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Analytical Results for the 107-N and 1310-N Basin Sediment Disposition Sample Characterization Project

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Rust Federal Services of Hanford, Inc., Richland, WA 99352
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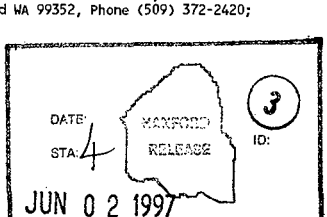

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ANALYTICAL SERVICES

ANALYTICAL RESULTS FOR THE 107-N AND 1310-N BASIN SEDIMENT DISPOSITION SAMPLE CHARACTERIZATION PROJECT

Project Coordinator: George L. Miller

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

by

222-S Laboratory
Rust Federal Services of Hanford Inc.
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Richland, Washington

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

This document consists of pages 1 through 224. Pages ii, 2, 39, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 183, 190, 195, 208, 218 were intentionally left blank.

CASE NARRATIVE

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ANALYTICAL RESULTS FOR THE 107-N AND 1310-N BASIN SEDIMENT DISPOSITION, SAMPLE CHARACTERIZATION PROJECT,

INTRODUCTION

Project Documentation and Direction

Analytical direction for this project was provided in the following References.

1. Duncan, G. M., BHI-00973, Rev. 0, *Sampling and Analysis Plan for the 107-N Basin Recirculation Building*, published on February 6, 1997, Bechtel Hanford, Inc., Richland, Washington 99352.

2. Greenidge, M. E., *Letter of Instruction for N Area Deactivation Sediment and Water Task Sample Analysis*, written to C. G. Mattsson, Fluor Daniel Hanford, Inc. on February 13, 1997.

3. Meznarich, H. K., WHC-SD-CP-QAPP-016, Rev. 1A, *222-S Laboratory Quality Assurance Plan*, released on August 31, 1995, Westinghouse Hanford Company, Richland, WA 99352.

4. Changes in project requirements as documented through Internal Memorandum and unofficially via cc:Mail (included as Appendix 2).

Project Description

Turnaround time for this project was 60 days, as required in Reference 2. The analyses were to be performed using SW-846 procedures whenever possible to meet analytical requirements as a Resource Conservation Recovery Act (RCRA) protocol project. Except for the preparation and analyses of polychlorinated biphenyl hydrocarbons (PCB) and Nickel-63, which the program deleted as a required analyte for 222-S Laboratory, all preparative and analytical work was performed at the 222-S Laboratory. Quanterra Environmental Services of Earth City, Missouri, performed the PCB analyses.

During work on this project, two events occurred nearly simultaneously, which negatively impacted the 60 day deliverable schedule: an analytical hold due to waste handling issues at the 222-S Laboratory, and the discovery of PCBs at concentrations of regulatory significance in the 105-N Basin samples.

Due to findings of regulatory non-compliance by the Washington State, Department of Ecology, the 222-S Laboratory placed a temporary administrative hold on its analytical work until all waste handling, designation and segregation issues were resolved. During the hold of approximately three weeks, all analytical and waste handling procedures were rewritten to comply with the legal regulations, and all staff were retrained in the designation, segregation and disposal of RCRA liquid and solid wastes.

Upon finding significant concentrations of PCBs in the 105-N Basin samples, it was determined that analyses would be placed on hold until a method of segregating and disposal of PCB laden (or PCB laden suspect) analytical waste which was compliant with the Toxic Substances Control Act (TSCA) could be implemented. The consequences of this decision were: 1.) only those analyses required to enable an analysis of PCBs in the samples were performed until the PCB content was known, 2.) a standing order of policy and interim procedure for handling of PCB (or suspected PCB) samples in the laboratory was written, and 3.) agreement was obtained from the regulators that if no PCBs were found in the 107-N samples, that they could be processed analytically as a project separate from the other N Basin characterization projects, irrespective of whether samples from the other projects were found to contain PCBs. Each of these actions required additional time, causing delivery of the report to be delayed by two weeks.

SAMPLE COLLECTION AND RECEIVING

Table 1 provides dates associated with sample collection, and the receiving and analyses of samples at the 222-S Laboratory. Table 1 also indicates RCRA sample holding times.

ANALYTICAL REQUIREMENTS

On May 23, 1997, the Laboratory was informed by the program via electronic mail that the accuracy control limits for this project were changed from ±2 standard deviations (based on LCS data) for the spikes and LCS standards to ±3 standard deviations for LCS standards and to 75 to 125 percent recovery for spikes.

The original quality control (QC) limits for this project for accuracy (specified in Reference 1) were unusually restrictive as well as being incongruous with the use normal quality control evaluation methods. The program specified that spike accuracy would be acceptable when the analytically derived spike values fell within ±2 standard deviations of the mean recovery for Laboratory Control Samples (LCS). The LCS, however, is a sample containing a standard compound of known concentration in an interference-free matrix. The 222-S Laboratory maintains historical data and routinely controls all analyses to within ±3 standard deviations for LCS. Thus, not only was the limit of ±2 standard deviations more restrictive than that of normal 222-S operations, but it was also required on spikes (unrelated in sample matrix to the LCS system), which often have significant matrix interference. The consequence of such restrictive QC limits was that many analytical results which would ordinarily be acceptable would have been flagged as being out of control.

As noted above, the accuracy QC requirements were changed just prior to completion of this project. The quality control requirements, which are summarized in Table 2 of this report, are based on the revised requirements. These new quality control requirements will be reflected in revised documents

to be produced by the program, and are now synchronous with those in Reference 3.

For settled density, centrifuged density and volume percent solids, the data were generated during the sample breakdown process. Breakdown was required to provide subsamples for subsequent analyses. Because the density and percent solids data cannot be provided after the samples have already been broken down, they are considered to be part of the breakdown process. The test plan (formalized later as controlled procedure, LT-519-103, Revision A-0, on May 21, 1997) was specifically developed for the breakdown of these N-Basin samples, for which there was no pre-existing procedure meeting the requirements of Reference 3.

Table 1. Sample Collection and Analytical Dates

Sample Collection		Sample Receiving		Sample Identification			Analytical Operations		
Date	Time	Date	Time	Customer Sample Number	Laboratory Sample Number	Sample Description	Analyte or Procedure	Analysis Date	Sample Holding Time, days
2/24/97	1130	2/24/97	1830	BOJYD5 (1310-N)	S97N000003	Original Sample	Settled Density	4/15/97	50
							Centrifuged Density	4/15/97	50
							Volume % Solids	4/15/97	50
					S97N000047	Settled Solid	Particle Size Distribution	5/12/97	77
							Viscosity	5/13/97	78
					S97N000054	Centrifuged Solid	Shipped to Quanterra for PCB Analysis	5/16/97	n/a
					S97N000053	Centrifuged Liquid	Anions by IC	5/22/97	87
							pH	5/22/97	87
							Ammonia	5/22/97	87
					S97N000049	Centrifuged Solid, Direct	TIC/TOC	5/24/97	89
							Mercury	5/2/97	67
					S97N000051	Centrifuged Solid, Acid Digest	Acid Digestion	4/22/97	57
							Total Alpha/Beta	4/24/97	59
							Am-241 & Cm-244	5/21/97	86
							Pu-238/239/240	5/21/97	86
							Gamma Energy Analyses	4/24/97	59
							Sr-90	5/15/97	80
							Tc-99	5/23/97	88
							Isotopic Th and U by ICP/MS	5/2/97	67
							Metals by ICP	4/28/97	63
					S97N000048	Centrifuged Solid, TCLP	TCLP Preparation	5/2/97	67
							Metals by ICP	5/7/97	72
							Mercury	5/27/97	92
3/10/97	1330	3/17/97	1335	BOJYD6 (107-N)	S97N000024	Original Sample	Settled Density	4/15/97	36
							Centrifuged Density	4/15/97	36
							Volume % Solids	4/15/97	36
					S97N000027	Settled Solid	Particle Size Distribution	5/12/97	63
							Viscosity	5/13/97	64
					S97N000032	Centrifuged Solid	Shipped to Quanterra for PCB Analysis	5/16/97	n/a
					S97N000030	Centrifuged Liquid	Anions by IC	5/22/97	73
							pH	5/22/97	73
							Ammonia	5/22/97	73
					S97N000029	Centrifuged Solid, Direct	TIC/TOC	5/24/97	75
							Mercury	5/14/97	65
					S97N000031	Centrifuged Solid, Acid Digest	Acid Digestion	4/22/97	43
							Total Alpha/Beta	4/24/97	45
							Am-241 & Cm-244	5/21/97	72
							Pu-238/239/240	5/21/97	72
							Gamma Energy Analyses	4/24/97	45
							Sr-90	5/15/97	66
							Tc-99	5/27/97	78
							Isotopic Th and U by ICP/MS	5/2/97	53
							Metals by ICP	4/28/97	49
					S97N000028	Centrifuged Solid, TCLP	TCLP Preparation	5/6/97	57
							Metals by ICP	5/7/97	58
							Mercury	5/27/97	78

Table 1. Sample Collection and Analytical Dates

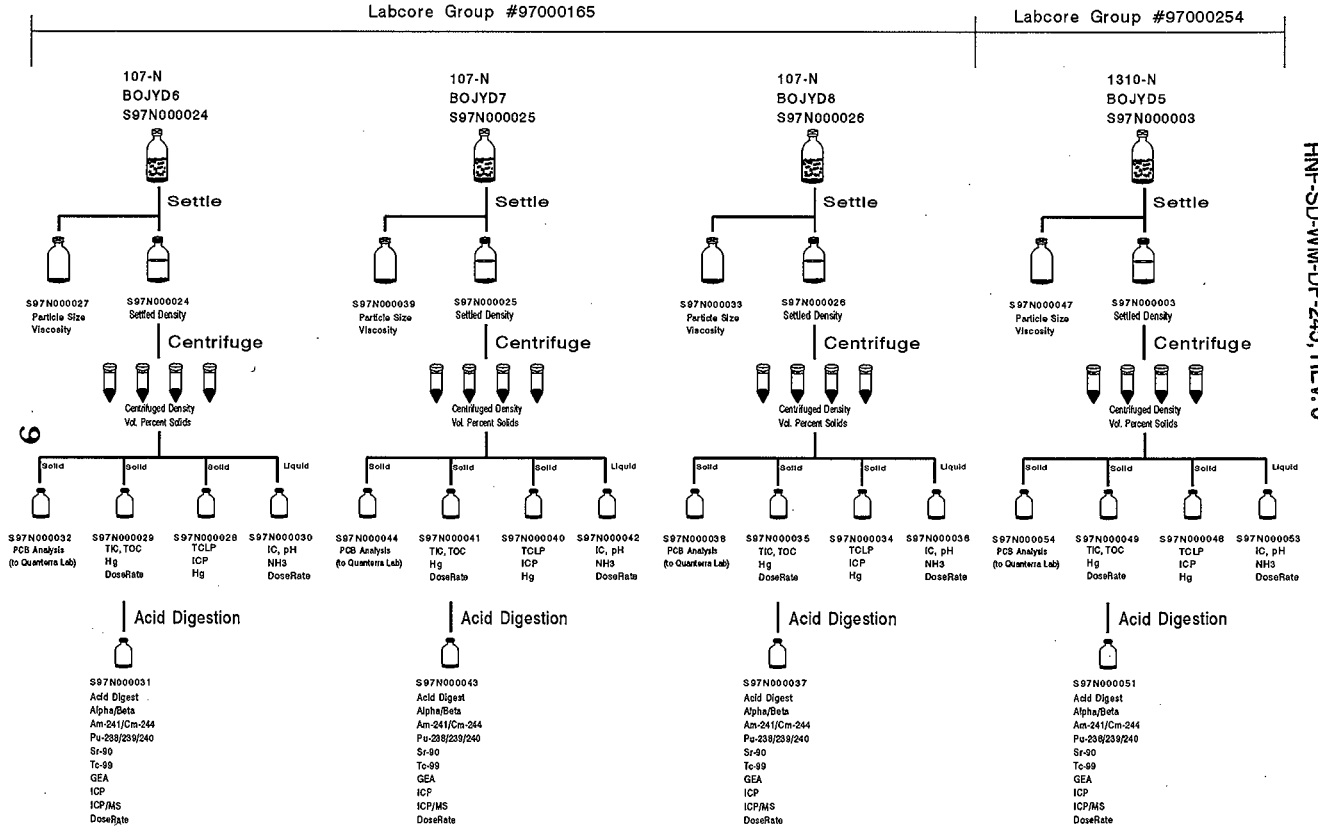
Sample Collection		Sample Receiving		Sample Identification			Analytical Operations		
Date	Time	Date	Time	Customer Sample Number	Laboratory Sample Number	Sample Description	Analyte or Procedure	Analysis Date	Sample Holding Time, days
3/11/97	1344	3/17/97	1335	BOJYD7 (107-N)	S97N000025	Original Sample	Settled Density	4/15/97	35
							Centrifuged Density	4/15/97	35
							Volume % Solids	4/15/97	35
					S97N000039	Settled Solid	Particle Size Distribution	5/12/97	62
							Viscosity	5/19/97	69
					S97N000044	Centrifuged Solid	Shipped to Quanterra for PCB Analysis	5/16/97	n/a
					S97N000042	Centrifuged Liquid	Anions by IC	5/22/97	72
							pH	5/22/97	72
							Ammonia	5/22/97	72
					S97N000041	Centrifuged Solid, Direct	TIC/TOC	5/24/97	74
							Mercury	5/2/97	52
					S97N000043	Centrifuged Solid, Acid Digest	Acid Digestion	4/22/97	42
							Total Alpha/Beta	4/24/97	44
							Am-241 & Cm-244	5/21/97	71
							Pu-238/239/240	5/21/97	71
							Gamma Energy Analyses	4/24/97	44
							Sr-90	5/15/97	65
							Tc-99	5/27/97	77
							Isotopic Th and U by ICP/MS	5/2/97	52
							Metals by ICP	4/28/97	48
					S97N000040	Centrifuged Solid, TCLP	TCLP Preparation	5/6/97	56
							Metals by ICP	5/7/97	57
							Mercury	5/27/97	77
3/12/97	0910	3/17/97	1335	BOJYD8 (107-N)	S97N000026	Original Sample	Settled Density	4/15/97	34
							Centrifuged Density	4/15/97	34
							Volume % Solids	4/15/97	34
					S97N000033	Settled Solid	Particle Size Distribution	5/12/97	61
							Viscosity	5/13/97	62
					S97N000038	Centrifuged Solid	Shipped to Quanterra for PCB Analysis	5/16/97	n/a
					S97N000036	Centrifuged Liquid	Anions by IC	5/22/97	71
							pH	5/22/97	71
							Ammonia	5/22/97	71
					S97N000035	Centrifuged Solid, Direct	TIC/TOC	5/24/97	73
							Mercury	5/2/97	51
					S97N000037	Centrifuged Solid, Acid Digest	Acid Digestion	4/22/97	41
							Total Alpha/Beta	4/24/97	43
							Am-241 & Cm-244	5/21/97	70
							Pu-238/239/240	5/21/97	70
							Gamma Energy Analyses	4/24/97	43
							Sr-90	5/15/97	64
							Tc-99	5/27/97	76
							Isotopic Th and U by ICP/MS	5/2/97	51
							Metals by ICP	4/28/97	47
					S97N000034	Centrifuged Solid, TCLP	TCLP Preparation	5/6/97	55
							Metals by ICP	5/8/97	57
							Mercury	5/27/97	76

Table 2. Project Requirements for 107-N and 1310-N Basin

Procedure	Analyte	LABCORE Procedure #	QC Requirements (see note 2)		Target MDA / MDL µCi/g or µg/g
			Duplicate RPD	Spike % Recovery	
Gross Alpha	Alpha	@AB-01	±30	75-125	0.05
Gross Beta	Beta	@AB-01	±30	75-125	0.1
GEA	Am-241	@GEA-04	±30	n/a	0.05
GEA	Sb-125	@GEA-04	±30	n/a	0.05
GEA	Co-60	@GEA-04	±30	n/a	0.05
GEA	Cs-134	@GEA-04	±30	n/a	0.05
GEA	Cs-137	@GEA-04	±30	n/a	0.05
GEA	Eu-152	@GEA-04	±30	n/a	0.05
GEA	Eu-154	@GEA-04	±30	n/a	0.05
GEA	Eu-155	@GEA-04	±30	n/a	0.05
GEA	Ra-226	@GEA-04	±30	n/a	0.05
GEA	Ac-228	@GEA-04	±30	n/a	0.05
Sr-90	Sr-90	@SR90-01	±30	n/a	0.05
Tc-99 (Chemical separation/LCS)	Tc-99	@TC99-01	±30	n/a	0.1
Isotopic Thorium (ICP/MS)	Th-228/230/232	ICPMS-01	±30	n/a	0.1
Isotopic Uranium (ICP/MS)	U-234/235/238	ICPMS-01	±30	n/a	0.1
Am-241, Cm-244 (AEA)	Am-241 and Cm-244	@AM24102	±30	n/a	0.02
Pu-238/239/240 (AEA)	Pu-238/239/240	@PU23902	±30	n/a	0.02
Total Metals (ICP)	Ag	@ICP-A02	±30	75-125	6
Total Metals (ICP)	Al	@ICP-A02	±30	75-125	20
Total Metals (ICP)	As	@ICP-A02	±30	75-125	100
Total Metals (ICP)	Ba	@ICP-A02	±30	75-125	150
Total Metals (ICP)	Be	@ICP-A02	±30	75-125	0.25
Total Metals (ICP)	Cd	@ICP-A02	±30	75-125	3.5
Total Metals (ICP)	Cr	@ICP-A02	±30	75-125	15
Total Metals (ICP)	Fe	@ICP-A02	±30	75-125	10
Total Metals (ICP)	Mn	@ICP-A02	±30	75-125	2
Total Metals (ICP)	Na	@ICP-A02	±30	75-125	60
Total Metals (ICP)	Ni	@ICP-A02	±30	75-125	100
Total Metals (ICP)	Si	@ICP-A02	±30	75-125	3
Total Metals (ICP)	Pb	@ICP-A02	±30	75-125	7
Total Metals (ICP)	Sb	@ICP-A02	±30	75-125	40
Total Metals (ICP)	Se	@ICP-A02	±30	75-125	3
Total Metals (ICP)	Tl	@ICP-A02	±30	75-125	1.5
Total Metals (ICP)	V	@ICP-A02	±30	75-125	4.5
Total Metals (ICP)	Zn	@ICP-A02	±30	75-125	3
Mercury (AA/Cold Vapor)	Hg	HG-02	±30	75-125	0.5
TCLP Metals	Sb (see note 1)	@ICP-T01	±30	75-125	2
TCLP Metals	As	@ICP-T01	±30	75-125	5
TCLP Metals	Ba	@ICP-T01	±30	75-125	7
TCLP Metals	Be (see note 1)	@ICP-T01	±30	75-125	0.01
TCLP Metals	Cd	@ICP-T01	±30	75-125	0.2
TCLP Metals	Cr	@ICP-T01	±30	75-125	0.8
TCLP Metals	Pb	@ICP-T01	±30	75-125	0.4
TCLP Metals	Ni (see note 1)	@ICP-T01	±30	75-125	5
TCLP Metals	Se	@ICP-T01	±30	75-125	0.2
TCLP Metals	Ag	@ICP-T01	±30	75-125	0.3
TCLP Metals	Tl (See note 1)	@ICP-T01	±30	75-125	0.08
TCLP Metals	V (see note 1)	@ICP-T01	±30	75-125	0.2
TCLP Metals	Hg	HG-02	±30	75-125	0.02
Anions (Ion Chromatography)	Br	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	Cl	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	F	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	NO3	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	NO2	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	PO4	@IC-01	±30	75-125	5
Anions (Ion Chromatography)	SO4	@IC-01	±30	75-125	5
Ammonia (Ion Selective Electrode)	NH3	NH3-01	±30	75-125	10
TOC (Combustion)	TOC	TOC-01	±30	75-125	200
TIC (Acidification/Coulometric)	TIC	TIC-02	±30	75-125	50
pH	pH	PH-01	±30	n/a	0.1 pH unit
Particle Size Distribution (Analyzer)	Particle Size	PARTSZ01	n/a	n/a	n/a
Density (Settled and Centrifuged)	Density	Test Plan	n/a	n/a	n/a
Viscosity	Viscosity	VISCSTY1	n/a	n/a	n/a

Note 1. Although the project requested this analysis, the regulatory definition of TCLP in SW-846, section 7.4.3, does not include these metals.
Note 2. Accuracy is ±3 standard deviations for the statistically derived LCS standard or 75 to 125 percent recovery for the spike.
Note 3. Laser ablation/mass spectrometry was not included in the table because it was deleted from the project subsequent to release of the Letter of Instruction.
Note 4. Polychlorinated biphenyl analysis was not included in the table because this analysis was assigned to Quanterra lab, which will provide a separate report.

Figure 1. 107-N Basin Sample Processing Scheme



SAMPLE PREPARATION

Figure 1 depicts the processing scheme for samples and indicates the relationships between subsamples. The procedure for initial breakdown of samples, as well as for determining settled and centrifuged density of solids is provided as Appendix 1, *Test Plan for Processing Sediment Samples from 105-N Basin (Revision 1).*

For those analyses requiring fully solubilized solids in an acid matrix, an acid digestion was performed on subsamples using procedure LA-505-159, Rev. D-0. The procedure was taken directly from EPA SW-846, Method 3050.

DISCUSSION OF ANALYTICAL RESULTS

Summary analytical results, including analyte-specific chemist's narratives are presented on pages 38 through 181. Results for the PCB analyses will be provided to the program separately by the Quanterra Environmental Services laboratory.

All of the reported data have met the ±3 standard deviation accuracy requirement for LCS (when an LCS is associated with that analyte).

Toxicity Characteristic Leach Procedure (TCLP) results were requested by the program for 13 metals, however the SW-846 has provisions for only eight: As, Ba, Cd, Cr, Pb, Se, Ag and Hg. As a consequence, data are presented in this report for only those eight analytes. Analytical results for the other metals (Sb, Be, Ni, Tl and V), after having been processed through the TCLP procedure, will be provided in a subsequent revision to this report. The lower accuracy control limit stated in SW-846 for TCLP metals is 50 percent recovery, which is different than the project's specified control limit of 75 percent. The results in this project were controlled to the SW-846 control limit. Less than 100 grams were used for extraction due to the need to limit radiation exposure to laboratory staff. A discussion of these deviations from SW-846 regulatory requirements for TCLP is provided as Appendix 3.

