLID	<u>N/A</u>	<u>Q</u>		ml

Final page for worklist # 22920

Alan B Campbell 3/16/98
Analyst Signature Date

Alan B Campbell 3/16/98
Analyst Signature Date
3.17.98

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 Data Entry Template for Worklist# 23024

Analyst: AB Instrument: BA000 Book # _____

Method: LO-160-103 Rev/Mod C-0

Worklist Comment: S-102 Core#232 SEG#5 Riser#16 Extrusion

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	INSTCHK01				EXTRUD01	SOLID	<u>20.00</u>	<u>20.00</u>	<u>N/A</u>	
		2	INSTCHK02				EXTRUD01	SOLID	<u>500.00</u>	<u>500.04</u>	<u>N/A</u>	
98000175	S-102	3	SAMPLE	S98T001041	0		DLIQVOL1	SOLID	<u>N/A</u>	<u>0</u>		ml
98000175	S-102	4	SAMPLE	S98T001041	0		DLIQWT01	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	5	SAMPLE	S98T001041	0		EST.G/ML	SOLID	<u>N/A</u>	<u>0</u>		g/mL
98000175	S-102	6	SAMPLE	S98T001041	0		EXTRUD01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	7	SAMPLE	S98T001041	0		LLIQWT01	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	8	SAMPLE	S98T001041	0		NOTEBOOK	SOLID	<u>N/A</u>	<u>N/204</u>		
98000175	S-102	9	SAMPLE	S98T001041	0		SLDVOL01	SOLID	<u>N/A</u>	<u>NA</u>		ml
98000175	S-102	10	SAMPLE	S98T001041	0		SLDWT-01	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	11	SAMPLE	S98T001041	0		APPEAR01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	12	SAMPLE	S98T001041	0		ORGVOL01	SOLID	<u>N/A</u>	<u>0</u>		ml

Final page for worklist # 23024

AB Campbell 3/18/98
Analyst Signature Date

AB Campbell 3/18/98
Analyst Signature Date
Aug 21 3.18.98

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.

worklistrpt Version 2.1 05/15/95
04/06/98 10:48

HNF-1649 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 23338

Analyst: WJ7 Instrument: BA000 Book # N/A

Method: LO-160-103 Rev/Mod C-0

Worklist Comment: S-102 C232 SEG #9 RISER 16 EXTRUSION

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 INSTCHK01			EXTRUD01	SOLID	<u>20</u>	<u>20.00</u>	<u>N/A</u>	
		2 INSTCHK02			EXTRUD01	SOLID	<u>500</u>	<u>500.02</u>	<u>N/A</u>	
98000175	S-102	3 SAMPLE	S98T01178	0	DLIQVOL1	SOLID	<u>N/A</u>	<u>0</u>		mL
98000175	S-102	4 SAMPLE	S98T01178	0	DLQWTO1	SOLID	<u>N/A</u>	<u>0</u>		g
98000175	S-102	5 SAMPLE	S98T01178	0	EST.G/ML	SOLID	<u>N/A</u>	<u>0</u>		g/mL
98000175	S-102	6 SAMPLE	S98T01178	0	EXTRUD01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	7 SAMPLE	S98T01178	0	LLQWTO1	SOLID	<u>N/A</u>	<u>55</u>		g
98000175	S-102	8 SAMPLE	S98T01178	0	NOTEBOOK	SOLID	<u>N/A</u>	<u>N-1204</u>		
98000175	S-102	9 SAMPLE	S98T01178	0	SLDVOL01	SOLID	<u>N/A</u>	<u>N/A</u>		mL
98000175	S-102	10 SAMPLE	S98T01178	0	SLDWT-01	SOLID	<u>N/A</u>	<u>480.4</u>		g
98000175	S-102	11 SAMPLE	S98T01178	0	APPEAR01	SOLID	<u>N/A</u>	<u>Complete</u>		
98000175	S-102	12 SAMPLE	S98T01178	0	ORGVOL01	SOLID	<u>N/A</u>	<u>0</u>		mL

Final page for worklist # 23338

WJ7 4/15/98
Analyst Signature Date

WJ7 4/15/98
Analyst Signature Date
Validated And Due 4-16-98

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.

worklistrpt Version 2.1 05/15/95

HNF-1649 REV. 0

Page: 1

04/06/98 10:58

LABCORE Data Entry Template for Worklist# 23339

Analyst: CSL Instrument: BA000 Book # N/AMethod: LO-160-103 Rev/Mod C. 0

Worklist Comment: S-102 C232 SEG #11 RISER 16 EXTRUSION

GROUP	PROJECT	S TYPE	SAMPLI.#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 INSTCHK01			EXTRUD01	SOLID	<u>20</u>	<u>20.00</u>	N/A	
		2 INSTCHK02			EXTRUD01	SOLID	<u>500</u>	<u>500.02</u>	N/A	
98000175	S-102	3 SAMPLE	S98T01180	0	DLIQVOL1	SOLID	N/A	<u>0</u>		ml
98000175	S-102	4 SAMPLE	S98T01180	0	DLIQWT01	SOLID	N/A	<u>0</u>		g
98000175	S-102	5 SAMPLE	S98T01180	0	EST.G/ML	SOLID	N/A	<u>0</u>		g/ml
98000175	S-102	6 SAMPLE	S98T01180	0	EXTRUD01	SOLID	N/A	<u>complete</u>		
98000175	S-102	7 SAMPLE	S98T01180	0	LLIQWT01	SOLID	N/A	<u><10</u>		g
98000175	S-102	8 SAMPLE	S98T01180	0	NOTEBOOK	SOLID	N/A	<u>N-1204</u>		
98000175	S-102	9 SAMPLE	S98T01180	0	SLDVOL01	SOLID	N/A	<u>NA</u>		ml
98000175	S-102	10 SAMPLE	S98T01180	0	SLDWT-D1	SOLID	N/A	<u>335.0</u>		g
98000175	S-102	11 SAMPLE	S98T01180	0	APPEAR01	SOLID	N/A	<u>complete</u>		
98000175	S-102	12 SAMPLE	S98T01180	0	ORGVOL01	SOLID	N/A	<u>0</u>		ml

Final page for worklist # 23339

Analyst Signature CSL Date 4/15/98Analyst Signature CSL Date 4/15/98
Validated And CSL 4.16.98

validated 2014 4/15/98

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.

INORGANIC ANALYSIS

THIS PAGE WAS INTENTIONALLY LEFT BLANK

worklistprt Version 2.1 05/15/95
08/27/98 10:05

LABCORE Data Entry Template for Worklist# 25895

Analyst: KRM Instrument: DSC0 3 Bool: # 12NMB
 Method: LA-514-114 Rev/Mod D-1
 Worklist Comment: S102 (CMPT) DSC-03 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			DSC-03	LIQUID	<u>28.45</u>	<u>28.50</u>	<u>N/A</u>	Joules/g
98000466	S-102 CMPT	2 SAMPLE	S98T002514 0		DSC-03	LIQUID	<u>N/A</u>	<u>44.66</u>	<u>9/23/98</u>	Joules/g
98000466	S-102 CMPT	3 DUP	S98T002514 0		DSC-03	LIQUID	<u>44.66</u>	<u>44.07</u>	<u>N/A</u>	Joules/g

Final page for worklist # 25895

Analyst Signature

Date

9-22-98

Validated 9/24/98 Bachelor

Analyst Signature

Date

9/24/98

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.

Curve 1: DSC

File Info: IND092201 Tue Sep 22 06:26:14 1998

Sample Weight: 11.670 mg

STD 12N14-B

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 73 TO 78

Curve 1: DSC
 File info: SAM092207 Tue Sep 22 21:40:54 1998
 Sample Weight: 8.550 mg
 S98T002514

KR MONTEITH
 PERKIN-ELMER
 7 Series Thermal Analysis System
 Wed Sep 23 14:33:19 1998

N2 10C/min
 TEMP: 35.0 °C
 TIME: 500.0 s
 RATE: 0.0 min RATE: 10.0 C/min

HNF-1649 REV. 0

Curve 1: DSC
 File Info: SAM092208 Tue Sep 22 22:42:05 1998
 Sample Weight: 15.010 mg
 S98T002514 DUP

LABCORE Completed Worklist Report for Worklist# 26515

Analyst: ppb

Instrument: DSC0

Book#: NA

Method: LA-514-11⁴ Rev/Mod D-1

Worklist Comment: s-102 dry-dsc liquid jro

Seq	Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	SAMPLE	S98T002514	0	DSC-02	LIQUID	N/A	91.19		Joules/g Dry
2	DUP	S98T002514	0	DSC-02	LIQUID	91.19	89.98	1.336	RPD

Final page for worklist# 26515

Analyst Signature _____ Date _____

San P. Chen 10-8-97
Analyst Signature Date

B. Rachel 10/12/98
Reviewer Signature Date

HNF-1649 REV. 0

worklistrpt Version 2.1 05/15/95
08/27/98 10:08

Page: 1

LABCORE Data Entry Template for Worklist# 25897

Analyst: SLH Instrument: TGA0 3 Book # 117N8-AMethod: LA-514-114 Rev/Mod D-1

Worklist Comment: S102 (CMPT) FOR TGA-03 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			TGA-03	LIQUID	<u>59.4</u>	<u>58.94</u>	N/A	%
98000466	S-102 CMPT	2 SAMPLE	S98T002514 0		TGA-03	LIQUID	N/A	<u>51.53</u>		%
98000466	S-102 CMPT	3 DUP	S98T002514 0		TGA-03	LIQUID	<u>51.53</u>	<u>50.52</u>	N/A	%

Final page for worklist # 25897

Sandra L. Hood Boatright
 Analyst Signature Date
9-20-98

Sandra L. Hood Boatright 10-7-98
 Analyst Signature Date

Validated 10/8/98 Rachelor

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: TER092002 Sun Sep 20 19:15:35 1998
 Sample Weight: 16.929 mg
 117N8-A

HNF-1649 REV. 0

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
 COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 78 TO 80.

SL HOOD BOATRIGHT
 PERKIN-ELMER
 7 Series Thermal Analysis System
 Sun Sep 20 19:30:41 1998

10C/MIN N2
 30.0 g
 0.0 min RATE: 10.0 C/min
 TIME: 300.0 g

HNF-1649 REV. 0

E VIA

Curve 1: TGA

File Info: SAM092007 Sun Sep 20 20:22:24 1998

Sample Weight: 15.064 mg

S98T002514

Curve 1: TGA

File Info: SAM092008 Sun Sep 20 22:58:05 1998

Sample Weight: 14.553 mg

S98T002514 DUP

10C/MIN N2

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

LABCORE Data Entry Template for Worklist# 25899

Analyst: RR Instrument: BA001 Book # 134715-CMethod: LA-510-112 Rev/Mod D-1

Worklist Comment: S102 (CMPT) FOR SPG-01 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			SPG-01	LIQUID	<u>1.377</u>	<u>1.369</u>	<u>N/A</u>	Sp.G.
98000466	S-102 CMPT	2 SAMPLE	S98T002515	0	SPG-01	LIQUID	<u>N/A</u>	<u>1.382</u>		Sp.G.
98000466	S-102 CMPT	3 DUP	S98T002515	0	SPG-01	LIQUID	<u>1.382</u>	<u>1.432</u>	<u>N/A</u>	Sp.G.

Final page for worklist # 25899

[Signature] 8/28/98
Analyst Signature Date

[Signature] 9/10/98
Analyst Signature Date

[Signature] 9/15/98
REVIEWER 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.

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

Type		STD	REPLICATE
STD	Gross Weight (W2)	1.9010	1.9866
Work List	Tare Weight (W1)	1.7640	1.8498
25899	Weight of Solution (W2-W1)	0.137	0.1368
Test Code	Volume of Solution μ L	100.0000	100.0000
SPG01	Specific Gravity	1.3700	1.3680
Matrix	Specific Gravity (Average)	1.3690	
LIQUID			
Sample #			
STD			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
RWK	Specific Gravity = $[(W2-W1) * 1000 \mu\text{L/mL}] / [\text{Vol. of Solution } \mu\text{L} * 1.000 \text{ g/mL}]$		
Date			
08/28/98	v RESULT v		
Time	Specific Gravity Average =	1.369	
03:00 PM			

Data Entry by: NA	Date: 09/10/98
Approved by: NA	Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

Type		SAM	REPLICATE
SAM	Gross Weight (W2)	1.9729	
Work List	Tare Weight (W1)	1.8347	
25899	Weight of Solution (W2-W1)	0.1382	0
Test Code	Volume of Solution μ L	100.0000	
SPG01	Specific Gravity	1.3820	NA
Matrix			
LIQUID			
Sample #			
S98T002515			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
RWK	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		
08/28/98			
Time	Specific Gravity =	1.382	
03:00 PM			

Data Entry by: NA

Date: 09/10/98

Approved by: NA

Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

Type		DUP	REPLICATE
DUP	Gross Weight (W2)	1.9711	
Work List	Tare Weight (W1)	1.8288	
25899	Weight of Solution (W2-W1)	0.1423	0
Test Code	Volume of Solution μL	100.0000	
SPG01	Specific Gravity	1.4230	NA
Matrix			
LIQUID			
Sample #			
S98T002515			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
RWK	Specific Gravity = $[(W2-W1) * 1000 \mu\text{L/mL}] / [\text{Vol. of Solution } \mu\text{L} * 1.000 \text{ g/mL}]$		
Date			
08/28/98	$\checkmark$ RESULT $\checkmark$		
Time	Specific Gravity =	1.423	
03:00 PM			

Data Entry by: NA

Date: 09/10/98

Approved by: NA

Date:

LABCORE Completed Worklist Report for Worklist# 25888

Analyst: slh Instrument: PH01>7 Book#: _____

Method: LA-212-106 Rev/Mod C-2

Worklist Comment: S102 (CMPT) FOR PH-01 RTS

Seq	Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STDPH	0		PH-01	LIQUID	8.00 ^{mL} 9/2/98	8.02	8.020	pH
2	SAMPLE	S98T002514	0	PH-01	LIQUID	N/A	13.75	1.00e-002	pH
3	DUP	S98T002514	0	PH-01	LIQUID	13.75	13.83	0.560	RPD

Final page for worklist# 25888

Analyst Signature _____ Date _____

SLH SP 9/10/98
Analyst Signature Date

MLA 9/15/98
Reviewer Signature Date

LABCORE Data Entry Template for Worklist# 25888

Analyst: SUH Instrument: PH01 Book# 18N19-C

Method: LA-212-106 Rev/Mod C-2

Worklist Comment: S102 (CMPT) FOR PH-01 RTS

S Type	Sample#	R A	Test	Matrix	W/L 8.00	1022# Group#	Project		
1 STDPH			PH-01	LIQUID		<u>8.02</u>	<u>NA</u>	<u>PH</u>	
2 SAMPLE	S98T002514 0		PH-01	LIQUID		<u>NA</u>	<u>13.75</u>	<u>PH</u>	
Analytes Requested: PH-01									
3 DUP	S98T002514 0		PH-01	LIQUID		<u>13.75</u>	<u>13.83</u>	<u>NA</u>	<u>PH</u>

Final page for worklist # 25888

Andrew Hood Bastrant
Analyst Signature Date
8-28-98

JM Sm
Analyst Signature Date
9/10/98

Data Entry Comments:

LABCORE Data Entry Template for Worklist# 25887

Analyst: _____ Instrument: PH01 _____ Book # _____

Method: LA-211-102 Rev/Mod D-0

Worklist Comment: S102 (CMPT) OH-01 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			OH-01	LIQUID	<u>1.72E4</u>	<u>1.74E4</u>	<u>N/A</u>	ug/mL
		2 BLNK			OH-01	LIQUID	<u>1</u>	<u>2500</u>	<u>N/A</u>	ug/mL
98000466	S-102 CMPT	3 SAMPLE	S98T002514	0	OH-01	LIQUID	<u>N/A</u>	<u>3.79E4</u>		ug/mL
98000466	S-102 CMPT	4 DUP	S98T002514	0	OH-01	LIQUID	<u>3.79E4</u>	<u>3.72E4</u>	<u>N/A</u>	ug/mL

Final page for worklist # 25887

SEE ATTACHED
Analyst Signature _____ Date _____

SA Sp 9/10/98
Analyst Signature _____ Date _____

Emi A 9/15/98
REVIEWER 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.

LABCORE Data Entry Template for Worklist# 25887

Analyst: SLH Instrument: PH01 Book # 111N8

Method: LA-211-102 Rev/Mod _____

Worklist Comment: S102 (CMPT) OH-01 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			OH-01	LIQUID			N/A	ug/mL
98000466	S-102 CMPT	2 SAMPLE	S98T002514	0	OH-01	LIQUID	N/A			ug/mL
98000466	S-102 CMPT	3 DUP	S98T002514	0	OH-01	LIQUID			N/A	ug/mL

Final page for worklist # 25887

Andrew Hood Bostwick
Analyst Signature Date
8-28-98

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.

.Bik Wt 25887
 date 98-08-28 time 14:47
 GET pH 12 # 380
 Id.#1 2346
 Id.#2 .1934
 pH(init) 7.77
 V/ml pH
 EP1 .008 6.84
 stop volt.reached
 =====

date 98-08-28 time 14:48
 GET pH 12 # 380
 .10ml/div Δ pH=1/div
 start V .000 ml

STD .050ml
 Wt 25887
 INN 8

date 98-08-28 time 14:55
 GET pH 12 # 381
 Id.#1 2346
 Id.#2 .1934
 pH(init) 11.43
 V/ml pH
 EP1 .265 9.68
 EP2 .347 6.84
 stop volt.reached
 =====

date 98-08-28 time 14:55
 GET pH 12 # 381
 .10ml/div Δ pH=1/div
 start V .000 ml

S98T002514 3m
 .250 ml
 date 98-08-28 time 15:51
 GET pH 12 # 385
 Id.#1 2346
 Id.#2 .1934
 pH(init) 12.22
 V/ml pH
 EP1 2.681 10.67
 manual stop
 =====

date 98-08-28 time 15:52
 GET pH 12 # 385
 .10ml/div Δ pH=1/div
 start V .000 ml

date 98-08-28 time 16:43
 GET pH 12 # 388
 Id.#1 2346
 Id.#2 .1934
 pH(init) 12.13
 V/ml pH
 EP1 2.828 10.59
 manual stop

=====

Dup
 S98T002514 *sub*
 .250ml

~~date 98-08-28 time 16:49~~
~~GET pH 12 # 387~~
~~no titration data~~

cont
 S98T002514 *Dup*
 date 98-08-28 time 16:44
 GET pH 12 # 388
 .10ml/div .001L/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 HNO ₃ (Molarity)	0.1934
Work List	HNO ₃ Titrant at OH end-point in mL	0.265
25887	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	1.03E+00
OH01	OH in Sample in µg/mL (PPM)	1.74E+04
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
STD		
Instrument Code	Detection Limit (µg/mL)	2.50E+03
PH01		
Analyst	OH Molarity = ((mL HNO ₃)*(M HNO ₃))/Sample Size in mL*Dilution Factor	
SLH		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/28/98		
Time		
05:00 PM	Concentration of OH in Sample (Molarity)	1.03E+00
	OH in Sample in µg/mL (PPM)	1.74E+04

Data Entry by:	Date: 09/10/98
Approved by: NA	Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

OH (AUTO) : LA-211-102 (D-0)		BLK
Type	Sample Size (mL) SS	0.250
BLK	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	0.008
25887	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	6.19E-03
OH01	OH in Sample in µg/mL (PPM)	1.05E+02
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
BLK		
Instrument Code	Detection Limit (µg/mL)	5.00E+02
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
SLH		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/28/98		
Time		BLK
05:00 PM	Concentration of OH in Sample (Molarity)	6.19E-03
	OH in Sample in µg/mL (PPM)	<500

The Result is < Detection Limit

Data Entry by:	Date: 09/10/98
Approved by: NA	Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

OH (AUTO) : LA-211-102 (D-0)		SAM
Type	Sample Size (mL) SS	0.250
SAM	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	2.881
25887	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	2.23E+00
OH01	OH in Sample in µg/mL (PPM)	3.79E+04
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
S98T002514		
Instrument Code	Detection Limit (µg/mL)	5.00E+02
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
SLH		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/28/98		
Time		SAM
05:00 PM	Concentration of OH in Sample (Molarity)	2.23E+00
	OH in Sample in µg/mL (PPM)	3.79E+04

Data Entry by:	Date: 09/10/98
Approved by: NA	Date:

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

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

		DUP
Type	Sample Size (mL) SS	0.250
DUP	Concentration of HNO3 (Molarity)	0.1934
Work List	HNO3 Titrant at OH end-point in mL	2.828
25887	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	2.19E+00
OH01	OH in Sample in µg/mL (PPM)	3.72E+04
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
S98T002514		
Instrument Code	Detection Limit (µg/mL)	5.00E+02
PH01		
Analyst	OH Molarity = ((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
SLH		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
08/28/98		
Time		DUP
05:00 PM	Concentration of OH in Sample (Molarity)	2.19E+00
	OH in Sample in µg/mL (PPM)	3.72E+04

Data Entry by:	Date: 09/10/98
Approved by: NA	Date:

LABCORE Completed Worklist Report for Worklist# 25889

Analyst: slh

Instrument: NH301

Book#: _____

Method: LA-631-001 Rev/Mod _____

Worklist Comment: S102 (CMPT) NH3-01 RTS

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 BLNK	0	NH3-01	LIQUID	1	<5.00E+0		ug/mL
2 STD	0	NH3-01	LIQUID	3.85E+02	3.82E+2	99.221 % Recovery	
3 SAMPLE	S98T002516 0	NH3-01	LIQUID	N/A	3.47E+01	5.000 ug/mL	
4 DUP	S98T002516 0	NH3-01	LIQUID	3.47E+1	2.44E+1	34.856 RPD	
5 TRIPL	S98T002516 0	NH3-01	LIQUID	N/A	N/A	RPD	
6 SPK	S98T002516 0	NH3-01	LIQUID	1.93E+02	1.91E+02	98.964 % Recovery	
7 STD	0	NH3-01	LIQUID	3.85E+02	4.04E+2	104.935 % Recovery	

Final page for worklist# 25889

Analyst Signature

Date

Analyst Signature

Date

Reviewer Signature

Date

See next page for signatures *[Signature]* 10/26/98

LABCORE Completed Worklist Report for Worklist# 25889

Analyst: slh Instrument: NH301 Book#: _____

Method: LA-631-001 Rev/Mod C-0

Worklist Comment: S102 (CMPT) NH3-01 RTS

Seq	Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK	0		NH3-01	LIQUID	1	<5.00E+0		ug/mL
2	STD	0		NH3-01	LIQUID	3.85E+02	3.82E+2	99.221 %	Recovery
3	SAMPLE	S98T002516	0	NH3-01	LIQUID	N/A	3.47E+01	5.000	ug/mL
4	DUP	S98T002516	0	NH3-01	LIQUID	3.47E+1	2.44E+1	34.856	RPD
5	TRIPL	S98T002516	0	NH3-01	LIQUID	3.47E+1	<2.00E+1		RPD
6	SPK	S98T002516	0	NH3-01	LIQUID	1.93E+02	8.67E+2	44.922 %	Recovery
7	STD	0		NH3-01	LIQUID	3.85E+02	4.04E+2	104.935 %	Recovery

Final page for worklist# 25889

Analyst Signature _____ Date _____

9/10/98
Analyst Signature _____ Date _____

9/15/98
Reviewer Signature _____ Date _____

09/10/98 13:04

LABCORE Data Entry Template for Worklist# 25889

Analyst: _____ Instrument: NH301 _____ Book # _____

Method: LA-631-001 Rev/Mod _____

Worklist Comment: S102 (CMPT) NH3-01 RTS

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK				NH3-01	LIQUID	_____	_____	N/A	ug/mL
		2	STD				NH3-01	LIQUID	_____	_____	N/A	ug/mL
98000466	S-102 CMPT	3	SAMPLE	S98T002516	0		NH3-01	LIQUID	N/A	_____	_____	ug/mL
98000466	S-102 CMPT	4	DUP	S98T002516	0		NH3-01	LIQUID	_____	_____	N/A	ug/mL
98000466	S-102 CMPT	5	TRIPL	S98T002516	0		NH3-01	LIQUID	_____	_____	N/A	ug/mL
98000466	S-102 CMPT	6	SPK	S98T002516	0		NH3-01	LIQUID	_____	_____	N/A	ug/mL
		7	STD				NH3-01	LIQUID	_____	_____	N/A	ug/mL

Final page for worklist # 25889

SEE ATTACHED
Analyst Signature _____ Date _____JAL SP 9/10/98
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.

LABCORE Data Entry Template for Worklist# 25889

Analyst: SLH Instrument: NH301 Book # SDN19-B

Method: LA-631-001 Rev/Mod _____

Worklist Comment: S102 (CMPT) NH3-01 RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 BLNK			NH3-01	LIQUID			N/A	ug/mL
		2 STD			NH3-01	LIQUID			N/A	ug/mL
98000466	S-102 CMPT	3 SAMPLE	S98T002516	0	NH3-01	LIQUID	N/A			ug/mL
98000466	S-102 CMPT	4 DUP	S98T002516	0	NH3-01	LIQUID			N/A	ug/mL
98000466	S-102 CMPT	5 SPK	S98T002516	0	NH3-01	LIQUID			N/A	ug/mL
		6 STD			NH3-01	LIQUID			N/A	ug/mL

Final page for worklist # 25889

Sandra Hord Boatright
Analyst Signature Date
8-29-98

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.

WORKBOOK PAGE: BLANK1

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		BLNK
Type	Instrument Data (µg/mL)	ID 0.000
BLNK	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code		
NH3-01		
Matrix		
LIQUID	Dilution Factor	DF 1.000
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC < 5.00E+00
Sample #		
STD	Detection Limit (µg/mL)	5.00E+00
Instrument Code		
NH301	Detection Limit = 0.200µg * (FVOL/VSAM)	
Prepared By		
JDS	NH3 Concentration (µg/mL) = (BR) * (FVOL / VSAM) * DDF	
Chemist		
MJL		
Analyst		
SLH		
Date Complete		
09/10/98		
Analysis Date		
08/29/98		
Analysis Time		
04:30 PM		
Sample Point	NH3 Concentration (µg/mL)	< 5.00E+00
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: N/A	MJL Date:

SAMPLE.WB1 REV 1.0

631001ML

WORKBOOK PAGE: STD2

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		STD
Type	Instrument Data (µg/mL)	ID 15.300
STD	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code	LCS Standard Book Number	LCS 50N19B
NH3-01	LCS Standard Concentration (µg/mL)	STD VAL 3.85E+02
Matrix		
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC 3.82E+02
Sample #		
STD	Detection Limit (µg/mL)	5.00E+00
Instrument Code		
NH301	Detection Limit = $0.200\mu\text{g} * (\text{FVOL}/\text{VSAM})$	
Prepared By		
JDS	NH3 Concentration (µg/mL) = $(\text{ID}-\text{BR}) * (\text{FVOL}/\text{VSAM})$	
Chemist		
MJL	QC ACTUAL = STD VAL	
Analyst	QC FOUND = $(\text{ID}-\text{BR}) * (\text{FVOL}/\text{VSAM})$	
SLH		
Date Complete		
09/10/98		
Analysis Date	QC ACTUAL (µg)	3.85E+02
08/29/98	QC FOUND (µg)	3.82E+02
Analysis Time		
04:30 PM		
Sample Point		
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: NA	MJL Date:

SAMPLE.WB1 REV 1.0

631001ML

WORKBOOK PAGE: SAM3

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		SAMPLE
Type	Instrument Data (µg/mL)	ID 1.410
SAMPLE	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code		
NH3-01		
Matrix		
LIQUID	Dilution Factor	DF 1.000
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC 3.47E+01
Sample #		
S98T002516	Detection Limit (µg/mL)	5.00E+00
Instrument Code		
NH301	Detection Limit = $0.200\mu\text{g} * (\text{FVOL}/\text{VSAM}) * \text{DF}$	
Prepared By		
JDS	NH3 Concentration (µg/mL) = $(\text{ID}-\text{BR}) * (\text{FVOL} / \text{VSAM}) * \text{DF}$	
Chemist		
MJL		
Analyst		
SLH		
Date Complete		
09/10/98		
Analysis Date		
08/29/98		
Analysis Time		
04:30 PM		
Sample Point	NH3 Concentration (µg/mL)	3.47E+01
S102		

Analyst:	SLH	Date: 09/10/98
Signature of Chemist: <i>NA</i>	MJL	Date:

SAMPLE.WB1 REV 1.0

631001ML

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		DUP
Type	Instrument Data (µg/mL)	ID 1.000
DUP	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code		
NH3-01		
Matrix		
LIQUID	Dilution Factor	DF 1.000
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC 2.44E+01
Sample #		
S98T002516	Detection Limit (µg/mL)	5.00E+00
Instrument Code		
NH301	Detection Limit = $0.200\mu\text{g} * (\text{FVOL}/\text{VSAM}) * \text{DF}$	
Prepared By		
JDS	NH3 Concentration (µg/mL) = $(\text{ID}-\text{BR}) * (\text{FVOL} / \text{VSAM}) * \text{DF}$	
Chemist		
MJL		
Analyst		
SLH		
Date Complete		
09/10/98		
Analysis Date		
08/29/98		
Analysis Time		
04:30 PM		
Sample Point	NH3 Concentration (µg/mL)	2.44E+01
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: NA	MJL Date:

WORKBOOK PAGE: TRIPL5

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		TRIPL
Type	Instrument Data (µg/mL)	ID 0.174
TRIPL	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 0.250
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code		
NH3-01		
Matrix		
LIQUID	Dilution Factor	DF 1.000
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC < 2.00E+01
Sample #		
S98T002516	Detection Limit (µg/mL)	2.00E+01
Instrument Code		
NH301	Detection Limit = $0.200\mu\text{g} * (\text{FVOL}/\text{VSAM}) * \text{DF}$	
Prepared By		
JDS	NH3 Concentration (µg/mL) = $(\text{ID}-\text{BR}) * (\text{FVOL} / \text{VSAM}) * \text{DF}$	
Chemist		
MJL		
Analyst		
SLH		
Date Complete		
09/10/98		
Analysis Date		
08/29/98		
Analysis Time		
04:30 PM		
Sample Point	NH3 Concentration (µg/mL)	< 2.00E+01
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: NA	MJL Date:

SAMPLE.WB1 REV 1.0

631001ML

WORKBOOK PAGE: SPIKE6

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		SPK
Type	Instrument Data (µg/mL)	ID 9.040
SPK	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code	Spike Book Number	SPK 50N19B
NH3-01	Spike Value (µg/mL)	SPK VAL 3.85E+02
Matrix	Vol of Spike Standard Used (mL)	VOL SPK 0.500
LIQUID		
Batch Number		
98004456		
Rerun	Sample Instrument Data (µg/mL)	SAM ID 1.41
0	Sample Volume of Sample (mL)	SAM VSAM 1.000
Sample Prep	Sample Final Volume (mL)	SAM FVOL 25.0
N/A		
Sample #		
S98T002516		
Instrument Code		
NH301		
Prepared By		
JDS		
Chemist		
MJL	QC ACTUAL = SPK VAL * VOL SPK	
Analyst	QC FOUND = (((ID-BR) * FVOL) - (SAM ID - BR) * SAM FVOL * (VSAM / SAM VSAM))	
SLH		
Date Complete		
09/10/98		
Analysis Date	QC ACTUAL (µg)	1.93E+02
08/29/98	QC FOUND (µg)	1.91E+02
Analysis Time		
04:30 PM		
Sample Point		
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: NA	MJL Date:

SAMPLE.WB1 REV 1.0

631001ML

WORKBOOK PAGE: ST_END7

AMMONIA (NH3) : LA-631-001 (C-0)

LIQUIDS/SOLIDS

		STD
Type	Instrument Data (µg/mL)	ID 16.200
STD	Blank Result from the Instrument (µg/mL)	BR 0.023
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM 1.000
25889	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL 25.0
Test Code	LCS Standard Book Number	LCS 50N19B
NH3-01	LCS Standard Concentration (µg/mL)	STD VAL 3.85E+02
Matrix		
Batch Number		
98004456		
Rerun		
0		
Sample Prep		
N/A	NH3 Concentration (µg/mL)	NH3 CONC 4.04E+02
Sample #		
STD	Detection Limit (µg/mL)	5.00E+00
Instrument Code		
NH301	Detection Limit = $0.200\mu\text{g} * (\text{FVOL}/\text{VSAM})$	
Prepared By		
JDS	NH3 Concentration (µg/mL) = $(\text{ID}-\text{BR}) * (\text{FVOL} / \text{VSAM})$	
Chemist		
MJL	QC ACTUAL = STD VAL	
Analyst	QC FOUND = $(\text{ID}-\text{BR}) * (\text{FVOL}/\text{VSAM})$	
SLH		
Date Complete		
09/10/98		
Analysis Date	QC ACTUAL (µg)	3.85E+02
08/29/98	QC FOUND (µg)	4.04E+02
Analysis Time		
04:30 PM		
Sample Point		
S102		