A poor correlation of results between Total Alpha, Am-241 by GEA and by AEA, and Pu-239/240 by AEA was observed for samples BOJYD7 and BOJYD8. From a second evaluation of these data, it was not able to determined that an error had been made or the most likely source of error. As a consequence, a rerun of both Pu-238/239/240 by AEA and Am-241/Cm-244 by AEA was requested to confirm the original results. These rerun data will be provided in a revision to this report. The original data for these samples are included in this report on a separate summary table.

Volume Percent of Centrifuged Solids

Analytical data were extracted from the determination of solids density and are reported in tabular form on page 40. The formalized procedure, LT-519-103, was not available at the time that these results were acquired, however the test plan from which the results were generated is provided as Appendix 1.

Volume percent of centrifuged solids is calculated as follows:

%Solids = (milliliters of centrifuged solids ÷ milliliters of settled solids) x 100.

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	not specified
Procedure Used:	Test Plan (see Appendix 1)
Required Precision:	not specified
Met Precision Requirement?:	n/a
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	not specified
Samples Not Meeting Target PQL:	n/a
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blanks Contaminated?:	n/a

Settled and Centrifuged Density

Density data are presented in tabular form on page 44 as part of the Chemist's physical testing narrative. The method of analysis was given in Appendix 1, a test plan, thus a formalized procedure number is not available.

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	not specified
Procedure Used:	Test Plan
Required Precision:	±30 RPD
Met Precision Requirement?:	yes
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	not specified
Samples Not Meeting Target PQL:	n/a
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blanks Contaminated?:	n/a

Particle Size Distribution

Particle size data are presented in graphical and tabular forms on pages 46 through 64 as part of the Chemist's physical testing narrative.

Procedural Anomalies/Difficulties: The chemist noted that all four samples probably contained particles with diameters <0.5 μm and >150 μm, which exceed the detection limits of the instrument.

Required RCRA Procedure:	not specified
Procedure Used:	LT-519-101, Rev. A-1
Required Precision:	n/a
Met Precision Requirement?:	n/a
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	not specified
Samples Not Meeting Target PQL:	n/a
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blanks Contaminated?:	n/a

Viscosity

Viscosity data are presented in graphical and tabular form on pages 66 through 108 as part of the Chemist's physical testing narrative.

Procedural Anomalies/Difficulties: The chemist noted that pieces of metal were found in samples BOYJD7 (several small pieces) and BOYJD8 (one piece 3 centimeters in length) during analyses.

Required RCRA Procedure:	not specified
Procedure Used:	LT-519-115, Rev. B-0
Required Precision:	n/a
Met Precision Requirement?:	n/a
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	not specified
Samples Not Meeting Target PQL:	n/a
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blanks Contaminated?:	n/a

pH (Electrometric)

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	not specified
Procedure Used:	LA-212-106, Rev. B-0
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (0.25 RPD)
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a. Recovery of LCS was within ±3 standard deviations.
Target Practical Quant Limit (PQL):	0.1 pH unit
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	immediate field analysis
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	n/a

Total Inorganic Carbon (Acid/Coulometric)

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9060 modified
Procedure Used:	LA-342-100, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (4.9 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (97.6 %Recovery)
Target Practical Quant Limit (PQL):	50 µg/g
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	contamination is insignificant

Total Organic Carbon (Combustion/Coulometric)

The combustion procedure (specified in Reference 2) for TOC has been inactivated at 222-S Laboratory and replaced with a persulfate oxidation procedure.

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	not specified
Procedure Used:	LA-342-100, Rev. E-0, Persulfate Oxidation
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (0.3 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	no (125.7 %Recovery) A rerun was not requested because of the requirement for rapid turnaround of data and because the spike result exceeded the accuracy control limit only very slightly.
Target Practical Quant Limit (PQL):	200 µg/g
Samples Not Meeting Target PQL:	n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA):	28 days
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	no

Ammonia by Ion Selective Electrode

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	not specified
Procedure Used:	LA-631-001, Rev. B-2
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (100.8 %Recovery)
Target Practical Quant Limit (PQL):	10 µg/ml
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Bromide by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (95.9 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	all due to procedural requirement for sample dilution. The smallest dilution (11x) was used for these analyses, yielding the lowest detection limit (and associated PQL).
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Chloride by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (2.2 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (88.6 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	28 days
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	no

Fluoride by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (0.7 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (100.8 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Nitrate by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (7.5 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (93.4 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	BOJYD5, BOJYD7 and BOJYD8 due to procedural requirement for sample dilution. The smallest dilution (11x) was used for these analyses, yielding the lowest detection limit (and associated PQL).
Maximum Sample Holding Time (RCRA):	48 hours
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	no

Nitrite by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (95.4 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	all due to procedural requirement for sample dilution. The smallest dilution (11x) was used for these analyses, yielding the lowest detection limit (and associated PQL).
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Phosphate by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (93.6 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	all due to procedural requirement for sample dilution. The smallest dilution (11x) was used for these analyses, yielding the lowest detection limit (and associated PQL).
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Sulfate by Ion Chromatography

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 9056
Procedure Used:	LA-533-105, Rev. D-1, equivalent to 9056
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (0.2 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (96.5 %Recovery)
Target Practical Quant Limit (PQL):	5 µg/ml
Samples Not Meeting Target PQL:	n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA):	28 days
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	no

Mercury by Cold Vapor Atomic Absorption Spectrometry

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 7471
Procedure Used:	LA-325-104, Rev. D-0, equivalent to 7471
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (10.2 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (86.7 %Recovery)
Target Practical Quant Limit (PQL):	0.5 µg/g
Samples Not Meeting Target PQL:	BOJYD7 and BOJYD8. n/a for BOJYD5 and BOJYD6, which had detectable concentrations greater than the PQL).
Maximum Sample Holding Time (RCRA):	28 days
Samples Exceeding Max Holding Time:	all
Blank Contaminated?:	no

Aluminum by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (9.6 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (112.4 %Recovery)
Target Practical Quant Limit (PQL):	20 µg/g
Samples Not Meeting Target PQL:	n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Antimony by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (99.6 %Recovery)
Target Practical Quant Limit (PQL):	40 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 29 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Arsenic by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (106.6 %Recovery)
Target Practical Quant Limit (PQL):	100 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 20 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Barium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (10.7 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (99.4 %Recovery)
Target Practical Quant Limit (PQL):	150 µg/g
Samples Not Meeting Target PQL:	BOJYD5 and BOJYD6 due to ALARA requirement. To meet the PQL would require digestion of 4 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Beryllium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (102.4 %Recovery)
Target Practical Quant Limit (PQL):	0.25 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 387 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Cadmium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (22.4 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (99.6 %Recovery)
Target Practical Quant Limit (PQL):	3.5 µg/g
Samples Not Meeting Target PQL:	n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Chromium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (3.5 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (100 %Recovery)
Target Practical Quant Limit (PQL):	15 µg/g
Samples Not Meeting Target PQL: greater than the PQL)	n/a (all had detectable concentrations
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Iron by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (7.0 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	no (-440 %Recovery). All samples had concentrations exceeding 1000 µg/g, which is the upper limit for detector linearity. Consequently, percent recovery is not a valid measure of accuracy for this analyte. The LCS had a recovery of 91.8 %Recovery, which was within the ±2 standard deviation control limit.
Target Practical Quant Limit (PQL):	10 µg/g
Samples Not Meeting Target PQL: greater than the PQL)	n/a (all had detectable concentrations
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Lead by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (5.8 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (97.8 %Recovery)
Target Practical Quant Limit (PQL):	7 µg/g
Samples Not Meeting Target PQL: greater than the PQL)	n/a (all had detectable concentrations
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Manganese by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (4.9 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (95.6 %Recovery)
Target Practical Quant Limit (PQL):	2 µg/g
Samples Not Meeting Target PQL: greater than the PQL)	n/a (all had detectable concentrations
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Nickel by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (1.7 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (102.8 %Recovery)
Target Practical Quant Limit (PQL):	100 µg/g
Samples Not Meeting Target PQL:	BOJYD7 and BOJYD8 due to ALARA requirement. To meet the PQL would require digestion of 6 times the amount of sample originally digested. For BOJYD6 and BOJYD7, this measure was not applicable because these samples had detectable concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Selenium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (96.0 %Recovery)
Target Practical Quant Limit (PQL):	3 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 647 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Silicon by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: SW-846, 6010A
Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
Required Precision: ±30 RPD
Met Precision Requirement: yes (2.1 RPD)
Required Spike Accuracy: 75 - 125 %Recovery
Met Accuracy Requirement?: no (132.6 %Recovery), due to being acid digestion in glassware composed of silicon. All silicon results may be considered to be biased high. The LCS is within ±3 standard deviations.
Target Practical Quant Limit (PQL): 3 µg/g
Samples Not Meeting Target PQL: n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA): 6 months
Samples Exceeding Max Holding Time: none
Blank Contaminated?: yes as expected, but insignificant relative to the concentrations in the samples.

Silver by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: SW-846, 6010A
Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
Required Precision: ±30 RPD
Met Precision Requirement: RPD not calculable
Required Spike Accuracy: 75 - 125 %Recovery
Met Accuracy Requirement?: yes (92.4 %Recovery)
Target Practical Quant Limit (PQL): 6 µg/g
Samples Not Meeting Target PQL: all due to ALARA requirement. To meet the PQL would require digestion of 33 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA): 6 months
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Sodium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement:	yes (19.9 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (93.8 %Recovery)
Target Practical Quant Limit (PQL):	60 µg/g
Samples Not Meeting Target PQL:	BOJYD7 due to ALARA requirement. To meet the PQL would require digestion of 33 times the amount of sample originally digested. For BOJYD5, BOJYD6 and BOJYD8, this measure was not applicable because these samples had detectable concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Thallium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (93.6 %Recovery)
Target Practical Quant Limit (PQL):	1.5 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 2580 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Vanadium by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement:	yes (101.6 %Recovery)
Target Practical Quant Limit (PQL):	4.5 µg/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 215 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Zinc by Inductively Coupled Plasma/Atomic Emission Spectroscopy

Procedural Anomalies/Difficulties:	
Required RCRA Procedure:	SW-846, 6010A
Procedure Used:	LA-505-161, Rev. C-1, equivalent to 6010
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (2.5 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (89.8 %Recovery)
Target Practical Quant Limit (PQL):	3 µg/g
Samples Not Meeting Target PQL:	n/a (all had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Mercury by TCLP Extraction/Cold Vapor Atomic Absorption Spectrometry

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 7471
Analytical Procedure Used: LA-325-104, Rev. D-0, equivalent to 7471
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846
Met Accuracy Requirement?: no per project limit; yes per SW-846 (52.3 %Recovery)
Target Practical Quant Limit (PQL): 0.02 µg/g
Samples Not Meeting Target PQL: all The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between <0.03 and <0.06 µg/g for all samples.
Maximum Sample Holding Time (RCRA): 28 days to TCLP Extraction, and 28 additional days to analysis.
Samples Exceeding Max Holding Time: all samples exceeded the time to TCLP extraction. However all samples met the holding time requirement between extraction and analysis, ranging from 21 to 25 days.
Blank Contaminated?: no

Arsenic by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846.
Met Accuracy Requirement?: yes for both the project and for SW-846 (109.3 %Recovery)
Target Practical Quant Limit (PQL): 5 µg/g
Samples Not Meeting Target PQL: all The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 5.8 and 6.2 µg/g for all samples.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Barium by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: no (51.3 RPD)
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846.
Met Accuracy Requirement?: yes (110.4 %Recovery)
Target Practical Quant Limit (PQL): 7 µg/g
Samples Not Meeting Target PQL: none. The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 2.9 and 3.1 µg/g for all samples.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Cadmium by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846.
Met Accuracy Requirement?: yes (108.0 %Recovery)
Target Practical Quant Limit (PQL): 0.2 µg/g
Samples Not Meeting Target PQL: BOJYD5 and BOYJD6 for which the detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 0.29 and 0.31 µg/g. (n/a for samples BOJYD7 and BOYJD8 which had detectable concentrations greater than the PQL)
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Chromium by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846.
Met Accuracy Requirement?: yes (107.2 %Recovery)
Target Practical Quant Limit (PQL): 0.8 µg/g
Samples Not Meeting Target PQL: none. The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 0.58 and 0.62 µg/g for all samples.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Lead by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846.
Met Accuracy Requirement?: yes (110.2 %Recovery)
Target Practical Quant Limit (PQL): 0.4 µg/g
Samples Not Meeting Target PQL: all The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 5.8 and 6.2 µg/g for all samples.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Selenium by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement: no (43.0 RPD)
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846. The LCS standard exceeded the upper control limit of 108.1%.
Met Accuracy Requirement?: yes (120.3 %Recovery)
Target Practical Quant Limit (PQL): 0.2 µg/g
Samples Not Meeting Target PQL: all The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 5.8 and 6.1 µg/g.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Silver by TCLP Extraction/ICP/Atomic Emission Spectroscopy

TCLP Anomalies/Difficulties: None Noted
Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: SW-846, 6010A
Analytical Procedure Used: LA-505-161, Rev. C-1, equivalent to 6010
TCLP Method 1311 Used: LA-544-134, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement: yes (0.7 RPD)
Required Spike Accuracy: 75 to 125 %Recovery for the project, and 50 to 150 %Recovery per SW-846. The LCS recovery was within control limits.
Met Accuracy Requirement?: no for the project, but yes for SW-846 (59.3 %Recovery)
Target Practical Quant Limit (PQL): 0.3 µg/g
Samples Not Meeting Target PQL: all The detection limit multiplied by 10 (to calculate the analytically derived PQL) varied between 0.58 and 0.62 µg/g.
Maximum Sample Holding Time (RCRA): 180 days to TCLP Extraction, and 180 additional days to analysis.
Samples Exceeding Max Holding Time: none
Blank Contaminated?: insignificant contamination

Isotopic Uranium by Inductively Coupled Plasma/Mass Spectrometry

Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: none specified
Analytical Procedure Used: LT-506-101, Rev. A-1
Required Precision: ±30 RPD
Met Precision Requirement: yes: Not calculable for U-234; U-235 at 14.9 RPD; and U-238 at 12.9 RPD
Required Spike Accuracy: 75 to 125 %Recovery
Met Accuracy Requirement?: yes (98.6 %Recovery for U-238)
Target Practical Quant Limit (PQL): 0.1 µg/g
Samples Not Meeting Target PQL: all samples did not meet the PQL limit for U-234. The PQL did not apply to U-235 and U-238 because they were detected at concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA): 6 months
Samples Exceeding Max Holding Time: none
Blank Contaminated?: insignificant contamination for U-238

Isotopic Thorium by Inductively Coupled Plasma/Mass Spectrometry

Procedural Anomalies/Difficulties: None noted
Required RCRA Analytical Procedure: none specified
Analytical Procedure Used: LT-506-101, Rev. A-1
Required Precision: ±30 RPD
Met Precision Requirement: RPD not calculable for Th-228 and Th-230; The RPD Requirement was met for Th-232 (14.0 RPD).
Required Spike Accuracy: 75 to 125 %Recovery
Met Accuracy Requirement?: No spike or LCS standard was available for Thorium isotopes, however for U-238 (which was analyzed simultaneously) the recovery was 98.6%, which was within the control limit.
Target Practical Quant Limit (PQL): 0.1 µg/g
Samples Not Meeting Target PQL: BOYJD7 did not meet the limit for Th-232. The PQL for Th-232 did not apply to the other samples because they were detected at concentrations greater than the PQL. None of the samples met the PQL for Th-228 and Th-230.
Maximum Sample Holding Time (RCRA): 6 months
Samples Exceeding Max Holding Time: none
Blank Contaminated?: no

Total Alpha by Gas Proportional Counting

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-508-101, Rev. G-0
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (7.1 RPD). LCS recovery was within ±3 standard deviations.
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (101.5 %Recovery)
Target Practical Quant Limit (PQL):	0.05 µCi/g
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Total Beta by Gas Proportional Counting

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-508-101, Rev. G-0
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (11.3 RPD)
Required Spike Accuracy:	75 - 125 %Recovery
Met Accuracy Requirement?:	yes (106.8 %Recovery)
Target Practical Quant Limit (PQL):	0.1 µCi/g
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	6 months
Samples Exceeding Max Holding Time:	none
Blank Contaminated?:	no

Strontium-89/90 by Chemical Separation/Beta Proportional Count

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-220-101, Rev. D-1
Required Precision:	±30 RPD
Met Precision Requirement?:	yes (5.6 RPD)
Required Spike Accuracy:	spike not requested
Met Accuracy Requirement?:	n/a. LCS recovery was within ±3 standard deviations. Carrier recoveries for all samples were >81.2%.
Target Practical Quant Limit (PQL):	0.05 µCi/g
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Technetium-99 by Chemical Separation/Liquid Scintillation

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-438-101, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	spike not requested
Met Accuracy Requirement?:	n/a. LCS recovery was within ±3 standard deviations. Tracer recoveries for all samples were >36.2%.
Target Practical Quant Limit (PQL):	0.1 μCi/g
Samples Not Meeting Target PQL:	none
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Americium-241 by Chemical Separation/Alpha Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	*LA-953-104, Rev. B-0*
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	spike not requested
Met Accuracy Requirement:	n/a. LCS recovery was within ±3 standard deviations. Tracer recoveries for all samples were >77.5%.
Target Practical Quant Limit (PQL):	0.02 μCi/g
Samples Not Meeting Target PQL:	none. The limit was not applicable for samples BOJYD7 and BOJYD8 because they had detected concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Plutonium-239/240 by Chemical Separation/Alpha Energy Analysis

Procedural Anomalies/Difficulties: none noted
Required RCRA Procedure: none specified
Procedure Used: LA-953-104, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: yes (0.9 RPD)
Required Spike Accuracy: spike not requested
Met Accuracy Requirement?: n/a. LCS recovery was within ±3 standard deviations. Tracer recoveries for all samples varied between 92.2 and 106.0%.
Target Practical Quant Limit (PQL): 0.02 μCi/g
Samples Not Meeting Target PQL: none. The limit was not applicable for samples BOJYD7 and BOJYD8 because they had detected concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA): not specified
Samples Exceeding Max Holding Time: n/a
Blank Contaminated?: no

Plutonium-238 by Chemical Separation/Alpha Energy Analysis

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: none specified
Procedure Used: LA-953-104, Rev. B-0
Required Precision: ±30 RPD
Met Precision Requirement?: yes (2.7 RPD)
Required Spike Accuracy: n/a
Met Accuracy Requirement?: n/a. There is no LCS standard for Pu-238, therefore the control limit to LCS does not apply.
Target Practical Quant Limit (PQL): 0.02 μCi/g
Samples Not Meeting Target PQL: none. The limit was not applicable for samples BOJYD7 and BOJYD8 because they had detected concentrations greater than the PQL.
Maximum Sample Holding Time (RCRA): not specified
Samples Exceeding Max Holding Time: n/a
Blank Contaminated?: insignificant contamination was present

Americium-241 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	0.05 μCi/g
Samples Not Meeting Target PQL:	all due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Cesium-134 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	0.05 μCi/g
Samples Not Meeting Target PQL:	all due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Cesium-137 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a. LCS recovery was within control limits.
Target Practical Quant Limit (PQL):	0.05 μCi/g
Samples Not Meeting Target PQL:	BOJYD6 due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Cobalt-60 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a LCS recovery was within control limits.
Target Practical Quant Limit (PQL):	0.05 µCi/g
Samples Not Meeting Target PQL:	BOJYD6 due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Europium-152 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	0.05 µCi/g
Samples Not Meeting Target PQL:	all due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Europium-154 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	0.05 µCi/g
Samples Not Meeting Target PQL:	all due to ALARA requirement.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

Europium-155 by Gamma Energy Analysis

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: none specified
Procedure Used: LA-548-121, Rev. E-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: n/a
Met Accuracy Requirement?: n/a
Target Practical Quant Limit (PQL): 0.05 μCi/g
Samples Not Meeting Target PQL: all due to ALARA requirement.
Maximum Sample Holding Time (RCRA): not specified
Samples Exceeding Max Holding Time: n/a
Blank Contaminated?: no

Radium-226 by Gamma Energy Analysis

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: none specified
Procedure Used: LA-548-121, Rev. E-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: n/a
Met Accuracy Requirement?: n/a
Target Practical Quant Limit (PQL): 0.05 μCi/g
Samples Not Meeting Target PQL: all due to ALARA requirement. To meet the PQL would require digestion of 41 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA): 6 months
Samples Exceeding Max Holding Time: n/a
Blank Contaminated?: no

Antimony-125 by Gamma Energy Analysis

Procedural Anomalies/Difficulties: None noted
Required RCRA Procedure: none specified
Procedure Used: LA-548-121, Rev. E-0
Required Precision: ±30 RPD
Met Precision Requirement?: RPD not calculable
Required Spike Accuracy: n/a
Met Accuracy Requirement?: n/a
Target Practical Quant Limit (PQL): 0.05 μCi/g
Samples Not Meeting Target PQL: all due to ALARA requirement. To meet the PQL would require digestion of 23,200 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA): not specified
Samples Exceeding Max Holding Time: n/a
Blank Contaminated?: no

Actinium-228 by Gamma Energy Analysis

Procedural Anomalies/Difficulties:	None noted
Required RCRA Procedure:	none specified
Procedure Used:	LA-548-121, Rev. E-0
Required Precision:	±30 RPD
Met Precision Requirement?:	RPD not calculable
Required Spike Accuracy:	n/a
Met Accuracy Requirement?:	n/a
Target Practical Quant Limit (PQL):	0.05 μCi/g
Samples Not Meeting Target PQL:	all due to ALARA requirement. To meet the PQL would require digestion of 18 times the amount of sample originally digested.
Maximum Sample Holding Time (RCRA):	not specified
Samples Exceeding Max Holding Time:	n/a
Blank Contaminated?:	no

SUMMARY DATA TABLES AND CHEMISTS'S NARRATIVES

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Volume Percent Solids

Customer Sample Number	Labcore Sample Number	Sample Result %	Duplicate Result %	Average Result %	Precision RPD
BOJYD5	S97N000003	71.4	78.9	75.2	10.0
BOJYD6	S97N000024	43.8	40.0	41.9	9.1
BOJYD7	S97N000025	50.0	50.0	50.0	0.0
BOJYD8	S97N000026	53.6	50.0	51.8	6.9

Calculated as milliliters of centrifuged solids divided by milliliters of settled solids, the quantity of which is multiplied by 100

Numatec Hanford Corporation | **Internal Memo**

From: Process Chemistry 8C510-97-011
Phone: 373-4995 T6-07
Date: May 22, 1997
Subject: 107-N PHYSICAL TESTING RESULTS

To: G. L. Miller T6-06

cc: D. L. Herting T6-07
J. R. Jewett T6-07
K. L. Powell T6-12
A. D. Rice T6-06
C. M. Seidel T6-14
JFO File/LB

Reference: Internal Memo, J. F. O'Rourke to G. L. Miller, "Test Plan for Processing Sediment Samples from 105-N Basin", dated March 12, 1997.

This letter reports the results of the physical testing conducted by Process Chemistry on sediment samples collected for the 107-N project. This letter includes results from the settled solids density, centrifuged solids density, particle size distribution, and viscosity analyses.

The settled and centrifuged solids densities from samples S97N000003, S97N000024, S97N000025, and S97N000026 are presented in Attachment I. The settled and centrifuged solids measurements were made as directed in the reference. The settled solids densities were measured after the samples were allowed to sit overnight. The cones were then centrifuged for greater than one hour and the centrifuged solids densities were measured. The settled and centrifuged solids measurements were completed on April 15, 1997. Layering was not apparent in any of the cones. All information associated with this testing was recorded in controlled laboratory notebook HNF-N-22-1.

The results of the particle size distribution analyses of samples S97N000027, S97N000033, S97N000039, and S97N000047 are presented in Attachments II through V. Laboratory Technology Procedure LT-519-101 (Revision A-1) was followed for all of the particle size analyses. All information associated with these analyses was recorded in controlled laboratory notebook RHO-RE-NB-208.

The samples were analyzed for particle size distribution on May 12, 1997. Most particles in the four samples were less than 10 μm in diameter. In sample S97N000027, the particulate mass was spread over diameter ranges up to 50 μm. The particle mass in samples S97N000039 and S97N000047 covered diameter ranges up to 100 μm. The mass in sample S97N000033 was distributed over the entire 150 μm range of the instrument.

All four sediment samples probably also contain particles with diameters less than 0.5 μm which would not be detected by this instrument. Sample S97N000033 appears likely to contain particles which exceed the upper 150 μm limit for the instrument.

Attachments VI through IX contains viscosity curves (viscosity vs. shear rate and shear stress vs. shear rate) and raw data for samples S97N000027, S97N000033, S97N000039, and S97N000047. Laboratory Technology Procedure LT-519-115 (Revision B-0) was followed for the viscosity analyses. All information associated with these measurements was recorded in the controlled laboratory notebooks HNF-N-22-1 and WHC-N-1272-1.

Samples S97N000027, S97N000033, and S97N000047 were analyzed for viscosity on May 13, 1997. Sample S97N000039 was run three times before a consistent result was obtained. The final viscosity measurement of sample S97N000039 was completed on May 19, 1997. This final viscosity run is included in Attachment VIII.

In each case, the sediment in samples S97N000027, S97N000033, S97N000039, and S97N0000047 had not been disturbed for at least 24 hours prior to the viscosity measurement. The viscosities were measured with shear rates increasing from 0 s^{-1} to 300 s^{-1} and decreasing from 300 s^{-1} to 0 s^{-1}. At the viscosities observed in these samples, the lower shear rate limit for the ME-45 sensor system is approximately 10 s^{-1}. Measurements with shear rates below 10 s^{-1} should be considered highly questionable. All viscosity tests were performed at ambient temperature.

During the viscosity measurements, pieces of metal were found in samples S97N000033 and S97N000039. A piece of metal, three centimeters in length, was discovered in sample S97N000033. No other metal objects were discovered in this sample. Sample S97N000039 contained several small metal pieces, ranging in size from several millimeters to one centimeter.

If you have any questions on this letter, feel free to call me at 373-4995.

J. F. O'Rourke
Process Chemistry
Numatec Hanford Corporation

Attachments (9)

8C510-PCS97-011

Attachment I

107-N SETTLED AND CENTRIFUGED SOLIDS DENSITIES

Consisting of 2 Pages including the cover page

TABLE 1 107-N SETTLED AND CENTRIFUGED SOLIDS DENSITIES

SAMPLE	SETTLED SOLIDS DENSITY (g/mL)	CENTRIFUGED SOLIDS DENSITY (g/mL)
S97N000003	1.25	1.43
	1.33	1.37
S97N000024	1.07	1.21
	1.19	1.33
S97N000025	1.14	1.32
	1.15	1.44
S97N000026	1.15	1.35
	1.20	1.47

8C510-PCS97-011

Attachment II

SAMPLE S97N000047 (BOJYD5) PARTICLE SIZE DISTRIBUTION RESULTS

Consisting of 5 Pages including the cover page

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

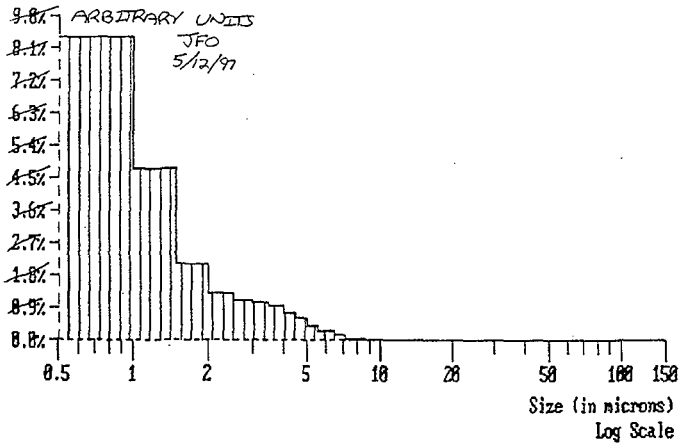
SAMPLE NAME : S97N000047 107N **HNF-SD-WM-DP-245, REV. 0**
FILE NAME : S97N47

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 525913
TIME	: 11:53	ACQ. MODE	: SAMPLE-	S.N.F.	: 0.68
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 870 SEC	S.D.U.	: 4798
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 5.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY NUMBER DENSITY GRAPH

Name: S97N000047 107N
5.2E+06 #/ml(100.0%)
Mode at 0.75 µm
<< SCALE RANGE (µm): ADJUSTED >>

Median : 0.91µm
Mean(nl): 1.25µm
S.D.(nl): 1.14µm
Conf(nl):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

NUMBER DISTRIBUTION TABLE (RANGES)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000047 107N
FILE NAME : S97N47

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 525913
TIME	: 11:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.68
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 870 SEC	S.D.U.	: 4798
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 5.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

RANGE (microns)	LOCAL (%)	UNDER(%)	-CUMULATIVE-	OVER(%)
0.0 - 1.0	61.58	61.58		38.42
1.0 - 2.0	26.89	88.47		11.53
2.0 - 3.0	5.31	93.78		6.22
3.0 - 4.0	3.11	96.88		3.12
4.0 - 5.0	1.65	98.53		1.47
5.0 - 6.0	0.73	99.26		0.74
6.0 - 7.0	0.33	99.59		0.41
7.0 - 8.0	0.12	99.71		0.29
8.0 - 9.0	0.07	99.78		0.22
9.0 - 10.0	0.05	99.83		0.17
10.0 - 20.0	0.15	99.98		0.02
20.0 - 30.0	0.01	99.99		0.01
30.0 - 40.0	0.00	100.00		0.00
40.0 - 50.0	0.00	100.00		0.00
50.0 - 60.0	0.00	100.00		0.00
60.0 - 70.0	0.00	100.00		0.00
70.0 - 80.0	0.00	100.00		0.00
80.0 - 90.0	0.00	100.00		0.00
90.0 - 100.0	0.00	100.00		0.00
100.0 - 150.0	0.00	100.00		0.00

G A L A I - C I S - 1

Computerized Inspection System

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000047 107N
FILE NAME : S97N47

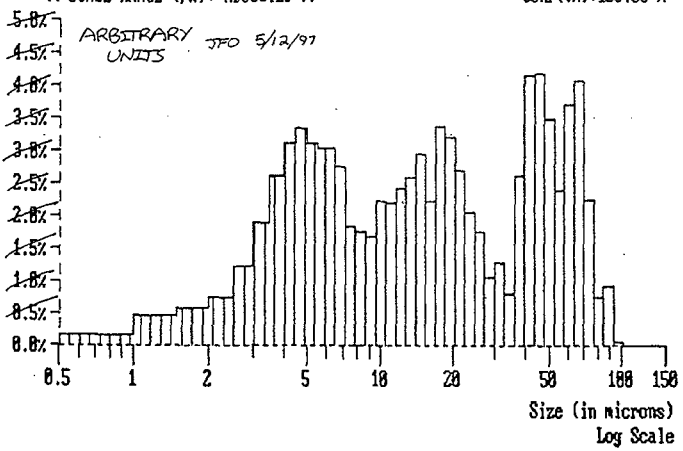
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 525913
TIME	: 11:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.68
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 870 SEC	S.D.U.	: 4798
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 5.2E+06 #/
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY VOLUME DENSITY GRAPH

Name: S97N000047 107N
5.2E-05 cc/ml(100.0%)
Mode at 45.76 µm
<< SCALE RANGE (µm): ADJUSTED >>

Mean(nu): 2.69µm
S.D.(nu): 1.84µm

Median : 13.99µm
Mean(vm): 23.31µm
S.D.(vm): 22.52µm
Conf(vm):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

VOLUME DISTRIBUTION TABLE (RANGES)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000047 107N
FILE NAME : S97N47

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 525913
TIME	: 11:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.68
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 870 SEC	S.D.U.	: 4798
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 5.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

RANGE (microns)	LOCAL (%)	UNDER(%)	-CUMULATIVE-	OVER(%)
0.0 - 1.0	1.34	1.34		98.66
1.0 - 2.0	3.85	5.19		94.81
2.0 - 3.0	4.18	9.37		90.63
3.0 - 4.0	6.79	16.16		83.84
4.0 - 5.0	7.58	23.74		76.26
5.0 - 6.0	6.13	29.87		70.13
6.0 - 7.0	4.65	34.52		65.48
7.0 - 8.0	2.62	37.14		62.86
8.0 - 9.0	2.18	39.32		60.68
9.0 - 10.0	2.06	41.37		58.63
10.0 - 20.0	19.26	60.64		39.36
20.0 - 30.0	8.72	69.36		30.64
30.0 - 40.0	4.61	73.98		26.02
40.0 - 50.0	9.45	83.42		16.58
50.0 - 60.0	5.35	88.77		11.23
60.0 - 70.0	7.20	95.97		4.03
70.0 - 80.0	2.26	98.23		1.77
80.0 - 90.0	1.64	99.88		0.12
90.0 - 100.0	0.12	100.00		0.00
100.0 - 150.0	0.00	100.00		0.00

8C510-PCS97-011

Attachment III

SAMPLE S97N000027 (B0JYD6) PARTICLE SIZE DISTRIBUTION RESULTS

Consisting of 5 Pages including the cover page

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

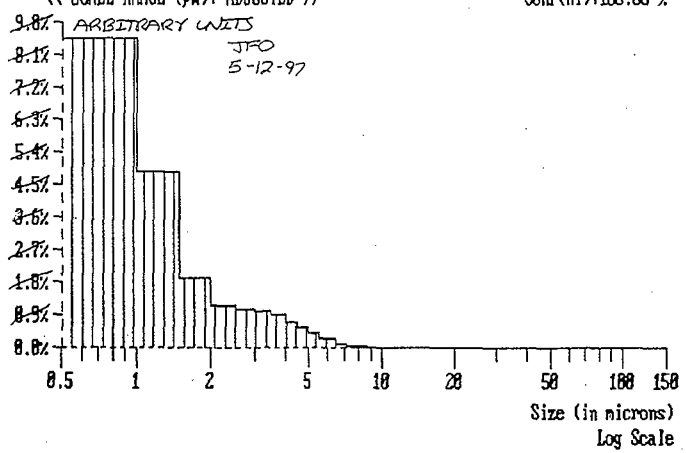
SAMPLE NAME : S97N000027 107N BOJYD6 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N27

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 618902
TIME	: 12:34	ACQ. MODE	: SAMPLE	S.N.F.	: 0.98
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1040 SEC	S.D.U.	: 3981
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 4.2E+06 #/ml
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY NUMBER DENSITY GRAPH

Name: S97N000027 107N BOJYD6
4.2E+06 #/ml(100.0%)
Mode at 0.75 µm
<< SCALE RANGE (µm): ADJUSTED >>

Median : 0.90µm
Mean(nl): 1.24µm
S.D.(nl): 1.23µm
Conf(nl):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

NUMBER DISTRIBUTION TABLE (RANGES)

SAMPLE NAME : S97N000027 107N BOJYD6 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N27

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 618902
TIME	: 12:34	ACQ. MODE	: SAMPLE	S.N.F.	: 0.98
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1040 SEC	S.D.U.	: 3981
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 4.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

RANGE (microns)	LOCAL (%)	UNDER(%)	-CUMULATIVE-	OVER(%)
0.0 - 1.0	62.62	62.62		37.38
1.0 - 2.0	26.57	89.19		10.81
2.0 - 3.0	4.86	94.05		5.95
3.0 - 4.0	2.92	96.97		3.03
4.0 - 5.0	1.57	98.54		1.46
5.0 - 6.0	0.68	99.22		0.78
6.0 - 7.0	0.30	99.52		0.48
7.0 - 8.0	0.12	99.64		0.36
8.0 - 9.0	0.07	99.71		0.29
9.0 - 10.0	0.04	99.75		0.25
10.0 - 20.0	0.20	99.95		0.05
20.0 - 30.0	0.04	99.99		0.01
30.0 - 40.0	0.01	100.00		0.00
40.0 - 50.0	0.00	100.00		0.00
50.0 - 60.0	0.00	100.00		0.00
60.0 - 70.0	0.00	100.00		0.00
70.0 - 80.0	0.00	100.00		0.00
80.0 - 90.0	0.00	100.00		0.00
90.0 - 100.0	0.00	100.00		0.00
100.0 - 150.0	0.00	100.00		0.00

G A L A I - C I S - 1

Computerized Inspection System

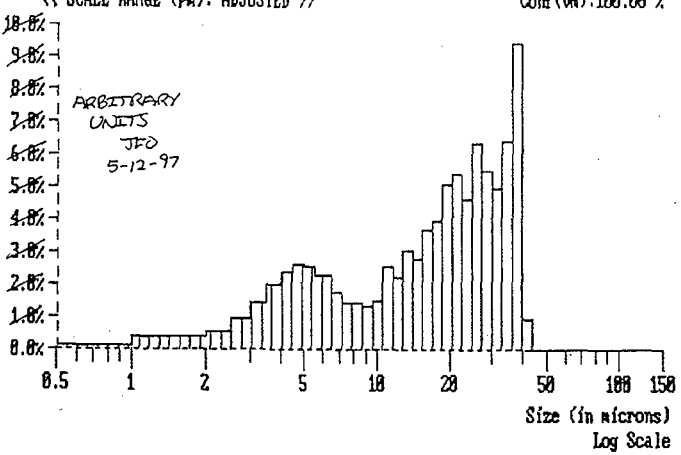
GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

SAMPLE NAME : S97N000027 107N BOJYD6 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N27

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 618902
TIME	: 12:34	ACQ. MODE	: SAMPLE	S.N.F.	: 0.98
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1040 SEC	S.D.U.	: 3981
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 4.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY VOLUME DENSITY GRAPH

Name: S97N000027 107N BOJYD6 Median : 18.83µm
5.2E-05 cc/ml(100.0%) Mean(nu): 2.87µm Mean(vm): 18.39µm
Mode at 37.84 µm S.D.(nu): 2.84µm S.D.(vm): 11.85µm
<< SCALE RANGE (µm): ADJUSTED >> Conf(vm):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

VOLUME DISTRIBUTION TABLE (RANGES)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000027 107N BOJYD6
FILE NAME : S97N27

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 618902
TIME	: 12:34	ACQ. MODE	: SAMPLE	S.N.F.	: 0.98
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1040 SEC	S.D.U.	: 3981
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 4.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

RANGE (microns)	LOCAL (%)	UNDER(%)-CUMULATIVE-OVER(%)	
0.0 - 1.0	1.12	1.12	98.88
1.0 - 2.0	3.03	4.15	95.85
2.0 - 3.0	3.18	7.34	92.66
3.0 - 4.0	5.24	12.58	87.42
4.0 - 5.0	5.94	18.51	81.49
5.0 - 6.0	4.71	23.22	76.78
6.0 - 7.0	3.40	26.63	73.37
7.0 - 8.0	2.07	28.70	71.30
8.0 - 9.0	1.87	30.57	69.43
9.0 - 10.0	1.53	32.10	67.90
10.0 - 20.0	23.17	55.28	44.72
20.0 - 30.0	23.56	78.84	21.16
30.0 - 40.0	20.69	99.52	0.48
40.0 - 50.0	0.48	100.00	0.00
50.0 - 60.0	0.00	100.00	0.00
60.0 - 70.0	0.00	100.00	0.00
70.0 - 80.0	0.00	100.00	0.00
80.0 - 90.0	0.00	100.00	0.00
90.0 - 100.0	0.00	100.00	0.00
100.0 - 150.0	0.00	100.00	0.00

8C510-PCS97-011

Attachment IV

SAMPLE S97N000039 (B0JYD7) PARTICLE SIZE DISTRIBUTION RESULTS

Consisting of 5 Pages including the cover page

HNF-SD-WM-DP-245, REV. 0

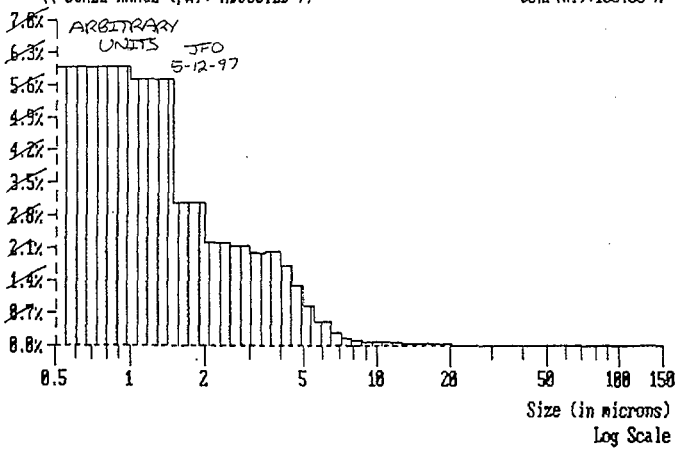
SAMPLE NAME : S97N000039 107N BOJYD7
FILE NAME : S97N39

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 403722
TIME	: 12:13	ACQ. MODE	: SAMPLE`	S.N.F.	: 0.84
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1000 SEC	S.D.U.	: 3177
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 3.7E+06 #/ml
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.3E-02 %

PROBABILITY NUMBER DENSITY GRAPH

Name: S97N000039 107N BOJYD7
3.7E+06 #/ml(100.0%)
Mode at 8.75 µm
<< SCALE RANGE (µm): ADJUSTED >>

Median : 1.13µm
Mean(nl): 1.67µm
S.D.(nl): 1.79µm
Conf(nl):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

NUMBER DISTRIBUTION TABLE (RANGES)

SAMPLE NAME : S97N000039 107N BOJYD7 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N39

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 403722
TIME	: 12:13	ACQ. MODE	: SAMPLE	S.N.F.	: 0.84
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1000 SEC	S.D.U.	: 3177
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 3.7E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.3E-02 %

RANGE (microns)	LOCAL (%)	UNDER(%)	CUMULATIVE-OVER(%)
0.0 - 1.0	43.79	43.79	56.21
1.0 - 2.0	33.89	77.68	22.32
2.0 - 3.0	9.38	87.06	12.94
3.0 - 4.0	6.13	93.18	6.82
4.0 - 5.0	3.59	96.78	3.22
5.0 - 6.0	1.46	98.23	1.77
6.0 - 7.0	0.58	98.82	1.18
7.0 - 8.0	0.27	99.08	0.92
8.0 - 9.0	0.17	99.25	0.75
9.0 - 10.0	0.12	99.38	0.62
10.0 - 20.0	0.51	99.88	0.12
20.0 - 30.0	0.09	99.97	0.03
30.0 - 40.0	0.01	99.99	0.01
40.0 - 50.0	0.01	100.00	0.00
50.0 - 60.0	0.00	100.00	0.00
60.0 - 70.0	0.00	100.00	0.00
70.0 - 80.0	0.00	100.00	0.00
80.0 - 90.0	0.00	100.00	0.00
90.0 - 100.0	0.00	100.00	0.00
100.0 - 150.0	0.00	100.00	0.00

G A L A I - C I S - 1

Computerized Inspection System

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000039 107N BOJYD7
FILE NAME : S97N39

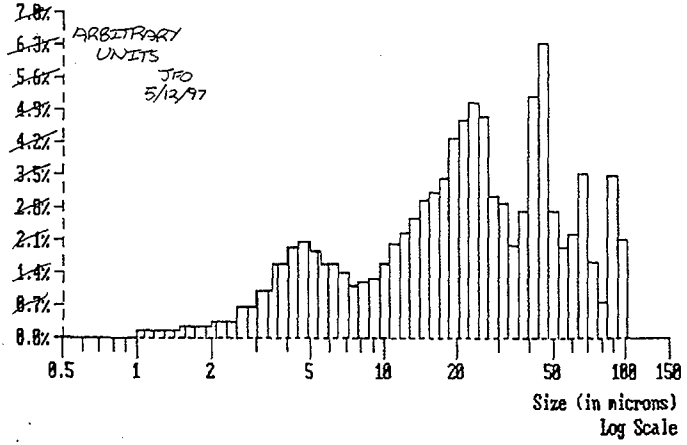
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 403722
TIME	: 12:13	ACQ. MODE	: SAMPLE	S.N.F.	: 0.84
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1000 SEC	S.D.U.	: 3177
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 3.7E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.3E-02 %

PROBABILITY VOLUME DENSITY GRAPH

Name: S97N000039 107N BOJYD7
1.3E-04 cc/ml(100.0%)
Mode at 45.76 µm
<< SCALE RANGE (µm): ADJUSTED >>