Analyst:	SLH Date: 09/10/98
Signature of Chemist: N/A	MJL Date:

SAMPLE.WB1 REV 1.0

631001ML

DOUBLE KNOWN ADDITION SELECTED
AT 15:51, 08-28-98

SAMPLE VOL= 25.000 AT 07:13, 08-29-98
ENTERED

EMF= 213.4 mV AT 07:22, 08-29-98

EMF= 212.5 mV AT 07:23, 08-29-98

EMF= 212.2 mV AT 07:23, 08-29-98

EMF= 211.7 mV AT 07:24, 08-29-98

EMF= 211.3 mV AT 07:24, 08-29-98

EMF= 210.8 mV AT 07:25, 08-29-98

EMF= 210.3 mV AT 07:25, 08-29-98

EMF= 210.0 mV AT 07:26, 08-29-98

EMF= 209.7 mV AT 07:26, 08-29-98

EMF= 209.3 mV AT 07:26, 08-29-98

EMF= 208.8 mV AT 07:27, 08-29-98

EMF= 208.2 mV AT 07:28, 08-29-98

EMF= 207.6 mV AT 07:28, 08-29-98

EMF= 205.2 mV AT 07:30, 08-29-98

EMF= 200.1 mV AT 07:33, 08-29-98

~~EMF= 199.8 mV AT 07:33, 08-29-98~~
ENTERED

STD CONC= 999 AT 07:33, 08-29-98
ENTERED

STD VOL= .25000 AT 07:33, 08-29-98
ENTERED

EMF= 44.6 mV AT 07:37, 08-29-98

EMF= 44.3 mV AT 07:38, 08-29-98

EMF= 43.9 mV AT 07:38, 08-29-98

EMF= 43.8 mV AT 07:39, 08-29-98

EMF= 43.7 mV AT 07:40, 08-29-98

EMF= 43.7 mV AT 07:40, 08-29-98

EMF= 43.7 mV AT 07:41, 08-29-98
ENTERED

STD VOL= 2.5000 AT 07:41, 08-29-98
ENTERED

EMF=-15.2 mV AT 07:44, 08-29-98

EMF=-15.4 mV AT 07:45, 08-29-98

EMF=-15.5 mV AT 07:45, 08-29-98

EMF=-15.7 mV AT 07:46, 08-29-98

EMF=-15.5 mV AT 07:48, 08-29-98

EMF=-15.3 mV AT 07:48, 08-29-98

EMF=-15.2 mV AT 07:49, 08-29-98

EMF=-15.2 mV AT 07:49, 08-29-98

EMF=-15.4 mV AT 07:49, 08-29-98
ENTERED

1:NH3 SLOPE=-59.1 mV/DEC
AT 07:49, 08-29-98

1:NH3 CONC= .0227

Bik

WL 25889

DOUBLE KNOWN ADDITION SELECTED

AT 10:26, 08-29-98

SAMPLE VOL= 25.000 AT 10:26, 08-29-98
ENTERED

EMF= 32.6 mV AT 10:28, 08-29-98

EMF= 32.3 mV AT 10:29, 08-29-98

EMF= 32.3 mV AT 10:30, 08-29-98

EMF= 32.4 mV AT 10:30, 08-29-98

EMF= 32.5 mV AT 10:31, 08-29-98

EMF= 32.6 mV AT 10:32, 08-29-98

EMF= 32.8 mV AT 10:33, 08-29-98

EMF= 32.9 mV AT 10:33, 08-29-98

EMF= 33.0 mV AT 10:34, 08-29-98

EMF= 33.1 mV AT 10:34, 08-29-98

EMF= 33.2 mV AT 10:35, 08-29-98
ENTEREDSTD CONC= 999 AT 10:35, 08-29-98
ENTEREDSTD VOL= .25000 AT 10:35, 08-29-98
ENTERED

EMF= 20.4 mV AT 10:37, 08-29-98

EMF= 20.3 mV AT 10:37, 08-29-98

EMF= 20.1 mV AT 10:38, 08-29-98

EMF= 20.2 mV AT 10:38, 08-29-98

EMF= 20.4 mV AT 10:40, 08-29-98

EMF= 20.6 mV AT 10:41, 08-29-98

EMF= 20.8 mV AT 10:41, 08-29-98

EMF= 21.0 mV AT 10:42, 08-29-98

EMF= 21.1 mV AT 10:43, 08-29-98

EMF= 20.8 mV AT 10:43, 08-29-98
ENTERED

STD VOL= 2.5000 AT 10:44, 08-29-98
ENTERED

EMF=-19.0 mV AT 10:46, 08-29-98

EMF=-19.2 mV AT 10:47, 08-29-98

EMF=-19.2 mV AT 10:47, 08-29-98

EMF=-19.2 mV AT 10:48, 08-29-98

EMF=-19.0 mV AT 10:49, 08-29-98

EMF=-18.9 mV AT 10:49, 08-29-98

EMF=-18.7 mV AT 10:50, 08-29-98

EMF=-18.5 mV AT 10:51, 08-29-98

EMF=-18.4 mV AT 10:51, 08-29-98

EMF=-18.2 mV AT 10:52, 08-29-98

EMF=-18.1 mV AT 10:53, 08-29-98

EMF=-17.9 mV AT 10:53, 08-29-98

EMF=-17.6 mV AT 10:54, 08-29-98

EMF=-17.5 mV AT 10:55, 08-29-98

EMF=-17.4 mV AT 10:55, 08-29-98

EMF=-17.3 mV AT 10:56, 08-29-98

EMF=-17.2 mV AT 10:56, 08-29-98

EMF=-17.1 mV AT 10:56, 08-29-98

ENTERED

1:NH3 SLOPE=-58.0 mV/DEC
AT 10:57, 08-29-98

1:NH3 CONC= 15.3

STD 1ml 50 N19-B

DOUBLE KNOWN ADDITION SELECTED
AT 10:57, 08-29-98

SAMPLE VOL= 25.000 AT 11:10, 08-29-98
ENTERED

EMF= 85.1 mV AT 11:12, 08-29-98

EMF= 84.9 mV AT 11:12, 08-29-98

EMF= 95.5 mV AT 11:18, 08-29-98

EMF= 95.9 mV AT 11:18, 08-29-98

EMF= 96.2 mV AT 11:19, 08-29-98

EMF= 96.6 mV AT 11:19, 08-29-98

EMF= 97.0 mV AT 11:20, 08-29-98

EMF= 96.1 mV AT 11:20, 08-29-98
ENTERED

STD CONC= 999 AT 11:20, 08-29-98
ENTERED

STD VOL= .25000 AT 11:20, 08-29-98
ENTERED

EMF= 42.0 mV AT 11:24, 08-29-98

EMF= 41.6 mV AT 11:24, 08-29-98

EMF= 41.5 mV AT 11:25, 08-29-98

EMF= 41.3 mV AT 11:25, 08-29-98

EMF= 41.4 mV AT 11:26, 08-29-98

EMF= 41.4 mV AT 11:27, 08-29-98

EMF= 41.9 mV AT 11:29, 08-29-98

EMF= 42.1 mV AT 11:29, 08-29-98

EMF= 42.3 mV AT 11:30, 08-29-98

EMF= 42.5 mV AT 11:30, 08-29-98

EMF= 42.9 mV AT 11:31, 08-29-98
ENTERED

STD VOL= 2.5000 AT 11:31, 08-29-98
ENTERED

EMF=-13.2 mV AT 11:34, 08-29-98

EMF=-13.6 mV AT 11:35, 08-29-98

EMF=-13.7 mV AT 11:35, 08-29-98

EMF=-14.0 mV AT 11:36, 08-29-98

EMF=-14.1 mV AT 11:36, 08-29-98

EMF=-14.0 mV AT 11:37, 08-29-98

EMF=-14.0 mV AT 11:37, 08-29-98

EMF=-13.6 mV AT 11:39, 08-29-98

EMF=-13.5 mV AT 11:39, 08-29-98

EMF=-13.4 mV AT 11:40, 08-29-98

EMF=-13.3 mV AT 11:40, 08-29-98

EMF=-12.7 mV AT 11:41, 08-29-98

EMF=-13.0 mV AT 11:41, 08-29-98

ENTERED

1:NH3 SLOPE=-58.9 mV/DEC
AT 11:41, 08-29-98

1:NH3 CONC= 1.41

598700 2516 Sam

ml

DOUBLE KNOWN ADDITION SELECTED
AT 11:45, 08-29-98

SAMPLE VOL= 25.000 AT 11:45, 08-29-98
ENTERED

EMF= 101.0 mV AT 11:52, 08-29-98

EMF= 101.5 mV AT 11:53, 08-29-98

EMF= 101.9 mV AT 11:53, 08-29-98

EMF= 102.3 mV AT 11:53, 08-29-98

EMF= 102.6 mV AT 11:54, 08-29-98

EMF= 103.1 mV AT 11:54, 08-29-98

EMF= 103.4 mV AT 11:55, 08-29-98

EMF= 103.7 mV AT 11:56, 08-29-98

EMF= 104.0 mV AT 11:56, 08-29-98

EMF= 104.3 mV AT 11:57, 08-29-98

EMF= 104.6 mV AT 11:57, 08-29-98

EMF= 104.8 mV AT 11:58, 08-29-98

EMF= 105.1 mV AT 11:59, 08-29-98

EMF= 105.3 mV AT 11:59, 08-29-98

EMF= 105.6 mV AT 12:00, 08-29-98

EMF= 106.0 mV AT 12:00, 08-29-98
ENTERED

STD CONC= 999 AT 12:00, 08-29-98
ENTERED

STD VOL= .25000 AT 12:00, 08-29-98
ENTERED

EMF= 45.0 mV AT 12:03, 08-29-98

EMF= 44.9 mV AT 12:03, 08-29-98

EMF= 44.7 mV AT 12:04, 08-29-98

EMF= 44.6 mV AT 12:04, 08-29-98

EMF= 44.8 mV AT 12:05, 08-29-98

EMF= 44.9 mV AT 12:06, 08-29-98

EMF= 45.0 mV AT 12:06, 08-29-98

EMF= 45.1 mV AT 12:07, 08-29-98

EMF= 45.2 mV AT 12:07, 08-29-98

EMF= 45.3 mV AT 12:08, 08-29-98

EMF= 45.4 mV AT 12:08, 08-29-98

EMF= 45.5 mV AT 12:08, 08-29-98

EMF= 45.9 mV AT 12:09, 08-29-98
ENTERED

STD VOL= 2.5000 AT 12:09, 08-29-98
ENTERED

EMF=-10.8 mV AT 12:12, 08-29-98

EMF=-11.2 mV AT 12:12, 08-29-98

EMF=-11.3 mV AT 12:13, 08-29-98

EMF=-11.1 mV AT 12:15, 08-29-98

EMF=-10.7 mV AT 12:16, 08-29-98

EMF=-10.6 mV AT 12:17, 08-29-98

EMF=-10.4 mV AT 12:17, 08-29-98

EMF=-10.0 mV AT 12:19, 08-29-98
ENTERED

1:NH3 SLOPE=-58.1 mV/DEC
AT 12:19, 08-29-98

1:NH3 CONC= 1.00

598T002516

Dup 1ml

DOUBLE KNOWN ADDITION SELECTED
AT 14:05, 08-29-98

HNF-1649 REV. 0

SAMPLE VOL= 25.000 AT 14:05, 08-29-98
ENTERED

EMF= 53.0 mV AT 14:08, 08-29-98

EMF= 53.3 mV AT 14:09, 08-29-98

EMF= 53.6 mV AT 14:09, 08-29-98

EMF= 53.7 mV AT 14:09, 08-29-98

EMF= 53.9 mV AT 14:10, 08-29-98

EMF= 54.3 mV AT 14:10, 08-29-98

EMF= 54.6 mV AT 14:11, 08-29-98

EMF= 54.9 mV AT 14:11, 08-29-98

EMF= 55.7 mV AT 14:14, 08-29-98

EMF= 55.9 mV AT 14:14, 08-29-98

EMF= 56.0 mV AT 14:14, 08-29-98

EMF= 56.3 mV AT 14:15, 08-29-98

EMF= 56.4 mV AT 14:16, 08-29-98

EMF= 56.5 mV AT 14:16, 08-29-98

EMF= 56.8 mV AT 14:17, 08-29-98

EMF= 57.0 mV AT 14:17, 08-29-98

EMF= 57.2 mV AT 14:18, 08-29-98

EMF= 57.4 mV AT 14:18, 08-29-98

EMF= 57.6 mV AT 14:19, 08-29-98

EMF= 57.7 mV AT 14:19, 08-29-98

EMF= 58.0 mV AT 14:20, 08-29-98

EMF= 58.2 mV AT 14:21, 08-29-98

EMF= 58.4 mV AT 14:21, 08-29-98

EMF= 58.6 mV AT 14:22, 08-29-98

EMF= 59.0 mV AT 14:23, 08-29-98

~~EMF= 59.2 mV AT 14:23, 08-29-98~~

EMF= 59.4 mV AT 14:24, 08-29-98

EMF= 59.4 mV AT 14:24, 08-29-98

ENTERED

STD CONC= 999 AT 14:25, 08-29-98
ENTERED

STD VOL= .25000 AT 14:25, 08-29-98
ENTERED

EMF= 39.6 mV AT 14:27, 08-29-98

EMF= 39.4 mV AT 14:27, 08-29-98

EMF= 39.4 mV AT 14:27, 08-29-98

EMF= 39.5 mV AT 14:28, 08-29-98

EMF= 40.1 mV AT 14:30, 08-29-98

EMF= 40.3 mV AT 14:31, 08-29-98
ENTERED

STD VOL= 2.5000 AT 14:31, 08-29-98
ENTERED

EMF=-7.3 mV AT 14:33, 08-29-98

EMF=-7.6 mV AT 14:34, 08-29-98

EMF=-7.7 mV AT 14:34, 08-29-98

EMF=-7.7 mV AT 14:34, 08-29-98

EMF=-7.6 mV AT 14:35, 08-29-98

EMF=-7.5 mV AT 14:35, 08-29-98

EMF=-7.1 mV AT 14:37, 08-29-98

EMF=-6.8 mV AT 14:38, 08-29-98

EMF=-6.8 mV AT 14:38, 08-29-98

EMF=-6.4 mV AT 14:39, 08-29-98

EMF=-6.1 mV AT 14:41, 08-29-98

EMF=-5.9 mV AT 14:41, 08-29-98

EMF=-5.8 mV AT 14:42, 08-29-98

EMF=-5.7 mV AT 14:42, 08-29-98

EMF=-5.5 mV AT 14:43, 08-29-98

EMF=-5.4 mV AT 14:43, 08-29-98

EMF=-5.3 mV AT 14:43, 08-29-98

EMF=-4.9 mV AT 14:44, 08-29-98
ENTERED

1:NH3 SLOPE=-59.9 mV/DEC
AT 14:44, 08-29-98

1:NH3 CONCEN= 9.04

598 T00 2576

8pk + .500 ml spk 50N19-B

DOUBLE KNOWN ADDITION SELECTED
AT 14:50, 08-29-98

SAMPLE VOL= 25.000 AT 14:50, 08-29-98
ENTERED

EMF= 154.6 mV AT 14:55, 08-29-98

EMF= 160.1 mV AT 14:58, 08-29-98

EMF= 160.5 mV AT 14:58, 08-29-98

EMF= 161.0 mV AT 14:58, 08-29-98

EMF= 161.3 mV AT 14:59, 08-29-98

EMF= 161.6 mV AT 14:59, 08-29-98

EMF= 161.8 mV AT 14:59, 08-29-98

EMF= 162.1 mV AT 15:00, 08-29-98

EMF= 162.5 mV AT 15:00, 08-29-98

EMF= 162.8 mV AT 15:01, 08-29-98

EMF= 163.0 mV AT 15:02, 08-29-98

EMF= 163.3 mV AT 15:02, 08-29-98

EMF= 163.1 mV AT 15:02, 08-29-98

ENTERED

STD CONC= 999 AT 15:03, 08-29-98
ENTERED

STD VOL= .25000 AT 15:03, 08-29-98
ENTERED

EMF= 55.5 mV AT 15:06, 08-29-98

EMF= 55.3 mV AT 15:06, 08-29-98

EMF= 55.2 mV AT 15:08, 08-29-98

EMF= 55.3 mV AT 15:08, 08-29-98

EMF= 55.3 mV AT 15:09, 08-29-98

EMF= 55.7 mV AT 15:11, 08-29-98

EMF= 55.9 mV AT 15:12, 08-29-98

EMF= 55.9 mV AT 15:12, 08-29-98

EMF= 55.9 mV AT 15:12, 08-29-98

EMF= 56.1 mV AT 15:13, 08-29-98

EMF= 56.2 mV AT 15:14, 08-29-98

~~EMF= 56.3 mV AT 15:14, 08-29-98~~

EMF= 56.5 mV AT 15:15, 08-29-98

EMF= 56.7 mV AT 15:16, 08-29-98

EMF= 56.9 mV AT 15:16, 08-29-98

EMF= 56.9 mV AT 15:17, 08-29-98

ENTERED

STD VOL= 2.5000 AT 15:18, 08-29-98
ENTERED

EMF=-3.8 mV AT 15:20, 08-29-98

EMF=-4.0 mV AT 15:21, 08-29-98

EMF=-4.0 mV AT 15:21, 08-29-98

EMF=-4.0 mV AT 15:22, 08-29-98

EMF=-3.9 mV AT 15:22, 08-29-98

EMF=-3.9 mV AT 15:23, 08-29-98

EMF=-3.9 mV AT 15:23, 08-29-98

EMF=-3.7 mV AT 15:24, 08-29-98

EMF=-3.6 mV AT 15:24, 08-29-98

EMF=-3.5 mV AT 15:25, 08-29-98

EMF=-3.4 mV AT 15:25, 08-29-98

EMF=-3.3 mV AT 15:26, 08-29-98

EMF=-3.2 mV AT 15:26, 08-29-98

EMF=-3.0 mV AT 15:27, 08-29-98

EMF=-3.0 mV AT 15:27, 08-29-98
ENTERED

1:NH3 SLOPE=-60.3 mV/DEC
AT 15:27, 08-29-98

1:NH3 CONC= .174

398T002516

Trp only used .250 ml
sample size
sample bottle empty

DOUBLE KNOWN ADDITION SELECTED
AT 15:47, 08-29-98

SAMPLE VOL= 25.000 AT 15:47, 08-29-98
ENTERED

EMF= 42.3 mV AT 15:50, 08-29-98

EMF= 42.2 mV AT 15:50, 08-29-98

EMF= 42.2 mV AT 15:51, 08-29-98

EMF= 42.2 mV AT 15:51, 08-29-98

EMF= 42.6 mV AT 15:53, 08-29-98

EMF= 42.7 mV AT 15:54, 08-29-98

EMF= 42.8 mV AT 15:54, 08-29-98

EMF= 42.9 mV AT 15:55, 08-29-98

EMF= 43.0 mV AT 15:55, 08-29-98

EMF= 43.0 mV AT 15:56, 08-29-98
ENTERED

STD CONC= 999 AT 15:57, 08-29-98
ENTERED

STD VOL= .25000 AT 15:57, 08-29-98
ENTERED

HNF-1649 REV. 0

EMF= 31.3 mV AT 15:59, 08-29-98

EMF= 31.0 mV AT 15:59, 08-29-98

EMF= 30.9 mV AT 15:59, 08-29-98

EMF= 30.8 mV AT 16:00, 08-29-98

EMF= 30.7 mV AT 16:00, 08-29-98

EMF= 30.7 mV AT 16:00, 08-29-98

EMF= 30.7 mV AT 16:00, 08-29-98
ENTERED

STD VOL= 2.5000 AT 16:01, 08-29-98
ENTERED

EMF=-8.7 mV AT 16:04, 08-29-98

EMF=-8.9 mV AT 16:04, 08-29-98

EMF=-9.0 mV AT 16:06, 08-29-98

EMF=-9.0 mV AT 16:06, 08-29-98

EMF=-8.9 mV AT 16:07, 08-29-98

EMF=-8.3 mV AT 16:10, 08-29-98

EMF=-8.3 mV AT 16:11, 08-29-98

EMF=-8.2 mV AT 16:11, 08-29-98

EMF=-8.2 mV AT 16:12, 08-29-98

EMF=-7.9 mV AT 16:13, 08-29-98

EMF=-7.9 mV AT 16:14, 08-29-98
ENTERED

1:NH3 SLOPE=-60.1 mV/DEC
AT 16:14, 08-29-98

1:NH3 CONC= 16.2

STO End

Iml SDN19-B

LABCORE Completed Worklist Report for Worklist# 22904

Analyst: adp

Instrument: IC01

Book# 137N208

Method: 44-533-105 Rev/Mod E-0

Worklist Comment: S102, @IC-01 QC for Br only. skw

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	<1.39e-1		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	CCV	0	@IC-QC F	QC	5.50e1	5.76e+01	97.627 % Recovery	
2	CCV	0	@IC-QC CL	QC	8.00e1	7.53e+01	94.125 % Recovery	
2	CCV	0	@IC-QC NO2	QC	5.42e2	5.05e+02	93.173 % Recovery	
2	CCV	0	@IC-QC BR	QC	5.89e2	6.07e+02	103.056 % Recovery	
2	CCV	0	@IC-QC NO3	QC	5.94e2	5.95e+02	100.168 % Recovery	
2	CCV	0	@IC-QC PO4	QC	5.45e2	5.25e+02	96.330 % Recovery	
2	CCV	0	@IC-QC SO4	QC	6.32e2	6.48e+02	102.532 % Recovery	
2	CCV	0	@IC-QC OXALATE2	QC	5.31e2	5.31e+02	100.000 % Recovery	
3	SAMPLE	S98T000902	0 @IC-01 F-02	LIQUID	N/A	< 1.200e-02	1.20e-002	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 CL-02	LIQUID	N/A	< 2.700e-02	1.70e-002	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 NO2-02	LIQUID	N/A	< 1.080e-01	0.108	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 BR-02	LIQUID	N/A	< 1.250e-01	0.125	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 NO3-02	LIQUID	N/A	< 1.390e-01	0.139	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 PO4-02	LIQUID	N/A	< 1.200e-01	0.120	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 SO4-02	LIQUID	N/A	< 1.380e-01	0.138	ug/mL
3	SAMPLE	S98T000902	0 @IC-01 OXALATE2	LIQUID	N/A	< 1.050e-01	0.105	ug/mL
4	DUP	S98T000902	0 @IC-01 F-02	LIQUID	<1.20e-2	<1.20e-2		RPD
4	DUP	S98T000902	0 @IC-01 CL-02	LIQUID	2.70e-02	2.50e-02	7.692	RPD
4	DUP	S98T000902	0 @IC-01 NO2-02	LIQUID	<1.08e-1	<1.08e-1		RPD
4	DUP	S98T000902	0 @IC-01 BR-02	LIQUID	<1.25e-1	<1.25e-1		RPD
4	DUP	S98T000902	0 @IC-01 NO3-02	LIQUID	<1.39e-1	<1.39e-1		RPD
4	DUP	S98T000902	0 @IC-01 PO4-02	LIQUID	<1.20e-1	4.41e-01		RPD
4	DUP	S98T000902	0 @IC-01 SO4-02	LIQUID	<1.38e-1	<1.38e-1		RPD
4	DUP	S98T000902	0 @IC-01 OXALATE2	LIQUID	<1.05e-1	<1.05e-1		RPD
5	SAMPLE	S98T000903	0 @IC-01 F-02	LIQUID	N/A	< 1.333e+01	13.330	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 CL-02	LIQUID	N/A	< 1.889e+01	18.890	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 NO2-02	LIQUID	N/A	< 1.200e+02	120.000	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 BR-02	LIQUID	N/A	2.632e+04	138.900	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 NO3-02	LIQUID	N/A	< 1.544e+02	154.400	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 PO4-02	LIQUID	N/A	< 1.333e+02	133.300	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 SO4-02	LIQUID	N/A	< 1.533e+02	153.300	ug/mL
5	SAMPLE	S98T000903	0 @IC-01 OXALATE2	LIQUID	N/A	< 1.167e+02	116.700	ug/mL
6	DUP	S98T000903	0 @IC-01 F-02	LIQUID	<1.33e1	<1.33e1		RPD

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

LABCORE Completed Worklist Report for Worklist# 22904

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
6 DUP	S98T000903	0	IC-01	CL-02	LIQUID	<1.89e1	<1.89e1	RPD
6 DUP	S98T000903	0	IC-01	NO2-02	LIQUID	<1.20e2	<1.20e2	RPD
6 DUP	S98T000903	0	IC-01	ER-02	LIQUID	2.63e+04	2.70e+04	2.627 RPD
6 DUP	S98T000903	0	IC-01	NO3-02	LIQUID	<1.54e2	<1.54e2	RPD
6 DUP	S98T000903	0	IC-01	PO4-02	LIQUID	<1.33e2	<1.33e2	RPD
6 DUP	S98T000903	0	IC-01	SO4-02	LIQUID	<1.53e2	<1.53e2	RPD
6 DUP	S98T000903	0	IC-01	OXALATE2	LIQUID	<1.17e2	<1.17e2	RPD

Final page for worklist# 22904

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

Reviewer Signature _____ Date 5/26/98

HNF-1649 REV. 0

03/11/98 10:15

Page: 1

A-0004-1

LABCORE Data Entry Template for Worklist# 22904

Analyst: ADD Instrument: IC0 1 Book# 137N20-BMethod: LA-533-105 Rev/Mod E-0

Worklist Comment: S102, @IC-01 QC for Br only. skw

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 CCB			@IC-QC	QC		
2 CCV			@IC-QC	QC		
3 SAMPLE	S98T000902 0		@IC-01	LIQUID	98000175	S-102
	Analytes Requested: BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02					
4 DUP	S98T000902 0		@IC-01	LIQUID		
5 SAMPLE	S98T000903 0		@IC-01	LIQUID	98000175	S-102
	Analytes Requested: BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02					
6 DUP	S98T000903 0		@IC-01	LIQUID		

Final page for worklist # 22904

Analyst Signature *Anthony Purinton* Date 5-21-98uploaded 5-22-98*John Warell*22904MAY.CSVValidated 5/26/98 *gm Juge*

Analyst Signature _____ Date _____

Data Entry Comments:

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

HNF-1649 REV. 0

Data Reprocessed On 05/21/1998 16:26:54

Sample Name: 137N20-B Date: 05/21/1998 16:20:52
 Data File : C:\DX\DATA\98051521.D27
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 27 Detector: CDM-1
 Analyst : *Anthony Purno* Column: AG4A/AS4A anion column

5-21-98

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	0.86		0.000	80	345	2	
2	1.02	fluoride	57.579	97.59	2442	11727	2 0.00
3	1.34		0.000	102	627	1	
4	1.55	chloride	75.339	94.17	2292	10219	1 -1.69
5	1.86	nitrite	504.761	93.13	8830	47438	1 -2.62
6	2.81	bromide	607.389	103.12	5728	36237	1 -3.88
7	3.19	nitrate	595.156	100.19	6192	46115	1 0.10
8	4.59	phosphate	525.304	96.34	1827	21213	1 -6.01
9	6.03	sulfate	647.936	102.52	4707	66609	1 -8.13
10	7.95	oxalate	530.663	99.94	2324	41480	1 -8.02
Totals			3544.126	34525	282011		

File: 98051521.D27 Sample: 137N20-B

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 124 TO 129.

SS.100-10

HNF-1649 REV. 0

Sample Name: BLANK Date: 05/21/1998 16:09:39
Data File : C:\DX\DATA\98051521.D26
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 26 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	1.35		0.000	80	488	1	
2	1.56	chloride	-0.007	28	110	1	-1.27
3	2.83	bromide	0.098	12	63	1	-2.97
4	3.25	nitrate	0.056	17	91	1	-2.50
Totals			0.147	137	752		

File: 98051521.D26 Sample: BLANK

391

Sample Name: S98T000902 SAM Date: 05/21/1998 17:06:00
 Data File : C:\DX\DATA\98051521.D32
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 32 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	1.55	chloride	0.027	144	563	1	-1.69
2	3.25	nitrate	0.121	93	603	1	-2.30
3	6.13	sulfate	-0.089	22	351	1	-6.50
Totals			0.060	260	1517		

File: 98051521.D32 Sample: S98T000902 SAM

HNF-1649 REV. 0

Sample Name: S98T000902 DUP Date: 05/21/1998 16:55:16
Data File : C:\DX\DATA\98051521.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	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	1.56	chloride	0.025	131	531	1	-1.27
2	3.26	nitrate	0.109	81	508	1	-2.10
3	4.88	phosphate	0.441	99	1393	1	0.00
Totals			0.576	310	2432		

File: 98051521.D31 Sample: S98T000902 DUP

SS-1

HNF-1649 REV. 0

```

=====
Sample Name: S98T000903 SAM                      Date: 05/21/1998 17:28:14
Data File  : C:\DX\DATA\98051521.D34
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 34              Detector: CDM-1
Analyst    :                      Column: AG4A/AS4A anion column
=====

```

```

=====
Calibration Volume Dilution Points Rate Start Stop Area Reject
-----
External          1          1111  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	0.87		0.000	9	41	1	
2	1.14		0.000	67	306	1	
3	1.56	chloride	-10.081	20	79	1	-1.27
4	2.79	bromide	26319.026	23401	153198	1	-4.57
5	6.08	sulfate	85.769	144	2018	1	-7.32
Totals			26394.714	23641	155642		

File: 98051521.D34 Sample: S98T000903 SAM

```

=====
Sample Name: S98T000903 DUP          Date: 05/21/1998 17:38:59
Data File  : C:\DX\DATA\98051521.D35
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 35      Detector: CDM-1
Analyst    :                          Column: AG4A/AS4A anion column
=====

```

```

=====
Calibration Volume Dilution Points Rate Start Stop Area Reject
-----
External          1          1111 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	19	99	1	
2	1.14		0.000	70	296	1	
3	1.55	chloride	-3.202	33	161	1	-1.69
4	2.79	bromide	26970.188	23955	157345	1	-4.57
5	6.08	sulfate	86.790	149	2027	1	-7.32
Totals			27053.775	24225	159929		

File: 98051521.D35 Sample: S98T000903 DUP

LABCORE Completed Worklist Report for Worklist# 25892

Analyst: adp

Instrument: IC40S1

Book# 21N217

Method: 14-533-10 Rev/Mod E-0

Worklist Comment: S102 (CMPT) @IC-01 RTS

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 CCB	0	0	01C-QC	F	QC	1	<1.20e-2	ug/mL
1 CCB	0	0	01C-QC	CL	QC	1	<1.70e-2	ug/mL
1 CCB	0	0	01C-QC	NO2	QC	1	<1.08e-1	ug/mL
1 CCB	0	0	01C-QC	BR	QC	1	<1.25e-1	ug/mL
1 CCB	0	0	01C-QC	NO3	QC	1	<1.39e-1	ug/mL
1 CCB	0	0	01C-QC	PO4	QC	1	<1.20e-1	ug/mL
1 CCB	0	0	01C-QC	SO4	QC	1	<1.38e-1	ug/mL
1 CCB	0	0	01C-QC	OXALATE2	QC	1	<1.05e-1	ug/mL
2 ICV	0	0	01C-QC	F	QC	5.90e1	6.04e+01	102.373 % Recovery
2 ICV	0	0	01C-QC	CL	QC	8.00e1	7.48e+01	93.500 % Recovery
2 ICV	0	0	01C-QC	NO2	QC	5.32e2	4.86e+02	91.353 % Recovery
2 ICV	0	0	01C-QC	BR	QC	5.86e2	5.59e+02	95.392 % Recovery
2 ICV	0	0	01C-QC	NO3	QC	5.92e2	5.70e+02	96.284 % Recovery
2 ICV	0	0	01C-QC	PO4	QC	5.47e2	4.86e+02	88.848 % Recovery
2 ICV	0	0	01C-QC	SO4	QC	6.38e2	6.06e+02	94.984 % Recovery
2 ICV	0	0	01C-QC	OXALATE2	QC	5.39e2	5.01e+02	92.950 % Recovery
3 CCV	0	0	01C-QC	F	QC	6.40e1	6.88e+01	107.500 % Recovery
3 CCV	0	0	01C-QC	CL	QC	9.00e1	9.15e+01	101.667 % Recovery
3 CCV	0	0	01C-QC	NO2	QC	5.43e2	5.20e+02	95.764 % Recovery
3 CCV	0	0	01C-QC	BR	QC	6.30e2	6.67e+02	105.873 % Recovery
3 CCV	0	0	01C-QC	NO3	QC	6.98e2	7.29e+02	104.441 % Recovery
3 CCV	0	0	01C-QC	PO4	QC	6.32e2	6.33e+02	100.158 % Recovery
3 CCV	0	0	01C-QC	SO4	QC	6.99e2	7.05e+02	100.858 % Recovery
3 CCV	0	0	01C-QC	OXALATE2	QC	5.28e2	5.39e+02	102.083 % Recovery
4 SAMPLE	S98T002515	0	01C-01	F-02	LIQUID	N/A	< 6.181e+01	61.810 ug/mL
4 SAMPLE	S98T002515	0	01C-01	BR-02	LIQUID	N/A	< 6.439e+02	643.900 ug/mL
4 SAMPLE	S98T002515	0	01C-01	PO4-02	LIQUID	N/A	< 3.129e+03	3129.000 ug/mL
4 SAMPLE	S98T002515	0	01C-01	SO4-02	LIQUID	N/A	< 4.650e+03	4650.000 ug/mL
4 SAMPLE	S98T002515	0	01C-01	OXALATE2	LIQUID	N/A	< 5.409e+02	540.900 ug/mL
5 DUP	S98T002515	0	01C-01	F-02	LIQUID	<6.18e1	<6.18e1	RPD
5 DUP	S98T002515	0	01C-01	CL-02	LIQUID	1.01e+04	1.02e+04	0.985 RPD
5 DUP	S98T002515	0	01C-01	NO2-02	LIQUID	1.17e+05	1.15e+05	1.724 RPD
5 DUP	S98T002515	0	01C-01	BR-02	LIQUID	<6.44e2	<6.44e2	RPD
5 DUP	S98T002515	0	01C-01	NO3-02	LIQUID	2.39e+05	2.39e+05	0.000 RPD
5 DUP	S98T002515	0	01C-01	PO4-02	LIQUID	3.13e+03	3.15e+03	0.637 RPD
5 DUP	S98T002515	0	01C-01	SO4-02	LIQUID	4.65e+03	4.67e+03	0.429 RPD
5 DUP	S98T002515	0	01C-01	OXALATE2	LIQUID	<5.41e2	5.82e+02	RPD
6 SPK	S98T002515	0	01C-01	F-02	LIQUID	5.90e1	5.64e+01	95.593 % Recovery
6 SPK	S98T002515	0	01C-01	CL-02	LIQUID	9.00e1	5.18e+01	64.750 % Recovery
6 SPK	S98T002515	0	01C-01	NO2-02	LIQUID	5.32e2	2.15e+02	40.414 % Recovery
6 SPK	S98T002515	0	01C-01	BR-02	LIQUID	5.86e2	5.38e+02	91.809 % Recovery

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

LABCORE Completed Worklist Report for Worklist# 25892

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
6 SPK	S98T002515	0	@IC-01	NO3-02	LIQUID	5.92e2	5.38e+01	9.088 % Recovery
6 SPK	S98T002515	0	@IC-01	PO4-02	LIQUID	5.47e2	5.00e+02	91.408 % Recovery
6 SPK	S98T002515	0	@IC-01	SC4-02	LIQUID	6.38e2	6.08e+02	95.298 % Recovery
6 SPK	S98T002515	0	@IC-01	OXALATE2	LIQUID	5.39e2	5.09e+02	94.434 % Recovery

Final page for worklist# 25892

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

Reviewer Signature _____ Date 9/1/98

08/27/98 09:58
A-0004-1

HNF-1649 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 25892

Analyst: ADP Instrument: IC Book# 8-FN21-AMethod: LA-533-105 Rev/Mod E-6Worklist Comment: S102 (CMPT) @IC-01 RTS

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 CCB			@IC-QC	QC		
2 ICV			@IC-QC	QC		
3 CCV			@IC-QC	QC		
4 SAMPLE	S98T002515 0		@IC-01	LIQUID	98000466	S-102 CMPT
	Analytes Requested: BR-02, CL-02, F-02, NO2-02, NO3-02, OXALATE2, PO4-02, SO4-02					
5 DUP	S98T002515 0		@IC-01	LIQUID		
6 SPK	S98T002515 0		@IC-01	LIQUID		

Final page for worklist # 25892

Analyst Signature Date 8-28-98

Analyst Signature Date

Cl, NO₂, NO₃ need to be rerun at 10201 DF
to improve spike recovery. JMF.

Rest validated 9/1/98 JMF

Data Entry Comments:

uploaded 8-31-98
John Worell
25892AUG.CSV

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

HNF-1649 REV.0

Data Reprocessed On 08/28/1998 15:04:01

Sample Name: 21N21-A Date: 08/23/1998 14:47:48
 Data File : C:\DX\DATA\98082811.D05
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 5 Detector: CDM-1
 Analyst : *Anthony Paretti* Column: AG4A/AS4A anion column
8-28-98

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	0.85		0.000	94	349	2	
2	1.00	fluoride	60.437	102.44	12081	2	0.00
3	1.49	chloride	74.755	93.44	9956	1	-0.89
4	1.77	nitrite	486.229	91.41	45521	1	-2.39
5	2.62	bromide	559.052	96.06	34774	1	0.26
6	2.96	nitrate	570.279	96.33	46514	1	0.00
7	4.27	phosphate	485.622	88.78	19105	1	0.00
8	5.49	sulfate	606.453	95.05	63982	1	-1.90
9	7.20	oxalate	500.876	92.93	40467	1	-0.74
Totals			3343.703	35206	272748		

File: 98082811.D05 Sample: 21N21-A

SS.100-10

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
 COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 133 TO 138

HNF-1649 REV. 0

```

=====
Sample Name: BLANK                      Date: 08/28/1998 14:36:44
Data File  : C:\DX\DATA\98082811.D04
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 4      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	0.85		0.000	10	35	1	
2	1.11		0.000	19	80	1	
3	1.49	chloride	0.010	20	142	1	-0.89
4	3.01		0.000	22	123	1	
Totals			0.010	71	380		

File: 98082811.D04 Sample: BLANK

551

HNF-1649 REV. 0

Data Reprocessed On 08/28/1998 15:56:22

```

=====
Sample Name: CCV20N21-A                      Date: 08/28/1998 15:42:24
Data File : C:\DX\DATA\98082821.D03
Method    : C:\DX\METHOD\400ASYS2.met
ACI Address: 1 System: 2 Inject#: 3           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	0.79		0.000	85	331	2	
2	0.95	fluoride	68.846	2026	5970	2	0.35
3	1.49	chloride	91.549	1614	5135	1	-1.33
4	1.79	nitrite	520.455	5282	20292	1	-2.00
5	2.75	bromide	667.299	3279	17284	1	-2.25
6	3.14	nitrate	728.599	4114	25184	1	-2.18
7	4.59	phosphate	633.451	987	10858	1	-1.15
8	6.08	sulfate	704.721	2176	29984	1	-0.87
9	8.00	oxalate	538.811	985	18095	1	-0.66
Totals			3953.730	20549	133134		

File: 98082821.D03 Sample: CCV20N21-A

SS .100-10

HNF-1649 REV. 0

Sample Name: S98T002515 SAM Date: 08/28/1998 16:08:35
 Data File : C:\DX\DATA\98082831.D02
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 2 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration Volume Dilution Points Rate Start Stop Area Reject

External 1 5151 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	40	168	1	
2	0.87		0.000	512	2843	2	
3	1.12		0.000	1043	8516	2	
4	1.48	chloride	10115.723	5069	27026	1	-1.33
5	1.79	nitrite	117092.717	39456	222463	1	-0.92
6	2.64	bromide	628.231	19	78	1	1.02
7	2.88	nitrate	239316.367	48318	421880	1	-2.37
8	4.32	phosphate	3128.687	172	2073	1	1.25
9	5.60	sulfate	4650.068	830	10378	1	0.00
10	7.31	oxalate	448.744	27	339	1	0.74
Totals			375380.537	95485	695765		

File: 98082831.D02 Sample: S98T002515 SAM

SS 100-10 - 200-10

HNF-1649 REV. 0

Sample Name: S98T002515 DUP Date: 08/24/1998 16:20:23
 Data File : C:\DX\DATA\98082831.D03
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 3 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration Volume Dilution Points Rate Start Stop Area Reject

External 1 5151 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	548	3215	2	
2	1.10		0.000	1052	8671	2	
3	1.47	chloride	10179.314	5079	27203	1	-2.22
4	1.77	nitrite	115452.011	39521	219277	1	-2.03
5	2.61	bromide	642.031	20	95	1	0.00
6	2.85	nitrate	239345.660	48217	421937	1	-3.28
7	4.27	phosphate	3151.952	163	2091	1	0.00
8	5.55	sulfate	4669.352	817	10417	1	-0.95
9	7.31	oxalate	581.871	26	550	1	0.74
Totals			374022.192	95442	693456		

File: 98082831.D03 Sample: S98T002515 DUP

SS 100-10 -200-10

Sample Name: S98T002515 SPK Date: 08/28/1998 16:31:46
 Data File : C:\DX\DATA\98082831.D04
 Method : C:\DX\METHOD\KIT.MET
 ACI Address: 1 System: 1 Inject#: 4 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	5151	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	480	2251	2	
2	1.01	fluoride	2847.036	2400	11139	2	1.33
3	1.11		0.000	1106	6484	2	
4	1.47	chloride	12732.285	6263	34370	1	-1.78
5	1.79	nitrite	127965.158	43376	243614	1	-1.29
6	2.62	bromide	27149.098	6038	33052	1	0.26
7	2.87	nitrate	242030.930	48750	427150	1	-2.82
8	4.29	phosphate	28358.355	1729	21972	1	0.63
9	5.55	sulfate	35357.180	5969	73164	1	-0.95
10	7.20	oxalate	25717.061	2365	40744	1	-0.74
Totals			502157.104	118475	893940		

File: 98082831.D04 Sample: S98T002515 SPK

SS .100-10-.200-10
 SPK# 21N21-A

LABCORE Completed Worklist Report for Worklist# 25981

Analyst: adp

Instrument: IC40S2

Book#: 21N21B

Method: LA-533-105 Rev/Mod F-0

Worklist Comment: S102 (CMPT) @IC-01 Rerun for poor spk recovery; try 10201 DF

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	CCB	0	①IC-QC	F	QC	1	<1.20e-2	ug/mL
1	CCB	0	①IC-QC	CL	QC	1	<1.70e-2	ug/mL
1	CCB	0	①IC-QC	NO2	QC	1	<1.08e-1	ug/mL
1	CCB	0	①IC-QC	BR	QC	1	<1.25e-1	ug/mL
1	CCB	0	①IC-QC	NO3	QC	1	<1.39e-1	ug/mL
1	CCB	0	①IC-QC	PO4	QC	1	<1.20e-1	ug/mL
1	CCB	0	①IC-QC	SO4	QC	1	<1.38e-1	ug/mL
1	CCB	0	①IC-QC	OXALATE2	QC	1	<1.05e-1	ug/mL
2	ICV	0	①IC-QC	F	QC	5.90e1	6.57e+01	111.356 % Recovery
2	ICV	0	①IC-QC	CL	QC	8.00e1	8.26e+01	103.250 % Recovery
2	ICV	0	①IC-QC	NO2	QC	5.35e2	5.63e+02	106.355 % Recovery
2	ICV	0	①IC-QC	BR	QC	5.86e2	6.14e+02	104.778 % Recovery
2	ICV	0	①IC-QC	NO3	QC	5.92e2	5.74e+02	96.959 % Recovery
2	ICV	0	①IC-QC	PO4	QC	5.47e2	5.35e+02	97.806 % Recovery
2	ICV	0	①IC-QC	SO4	QC	6.38e2	6.38e+02	99.687 % Recovery
2	ICV	0	①IC-QC	OXALATE2	QC	5.57e2	5.79e+02	103.950 % Recovery
3	CCV	0	①IC-QC	F	QC	6.40e1	6.72e+01	105.000 % Recovery
3	CCV	0	①IC-QC	CL	QC	9.00e1	9.45e+01	105.000 % Recovery
3	CCV	0	①IC-QC	NO2	QC	5.49e2	5.61e+02	102.185 % Recovery
3	CCV	0	①IC-QC	BR	QC	6.30e2	6.67e+02	105.873 % Recovery
3	CCV	0	①IC-QC	NO3	QC	6.98e2	7.13e+02	102.149 % Recovery
3	CCV	0	①IC-QC	PO4	QC	6.32e2	6.30e+02	99.684 % Recovery
3	CCV	0	①IC-QC	SO4	QC	6.99e2	7.19e+02	102.861 % Recovery
3	CCV	0	①IC-QC	OXALATE2	QC	5.40e2	5.52e+02	102.222 % Recovery
4	SAMPLE	S98T002515	①IC-01	CL-02	LIQUID	N/A	9.083e+03	173.400 ug/mL
4	SAMPLE	S98T002515	①IC-01	NO2-02	LIQUID	N/A	1.006e+05	1102.000 ug/mL
4	SAMPLE	S98T002515	①IC-01	NO3-02	LIQUID	N/A	1.985e+05	1418.000 ug/mL
5	DUP	S98T002515	①IC-01	F-02	LIQUID	?	5.41e+02	RPD
5	DUP	S98T002515	①IC-01	CL-02	LIQUID	9.08e+03	9.10e+03	0.220 RPD
5	DUP	S98T002515	①IC-01	NO2-02	LIQUID	1.01e+05	1.00e+05	0.995 RPD
5	DUP	S98T002515	①IC-01	BR-02	LIQUID	?	<1.28e3	RPD
5	DUP	S98T002515	①IC-01	NO3-02	LIQUID	1.98e+05	2.03e+05	2.494 RPD
5	DUP	S98T002515	①IC-01	PO4-02	LIQUID	?	5.66e+03	RPD
5	DUP	S98T002515	①IC-01	SO4-02	LIQUID	?	5.98e+03	RPD
5	DUP	S98T002515	①IC-01	OXALATE2	LIQUID	?	<1.07e3	RPD
6	SPK	S98T002515	①IC-01	F-02	LIQUID	5.90e1	0.00e+00	0.000 % Recovery
6	SPK	S98T002515	①IC-01	CL-02	LIQUID	8.00e1	8.04e+01	100.500 % Recovery
6	SPK	S98T002515	①IC-01	NO2-02	LIQUID	5.35e2	5.63e+02	105.234 % Recovery
6	SPK	S98T002515	①IC-01	BR-02	LIQUID	5.86e2	0.00e+00	0.000 % Recovery
6	SPK	S98T002515	①IC-01	NO3-02	LIQUID	5.92e2	5.87e+02	99.155 % Recovery
6	SPK	S98T002515	①IC-01	PO4-02	LIQUID	5.47e2	0.00e+00	0.000 % Recovery

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

LABCORE Completed Worklist Report for Worklist# 25981

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
6	SPK	S98T002515	0	@IC-01	SO4-02	LIQUID	6.38e2	0.00e+00	0.000	% Recovery
6	SPK	S98T002515	0	@IC-01	OXALATE2	LIQUID	5.57e2	0.00e+00	0.000	% Recovery

Final page for worklist# 25981

Analyst Signature Date

Analyst Signature Date

James M. Lutz

Reviewer Signature Date

09/01/98 13:09
A-0004-1

LABCORP Data Entry Template for Worklist# 25981

Analyst: ADP Instrument: IC _____ Book# 21N21-BMethod: LA-533-105 Rev/Mod E-0

Worklist Comment: S102 (CMPT) @IC-01 Rerun for poor spk recovery; try 10201 DF

S	Type	Sample#	R	Test	Matrix	Group#	Project
1	CCB			@IC-QC	QC		
2	ICV			@IC-QC	QC		
3	CCV			@IC-QC	QC		
4	SAMPLE	S98T002515 0		@IC-01	LIQUID	98000466	S-102 CMPT
		Analytes Requested:		CL-02	, NO2-02	, NO3-02	
5	DUP	S98T002515 0		@IC-01	LIQUID		
6	SPK	S98T002515 0		@IC-01	LIQUID		

Final page for worklist # 25981

Anthony Purnell 9-1-98
 Analyst Signature Date

 Analyst Signature Date

Validated 9/3/98 GM Lyle

Data Entry Comments:

uploaded 9-2-98

John Warrall

25981AUG.CSV

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

Sample Name: 21N21-B Date: 09/01/1998 22:01:27
 Data File : C:\DX\DATA\98090111.D02
 Method : C:\DX\METHOD\4000SYS2.MET
 ACI Address: 1 System: 2 Inject#: 2 Detector: CDM-1
 Analyst : *Anthony F. Smith* 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	0.79		0.000	80	306	2	
2	0.95	fluoride	65.688	134	5691	2	0.35
3	1.49	chloride	82.643	103.30	4627	1	-1.33
4	1.80	nitrite	568.720	106.30	22231	1	-1.64
5	2.75	bromide	614.499	104.86	15878	1	-2.25
6	3.14	nitrate	574.339	97.62	19710	1	-2.18
7	4.64	phosphate	534.740	97.76	9135	1	0.00
8	6.19	sulfate	636.317	99.74	27016	1	0.87
9	8.16	oxalate	579.247	103.99	19461	1	1.32
Totals			3656.193		19758		124054