Mean(nv): 4.06µm
S.D.(nv): 2.99µm

Median : 22.62µm
Mean(vn): 29.62µm
S.D.(vn): 24.23µm
Conf(vn):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)
VOLUME DISTRIBUTION TABLE (RANGES)

HNF-SD-WM-DP-245, REV. 0

SAMPLE NAME : S97N000039 107N BOJYD7
FILE NAME : S97N39

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 403722
TIME	: 12:13	ACQ. MODE	: SAMPLE	S.N.F.	: 0.84
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1000 SEC	S.D.U.	: 3177
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 3.7E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.3E-02 %

RANGE (microns)	LOCAL (%)	UNDER(%)	-CUMULATIVE-	OVER(%)
0.0 - 1.0	0.28	0.28		99.72
1.0 - 2.0	1.46	1.74		98.26
2.0 - 3.0	2.17	3.90		96.10
3.0 - 4.0	3.92	7.82		92.18
4.0 - 5.0	4.77	12.59		87.41
5.0 - 6.0	3.53	16.12		83.88
6.0 - 7.0	2.36	18.48		81.52
7.0 - 8.0	1.64	20.12		79.88
8.0 - 9.0	1.51	21.63		78.37
9.0 - 10.0	1.59	23.23		76.77
10.0 - 20.0	20.87	44.10		55.90
20.0 - 30.0	18.38	62.48		37.52
30.0 - 40.0	8.08	70.56		29.44
40.0 - 50.0	12.83	83.38		16.62
50.0 - 60.0	3.41	86.79		13.21
60.0 - 70.0	5.05	91.84		8.16
70.0 - 80.0	2.02	93.87		6.13
80.0 - 90.0	0.80	94.67		5.33
90.0 - 100.0	5.33	100.00		0.00
100.0 - 150.0	0.00	100.00		0.00

8C510-PCS97-011

Attachment V

SAMPLE S97N000033 (B0JYD8) PARTICLE SIZE DISTRIBUTION RESULTS

Consisting of 5 Pages including the cover page

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

33 JFD 5/14/97

SAMPLE NAME : S97N000053 107N BOJYD8
FILE NAME : S97N53

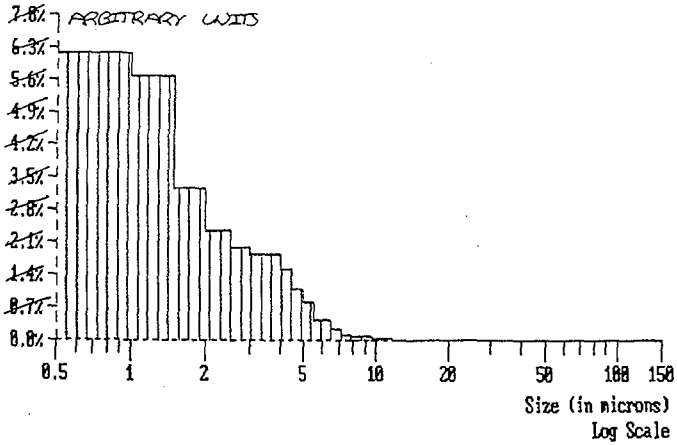
HNF-SD-WM-DP-245, REV. 0

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 600370
TIME	: 12:53	ACQ. MODE	: SAMPLE*	S.N.F.	: 0.85
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1277 SEC	S.D.U.	: 3675
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 2.9E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.5E-02 %

PROBABILITY NUMBER DENSITY GRAPH

Name: S97N000053 107N BOJYD8
2.9E+06 #/ml(100.0%)
Mode at 0.75 µm
<< SCALE RANGE (µm): ADJUSTED >>

Median : 1.10µm
Mean(nl): 1.58µm
S.D.(nl): 1.72µm
Conf(nl):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

NUMBER DISTRIBUTION TABLE (RANGES)

SAMPLE NAME : S97N000033 107N BOJYD8 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N53

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 600370
TIME	: 12:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.85
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1277 SEC	S.D.U.	: 3675
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 2.9E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.5E-02 %

RANGE (microns)	LOCAL (%)	UNDER(%)	-CUMULATIVE-	OVER(%)
0.0 - 1.0	45.15	45.15		54.85
1.0 - 2.0	34.13	79.28		20.72
2.0 - 3.0	9.38	88.67		11.33
3.0 - 4.0	5.58	94.25		5.75
4.0 - 5.0	3.17	97.42		2.58
5.0 - 6.0	1.34	98.76		1.24
6.0 - 7.0	0.51	99.27		0.73
7.0 - 8.0	0.19	99.46		0.54
8.0 - 9.0	0.11	99.58		0.42
9.0 - 10.0	0.08	99.65		0.35
10.0 - 20.0	0.26	99.91		0.09
20.0 - 30.0	0.05	99.96		0.04
30.0 - 40.0	0.02	99.98		0.02
40.0 - 50.0	0.01	99.99		0.01
50.0 - 60.0	0.00	99.99		0.01
60.0 - 70.0	0.00	100.00		0.00
70.0 - 80.0	0.00	100.00		0.00
80.0 - 90.0	0.00	100.00		0.00
90.0 - 100.0	0.00	100.00		0.00
100.0 - 150.0	0.00	100.00		0.00

G A L A I - C I S - 1

Computerized Inspection System

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

33 JFO 5/14/97

SAMPLE NAME : S97N000053 107N BOJYD8

HNF-SD-WM-DP-245, REV. 0

FILE NAME : S97N53

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 600370
TIME	: 12:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.85
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1277 SEC	S.D.U.	: 3675
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 2.9E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.5E-02 %

PROBABILITY VOLUME DENSITY GRAPH

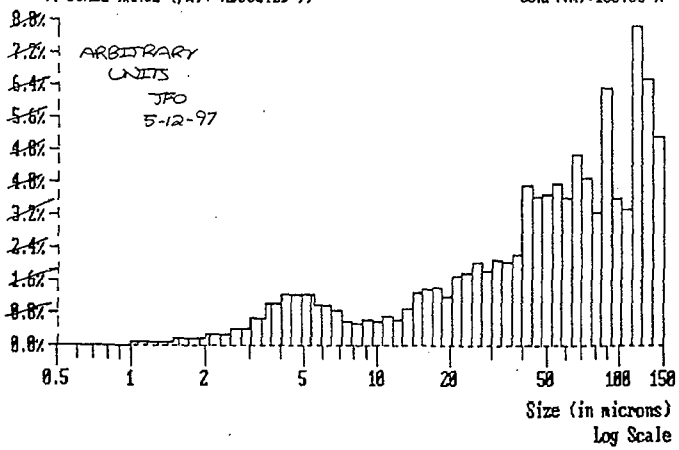
Name: S97N000053 107N BOJYD8

1.5E-04 cc/ml(100.0%) Mean(nv): 4.55µm Median : 54.76µm

Mode at 118.40 µm S.D.(nv): 3.43µm Mean(vm): 62.87µm

<< SCALE RANGE (µm): ADJUSTED >> S.D.(vm): 43.23µm

Conf(vm):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
LABS)

VOLUME DISTRIBUTION TABLE (RANGES)

SAMPLE NAME : S97N000033 107N BOJYD8 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N53

33 JPD 5/14/97

DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 600370
TIME	: 12:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.85
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1277 SEC	S.D.U.	: 3675
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 2.9E+06 #/ml
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.5E-02 %

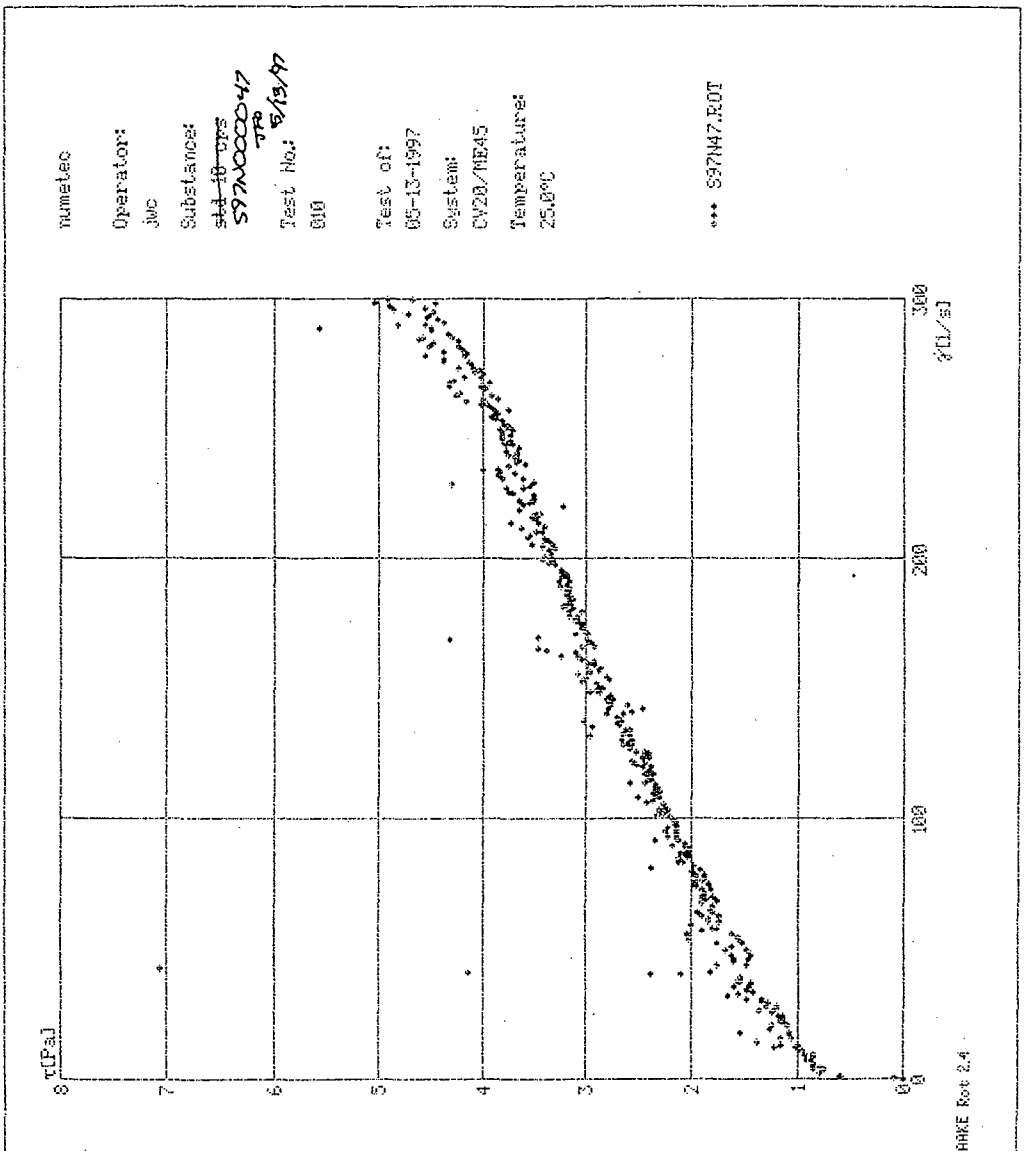
RANGE (microns)	LOCAL (%)	UNDER(%)-CUMULATIVE-OVER(%)
0.0 - 1.0	0.20	0.20 99.80
1.0 - 2.0	1.06	1.27 98.73
2.0 - 3.0	1.52	2.78 97.22
3.0 - 4.0	2.54	5.33 94.67
4.0 - 5.0	2.98	8.31 91.69
5.0 - 6.0	2.30	10.62 89.38
6.0 - 7.0	1.46	12.08 87.92
7.0 - 8.0	0.84	12.92 87.08
8.0 - 9.0	0.74	13.66 86.34
9.0 - 10.0	0.69	14.35 85.65
10.0 - 20.0	7.74	22.10 77.90
20.0 - 30.0	7.77	29.87 70.13
30.0 - 40.0	6.29	36.16 63.84
40.0 - 50.0	9.48	45.64 54.36
50.0 - 60.0	7.35	52.99 47.01
60.0 - 70.0	6.66	59.66 40.34
70.0 - 80.0	5.46	65.12 34.88
80.0 - 90.0	5.46	70.58 29.42
90.0 - 100.0	4.84	75.42 24.58
100.0 - 150.0	24.58	100.00 0.00

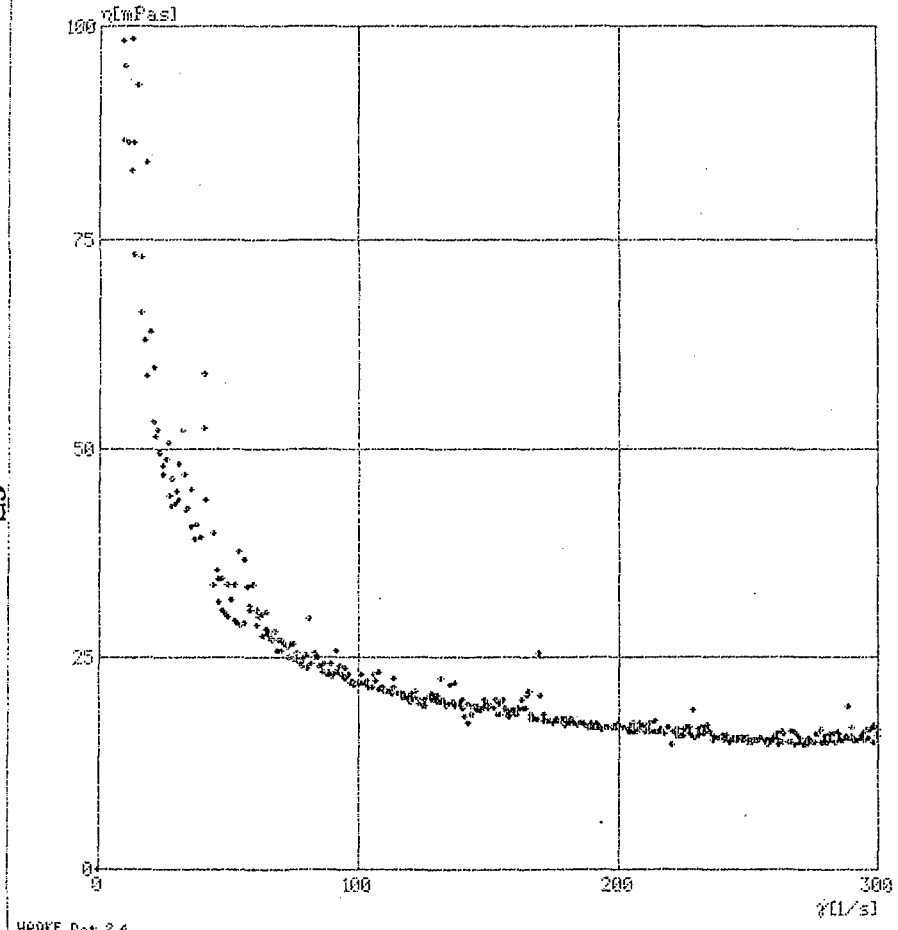
8C510-PCS97-011

Attachment VI

SAMPLE S97N000047 (B0JYD5) VISCOSITY RESULTS

Consisting of 11 Pages including the cover page


rheometec
Operator:
jwc
Substance:
std 10 cps
S97N000047
Test No.: 9/5/97
010
Test on:
05-13-1997
System:
CV20/ME45
Temperature:
25.0°C
*** S97N47.ROT
τ[Pa]
γ[1/s]
0
1
2
3
4
5
6
7
8
100
200
300
HAAKE Rot 2.4



numetec

Operator:
jwc

Substance:
~~std 10 cps~~
S97N0000047
JRD 5/13/97

Test No.:
010

Test of:
05-13-1997

System:
CV20/ME45

Temperature:
25.0°C

*** S97N47.ROT

HAAKE Rot 2.4

49

597N00000 47 JFO
5/14/97

Test number : 010
Operator : jwc
Sensor : ME45 Meas. system : CV20
%Tau : 100% %D : 100%
Factor A : 0.800 Factor K : 3.000 Gap : 0.000 mm
Data stored in file C:\HAAKE\S97N47.ROT

Segment number 1 of type 'Tau/D' is defined as :
D from 0.000 to 300.0 1/s in 3.00 min at 25.0°C.
Area is 831.4 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=0.000 Eta(max)=418.3 Eta=31.67 s(n-1)=46.26

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[°C]
1	0.000	0.013	0.000	0.00	27.7
2	0.235	0.077	327.800	0.02	27.8
3	1.461	0.611	418.300	0.03	27.8
4	2.664	0.785	294.600	0.04	27.8
5	3.866	0.852	220.500	0.05	27.7
6	5.117	0.858	167.600	0.06	27.9
7	7.537	0.914	121.200	0.09	27.9
8	8.700	0.856	98.430	0.10	27.8
9	9.883	0.855	86.520	0.11	27.7
10	12.240	1.207	98.580	0.14	27.9
11	13.440	1.160	86.330	0.15	27.8
12	14.730	1.370	92.990	0.16	27.7
13	15.900	1.160	72.940	0.17	27.7
14	16.820	1.538	83.930	0.20	28.0
15	19.570	1.254	64.090	0.21	27.7
16	20.700	1.236	59.680	0.22	27.8
17	21.950	1.148	52.310	0.23	27.8
18	24.340	1.168	47.980	0.26	28.2
19	25.540	1.241	48.590	0.27	27.9
20	26.720	1.354	50.680	0.28	27.9
21	27.910	1.293	46.320	0.29	27.9
22	29.720	1.333	44.870	0.30	27.9
23	30.650	1.345	43.890	0.32	27.9
24	33.190	1.417	42.690	0.34	28.0
25	34.460	1.479	42.930	0.36	27.9
26	35.630	1.451	40.710	0.37	28.0
27	37.980	1.556	40.980	0.39	27.9
28	39.100	1.537	39.300	0.40	27.4
29	40.270	2.380	59.090	0.42	27.9
30	41.450	1.816	43.810	0.43	27.8
31	43.990	1.753	39.850	0.45	27.8
32	45.110	1.597	35.390	0.46	27.8
33	46.330	1.587	34.260	0.48	28.0
34	47.510	1.627	34.240	0.49	28.1
35	49.850	1.675	33.590	0.51	28.1
36	51.030	1.625	31.850	0.52	28.0
37	52.200	1.750	33.530	0.53	27.9
38	53.520	2.015	37.650	0.55	27.9
39	55.870	2.042	36.560	0.57	27.9
40	57.040	1.900	33.320	0.58	27.9
41	58.210	1.801	30.940	0.59	27.9
42	60.510	1.848	30.540	0.62	27.9

46	65.570	1.894	24.100	0.68	28.3
47	67.740	1.902	28.070	0.68	28.0
48	68.910	1.868	27.100	0.70	27.9
49	70.090	1.691	26.380	0.71	28.1
50	72.430	1.894	26.140	0.74	27.9
51	73.750	1.952	26.470	0.75	27.8
52	74.930	1.985	26.490	0.76	28.1
53	76.100	1.950	25.620	0.77	28.0
54	78.450	1.951	24.870	0.80	28.0
55	79.620	2.007	25.210	0.81	28.0
56	80.790	2.380	29.460	0.82	27.9
57	83.280	2.122	25.480	0.84	28.0
58	84.460	2.117	25.060	0.86	27.9
59	85.630	2.051	23.960	0.87	27.8
60	86.800	2.102	24.220	0.88	28.1
61	88.150	2.173	24.370	0.90	28.0
62	90.320	2.057	22.770	0.92	27.9
63	91.500	2.346	25.640	0.93	28.0
64	92.670	2.230	24.060	0.94	28.2
65	95.160	2.252	23.670	0.96	28.1
66	96.330	2.213	22.970	0.97	27.9
67	97.510	2.164	22.190	0.99	28.2
68	98.680	2.138	21.660	1.00	27.8
69	101.000	2.325	23.020	1.02	27.8
70	102.200	2.256	22.080	1.03	28.1
71	103.400	2.308	22.330	1.05	28.1
72	105.900	2.431	22.960	1.07	27.9
73	107.000	2.368	22.120	1.08	28.1
74	108.200	2.504	23.140	1.09	28.0
75	109.400	2.354	21.520	1.11	28.3
76	111.700	2.332	20.870	1.13	27.9
77	112.900	2.350	20.810	1.14	28.1
78	114.200	2.575	22.550	1.15	27.6
79	115.400	2.399	20.790	1.17	28.2
80	117.700	2.372	20.150	1.19	28.1
81	118.900	2.406	20.230	1.20	27.8
82	120.100	2.381	19.830	1.21	27.9
83	121.300	2.452	20.220	1.23	27.9
84	123.600	2.401	19.420	1.25	28.1
85	124.900	2.410	19.290	1.26	28.1
86	126.100	2.435	19.310	1.27	27.8
87	128.400	2.652	20.650	1.30	28.1
88	129.600	2.604	20.090	1.31	28.2
89	130.800	2.570	19.650	1.32	28.1
90	132.000	2.591	19.630	1.33	28.1
91	134.500	2.585	19.220	1.36	28.1
92	135.600	2.956	21.790	1.37	28.2
93	136.800	2.714	19.840	1.38	28.0
94	138.000	3.021	21.900	1.39	28.2
95	140.300	2.650	18.880	1.42	28.1
96	141.500	2.556	18.060	1.43	28.1
97	142.700	2.458	17.230	1.44	28.1
98	143.800	2.601	18.090	1.45	28.0
99	146.300	2.753	18.810	1.48	28.0
100	147.600	2.771	18.780	1.49	28.1
101	148.800	2.873	19.300	1.50	28.2
102	150.000	2.849	18.890	1.51	27.9
103	152.300	2.904	19.060	1.54	28.1
104	153.500	2.785	18.140	1.55	28.4
105	154.700	2.810	18.170	1.56	28.3
106	157.000	2.882	18.350	1.58	28.3
107	158.200	2.860	18.070	1.60	28.0
108	159.400	2.922	18.330	1.61	28.1