File: 98090111.D02 Sample: 21N21-B

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 142 TO 147.


```

=====
Sample Name: BLANK                      Date: 09/01/1998 21:46:39
Data File  : C:\DX\DATA\98090111.D01
Method     : C:\DX\METHOD\4000SYS2.MET
ACI Address: 1 System: 2 Inject#: 1      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	0.79		0.000	18	77	1	
2	1.27		0.000	41	174	1	
3	1.49	chloride	0.016	27	74	1	-1.33
Totals			0.016	86	325

SS1

Sample Name: 20N21-B Date: 09/01/1998 22:18:17
 Data File : C:\DX\DATA\98090111.D03
 Method : C:\DX\METHOD\4000SYS2.MET
 ACI Address: 1 System: 2 Inject#: 3 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	0.79		0.000	87	334	2	
2	0.95	fluoride	67.216	2032	5826	2	0.35
3	1.49	chloride	94.467	1638	5302	1	-1.33
4	1.80	nitrite	560.612	5714	21905	1	-1.64
5	2.75	bromide	666.760	3334	17270	1	-2.25
6	3.13	nitrate	713.452	4034	24644	1	-2.39
7	4.64	phosphate	630.308	1057	10803	1	0.00
8	6.19	sulfate	718.953	2396	30603	1	0.87
9	8.16	oxalate	551.962	1071	18539	1	1.32
Totals			4003.730	21362	135226		

File: 98090111.D03 Sample: 20N21-B

SS 1/10-10

Sample Name: S98T002515 SAM Date: 09/01/1998 22:33:08
 Data File : C:\DX\DATA\98090111.D04
 Method : C:\DX\METHOD\4000SYS2.MET
 ACI Address: 1 System: 2 Inject#: 4 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	10201	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	0.79		0.000	164	801	2	
2	0.99	fluoride	529.192	144	418	2	4.56
3	1.07		0.000	306	1308	2	
4	1.49	chloride	9082.829	1562	5042	1	-1.33
5	1.80	nitrite	100560.728	10525	39612	1	-1.64
6	2.76	bromide	1162.394	31	147	1	-1.78
7	3.10	nitrate	198534.258	11079	70983	1	-3.43
8	4.64	phosphate	3608.790	53	548	1	0.00
9	6.19	sulfate	6158.887	161	2445	1	0.87
Totals			319637.079	24026	121305		

File: 98090111.D04 Sample: S98T002515 SAM

SS. 100-10 - .100-10

Sample Name: S98T002515 DUP Date: 09/01/1998 22:45:04
 Data File : C:\DX\DATA\98090111.D05
 Method : C:\DX\METHOD\4000SYS2.MET
 ACI Address: 1 System: 2 Inject#: 5 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration Volume Dilution Points Rate Start Stop Area Reject
 External 1 10201 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	0.79		0.000	165	817	2	
2	0.99	fluoride	541.173	145	429	2	4.56
3	1.07		0.000	307	1296	2	
4	1.49	chloride	9104.033	1567	5054	1	-1.33
5	1.80	nitrite	100490.133	10507	39583	1	-1.64
6	2.76	bromide	1150.953	32	144	1	-1.78
7	3.10	nitrate	202867.718	11122	72638	1	-3.43
8	4.64	phosphate	3655.119	53	556	1	0.00
9	6.19	sulfate	5981.414	167	2371	1	0.87
10	8.21	oxalate	763.743	16	330	1	1.99
Totals			324554.285	24081	123218		

File: 98090111.D05 Sample: S98T002515 DUP

SC 100-10-100-10

HNF-1649 REV. 0

Sample Name: S98T002515 SPK Date: 09/01/1998 22:57:05
 Data File : C:\DX\DATA\98090111.D06
 Method : C:\DX\METHOD\4000SYS2.MET
 ACI Address: 1 System: 2 Inject#: 6 Detector: CDM-1
 Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area	Reject
External	1	10201	3000	5Hz	0.00	10.00		30

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

Pk. Num	Ret Time Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.79	0.000	236	1142	2	
2	0.95 fluoride	6915.613	1967	5937	3	0.35
3	1.07	0.000	302	1398	4	
4	1.49 chloride	17205.144	3034	9708	1	-1.33
5	1.80 nitrite	157457.181	16419	63213	1	-1.64
6	2.74 bromide	58462.835	2975	14930	1	-2.49
7	3.09 nitrate	257822.254	14277	94060	1	-3.84
8	4.61 phosphate	56361.786	856	9541	1	-0.57
9	6.19 sulfate	68237.916	2202	28720	1	0.87
10	8.11 oxalate	57580.481	990	19152	1	0.66
Totals		680043.211	43257	247801		

File: 98090111.D06 Sample: S98T002515 SPK

SS .100-10-.100-10

SPK# 21N21-B

147

LABCORE Data Entry Template for Worklist# 22998

Analyst: DK 5/6 Instrument: ICPOX 4-1-98 Book# 716489

Method: LA-505-151/161 Rev/Mod C-2

Worklist Comment: DK 4-1-98 ICP S-102 (DIRECT)

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 ICV			@ICP-QC	QC		
2 ICB			@ICP-QC	QC		
3 LLS			@ICP-QC	QC		
4 ICSA			@ICP-QC	QC		
5 ICSAB			@ICP-QC	QC		
6 SAMPLE	S98T000902	0 D	@ICP-D03	LIQUID	98000175	S-102
	Analytes Requested: LI-D-01					
7 DUP	S98T000902	0 D	@ICP-D03	LIQUID		
8 SAMPLE	S98T000903	0 D	@ICP-D03	LIQUID	98000175	S-102
	Analytes Requested: LI-D-01					
9 DUP	S98T000903	0 D	@ICP-D03	LIQUID		
10 ICSA			@ICP-QC	QC		
11 ICSAB			@ICP-QC	QC		
12 CCV			@ICP-QC	QC		
13 CCB			@ICP-QC	QC		

Final page for worklist # 22998

Analyst Signature DK 5/6 Date 04-01-98

S98T000902, direct, 1st 1
S98T000902, direct, 1
S98T000903, 1-9, 1st 10
S98T000903, 1-9, 1st 10

Data Entry Comments:

uploaded 4-7-98
John Howell

Analyst Signature Date

Validated by:
Saul R. Pang
4/3/98

Analysis Report

Summary

Wed 04-01-98 02:10:46 PM

page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	980401C	ICP2	04/01/98	13:29	DKS	Q	CONC
2	ICB	980401C	ICP2	04/01/98	13:32	DKS	Q	CONC
3	ILS	980401C	ICP2	04/01/98	13:34	DKS	Q	CONC
4	ICSA	980401C	ICP2	04/01/98	13:37	DKS	Q	CONC
5	ICSAB	980401C	ICP2	04/01/98	13:40	DKS	Q	CONC
6	S98T000902	980401C	ICP2	04/01/98	13:45	DKS	S	CONC
7	S98T000902_D	980401C	ICP2	04/01/98	13:47	DKS	S	CONC
8	S98T000903	980401C	ICP2	04/01/98	13:50	DKS	S	CONC
9	S98T000903_D	980401C	ICP2	04/01/98	13:53	DKS	S	CONC
10	ICSA	980401C	ICP2	04/01/98	13:58	DKS	Q	CONC
11	ICSAB	980401C	ICP2	04/01/98	14:01	DKS	Q	CONC
12	CCV	980401C	ICP2	04/01/98	14:04	DKS	Q	CONC
13	CCB	980401C	ICP2	04/01/98	14:07	DKS	Q	CONC

Handwritten:
 04.01.98
 Worklist # 22998

Handwritten:
 5-102
 5987000902
 5987000903

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
 COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 149 TO 152

HNF-1649 REV. 0

Analysis Report

Averages

Wed 04-01-98 02:10:46 PM

page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.9432	4.9337	5.1064	5.0661	4.9797	5.0491
2	ICB	.00000	.00290	-.00578	.00600	.00002	-.00008
3	LLS	.02107	.09821	.19924	.09966	.10146	.01054
4	ICSA	.00300	242.73	-.03411	-.00794	.00224	.00033
5	ICSAB	.95295	244.37	-.03778	-.00693	.46927	.48256
6	S98T000902	-.00079	-.00059	-.00559	.03092	.00014	.00004
7	S98T000902_D	.00043	.00312	-.00006	.03435	.00008	.00000
8	S98T000903	.00902	.01932	-.03409	-.00003	.07143	-.00081
9	S98T000903_D	.00530	.00686	.05621	.01722	.07205	-.00080
10	ICSA	.00314	242.96	-.00325	-.00834	.00230	.00029
11	ICSAB	.95403	244.11	-.00089	-.01119	.46823	.48157
12	CCV	4.9359	4.8790	5.0835	5.0420	4.9356	5.0101
13	CCB	.00024	.00218	-.00126	.00343	.00013	-.00004

#	Sample Name	Bi	Ca	Gd	Ge	Co	Cr
1	ICV	4.8866	5.0272	4.9910	5.0335	5.0954	4.8299
2	ICB	.00468	-.00068	-.00051	-.00264	-.00043	.00003
3	LLS	.19917	.23076	.00952	.19912	.04124	.01818
4	ICSA	-.00690	254.35	.00281	-.00154	.00190	-.01528
5	ICSAB	-.01070	256.05	.93771	.00179	.46743	.44345
6	S98T000902	.00570	.08995	-.00058	-.00485	-.00181	-.00071
7	S98T000902_D	-.00449	.05528	.00086	.00268	.00131	-.00019
8	S98T000903	-.11659	.72419	.00337	.07186	.01023	.00479
9	S98T000903_D	.08180	.69591	-.00121	.00954	-.00173	-.00037
10	ICSA	.01551	255.01	.00313	.00729	-.00013	-.01475
11	ICSAB	-.01369	257.49	.93794	.00157	.46668	.44242
12	CCV	4.8517	5.0606	4.9728	4.9917	5.0861	4.8229
13	CCB	-.00253	.00083	-.00015	.00685	-.00150	-.00144

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.8071	.00587	4.8720	5.0899	5.0204	5.0108
2	ICB	.00052	-.00062	.00101	.14140	-.00078	.00011
3	LLS	.01723	-.00104	.09911	.41510	.10265	.02121
4	ICSA	-.01029	.01194	92.442	.15581	-.00478	.00209
5	ICSAB	.46233	.01346	92.945	.09123	-.00494	.96760
6	S98T000902	-.00056	.00075	-.00432	.01281	-.00070	.00142
7	S98T000902_D	.00038	.00079	-.00234	.09811	.00033	.00164
8	S98T000903	.24148	-.00258	.00243	.00274	.00199	1901.0
9	S98T000903_D	.29322	-.00717	.01389	1.3961	-.00745	1935.1
10	ICSA	-.00920	.01109	92.512	.07178	-.00428	.00231
11	ICSAB	.46023	.01061	93.036	.08673	-.00463	.95891
12	CCV	4.7566	.00634	4.8476	5.0552	4.9760	4.9114
13	CCB	-.00029	-.00027	.00106	-.00207	.00034	.00055

Analysis Report

Averages

Wed 04-01-98 02:10:46 PM

page 3

#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	5.0959	4.8744	5.0741	5.1492	4.9080	4.8939
2	ICB	-.00384	-.00012	-.00298	-.00933	-.00085	-.00407
3	LLS	.20189	.01902	.10382	.19470	.20096	.03710
4	ICSA	254.11	-.00746	-.01284	195.11	-.00036	-.00236
5	ICSAB	255.62	.43940	-.01214	195.88	.00127	.92111
6	S98T000902	.02012	.00027	.00014	.67173	-.00240	-.00327
7	S98T000902_D	.02436	.00026	.00083	.65382	.00090	-.00499
8	S98T000903	.07524	.00847	.16766	5.2030	.1041	1.1553
9	S98T000903_D	.10180	.00969	.14165	5.3224	-.00207	1.3599
10	ICSA	254.26	-.00761	-.01039	195.48	-.00028	-.01194
11	ICSAB	255.27	.44013	-.01555	195.24	-.00123	.92217
12	CCV	5.0456	4.8648	5.0563	5.0553	4.8475	4.8806
13	CCB	.00157	.00003	.00327	-.01865	-.00178	.00080

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	5.0891	4.8810	4.9859	4.8345	4.7041	4.8779
2	ICB	.01121	.00721	-.00620	.00492	.00577	.00117
3	LLS	.40542	.20135	.19454	.10270	.19550	Q.14062
4	ICSA	.01259	.02263	-.03607	.01894	.01716	-.01260
5	ICSAB	.01150	.98396	-.02112	.01190	.02678	-.01150
6	S98T000902	.00650	-.00335	.00859	.00271	.01764	.45493
7	S98T000902_D	.00721	-.00007	.02976	.01022	.01756	.43798
8	S98T000903	.17810	.05386	1.5369	.08630	.26428	.85692
9	S98T000903_D	.16200	.04413	1.5925	.06440	.17185	.83069
10	ICSA	.01576	.03448	-.02726	.01138	.03220	-.01242
11	ICSAB	.02829	.97621	-.02330	.00989	.01229	-.00953
12	CCV	5.0239	4.8842	4.9581	4.8127	4.6722	4.8677
13	CCB	.01441	-.00352	-.00716	.00815	.02224	.00252

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	4.8854	5.0961	.20814	4.9467	4.7524	9.7735
2	ICB	-.00349	-.00008	-.00083	.00000	.02435	-.03011
3	LLS	.19435	.02070	-.00051	.01900	.43373	.44655
4	ICSA	-.01818	-.00269	.01056	-.00068	-.00615	-.04653
5	ICSAB	-.02498	-.00262	.02177	-.00072	.03269	-.06636
6	S98T000902	.00974	.00021	-.00880	-.00088	.01786	.01604
7	S98T000902_D	.01286	.00021	-.00084	-.00043	.00765	.03425
8	S98T000903	-.01154	.01090	.02255	.00011	.24928	-.08289
9	S98T000903_D	-.04634	.01004	-.03335	.00426	.17255	-.03010
10	ICSA	-.02205	-.00271	.01656	.00070	.01916	-.05854
11	ICSAB	-.01927	-.00267	.01854	.00050	-.00700	-.06533
12	CCV	4.8381	5.0499	.21255	4.9198	4.7826	9.6811
13	CCB	-.00039	.00000	-.00319	-.00087	.01352	-.00656

Analysis Report

Averages

Wed 04-01-98 02:10:46 PM

page 4

#	Sample Name	V	Y	Zn	Zr
1	ICV	5.1113	.00705	5.0304	5.0098
2	IGB	-.00110	-.00030	.00034	-.00052
3	LLS	.09955	-.00018	.02065	.01872
4	IGSA	-.00011	.00707	-.00372	-.00431
5	IGSAB	.46713	.00708	.91519	-.00560
6	S98T000902	.00081	.00022	.00244	.00156
7	S98T000902_D	.00192	.00037	.00127	.00125
8	S98T000903	.00481	.00081	-1.1335	.00770
9	S98T000903_D	-.00289	-.00143	-1.1488	.00281
10	IGSA	-.00114	.00707	-.00341	-.00507
11	IGSAB	.46843	.00723	.91796	-.00476
12	CCV	5.0892	.00717	5.0237	4.9762
13	CCB	-.00015	-.00007	-.00003	.00024

OK RAB
04-01-98

File #: 980831Q.TYT

HNF-1649 REV. 0

08/31/98 07:07

A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 25960

Analyst: JX 5610 Instrument: ICP01 2. 8-31-98 Book# 738488Method: LA-505-151/161 Rev/Mod C-2

Worklist Comment: ICP S-102 (DIRECT)

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 ICV			@ICP-QC	QC		
2 ICB			@ICP-QC	QC		
3 LLS			@ICP-QC	QC		
4 ICSA			@ICP-QC	QC		
5 ICSAB			@ICP-QC	QC		
6 SERDIL	S98T002515 0 D		@ICP-D01	LIQUID		
7 SAMPLE	S98T002515 0 D		@ICP-D01	LIQUID	98000466 S-102 CMPT	
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						
8 DUP	S98T002515 0 D		@ICP-D01	LIQUID		
9 SPK	(1ppm) S98T002515 0 D		@ICP-D01	LIQUID		
10 ICSA	SPK (10ppm) 8-31-98		@ICP-QC	QC		
11 ICSAB			@ICP-QC	QC		
12 CCV			@ICP-QC	QC		
13 CCB			@ICP-QC	QC		

Data Entry Comments:

uploaded 8-31-98
John Wanele
25960A06.CSV

Validated by:
S. M. P. J.
8/31/98

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

08/31/98 08:58
A-0004-1

HNF-1649 REV. 0

Page: 2

LABCORE Data Entry Template for Worklist# 25960

S Type	Sample#	R A Test	Matrix	Group#	Project
--------	---------	----------	--------	--------	---------

Final page for worklist # 25960

Analyst Signature	Date
<i>JK</i>	<i>08-31-98</i>
5487002515-L	025-15-28, DF 3005
5487002515	025-15 601
5487002515-D	025-15 601
5487002515-G	025-15 601
5487002515-X	025-15-19 6010
5487002515-GY	025-15-19 6010

Analyst Signature	Date
-------------------	------

Data Entry Comments:

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

HNF-1649 REV. 0

Analysis Report

Summary

Mon 08-31-98 10:40:14 AM

page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	980831A	ICP2	08/31/98	09:41	DKS	Q	CONC
2	ICB	980831A	ICP2	08/31/98	09:44	DKS	Q	CONC
3	LLS	980831A	ICP2	08/31/98	09:48	DKS	Q	CONC
4	ICSA	980831A	ICP2	08/31/98	09:51	DKS	Q	CONC
5	ICSAB	980831A	ICP2	08/31/98	09:54	DKS	Q	CONC
6	S98T002515 L	980831A	ICP2	08/31/98	09:58	DKS	S	CONC
7	S98T002515-	980831A	ICP2	08/31/98	10:01	DKS	S	CONC
8	S98T002515 D	980831A	ICP2	08/31/98	10:04	DKS	S	CONC
9	S98T002515-A	980831A	ICP2	08/31/98	10:07	DKS	S	CONC
10	S98T002515 X	980831A	ICP2	08/31/98	10:13	DKS	S	CONC
11	S98T002515-AX	980831A	ICP2	08/31/98	10:17	DKS	S	CONC
12	ICSA	980831A	ICP2	08/31/98	10:26	DKS	Q	CONC
13	ICSAB	980831A	ICP2	08/31/98	10:29	DKS	Q	CONC
14	CCV	980831A	ICP2	08/31/98	10:32	DKS	Q	CONC
15	CCB	980831A	ICP2	08/31/98	10:35	DKS	Q	CONC

JK

5-102

08-31-98

5987002515

Worklist # 25860

Post Spike:

$$AL = \frac{\left(\frac{85018}{6010}\right) - \left(\frac{28367}{6010}\right)}{10} \times 100 = 94.3\%$$

$$Na = \frac{\left(\frac{276630}{6010}\right) - \left(\frac{228090}{6010}\right)}{10} \times 100 = 80.8\%$$

Predig spk:

$$Cr = \frac{1056.1 - 457.23}{601 \times 1} \times 100 = 99.6\%$$

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 155 TO 158.

HNF-1649 REV. 0

Analysis Report

Averages

Mon 08-31-98 10:40:14 AM

page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.8903	4.8335	4.9778	4.8213	4.8511	4.9729
2	ICB	-.00037	-.00707	-.01307	.00527	.00005	-.00014
3	LLS	.02051	.09694	.18641	.10434	.09651	.01007
4	ICSA	.00343	245.90	-.00144	-.00547	.00034	.00013
5	ICSA B	.96013	245.85	-.00722	-.00802	.46817	.48300
6	S98T002515 L	18.599	27793.	-.64.245	77.639	.23714	-.42410
7	S98T002515	15.561	26864.	-.53.337	67.287	.09782	.08885
8	S98T002515 D	15.435	27512.	-.58.062	68.439	.09713	.08835
9	S98T002515 A	580.10	28089.	570.51	649.97	570.09	599.65
10	S98T002515 X	21.841	28367.	-.87.593	86.290	.29884	-.28133
11	S98T002515 AX	58086	85018	59486	59117	58714	58719
12	ICSA	.00359	246.60	-.02570	-.00048	.00023	.00009
13	ICSA B	.95886	242.36	.02176	-.00773	.46095	.47804
14	CCV	4.9590	4.9553	5.0648	4.9700	5.0279	5.1340
15	CCB	.00105	.00731	-.01297	.00574	.00010	.00004

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	4.9777	4.8421	4.9782	4.9175	4.8886	4.9046
2	ICB	-.00347	-.01569	-.00135	.00111	-.00010	.00060
3	LLS	.20407	Q.20525	.00983	.19777	.03984	.02258
4	ICSA	.02599	249.20	.00562	.00690	.00173	-.00070
5	ICSA B	.01585	247.03	.94536	.00019	.45957	.47105
6	S98T002515 L	32.108	-3.3521	-.80617	21.982	4.1067	470.33
7	S98T002515	-2.2787	32.351	.23522	2.7718	.45713	457.23
8	S98T002515 D	-5.9686	44.536	.32799	1.3060	-.35684	469.56
9	S98T002515 A	583.91	621.33	599.05	595.95	586.49	1056.1
10	S98T002515 X	-15.634	-51.287	-2.2673	4.5543	7.5100	489.42
11	S98T002515 AX	59841.	58777.	59332.	59022.	59341.	60033.
12	ICSA	.00277	248.83	.00485	.00026	.00136	-.00152
13	ICSA B	.03138	246.83	.94190	.01405	.46068	.46967
14	CCV	5.0525	4.9036	5.0732	5.0946	4.9808	4.9913
15	CCB	.01210	-.01475	.00029	.00938	.00086	.00216

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.6623	.00588	4.7612	4.9534	4.9054	4.9213
2	ICB	-.00020	.00120	-.00181	-.19657	-.00070	.00077
3	LLS	.01693	.00153	.09565	Q.36478	.09887	.02172
4	ICSA	.00224	.00621	93.490	.02862	-.00356	.00310
5	ICSA B	.46919	.01279	92.814	.05566	-.00428	1.0209
6	S98T002515 L	1.0785	2.2608	6.3203	2732.3	2.2615	2.6646
7	S98T002515	1.1415	1.0753	4.8409	2659.3	.14388	1.9996
8	S98T002515 D	.67538	1.0264	4.6770	2744.5	.03591	2.1327
9	S98T002515 A	555.15	1.6346	579.48	3339.3	590.32	579.29
10	S98T002515 X	1.3451	6.9326	-1.0287	2503.6	-.77988	3.3213
11	S98T002515 AX	55164.	65.001	56652.	60198.	58682.	57349.
12	ICSA	.00216	.00917	93.451	.02986	-.00508	.00265
13	ICSA B	.45976	.01007	92.264	.07842	-.00374	.98018
14	CCV	4.8270	.00564	4.8299	4.8692	5.0785	5.1778
15	CCB	.00093	.00038	.00067	.02119	.00113	-.00011

HNF-1649 REV. 0

Analysis Report

Averages

Mon 08-31-98 10:40:14 AM

page 3

#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	4.9610	4.8742	4.9081	5.0924	4.9075	4.9638
2	ICB	-.00993	.00050	-.00109	-.01873	-.00067	.00095
3	LLS	.20123	.02042	.09684	.18344	.19707	.04264
4	ICSA	252.77	-.00501	-.01582	194.72	.00245	-.00455
5	ICSA B	251.79	.44649	-.00756	198.73	.00919	.91934
6	S98T002515 L	21.312	.69746	94.974	227830.	1.1014	-1.7914
7	S98T002515	.35090	.58958	91.385	212020.	1.1934	4.3161
8	S98T002515 D	2.7730	.64597	94.092	215920.	-.68524	2.4006
9	S98T002515 A	593.30	571.76	685.55	216910.	577.67	587.68
10	S98T002515 X	-9.9276	2.9383	110.97	228090.	4.4705	9.9185
11	S98T002515 AX	.0580	59123	59337	276630.	57154.	59300
12	ICSA	252.54	-.00503	-.01727	195.14	.00061	-.00112
13	ICSA B	248.19	.44519	-.00979	191.70	.00644	.92443
14	CCV	5.0268	4.9524	5.0170	5.3157	5.0910	5.0382
15	CCB	.00069	.00015	-.00048	.01722	.00226	.00213

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	4.8971	4.8441	4.8626	4.9316	4.7148	4.9335
2	ICB	.00064	-.02018	-.00066	-.00021	.00169	.01116
3	LLS	.37215	.19454	.20255	.09156	.19860	.15415
4	ICSA	.02734	.00996	-.01426	.00012	.04953	-.00017
5	ICSA B	.03592	1.0006	.02550	-.00660	.06734	-.00100
6	S98T002515 L	902.32	-1.6261	1737.9	2.9798	15.825	141.20
7	S98T002515	896.45	14.687	1734.2	-4.1798	37.523	128.28
8	S98T002515 D	922.19	15.951	1767.5	-1.3101	44.162	129.21
9	S98T002515 A	1531.7	598.37	2350.2	593.90	649.04	743.39
10	S98T002515 X	986.82	-12.564	1777.5	-13.540	55.849	167.49
11	S98T002515 AX	60190.	60047	60450	59797	57888.	61679
12	ICSA	.03314	.01362	-.02193	-.01089	.05567	.00570
13	ICSA B	.02765	.98864	-.00455	.00838	.04336	.00599
14	CCV	5.0265	4.8935	4.9259	5.0414	4.8248	5.0043
15	CCB	.00102	-.00747	.01350	-.00313	.00752	.00385

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	4.8716	4.8374	.18578	4.8661	4.7520	9.4078
2	ICB	.01316	.00017	-.00750	.00043	-.03476	.05139
3	LLS	.20581	.01989	-.00158	.02020	.38123	.51008
4	ICSA	-.00442	.00224	-.00703	.00179	-.02369	.09694
5	ICSA B	-.00993	.00227	-.00874	.00201	-.05134	.08854
6	S98T002515 L	16.190	.13039	5.5070	.71117	6.2302	74.571
7	S98T002515	8.4894	.18736	-3.7963	.26199	-17.267	35.027
8	S98T002515 D	8.0197	.15903	-4.3029	.11533	-10.378	41.092
9	S98T002515 A	583.95	587.96	21.234	530.28	544.61	1162.3
10	S98T002515 X	58.049	1.0731	-14.898	2.7109	-122.91	266.55
11	S98T002515 AX	56820.	58135	2218.7	58779.	58449.	110920.
12	ICSA	-.00608	.00221	-.00282	.00181	-.03281	.08025
13	ICSA B	-.00047	.00219	-.00106	.00252	-.03575	.09074
14	CCV	5.0571	5.0082	.18678	5.0160	4.8424	9.7477
15	CCB	.00216	.00000	.00365	.00024	-.02044	.00582

HNF-1649 REV. 0

Analysis Report

Averages

Mon 08-31-98 10:40:14 AM

page 4

#	Sample Name	V	Y	Zn	Zr
1	IGV	4.8423	.01504	4.6745	4.8506
2	ICB	.00263	.00052	-.00028	.00182
3	LLS	.10009	.00088	.01922	.02136
4	ICSA	.00288	.00787	-.00474	-.00103
5	ICSAB	.46630	.00764	.91530	-.00162
6	S98T002515 L	3.5128	.43934	.00287	1.4319
7	S98T002515	2.0978	.40905	-1.1873	1.1755
8	S98T002515 D	1.5431	.31226	-1.0677	1.2089
9	S98T002515-A	602.13	1.2018	593.89	595.98
10	S98T002515-X	15.652	3.1840	-1.8704	10.680
11	S98T002515-AX	58702.	93.233	56444.	58457.
12	ICSA	.00203	.00764	-.00481	-.00199
13	ICSAB	.46426	.00795	.91755	-.00117
14	CCV	4.9553	.01474	4.7064	4.9804
15	CCB	-.00019	-.00008	.00017	.00004

JK

08-31-98

file # U0909A.TRT

09/09/98 07:12

A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 26075

Analyst: B. E. G. G. Instrument: ICPMS1 _____ Book# 711110-PMethod: LA-506-1.01 Rev/Mod A-1Worklist Comment: ICP/MS S-102 (DIRECT) 8/5/98

S Type	Sample#	R A	Test	Matrix	Group#	Project
1	ICV		@MSU238	QC		
2	ICB		@MSU-A1	LIQUID		
3	SAMPLE	S987002514 0 A	@MSU-A1	LIQUID	98000466	S-102 CMPT
Analyst's Requested: U233-A1 , U234-A1 , U235-A1 , U236-A1 , U238-A1						
4	DUP	S987002514 0 A	@MSU-A1	LIQUID		
5	SPK	S987002514 0 A	@MSU-A1	LIQUID		
6	CCV		@MSU238	QC		
7	CCB		@MSU-A1	LIQUID		

Final page for worklist # 26075

[Signature] 9-9-98
 Analyst Signature Date

 Analyst Signature Date

S987002514 1-10 - 025-10
 2514-D "
 2514-A "

D.F.
 90501
 "
 "

Will 10ppm spikes added to post spike. (20 ppb)

Data Entry Comments:

Validated by:

[Signature]
 9/5/98

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

LABCORE Completed Worklist Report for Worklist# 26075

Analyst: bjg

Instrument: ICPMS1

Book#: 80A10C

Method: LA-506-101 Rev/Mod A-0

Worklist Comment: ICP/MS S-102 (DIRECTO

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 ICV	0	QMSU238	U238	QC	0.020	2.08e-02	104.000 % Recovery
2 ICB	0	QMSU-A1	U233-A1	LIQUID	1	<1.82e-5	ug/mL
2 ICB	0	QMSU-A1	U234-A1	LIQUID	1	<1.61e-5	ug/mL
2 ICB	0	QMSU-A1	U235-A1	LIQUID	1	<2.07e-5	ug/mL
2 ICB	0	QMSU-A1	U236-A1	LIQUID	1	<1.55e-5	ug/mL
2 ICB	0	QMSU-A1	U238-A1	LIQUID	1	<3.26e-5	ug/mL
3 SAMPLE	S98T002514 0 A	QMSU-A1	U233-A1	LIQUID	N/A	< 7.390e-01	0.739 ug/mL
3 SAMPLE	S98T002514 0 A	QMSU-A1	U234-A1	LIQUID	N/A	< 6.513e-01	0.651 ug/mL
3 SAMPLE	S98T002514 0 A	QMSU-A1	U235-A1	LIQUID	N/A	< 8.367e-01	0.837 ug/mL
3 SAMPLE	S98T002514 0 A	QMSU-A1	U236-A1	LIQUID	N/A	< 6.291e-01	0.629 ug/mL
3 SAMPLE	S98T002514 0 A	QMSU-A1	U238-A1	LIQUID	N/A	1.389e+00	1.322 ug/mL
4 DUP	S98T002514 0 A	QMSU-A1	U233-A1	LIQUID	<7.39e-1	<7.39e-1	RPD
4 DUP	S98T002514 0 A	QMSU-A1	U234-A1	LIQUID	<6.51e-1	<6.51e-1	RPD
4 DUP	S98T002514 0 A	QMSU-A1	U235-A1	LIQUID	<8.37e-1	<8.37e-1	RPD
4 DUP	S98T002514 0 A	QMSU-A1	U236-A1	LIQUID	<6.29e-1	<6.29e-1	RPD
4 DUP	S98T002514 0 A	QMSU-A1	U238-A1	LIQUID	1.39e+00	1.49e+00	6.944 RPD
5 SPK	S98T002514 0 A	QMSU-A1	U233-A1	LIQUID	?	6.33e-06	% Recovery
5 SPK	S98T002514 0 A	QMSU-A1	U234-A1	LIQUID	?	-1.22e-7	% Recovery
5 SPK	S98T002514 0 A	QMSU-A1	U235-A1	LIQUID	?	1.45e-04	% Recovery
5 SPK	S98T002514 0 A	QMSU-A1	U236-A1	LIQUID	?	1.51e-05	% Recovery
5 SPK	S98T002514 0 A	QMSU-A1	U238-A1	LIQUID	0.020	1.99e-02	99.500 % Recovery
6 CCV	0	QMSU238	U238	QC	0.020	1.99e-02	99.500 % Recovery
7 CCB	0	QMSU-A1	U233-A1	LIQUID	1	<1.82e-5	ug/mL
7 CCB	0	QMSU-A1	U234-A1	LIQUID	1	<1.61e-5	ug/mL
7 CCB	0	QMSU-A1	U235-A1	LIQUID	1	<2.07e-5	ug/mL
7 CCB	0	QMSU-A1	U236-A1	LIQUID	1	<1.55e-5	ug/mL
7 CCB	0	QMSU-A1	U238-A1	LIQUID	1	<3.26e-5	ug/mL

Final page for worklist# 26075

Analyst Signature

Date

Analyst Signature

Date

Sam M. Pang

10/28/98

Reviewer Signature

Date

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 isotope 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:

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

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:

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

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.

Analysis Report

09/09/98 13:20:25

page 1

Method: MS_TUNE

Sample Name: Sample-0

Operator:

Comment:

Run Time: 09/09/98 13:19

Type: Unk

Mode: INT

Corr.Fact: 1.000000

Elem	In[115]
Line	115/pulse
Units	Cts/S
Avg	77630.
Stddev	457.
%RSD	.5887

#1	78000.
#2	77590.
#3	76650.
#4	77750.
#5	78030.
#6	77560.
#7	78030.
#8	77030.
#9	77800.
#10	77900.

9-9-98

S-102

598700 2514

1-10-025-60

DA 40501

FILE# U0908A.72T

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 114 TO 182

Method: MS_TUNE Sample Name: Sample-0

Operator:

Comment:

Run Time: 09/09/98 13:20 Type: Unk

Mode: INT

Corr.Fact: 1.000000

Elem	In[115]
Line	115/pulse
Units	Cts/S
Avg	78570.
Stddev	688.
%RSD	.8752

#1	79470.
#2	77510.
#3	78020.
#4	79020.
#5	78480.
#6	78790.
#7	78870.
#8	77800.
#9	78230.
#10	79550.

Method: ISO_U

Sample Name: BLANK

Operator:

Comment:

Run Time: 09/09/98 13:22 Type: Std

Mode: IR

Corr.Fact: 1.000000

Elem	U_[235]	U_[238]
Line	235/pulse	238/pulse
Units	Cts/S	Cts/S
Avg	1.996	2.995
Stddev	.327	.285
%RSD	16.38	9.517

#1	2.525	3.031
#2	2.064	3.440
#3	1.758	2.828
#4	1.918	2.993
#5	1.714	2.682

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	6.6481
Stddev	.1754
%RSD	2.6379

#1	6.9293
#2	6.5415
#3	6.5427
#4	6.5159
#5	6.7110

Method: ISO_U

Sample Name: U High Std

Operator:

Comment:

Run Time: 09/09/98

13:25 Type: Std

Mode: IR

Corr.Fact: 1.000000

Elem	U_[235]	U_[238]
Line	235/pulse	238/pulse
Units	Cts/S	Cts/S
Avg	253.3	32610.
Stdddev	8.8	1257.
%RSD	3.477	3.854
#1	247.6	31650.
#2	262.5	34370.
#3	250.7	32040.
#4	243.1	31510.
#5	262.4	33470.

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	6.5248
Stdddev	.0631
%RSD	.96652

#1	6.5295
#2	6.4180
#3	6.5845
#4	6.5419
#5	6.5498

Method: ISO_U Sample Name: blank

Operator: bjg

Comment: background

Run Time: 09/09/98 13:36 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	2.411	2.095	2.213	2.207	3.962
Stddev	.426	.375	.482	.363	.762
%RSD	17.67	17.92	21.80	16.43	19.23

#1	2.415	2.635	2.049	2.415	3.659
#2	2.284	1.990	2.726	2.137	4.495
#3	1.791	2.314	1.866	2.314	4.926
#4	2.623	1.772	1.701	2.552	2.977
#5	2.941	1.765	2.721	1.618	3.750

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	6.8338
Stddev	.1325
%RSD	1.9389

#1	6.8316
#2	6.7853
#3	6.6985
#4	7.0538
#5	6.7997

Method: ISO_U Sample Name: blank

Operator: bjg

Comment: background

Run Time: 09/09/98 13:36 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	2.095	.0006	2.207	.0029
Stddev	.426	.375	.0014	.363	.0023
%RSD	17.67	17.92	222.3	16.43	78.76
#1	2.415	2.635	.0002	2.415	.0020
#2	2.284	1.990	.0021	2.137	.0046
#3	1.791	2.314	-.0004	2.314	.0059
#4	2.623	1.772	-.0008	2.552	-.0001
#5	2.941	1.765	.0021	1.618	.0023

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	6.8338
Stddev	.1325
%RSD	1.9389

#1	6.8316
#2	6.7853
#3	6.6985
#4	7.0538
#5	6.7997

Method: ISO_U

Sample Name: iso_u std

Operator: bjg

Comment: 100 pph

Run Time: 09/09/98 13:41 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	2.012	4.946	275.1	8.207	32830.
Stddev	.309	.472	19.8	.982	2158.
%RSD	15.34	9.550	7.181	11.97	6.575
#1	1.747	4.471	255.9	7.755	30530.
#2	2.317	4.944	306.4	7.107	34660.
#3	2.317	4.635	260.8	8.638	32040.
#4	1.660	4.979	274.9	9.670	35530.
#5	2.020	5.701	277.5	7.865	31400.

Int. Std.	Ir [193]
Line	193/pulse
Units	Cts/S
Avg	6.9214
Stddev	.2720
%RSD	3.9299

#1	7.1565
#2	6.4728
#3	7.1198
#4	6.9286
#5	6.9291

Method: ISO_U

Sample Name: iso_u std

Operator: bjg

Comment: 100 ppb

Run Time: 09/09/98 13:41 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	2.012	4.946	.7728	8.207	99.97
Stddev	.309	.472	.0559	.982	6.57
%RSD	15.34	9.550	7.234	11.97	6.575
#1	1.747	4.471	.7185	7.755	92.96
#2	2.317	4.944	.8614	7.107	105.5
#3	2.317	4.635	.7322	8.638	97.56
#4	1.660	4.979	.7723	9.670	108.2
#5	2.020	5.701	.7794	7.865	95.61

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	6.9214
Stddev	.2720
%RSD	3.9299

#1	7.1565
#2	6.4728
#3	7.1198
#4	6.9286
#5	6.9291

Method: ISO_U Sample Name: icv

Operator: bjg

Comment sst 6

Run Time: 09/09/98 13:50 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	3.349	1.894	25.29	4.341	6821.
Stddev	.371	.316	.90	.481	191.
%RSD	11.08	16.67	3.569	11.09	2.798
#1	3.065	2.281	25.09	4.562	6616.
#2	3.960	2.051	26.02	3.819	6862.
#3	3.429	1.890	23.87	3.919	6678.
#4	3.084	1.822	25.37	4.416	6846.
#5	3.208	1.426	26.09	4.990	7105.

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.0751
Stddev	.0626
%RSD	.88517

#1	7.0143
#2	7.0702
#3	7.1442
#4	7.1335
#5	7.0135

Method: ISO_U Sample Name: icv
Comment: sst 6
Run Time: 09/09/98 13:50 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	3.349	1.894	.0659	4.341	20.77
Stddev	.371	.316	.0026	.481	.58
%RSD	11.08	16.67	3.875	11.09	2.799
#1	3.065	2.281	.0654	4.562	20.14
#2	3.960	2.051	.0680	3.819	20.89
#3	3.429	1.890	.0619	3.919	20.33
#4	3.084	1.822	.0661	4.416	20.84
#5	3.208	1.426	.0682	4.990	21.63

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.0751
Stddev	.0626
%RSD	.88517

#1	7.0143
#2	7.0702
#3	7.1442
#4	7.1335
#5	7.0135

Method: ISO_U Sample Name: icb

Operator: bjg

Comment: 2% nitric

Run Time: 09/09/98 13:58 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	1.877	2.105	1.861	2.213	2.819
Stddev	.343	.856	.387	.136	.382
%RSD	18.29	40.64	20.79	6.128	13.55

#1	1.802	1.226	2.379	2.091	3.316
#2	1.319	1.319	1.944	2.429	2.777
#3	2.174	3.117	1.667	2.247	2.247
#4	2.114	2.819	1.339	2.184	2.889
#5	1.978	2.046	1.978	2.114	2.864

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.0929
Stddev	.1815
%RSD	2.5596

#1	6.9354
#2	7.2031
#3	6.8986
#4	7.0957
#5	7.3319

Method: ISO_U Sample Name: icb

Operator: bjg

Comment: 2% nitric

Run Time: 09/09/98 13:58 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	1.877	2.105	-.0004	2.213	-.0005
Stddev	.343	.856	.0011	.136	.0012
%RSD	18.29	40.64	287.7	6.128	217.1

#1	1.802	1.226	.0011	2.091	.0010
#2	1.319	1.319	-.0001	2.429	-.0007
#3	2.174	3.117	-.0009	2.247	-.0023
#4	2.114	2.819	-.0019	2.184	-.0003
#5	1.978	2.046	-.0001	2.114	-.0004

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.0929
Stddev	.1815
%RSD	2.5596

#1	6.9354
#2	7.2031
#3	6.8986
#4	7.0957
#5	7.3319

Method: ISO_U Sample Name: s98t002514

Operator: bjg

Comment: 40501 df

Run Time: 09/09/98 14:02 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	2.008	1.872	1.797	1.903	14.24
Stddev	.302	.315	.328	.425	1.31
%RSD	15.03	16.83	18.26	22.33	9.221
#1	1.872	1.872	2.121	1.685	12.29
#2	2.190	2.190	1.610	1.546	15.07
#3	2.392	2.126	1.329	1.727	14.22
#4	1.983	1.771	2.054	2.621	13.88
#5	1.602	1.402	1.869	1.936	15.75

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.5702
Stddev	.3548
%RSD	4.6862

#1	8.0132
#2	7.7627
#3	7.5257
#4	7.0585
#5	7.4911

Method: ISO_U Sample Name: s98t002514 Operator: bjg
Comment: 40501 df
Run Time: 09/09/98 14:02 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	2.008	1.872	-.0006	1.903	.0343
Stddev	.302	.315	.0009	.425	.0040
%RSD	15.03	16.83	164.9	22.33	11.68

#1	1.872	1.872	.0004	1.685	.0283
#2	2.190	2.190	-.0011	1.546	.0368
#3	2.392	2.126	-.0019	1.727	.0342
#4	1.983	1.771	.0002	2.621	.0332
#5	1.602	1.402	-.0004	1.936	.0389

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.5702
Stddev	.3548
%RSD	4.6862

#1	8.0132
#2	7.7627
#3	7.5257
#4	7.0585
#5	7.4911

Method: ISO_U Sample Name: s98t002514_d Operator: bjg
Comment: 40501 df
Run Time: 09/09/98 14:05 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	1.742	1.973	1.913	1.716	15.06
Stddev	.233	.662	.313	.337	1.93
%RSD	13.39	33.56	16.36	19.64	12.82
#1	1.416	1.030	1.867	1.609	13.07
#2	1.896	1.766	1.635	1.308	15.76
#3	1.959	2.162	1.756	1.892	14.73
#4	1.860	2.856	1.860	2.192	13.75
#5	1.579	2.052	2.447	1.579	18.00

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.3355
Stddev	.5760
%RSD	7.8520
#1	7.7680
#2	7.6459
#3	7.4012
#4	7.5278
#5	6.3343

Method: ISO_U Sample Name: s98t002514_d Operator: bjg
Comment: 40501 df
Run Time: 09/09/98 14:05 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	1.742	1.973	-.0002	1.716	.0367
Stddev	.233	.662	.0009	.337	.0059
%RSD	13.39	33.56	377.9	19.64	16.01

#1	1.416	1.030	-.0004	1.609	.0307
#2	1.896	1.766	-.0010	1.308	.0389
#3	1.959	2.162	-.0007	1.892	.0357
#4	1.860	2.856	-.0004	2.192	.0328
#5	1.579	2.052	.0013	1.579	.0457

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.3355
Stddev	.5760
%RSD	7.8520

#1	7.7680
#2	7.6459
#3	7.4012
#4	7.5278
#5	6.3343

Analysis Report

Method: ISO_U Sample Name: s98t002514_a Operator: bjg
Comment: 40501 d:
Run Time: 09/09/98 14:07 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	1.809	2.429	53.10	2.846	6545.
Stddev	.318	.254	2.04	.308	232.
%RSD	17.56	10.46	3.839	10.81	3.547

#1	1.395	2.410	53.02	2.790	6537.
#2	2.110	2.557	53.51	2.685	6505.
#3	1.544	2.251	51.58	2.766	6184.
#4	2.007	2.141	51.11	2.609	6730.
#5	1.989	2.785	56.29	3.381	6768.

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.6990
Stddev	.1802
%RSD	2.3404

#1	7.8839
#2	7.8213
#3	7.7736
#4	7.4748
#5	7.5412

Method: ISO_U Sample Name: s98t002514_a Operator: bjg
 Comment: 40501 df
 Run Time: 09/09/98 14:07 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	1.809	2.429	.1446	2.846	19.92
Stddev	.318	.254	.0058	.308	.71
%RSD	17.56	10.46	3.989	10.81	3.549
#1	1.395	2.410	.1444	2.790	19.90
#2	2.110	2.557	.1458	2.685	19.80
#3	1.544	2.251	.1403	2.766	18.83
#4	2.007	2.141	.1390	2.609	20.49
#5	1.989	2.785	.1536	3.381	20.60

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.6990
Stddev	.1802
%RSD	2.3404

#1	7.8839
#2	7.8213
#3	7.7736
#4	7.4748
#5	7.5412

$$\text{Spike } U_{238} = \frac{19.92 - 0.0343}{20} \times 100 =$$

$$= 99.4\%$$

Method: ISO_U

Sample Name: ccv

Operator: bjg

Comment: sst6

Run Time: 09/09/98 14:10 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	3.394	2.076	24.68	4.560	6536.
Stddev	.751	.269	1.13	.621	201.
%RSD	22.12	12.93	4.581	13.63	3.080

#1	2.379	2.115	25.05	4.362	6539.
#2	3.388	1.945	23.28	3.827	6289.
#3	4.453	2.124	23.91	5.275	6697.
#4	3.601	1.734	24.94	4.202	6388.
#5	3.148	2.464	26.21	5.133	6767.

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.5273
Stddev	.2734
%RSD	3.6325

#1	7.5657
#2	7.9692
#3	7.2984
#4	7.4973
#5	7.3059

Method: ISO_U

Sample Name: ccv

Operator: bjg

Comment: sst6

Run Time: 09/09/98 14:10 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	3.394	2.076	.0642	4.560	19.90
Stddev	.751	.269	.0032	.621	.61
%RSD	22.12	12.93	4.984	13.63	3.082
#1	2.379	2.115	.0652	4.362	19.91
#2	3.388	1.945	.0602	3.827	19.14
#3	4.453	2.124	.0620	5.275	20.39
#4	3.601	1.734	.0649	4.202	19.45
#5	3.148	2.464	.0685	5.133	20.60

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.5273
Stddev	.2734
%RSD	3.6325

#1	7.5657
#2	7.9692
#3	7.2984
#4	7.4973
#5	7.3059

Analysis Report

Method: ISO_U Sample Name: ccb

Operator: bjg

Comment: 2% nitric

Run Time: 09/09/98 14:18 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	1.863	1.826	1.414	1.823	2.580
Stddev	.333	.294	.230	.440	.529
%RSD	17.86	16.13	16.25	24.13	20.51

#1	2.299	2.029	1.420	1.826	2.096
#2	2.109	1.361	1.429	2.177	3.334
#3	1.586	1.724	1.586	1.379	2.345
#4	1.532	2.088	1.601	1.392	2.924
#5	1.789	1.926	1.032	2.339	2.201

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.2888
Stddev	.0835
%RSD	1.1458

#1	7.3943
#2	7.3484
#3	7.2501
#4	7.1824
#5	7.2686

Method: ISO_U Sample Name: ccb
Comment: 2% nitirc
Run Time: 09/09/98 14:18 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	1.863	1.826	-.0016	1.823	-.0013
Stddev	.333	.294	.0006	.440	.0016
%RSD	17.86	16.13	39.45	24.13	127.6

#1	2.299	2.029	-.0016	1.826	-.0027
#2	2.109	1.361	-.0016	2.177	.0010
#3	1.586	1.724	-.0012	1.379	-.0020
#4	1.532	2.088	-.0011	1.392	-.0002
#5	1.789	1.926	-.0027	2.339	-.0024

Int. Std.	Ir[193]
Line	193/pulse
Units	Cts/S
Avg	7.2888
Stddev	.0835
%RSD	1.1458

#1	7.3943
#2	7.3484
#3	7.2501
#4	7.1824
#5	7.2686

LABCORE Completed Worklist Report for Worklist# 25890

Analyst: jmv

Instrument: CARB2

Book#: _____

Method: LA-342-100 Rev/Mod F-1

Worklist Comment: S102 (CMPT) @TICTOC1 RTS

Seq Type	Sample# R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 BLNK	0	@TICTOC1 TIC-02	LIQUID	1	5.00E-1	0.500	ug/mL
1 BLNK	0	@TICTOC1 TOC-02	LIQUID	1	4.30E+0	4.300	ug/mL
2 STD	0	@TICTOC1 TIC-02	LIQUID	6.02E+02	6.00E+2	99.658 % Recovery	
2 STD	0	@TICTOC1 TOC-02	LIQUID	3.00E+03	2.82E+3	94.000 % Recovery	
3 SAMPLE	S98T002515	0 @TICTOC1 TIC-02	LIQUID	N/A	4.21E+03	5.000	ug/mL
3 SAMPLE	S98T002515	0 @TICTOC1 TOC-02	LIQUID	N/A	3.02E+03	40.000	ug/mL
4 DUP	S98T002515	0 @TICTOC1 TIC-02	LIQUID	4.21E+3	4.23E+3	0.474	RPD
4 DUP	S98T002515	0 @TICTOC1 TOC-02	LIQUID	3.02E+3	3.00E+3	0.664	RPD
5 SPK	S98T002515	0 @TICTOC1 TIC-02	LIQUID	1.00E+02	1.21E+02	121.000 % Recovery	
5 SPK	S98T002515	0 @TICTOC1 TOC-02	LIQUID	1.00E+02	9.39E+01	93.900 % Recovery	

Final page for worklist# 25890

Analyst Signature

Date

Analyst Signature

Date

Reviewer Signature

Date

LABCORE Data Entry Template for Worklist# 25890

Analyst: DMV Instrument: CARB2

Book#

25012-D
26012-E

Method: LA-342-100 Rev/Mod _____

Worklist Comment: S102 (CMPT) @TICTOC1 RTS

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 BLNK			@TICTOC1	LIQUID		
2 STD			@TICTOC1	LIQUID		
3 SAMPLE	S98T002515 0		@TICTOC1	LIQUID	98000466	S-102 CMPT 5
	Analytes Requested: TIC-02 , TOC-02					
4 DUP	S98T002515 0		@TICTOC1	LIQUID		
5 SPK	S98T002515 0		@TICTOC1	LIQUID		

Final page for worklist # 25890

Analyst Signature Joan M. Sat Date 9-1-98

Analyst Signature _____ Date _____

Data Entry Comments:

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)	10.1	29.5
25890	µg of Carbon from Baseline (C2)	9.6	33.8
Test Code			
@TICTOC1			
Matrix			
LIQUID			
Batch Number			
98004457			
Rerun	µg of Carbon = C1-C2		
0			
Sample Prep			
N/A			
Sample #			
BLK			
Instrument Code			
carb2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
JMV			
Date Complete			
09/11/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in µg/mL	5	40
11:45 PM			
Sample Point	µg of Carbon	5.00E-01	4.30E+00
S102			

Data Entered By:	JDS	Date:	09/11/98
Signature of Chemist:	N/A	Date:	
BLANK.WB1 REV 1.0	342100ML		

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)	609.4	597
25890	μg of Carbon from Baseline (C2)	9.6	33.8
Test Code	Standard Book Number	25N12D	26N12E
@TIC/TOC1	Standard Value ($\mu\text{g}/\text{ml}$)	602	3000
Matrix	QC Actual in $\mu\text{g}/\text{mL}$ = Standard Value ($\mu\text{g}/\text{mL}$) QC Found in $\mu\text{g}/\text{mL}$ = $(C1 - C2) * DF / SS$ QC Found in $\mu\text{g}/\text{mL}$ for TIC = 5 if $C1 < C2$ QC Found in $\mu\text{g}/\text{mL}$ for TOC = 40 if $C1 < C2$ % Recovery = QC Found / QC Actual * 100		
LIQUID			
Batch Number			
98004457			
Rerun			
0			
Sample Prep			
N/A			
Sample #			
STD			
Instrument Code			
carb2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
JMV			
Date Complete			
09/11/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in $\mu\text{g}/\text{mL}$	TIC	TOC
11:45 PM	QC Actual in $\mu\text{g}/\text{mL}$	5	40
Sample Point	QC Found in $\mu\text{g}/\text{mL}$	6.02E+02	3.00E+03
S102	Percent Standard Recovery	6.00E+02	2.82E+03
		99.6	93.9

Data Entered By:	JDS	Date:	09/11/98
Signature of Chemist:	NA	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)	0.1000	0.1000
SAMPLE	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	430.4	336.2
25890	µg of Carbon from Baseline (C2)	9.6	33.8
Test Code			
@TIC/TOC1			
Matrix			
LIQUID			
Batch Number			
98004457			
Rerun			
0			
Sample Prep			
N/A			
Sample #			
S98T002515			
Instrument Code			
carb2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
JMV			
Date Complete			
09/11/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in µg/mL	TIC	TOC
11:45 PM		5	40
Sample Point	µg of Carbon/mL	4.21E+03	3.02E+03
S102			

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

Data Entered By: JDS Date: 09/11/98

Signature of Chemist: NA Date:

WORKBOOK PAGE: DUP4

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

LIQUIDS

		TIC	TOC
Type	Sample Size in mL (SS)	0.1000	0.1000
DUP	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	432.6	333.4
25890	µg of Carbon from Baseline (C2)	9.6	33.8
Test Code	Known µg of C from Original Sample	4.21E+3	3.02E+3
@TICTOC1			
Matrix			
LIQUID			
Batch Number			
98004457			
Rerun			
0			
Sample Prep			
N/A			
Sample #			
S98T002515			
Instrument Code			
carb2			
Prepared By			
JDS			
Chemist			
MJL			
Analyst			
JMV			
Date Complete			
09/11/98			
Analysis Date			
09/01/98			
Analysis Time	Method Detection Limit in µg/mL	TIC	TOC
11:45 PM		5	40
Sample Point	µg of Carbon/mL	4.23E+03	3.00E+03
S102			

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

Data Entered By:	JDS	Date:	09/11/98
Signature of Chemist:	N/A	Date:	

WORKBOOK PAGE: SPIKE5

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

LIQUIDS

Type	Sample Vial Data	TIC	TOC
SPK	Sample Volume in mL (SS)	0.1000	0.1000
Work List	Final Coulometer Reading in µg (C1)	430.4	336.2
25890	Spiked Vial Data		
Test Code	Sample Volume in mL (SPK SS)	0.1000	0.1000
@TICTOC1	Amount of Spike Std. in mL (SPK VOL)	0.500	0.100
Matrix	Final Coulometer Reading in µg (C2)	793.3	618
LIQUID	Spike Book Number	25N12D	26N12E
Batch Number	Spike Standard Value in µg/mL (SPK CONC)	602	3000
98004457	µg C in baseline (BL)	9.6	33.8

Rerun

0

Sample Prep

N/A

Sample #

S98T002515

$$\text{Percent Spike Recovery} = ((C2-BL) - (C1-BL) * (SPK SS) / SS) / ((SPK CONC) * (SPK VOL)) * 100$$

Instrument Code

carb2

QC Actual in µg/mL = Spike Value (µg/mL)

$$\text{QC Found in } \mu\text{g/mL} = (\text{Percent Spike Recovery}) * (\text{QC Actual}) / 100$$

Prepared By

JDS

Chemist

MJL

Analyst

JMV

Date Complete

09/11/98

Analysis Date

09/01/98

Analysis Time

11:45 PM

Sample Point

S102

QC Actual in µg/mL

QC Found in µg/mL

Percent Spike Recovery

TIC

TOC

6.02E+02

3.00E+03

7.26E+02

2.82E+03

120.6

93.9

Data Entered By:

JDS

Date:

09/11/98

Signature of Chemist: N/A

Date:

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT

TICTOC REV 2.0

<<< BLANK ANALYSIS >>>

Sample: BASE

Date: 08/31/98

Time: 16:24:26

Sample Size = 1 uL

Dil Factor = 1

Blank ID # = BASE

Blank Value = N/A

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	==== Analysis Time ==	==== Coulometer ==	==== % Difference ==
1	0.51	0.40	0.00
2	1.01	0.80	50.00
3	1.51	1.20	33.33
4	2.00	1.80	33.33
5	2.50	2.10	14.29
6	3.00	2.60	19.23
7	3.50	3.10	16.13
8	4.00	3.60	13.89
9	4.50	3.90	7.69
10	5.00	4.40	11.36
11	5.50	4.90	10.20
12	6.00	5.30	7.55
13	6.50	5.70	7.02
14	7.00	6.30	9.52
15	7.50	6.50	3.08
16	8.00	6.90	5.80
17	8.50	7.60	9.23
18	9.00	7.80	2.56
19	9.50	8.20	4.88
20	10.00	8.60	4.65
21	10.50	9.20	6.52
22	11.00	9.60	4.17

BLANK VALUE = 9.6 micrograms carbon

BLANK FACTOR = 9.6 / 10.99884 =

+8.7E-01

ug/min Carbon

Sample Run By:

JM VANSANT

00001

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT
 COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 190 TO 201

HNF-1649 REV. 0

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

Sample: BASE

Date: 08/31/98

Time: 16:37:10

Sample Size = 1 uL

Dil Factor = 1

Blank ID # = BASE

Blank Value = N/A

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.30	0.00
2	1.01	0.80	62.50
3	1.50	1.70	82.98
4	2.00	12.70	62.99
5	2.50	18.70	32.09
6	3.00	21.40	12.62
7	3.50	23.30	8.15
8	4.00	24.90	6.43
9	4.50	25.70	3.11
10	5.00	26.60	3.38
11	5.50	27.40	2.92
12	6.00	28.10	2.49
13	6.50	28.80	2.43
14	7.00	29.50	2.37
15	7.50	30.20	2.32
16	8.00	30.80	1.95
17	8.50	31.50	2.22
18	9.00	32.10	1.87
19	9.50	32.50	1.23
20	10.00	32.90	1.22
21	10.50	33.30	1.20
22	11.00	33.80	1.48

BLANK VALUE = 33.8 micrograms carbon

BLANK FACTOR = $33.8 / 10.99884 = +3.07E+00$ ug/min Carbon

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

Sample Run By:

JM VANSANT

00001

HNF-1649 REV. 0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD

Date: 08/31/98

Time: 17:17:57

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .87 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

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

1	0.51	0.50	0.00
2	1.01	0.80	37.50
3	1.51	3.20	75.00
4	2.00	47.60	93.28
5	2.50	186.50	74.48
6	3.00	335.20	44.36
7	3.50	447.20	25.04
8	4.00	512.30	12.71
9	4.50	549.40	6.75
10	5.00	571.00	3.78
11	5.50	583.70	2.18
12	6.04	591.50	1.32
13	6.54	596.40	0.82
14	7.04	599.80	0.57
15	7.53	602.20	0.40
16	8.03	603.80	0.26
17	8.53	605.20	0.23
18	9.03	606.30	0.18
19	9.53	607.20	0.15
20	10.03	608.10	0.15
21	10.53	608.70	0.10
22	11.03	609.40	0.11

USER INPUT BLANK VALUE

BLANK VALUE = 9.568991 micrograms carbon

BLANK FACTOR = 9.568991 / 10.99884 = +8.7E-01 ug/min Carbon

SAMPLE RESULTS:

(609.4 - 9.598462) (1) / (1) =

+5.998E+01 g/L Carbon

(609.4 - 9.598462) (1) / (1) (12) =

+4.998E+01 Molar Carbon

Sample Run By:

JM VANSANT

00001

HNF-1649 REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD

Date: 08/31/98

Time: 17:31:35

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.07 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	== Analysis Time ==	== Coulometer ==	== % Difference ==
1	0.50	0.40	0.00
2	1.00	0.90	55.56
3	1.50	7.10	87.32
4	2.00	93.30	92.39
5	2.50	307.60	69.67
6	3.00	446.80	31.15
7	3.50	504.20	11.38
8	4.00	535.30	5.81
9	4.50	554.40	3.45
10	5.00	566.70	2.17
11	5.50	574.90	1.43
12	6.00	580.80	1.02
13	6.50	584.30	0.60
14	7.00	587.50	0.54
15	7.50	590.00	0.42
16	8.00	591.70	0.29
17	8.50	592.90	0.20
18	9.00	594.10	0.20
19	9.50	595.00	0.15
20	10.00	595.70	0.12
21	10.50	596.50	0.13
22	11.00	597.00	0.08

USER INPUT BLANK VALUE

BLANK VALUE = 33.76644 micrograms carbon

BLANK FACTOR = 33.76644 / 10.99884 = +3.1E+00 ug/min Carbon

SAMPLE RESULTS:

(597 - 33.76101) (1)/(1) =

+5.632E+01 g/L Carbon

(597 - 33.76101) (1)/(1) (12) =

+4.694E+01 Molar Carbon

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

Sample Run By:

JM VANSANT

00001

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLANK

Date: 08/31/98

Time: 16:49:49

Sample Size = 1. uL

Dil Factor = 1

Blank ID # =

Blank Value = .87 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