111	164.200	3.112	18.850	1.65	28.0
112	165.400	3.463	20.940	1.67	28.1
113	166.600	3.047	18.290	1.68	28.0
114	169.100	4.310	25.490	1.70	28.3
115	170.200	3.472	20.400	1.71	28.2
116	171.400	3.110	18.150	1.73	28.0
117	172.600	3.021	17.510	1.74	28.1
118	174.900	3.021	17.270	1.76	28.1
119	176.100	3.101	17.610	1.77	28.1
120	177.300	3.093	17.450	1.79	27.9
121	179.700	3.054	16.990	1.81	28.2
122	180.900	3.127	17.260	1.82	28.1
123	182.100	3.187	17.500	1.83	28.4
124	183.300	3.159	17.240	1.85	28.2
125	185.600	3.197	17.220	1.87	28.1
126	186.800	3.193	17.090	1.88	28.3
127	188.000	3.200	17.020	1.89	28.3
128	189.100	3.249	17.180	1.90	28.4
129	191.600	3.276	17.100	1.93	28.3
130	192.800	3.241	16.810	1.94	28.1
131	194.060	3.208	16.530	1.95	28.1
132	195.200	3.244	16.620	1.96	28.4
133	197.500	3.303	16.720	1.99	27.9
134	198.700	3.339	16.810	2.00	27.9
135	200.000	3.330	16.650	2.01	28.4
136	202.300	3.352	16.570	2.04	28.3
137	203.500	3.365	16.540	2.05	28.2
138	204.700	3.433	16.770	2.06	28.4
139	205.900	3.528	17.140	2.07	28.3
140	208.200	3.565	17.120	2.10	28.3
141	209.400	3.557	16.990	2.11	27.9
142	210.600	3.494	16.600	2.12	27.9
143	211.900	3.631	17.140	2.13	28.2
144	214.200	3.733	17.430	2.15	28.3
145	215.400	3.492	16.210	2.17	28.0
146	216.600	3.502	16.170	2.18	28.3
147	217.700	3.445	15.820	2.19	28.2
148	220.100	3.226	14.660	2.21	28.4
149	221.400	3.562	16.090	2.23	28.0
150	222.600	3.651	16.400	2.24	28.1
151	224.900	3.715	16.510	2.26	28.4
152	226.100	3.755	16.610	2.27	28.3
153	227.300	3.768	16.580	2.29	28.3
154	228.400	4.300	18.820	2.30	28.0
155	230.900	3.811	16.500	2.32	28.1
156	232.100	3.855	16.610	2.33	28.1
157	233.300	3.834	16.440	2.34	28.3
158	234.500	4.001	17.070	2.36	28.1
159	236.800	3.665	15.480	2.38	28.0
160	238.000	3.649	15.340	2.39	28.1
161	239.100	3.696	15.460	2.40	28.2
162	240.300	3.674	15.290	2.42	28.0
163	242.800	3.649	15.030	2.44	28.1
164	244.000	3.721	15.250	2.46	28.0
165	245.100	3.741	15.260	2.46	28.2
166	247.500	3.742	15.120	2.49	28.2
167	248.600	3.812	15.330	2.50	28.4
168	249.900	3.829	15.330	2.51	28.4
169	251.000	3.768	15.010	2.52	27.9
170	253.500	3.866	15.250	2.55	28.1
171	254.700	3.911	15.360	2.56	28.3
172	255.800	3.872	15.140	2.57	28.5
173	257.000	3.756	14.620	2.58	28.3

177	263.000	3.910	14.670	2.64	25.4
178	265.400	3.978	14.980	2.67	28.4
179	266.500	4.009	15.050	2.68	28.3
180	267.700	3.944	14.730	2.69	28.1
181	270.000	4.007	14.840	2.71	28.1
182	271.300	3.991	14.710	2.73	28.3
183	272.500	4.031	14.790	2.74	28.0
184	273.700	4.235	15.470	2.75	28.2
185	276.100	4.382	15.870	2.77	28.2
186	277.200	4.386	15.830	2.79	28.3
187	278.400	4.568	16.410	2.80	28.3
188	279.600	4.388	15.700	2.81	28.5
189	282.000	4.512	16.000	2.83	28.1
190	283.200	4.485	15.840	2.84	28.1
191	284.300	4.620	16.250	2.86	28.1
192	285.500	4.579	16.040	2.87	28.3
193	287.900	4.508	15.660	2.89	28.0
194	289.100	4.490	15.530	2.90	28.3
195	290.200	4.559	15.710	2.92	28.3
196	292.700	4.547	15.540	2.94	28.3
197	293.900	4.516	15.370	2.95	28.0
198	295.000	4.487	15.210	2.96	28.3
199	296.200	4.553	15.370	2.98	28.1
200	298.500	4.464	14.950	3.00	28.3

Segment number 2 of type 'Tau/D' is defined as :
D from 300.0 to 0.000 1/s in 3.00 min at 25.0xC.
Area is 848.6 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=14.88 Eta(max)=441.5 Etam=29.16 s(n-1)=38.62

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	300.000	4.691	15.640	3.00	28.1
2	299.700	4.919	16.410	3.02	28.3
3	298.300	5.039	16.890	3.03	28.2
4	297.200	4.912	16.530	3.04	28.4
5	296.000	4.862	16.420	3.05	28.2
6	294.700	4.722	16.020	3.07	27.9
7	292.400	4.434	15.170	3.09	28.0
8	291.100	4.386	15.070	3.10	28.0
9	290.000	4.830	16.650	3.11	28.1
10	288.800	5.572	19.290	3.12	28.4
11	286.400	4.335	15.140	3.15	28.2
12	285.300	4.302	15.080	3.16	28.0
13	284.200	4.241	14.920	3.17	28.2
14	281.800	4.244	15.060	3.20	28.2
15	280.500	4.207	15.000	3.21	28.2
16	279.300	4.166	14.910	3.22	28.4
17	278.200	4.177	15.020	3.23	28.2
18	275.800	4.142	15.020	3.26	28.5
19	274.600	4.108	14.960	3.27	28.3
20	273.500	4.103	15.000	3.28	28.4
21	272.300	4.069	14.940	3.29	28.4
22	269.800	4.181	15.500	3.32	28.3
23	268.600	4.285	15.950	3.33	28.3
24	267.400	4.313	16.130	3.34	28.2
25	266.300	4.318	16.220	3.35	27.9
26	263.900	4.219	15.990	3.37	28.3
27	262.800	4.263	16.230	3.39	28.4
28	261.600	3.997	15.280	3.40	28.2
29	259.100	3.956	15.270	3.42	28.3
30	257.900	3.914	15.180	3.43	28.3
31	256.700	3.870	15.070	3.45	28.2
32	255.600	3.858	15.100	3.46	28.5
33	253.200	3.821	15.090	3.48	28.3
34	252.100	3.798	15.070	3.49	28.5
35	250.700	3.748	14.950	3.51	28.4
36	249.600	3.713	14.880	3.52	28.0
37	247.200	3.815	15.430	3.54	28.2
38	246.000	3.812	15.490	3.55	28.3
39	244.900	3.799	15.520	3.57	28.5
40	243.700	3.775	15.490	3.58	28.2
41	241.300	3.773	15.630	3.60	28.3
42	240.100	3.750	15.620	3.61	27.9
43	239.000	3.668	15.350	3.62	28.1
44	236.500	3.602	15.230	3.65	28.2
45	235.300	3.763	15.990	3.66	28.4
46	234.200	3.853	16.450	3.67	28.0
47	233.000	3.700	15.880	3.68	28.4
48	230.600	3.617	15.680	3.71	28.3
49	229.300	3.519	15.350	3.72	27.9
50	228.200	3.557	15.590	3.73	28.1
51	227.000	3.605	15.880	3.74	28.1

54	222.300	3.514	15.810	3.78	28.3
55	221.100	3.605	15.300	3.80	28.3
56	218.600	3.652	16.700	3.83	28.3
57	217.400	3.488	16.040	3.84	28.2
58	216.300	3.528	16.310	3.85	28.4
59	213.900	3.481	16.270	3.87	28.3
60	212.800	3.419	16.070	3.89	28.2
61	211.600	3.406	16.100	3.90	28.5
62	210.400	3.428	16.290	3.91	28.3
63	207.900	3.421	16.460	3.93	28.2
64	206.800	3.363	16.260	3.95	28.4
65	205.600	3.321	16.150	3.96	28.2
66	204.400	3.305	16.170	3.97	28.4
67	202.100	3.356	16.610	3.99	28.4
68	200.900	3.417	17.010	4.01	28.2
69	199.700	3.436	17.200	4.02	28.1
70	198.400	3.377	17.020	4.03	28.3
71	196.000	3.280	16.630	4.05	28.3
72	194.900	3.238	16.610	4.07	28.2
73	193.700	3.192	16.480	4.08	28.3
74	191.300	3.171	16.570	4.10	28.2
75	190.200	3.183	16.740	4.11	28.1
76	188.900	3.175	16.810	4.12	28.4
77	187.700	3.171	16.900	4.14	28.1
78	185.300	3.168	17.100	4.16	28.1
79	184.200	3.133	17.010	4.17	28.3
80	183.000	3.166	17.300	4.18	28.2
81	181.800	3.225	17.730	4.20	28.2
82	179.500	3.161	17.610	4.22	28.4
83	178.200	3.166	17.770	4.23	28.3
84	177.000	3.099	17.510	4.24	28.4
85	175.800	3.065	17.440	4.26	28.1
86	173.500	3.045	17.550	4.28	28.2
87	172.300	3.013	17.490	4.29	28.3
88	171.100	2.985	17.440	4.30	28.3
89	168.700	2.990	17.730	4.33	28.2
90	167.500	2.957	17.660	4.34	28.1
91	166.300	2.925	17.590	4.35	28.0
92	165.100	3.387	20.520	4.36	28.5
93	162.800	3.085	18.950	4.39	28.1
94	161.600	3.058	18.920	4.40	28.1
95	160.400	2.985	18.610	4.41	28.3
96	159.200	2.979	18.710	4.42	28.1
97	156.700	2.969	18.940	4.45	28.2
98	155.600	3.090	19.860	4.46	28.2
99	154.400	2.999	19.420	4.47	28.1
100	153.200	3.051	19.910	4.48	28.3
101	150.900	2.896	19.190	4.51	28.2
102	149.800	2.909	19.430	4.52	28.2
103	148.500	2.964	19.950	4.53	28.2
104	146.100	2.811	19.240	4.55	28.3
105	144.900	2.788	19.240	4.56	28.3
106	143.700	2.776	19.310	4.58	28.1
107	142.500	2.781	19.520	4.59	28.1
108	140.200	2.801	19.980	4.61	28.1
109	139.000	2.704	19.460	4.62	28.2
110	137.700	2.661	19.330	4.64	28.3
111	136.500	2.684	19.660	4.65	28.3
112	134.200	2.624	19.560	4.67	28.4
113	133.000	2.654	19.950	4.68	28.3
114	131.900	2.970	22.530	4.70	28.4
115	130.600	2.673	20.460	4.71	28.4
116	128.300	2.566	20.000	4.73	28.2

120	122.300	2.500	50.000	4.73	28.0
121	121.200	2.517	20.760	4.50	28.0
122	119.900	2.458	20.490	4.81	28.1
123	117.560	2.436	20.730	4.84	28.4
124	116.300	2.403	20.660	4.85	28.3
125	115.100	2.392	20.760	4.86	28.2
126	113.900	2.452	21.520	4.87	28.2
127	111.600	2.347	21.040	4.90	28.4
128	110.500	2.304	20.660	4.91	28.1
129	109.200	2.349	21.500	4.92	28.2
130	108.100	2.300	21.290	4.93	28.0
131	105.600	2.267	21.470	4.96	28.3
132	104.400	2.247	21.520	4.97	28.2
133	103.200	2.231	21.620	4.98	28.2
134	100.900	2.212	21.930	5.01	28.2
135	99.710	2.191	21.970	5.02	28.4
136	98.530	2.153	21.850	5.03	28.2
137	97.360	2.149	22.070	5.04	28.0
138	94.870	2.136	22.520	5.06	28.3
139	93.700	2.147	22.910	5.08	28.3
140	92.520	2.140	23.130	5.09	28.1
141	91.400	2.115	23.140	5.10	28.0
142	89.000	2.066	23.210	5.12	28.3
143	87.830	2.023	23.030	5.14	28.2
144	86.510	2.015	23.290	5.15	28.0
145	85.340	2.046	23.980	5.16	28.2
146	82.990	2.085	25.130	5.18	27.8
147	81.820	1.975	24.130	5.20	28.1
148	80.650	1.915	23.740	5.21	28.1
149	78.300	1.885	24.070	5.23	28.1
150	77.130	1.883	24.420	5.24	28.1
151	75.860	1.903	25.090	5.26	28.2
152	74.630	1.839	24.640	5.27	28.2
153	72.290	1.810	25.040	5.29	28.2
154	71.110	1.879	26.430	5.30	28.2
155	69.940	1.799	25.720	5.31	28.2
156	68.770	1.767	25.700	5.33	28.2
157	66.280	1.808	27.280	5.35	28.2
158	65.100	1.814	27.870	5.36	28.2
159	63.930	1.804	28.220	5.37	28.3
160	62.760	1.731	27.580	5.39	28.3
161	60.410	1.737	28.760	5.41	28.2
162	59.240	1.994	33.660	5.42	28.1
163	58.060	1.767	30.440	5.43	28.1
164	55.570	1.617	29.110	5.46	28.1
165	54.400	1.561	28.700	5.47	28.3
166	53.230	1.544	29.020	5.48	28.2
167	52.050	1.524	29.270	5.49	28.2
168	49.710	1.481	29.790	5.52	28.3
169	48.530	1.458	30.050	5.53	28.1
170	47.360	1.442	30.440	5.54	28.1
171	46.190	1.462	31.660	5.55	28.3
172	43.700	1.466	33.560	5.58	28.2
173	42.520	7.063	166.100	5.59	28.2
174	41.350	4.141	100.100	5.60	28.0
175	40.220	2.108	52.360	5.61	28.1
176	37.830	1.542	40.760	5.64	28.2
177	36.660	1.436	39.180	5.65	28.1
178	35.340	1.595	45.150	5.66	28.1
179	32.990	1.552	47.050	5.68	28.1
180	31.820	1.663	52.270	5.70	28.1
181	30.650	1.479	48.270	5.71	28.2
182	29.470	1.276	43.290	5.72	28.2

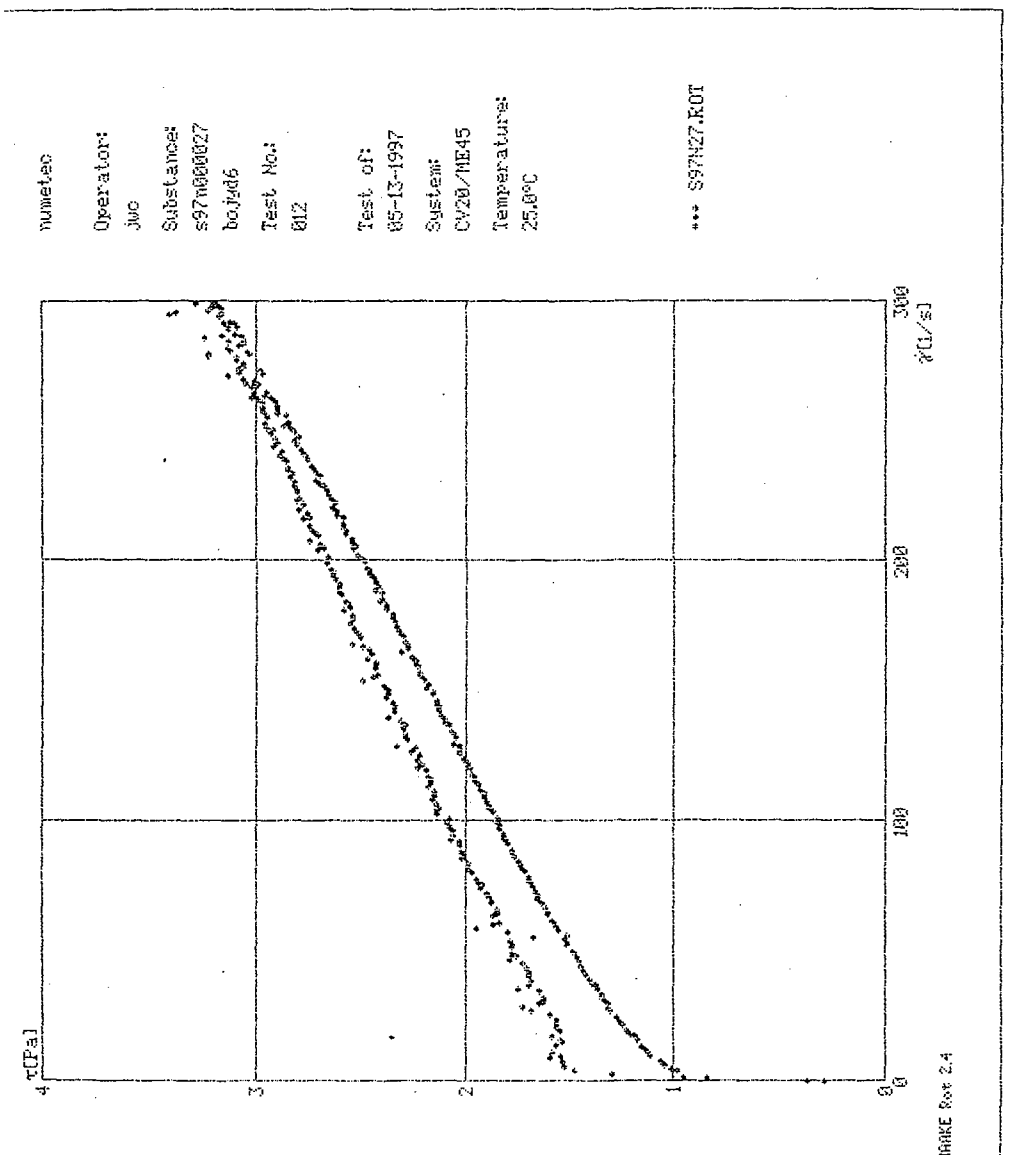
185	24.250	1.138	46.920	5.77	28.2
186	23.010	1.138	49.460	5.78	28.2
187	21.750	1.117	51.340	5.80	28.1
188	20.560	1.095	53.260	5.81	28.1
189	18.190	1.070	58.820	5.83	28.1
190	17.020	1.073	63.010	5.84	28.1
191	15.850	1.052	66.360	5.86	28.1
192	13.470	0.985	73.180	5.88	28.1
193	12.250	1.015	82.890	5.89	28.1
194	11.000	0.949	86.280	5.90	28.1
195	9.790	0.932	95.190	5.92	28.1
196	7.419	0.880	118.600	5.94	28.1
197	6.261	0.842	134.500	5.95	28.1
198	4.961	0.789	158.900	5.96	28.1
199	3.851	0.742	192.600	5.98	28.1
200	1.349	0.596	441.500	6.00	28.1

8C510-PCS97-011

Attachment VII

SAMPLE S97N000027 (B0JYD6) VISCOSITY RESULTS

Consisting of 11 Pages including the cover page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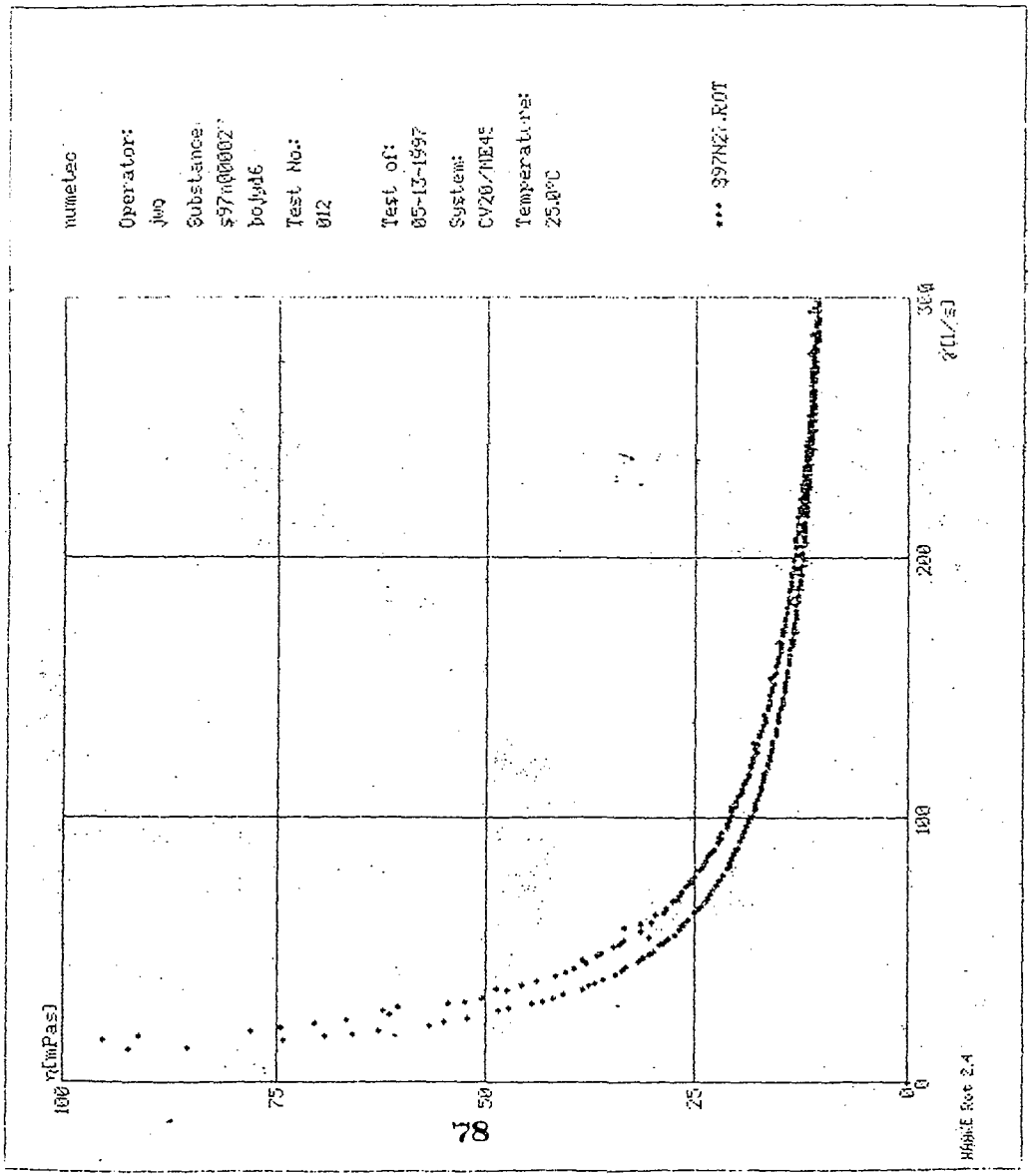
jwo
Substance:
s97m0000027
bojqd6
Test No.:
012
Test of:
05-13-1997
System:
CV20/ME45
Temperature:
25.0°C
*** S97M27.ROT
τ[Pa]
γ[1/s]
0
1
2
3
4
100
200
300
HAAKE Rot 2.4


numetec
Operator:
jwp
Substance:
s97n00002
bolyde
Test No.:
012
Test of:
05-13-1997
System:
CV20/ME45
Temperature:
25.0°C
... 997N22.ROT
η[mPas]
γ[1/s]
100
75
50
25
0
0
100
200
300
HAAKE Rot 2.4