```

== Reading ==== Analysis Time ==== Coulometer ==== % Difference ==
 1          0.51          0.40          0.00
 2          1.01          0.90          55.56
 3          1.51          1.40          35.71
 4          2.00          2.40          41.67
 5          2.50          3.00          20.00
 6          3.00          3.70          18.92
 7          3.50          4.30          13.95
 8          4.00          4.70          8.51
 9          4.50          5.20          9.62
10          5.00          5.60          7.14
11          5.50          6.00          6.67
12          6.00          6.40          6.25
13          6.50          6.80          5.88
14          7.00          7.20          5.56
15          7.50          7.70          6.49
16          8.00          8.00          3.75
17          8.50          8.30          3.61
18          9.00          8.70          4.60
19          9.50          9.00          3.33
20         10.00          9.50          5.26
21         10.50          9.80          3.06
22         11.00         10.10          2.90

```

USER INPUT BLANK VALUE

BLANK VALUE = 9.568991 micrograms carbon

BLANK FACTOR = 9.568991 / 10.99884 = +8.7E-01 ug/min Carbon

SAMPLE RESULTS:

```

( 10.1 - 9.568991 ) (1)/(1) = +5.31E-01 g/L Carbon
( 10.1 - 9.568991 ) (1)/(1) (12) = +4.43E-02 Molar Carbon

```

Sample Run By:

JM VANSANT

00001

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLANK

Date: 08/31/98

Time: 17:02:51

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.07 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time ==	Coulometer ==	% Difference ==
1	0.51	0.50	0.00
2	1.01	0.80	37.50
3	1.51	4.40	81.82
4	2.00	11.40	61.40
5	2.50	16.10	29.19
6	3.00	18.80	14.36
7	3.50	20.30	7.39
8	4.00	21.50	5.58
9	4.50	22.60	4.87
10	5.00	23.50	3.83
11	5.50	24.20	2.89
12	6.00	24.70	2.02
13	6.50	25.40	2.76
14	7.00	25.90	1.93
15	7.50	26.40	1.89
16	8.00	27.10	2.58
17	8.50	27.40	1.09
18	9.00	27.90	1.79
19	9.50	28.40	1.76
20	10.00	28.60	0.70
21	10.50	29.00	1.38
22	11.00	29.50	1.69

USER INPUT BLANK VALUE

BLANK VALUE = 33.76644 micrograms carbon

BLANK FACTOR = 33.76644 / 10.99884 = +3.1E+00 ug/min Carbon

SAMPLE RESULTS:

(29.5 - 33.764) (1)/(1) = < 5.00 E-3 g/L Carbon
 (29.5 - 33.764) (1)/(1) (12) = < 4.17 E-4 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

JM VANSANT

00001

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002515

Date: 08/31/98

Time: 22:27:21

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .87 ug/minute C

Analyst : JM VANSANT

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	1.50	5.30	86.79
4	2.00	61.60	91.40
5	2.50	196.40	68.64
6	3.00	298.10	34.12
7	3.50	348.50	14.46
8	4.00	376.30	7.39
9	4.50	392.10	4.03
10	5.00	402.20	2.51
11	5.50	409.00	1.66
12	6.00	413.60	1.11
13	6.50	417.20	0.86
14	7.00	419.60	0.57
15	7.50	421.40	0.43
16	8.00	423.20	0.43
17	8.50	424.50	0.31
18	9.00	425.80	0.31
19	9.50	427.10	0.30
20	10.00	428.20	0.26
21	10.50	429.30	0.26
22	11.00	430.40	0.26

USER INPUT BLANK VALUE

BLANK VALUE = 9.568991 micrograms carbon

BLANK FACTOR = 9.568991 / 10.99884

+8.7E-01

ug/min Carbon

SAMPLE RESULTS:

(430.4 - 9.568831) (1) / (1) =

+4.208E+02 g/L Carbon

(430.4 - 9.568831) (1) / (1) (12) =

+3.507E+01 Molar Carbon

Sample Run By:

JM VANSANT

00001

HNF-1649 REV.0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002515

Date: 08/31/98

Time: 22:39:38

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.07 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	==== Analysis Time ==	==== Coulometer ==	==== % Difference ==
1	0.51	0.80	0.00
2	1.01	8.50	90.59
3	1.51	111.80	92.40
4	2.01	207.70	46.17
5	2.51	256.90	19.15
6	3.01	283.50	9.38
7	3.51	298.90	5.15
8	4.01	308.90	3.24
9	4.51	315.10	1.97
10	5.01	319.50	1.38
11	5.51	323.10	1.11
12	6.01	325.30	0.68
13	6.50	327.40	0.64
14	7.00	329.00	0.49
15	7.50	330.00	0.30
16	8.00	331.20	0.36
17	8.50	332.20	0.30
18	9.00	333.00	0.24
19	9.50	334.00	0.30
20	10.00	334.80	0.24
21	10.50	335.50	0.21
22	11.00	336.20	0.21

USER INPUT BLANK VALUE

BLANK VALUE = 33.76644 micrograms carbon

BLANK FACTOR = 33.76644 / 10:99884 = +3.1E+00 ug/min Carbon

SAMPLE RESULTS:

(336.2 - 33.77225) (1)/(1) = +3.024E+01 g/L Carbon
 (336.2 - 33.77225) (1)/(1)(12) = +2.520E+01 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

JM VANSANT

0000

HNF-1649 REV.0

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002515DUP

Date: 08/31/98

Time: 22:54:11

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .87 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	==== Analysis Time ==	==== Coulometer ==	==== % Difference ==
1	0.51	1.00	0.00
2	1.04	1.70	41.18
3	1.54	6.20	72.58
4	2.04	56.30	88.99
5	2.54	175.60	67.94
6	3.04	280.90	37.49
7	3.54	340.90	17.60
8	4.04	373.20	8.65
9	4.54	392.10	4.82
10	5.04	402.50	2.58
11	5.54	410.20	1.88
12	6.04	414.60	1.06
13	6.54	418.20	0.86
14	7.04	420.90	0.64
15	7.54	423.10	0.52
16	8.04	425.10	0.47
17	8.54	426.40	0.30
18	9.04	427.90	0.35
19	9.54	429.20	0.30
20	10.04	430.30	0.26
21	10.53	431.70	0.32
22	11.03	432.60	0.21

USER INPUT BLANK VALUE

BLANK VALUE = 9.568991 micrograms carbon

BLANK FACTOR = 9.568991 / 10.99884 =

+8.7E-01 ug/min Carbon

SAMPLE RESULTS:

(432.6 - 9.599312) (1)/(1) =

+4.230E+02 g/L Carbon

(432.6 - 9.599312) (1)/(1) (12) =

+3.525E+01 Molar Carbon

Sample Run By:

JM VANSANT

00001

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0.

Sample: S98T002515DUP

Date: 08/31/98

Time: 23:06:17

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.07 ug/minute C.

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	==== Analysis Time ==	==== Coulometer ==	==== % Difference ==
1	0.51	1.20	0.00
2	1.01	5.40	77.78
3	1.51	83.20	93.51
4	2.00	191.50	56.55
5	2.50	249.20	23.15
6	3.00	278.50	10.52
7	3.50	295.00	5.55
8	4.00	305.30	3.33
9	4.50	311.90	2.11
10	5.00	316.30	1.35
11	5.50	319.70	1.06
12	6.00	322.10	0.75
13	6.50	324.40	0.71
14	7.00	325.80	0.45
15	7.50	327.10	0.40
16	8.00	328.10	0.30
17	8.50	329.10	0.30
18	9.00	330.20	0.33
19	9.50	331.10	0.21
20	10.00	331.90	0.24
21	10.50	332.80	0.21
22	11.00	333.40	0.18

USER INPUT BLANK VALUE

BLANK VALUE = 33.76644 micrograms carbon

BLANK FACTOR = 33.76644 / 10.99884 = +3.1E+00 ug/min Carbon

SAMPLE RESULTS:

(333.4 - 33.76663) (1)/(1) = +2.996E+02 g/L Carbon
 (333.4 - 33.76663) (1)/(1) (12) = +2.497E+01 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

JM VANSANT

00001

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TIC/OC REV 2.0

Sample: S98T002515SPK

Date: 08/31/98

Time: 23:28:58

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = .87 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

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

1	0.51	21.40	0.00
2	1.01	33.70	36.50
3	1.51	47.60	29.20
4	2.00	168.60	71.77
5	2.50	405.40	58.41
6	3.00	578.80	29.96
7	3.50	659.00	12.17
8	4.00	704.90	6.51
9	4.50	732.80	3.81
10	5.00	750.40	2.35
11	5.50	761.50	1.46
12	6.00	768.60	0.92
13	6.50	774.00	0.70
14	7.00	777.60	0.46
15	7.50	781.00	0.44
16	8.00	783.20	0.28
17	8.50	785.30	0.27
18	9.00	787.20	0.24
19	9.50	788.70	0.19
20	10.00	790.30	0.20
21	10.50	791.70	0.18
22	11.00	793.30	0.20

USER INPUT BLANK VALUE

BLANK VALUE = 9.568991 micrograms carbon

BLANK FACTOR = 9.568991 / 10.99884 = +8.7E-01 ug/min Carbon

SAMPLE RESULTS:

(793.3 - 9.568089) (1)/(1) = +7.837E+03 g/L Carbon
 (793.3 - 9.568089) (1)/(1) (12) = +6.531E+01 Molar Carbon

Sample Run By:

JM VANSANT

00001

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98T002515SPK

Date: 08/31/98

Time: 23:43:37

Sample Size = 1 uL

Dil Factor = 1

Blank ID # =

Blank Value = 3.07 ug/minute C

Analyst : JM VANSANT

Min Readings = 22

Max Readings = 22

% Difference = 10

== Reading ==	Analysis Time	Coulometer	% Difference ==
1	0.51	1.10	0.00
2	1.01	4.20	73.81
3	1.51	109.80	96.17
4	2.00	323.00	66.01
5	2.50	444.30	27.30
6	3.00	503.60	11.78
7	3.50	541.60	7.02
8	4.00	565.50	4.23
9	4.50	581.10	2.68
10	5.00	590.80	1.64
11	5.50	597.20	1.07
12	6.00	602.00	0.80
13	6.50	605.80	0.63
14	7.00	608.20	0.39
15	7.50	610.10	0.31
16	8.00	611.50	0.23
17	8.50	612.90	0.23
18	9.00	614.10	0.20
19	9.50	615.20	0.18
20	10.00	616.20	0.16
21	10.50	617.20	0.16
22	11.00	618.00	0.13

USER INPUT BLANK VALUE

BLANK VALUE = 33.76644 micrograms carbon

BLANK FACTOR = 33.76644 / 10.99884 = +3.1E+00 ug/min Carbon

SAMPLE RESULTS:

(618 - 33.764) (1)/(1) = +5.842E+00 g/L Carbon
 (618 - 33.764) (1)/(1) (12) = +4.869E+00 Molar Carbon
 <<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!>>>>

Sample Run By:

JM VANSANT

00001

RADIOCHEMICAL ANALYSIS

THIS PAGE WAS INTENTIONALLY LEFT BLANK

LABCORE Completed Worklist Report for Worklist# 25886

Analyst: scl

Instrument: GEA02

Book# 28857

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

Worklist Comment: S102 @GEA-01 RTS

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0		0GEA-01 C060-02	LIQUID	4.656e-03	4.78e-03	102.663 % Recovery	
1 STD	0		0GEA-01 C060-02E	LIQUID	1	3.17	3.170 % Ct Error	
1 STD	0		0GEA-01 CS13702	LIQUID	7.489e-03	7.76e-03	103.619 % Recovery	
1 STD	0		0GEA-01 CS13702E	LIQUID	1	3.00	3.000 % Ct Error	
2 BLNK	0		0GEA-01 C060-02	LIQUID	1	<7.24e-4	uCi/mL	
2 BLNK	0		0GEA-01 CS13702	LIQUID	1	2.16e-03	0.002 uCi/mL	
3 SAMPLE	S98T002516	0	0GEA-01 C060-02	LIQUID	N/A	< 3.801e-03	3.80e-003 uCi/mL	
3 SAMPLE	S98T002516	0	0GEA-01 C060-02E	LIQUID	N/A	n/a	% Ct. Error	
3 SAMPLE	S98T002516	0	0GEA-01 CS13702	LIQUID	N/A	3.080e+02	uCi/mL	
3 SAMPLE	S98T002516	0	0GEA-01 CS13702E	LIQUID	N/A	0.100	% Ct. Error	
4 DUP	S98T002516	0	0GEA-01 C060-02	LIQUID	<3.80e-3	<3.97e-3	RFD	
4 DUP	S98T002516	0	0GEA-01 C060-02E	LIQUID	1	n/a	% Ct Error	
4 DUP	S98T002516	0	0GEA-01 CS13702	LIQUID	3.08e+02	3.07e+02	0.325 RFD	
4 DUP	S98T002516	0	0GEA-01 CS13702E	LIQUID	1	0.100	0.100 % Ct Error	

Final page for worklist# 25886

Analyst Signature

Date

Analyst Signature

Date

Reviewer Signature

8-31-98
Date

LABCORE Data Entry Template for Worklist# 25886

Analyst: S.L Instrument: GEA00 Book# 28857

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

Worklist Comment: S102 @GEA-01 RTS

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@GEA-01	LIQUID		
2 BLNK			@GEA-01	LIQUID		
3 SAMPLE	S98T002516 0		@GEA-01	LIQUID	98000466	S-102 CMPT
	Analytes Requested: CO60-02 , CO60-02E, CS13702 , CS13702E					
4 DUP	S98T002516 0		@GEA-01	LIQUID		

Final page for worklist # 25886

S.L 8-28-98
Analyst Signature Date

A. L. Phat 8-31-98
Analyst Signature Date

Data Entry Comments:

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

* 222-S Laboratory Counting Room 28-AUG-1998 12:31:15.58 *

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

Worklist #: 25886
 Sample ID: WL25886-STD
 Sample Size: 1.00000E-03 L
 Dilution Factor: 1.00000E+00

Removed by:

Em Baule

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

Detector ID: GEA2
 File Number: dka300:[spec.GEA2]2g2335.cnf
 Geometry: 42
 Count Time: 0 00:50:00.00 sec
 Real Time: 0 00:50:23.25 sec
 Dead Time: 0.8%

Verified by:

John Pelzer 31 Aug 98

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

Sample Count Time: 28-AUG-1998 11:39:57.08
 Decayed to: 28-AUG-1998 11:39:57.08
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: EMB
 Background Subtract: DKA300:[SPEC.GEA2]2GBACK

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

Date of last energy calibration: 16-DEC-1997 11:02:19.60
 Date of last efficiency calibration: 10-NOV-1997 10:04:32.95

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uci/L
0	661.62*	5336	1.46	1323.28	1315	16	3.0		CS-137	7.76
0	1173.18	2416	1.83	2346.53	2337	17	4.3		CO-60	4.79
0	1332.42	2159	1.99	2665.07	2656	19	4.6		CO-60	4.76
0	1460.53*	13	1.77	2921.35	2914	13184.1			K-40	0.280

Summary of Nuclide Activity

Page : 2

Sample ID : WL25886-STD

Acquisition date : 28-AUG-1998 11:39:57

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	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
K-40	1.28E+09Y	1.00	2.803E-01	2.803E-01	5.162E-01	184.15	97R
CO-60	5.27Y	1.00	4.775E+00	4.775E+00	0.151E+00	3.17	
CS-137	30.00Y	1.00	7.761E+00	7.761E+00	0.233E+00	3.00	11/5/98
Total Activity :			1.282E+01	1.282E+01			

Grand Total Activity :	1.282E+01	1.282E+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 : WL25886-STD

Acquisition date : 28-AUG-1998 11:39:57

Nuclide	Bkgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	250.	477.59	6.8054E-01
NA-22	25.	1274.53	5.4999E-02
NA-24	11.	1368.55	4.1932E-02
AR-41	26.	1293.60	6.6241E-02
SC-46	110.	1120.55	9.8190E-02
CR-51	280.	320.08	5.0906E-01
MN-54	135.	834.83	8.5605E-02
CO-56	127.	846.76	8.4030E-02
CO-57	296.	122.06	4.1187E-02
CO-58	120.	810.78	7.9428E-02
FE-59	109.	1099.25	1.7034E-01
ZN-65	121.	1115.55	2.0170E-01
SE-75	317.	264.66	7.8921E-02
KR-85	177.	514.00	1.4710E+01
SR-85	177.	514.01	6.6481E-02
Y-88	8.	1836.06	4.7740E-02
Y-91	52.	1204.67	2.4460E+01
NB-94	131.	871.09	8.7191E-02
NB-95	132.	765.78	7.8905E-02
ZR-95	111.	756.73	1.3151E-01
ZRNB-95	112.	724.18	3.1903E-01
RU-103	230.	497.08	7.7284E-02
RURH-106	130.	621.93	1.3217E+00
AG-108m	99.	722.94	7.2245E-02
CD-109	273.	88.03	1.3330E+00
AG-110M	220.	657.76	9.3406E-02
SN-113	262.	391.69	9.3570E-02
TE-123m	311.	159.00	4.1407E-02
SB-124	123.	602.73	6.3499E-02
SB-125	286.	427.89	2.3076E-01
TE-125m	304.	109.27	1.3705E+01
I-129	247.	39.60	1.4623E+01
I-131	272.	364.48	7.0298E-02
XE-131m	329.	163.93	1.8336E+00
BA-133	270.	356.02	8.9493E-02
CS-134	135.	604.70	6.6652E-02
CS-136	126.	818.51	8.1670E-02
CS-138	6.	1435.86	7.1965E-02
CE-139	304.	165.85	4.3397E-02
BA-140	168.	537.31	2.6636E-01
LA-140	7.	1596.21	4.0117E-02
CE-141	326.	145.44	7.3499E-02
CE-144	349.	133.51	3.3409E-01
CEPR-144	349.	133.51	6.6756E-01
EU-152	298.	121.78	1.2514E-01
EU-154	25.	1274.51	1.6013E-01
EU-155	258.	86.54	1.4713E-01
HF-181	259.	482.18	8.9833E-02
TA-182	265.	67.75	2.1119E-01
HG-203	325.	279.20	5.9949E-02
BI-207	141.	569.70	6.4288E-02

HNF-1649 REV. 0

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : WL25886-STD

Acquisition date : 28-AUG-1998 11:39:57

Nuclide	Bkgnd Sum	Energy (keV)	MDA (uCi/L)
TL-208	327.	277.36	7.7267E-01
PB-210	291.	46.50	1.0903E+01
BI-212	114.	727.18	1.0583E+00
PB-212	372.	238.63	1.0560E-01
BI-214	164.	609.31	1.6010E-01
PB-214	304.	351.92	2.9061E-01
RA-224	354.	240.99	1.1449E+00
RA-226	397.	186.10	1.1713E+00
AC-228	171.	911.21	3.8593E-01
TH-228	263.	84.37	4.0236E+00
TH-229	267.	88.47	1.9105E-01
U-232	272.	57.78	7.6626E+01
PA-233	286.	312.17	1.3121E-01
UTH-233	345.	245.34	4.1207E+01
PA-234M	138.	1001.03	1.5384E+01
TH-234	253.	63.29	2.7818E+00
U-235	385.	185.71	7.0231E-02
NP-237	260.	86.48	3.9104E-01
U-237	297.	59.54	4.1294E-01
NP-238	151.	984.45	3.7232E-01
NP-239	294.	106.12	1.7121E-01
PU-239	319.	129.30	5.5880E+02
AM-241	297.	59.54	3.9610E-01
AM-243	264.	74.67	1.1101E-01

* 222-S Laboratory Counting Room 28-AUG-1998 15:19:31.56 *

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

Worklist #: 25886
 Sample ID: WL25886-BLNK
 Sample Size: 1.00000E-03 L
 Dilution Factor: 4.10000E+01

Removed by:

Emilio

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

Detector ID: GEA2
 File Number: dka300:[spec.GEA2]2g2337.cnf
 Geometry: 42
 Count Time: 0 02:30:00.00 sec
 Real Time: 0 02:30:32.22 sec
 Dead Time: 0.4%

Verified by:

John Reyer 31 Aug 98

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

Sample Count Time: 28-AUG-1998 12:48:07.88
 Decayed to: 28-AUG-1998 12:48:07.88
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: EMB
 Background Subtract: DKA300:[SPEC.GEA2]2GBACK

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

Date of last energy calibration: 16-DEC-1997 11:02:19.60
 Date of last efficiency calibration: 10-NOV-1997 10:04:32.95

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uci/L
0	295.22*	43	1.12	590.42	586	8111.7				
0	661.63*	109	1.23	1323.30	1318	11 45.0			CS-137	2.16

Summary of Nuclide Activity

Page : 2

Sample ID : WL25886-BLNK

Acquisition date : 28-AUG-1998 12:48:07

Total number of lines in spectrum	2	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	2	100.00%

Nuclide Type :

Nuclide	Hliffe	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
			uCi/L	uCi/L	2-Sigma Error	%Error	
CS-137	30.00Y	1.00	2.157E+00	2.157E+00	0.971E+00	45.01	
Total Activity :			2.157E+00	2.157E+00			

Grand Total Activity :	2.157E+00	2.157E+00
------------------------	-----------	-----------

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report

Page : 3

Sample ID : WL25886-BLNC

Acquisition date : 28-AUG-1998 12:48:07

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	95.	477.59	5.8540E+00
NA-22	28.	1274.53	7.9319E-01
NA-24	20.	1368.55	7.6207E-01
K-40	341.	1460.75	2.7094E+01
AR-41	28.	1293.60	1.2543E+00
SC-46	52.	1120.55	9.4933E-01
CR-51	102.	320.08	4.2872E+00
MN-54	39.	834.83	6.5225E-01
CO-56	37.	846.76	6.4930E-01
CO-57	185.	122.06	4.4855E-01
CO-58	42.	810.78	6.6530E-01
FE-59	24.	1099.25	1.1659E+00
CO-60	21.	1332.50	7.2420E-01
ZN-65	26.	1115.55	1.3632E+00
SE-75	161.	264.66	7.7948E-01
KR-85	144.	514.00	1.8253E+02
SR-85	144.	514.01	8.2498E-01
Y-88	5.	1836.06	5.3922E-01
Y-91	36.	1204.67	2.8227E+02
NB-94	38.	871.09	6.6527E-01
NB-95	51.	765.78	6.9244E-01
ZR-95	59.	756.73	1.3340E+00
ZRNB-95	51.	724.18	3.0081E+00
RU-103	81.	497.08	6.4387E-01
RURH-106	64.	621.93	1.2885E+01
AG-108m	51.	722.94	7.2138E-01
CD-109	191.	88.03	1.5345E+01
AG-110M	65.	657.76	7.1685E-01
SN-113	120.	391.69	8.8105E-01
TE-123m	213.	159.00	4.7087E-01
SB-124	73.	602.73	6.7958E-01
SB-125	104.	427.89	1.9458E+00
TE-125m	208.	109.27	1.5572E+02
I-129	151.	39.60	1.5796E+02
I-131	121.	364.48	6.5387E-01
XE-131m	194.	163.93	1.9467E+01
BA-133	111.	356.02	7.9819E-01
CS-134	75.	604.70	6.8770E-01
CS-136	40.	818.51	6.5666E-01
CS-138	13.	1435.86	2.7380E+00
CE-139	178.	165.85	4.5827E-01
BA-140	61.	537.31	2.2657E+00
LA-140	6.	1596.21	5.4805E-01
CE-141	210.	145.44	8.1152E-01
CE-144	201.	133.51	3.5010E+00
CEPR-144	201.	133.51	6.9959E+00
EU-152	185.	121.78	1.3579E+00
EU-154	28.	1274.51	2.3028E+00
EU-155	196.	86.54	1.7613E+00
HF-181	86.	482.18	7.2795E-01
TA-182	157.	67.75	2.2430E+00

HNF-1649 REV. 0

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : WL25886-BLNK

Acquisition date : 28-AUG-1998 12:48:07

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
HG-203	175.	279.20	6.0855E-01
BI-207	62.	569.70	5.9520E-01
TL-208	168.	277.36	7.6575E+00
PB-210	145.	46.50	1.0684E+02
BI-212	53.	727.18	1.0059E+01
PB-212	190.	238.63	1.0453E+00
BI-214	143.	609.31	2.0501E+00
PB-214	212.	351.92	7.4233E+00
RA-224	186.	240.99	1.1549E+01
RA-226	225.	186.10	1.2159E+01
AC-228	82.	911.21	3.7263E+00
TH-228	192.	84.37	4.7343E+01
TH-229	190.	88.47	2.2190E+00
U-232	173.	57.78	8.4174E+02
PA-233	159.	312.17	1.3548E+00
UTH-233	180.	245.34	4.1149E+02
PA-234M	36.	1001.03	1.1177E+02
TH-234	173.	63.29	3.1714E+01
U-235	229.	185.71	7.4605E-01
NP-237	197.	86.48	4.6740E+00
U-237	174.	59.54	4.3791E+00
NP-238	33.	984.45	2.5276E+00
NP-239	188.	106.12	1.9073E+00
PU-239	193.	129.30	5.9840E+03
AM-241	174.	59.54	4.1854E+00
AM-243	188.	74.67	1.2873E+00

* 222-S Laboratory Counting Room 28-AUG-1998 18:13:40.90 *

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

Worklist #: 25886
Sample ID: S98T2516-SAM
Sample Size: 1.00000E-03 L
Dilution Factor: 4.10000E+01

Removed by:

[Signature]

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

Detector ID: GEA2
File Number: dka300:[spec.GEA2]2g2338.cnf
Geometry: 43
Count Time: 0 02:30:00.00 sec
Real Time: 0 02:50:23.31 sec
Dead Time: 12%

Verified by:

John Reizer 31 Aug 98

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

Sample Count Time: 28-AUG-1998 15:22:29.08
Decayed to: 28-AUG-1998 15:22:29.08
Standard Deviations: 2
Analysis Library: ENVGEA
Analyst: EMB
Background Subtract: DKA300:[SPEC.GEA2]2GBACK

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

Date of last energy calibration: 16-DEC-1997 11:02:19.60
Date of last efficiency calibration: 10-NOV-1997 10:09:16.15

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uci/L
0	189.66	32310	7.50	379.28	370	25	13.2			
0	661.71*	4210846	1.50	1323.46	1315	16	0.1		CS-137	3.077E+05
0	1323.04	889	1.81	2646.31	2637	17	7.4			

Summary of Nuclide Activity

Page : 2

Sample ID : S98T2516-SAM

Acquisition date : 28-AUG-1998 15:22:29

Total number of lines in spectrum	3	
Number of unidentified lines	2	
Number of lines tentatively identified by NID	1	33.33%

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	3.077E+05	3.077E+05	0.003E+05	0.10	
Total Activity :			3.077E+05	3.077E+05			

Grand Total Activity :	3.077E+05	3.077E+05
------------------------	-----------	-----------

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report

Page : 3

Sample ID : S98T2516-SAM

Acquisition date : 28-AUG-1998 15:22:29

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uci/L)
BE-7	128672.	477.59	7.5713E+02
NA-22	55.	1274.53	3.8774E+00
NA-24	18.	1368.55	2.6132E+00
K-40	310.	1460.75	9.1520E+01
AR-41	36.	1293.60	5.2988E+00
SC-46	151.	1120.55	5.6520E+00
CR-51	117909.	320.08	5.2291E+02
MN-54	314.	834.83	6.4092E+00
CO-56	291.	846.76	6.2537E+00
CO-57	129707.	122.06	4.6620E+01
CO-58	374.	810.78	6.8490E+00
FE-59	123.	1099.25	8.9331E+00
CO-60	49.	1332.50	3.8008E+00
ZN-65	121.	1115.55	9.9872E+00
SE-75	132733.	264.66	8.2102E+01
KR-85	66761.	514.00	1.3884E+04
SR-85	66752.	514.01	6.2804E+01
Y-88	12.	1836.06	2.6057E+00
Y-91	58.	1204.67	1.2629E+03
NB-94	229.	871.09	5.6961E+00
NB-95	829.	765.78	9.6238E+00
ZR-95	1027.	756.73	1.9374E+01
ZRNB-95	1786.	724.18	6.1371E+01
RU-103	81433.	497.08	7.1047E+01
RURH-106	28681.	621.93	9.4145E+02
AG-108m	1839.	722.94	1.4920E+01
CD-109	109081.	88.03	1.4559E+03
AG-110M	71646.	657.76	8.1712E+01
SN-113	121075.	391.69	9.9394E+01
TE-123m	135034.	159.00	4.5757E+01
SB-124	29392.	602.73	4.7078E+01
SB-125	136231.	427.89	2.4832E+02
TE-125m	118915.	109.27	1.4745E+04
I-129	97824.	39.60	1.3906E+04
I-131	116416.	364.48	7.2413E+01
XE-131m	135445.	163.93	1.9759E+03
BA-133	116091.	356.02	9.2228E+01
CS-134	29227.	604.70	4.7144E+01
CS-136	341.	818.51	6.6037E+00
CS-138	14.	1435.86	1.1420E+01
CE-139	134825.	165.85	4.8292E+01
BA-140	48909.	537.31	2.2071E+02
LA-140	18.	1596.21	2.9980E+00
CE-141	135939.	145.44	8.0269E+01
CE-144	134330.	133.51	3.5308E+02
CEPR-144	134326.	133.51	7.0553E+02
EU-152	129542.	121.78	1.4108E+02
EU-154	55.	1274.51	1.1257E+01
EU-155	108490.	86.54	1.6458E+02
HF-181	104331.	482.18	8.8442E+01
TA-182	98932.	67.75	2.2064E+02

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : S98T2516-SAM

Acquisition date : 28-AUG-1998 15:22:29

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
HG-203	127606.	279.20	6.0225E+01
BI-207	32337.	569.70	4.6989E+01
TL-208	128843.	277.36	7.7664E+02
PB-210	96338.	46.50	1.0072E+04
BI-212	1734.	727.18	1.9886E+02
PB-212	142764.	238.63	1.0629E+02
BI-214	29000.	609.31	1.0297E+02
PB-214	115416.	351.92	7.0391E+02
RA-224	141725.	240.99	1.1838E+03
RA-226	171575.	186.10	1.2789E+03
AC-228	231.	911.21	2.2226E+01
TH-228	108047.	84.37	4.4564E+03
TH-229	109397.	88.47	2.1131E+02
U-232	96655.	57.78	7.6529E+04
PA-233	119428.	312.17	1.3458E+02
UTH-233	139148.	245.34	4.2361E+04
PA-234M	159.	1001.03	8.1737E+02
TH-234	98200.	63.29	2.9412E+03
U-235	169307.	185.71	7.7274E+01
NP-237	108473.	86.48	4.3589E+02
U-237	96488.	59.54	3.9900E+02
NP-238	135.	984.45	1.7813E+01
NP-239	117062.	106.12	1.8847E+02
PU-239	133983.	129.30	6.1726E+05
AM-241	96487.	59.54	3.8110E+02
AM-243	103213.	74.67	1.1939E+02

 * 222-S Laboratory Counting Room 28-AUG-1998 21:22:54.70 *

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

Worklist #: 25886
 Sample ID: S98T2516-DUP
 Sample Size: 1.00000E-03 L
 Dilution Factor: 4.10000E+01

Removed by:

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

Detector ID: GEA2
 File Number: dka300:[spec.GEA2]2g2339.cnf
 Geometry: 43
 Count Time: 0 02:30:00.00 sec
 Real Time: 0 02:50:21.98 sec
 Dead Time: 12%

Verified by:

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

Sample Count Time: 28-AUG-1998 18:31:37.56
 Decayed to: 28-AUG-1998 18:31:37.56
 Standard Deviations: 2
 Analysis Library: ENVGEA
 Analyst: MB
 Background Subtract: DKA300:[SPEC.GEA2]2GBACK

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

Date of last energy calibration: 16-DEC-1997 11:02:19.60
 Date of last efficiency calibration: 10-NOV-1997 10:09:16.15

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.70*	4206119	1.49	1323.44	1315	16	0.1		CS-137	3.074E+05
0	1323.03	874	1.92	2646.28	2638	18	7.7			
0	1764.62*	14	2.01	3529.68	3523	12104.6				

HNF-1649 REV.0

Summary of Nuclide Activity

Page : 2

Sample ID : S98T2516-DUP

Acquisition date : 28-AUG-1998 18:31:37

Total number of lines in spectrum	3	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	2	66.67%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
			uCi/L	uCi/L	2-Sigma Error	%Error	
CS-137	30.00Y	1.00	3.074E+05	3.074E+05	0.003E+05	0.10	
Total Activity :			3.074E+05	3.074E+05			

Grand Total Activity :	3.074E+05	3.074E+05
------------------------	-----------	-----------

Flags: "K" = Keyline not found

"M" = Manually accepted

"E" = Manually edited

"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report

Page : 3

Sample ID : S98T2516-DUP

Acquisition date : 28-AUG-1998 18:31:37

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	128745.	477.59	7.5735E+02
NA-22	54.	1274.53	3.8345E+00
NA-24	27.	1368.55	3.1670E+00
K-40	322.	1460.75	9.3177E+01
AR-41	40.	1293.60	5.5679E+00
SC-46	159.	1120.55	5.7908E+00
CR-51	117753.	320.08	5.2257E+02
MN-54	294.	834.83	6.2031E+00
CO-56	298.	846.76	6.3183E+00
CO-57	129862.	122.06	4.6648E+01
CO-58	370.	810.78	6.8208E+00
FE-59	121.	1099.25	8.8551E+00
CO-60	54.	1332.50	3.9734E+00
ZN-65	116.	1115.55	9.7693E+00
SE-75	132668.	264.66	8.2082E+01
KR-85	66691.	514.00	1.3877E+04
SR-85	66684.	514.01	6.2773E+01
Y-88	7.	1836.06	2.1153E+00
Y-91	57.	1204.67	1.2520E+03
NB-94	244.	871.09	5.8716E+00
NB-95	824.	765.78	9.5961E+00
ZR-95	997.	756.73	1.9094E+01
ZRNB-95	1740.	724.18	6.0582E+01
RU-103	80925.	497.08	7.0826E+01
RURH-106	28276.	621.93	9.3480E+02
AG-108m	1756.	722.94	1.4581E+01
CD-109	108616.	88.03	1.4528E+03
AG-110M	72411.	657.76	8.2146E+01
SN-113	120141.	391.69	9.9010E+01
TE-123m	134677.	159.00	4.5696E+01
SB-124	29079.	602.73	4.6827E+01
SB-125	136800.	427.89	2.4883E+02
TE-125m	118648.	109.27	1.4728E+04
I-129	97362.	39.60	1.3873E+04
I-131	116110.	364.48	7.2318E+01
XE-131m	134208.	163.93	1.9668E+03
BA-133	114903.	356.02	9.1755E+01
CS-134	29076.	604.70	4.7023E+01
CS-136	349.	818.51	6.6761E+00
CS-138	19.	1435.86	1.2763E+01
CE-139	134647.	165.85	4.8260E+01
BA-140	48964.	537.31	2.2084E+02
LA-140	9.	1596.21	2.2568E+00
CE-141	135089.	145.44	8.0018E+01
CE-144	134344.	133.51	3.5310E+02
CEPR-144	134342.	133.51	7.0557E+02
EU-152	129761.	121.78	1.4120E+02
EU-154	54.	1274.51	1.1136E+01
EU-155	108153.	86.54	1.6433E+02
HF-181	104471.	482.18	8.8502E+01
TA-182	98829.	67.75	2.2053E+02

HNF-1649 REV. 0

Minimum Detectable Activity Report (continued)

Page : 4

Sample ID : S98T2516-DUP

Acquisition date : 28-AUG-1998 18:31:37

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
HG-203	127774.	279.20	6.0265E+01
BI-207	32326.	569.70	4.6981E+01
TL-208	128467.	277.36	7.7550E+02
PB-210	96148.	46.50	1.0063E+04
BI-212	1697.	727.18	1.9674E+02
PB-212	141807.	238.63	1.0593E+02
BI-214	29034.	609.31	1.0303E+02
PB-214	115790.	351.92	7.0496E+02
RA-224	141527.	240.99	1.1830E+03
RA-226	170681.	186.10	1.2755E+03
AC-228	255.	911.21	2.3321E+01
TH-228	107415.	84.37	4.4434E+03
TH-229	108685.	88.47	2.1062E+02
U-232	96402.	57.78	7.6429E+04
PA-233	119074.	312.17	1.3438E+02
UTH-233	139213.	245.34	4.2370E+04
PA-234M	165.	1001.03	8.3209E+02
TH-234	97483.	63.29	2.9304E+03
U-235	168639.	185.71	7.7122E+01
NP-237	108174.	86.48	4.3529E+02
U-237	96758.	59.54	3.9956E+02
NP-238	146.	984.45	1.8460E+01
NP-239	116354.	106.12	1.8790E+02
PU-239	133285.	129.30	6.1565E+05
AM-241	96757.	59.54	3.8163E+02
AM-243	103160.	74.67	1.1936E+02

LABCORE Completed Worklist Report for Worklist# 25884

Analyst: gay

Instrument: AB12

Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: S102 FOR @SR90-01 RTS

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0		@SR90-01 SR90-01 LIQUID		1.05E-03	1.10E-3	104.762 % Recovery	
1 STD	0		@SR90-01 SR90-01C LIQUID		100	8.59E+01	85.900 % Recovery	
1 STD	0		@SR90-01 SR90-01E LIQUID		1.00	2.05E+00	2.050 % Ct. Error	
2 BLNK	0		@SR90-01 SR90-01 LIQUID		1	<1.44E-2		uCi/mL
2 BLNK	0		@SR90-01 SR90-01C LIQUID		100	8.66E+01	86.600 % Recovery	
2 BLNK	0		@SR90-01 SR90-01E LIQUID		1.00	9.00E+01	90.000	uCi/mL
3 BLNK/BKG	0		@SR90-01 SR90-01 LIQUID		1	5.64E-01	0.564 BLNK/BKG	
4 SAMPLE	S98T002516	0	@SR90-01 SR90-01 LIQUID		N/A	2.92E-01	2.92e-002	uCi/mL
4 SAMPLE	S98T002516	0	@SR90-01 SR90-01C LIQUID		N/A	8.83E+01		% Recovery
4 SAMPLE	S98T002516	0	@SR90-01 SR90-01E LIQUID		N/A	1.43E+01		% Ct. Error
5 DUP	S98T002516	0	@SR90-01 SR90-01 LIQUID		2.92E-1	2.96E-1	1.351 RPD	
5 DUP	S98T002516	0	@SR90-01 SR90-01C LIQUID		100	8.82E+01	88.200 % Recovery	
5 DUP	S98T002516	0	@SR90-01 SR90-01E LIQUID		1.00	1.42E+01	14.200 % Ct. Err	

Final page for worklist# 25884

Analyst Signature

Date

Analyst Signature

Date

Reviewer Signature

Date

08/27/98 09:52
A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 25884

Analyst: gay Instrument: AB00 _____ Book# 28B57Method: LA-220-101 Rev/Mod E-3

Worklist Comment: S102 FOR @SR90-01 RTS

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	S98T002516 0			@SR90-01	LIQUID	98000466	S-102 CMPT
					Analytes Requested: SR90-01 , SR90-01C, SR90-01E			
5	DUP	S98T002516 0			@SR90-01	LIQUID		

Final page for worklist # 25884

A. Gay 8-28-98
Analyst Signature DateSharon L. Uddell 8-31-98
Analyst Signature Date

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

				STANDARD	
Type	DETECTOR NUMBER	12	CARRIER ADDED in mL (CVA)	1.000	
STD	TOTAL COUNTS (TC)	9218	GROSS WEIGHT (W2)	7.1651	
Work List	COUNT TIME in MINUTES (CT)	10	TARE WEIGHT (W1)	7.0792	
25884	BACKGROUND in cpm (BKG)	3.9	NET WEIGHT (W3)	0.0859	
Test Code	SAMPLE VOLUME in mL (SS)	1.000	DELTA TIME (HOURS) (DT)	3.87	
@SR90-01	DILUTION FACTOR (DF)	1			
Matrix	DIGEST DILUTION FACTOR DDF	1			
LIQUID	SAMPLE COUNT RATE (Rs)	917.90	Sr-90 EFFICIENCY FACTO (C1)	0.4180	
Batch Number	CRITICAL LEVEL (Lc)	1.19	Y-90 EFFICIENCY FACTOR (C2)	0.4660	
98004445	TIME OF SEPARATION (ST)	10:53	Rmax	N/A	
ReRun	DATE OF SEPARATION (SD)	08/28/98	DETECTION LIMIT (Ld)	2.47	
0	TIME OF COUNT (TOC)	14:45	Sr-89/90 CONC. in µCi/L	1.1013E+00	
Sample Prep	DATE OF COUNT (DOC)	08/28/98			
N/A	STANDARD BOOK #	28B57			
Sample	STANDARD VALUE in µCi/mL	1.0483E-03			
WL25884-STD					
Instrument Code					
WB27811					
Prepared By	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)				
SLH2	Sr-89/90 CONC in µCi/mL REPLACE RS WITH RMAX IF RS<=Lc AND RS>=0 OR REPLACE RS WITH Lc IF RS<0				
Chemist	RS*DF*DDF*1000/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)				
SAC	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))				
Analyst	Relative Counting Error = The Square Root of ((TC + BKG * CT) / (TC - BKG * CT)*1.96)				
GAY	Percent Carrier Recovery = (Net Weight / Expected weight) * 100				
Date Complete	NOTE: Expected weight = CVA * 0.1				
08/31/98	Detection Levels and Less Than Values are determined from Procedure LA-508-002.				
Analysis Date	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100				
08/28/98	Sr-89/90 CONCENTRATION	1.10E-03	µCi/mL	DETECTION LEVEL 2.96E-06 µCi/L	
Analysis Time					
01:30 PM	RELATIVE COUNTING ERROR	2.1%			
Sample Point					
S-102 CMPT	PERCENT CARRIER RECOVERY	85.9%			

Analyst:	GAY	Date:	31-Aug-98
Signature of Chemist:	<i>[Signature]</i>	SAC	Date: <i>31 Aug 98</i>

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)

Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	BLNK
BLNK	TOTAL COUNTS	(TC)	22	GROSS WEIGHT	(W2)	1.000
WorkList	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.1640
25884	BACKGROUND in cpm	(BKG)	3.9	NET WEIGHT	(W3)	7.0774
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	0.0866
@SR90-01	DILUTION FACTOR	DF	10201			4.28
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	-1.70	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.19	Y-90 EFFICIENCY FACTOR	(C2)	0.4680
98004445	TIME OF SEPARATION	(ST)	10:53	Rmax		N/A
ReRun	DATE OF SEPARATION	(SD)	08/28/98	DETECTION LIMIT	(Ld)	2.47
0	TIME OF COUNT	(TOC)	15:10	Sr-89/90 CONC in $\mu\text{Ci/L}$	<	1.4379E+01
Sample Prep	DATE OF COUNT	(DOC)	08/28/98			
N/A						
Sample #						
WL25884-BLNK						
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 to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)					
SLH2	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					
GAY	Detection Levels and Less Than Values are determined from Procedure LA-508-002.					
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100					
08/31/98						
Analysis Date	Sr-89/90 CONCENTRATION < 1.44E-02 $\mu\text{Ci/mL}$					DETECTION LEVEL
08/28/98	LESS THAN Value was Determined from Lc.					
Analysis Time	RELATIVE COUNTING ERROR 90.0%					2.99E-02 $\mu\text{Ci/mL}$
01:30 PM						
Sample Point						
S-102 CMPT	PERCENT CARRIER RECOVERY 86.6%					

Analyst:	GAY	Date:	31-Aug-98
Signature of Chemist:	SAC	Date:	31 Aug 98

BLANK.WB1 REV 2.0

22010NML

HNF-1649 REV. 0

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)	286	GROSS WEIGHT	(W2)	7.1380
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.0497
25884	BACKGROUND in cpm	(BKG)	3.9	NET WEIGHT	(W3)	0.0883
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	4.45
@SR90-01	DILUTION FACTOR	DF	10201			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	24.70	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.19	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98004445	TIME OF SEPARATION	(ST)	10:53	Rmax		N/A
Run	DATE OF SEPARATION	(SD)	08/28/98	DETECTION LIMIT	(Ld)	2.47
0	TIME OF COUNT	(TOC)	15:20	Sr-89/90 CONC in $\mu\text{Ci/L}$		2.9222E+02
Sample Prep	DATE OF COUNT	(DOC)	08/28/98			
N/A						
Sample #						
S98T002516						
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 to the power of ((-natural log 2)/64.2*DT))))*SS*REC*2220000					
SLH2	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					
GAY	Detection Levels and Less Than Values are determined from Procedure LA-508-002.					
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100					
08/31/98						
Analysis Date						DETECTION LEVEL 2.92E-02 $\mu\text{Ci/mL}$
08/28/98	Sr-89/90 CONCENTRATION	2.92E-01			$\mu\text{Ci/mL}$	
Analysis Time						
01:30 PM	RELATIVE COUNTING ERROR	14.3%				
Sample Point						
S-102 CMPT	PERCENT CARRIER RECOVERY	88.3%				

Analyst:	GAY	Date:	31-Aug-98
Signature of Chemist:	SAC	Date:	31-Aug-98
SAMPLE:WB1 REV 2.0 22010NML			

WORKBOOK PAGE: DUP5

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

Type	DETECTOR NUMBER	12	CARRIER ADDED in mL	(CVA)	DUP
DUP	TOTAL COUNTS	(TC)	289	GROSS WEIGHT	(W2) 7.1377
Worklist	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1) 7.0495
25884	BACKGROUND in cpm	(BKG)	3.9	NET WEIGHT	(W3) 0.0882
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT) 4.62
@SR90-01	DILUTION FACTOR	DF	10201		
Matrix	DIGEST DILUTION FACTOR	(DDF)	1		
LIQUID	SAMPLE COUNT RATE	(Rs)	25.00	Sr-90 EFFICIENCY FACTOR	(C1) 0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.19	Y-90 EFFICIENCY FACTOR	(C2) 0.4660
98004445	TIME OF SEPARATION	(ST)	10:53	Rmax	N/A
ReRun	DATE OF SEPARATION	(SD)	08/28/98	DETECTION LIMIT	(Ld) 2.47
0	TIME OF COUNT	(TOC)	15:30	Sr-89/90 CONC in $\mu\text{Ci/L}$	2.9557E+02
Sample Prep	DATE OF COUNT	(DOC)	08/28/98		
N/A					
Sample #					
S98T002516					
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	$RS \cdot DF \cdot DDF / ((C1 + C2 \cdot (1 - e^{-\text{to the power of } ((-\text{natural log } 2) / 64.2 \cdot DT))) \cdot SS \cdot \text{REC} \cdot 2220000)$				
SLH2	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery $((W2 - W1) / (CVA \cdot 0.1000))$				
Chemist	Relative Counting Error = (The Square Root of $(TC + BKG \cdot CT) / (TC - BKG \cdot CT)$) * 1.96				
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100				
Analyst	NOTE: Expected weight = $CVA \cdot 0.1$				
GAY	Detection Levels and Less Than Values are determined from Procedure LA-508-002.				
Date Complete	Delta Time (hours) = $((DOC - SD) \cdot 24) + (TOC - ST) / 100$				
08/31/98					
Analysis Date					
08/28/98	Sr-89/90 CONCENTRATION	2.96E-01	$\mu\text{Ci/mL}$	DETECTION LEVEL	
Analysis time					
01:30 PM	RELATIVE COUNTING ERROR	14.2%		2.92E-02 $\mu\text{Ci/mL}$	
Sample Point					
S-102 CMPT	PERCENT CARRIER RECOVERY	88.2%			

Analyst:	GAY	Date:	31-Aug-98
Signature of Chemist:	<i>[Signature]</i>	SAC	Date: 31-Aug-98
SAMPLE.WB1 REV 2.0		22010NML	

LABCORE Completed Worklist Report for Worklist# 26365

Analyst: aki Instrument: AB13 Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: S-102 CMPT Rerun of WL26204. gll

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0	0AM24101	AM24101	LIQUID	2.27E-04	2.02E-4	88.987	% Recovery
1 STD	0	0AM24101	AM24101T	LIQUID	100.	9.27E+01	92.700	% Recovery
1 STD	0	0AM24101	AM24101E	LIQUID	1.0	1.64E+00	1.640	% Ct Error
2 BLNK	0	0AM24101	AM24101	LIQUID	1	<1.59E-5		uCi/mL
2 BLNK	0	0AM24101	AM24101T	LIQUID	100.0	8.26E+01	82.600	% Recovery
2 BLNK	0	0AM24101	AM24101E	LIQUID	1.0	1.00E+02	100.000	% Ct Error
3 SAMPLE	S98T002679	0	0AM24101	AM24101	LIQUID	N/A	2.81E-04	3.31e-005 uCi/mL
3 SAMPLE	S98T002679	0	0AM24101	AM24101E	LIQUID	N/A	2.72E+00	% Ct. Error
3 SAMPLE	S98T002679	0	0AM24101	AM24101T	LIQUID	N/A	8.60E+01	% Recovery
4 DUP	S98T002679	0	0AM24101	AM24101	LIQUID	2.81E-4	2.81E-4	0.000 RPD
4 DUP	S98T002679	0	0AM24101	AM24101T	LIQUID	100.0	7.70E+01	77.000 % Recovery
4 DUP	S98T002679	0	0AM24101	AM24101E	LIQUID	1.0	2.75E+00	2.750 % Ct Error

Final page for worklist# 26365

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

John Relyea 30 Sept 98
Reviewer Signature _____ Date _____

09/25/98 13:33

A-0004-1

Page: 1

LABCORE Data Entry Template for Worklist# 26365

Analyst: AKC Instrument: AM01 13 Book# 28B57Method: LA-953-104 Rev/Mod BO

Worklist Comment: S-102 CMPT Rerun of WL26204. gll

S Type	Sample#	R A	Test	Matrix	Group#	Project
1 STD			@AM24101	LIQUID		
2 BLNK			@AM24101	LIQUID		
3 SAMPLE	S98T002679 0		@AM24101	LIQUID	98000466	S-102 CMPT
	Analytes Requested: AM24101 , AM24101E, AM24101T					
4 DUP	S98T002679 0		@AM24101	LIQUID		

Final page for worklist # 26365

Analyst Signature Calita Hanson Date 9/29/98Analyst Signature [Signature] Date 9/30/98Signature Sylvia Z. Cochran Date 9/30/98

Data Entry Comments:

WORKBOOK PAGE: STD1

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

LIQUID

STD

Type	Date Counted	SEP-29-98	Am 241 AEA Frac. (C241)	0.606
STD	Sample Volume in mL (SS)	1.000	Am 243 AEA Frac. (C243)	0.28
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0
26365	Tracer Volume in mL (SPKV)	0.200	Total AT Counts	6512
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.2
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	94.47
LIQUID	Detector Number	13	Am 243 cpm	43.61
Batch Number	Detector Efficiency (DetEff)	0.3166	Cm 243/244 cpm	0
98004946	Standard Book No	28B57	AEA Count Time (min)	480
Rerun	Standard Value in $\mu\text{Ci/mL}$	2.270E-04	Am 241 $\mu\text{Ci/L}$ =	2.0161E-01
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 1.7936E-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))			
WL26365-STD	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))			
Instrument Code				
WB27810	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100			
Prepared By	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV			
MCB				
Chemist				
JFR	Am 241 $\mu\text{Ci/mL}$ =	2.02E-04	DETECTION LEVELS in $\mu\text{Ci/mL}$	
Analyst	Relative Counting Error =	1.6%		
AKL			Am 241 1.79E-05	
Date/Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.			
09/30/98	Cm 243/244 $\mu\text{Ci/mL}$	< 1.79E-05	Cm 243/244 1.79E-05	
Analysis Date	Relative Counting Error =	100.0%		
09/29/98	Am 243 Tracer Recovery =	92.7%		
Analysis Time				
09:30 AM				
Sample Point				
S-102 CMPT				

Analyst:	AKL	Date:	09/30/98
Signature of Chemist:	JFR	Date:	9-30

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	SEP-29-98	Am 241 AEA Frac. (C241)	0	
BLNK	Sample Volume in mL (SS)	0.200	Am 243 AEA Frac. (C243)	0.884	
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0	
26365	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	924	
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30	
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.2	
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	0	
LIQUID	Detector Number	13	Am 243 cpm	20.89	
Batch Number	Detector Efficiency (DetEff)	0.3166	Cm 243/244 cpm	0	
98004946			AEA Count Time (min)	480	
ReRun			Am 241 $\mu\text{Ci/L}$ =	< 1.5941E-02	
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 1.5941E-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))				
WL26365-BLNK	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
Instrument Code					
WB27810	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100				
Prepared By	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV				
MCB					
Chemist	NOTE: Am-241 Result is a LESS THAN Value.				
JFR	Am 241 $\mu\text{Ci/mL}$ =	< 1.59E-05	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.				
09/30/98	Cm 243/244 $\mu\text{Ci/mL}$	< 1.59E-05	Am 241	1.59E-05	
Analysis Date	Relative Counting Error =	100.0%	Cm 243/244		
09/29/98	Am 243 Tracer Recovery =	82.6%		1.59E-05	
Analysis Time					
09:30 AM					
Sample Point					
S-102 CMPT					

Analyst:	AKL	Date:	09/30/98
Signature of Chemist:	JFR	Date:	9-30

BLANK.WB1 REV 1.2

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	SEP-29-98	Am 241 AEA Frac. (C241)	0.493	
SAMPLE	Sample Volume in mL (SS)	0.200	Am 243 AEA Frac. (C243)	0.409	
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0.017	
26365	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	2071	
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30	
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.2	
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	23.79	
LIQUID	Detector Number	13	Am 243 cpm	19.73	
Batch Number	Detector Efficiency (DetEff)	0.3166	Cm 243/244 cpm	0.82	
98004946			AEA Count Time (min)	480	
Rerun			Am 241 $\mu\text{Ci/L}$ =	2.8071E-01	
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 3.3105E-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))				
S98T002679	Cm-243/244 $\mu\text{Ci/L}$ = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/ μCi))				
Instrument Code					
WB27810	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100				
Prepared By	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV				
MCB					
Chemist					
JFR	Am 241 $\mu\text{Ci/mL}$ =	2.81E-04	DETECTION LEVELS in $\mu\text{Ci/mL}$		
Analyst	Relative Counting Error =	2.7%			
AKL					
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.				
09/30/98	Cm 243/244 $\mu\text{Ci/mL}$	< 3.31E-05	Am 241	3.31E-05	
Analysis Date	Relative Counting Error =	10.1%	Cm 243/244	3.31E-05	
09/29/98	Am 243 Tracer Recovery =	86.0%			
Analysis Time					
09:30 AM					
Sample Point					
S-102 CMPT					

Analyst:	AKL	Date:	09/30/98
Signature of Chemist:	JFR	Date:	9-30

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	SEP-29-98	Am 241 AEA Frac. (C241)	0.476	
DUP	Sample Volume in mL (SS)	0.200	Am 243 AEA Frac. (C243)	0.394	
Work List	Sample D.F. (DF)	1	Cm 243/244 AEA Frac. (Cm)	0.018	
26365	Tracer Volume in mL (SPKV)	0.100	Total AT Counts	1926	
Test Code	Digest D.F. (DDF)	1.000	AT Count Time (min) (TC)	30	
@AM24101	Tracer Book No.	140B43	Background in cpm (Bkg)	0.2	
Matrix	Am-243 Tracer Value (dpm/mL)	1034	Am 241 cpm	23.42	
LIQUID	Detector Number	13	Am 243 cpm	19.4	
Batch Number	Detector Efficiency (DetEff)	0.3166	Cm 243/244 cpm	0.88	
98004946			AEA Count Time (min)	480	
Return			Am 241 $\mu\text{Ci/L}$ =	2.8135E-01	
0			Cm 243/244 $\mu\text{Ci/L}$ =	< 3.8368E-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))				
S98T002679	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				
WB27810	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 $\mu\text{Ci/mL}$ =	2.81E-04	DETECTION LEVELS in $\mu\text{Ci/mL}$		
Analyst	Relative Counting Error =	2.7%			
AKL					
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.				
09/30/98	Cm 243/244 $\mu\text{Ci/mL}$	< 3.84E-05	Am 241	3.84E-05	
Analysis Date	Relative Counting Error =	9.8%	Cm 243/244	3.84E-05	
09/29/98	Am 243 Tracer Recovery =	77.0%			
Analysis Time					
09:30 AM					
Sample Point					
S-102 CMPT					

Analyst:	AKL	Date:	09/30/98
Signature of Chemist:	JFR	Date:	9-30

SAMPLE.WB1 REV 1.2

953103M

HNF-1649 REV. 0

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

DATA REDUCTION REPORT

SAMPLE
 WL26365-STD
 File ID: 1a1806.CNF

Counted on: 9/29/98 @17:20
 Detector: AEA1
 Geometry number: 1
 Count time: 28803. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	3142.7	3142.7	303.009	303.009	12.000	5.615	6.000	2.730
2	1414.7	1414.7	257.291	257.279	12.000	5.229	6.000	2.306
3	53.5	53.5	193.661	193.440	76.000	1.000	38.000	0.100
4?	12.7	12.7	162.408	161.653	14.000	14.004	7.000	3.181
5	11.8	11.8	134.719	134.089	32.000	2.672	16.000	0.093
6?	3.7	3.7	100.801	100.801	18.000	6.350	9.000	1.473
7?	5.4	5.4	80.754	80.428	12.000	0.883	6.000	6.091
8?	5.4	5.4	72.339	71.919	10.000	1.813	5.000	1.749
9?	5.5	5.5	54.626	54.405	6.000	3.320	3.000	0.983

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err	d/m	Activity uCi/ea
		Exp.	Obs.	Diff.	c/m	@95		
1	Pu238	0.606	5.487	5.476	0.0110.03	94.47	0.9	535.3 0.241E-03
	Am241		5.479	5.476	0.003			410.0 0.185E-03
2	Am243	0.280	5.266	5.266	0.0000.02	43.61	1.4	179.7 0.810E-04
3		0.028	4.972		0.00	4.29	4.3	17.5 0.788E-05
4	????		4.826			0.70	25.1	
5		0.012	4.699		0.01	1.93	8.2	7.9 0.355E-05
6	????		4.546			0.17	76.0	
7	????		4.452			0.05	194.	
8	????		4.413			0.09	108.	
9	????		4.332			0.19	44.0	

Totals: 0.926 <--valid peaks only--> 144.30

DETECTOR CALIBRATION

Energy (MEV) = 4.082 + (0.0046)*Channel
 Energy range (MeV): 4.082 TO 6.437
 Efficiency = 0.2451 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item 234 Total % Recovery

HNF-1649 REV. 0

Raw spectrum	74815.0	100.000
Smoothed	74815.0	100.000
Composite fit	69848.9	93.362
Residuals	4966.1	6.638

Analyzed by: _____

MB

Spectrum 1a1806.CNF

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

Display Max.: 19907.2

```

5
5
5
9
9
9
9
9
8
8
7
6
6
6
5
5
5
5
4
4
4
4
3
3
3
.
..
..
2..
..2..
.....2
.....2
.....2
12....
..1...
.....1.
.....1
.....1
.....1
.....1
..1....

```

Raw Data Dump for AEA Spectrum: 1a1806.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	2.	3.
21	5.	8.	7.	11.	6.	10.	6.	7.	4.
31	7.	10.	9.	10.	7.	7.	10.	11.	8.
41	7.	10.	6.	10.	9.	7.	14.	9.	9.
51	3.	14.	13.	14.	11.	18.	9.	6.	13.
61	9.	6.	15.	7.	9.	8.	10.	12.	9.
71	11.	22.	10.	14.	11.	14.	11.	9.	13.
81	13.	17.	12.	12.	8.	12.	10.	16.	15.
91	8.	12.	15.	16.	19.	14.	15.	13.	17.
101	16.	17.	16.	11.	15.	15.	16.	20.	16.
111	11.	20.	8.	12.	17.	23.	21.	14.	23.
121	25.	18.	23.	22.	20.	25.	21.	13.	18.
131	24.	18.	19.	30.	24.	23.	19.	26.	15.
141	12.	10.	24.	26.	15.	22.	18.	29.	18.
151	25.	20.	29.	21.	29.	27.	34.	32.	26.
161	42.	37.	35.	32.	35.	30.	27.	33.	41.
171	33.	36.	33.	36.	46.	29.	44.	37.	40.
181	39.	45.	47.	49.	53.	44.	48.	45.	47.
191	56.	40.	55.	57.	49.	44.	53.	45.	55.
201	53.	48.	55.	61.	69.	79.	69.	78.	67.
211	76.	64.	80.	80.	101.	87.	109.	89.	97.
221	91.	93.	86.	93.	105.	109.	111.	141.	115.
231	134.	122.	136.	135.	171.	169.	209.	227.	210.
241	268.	255.	306.	325.	372.	368.	501.	572.	634.
251	777.	838.	1005.	1096.	1319.	1545.	1640.	1666.	1487.
261	667.	378.	282.	259.	218.	262.	221.	210.	205.
271	224.	244.	230.	207.	181.	199.	227.	217.	235.
281	279.	320.	303.	338.	388.	428.	503.	568.	585.
291	807.	959.	1031.	1248.	1406.	1499.	1677.	1932.	2314.
301	3060.	3494.	3682.	3519.	3033.	2156.	1363.	928.	712.
311	523.	459.	364.	291.	209.	138.	102.	55.	15.
321	2.	3.	0.	1.	2.	0.	0.	0.	1.
331	0.	0.	1.	2.	0.	0.	2.	0.	2.
341	1.	0.	1.	0.	3.	4.	2.	7.	6.
351	1.	0.	1.	0.	2.	0.	1.	2.	0.
361	4.	0.	0.	0.	1.	0.	0.	0.	0.
371	1.	2.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	2.	1.	0.	1.
391	2.	0.	0.	1.	0.	0.	0.	1.	2.
401	1.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	2.	0.	0.	1.	0.	0.	1.	1.
421	0.	0.	0.	0.	0.	0.	2.	0.	0.
431	1.	2.	0.	0.	0.	2.	1.	0.	1.
441	1.	0.	0.	1.	0.	0.	0.	0.	0.
451	0.	1.	1.	0.	1.	1.	2.	0.	0.
461	0.	2.	0.	1.	0.	0.	1.	0.	1.
471	0.	2.	0.	1.	2.	0.	1.	0.	1.
481	0.	1.	1.	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
 WL26365-BLNK
 File ID: 2a2000.CNF

Counted on: 9/29/98 @17:20
 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	730.0	730.0	256.737	256.737	12.000	4.783	6.000	2.350
2	12.1	12.1	207.395	207.212	48.000	102.436	24.000	11.461

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Exp.	Peak Centroid Obs.	Diff.	FWHM	Count Rate	%err	d/m	Activity uCi/ea
1	Am243	0.884	5.266	5.263	0.003	0.02	20.89	2.0	89.8	0.404E-04
2	Pu242	0.066	4.891	5.036	-1.145	0.47	1.56	27.0	6.7	0.300E-05
Totals:		0.950	<--valid peaks only-->				22.45			

DETECTOR CALIBRATION

Energy(MEV) = $4.082 + (0.0046) \cdot \text{Channel}$
 Energy range (MeV): 4.082 TO 6.438
 Efficiency = 0.2351 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	11345.0	100.000
Smoothed	11345.0	100.000
Composite fit	10778.6	95.008
Residuals	566.4	4.992

Analyzed by: _____

MB

Raw Data Dump for AEA Spectrum: 2a2000.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	2.
21	1.	0.	0.	2.	2.	1.	2.	0.	0.
31	1.	2.	3.	1.	0.	0.	1.	0.	0.
41	0.	2.	1.	3.	1.	1.	0.	2.	2.
51	0.	2.	1.	3.	2.	2.	1.	0.	1.
61	1.	3.	0.	2.	3.	2.	1.	2.	1.
71	1.	1.	3.	2.	1.	0.	1.	0.	1.
81	1.	2.	3.	2.	0.	0.	0.	1.	1.
91	2.	2.	2.	0.	2.	3.	1.	0.	2.
101	1.	2.	0.	3.	0.	0.	0.	1.	1.
111	1.	1.	2.	2.	2.	3.	0.	0.	4.
121	1.	1.	1.	5.	0.	3.	1.	0.	4.
131	4.	4.	2.	3.	2.	3.	0.	4.	1.
141	2.	2.	2.	3.	5.	1.	2.	4.	7.
151	4.	3.	7.	5.	2.	2.	1.	5.	2.
161	2.	4.	2.	7.	3.	4.	4.	7.	5.
171	4.	4.	1.	1.	2.	6.	4.	10.	3.
181	4.	6.	7.	2.	6.	5.	4.	9.	10.
191	8.	9.	7.	5.	8.	14.	10.	5.	9.
201	11.	8.	12.	14.	8.	10.	17.	13.	15.
211	8.	15.	11.	14.	12.	14.	14.	11.	16.
221	15.	18.	14.	26.	24.	30.	29.	28.	27.
231	21.	39.	30.	60.	53.	58.	74.	55.	84.
241	95.	108.	125.	146.	196.	227.	241.	316.	327.
251	429.	504.	556.	659.	692.	854.	824.	843.	626.
261	258.	142.	104.	65.	68.	54.	50.	42.	56.
271	43.	30.	13.	12.	10.	7.	1.	3.	1.
281	0.	1.	0.	1.	1.	0.	2.	1.	3.
291	2.	5.	4.	3.	3.	6.	9.	5.	1.
301	5.	11.	8.	6.	5.	3.	2.	1.	1.
311	2.	1.	0.	2.	0.	1.	0.	1.	0.
321	0.	0.	0.	0.	0.	0.	0.	0.	1.
331	3.	0.	0.	0.	1.	0.	0.	1.	1.
341	1.	1.	3.	2.	2.	1.	4.	3.	4.
351	1.	0.	2.	0.	1.	1.	1.	0.	1.
361	0.	2.	0.	1.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	1.	1.
411	0.	0.	0.	0.	0.	0.	0.	0.	1.
421	1.	0.	0.	0.	0.	0.	0.	0.	0.
431	2.	0.	0.	1.	0.	3.	0.	1.	1.
441	1.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	1.	0.	0.
471	1.	0.	1.	1.	0.	1.	2.	3.	2.
481	1.	1.	2.	0.	0.	0.	1.	0.	0.
491	0.	0.	0.	0.	1.	0.	0.	0.	0.
511	0.	0.							

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

DATA REDUCTION REPORT

SAMPLE
S98T2679-SAM(AM)
File ID: 3a3293.CNF

Counted on: 9/29/98 @17:20
Detector: AEA3
Geometry number: 1
Count time: 28803. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	24.7	24.7	367.810	367.810	10.000	3.472	5.000	1.160
2	724.9	724.9	299.006	299.005	12.000	6.302	6.000	2.701
3	632.6	632.6	252.753	252.741	12.000	5.222	6.000	2.246

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	Cm244	0.017	5.795	5.789	0.0060.02	0.82	9.9	3.5	0.157E-05	
	Cm243		5.779	5.789	-0.010			4.8	0.215E-05	
2	Pu238	0.493	5.487	5.472	0.0150.03	23.79	1.8	141.0	0.635E-04	
	Am241		5.479	5.472	0.007			108.0	0.486E-04	
3	Am243	0.409	5.266	5.259	0.0070.02	19.73	2.0	85.0	0.383E-04	
Totals:		0.919	<--valid peaks only-->				44.34			

DETECTOR CALIBRATION

Energy (MEV) = 4.097 + (0.0046)*Channel
Energy range (MeV): 4.097 TO 6.452
Efficiency = 0.2344 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	23171.0	100.000
Smoothed	23171.0	100.000
Composite fit	21287.7	91.872
Residuals	1883.3	8.128

Analyzed by:

MB

Spectrum 3a3293.CNF

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

Display Max.:

4822.8

```

.
.
.
.
3..
...3.
.....3
.....3.
.....3
2.....3..
.2....
.....2
.....2
.....2
.....2
.....2
.....2
..

```

```

1
1
.1
1

```

Raw Data Dump for AEA Spectrum: 3a3293.CNF HNF-1649 REV. 0

1	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.
21	2.	0.	0.	0.	0.	4.	3.	1.	3.
31	1.	3.	0.	1.	2.	1.	0.	2.	2.
41	1.	0.	0.	3.	0.	1.	0.	1.	0.
51	3.	2.	1.	2.	1.	1.	0.	4.	3.
61	2.	2.	1.	3.	2.	1.	3.	3.	2.
71	1.	2.	5.	1.	1.	0.	1.	1.	5.
81	2.	2.	2.	5.	3.	3.	1.	1.	2.
91	2.	3.	5.	2.	1.	4.	4.	2.	3.
101	4.	2.	5.	4.	1.	4.	2.	3.	5.
111	5.	1.	1.	4.	2.	3.	5.	3.	4.
121	6.	0.	2.	3.	3.	1.	5.	2.	7.
131	6.	2.	4.	4.	6.	3.	1.	6.	10.
141	5.	4.	7.	3.	5.	6.	6.	8.	9.
151	10.	6.	4.	9.	8.	7.	7.	7.	2.
161	3.	6.	8.	4.	9.	9.	7.	5.	8.
171	8.	6.	9.	7.	12.	11.	7.	6.	6.
181	13.	8.	7.	10.	12.	11.	10.	10.	11.
191	14.	16.	7.	10.	13.	17.	21.	11.	24.
201	12.	12.	16.	14.	21.	16.	24.	18.	25.
211	24.	27.	19.	25.	28.	26.	29.	21.	30.
221	36.	40.	37.	47.	39.	48.	51.	49.	49.
231	75.	54.	79.	80.	101.	101.	100.	125.	155.
241	193.	220.	236.	290.	327.	358.	393.	475.	497.
251	634.	693.	715.	743.	547.	416.	270.	171.	101.
261	73.	59.	74.	68.	62.	72.	55.	69.	54.
271	58.	58.	34.	50.	54.	73.	83.	86.	85.
281	118.	99.	129.	150.	192.	189.	206.	239.	277.
291	343.	417.	466.	505.	607.	667.	681.	816.	799.
301	690.	569.	360.	228.	177.	159.	124.	110.	81.
311	51.	31.	21.	9.	0.	3.	1.	1.	0.
321	0.	2.	1.	0.	0.	1.	3.	1.	2.
331	0.	2.	1.	2.	4.	0.	1.	4.	3.
341	2.	3.	3.	3.	4.	6.	6.	4.	4.
351	4.	4.	9.	8.	4.	10.	6.	18.	8.
361	16.	13.	27.	21.	22.	22.	25.	26.	32.
371	15.	3.	3.	2.	0.	0.	0.	0.	0.
381	0.	0.	1.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	1.
401	0.	0.	1.	0.	1.	0.	0.	0.	0.
411	0.	2.	1.	1.	0.	0.	0.	3.	0.
421	2.	1.	1.	2.	4.	0.	2.	0.	5.
431	2.	0.	0.	6.	4.	2.	7.	4.	1.
441	0.	0.	0.	1.	0.	0.	0.	0.	2.
451	0.	1.	0.	0.	1.	1.	0.	0.	0.
461	0.	0.	0.	1.	0.	0.	0.	0.	0.
471	0.	0.	2.	0.	4.	3.	2.	1.	3.
481	1.	2.	1.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.							

HNF-1649 REV. 0

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

DATA REDUCTION REPORT

SAMPLE
 S98T2679-DUP(AM)
 File ID: 4a4294.CNF

Counted on: 9/29/98 @17:21
 Detector: AEA4
 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	23.1	23.1	365.496	365.496	12.000	6.111	6.000	1.944
2	676.1	676.1	298.108	298.107	14.000	6.137	7.000	2.320
3	600.8	600.8	252.388	252.369	10.000	4.738	5.000	1.825
4	13.0	13.0	158.542	158.534	154.000	1.000	77.000	0.100

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err	Activity
			Exp.	Obs. Diff.	c/m	@95	d/m uCi/ea
1	Pu236	0.018	5.755	5.775 -0.020	0.88	9.6	4.0 0.178E-05
	Cm243		5.779	5.775 0.004			5.3 0.239E-05
2	Pu238	0.476	5.487	5.465 0.022	23.42	1.8	143.6 0.647E-04
	Am241		5.479	5.465 0.014			110.0 0.496E-04
3	Am243	0.394	5.266	5.255 0.011	19.40	2.1	86.5 0.390E-04
4		0.021		4.823 0.00	1.04	8.8	4.6 0.206E-05

Totals:		0.909	<--valid peaks only-->			44.73	

DETECTOR CALIBRATION

Energy(MEV) = 4.094 + (0.0046)*Channel
 Energy range (MeV): 4.094 TO 6.449
 Efficiency = 0.2265 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	23615.0	100.000
Smoothed	23615.0	100.000
Composite fit	21472.0	90.925
Residuals	2143.0	9.075

Analyzed by:

244

MB

Raw Data Dump for AEA Spectrum: 4a4294.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	3.	1.	2.
21	3.	3.	2.	2.	3.	1.	2.	4.	4.	5.
31	5.	3.	5.	3.	2.	1.	3.	7.	1.	1.
41	5.	5.	6.	3.	3.	3.	3.	5.	4.	1.
51	4.	2.	3.	5.	1.	3.	1.	2.	6.	3.
61	1.	1.	3.	4.	1.	5.	3.	2.	2.	3.
71	3.	0.	3.	2.	5.	2.	5.	1.	3.	5.
81	3.	1.	5.	1.	1.	2.	4.	7.	4.	2.
91	6.	3.	7.	8.	3.	3.	7.	2.	3.	2.
101	5.	3.	4.	2.	4.	3.	4.	5.	5.	9.
111	3.	6.	8.	2.	4.	7.	4.	3.	10.	6.
121	6.	5.	3.	8.	8.	5.	8.	4.	4.	7.
131	6.	5.	6.	3.	8.	8.	7.	11.	7.	7.
141	4.	10.	4.	9.	10.	10.	9.	7.	15.	9.
151	7.	12.	12.	8.	8.	11.	11.	19.	10.	13.
161	12.	11.	5.	11.	8.	14.	9.	14.	10.	13.
171	13.	10.	11.	15.	14.	20.	12.	15.	12.	22.
181	16.	19.	25.	17.	11.	19.	28.	17.	19.	10.
191	20.	21.	21.	21.	26.	27.	22.	12.	23.	30.
201	25.	32.	34.	31.	27.	24.	29.	30.	38.	33.
211	42.	20.	27.	48.	38.	32.	41.	46.	44.	44.
221	45.	48.	58.	68.	61.	54.	62.	87.	77.	75.
231	84.	87.	100.	107.	123.	107.	127.	145.	182.	207.
241	198.	247.	295.	302.	308.	342.	384.	430.	506.	578.
251	610.	671.	701.	680.	468.	282.	181.	132.	88.	75.
261	81.	69.	69.	78.	86.	69.	77.	59.	61.	72.
271	69.	78.	79.	80.	79.	95.	98.	101.	113.	127.
281	133.	141.	145.	176.	188.	218.	258.	285.	308.	310.
291	383.	454.	455.	547.	610.	640.	714.	746.	803.	634.
301	544.	327.	221.	185.	155.	106.	102.	63.	68.	49.
311	38.	30.	9.	3.	5.	2.	2.	1.	0.	4.
321	2.	2.	1.	2.	1.	2.	1.	1.	2.	1.
331	1.	1.	1.	3.	0.	1.	0.	2.	4.	6.
341	1.	8.	3.	4.	7.	7.	4.	6.	1.	6.
351	11.	7.	7.	6.	12.	9.	12.	14.	18.	19.
361	20.	25.	16.	29.	23.	25.	24.	21.	18.	20.
371	6.	3.	0.	0.	0.	1.	0.	0.	0.	0.
381	0.	0.	1.	1.	0.	0.	1.	1.	1.	0.
391	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.
401	0.	0.	1.	0.	1.	0.	0.	1.	0.	1.
411	0.	1.	1.	0.	1.	0.	1.	1.	1.	0.
421	2.	1.	1.	3.	6.	2.	1.	2.	2.	3.
431	3.	2.	1.	2.	5.	10.	0.	0.	0.	0.
441	0.	0.	1.	0.	0.	0.	0.	0.	1.	0.
451	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
471	1.	0.	1.	0.	1.	3.	2.	1.	1.	1.
481	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

LABCORE Completed Worklist Report for Worklist# 26209

Analyst: ak1

Instrument: AB18

Book#: _____

Method: LA-953-104 Rev/Mod _____

Worklist Comment: S102 CMPT, @PU23901, tdm

Seq Type	Sample#	R A	Test	Matrix	Actual	Found	DL or Yield	Unit
1 STD	0		@PU23901 PU23901 LIQUID		1.12E-04	1.23E-4	109.821 % Recovery	
1 STD	0		@PU23901 PU23901T LIQUID		100	8.72E+01	87.200 % Recovery	
1 STD	0		@PU23901 PU23901E LIQUID		1.00	1.91E+00	1.910 % Ct Error	
2 BLNK	0		@PU23901 PU23901 LIQUID		1	<2.97E-5	uCi/mL	
2 BLNK	0		@PU23901 PU23901T LIQUID		100	9.39E+01	93.900 % Recovery	
2 BLNK	0		@PU23901 PU23901E LIQUID		1.00	1.00E+02	100.000 uCi/mL	
3 SAMPLE	S98T002679	0	@PU23901 PU23901 LIQUID		N/A	3.13E-05	3.13E-005 uCi/mL	
3 SAMPLE	S98T002679	0	@PU23901 PU23901T LIQUID		N/A	8.98E+01	% Recovery	
3 SAMPLE	S98T002679	0	@PU23901 PU23901E LIQUID		N/A	7.98E+00	% Ct. Error	
4 DUP	S98T002679	0	@PU23901 PU23901 LIQUID		<3.13E-5	3.44E-5	RPD	
4 DUP	S98T002679	0	@PU23901 PU23901T LIQUID		100	8.59E+01	85.800 % Recovery	
4 DUP	S98T002679	0	@PU23901 PU23901E LIQUID		1.00	7.42E+00	7.420 % Ct Error	

Final page for worklist# 26209

Analyst Signature _____ Date _____

Analyst Signature _____ Date _____

John Polyea
Reviewer Signature Date 25 Sept 98

LABCORE Data Entry Template for Worklist# 26209

Analyst: ALL Instrument: PU01 18 Book# 28657

Method: LA-953-104 Rev/Mod 60

Worklist Comment: S102 CMPT, @PU23901, tdm

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@PU23901	LIQUID		
2	BLNK				@PU23901	LIQUID		
3	SAMPLE	S98T002679 0			@PU23901	LIQUID	98000466	S-102 CMPT
					Analytes Requested: PU23901 , PU23901E, PU23901T			
4	DUP	S98T002679 0			@PU23901	LIQUID		

Final page for worklist # 26209

Alita Hergen 9/24/98
Analyst Signature Date

McBrien 9/25/98
Analyst Signature Date
A7 LPLT 9/25/98

Data Entry Comments:

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

HNF-1649 REV. 0

WORKBOOK PAGE: STD1

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

LIQUID

STD

Pu 236 and 239/240 : LA-540-120 (V012) of LA-540-120		SEP-25-98	Pu 236 AEA FRAC (C236)	0.385
Type	DATE COUNTED	1.000	Pu 238 AEA FRAC (C238)	0.000
STD	SAMPLE VOLUME in mL SS	1.000	Pu 239 AEA FRAC (C239)	0.548
Work List	SAMPLE DILUTION FACTOR DF	0.100	TOTAL AT COUNTS	3513
26209	TRACER VOLUME in mL SPKV	1.000	AT COUNT TIME (MIN)	30
Test Code	DIGEST DILUTION FACTOR DDF	145B43	BACKGROUND in cpm (Bkg)	0.100
@PU23901	TRACER BOOK NO	18	Pu 236 cpm	37.320
Matrix	DETECTOR NUMBER	0.269	Pu 238 cpm	0.000
LIQUID	EFFICIENCY FACTOR EFF	01/19/98	Pu 239 cpm	53.130
Batch Number	TRACER PREPARATION DATE	2270.000	AEA COUNT TIME	480
98004788	TRACER PREPARATION VALUE (dpm/mL)	1923.172	Pu 239/240 μ Ci/L	1.2331E-01
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	0.000		
0	PU-238 TRACER VALUE (dpm/mL)	28B57		
Sample Prep	STANDARD BOOK NO	1.120E-04		
N/A	STANDARD VALUE in μ Ci/mL			
Sample #				
WL26209-STD				

Instrument Code Decay Time = Date Counted - Tracer Preparation Date

WB27809 Pu-236 Decay Corr'd Value = Pu-236 Preparation Value $\times [e^{-(\ln 2 \times \text{Decay Time}/1040.95)}]$ Prepared By MCB Pu 236 Tracer Recovery = (Total AT Counts / TC - Bkg) $\times 1/\text{EFF} \times \text{C236} \times 100 / \text{Pu-236 Decay Corr'd Value} \times \text{SPKV}$ Chemist JFR Pu 239/240 μ Ci/L = (C239)/(Pu 236 Decay Corr'd Value)(SPKV)/(1000mL/L)(DF)(DDF) / [(C236)(SS)(2220000 dpm/ μ Ci)]JFR Pu 238 dpm = [(Total AT Counts / TC) - Bkg $\times 1/\text{EFF} \times \text{C238}] - (\text{Pu-238 Tracer Value} \times \text{SPKV} \times \text{Pu 236 Tracer Recovery} / 100)$ Analyst AKL Pu 238 μ Ci/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-238 Tracer Recovery / 100)(2220000 dpm/ μ Ci)(D g/L)(SS)]Date Complete 09/25/98 Relative Counting Error = Square Root of $\{[(1/(\text{Pu 236 cpm} \times \text{min})) + (1/(\text{Pu 238 or 239/240 cpm} \times \text{min}))] \times 1.96 \times 100\}$

AKL

Date Complete

09/25/98

Analysis Date

09/24/98

Analysis Time

03:40 PM

Sample Point

S-102 CMPT

Pu 239/240 μ Ci/mL 1.23E-04

Relative Counting Error = 1.9%

DETECTION

LEVELS

in μ Ci/mL

Pu 239/240

7.74E-06

Pu 236 Tracer Recovery = 87.2%

Analyst	AKL	Date:	25-Sep-98
Signature of Chemist	JFR	Date:	7

STANDARD.WB1 REV 1.0

943128AKL

WORKBOOK PAGE: BLANK2

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

L

BLNK

Type	DATE COUNTED	SEP-25-98	PU 236 AEA FRAC (C236)	0.933
BLNK	SAMPLE VOLUME in mL SS	0.100	PU 238 AEA FRAC (C238)	0.013
Work List	SAMPLE DILUTION FACTOR DF	1.000	PU 239 AEA FRAC (C239)	0.000
26209	TRACER VOLUME in mL SPKV	0.100	TOTAL AT COUNTS	1562
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	18	PU 236 cpm	37.960
LIQUID	EFFICIENCY FACTOR EFF	0.2686	PU 238 cpm	0.550
Batch Number	TRACER PREPARATION DATE	01/19/98	PU 239 cpm	0.000
98004788	TRACER PREPARATION VALUE (dpm/mL)	2270.00	AEA COUNT TIME	480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1923.17	Pu 239/240 μ Ci/L =	< 2.968E-02
0	PU-238 TRACER VALUE (dpm/mL)	0.00		

Sample Prep:

N/A

Sample #

Decay Time = Date Counted - Tracer Preparation Date

WL26209-BLNK

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)

WB27809

Pu 239/240 μ Ci/L = (C239) / (Pu 236 Decay Corr'd Value) * (SPKV) / (1000 mL/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) * (1000 mL/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

09/25/98

Pu 239/240 μ Ci/mL < 2.97E-05

Analysis Date

09/24/98

Relative Counting Error = 100.0%

Analysis Time

03:40 PM

NOTE: Pu 238 Result is a LESS THAN Value.

Sample Point

S-102 CMPT

Pu 238 μ Ci/mL < 2.97E-05

Relative Counting Error = 12.2%

Pu 236 Tracer Recovery = 93.9%

DETECTION

LEVELS

in μ Ci/mL

Pu 239/240

2.97E-05

Pu 238

2.97E-05

Analyst:	AKL	Date:	25-Sep-98
Signature of Chemist:	JFR	Date:	9/

BLANK WB1 REV 1.0

HNF-1649 REV. 0

WORKBOOK PAGE: SAM3

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

LIQUID /

				LIQUID /	SAMPLE
Type	DATE COUNTED	SEP-25-98	Pu 236 AEA FRAC (C236)		0.926
SAMPLE	SAMPLE VOLUME in mL	SS	0.100	Pu 238 AEA FRAC (C238)	0.015
Work List	SAMPLE DILUTION FACTOR	DF	1.000	Pu 239 AEA FRAC (C239)	0.033
26209	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS	1505
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	18	Pu 236 cpm		36.900
LIQUID	EFFICIENCY FACTOR	EFF	0.269	Pu 238 cpm	0.610
Batch Number	TRACER PREPARATION DATE	01/19/98	Pu 239 cpm		1.300
98004788	TRACER PREPARATION VALUE (dpm/mL)	2270.000	AEA COUNT TIME		480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1923.172	Pu 239/240 µCi/L =	<	3.1271E-02
0	PU-238 TRACER VALUE (dpm/mL)	0.000			

Sample Prep

N/A

Sample #

S98T002679

Instrument Code

WB27809

Prepared By

MCB

Chemist

JFR

Analyst

AKL

Date Complete

09/25/98

Analysis Date

09/24/98

Analysis Time

03:40 PM

Sample Point

S-102 CMPT

Decay Time = Date Counted - Tracer Preparation Date

Pu-236 Decay Corr'd Value = Pu-236 Preparation Value * [e to the power of {(-ln2 * 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 µCi/L = (C239) / (Pu 236 Decay Corr'd Value) * (SPKV) / (1000 mL/L) * (DF) * (DDF) / [(C236) * (SS) * (D g/L) * (2220000 dpm/µCi)]

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

Pu 238 µCi/L = [(Pu 238 dpm) * (DF) * (DDF) / (1000 mL/L)] / [(Pu-238 Tracer Recovery / 100) * (2220000 dpm/µCi) * (D g/L) * (SS)]

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

Pu 239/240 µCi/mL < 3.13E-05

Relative Counting Error = 8.0%

DETECTION

LEVELS

in µCi/mL

NOTE: Pu 238 Result is a LESS THAN Value.

Pu 238 µCi/mL < 3.13E-05

Relative Counting Error = 11.5%

Pu 236 Tracer Recovery = 89.8%

Pu 239/240

3.13E-05

Pu 238

3.13E-05

Analyst:

AKL

Date:

25-Sep-98

Signature of Chemist:

JFR

Date:

"/

SAMPLE.WB1 REV 1.0

943128ML

HNF-1649 REV. 0

WORKBOOK PAGE: DUP4

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

LIQUID /

DUP

Type	DATE COUNTED	SEP-25-98	PU 236 AEA FRAC (C236)	0.906
DUP	SAMPLE VOLUME in mL	SS	0.100 PU 238 AEA FRAC (C238)	0.015
Work List	SAMPLE DILUTION FACTOR	DF	1.000 PU 239 AEA FRAC (C239)	0.036
26209	TRACER VOLUME in mL	SPKV	0.100 TOTAL AT COUNTS	1471
Test Code	DIGEST DILUTION FACTOR	DDF	1.00000 AT COUNT TIME (MIN)	30
@PU23901	TRACER BOOK NO	145B43	BACKGROUND in cpm (Bkg)	0.100
Matrix	DETECTOR NUMBER	18	PU 236 cpm	37.780
LIQUID	EFFICIENCY FACTOR	EFF	0.269 PU 238 cpm	0.620
Batch Number	TRACER PREPARATION DATE	01/19/98	PU 239 cpm	1.510
98004788	TRACER PREPARATION VALUE (dpm/mL)	2270.000	AEA COUNT TIME	480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)	1923.172	Pu 239/240 µCi/L =	3.4422E-02
0	PU-238 TRACER VALUE (dpm/mL)	0.000		
Sample Prep				
N/A				
Sample #	Decay Time = Date Counted - Tracer Preparation Date			
S98T002679	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value $[e^{-(\ln 2 * \text{Decay Time}/1040.95)}]$			
Instrument Code	Pu 238 Tracer Recovery = (Total AT Counts / TC - Bkg) * C236 * 100 / (Pu-236 Decay Corr'd Value * SPKV * EFF)			
WB27809	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 236 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 $\{[1 / (Pu 236 \text{ cpm} * \text{min})] + [1 / (Pu 238 \text{ or } 239/240 \text{ cpm} * \text{min})]\} * 1.96 * 100$			
JFR				
Analyst				
AKL				
Date Complete				
09/25/98	Pu 239/240 µCi/mL	3.44E-05	DETECTION LEVELS in µCi/mL	
Analysis Date	Relative Counting Error =	7.4%		
09/24/98			Pu 239/240	
Analysis Time	NOTE: Pu 238 Result is a LESS THAN Value.		3.34E-05	
03:40 PM	Pu 238 µCi/mL	< 3.34E-05	Pu 238	
Sample Point	Relative Counting Error =	11.5%	3.34E-05	
S-102 CMPT	Pu 236 Tracer Recovery =	85.8%		

Analyst:	AKL	Date:	25-Sep-98
Signature of Chemist:	JFR	Date:	//

SAMPLE.WB1 REV 1.0

943128ML

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

DATA REDUCTION REPORT

SAMPLE
 WL26209-STD-PU
 File ID: 17a1768.CNF

Counted on: 9/25/98 @ 1:47
 Detector: AEA17
 Geometry number: 1
 Count time: 28800. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1268.9	1268.9	363.297	363.297	10.000	2.963	5.000	1.136
2?	27.5	27.5	304.554	304.209	32.000	8.661	16.000	16.353
3	71.3	71.3	288.407	288.346	10.000	3.468	5.000	2.108
4?	18.2	18.2	270.903	270.165	12.000	3.307	6.000	0.834
5	2068.5	2068.5	229.488	229.487	10.000	3.238	5.000	1.620

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count	%err	Activity	
		Exp.	Obs.	Diff.	FWHM	Rate c/m	@95	d/m	uCi/ea
1	Pu236	0.385	5.755	5.764	-0.0090.01	37.32	1.5	156.6	0.706E-04
	Cm243		5.779	5.764	0.015			210.3	0.947E-04
2		????		5.492		0.81	12.0		
3	Th228	0.017	5.400	5.419	-0.0190.02	1.70	7.3	9.8	0.443E-05
4		????		5.336		0.73	12.7		
5	Pu239	0.548	5.147	5.149	-0.0020.01	53.13	1.2	218.5	0.984E-04
	Pu240		5.144	5.149	-0.005			218.5	0.984E-04

Totals:		0.950	<--valid peaks only-->			92.14			

DETECTOR CALIBRATION

Energy (MEV) = 4.093 + (0.0046)*Channel
 Energy range (MeV): 4.093 TO 6.448
 Efficiency = 0.2431 CPM/CPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	46551.0	100.000
Smoothed	46551.0	100.000
Composite fit	44962.4	96.587
Residuals	1588.6	3.413

Spectrum 17a1768.CNF

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

Display Max.: 13664.7