S97N000027 JFO 5/14/97

: RM4S Meas. system : CV20
%Tau : 100% %D : 100%
Factor A : 0.800 Factor M : 3.000 Gap : 0.000 mm
Data stored in file C:\HAAKE\S97N27.ROT

Segment number 1 of type 'Tau/D' is defined as :
D from 0.000 to 300.0 1/s in 3.00 min at 25.0xC.
Area is 697.3 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=0.000 Eta(max)=1736 Eta=42.23 s(n-1)=138.3

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	0.000	0.283	0.000	0.00	25.8
2	0.210	0.365	1736.000	0.02	25.9
3	1.476	0.945	640.200	0.03	25.9
4	2.678	1.296	483.700	0.04	25.9
5	3.856	1.477	382.900	0.05	26.0
6	5.127	1.525	297.400	0.06	25.9
7	7.546	1.534	203.300	0.09	26.0
8	8.803	1.594	181.100	0.10	25.9
9	9.941	1.547	155.600	0.11	26.0
10	11.170	1.582	141.700	0.12	26.0
11	13.610	1.565	115.000	0.15	26.0
12	15.010	1.531	102.000	0.16	25.9
13	16.270	1.548	95.190	0.17	26.0
14	17.420	1.585	90.960	0.19	25.9
15	19.800	1.543	77.920	0.21	26.0
16	21.010	1.564	74.450	0.22	26.0
17	22.250	1.568	70.470	0.23	26.1
18	23.450	1.563	66.640	0.25	26.0
19	25.880	1.591	61.490	0.27	26.0
20	27.120	1.690	62.330	0.28	26.0
21	28.460	1.724	60.600	0.29	26.0
22	30.110	1.644	54.590	0.31	26.0
23	30.940	1.621	52.410	0.32	26.0
24	32.260	1.629	50.510	0.34	26.2
25	34.750	1.646	47.370	0.36	26.1
26	35.870	1.746	48.680	0.37	26.1
27	37.100	1.692	45.600	0.38	26.1
28	38.320	1.681	43.880	0.40	26.1
29	40.760	1.698	41.660	0.42	26.1
30	41.940	1.698	40.500	0.43	26.1
31	43.110	1.701	39.460	0.44	26.1
32	45.450	1.723	37.910	0.47	26.0
33	46.630	1.784	38.270	0.48	26.2
34	47.950	1.753	36.560	0.49	26.1
35	49.120	1.773	36.090	0.50	26.3
36	51.470	1.776	34.520	0.53	26.1
37	52.640	1.778	33.770	0.54	26.1
38	53.810	1.788	33.230	0.55	26.1
39	54.990	1.672	30.410	0.56	26.1
40	57.330	1.793	31.280	0.59	26.1
41	58.600	1.947	33.230	0.60	26.1
42	59.780	1.864	31.180	0.61	26.1

46	66.890	1.881	27.470	0.67	26.1
47	68.180	1.873	27.470	0.69	26.1
48	69.350	1.877	27.060	0.70	26.0
49	70.530	1.887	26.760	0.72	26.3
50	71.700	1.896	26.450	0.73	26.2
51	74.050	1.930	26.070	0.75	26.1
52	75.220	1.919	25.510	0.76	26.2
53	76.390	1.939	25.390	0.78	25.9
54	77.570	1.946	25.090	0.79	26.3
55	80.060	1.969	24.600	0.81	26.3
56	81.230	1.975	24.310	0.82	26.2
57	82.400	1.984	24.070	0.84	26.2
58	83.580	1.988	23.780	0.85	26.2
59	85.920	2.022	23.530	0.87	26.2
60	87.100	2.008	23.060	0.88	26.1
61	88.270	2.015	22.830	0.90	26.1
62	90.760	2.024	22.300	0.92	26.1
63	91.940	2.032	22.100	0.93	26.1
64	93.110	2.070	22.230	0.94	26.2
65	94.280	2.063	21.880	0.95	26.3
66	96.630	2.062	21.340	0.98	26.2
67	97.800	2.076	21.230	0.99	26.3
68	99.070	2.089	21.090	1.00	26.2
69	100.300	2.079	20.730	1.01	26.1
70	102.600	2.139	20.840	1.04	26.2
71	103.800	2.139	20.600	1.05	26.3
72	105.000	2.134	20.320	1.06	26.2
73	106.200	2.135	20.110	1.07	26.3
74	108.600	2.162	19.920	1.10	26.2
75	109.800	2.145	19.530	1.11	26.3
76	111.000	2.151	19.370	1.12	26.3
77	113.300	2.178	19.220	1.15	26.3
78	114.500	2.173	18.970	1.16	26.4
79	115.700	2.174	18.790	1.17	26.2
80	116.900	2.179	18.650	1.18	26.3
81	119.200	2.192	18.390	1.21	26.3
82	120.500	2.230	18.500	1.22	26.4
83	121.700	2.212	18.170	1.23	26.0
84	122.900	2.227	18.130	1.24	26.2
85	125.200	2.225	17.770	1.26	26.3
86	126.400	2.260	17.880	1.28	26.2
87	127.600	2.243	17.580	1.29	26.8
88	128.800	2.333	18.110	1.30	26.5
89	131.300	2.276	17.330	1.32	26.4
90	132.400	2.294	17.320	1.34	26.2
91	133.600	2.295	17.180	1.35	26.4
92	135.900	2.304	16.950	1.37	26.4
93	137.100	2.291	16.710	1.38	26.2
94	138.300	2.310	16.700	1.40	26.4
95	139.400	2.367	16.970	1.41	26.3
96	141.900	2.345	16.520	1.43	26.2
97	143.100	2.342	16.370	1.44	26.5
98	144.300	2.337	16.200	1.46	26.3
99	145.500	2.353	16.170	1.47	26.1
100	147.800	2.377	16.080	1.49	26.5
101	149.000	2.373	15.930	1.50	26.4
102	150.300	2.376	15.810	1.51	26.4
103	151.400	2.388	15.770	1.53	26.5
104	153.800	2.491	16.200	1.56	26.4
105	155.000	2.442	15.760	1.56	26.5
106	156.200	2.423	15.520	1.57	26.5
107	158.500	2.435	15.360	1.60	26.3
108	159.70				

112	165.700	2.457	14.630	1.67	26.2
113	166.800	2.491	14.930	1.68	26.6
114	168.000	2.543	15.130	1.69	26.3
115	170.400	2.502	14.690	1.72	26.4
116	171.700	2.512	14.630	1.73	26.4
117	172.900	2.522	14.580	1.74	26.3
118	174.000	2.530	14.540	1.75	26.6
119	176.400	2.548	14.450	1.78	26.6
120	177.600	2.542	14.310	1.79	26.5
121	178.700	2.542	14.220	1.80	26.4
122	181.100	2.583	14.260	1.82	26.4
123	182.400	2.553	14.000	1.84	26.3
124	183.600	2.564	13.970	1.85	26.3
125	184.800	2.574	13.930	1.86	26.2
126	187.100	2.590	13.840	1.88	26.5
127	188.300	2.599	13.800	1.90	26.3
128	189.400	2.607	13.760	1.91	26.2
129	190.600	2.600	13.640	1.92	26.5
130	193.100	2.621	13.570	1.94	26.2
131	194.300	2.631	13.540	1.95	26.4
132	195.500	2.630	13.460	1.97	26.4
133	196.600	2.641	13.430	1.98	26.5
134	199.000	2.665	13.400	2.00	26.2
135	200.100	2.660	13.290	2.01	26.0
136	201.500	2.655	13.180	2.03	26.3
137	203.800	2.699	13.240	2.05	26.2
138	205.000	2.674	13.050	2.06	26.4
139	206.200	2.691	13.060	2.07	26.6
140	207.300	2.740	13.210	2.09	26.5
141	209.700	2.706	12.900	2.11	26.4
142	210.900	2.724	12.920	2.12	26.6
143	212.200	2.734	12.890	2.13	26.4
144	213.300	2.740	12.840	2.15	26.6
145	215.700	2.771	12.850	2.17	26.5
146	216.900	2.745	12.660	2.18	26.7
147	218.000	2.755	12.640	2.19	26.2
148	219.200	2.792	12.740	2.20	26.5
149	221.600	2.775	12.520	2.23	26.4
150	222.900	2.801	12.570	2.24	26.3
151	224.000	2.796	12.480	2.25	26.7
152	226.400	2.804	12.380	2.28	26.4
153	227.600	2.801	12.310	2.29	26.4
154	228.700	2.817	12.310	2.30	26.4
155	229.900	2.815	12.240	2.31	26.7
156	232.400	2.831	12.180	2.34	26.2
157	233.600	2.823	12.090	2.35	26.5
158	234.800	2.843	12.110	2.36	26.4
159	235.900	2.849	12.080	2.37	26.6
160	238.300	2.853	11.970	2.40	26.3
161	239.400	2.869	11.980	2.41	26.5
162	240.600	2.883	11.980	2.42	26.4
163	241.800	2.873	11.880	2.43	26.5
164	244.300	2.914	11.930	2.45	26.5
165	245.400	2.900	11.820	2.47	26.6
166	246.600	2.903	11.770	2.48	26.7
167	249.000	2.927	11.760	2.50	26.6
168	250.000	2.916	11.660	2.51	26.5
169	251.300	2.944	11.720	2.53	26.5
170	252.500	2.951	11.690	2.54	26.3
171	254.900	2.942	11.540	2.56	26.7
172	256.000	2.944	11.500	2.57	26.5
173	257.300	2.961	11.510	2.59	26.6
174	[illegible]	[illegible]	[illegible]	2.[illegible]	[illegible]

177	263.200	3.020	11.470	2.65	26.4
178	264.500	3.008	11.370	2.66	26.5
179	266.800	3.020	11.320	2.68	26.6
180	268.000	3.003	11.210	2.69	26.7
181	269.100	3.009	11.160	2.70	26.5
182	271.500	3.125	11.510	2.73	26.6
183	272.700	3.079	11.290	2.74	26.3
184	273.900	3.075	11.230	2.75	26.1
185	275.100	3.064	11.140	2.76	26.6
186	277.600	3.084	11.110	2.79	26.6
187	278.700	3.213	11.530	2.80	26.7
188	279.900	3.219	11.500	2.81	26.7
189	281.000	3.112	11.070	2.82	26.4
190	283.400	3.081	10.870	2.85	26.4
191	284.700	3.123	10.970	2.86	26.6
192	285.800	3.236	11.320	2.87	26.8
193	287.000	3.153	10.990	2.88	26.5
194	289.400	3.129	10.810	2.91	26.7
195	290.500	3.128	10.770	2.92	26.1
196	291.700	3.149	10.800	2.93	26.5
197	294.100	3.171	10.760	2.95	26.5
198	295.300	3.162	10.710	2.97	26.7
199	296.500	3.221	10.860	2.98	26.4
200	297.700	3.193	10.730	2.99	26.4

Segment number 2 of type 'Tau/D' is defined as :
D from 300.0 to 0.000 1/s in 3.00 min at 25.0xC.
Area is 647.9 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=10.61 Eta(max)=590.3 Etam=26.55 s(n-1)=49.51

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	299.400	3.281	10.960	3.00	26.5
2	299.500	3.200	10.680	3.02	26.6
3	298.400	3.172	10.630	3.03	26.5
4	297.300	3.155	10.610	3.04	26.6
5	296.000	3.365	11.370	3.05	26.6
6	294.800	3.400	11.530	3.06	26.6
7	292.400	3.122	10.670	3.09	26.6
8	291.300	3.099	10.640	3.10	26.6
9	290.100	3.088	10.650	3.11	26.6
10	287.700	3.095	10.760	3.14	26.6
11	286.600	3.065	10.700	3.15	26.6
12	285.300	3.059	10.720	3.16	26.4
13	284.200	3.058	10.760	3.17	26.7
14	281.800	3.123	11.080	3.20	26.6
15	280.600	3.039	10.830	3.21	26.6
16	279.500	3.021	10.810	3.22	26.6
17	278.300	3.089	11.100	3.23	26.7
18	276.000	3.055	11.070	3.25	26.3
19	274.600	3.054	11.120	3.27	26.5
20	273.500	2.974	10.860	3.28	26.6
21	272.300	2.966	10.890	3.29	26.5
22	269.900	3.060	11.340	3.31	26.6
23	268.800	3.049	11.340	3.33	26.8
24	267.600	2.985	11.150	3.34	26.6
25	265.200	2.944	11.100	3.36	26.6
26	263.900	2.955	11.200	3.37	26.6
27	262.800	2.927	11.140	3.39	26.7
28	261.600	2.904	11.100	3.40	26.4
29	259.200	2.899	11.180	3.42	26.5
30	258.100	2.897	11.230	3.43	26.6
31	256.900	2.896	11.270	3.45	26.4
32	255.700	2.852	11.150	3.46	26.5
33	253.200	2.849	11.250	3.48	26.7
34	252.000	2.863	11.370	3.49	26.4
35	250.900	2.831	11.280	3.50	26.7
36	249.700	2.811	11.260	3.52	26.7
37	247.400	2.796	11.300	3.54	26.6
38	246.200	2.813	11.420	3.55	26.6
39	245.000	2.804	11.440	3.56	26.6
40	242.500	2.781	11.470	3.59	26.8
41	241.300	2.775	11.500	3.60	26.6
42	240.200	2.762	11.500	3.61	26.6
43	239.100	2.757	11.530	3.62	26.5
44	236.700	2.736	11.560	3.65	26.3
45	235.500	2.723	11.560	3.66	26.5
46	234.200	2.712	11.580	3.67	26.7
47	233.000	2.698	11.580	3.68	26.3
48	230.600	2.712	11.760	3.71	26.6
49	229.500	2.689	11.720	3.72	26.7
50	228.300	2.673	11.710	3.73	26.4
51	227.200	2.661	11.720	3.74	26.6

54	222.300	2.626	11.510	3.78	26.4
55	219.900	2.629	11.950	3.81	26.7
56	218.800	2.609	11.930	3.83	26.6
57	217.600	2.608	11.990	3.84	26.6
58	216.400	2.586	11.950	3.85	26.5
59	214.100	2.579	12.050	3.87	26.6
60	212.800	2.567	12.160	3.89	26.6
61	211.600	2.577	12.180	3.90	26.5
62	210.400	2.570	12.220	3.91	26.3
63	208.100	2.542	12.220	3.93	26.8
64	206.900	2.540	12.280	3.95	26.7
65	205.700	2.523	12.270	3.96	26.5
66	204.500	2.531	12.370	3.97	26.2
67	202.100	2.510	12.420	3.99	26.4
68	200.900	2.496	12.420	4.00	26.6
69	199.800	2.486	12.440	4.02	26.5
70	197.400	2.467	12.500	4.04	26.5
71	196.200	2.463	12.560	4.05	26.7
72	195.000	2.465	12.640	4.06	26.6
73	193.800	2.439	12.580	4.08	26.5
74	191.300	2.433	12.720	4.10	26.6
75	190.200	2.424	12.750	4.11	26.5
76	189.000	2.433	12.870	4.12	26.7
77	187.900	2.406	12.810	4.14	26.6
78	185.500	2.397	12.920	4.16	26.6
79	184.300	2.409	13.070	4.17	26.7
80	183.000	2.384	13.020	4.18	26.4
81	181.800	2.379	13.080	4.20	26.5
82	179.500	2.355	13.120	4.22	26.4
83	178.300	2.354	13.200	4.23	26.6
84	177.100	2.341	13.220	4.24	26.6
85	174.800	2.326	13.310	4.27	26.7
86	173.600	2.320	13.370	4.28	26.3
87	172.300	2.308	13.400	4.29	26.5
88	171.100	2.300	13.440	4.30	26.5
89	168.800	2.293	13.580	4.33	26.4
90	167.600	2.281	13.610	4.34	26.7
91	166.400	2.285	13.730	4.35	26.6
92	165.200	2.306	13.950	4.36	26.3
93	162.900	2.257	13.860	4.39	26.7
94	161.600	2.242	13.870	4.40	26.6
95	160.400	2.238	13.950	4.41	26.6
96	159.200	2.229	14.000	4.42	26.7
97	156.900	2.225	14.180	4.45	26.6
98	155.700	2.216	14.230	4.46	26.7
99	154.500	2.201	14.240	4.47	26.6
100	152.100	2.181	14.340	4.49	26.5
101	150.900	2.190	14.510	4.50	26.6
102	149.700	2.162	14.440	4.52	26.5
103	148.600	2.156	14.510	4.53	26.5
104	146.200	2.143	14.650	4.55	26.5
105	145.000	2.141	14.770	4.56	26.7
106	143.900	2.126	14.770	4.58	26.5
107	142.700	2.127	14.900	4.59	26.7
108	140.200	2.114	15.080	4.61	26.5
109	139.100	2.094	15.060	4.62	26.5
110	137.800	2.096	15.210	4.64	26.5
111	136.700	2.079	15.210	4.65	26.5
112	134.300	2.067	15.390	4.67	26.5
113	133.100	2.062	15.490	4.68	26.3
114	131.900	2.049	15.540	4.69	26.2
115	129.500	2.057	15.880	4.72	26.4

119	123.600	2.010	16.250	4.76	26.5
120	122.400	1.992	16.270	4.79	26.5
121	121.200	1.988	16.400	4.80	26.3
122	119.900	1.978	16.500	4.81	26.4
123	117.600	1.965	16.710	4.84	26.6
124	116.500	1.962	16.840	4.85	26.6
125	115.300	1.956	16.970	4.86	26.5
126	114.200	1.942	17.010	4.87	26.5
127	111.700	1.924	17.220	4.90	26.6
128	110.500	1.909	17.290	4.91	26.5
129	109.300	1.906	17.440	4.92	26.5
130	106.900	1.892	17.700	4.94	26.6
131	105.700	1.891	17.890	4.96	26.5
132	104.500	1.889	18.060	4.97	26.5
133	103.400	1.866	18.060	4.98	26.4
134	100.900	1.847	18.310	5.00	26.5
135	99.710	1.857	18.630	5.02	26.7
136	98.530	1.840	18.680	5.03	26.7
137	97.360	1.836	18.860	5.04	26.2
138	95.010	1.814	19.090	5.06	26.5
139	93.840	1.819	19.390	5.08	26.7
140	92.670	1.806	19.490	5.09	26.5
141	91.500	1.796	19.630	5.10	26.6
142	89.000	1.778	19.970	5.12	26.6
143	87.830	1.778	20.240	5.14	26.6
144	86.660	1.763	20.350	5.15	26.6
145	84.310	1.741	20.650	5.17	26.7
146	83.140	1.733	20.850	5.18	26.5
147	81.960	1.724	21.040	5.19	26.5
148	80.790	1.714	21.210	5.21	26.2
149	78.300	1.693	21.620	5.23	26.6
150	77.130	1.693	21.950	5.24	26.8
151	75.950	1.685	22.190	5.25	26.5
152	74.780	1.680	22.470	5.27	26.7
153	72.480	1.668	23.020	5.29	26.5
154	71.260	1.657	23.250	5.30	26.5
155	69.990	1.653	23.610	5.31	26.4
156	68.770	1.638	23.820	5.33	26.2
157	66.420	1.617	24.350	5.35	26.5
158	65.250	1.608	24.650	5.36	26.6
159	64.080	1.603	25.020	5.37	26.5
160	61.730	1.585	25.670	5.40	26.5
161	60.560	1.573	25.980	5.41	26.5
162	59.240	1.565	26.420	5.42	26.5
163	58.060	1.554	26.760	5.43	26.6
164	55.720	1.514	27.180	5.46	26.5
165	54.550	1.525	27.960	5.47	26.4
166	53.370	1.517	28.420	5.48	26.6
167	52.200	1.514	29.010	5.49	26.6
168	49.760	1.487	29.890	5.52	26.6
169	48.530	1.470	30.290	5.53	26.5
170	47.360	1.469	31.010	5.54	26.5
171	46.190	1.455	31.490	5.55	26.4
172	43.840	1.447	33.000	5.58	26.6
173	42.670	1.432	33.570	5.59	28.4
174	41.500	1.423	34.300	5.60	26.5
175	39.050	1.402	35.910	5.62	26.7
176	37.830	1.389	36.730	5.64	26.4
177	36.660	1.375	37.510	5.65	26.4
178	35.480	1.362	38.380	5.66	26.5
179	33.140	1.342	40.510	5.68	26.5
180	31.960	1.340	41.920	5.69	26.5

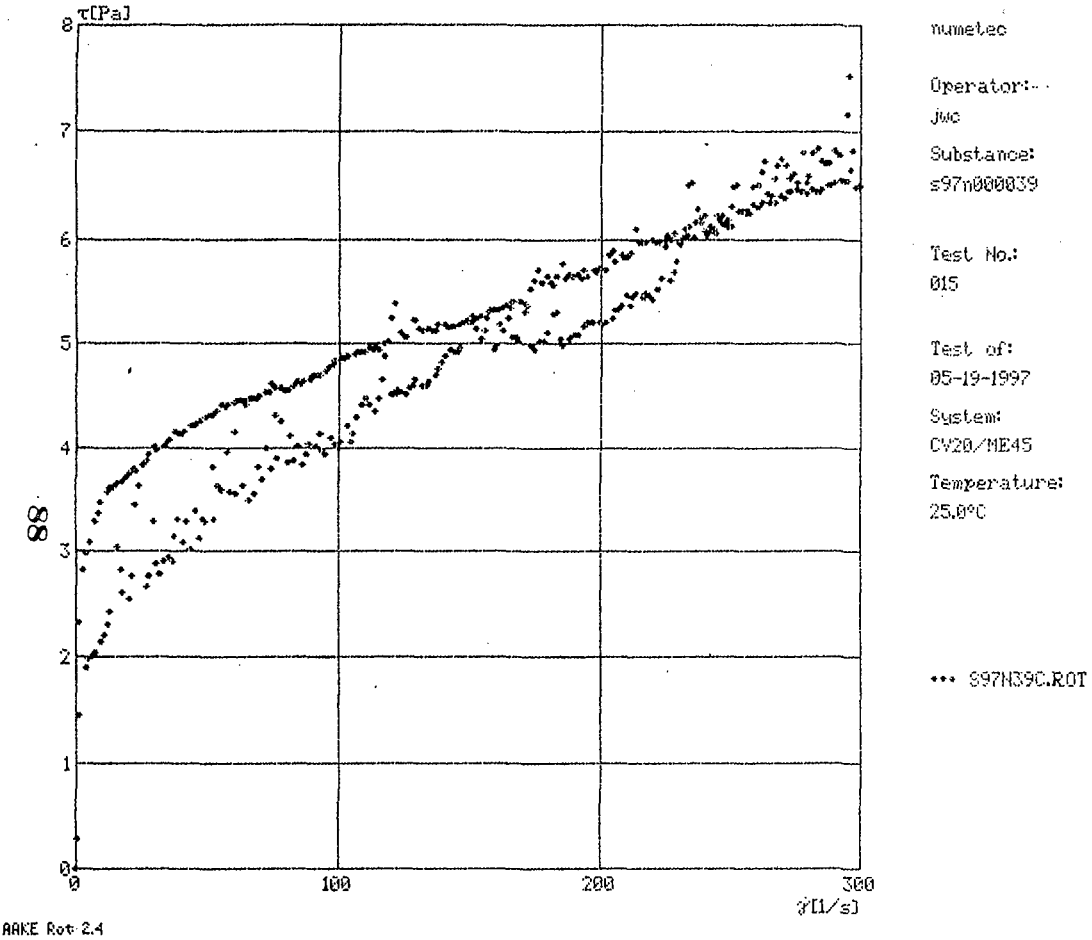
185	24.280	1.268	52.240	5.77	26.4
186	23.020	1.263	54.870	5.78	26.4
187	21.860	1.243	56.870	5.80	26.3
188	19.530	1.224	62.680	5.82	26.3
189	18.330	1.206	65.780	5.83	26.4
190	17.140	1.186	69.210	5.84	26.4
191	15.870	1.176	74.060	5.85	26.6
192	13.470	1.148	85.280	5.88	26.4
193	12.310	1.137	92.310	5.89	26.4
194	11.090	1.117	100.700	5.90	26.4
195	9.941	1.107	111.300	5.91	26.5
196	7.571	1.060	140.000	5.94	26.4
197	6.246	1.040	166.500	5.95	26.5
198	5.098	1.010	198.100	5.96	26.4
199	3.910	0.978	250.000	5.97	26.4
200	1.417	0.837	590.300	6.00	26.4

8C510-PCS97-011

Attachment VIII

SAMPLE S97N000039 (BOJYD7) VISCOSITY RESULTS

Consisting of 11 Pages including the cover page


τ[Pa]
8
7
6
5
4
3
2
1
0
0
100
200
300
γ[1/s]
numetec
Operator:
jwc
Substance:
s97n000039
Test No.:
015
Test of:
05-19-1997
System:
CV20/ME45
Temperature:
25.0°C
••• S97N39C.ROT

AAKE Rot 2.4

numetec
Operator:
jwo
Substance:
s97m000039
Test No.:
015
Test of:
05-19-1997
System:
CV20/ME45
Temperature:
25.0°C
... S97N39C.KOT
300
200
100
0
0
100
200
300
γ[1/s]
ANKE Rot 2.4

Date : 05-19-1997 Testdate : 05-19-1997
Substance : s97n000039
Test number : 015
Operator : jwc
Sensor : ME45 Meas. system : CV20
%Tau : 100% %D : 100%
Factor A : 0.800 Factor M : 3.000 Gap : 0.000 mm
Data stored in file C:\HAAKE\S97N39C.ROT

Segment number 1 of type 'Tau/D' is defined as :
D from 0.000 to 300.0 1/s in 3.00 min at 25.0°C.
Area is 1545 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=0.000 Eta(max)=1587 Eta=82.32 s(n-1)=177.1

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[°C]
1	0.000	0.000	0.000	0.00	21.0
2	0.235	0.296	1261.000	0.02	21.2
3	1.461	2.319	1587.000	0.03	21.1
4	2.659	2.835	1066.000	0.04	21.1
5	3.851	2.978	773.300	0.05	21.2
6	5.132	3.090	602.200	0.06	21.2
7	7.507	3.292	438.500	0.08	21.2
8	8.715	3.367	386.300	0.10	21.1
9	9.878	3.475	351.800	0.11	21.2
10	12.240	3.582	292.700	0.14	21.2
11	13.460	3.613	268.400	0.15	21.2
12	14.710	3.621	246.100	0.16	21.2
13	15.910	3.647	229.200	0.17	21.2
14	18.290	3.682	201.300	0.20	21.1
15	19.580	3.724	190.200	0.21	21.3
16	20.670	3.764	182.100	0.22	21.2
17	22.060	3.788	171.700	0.23	21.3
18	23.210	3.772	162.500	0.24	21.2
19	25.690	3.844	149.600	0.27	21.3
20	26.860	3.872	144.200	0.28	21.2
21	28.020	3.930	140.300	0.29	21.3
22	29.670	4.020	135.500	0.30	21.2
23	30.550	3.975	130.100	0.32	21.3
24	33.240	4.023	121.100	0.34	21.3
25	34.410	4.043	117.500	0.36	21.3
26	35.630	4.085	114.600	0.37	21.5
27	37.980	4.149	109.200	0.39	21.3
28	39.100	4.147	106.100	0.40	21.3
29	40.320	4.146	102.800	0.42	21.3
30	41.500	4.156	100.200	0.43	21.4
31	43.990	4.222	95.970	0.45	21.3
32	45.160	4.227	93.590	0.46	21.2
33	46.330	4.241	91.530	0.48	21.4
34	47.510	4.249	89.440	0.49	21.4
35	49.850	4.289	86.040	0.51	21.4
36	51.030	4.310	84.470	0.52	21.4
37	52.200	4.323	82.820	0.53	21.3
38	53.470	4.356	81.460	0.55	21.4
39	55.870	4.418	79.090	0.57	21.4
40	57.040	4.405	77.240	0.58	21.4

46	66.540	4.476	64.270	0.69	21.5
47	67.740	4.476	66.070	0.69	21.5
48	68.910	4.478	64.980	0.70	21.5
49	70.090	4.493	64.100	0.71	21.5
50	72.430	4.536	62.620	0.74	21.4
51	73.750	4.540	61.550	0.75	21.5
52	74.930	4.622	61.680	0.76	21.4
53	76.100	4.581	60.200	0.77	21.6
54	78.450	4.585	58.450	0.80	21.4
55	79.620	4.567	57.360	0.81	21.3
56	80.790	4.563	56.480	0.82	21.6
57	83.280	4.596	55.180	0.84	21.5
58	84.460	4.635	54.880	0.86	21.4
59	85.630	4.619	53.870	0.87	21.6
60	86.800	4.639	53.440	0.88	21.4
61	89.150	4.669	52.370	0.90	21.4
62	90.320	4.695	51.980	0.92	21.6
63	91.500	4.710	51.480	0.93	21.4
64	92.670	4.706	50.790	0.94	21.5
65	95.160	4.747	49.880	0.96	21.4
66	96.330	4.773	49.550	0.97	21.4
67	97.510	4.794	49.160	0.99	21.6
68	98.680	4.835	49.000	1.00	21.5
69	101.000	4.865	48.160	1.02	21.6
70	102.200	4.865	47.610	1.03	21.3
71	103.400	4.873	47.140	1.05	21.5
72	105.900	4.901	46.290	1.07	21.4
73	107.000	4.916	45.930	1.08	21.6
74	108.200	4.918	45.440	1.09	21.6
75	109.400	4.919	44.970	1.11	21.6
76	111.700	4.957	44.360	1.13	21.5
77	112.900	4.942	43.770	1.14	21.5
78	114.200	4.968	43.500	1.15	21.6
79	115.400	4.938	42.800	1.17	21.5
80	117.700	5.011	42.560	1.19	21.5
81	118.900	5.032	42.320	1.20	21.5
82	120.100	5.251	43.730	1.21	21.5
83	121.300	5.389	44.440	1.23	21.6
84	123.700	5.100	41.240	1.25	21.5
85	124.900	5.061	40.510	1.26	21.4
86	126.100	5.060	40.120	1.27	21.5
87	128.400	5.221	40.650	1.30	21.5
88	129.600	5.219	40.260	1.31	21.5
89	130.800	5.151	39.380	1.32	21.6
90	132.000	5.117	38.780	1.33	21.5
91	134.400	5.135	38.210	1.36	21.4
92	135.600	5.131	37.830	1.37	21.6
93	136.800	5.134	37.530	1.38	21.3
94	138.000	5.177	37.520	1.39	21.7
95	140.300	5.191	37.000	1.42	21.5
96	141.500	5.169	36.530	1.43	21.5
97	142.700	5.169	36.230	1.44	21.5
98	143.800	5.173	35.960	1.45	21.7
99	146.300	5.190	35.470	1.48	21.5
100	147.500	5.203	35.270	1.49	21.7
101	148.700	5.216	35.080	1.50	21.5
102	151.000	5.211	34.500	1.52	21.5
103	152.200	5.247	34.480	1.53	21.5
104	153.400	5.255	34.260	1.55	21.5
105	154.500	5.260	34.040	1.56	21.6
106	157.000	5.315	33.650	1.58	21.8
107	158.200	5.332	33.710	1.59	21.5
108	159.400	5.319	33.370	1.61	21.5

112	165.400	5.354	32.370	1.67	21.7
113	166.600	5.389	32.410	1.68	21.4
114	168.900	5.405	32.000	1.70	21.6
115	170.100	5.410	31.610	1.71	21.5
116	171.300	5.395	31.500	1.73	21.6
117	173.600	5.521	31.800	1.75	21.7
118	174.800	5.611	32.100	1.76	21.6
119	176.100	5.700	32.370	1.77	21.6
120	177.300	5.594	31.560	1.78	21.7
121	179.600	5.645	31.430	1.81	21.8
122	180.800	5.584	30.880	1.82	21.6
123	182.000	5.559	30.550	1.83	21.6
124	183.100	5.645	30.820	1.84	21.6
125	185.500	5.766	31.080	1.87	21.6
126	186.800	5.636	30.170	1.88	22.0
127	188.100	5.668	30.130	1.89	21.6
128	189.100	5.650	29.870	1.90	21.5
129	191.600	5.864	29.560	1.93	21.5
130	192.800	5.620	29.150	1.94	21.5
131	194.000	5.703	29.400	1.95	21.5
132	195.200	5.644	28.920	1.96	21.8
133	197.500	5.705	28.880	1.99	21.9
134	198.700	5.685	28.620	2.00	21.7
135	200.000	5.726	28.640	2.01	21.7
136	202.300	5.707	28.210	2.04	21.6
137	203.500	5.855	28.770	2.05	21.7
138	204.700	5.891	28.760	2.06	21.5
139	205.900	5.793	28.140	2.07	21.7
140	208.200	5.847	28.080	2.10	21.6
141	209.400	5.833	27.860	2.11	21.7
142	210.600	5.827	27.670	2.12	21.6
143	211.900	5.862	27.670	2.13	21.5
144	214.200	6.097	28.460	2.15	21.5
145	215.400	5.980	27.760	2.17	21.7
146	216.600	5.977	27.600	2.18	21.7
147	217.700	5.868	27.410	2.19	21.6
148	220.100	5.995	27.240	2.21	21.4
149	221.400	5.975	26.980	2.23	21.8
150	222.600	5.978	26.860	2.24	21.7
151	224.900	5.985	26.610	2.26	21.6
152	226.100	6.031	26.670	2.27	21.6
153	227.300	5.989	26.350	2.29	21.6
154	228.400	6.042	26.450	2.30	21.4
155	230.900	5.962	25.810	2.32	21.6
156	232.100	6.018	25.930	2.33	21.6
157	233.300	6.033	25.860	2.34	21.8
158	234.500	6.115	26.080	2.36	21.6
159	236.800	6.162	26.020	2.38	21.8
160	238.000	6.278	26.380	2.39	21.8
161	239.100	6.187	25.870	2.40	21.6
162	240.300	6.079	25.290	2.42	21.9
163	242.800	6.104	25.140	2.44	21.6
164	244.000	6.091	24.960	2.45	21.7
165	245.200	6.221	25.370	2.46	21.8
166	247.500	6.140	24.810	2.49	21.7
167	248.600	6.162	24.780	2.50	21.6
168	249.900	6.114	24.470	2.51	21.9
169	251.000	6.119	24.380	2.52	21.5
170	253.500	6.258	24.690	2.55	21.8
171	254.700	6.260	24.580	2.56	21.8
172	255.600	6.261	24.480	2.57	21.9
173	257.000	6.254	24.330	2.58	21.6

178	265.400	6.325	23.830	2.67	21.6
179	266.500	6.402	24.020	2.68	21.6
180	267.700	6.326	23.630	2.69	21.6
181	270.100	6.398	23.690	2.71	21.7
182	271.300	6.384	23.530	2.73	21.6
183	272.600	6.427	23.580	2.74	21.5
184	273.700	6.440	23.530	2.75	21.7
185	276.100	6.458	23.390	2.77	22.1
186	277.300	6.427	23.180	2.78	21.6
187	278.400	6.432	23.100	2.80	21.8
188	279.600	6.414	22.940	2.81	21.6
189	282.000	6.462	22.920	2.83	21.9
190	283.100	6.426	22.690	2.84	21.9
191	284.400	6.437	22.630	2.86	22.0
192	285.500	6.458	22.620	2.87	21.6
193	287.800	6.496	22.570	2.89	21.8
194	289.000	6.505	22.510	2.90	21.7
195	290.200	6.506	22.420	2.92	21.8
196	292.700	6.536	22.330	2.94	21.9
197	293.800	6.545	22.280	2.95	21.8
198	295.000	6.534	22.150	2.96	21.7
199	296.200	6.633	22.390	2.98	21.5
200	298.500	6.482	21.710	3.00	21.7

Segment number 2 of type 'Tau/D' is defined as :
D from 300.0 to 0.000 1/s in 3.00 min at 25.0xC.
Area is 1438 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=21.60 Eta(max)=989.8 Etax=56.60 s(n-1)=88.25

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	300.000	6.478	21.600	3.00	21.8
2	299.700	6.487	21.640	3.02	22.0
3	298.400	6.466	21.670	3.03	21.9
4	297.400	6.813	22.910	3.04	21.5
5	296.100	7.518	25.390	3.05	21.9
6	294.900	7.162	24.290	3.06	22.0
7	292.400	6.785	23.210	3.09	21.6
8	291.300	6.776	23.270	3.10	22.0
9	290.100	6.813	23.490	3.11	21.7
10	287.800	6.688	23.240	3.14	21.7
11	286.500	6.694	23.360	3.15	21.7
12	285.300	6.727	23.580	3.16	22.0
13	284.100	6.845	24.090	3.17	21.6
14	281.800	6.794	24.110	3.20	21.6
15	280.600	6.582	23.450	3.21	21.9
16	279.500	6.525	23.350	3.22	21.9
17	278.300	6.806	24.460	3.23	21.5
18	275.900	6.510	23.600	3.25	21.8
19	274.600	6.598	24.020	3.27	21.8
20	273.500	6.585	24.010	3.28	21.8
21	272.300	6.677	24.520	3.29	21.6
22	269.900	6.742	24.980	3.31	21.8
23	268.800	6.673	24.830	3.33	21.6
24	267.600	6.549	24.470	3.34	21.6
25	265.200	6.422	24.210	3.36	21.8
26	263.900	6.725	25.480	3.37	21.8
27	262.800	6.621	25.200	3.39	21.7
28	261.600	6.502	24.860	3.40	21.6
29	259.200	6.478	24.990	3.42	21.8
30	258.100	6.234	24.160	3.43	21.6
31	256.900	6.225	24.230	3.45	21.9
32	255.700	6.257	24.470	3.46	21.6
33	253.200	6.487	25.620	3.48	21.7
34	252.100	6.474	25.680	3.49	21.8
35	250.900	6.291	25.060	3.50	22.1
36	249.700	6.164	24.680	3.52	21.8
37	247.400	6.209	25.100	3.54	21.7
38	246.200	6.170	25.060	3.55	21.9
39	245.000	6.048	24.680	3.56	21.8
40	242.500	6.065	25.010	3.59	22.0
41	241.300	6.041	25.030	3.60	21.9
42	240.200	6.220	25.900	3.61	21.9
43	238.000	6.161	25.780	3.62	22.1
44	236.700	6.011	25.400	3.65	21.4
45	235.500	6.526	27.710	3.66	22.0
46	234.300	6.493	27.710	3.67	21.9
47	233.000	6.092	26.150	3.68	21.5
48	230.600	5.971	25.890	3.71	21.5

54	222.300	5.529	24.870	3.79	21.8
55	219.900	5.435	24.710	3.81	21.7
56	218.800	5.464	24.970	3.83	22.0
57	217.600	5.482	25.190	3.84	22.0
58	216.400	5.449	25.180	3.85	21.7
59	214.100	5.492	25.660	3.87	21.9
60	212.800	5.448	25.610	3.89	21.8
61	211.600	5.375	25.400	3.90	22.0
62	210.400	5.475	26.020	3.91	22.2
63	208.100	5.366	25.790	3.93	21.7
64	206.900	5.331	25.770	3.95	22.0
65	205.800	5.328	25.890	3.96	21.8
66	204.600	5.246	25.640	3.97	22.0
67	202.100	5.215	25.810	3.99	21.8
68	200.900	5.191	25.840	4.00	21.9
69	199.700	5.196	26.020	4.02	21.7
70	197.400	5.199	26.340	4.04	21.8
71	196.200	5.210	26.550	4.05	21.5
72	195.000	5.206	26.680	4.06	21.8
73	193.800	5.168	26.660	4.08	21.9
74	191.300	5.078	26.540	4.10	21.6
75	190.200	5.086	26.740	4.11	21.8
76	189.000	5.064	26.790	4.12	21.7
77	187.800	5.052	26.900	4.14	21.8
78	185.500	4.983	26.860	4.16	22.1
79	184.300	5.047	27.380	4.17	21.6
80	183.000	5.306	28.990	4.18	21.8
81	181.900	5.289	29.080	4.20	22.0
82	179.500	5.100	28.420	4.22	21.9
83	178.300	5.030	28.210	4.23	21.8
84	177.100	5.023	28.360	4.24	21.6
85	174.800	4.940	28.260	4.27	21.8
86	173.600	4.981	28.690	4.28	21.8
87	172.300	5.358	31.100	4.29	21.8
88	171.100	5.305	31.000	4.30	21.9
89	168.800	5.024	29.770	4.33	21.8
90	167.600	5.062	30.200	4.34	21.9
91	166.400	5.071	30.470	4.35	21.8
92	165.200	5.247	31.750	4.36	21.7
93	162.900	5.125	31.460	4.39	21.7
94	161.700	5.190	32.100	4.40	21.6
95	160.400	4.993	31.130	4.41	21.9
96	159.200	4.942	31.040	4.42	21.7
97	156.900	5.245	33.430	4.45	21.9
98	155.700	5.133	32.960	4.46	21.9
99	154.500	5.048	32.660	4.47	21.7
100	152.100	5.140	33.810	4.49	21.8
101	150.900	5.275	34.950	4.50	21.7
102	149.700	5.212	34.820	4.52	21.9
103	148.600	5.219	35.110	4.53	21.7
104	146.200	4.962	33.930	4.55	21.6
105	145.100	4.920	33.920	4.56	21.6
106	143.900	4.916	34.170	4.58	21.9
107	142.700	4.951	34.690	4.59	21.7
108	140.200	4.881	34.820	4.61	21.6
109	139.000	4.820	34.670	4.62	21.5
110	137.900	4.770	34.590	4.64	21.7
111	136.700	4.712	34.480	4.65	21.6
112	134.300	4.650	34.620	4.67	21.8
113	133.100	4.602	34.570	4.68	21.7
114	131.900	4.586	34.850	4.69	21.7

119	125.600	4.541	36.740	4.78	21.6
120	122.400	4.564	37.260	4.79	22.0
121	121.300	4.520	37.260	4.80	21.8
122	120.000	4.528	37.720	4.81	21.7
123	117.600	4.888	41.560	4.84	21.7
124	116.500	4.663	40.040	4.85	21.8
125	115.200	4.472	38.800	4.86	21.7
126	114.100	4.358	38.210	4.87	21.7
127	111.700	4.417	39.530	4.90	21.7
128	110.500	4.473	40.480	4.91	21.8
129	109.300	4.417	40.420	4.92	21.7
130	106.900	4.296	40.170	4.94	21.9
131	105.700	4.147	39.230	4.96	21.8
132	104.600	4.051	38.730	4.97	21.5
133	103.400	4.224	40.860	4.98	21.6
134	100.900	4.063	40.270	5.00	21.9
135	99.710	3.999	40.100	5.02	21.7
136	98.530	4.039	40.990	5.03	21.8
137	97.360	4.094	42.050	5.04	21.6
138	95.010	3.926	41.320	5.06	21.7
139	93.840	3.982	42.430	5.08	21.8
140	92.670	4.141	44.680	5.09	21.7
141	91.500	4.013	43.860	5.10	21.7
142	89.000	4.035	45.340	5.12	21.8
143	87.830	3.928	44.730	5.14	21.7
144	86.660	3.838	44.290	5.15	21.7
145	84.310	4.008	47.540	5.17	21.7
146	83.140	3.870	46.550	5.18	21.8
147	82.010	4.108	50.090	5.19	21.7
148	80.690	3.849	47.700	5.21	21.6
149	78.300	4.267	54.500	5.23	21.9
150	77.130	3.891	50.440	5.24	21.8
151	75.950	4.310	56.750	5.25	21.5
152	74.780	3.802	50.840	5.27	21.8
153	72.430	3.990	55.080	5.29	21.8
154	71.260	3.703	51.960	5.30	21.8
155	69.990	3.824	54.640	5.31	21.8
156	68.770	3.556	51.700	5.33	21.7
157	66.420	3.498	52.670	5.35	21.7
158	65.250	4.424	67.800	5.36	21.9
159	64.080	3.638	56.770	5.37	21.9
160	61.730	3.549	57.490	5.40	21.6
161	60.560	4.152	68.570	5.41	21.7
162	59.240	3.566	60.200	5.42	21.7
163	58.060	3.965	68.280	5.43	21.6
164	55.720	3.586	64.350	5.46	21.7
165	54.550	3.632	66.590	5.47	21.8
166	53.370	3.318	62.170	5.48	21.8
167	52.200	3.807	72.930	5.49	21.7
168	49.710	3.291	66.210	5.52	21.9
169	48.530	3.316	68.320	5.53	21.6
170	47.360	3.133	66.160	5.54	21.7
171	46.190	3.395	73.510	5.55	21.8
172	43.840	3.028	69.060	5.58	21.7
173	42.670	3.287	77.040	5.59	21.7
174	41.500	3.088	74.410	5.60	21.7
175	39.000	3.301	84.640	5.62	21.7
176	37.830	3.140	83.000	5.64	21.7
177	36.660	2.901	79.150	5.65	21.7
178	35.480	2.948	83.090	5.66	21.7
179	33.140	2.913	87.910	5.68	21.7
180	31.960	2.784	87.090	5.69	21.6