```

.
5.
..5.
.....5.
.....5
.....5
.....5
.....5.
4
4
4
4
4
3
3
2
2
.
.1
... 1
.....1
.....1
.....1
.1..

```

Raw Data Dump for AEA Spectrum: 17a1768.CNF HNF-1649 REV. 0

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.
21	0.	0.	0.	0.	1.	0.	1.	1.	2.	3.
31	0.	0.	2.	2.	1.	1.	1.	1.	0.	0.
41	0.	0.	2.	0.	0.	0.	0.	2.	1.	0.
51	1.	0.	0.	0.	0.	0.	3.	1.	1.	0.
61	2.	2.	2.	0.	2.	0.	0.	1.	2.	1.
71	0.	0.	1.	1.	0.	2.	0.	0.	3.	1.
81	0.	0.	3.	4.	1.	4.	2.	1.	2.	4.
91	1.	0.	2.	2.	3.	2.	0.	1.	1.	0.
101	2.	0.	0.	2.	0.	0.	1.	2.	2.	1.
111	1.	2.	0.	1.	2.	3.	0.	2.	3.	1.
121	2.	2.	2.	1.	5.	3.	3.	3.	5.	2.
131	3.	3.	4.	3.	3.	6.	5.	0.	2.	3.
141	5.	5.	4.	2.	2.	2.	3.	7.	7.	7.
151	3.	1.	7.	4.	3.	3.	5.	7.	9.	10.
161	12.	5.	7.	8.	8.	7.	13.	7.	8.	3.
171	14.	17.	13.	8.	13.	13.	22.	20.	15.	11.
181	14.	24.	23.	20.	24.	25.	27.	29.	35.	40.
191	42.	46.	49.	51.	56.	42.	48.	71.	79.	86.
201	68.	102.	84.	111.	111.	116.	134.	137.	162.	208.
211	217.	219.	271.	322.	331.	380.	500.	586.	660.	706.
221	821.	788.	913.	1053.	1243.	1500.	1810.	2145.	2379.	2509.
231	2250.	1647.	902.	328.	77.	17.	6.	2.	4.	2.
241	3.	3.	1.	3.	3.	2.	4.	6.	2.	3.
251	10.	9.	9.	8.	8.	6.	14.	6.	10.	6.
261	8.	11.	8.	8.	9.	16.	13.	24.	22.	26.
271	27.	23.	23.	14.	11.	15.	16.	13.	17.	23.
281	27.	34.	33.	43.	46.	61.	82.	78.	94.	74.
291	54.	23.	20.	21.	11.	16.	15.	20.	16.	20.
301	13.	19.	34.	23.	23.	27.	27.	17.	6.	11.
311	13.	10.	13.	12.	20.	11.	18.	20.	19.	16.
321	23.	22.	26.	23.	22.	30.	32.	30.	43.	38.
331	62.	42.	46.	55.	67.	65.	69.	64.	88.	103.
341	110.	98.	123.	141.	182.	210.	221.	256.	299.	368.
351	470.	524.	598.	690.	753.	636.	617.	697.	743.	936.
361	1067.	1317.	1496.	1565.	1356.	875.	341.	105.	15.	0.
371	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
381	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
421	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
431	1.	1.	0.	1.	1.	0.	0.	0.	0.	0.
441	0.	0.	1.	0.	0.	0.	0.	0.	0.	2.
451	0.	2.	1.	0.	0.	0.	1.	0.	1.	1.
461	1.	0.	3.	0.	1.	0.	0.	1.	1.	1.
471	1.	1.	4.	8.	6.	0.	2.	1.	4.	4.
481	2.	3.	0.	1.	1.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	1.	0.	0.	1.	1.	0.
511	1.	0.								

HNF-1649 REV. 0

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

DATA REDUCTION REPORT

SAMPLE
WL26209-BLNK-PU
File ID: 18a1846.CNF

Counted on: 9/25/98 @ 1:48
Detector: AEA18
Geometry number: 1
Count time: 28803. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	1487.1	1487.1	359.431	359.431	10.000	2.886	5.000	1.391
2	16.6	16.6	301.147	301.078	14.000	1.670	7.000	0.483
3	73.6	73.6	284.530	284.476	10.000	2.668	5.000	2.506
4	20.0	20.0	267.333	267.063	12.000	2.820	6.000	1.274

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid		Count Rate	%err	d/m	Activity uCi/ea
		Exp.	Obs.	Diff.	c/m	@95		
1	Pu236	0.933	5.755	5.748	0.0070.01	37.96	1.5	161.3 0.727E-04
2	Pu238	0.013	5.487	5.479	0.0080.01	0.55	12.4	3.2 0.143E-05
	Am241		5.479	5.479	0.000			2.4 0.109E-05
3	Th228	0.034	5.400	5.403	-0.0030.01	1.37	8.3	8.0 0.362E-05
4		0.013		5.323	0.01	0.53	14.5	2.2 0.990E-06
Totals:		0.993	<--valid peaks only-->		40.41			

DETECTOR CALIBRATION

Energy (MEV) = 4.094 + (0.0046)*Channel
Energy range (MeV): 4.094 TO 6.450
Efficiency = 0.2401 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	19535.0	100.000
Smoothed	19535.0	100.000
Composite fit	19398.0	99.299
Residuals	137.0	0.701

Analyzed by:

SLH2

Spectrum 18a1846.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc Display Max.: 8535.2

```

4
4
4
3
2.3.
2
2

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

```

Raw Data Dump for AEA Spectrum: 18a1846.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
21	0.	0.	0.	1.	0.	0.	0.	2.	0.	0.
31	2.	0.	2.	0.	0.	2.	1.	0.	0.	1.
41	0.	0.	0.	0.	1.	0.	0.	1.	0.	1.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.
71	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
81	0.	1.	1.	1.	1.	0.	1.	0.	0.	1.
91	0.	1.	1.	2.	2.	1.	0.	0.	0.	0.
101	1.	0.	1.	0.	0.	0.	0.	2.	0.	0.
111	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.
121	1.	1.	1.	0.	0.	1.	0.	1.	3.	0.
131	0.	1.	0.	0.	0.	1.	2.	0.	3.	1.
141	1.	0.	1.	1.	0.	0.	0.	0.	0.	1.
151	0.	1.	2.	1.	0.	0.	0.	0.	1.	0.
161	0.	1.	1.	0.	2.	0.	0.	0.	1.	1.
171	0.	0.	1.	1.	1.	1.	1.	1.	0.	3.
181	0.	1.	1.	1.	0.	0.	2.	1.	0.	1.
191	0.	0.	1.	1.	0.	1.	0.	3.	2.	1.
201	0.	0.	1.	2.	2.	0.	2.	2.	1.	2.
211	1.	2.	2.	2.	1.	1.	2.	2.	1.	2.
221	2.	4.	2.	2.	3.	1.	5.	6.	2.	4.
231	0.	1.	2.	2.	0.	4.	0.	3.	5.	2.
241	1.	2.	3.	0.	0.	3.	2.	1.	2.	6.
251	3.	8.	11.	5.	2.	5.	9.	6.	10.	9.
261	12.	9.	9.	25.	14.	32.	22.	24.	24.	17.
271	13.	6.	10.	5.	5.	13.	18.	30.	28.	31.
281	50.	58.	100.	92.	92.	94.	58.	32.	11.	5.
291	2.	5.	9.	6.	9.	7.	7.	8.	8.	11.
301	22.	12.	15.	5.	2.	3.	5.	4.	4.	0.
311	5.	4.	4.	1.	8.	1.	10.	6.	8.	10.
321	10.	5.	8.	12.	13.	12.	13.	29.	20.	23.
331	19.	24.	25.	28.	35.	38.	41.	50.	66.	75.
341	107.	138.	149.	189.	251.	290.	384.	516.	615.	688.
351	717.	671.	649.	647.	811.	942.	1194.	1538.	1828.	1843.
361	1619.	1085.	454.	136.	23.	9.	0.	0.	0.	1.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	1.	0.	0.	0.	0.	1.	0.	0.	0.	1.
421	0.	0.	2.	0.	0.	0.	0.	0.	0.	1.
431	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
441	1.	0.	0.	0.	1.	0.	0.	0.	0.	0.
451	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	1.	0.	1.	0.	2.	1.	1.	5.	5.	4.
471	7.	13.	10.	7.	6.	5.	7.	1.	3.	2.
481	2.	0.	1.	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
GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98T2679-SAM-PU
File ID: 19a1969.CNF

Counted on: 9/25/98 @ 1:49
Detector: AEA19
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	1516.2	1516.2	363.126	363.126	10.000	2.632	5.000	1.332
2	23.0	23.0	303.809	303.744	32.000	7.118	16.000	16.454
3	50.9	50.9	288.989	288.932	10.000	2.951	5.000	2.683
4?	13.4	13.4	271.339	271.176	10.000	2.201	5.000	1.110
5	53.6	53.6	231.063	231.061	12.000	3.875	6.000	2.439

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate	%err c/m	d/m	Activity uCi/ea
			Exp.	Obs.	Diff. FWHM				
1	Pu236	0.926	5.755	5.749	0.0060.01	36.90	1.5	157.9	0.711E-04
2	Pu238	0.015	5.487	5.475	0.0120.03	0.61	12.0	3.6	0.160E-05
	Am241		5.479	5.475	0.004			2.7	0.123E-05
3	Th228	0.025	5.400	5.407	-0.0070.01	0.99	9.5	5.9	0.264E-05
4		????		5.326		0.31	17.7		
5	Pu239	0.033	5.147	5.141	0.0060.02	1.30	7.9	5.4	0.245E-05
	Pu240		5.144	5.141	0.003			5.4	0.245E-05

Totals: 0.999 <--valid peaks only--> 39.80

DETECTOR CALIBRATION

Energy (MEV) = 4.078 + (0.0046)*Channel
Energy range (MeV): 4.078 TO 6.433
Efficiency = 0.2385 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	19134.0	100.000
Smoothed	19134.0	100.000
Composite fit	19258.3	100.649
Residuals	-124.3	-0.649

Spectrum 19a1969.CNF

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

Display Max.: 8819.7

```

5
.5
5

4
4
4
3
3
2
2

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

```

Raw Data Dump for AEA Spectrum: 19a1969.CNF										
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
21	2.	0.	1.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
41	0.	1.	0.	0.	1.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
61	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
71	0.	0.	1.	0.	0.	0.	2.	0.	0.	0.
81	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
101	1.	1.	0.	0.	1.	1.	0.	0.	0.	0.
111	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
121	1.	0.	0.	0.	1.	0.	0.	0.	0.	0.
131	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.
141	0.	0.	0.	0.	1.	1.	1.	0.	3.	1.
151	1.	1.	2.	1.	1.	0.	0.	1.	2.	1.
161	0.	0.	0.	0.	1.	0.	1.	1.	1.	1.
171	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
181	0.	3.	1.	0.	0.	0.	1.	0.	0.	0.
191	0.	0.	1.	0.	0.	0.	0.	1.	0.	1.
201	1.	1.	1.	2.	2.	3.	0.	1.	1.	1.
211	2.	3.	3.	5.	2.	4.	3.	9.	8.	12.
221	11.	16.	15.	30.	14.	34.	49.	39.	47.	54.
231	69.	60.	46.	36.	27.	12.	1.	2.	2.	0.
241	1.	2.	1.	1.	1.	2.	0.	1.	0.	2.
251	1.	0.	3.	3.	6.	7.	2.	6.	6.	3.
261	4.	1.	4.	1.	5.	6.	7.	8.	8.	13.
271	23.	14.	13.	8.	5.	4.	4.	5.	8.	9.
281	7.	13.	18.	17.	23.	41.	55.	52.	64.	65.
291	43.	29.	7.	10.	8.	13.	18.	12.	10.	13.
301	16.	20.	27.	22.	20.	21.	19.	5.	4.	4.
311	3.	4.	4.	4.	0.	0.	4.	1.	4.	2.
321	2.	5.	1.	6.	9.	8.	9.	6.	12.	9.
331	10.	13.	13.	11.	13.	11.	9.	19.	29.	37.
341	37.	40.	44.	66.	90.	91.	149.	155.	241.	302.
351	368.	538.	635.	749.	742.	596.	602.	668.	832.	1076.
361	1313.	1583.	1867.	1909.	1463.	805.	247.	52.	3.	0.
371	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	1.	1.	0.	1.	2.	0.	0.	0.	0.
431	0.	1.	0.	1.	0.	0.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
461	0.	1.	0.	1.	0.	1.	0.	2.	1.	2.
471	1.	1.	1.	4.	3.	5.	8.	3.	2.	4.
481	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
511	0.	0.								

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

DATA REDUCTION REPORT

SAMPLE
 S98T2679-DUP-PU
 File ID: 20a2036.CNF

Counted on: 9/25/98 @ 1:49
 Detector: AEA20
 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	1509.7	1509.7	361.687	361.687	10.000	2.714	5.000	1.323
2	20.0	20.0	302.900	302.804	34.000	9.617	17.000	17.305
3	51.4	51.4	286.405	286.353	10.000	3.589	5.000	3.005
4	13.5	13.5	269.530	269.276	10.000	3.208	5.000	1.080
5	62.8	62.8	228.311	228.304	12.000	3.545	6.000	2.154

PEAK RESULTS

Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid			Count Rate c/m	%err @95	d/m	Activity uCi/ea
			Exp.	Obs.	Diff. FWHM				
1	Pu236	0.906	5.755	5.764	-0.0090.01	37.78	1.5	162.3	0.731E-04
	Cm243		5.779	5.764	0.015			217.8	0.981E-04
2	Pu238	0.015	5.487	5.493	-0.0060.04	0.62	12.4	3.6	0.162E-05
	Am241		5.479	5.493	-0.014			2.8	0.124E-05
3	Th228	0.026	5.400	5.417	-0.0170.02	1.10	9.1	6.5	0.293E-05
4		0.011		5.338	0.01	0.44	15.9	1.8	0.832E-06
5	Pu239	0.036	5.147	5.150	-0.0030.02	1.51	7.3	6.3	0.285E-05
	Pu240		5.144	5.150	-0.006			6.3	0.285E-05

Totals:		0.993	<--valid peaks only-->			41.44			

DETECTOR CALIBRATION

Energy(MEV) = 4.100 + (0.0046)*Channel
 Energy range (MeV): 4.100 TO 6.455
 Efficiency = 0.2376 CPM/DPM
 (Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	20026.0	100.000
Smoothed	20026.0	100.000
Composite fit	19893.7	99.339
Residuals	132.3	0.661

Spectrum 20a2036.CNF

1 Legend: Raw = Modeled Peaks = 1,2,..., etc Display Max.: 7475.5

```

5
..5
5
4
4
4
4
.3
3
2
2

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

```

Raw Data Dump for AEA Spectrum: 20a2036.CNF HNF-1649 REV.0

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	1.	0.	2.	0.	0.
21	0.	0.	1.	2.	0.	1.	0.	0.	0.	1.
31	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
41	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	2.	2.	1.	0.	1.
61	1.	2.	1.	0.	0.	1.	1.	2.	1.	0.
71	0.	1.	0.	0.	0.	1.	0.	0.	1.	0.
81	1.	2.	0.	1.	0.	1.	0.	0.	1.	0.
91	0.	0.	1.	0.	0.	2.	1.	1.	0.	0.
101	1.	1.	0.	0.	0.	0.	1.	2.	1.	1.
111	1.	2.	0.	0.	0.	0.	0.	0.	0.	3.
121	1.	1.	1.	0.	0.	0.	0.	2.	2.	0.
131	1.	0.	0.	0.	1.	0.	1.	1.	0.	0.
141	0.	0.	3.	1.	1.	1.	2.	1.	2.	0.
151	2.	0.	0.	1.	0.	2.	0.	0.	0.	2.
161	0.	1.	1.	2.	2.	0.	4.	0.	0.	2.
171	1.	3.	0.	1.	0.	1.	0.	2.	0.	0.
181	0.	1.	2.	1.	1.	2.	1.	0.	0.	0.
191	2.	0.	2.	2.	1.	1.	3.	1.	1.	0.
201	3.	4.	3.	5.	0.	0.	5.	3.	2.	2.
211	5.	7.	7.	7.	10.	13.	17.	16.	11.	26.
221	19.	24.	32.	43.	46.	57.	58.	82.	74.	61.
231	42.	30.	14.	7.	3.	1.	0.	2.	4.	2.
241	2.	2.	5.	6.	2.	0.	3.	3.	2.	3.
251	4.	8.	5.	4.	6.	8.	4.	4.	3.	1.
261	8.	7.	7.	8.	12.	8.	8.	17.	20.	15.
271	19.	10.	4.	10.	8.	11.	7.	10.	14.	15.
281	24.	30.	29.	49.	55.	59.	67.	57.	33.	16.
291	12.	10.	17.	13.	12.	18.	18.	6.	18.	19.
301	14.	21.	26.	20.	20.	11.	8.	7.	4.	4.
311	3.	7.	4.	4.	6.	3.	6.	7.	6.	6.
321	8.	12.	13.	14.	7.	12.	13.	19.	18.	21.
331	21.	21.	22.	31.	32.	35.	38.	38.	62.	52.
341	67.	87.	109.	110.	157.	183.	235.	296.	379.	458.
351	575.	720.	722.	681.	629.	608.	684.	930.	1150.	1473.
361	1706.	1887.	1752.	1223.	573.	152.	15.	2.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	1.	3.	0.	0.	1.	0.	0.	0.
431	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	2.	1.	1.	0.	3.	3.
471	1.	5.	2.	2.	4.	3.	8.	11.	3.	1.
481	2.	1.	1.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

OPPORTUNISTIC ANALYTES
APPENDIX A

THIS PAGE WAS INTENTIONALLY LEFT BLANK

Appendix A. Opportunistic Analyte Results.
S-102 CMPT

CORE NUMBER: 232
SEGMENT #: 1

SEGMENT PORTION: Drainable Liquid

Sample#	R#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98T002515	D	Silver-ICP-Acid Dil.	ug/mL	97.80	<1.00e-02	15.60	15.40	15.50	1.29	93.90	6.010	n/a
S98T002515	D	Arsenic-ICP-Acid Dil.	ug/mL	99.60	<1.00e-01	60.10	<6.01e1	n/a	n/a	94.90	30.10	n/a
S98T002515	D	Boron-ICP-Acid Dil.	ug/mL	97.00	<5.00e-02	67.30	68.40	67.85	1.62	97.00	30.10	n/a
S98T002515	D	Beryllium-ICP-Acid Dil.	ug/mL	99.40	<5.00e-03	3.000	<3.00e0	n/a	n/a	94.90	3.000	n/a
S98T002515	D	Bismuth-ICP-Acid Dil.	ug/mL	99.60	<1.00e-01	60.10	<6.01e1	n/a	n/a	97.20	60.10	n/a
S98T002515	D	Calcium-ICP-Acid Dil.	ug/mL	96.80	<5.00e-03	3.000	<3.00e0	n/a	n/a	103.0	60.10	n/a
S98T002515	D	Cadmium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-03	3.000	<3.00e0	n/a	n/a	99.70	3.000	n/a
S98T002515	D	Cerium-ICP-Acid Dil.	ug/mL	98.40	<1.00e-01	60.10	<6.01e1	n/a	n/a	99.20	60.10	n/a
S98T002515	D	Cobalt-ICP-Acid Dil.	ug/mL	97.80	<2.00e-02	12.00	<1.20e1	n/a	n/a	97.60	12.00	n/a
S98T002515	D	Copper-ICP-Acid Dil.	ug/mL	99.00	<5.00e-01	2.66e+03	2.74e+03	2.70e+03	2.96	113.0	300.0	n/a
S98T002515	D	Lanthanum-ICP-Acid Dil.	ug/mL	98.20	<5.00e-02	30.10	<3.01e1	n/a	n/a	98.20	30.10	n/a
S98T002515	D	Lithium-ICP-Acid Dil.	ug/mL	99.20	<1.00e-02	6.010	<6.01e0	n/a	n/a	96.40	6.010	n/a
S98T002515	D	Magnesium-ICP-Acid Dil.	ug/mL	99.20	<1.00e-02	6.010	<6.01e0	n/a	n/a	98.70	60.10	n/a
S98T002515	D	Molybdenum-ICP-Acid Dil.	ug/mL	98.20	<5.00e-02	91.40	94.10	92.75	2.91	98.90	30.10	n/a
S98T002515	D	Neodymium-ICP-Acid Dil.	ug/mL	98.00	<2.00e-01	8.96e+02	922.0	909.0	2.86	106.0	120.0	n/a
S98T002515	D	Lead-ICP-Acid Dil.	ug/mL	96.80	<1.00e-01	60.10	<6.01e1	n/a	n/a	99.60	60.10	n/a
S98T002515	D	Sulfur-ICP-Acid Dil.	ug/mL	97.20	<1.00e-01	1.73e+03	1.77e+03	1.75e+03	2.29	102.0	60.10	n/a
S98T002515	D	Antimony-ICP-Acid Dil.	ug/mL	98.60	<6.00e-02	36.10	<3.61e1	n/a	n/a	98.80	36.10	n/a
S98T002515	D	Selenium-ICP-Acid Dil.	ug/mL	94.20	<1.00e-01	60.10	<6.01e1	n/a	n/a	108.0	60.10	n/a
S98T002515	D	Silicon-ICP-Acid Dil.	ug/mL	98.60	<5.00e-01	1.28e+02	129.0	128.5	0.78	102.0	30.10	n/a
S98T002515	D	Strontium-ICP-Acid Dil.	ug/mL	97.40	<1.00e-01	60.10	<6.01e1	n/a	n/a	97.20	60.10	n/a
S98T002515	D	Titanium-ICP-Acid Dil.	ug/mL	96.80	<1.00e-02	6.010	<6.01e0	n/a	n/a	97.80	6.010	n/a
S98T002515	D	Thallium-ICP-Acid Dil.	ug/mL	97.40	<2.00e-02	6.010	<6.01e0	n/a	n/a	90.60	120.0	n/a
S98T002515	D	Thallium-ICP-Acid Dil.	ug/mL	99.00	<2.00e-01	1.20e+02	<1.20e2	n/a	n/a	96.50	300.0	n/a
S98T002515	D	Uranium-ICP-Acid Dil.	ug/mL	94.10	<5.00e-01	3.000	<3.01e1	n/a	n/a	100.0	30.10	n/a
S98T002515	D	Vanadium-ICP-Acid Dil.	ug/mL	96.80	<5.00e-02	6.010	<6.01e0	n/a	n/a	98.80	6.010	n/a
S98T002515	D	Zinc-ICP-Acid Dil.	ug/mL	99.40	<1.00e-02	6.010	<6.01e0	n/a	n/a	91.81	643.9	n/a
S98T002515	D	Bromide by Ion Chromatograph	ug/mL	105.9	<1.25e-01	<6.44e-02	582.0	n/a	n/a	94.43	540.9	n/a
S98T002515	D	Oxalate-IC-Dioxan 4000/450	ug/mL	102.1	<1.05e-01	<5.47e-01	582.0	n/a	n/a	94.43	540.9	n/a
S98T002516	D	Cobalt-60 by GEA	uCi/mL	102.7	<7.24e-04	<3.80e-03	<3.97e-3	n/a	n/a	n/a	4.00e-03	n/a

Appendix A. Opportunistic Analyte Results.
S-102

CORE NUMBER: 232
SEGMENT #: FB

SEGMENT PORTION: Field Blank

Sample#	R #	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98T000902		Fluoride-IC-Dionex 4000/4500	ug/mL	97.63	<1.20e-02	<1.20e-02	<1.20e-02	n/a	n/a	n/a	1.20e-02	n/a
S98T000902		Chloride-IC-Dionex 4000/4500	ug/mL	94.12	<1.70e-02	2.70e-02	2.50e-02	2.60e-02	7.69	n/a	1.70e-02	n/a
S98T000902		Nitrite-IC - Dionex 4000/4500	ug/mL	93.17	<1.08e-01	<1.08e-01	<1.08e-01	n/a	n/a	n/a	1.08e-01	n/a
S98T000902		Nitrate by IC-Dionex 4000/4500	ug/mL	100.2	<1.39e-01	<1.39e-01	<1.39e-01	n/a	n/a	n/a	1.39e-01	n/a
S98T000902		Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	<1.20e-01	4.41e-01	n/a	n/a	n/a	1.20e-01	n/a
S98T000902		Sulfate by IC-Dionex 4000/4500	ug/mL	102.5	<1.38e-01	<1.38e-01	<1.38e-01	n/a	n/a	n/a	1.38e-01	n/a
S98T000902		Oxalate-IC-Dionex 4000/450	ug/mL	100.0	<1.05e-01	<1.05e-01	<1.05e-01	n/a	n/a	n/a	1.05e-01	n/a

Appendix A. Opportunistic Analyte Results.
S-102

CORE NUMBER: 232
SEGMENT #: HHF

SEGMENT PORTION: Hydrostatic Head Fluid

Sample#	R/A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S981000903		Fluoride-IC-Dionex 4000/4500	ug/mL	97.63	<1.20e-02	< 13.33	<1.33e1	N/A	N/A	N/A	13.33	N/A
S981000903		Chloride-IC-Dionex 4000/4500	ug/mL	94.12	<1.70e-02	< 18.89	<1.89e1	N/A	N/A	N/A	18.89	N/A
S981000903		Nitrite-IC - Dionex 4000/4500	ug/mL	93.17	<1.08e-01	<1.20e+02	<1.20e2	N/A	N/A	N/A	120.0	N/A
S981000903		Nitrate by IC-Dionex 4000/4500	ug/mL	100.2	<1.39e-01	<1.54e+02	<1.54e2	N/A	N/A	N/A	154.4	N/A
S981000903		Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	<1.33e+02	<1.33e2	N/A	N/A	N/A	133.3	N/A
S981000903		Sulfate by IC-Dionex 4000/4500	ug/mL	102.5	<1.38e-01	<1.53e+02	<1.53e2	N/A	N/A	N/A	153.3	N/A
S981000903		Oxalate-IC-Dionex 4000/450	ug/mL	100.0	<1.05e-01	<1.17e+02	<1.17e2	N/A	N/A	N/A	116.7	N/A

DISTRIBUTION SHEET

To Distribution	From Production Planning & Control	Page 1 of 1		
		Date: 11/04/98		
Project Title/Work Order HNF-1649 Rev. 0 "Tank 241-S-102, Cores 232, Analytical Results for the Final Report"		EDT NO.: EDT-623171		
		ECN NO.: N/A		
Name	MSIN	Text With all Attach	EDT/ECN ONLY	

DE&S Hanford, Inc.

J. E. Meacham

S7-14

X

U.S. Department of Energy, RL

C. A. Babel

S7-54

X

Lockheed Martin Hanford Corp.

J. N. Appel

G3-21

X

K. G. Carothers

R2-11

X

T. M. Blaak

S5-13

X

M. J. Kupfer

H5-49

X

J. G. Burton

S7-21

X

J. B. Schaffer

R2-12

X

L. A. Stauffer

R2-11

X

J. A. Voogd

H5-03

X

A. E. Young

R1-10

X

D. J. McCain

R2-12

X

L. M. Sasaki

R2-12

X

Lockheed Martin Services, Inc.

Central Files

A3-88

1

Pacific Northwest National Laboratory

R. A. Bechtold

K7-22

X

K. L. Silvers

K9-08

X

A. F. Noonan

K9-91XWaste Management of Hanford, Inc.

D. C. Hetzer

S6-31

X

K. L. Powell

S3-30

X

C. M. Seidel

S3-30

X

F. H. Steen

T6-12

X

L. A. Diaz

T6-12

X*

LTIC

T6-12

X

SGN Eurisys Services Corp.

B. A. Higley

H5-27

X

W. S. Callaway

S3-90XDefense Nuclear Federal Safety Board

Rich Tontodonato

X

625 Indiana Ave. N. W.

Washington D.C. 20004

* Needs only releasing paperwork, not a copy of the released document.