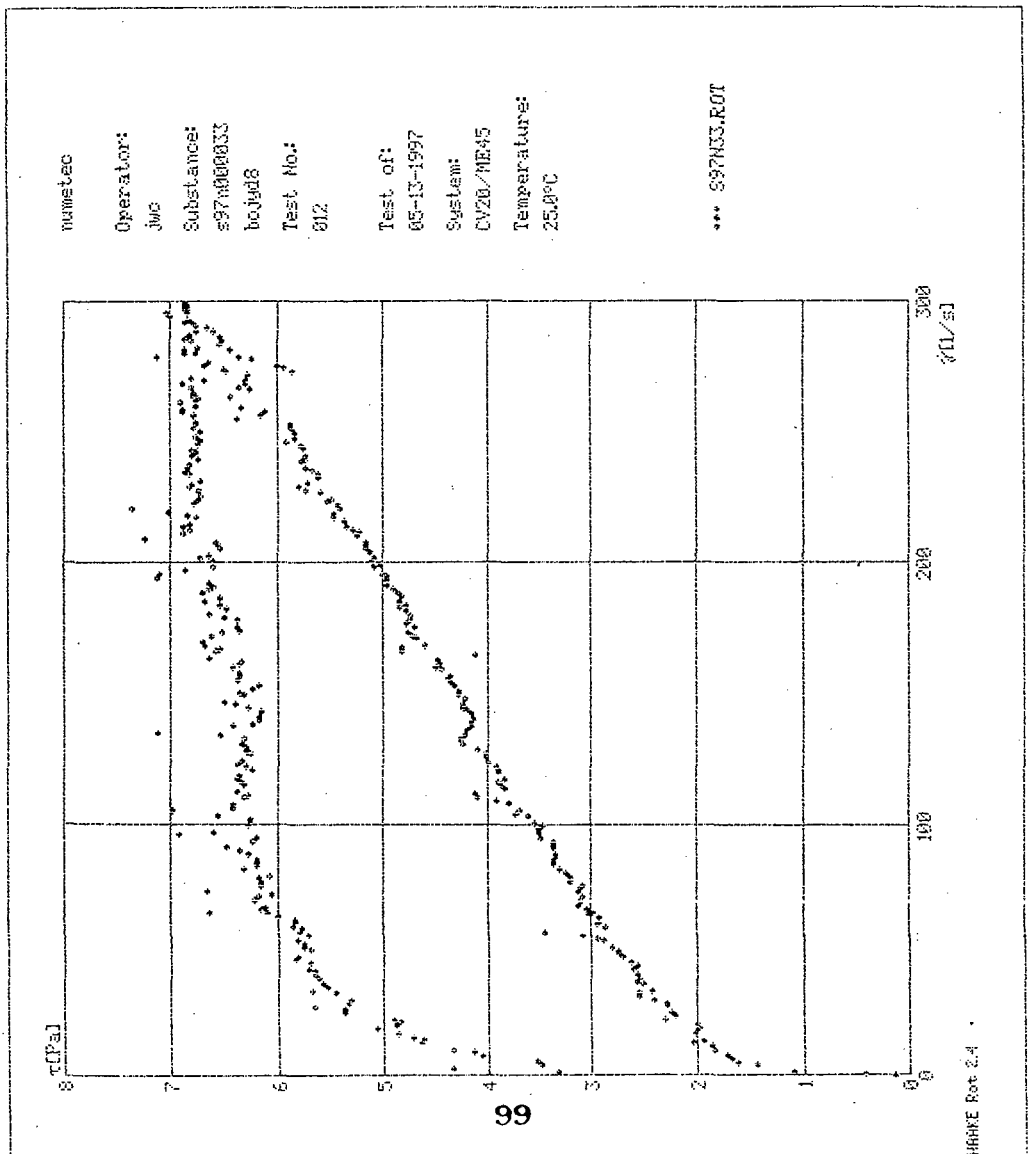
186	23.050	3.451	149.700	5.78	21.7
187	21.760	2.770	127.300	5.80	21.6
188	20.650	2.536	122.800	5.81	21.6
189	18.210	2.612	143.400	5.83	21.7
190	17.050	2.833	166.200	5.84	21.7
191	15.870	3.039	191.500	5.86	21.7
192	13.500	2.432	180.200	5.88	21.8
193	12.260	2.302	187.700	5.89	21.6
194	11.000	2.204	200.300	5.90	21.5
195	9.800	2.132	217.600	5.92	21.5
196	7.424	2.041	274.900	5.94	21.6
197	6.261	2.008	320.800	5.95	21.5
198	5.078	1.975	388.800	5.96	21.6
199	3.915	1.900	485.400	5.97	21.5
200	1.476	1.461	989.800	6.00	21.6

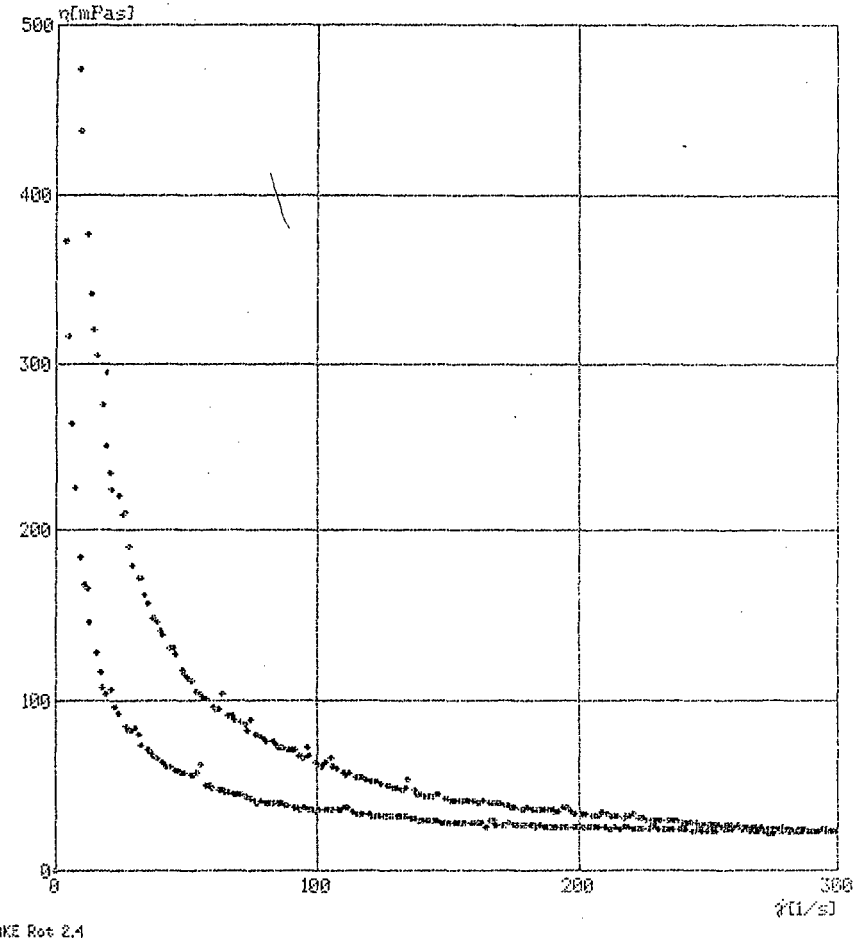
8C5I0-PCS97-0II

Attachment IX

SAMPLE S97N000033 (B0JYD8) VISCOSITY RESULTS

Consisting of 11 Pages including the cover page


numetec
Operator:
jwo
Substance:
s97n000033
bojw08
Test No.:
012
Test of:
05-13-1997
System:
CV20/MB45
Temperature:
25.0°C
*** S97N33.ROT
τ[Pa]
γ[1/s]
0
1
2
3
4
5
6
7
8
100
200
300
HAAKE Rot 2.4



numeteo

Operator:
jwo

Substance:
s97n000033
bojyd8

Test No.:
012

Test of:
05-13-1997

System:
CV20/ME45

Temperature:
25.0°C

*** S97N33.ROT

HAAKE Rot 2.4

S97N000033 JFD 5/14/97

Test number : 012
Operator : jwc
Sensor : ME45 Meas. system : CV20
XTau : 100% XD : 100%
Factor A : 0.600 Factor M : 3.000 Gap : 0.000 mm
Data stored in file C:\HAAKE\S97N33.ROT

Segment number 1 of type 'Tau/D' is defined as :
D from 0.000 to 300.0 1/s in 3.00 min at 25.0xC.
Area is 1858 Pa/s
200 steps are defined; 200 are actually present.

Apparent viscosity:
Eta(min)=0.000 Eta(max)=2182 Eta=105.8 s(n-1)=237.5

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	0.000	0.143	0.000	0.00	32.5
2	0.274	0.435	1590.000	0.02	32.6
3	1.525	3.327	2182.000	0.03	32.6
4	2.693	4.340	1612.000	0.04	32.6
5	3.686	3.483	896.300	0.05	32.5
6	5.186	3.537	682.100	0.06	32.5
7	7.576	4.050	534.500	0.08	32.6
8	8.739	4.143	474.100	0.10	32.7
9	9.907	4.330	437.000	0.11	32.6
10	12.320	4.643	376.900	0.14	32.6
11	13.520	4.616	341.500	0.15	32.7
12	14.750	4.717	319.800	0.16	32.7
13	15.980	4.867	304.600	0.17	32.6
14	18.350	5.067	276.100	0.20	32.6
15	19.510	4.890	250.600	0.21	32.7
16	20.680	4.842	234.100	0.22	32.8
17	21.850	4.912	224.800	0.23	32.8
18	24.260	5.366	221.200	0.25	32.7
19	25.530	5.361	210.000	0.27	32.6
20	26.750	5.651	211.200	0.28	32.7
21	27.940	5.320	190.400	0.29	32.6
22	29.520	5.305	179.700	0.30	32.7
23	31.720	5.444	171.600	0.33	32.7
24	32.990	5.679	172.100	0.34	32.7
25	34.260	5.533	161.500	0.35	32.8
26	35.480	5.568	156.900	0.37	32.7
27	37.830	5.607	148.200	0.39	32.7
28	39.000	5.646	144.800	0.40	32.8
29	40.180	5.655	140.800	0.41	32.8
30	41.350	5.705	138.000	0.43	32.8
31	43.700	5.692	130.300	0.45	32.6
32	45.010	5.835	129.600	0.46	32.8
33	46.190	5.813	125.900	0.47	32.9
34	48.530	5.696	117.400	0.50	32.8
35	49.710	5.744	115.600	0.51	32.8
36	50.880	5.744	112.900	0.52	32.8
37	52.050	5.814	111.700	0.53	32.8
38	54.400	5.707	104.900	0.56	32.9
39	55.720	5.782	103.800	0.57	32.9
40	56.890	5.766	101.400	0.58	32.8
41	58.060	5.857	100.900	0.59	32.8
42	60.410	5.822	96.380	0.62	32.9

47	67.600	6.158	91.110	0.69	33.0
48	68.770	6.119	88.950	0.70	32.6
49	71.110	6.222	87.500	0.72	32.9
50	72.280	6.177	85.450	0.74	32.9
51	73.460	6.046	82.310	0.75	33.0
52	74.680	6.648	89.020	0.76	32.6
53	77.130	6.153	79.780	0.78	32.9
54	78.300	6.162	78.700	0.79	33.0
55	79.470	6.181	77.770	0.81	32.9
56	80.650	6.072	75.300	0.82	32.9
57	82.990	6.304	75.960	0.84	32.7
58	84.260	6.187	73.430	0.85	32.9
59	85.480	6.186	72.360	0.87	32.9
60	86.660	6.203	71.580	0.88	32.9
61	89.000	6.282	70.560	0.90	32.9
62	90.270	6.358	70.430	0.91	32.9
63	91.350	6.482	70.950	0.93	32.9
64	93.740	6.229	66.440	0.95	32.7
65	94.920	6.194	65.250	0.96	32.7
66	96.190	6.925	71.990	0.97	33.0
67	97.360	6.587	67.660	0.99	32.9
68	99.710	6.270	62.890	1.01	32.9
69	100.900	6.244	61.900	1.02	32.9
70	102.100	6.260	61.340	1.03	32.8
71	103.200	6.555	63.500	1.05	32.9
72	105.200	6.977	66.300	1.06	32.8
73	106.000	6.409	60.480	1.08	33.0
74	107.600	6.414	59.590	1.09	33.0
75	110.100	6.310	57.300	1.11	32.7
76	111.300	6.273	56.340	1.13	33.0
77	112.500	6.367	56.610	1.14	33.0
78	115.000	6.307	54.860	1.16	33.1
79	116.100	6.329	54.500	1.17	33.0
80	117.400	6.366	54.240	1.19	33.0
81	118.500	6.353	53.620	1.20	32.9
82	120.900	6.238	51.610	1.22	33.0
83	122.000	6.299	51.630	1.23	33.1
84	123.200	6.371	51.700	1.24	33.0
85	124.400	6.332	50.880	1.26	32.9
86	126.900	6.263	49.360	1.28	32.8
87	128.000	6.289	49.130	1.29	32.9
88	129.200	6.290	48.670	1.30	33.0
89	130.400	6.333	48.570	1.32	33.0
90	132.700	6.306	47.520	1.34	33.0
91	134.000	6.534	48.770	1.35	32.8
92	135.200	7.123	52.690	1.36	33.1
93	137.600	6.420	46.660	1.39	33.0
94	138.700	6.231	44.920	1.40	33.1
95	139.900	6.164	44.060	1.41	32.7
96	141.100	6.170	43.740	1.42	33.0
97	143.400	6.158	42.940	1.45	33.1
98	144.600	6.280	43.420	1.46	33.0
99	145.900	6.389	43.790	1.47	32.9
100	147.100	6.497	44.180	1.48	33.0
101	149.500	6.304	42.180	1.51	33.0
102	150.600	6.354	42.190	1.52	33.0
103	151.800	6.235	41.090	1.53	33.0
104	152.900	6.177	40.390	1.54	33.0
105	155.300	6.373	41.030	1.57	33.0
106	156.600	6.349	40.540	1.58	33.0
107	157.800	6.360	40.310	1.59	33.1
108	160.100	6.406	40.010	1.61	33.2

112	166.100	6.572	39.560	1.67	33.3
113	167.300	6.544	39.120	1.68	33.3
114	168.500	6.671	39.580	1.70	33.3
115	169.600	6.688	39.420	1.71	33.1
116	172.000	6.625	38.520	1.73	32.7
117	173.200	6.526	37.650	1.74	33.1
118	174.300	6.362	36.490	1.76	33.1
119	175.500	6.367	36.280	1.77	32.8
120	178.000	6.368	35.780	1.79	33.2
121	179.200	6.487	36.200	1.80	33.2
122	180.400	6.635	36.790	1.82	33.0
123	182.700	6.472	35.430	1.84	33.2
124	183.900	6.544	35.580	1.85	33.2
125	185.100	6.684	36.110	1.86	33.2
126	186.400	6.532	35.050	1.88	33.1
127	188.700	6.695	35.480	1.90	33.2
128	189.900	6.646	35.000	1.91	33.0
129	191.100	6.590	34.490	1.92	33.2
130	192.300	6.628	34.470	1.93	33.1
131	194.600	7.124	36.610	1.96	33.2
132	195.800	7.092	36.210	1.97	33.0
133	197.100	6.853	34.780	1.98	33.3
134	198.200	6.596	33.270	1.99	33.1
135	200.600	6.592	32.860	2.02	32.9
136	201.800	6.716	33.290	2.03	32.9
137	203.000	6.631	32.670	2.04	33.2
138	205.300	6.532	31.810	2.07	33.1
139	206.600	6.562	31.760	2.08	32.8
140	207.800	6.574	31.640	2.09	33.1
141	208.900	7.243	34.660	2.10	33.1
142	211.300	6.874	32.530	2.13	33.1
143	212.500	6.818	32.090	2.14	33.3
144	213.600	6.875	32.180	2.15	33.3
145	214.800	6.813	31.710	2.16	33.2
146	217.300	6.753	31.080	2.18	33.3
147	218.500	6.837	31.300	2.20	32.9
148	219.600	7.017	31.950	2.21	33.4
149	220.900	7.359	33.310	2.22	33.1
150	223.200	6.779	30.380	2.24	33.2
151	224.400	6.731	29.990	2.26	33.1
152	225.600	6.717	29.780	2.27	33.1
153	228.000	6.728	29.510	2.29	33.1
154	229.200	6.822	29.770	2.30	33.1
155	230.400	6.804	29.540	2.32	33.1
156	231.600	6.725	29.040	2.33	33.3
157	233.900	6.813	29.120	2.35	33.2
158	235.000	6.863	29.200	2.36	33.1
159	236.300	6.837	28.940	2.38	32.8
160	237.500	6.810	28.670	2.39	32.9
161	239.900	6.733	28.070	2.41	33.2
162	241.100	6.793	28.180	2.42	33.2
163	242.300	6.758	27.890	2.43	33.1
164	243.400	6.804	27.950	2.45	33.2
165	245.700	6.742	27.440	2.47	33.6
166	247.000	6.717	27.200	2.48	33.1
167	248.200	6.755	27.210	2.49	33.3
168	250.600	6.725	26.840	2.52	33.0
169	251.800	6.768	26.880	2.53	33.2
170	252.900	6.750	26.690	2.54	33.1
171	254.100	6.764	26.620	2.55	33.2
172	256.500	6.781	26.440	2.58	33.1

177	265.000	6.784	25.480	2.65	32.8
178	264.600	6.783	25.610	2.66	33.3
179	267.200	6.797	25.440	2.68	33.2
180	268.400	6.863	25.640	2.70	33.0
181	269.600	6.678	24.770	2.71	33.1
182	270.800	6.797	25.100	2.72	32.8
183	273.200	6.478	23.710	2.74	33.1
184	274.300	6.489	23.650	2.76	33.0
185	275.500	6.672	24.220	2.77	33.4
186	276.700	6.645	24.010	2.78	33.1
187	279.100	7.120	25.510	2.80	33.0
188	280.400	6.863	24.480	2.82	33.1
189	281.500	6.867	24.390	2.83	33.2
190	282.700	6.742	23.850	2.84	33.0
191	285.000	6.804	23.870	2.86	33.1
192	286.200	6.852	23.940	2.87	33.1
193	287.300	6.824	23.750	2.89	33.1
194	288.500	6.755	23.410	2.90	33.3
195	291.000	6.751	23.200	2.92	32.9
196	292.200	6.800	23.270	2.93	33.0
197	293.300	6.836	23.310	2.95	33.2
198	295.700	6.836	23.120	2.97	33.1
199	296.900	6.869	23.130	2.98	33.3
200	298.000	6.867	23.040	2.99	32.8

Segment number 2 of type 'Rev/D' is defined as :
D from 300.0 to 0.000 1/s in 3.00 min at 25.0xC.
Area is 1302 Pa/s
200 steps are defined, 200 are actually present.

Apparent viscosity:
Eta(min)=21.38 Eta(max)=728.8 Eta=47.53 s(n-1)=66.36

Point	D[1/s]	Tau[Pa]	Eta[mPas]	t[min]	Temp[xC]
1	299.500	6.856	22.890	3.00	33.1
2	299.400	6.859	22.890	3.02	33.1
3	298.200	6.835	22.920	3.03	32.9
4	297.100	6.833	23.000	3.04	33.2
5	295.900	7.036	23.780	3.05	33.2
6	294.700	6.998	23.740	3.07	32.9
7	292.400	6.865	23.480	3.09	32.8
8	291.200	6.766	23.240	3.10	33.1
9	289.900	6.647	22.930	3.11	33.2
10	288.800	6.596	22.840	3.13	33.0
11	286.400	6.542	22.840	3.15	33.4
12	285.200	6.518	22.860	3.16	33.0
13	284.000	6.538	23.020	3.17	33.3
14	281.700	6.433	22.840	3.20	33.0
15	280.500	6.758	24.090	3.21	33.5
16	279.300	6.350	22.740	3.22	33.2
17	278.100	6.238	22.430	3.23	33.3
18	275.800	5.999	21.760	3.26	32.9
19	274.600	5.929	21.590	3.27	33.2
20	273.500	5.847	21.380	3.28	33.1
21	272.200	6.273	23.050	3.29	33.0
22	269.700	6.299	23.350	3.32	33.0
23	268.600	6.300	23.450	3.33	33.3
24	267.400	6.347	23.740	3.34	33.0
25	266.300	6.246	23.460	3.35	33.3
26	263.900	6.426	24.350	3.37	33.1
27	262.700	6.742	25.660	3.39	33.4
28	261.500	6.905	26.400	3.40	33.2
29	259.100	6.326	24.420	3.42	33.3
30	257.900	6.110	23.690	3.43	33.0
31	256.700	6.149	23.950	3.45	32.9
32	255.500	6.371	24.930	3.46	33.2
33	253.200	5.870	23.190	3.48	33.0
34	251.900	5.878	23.330	3.49	33.0
35	250.700	5.844	23.310	3.51	33.1
36	249.600	5.831	23.370	3.52	33.0
37	247.200	5.833	23.600	3.54	33.1
38	246.000	5.903	23.990	3.55	33.3
39	244.900	5.775	23.580	3.57	33.3
40	243.700	5.743	23.560	3.58	33.3
41	241.300	5.726	23.720	3.60	33.3
42	240.100	5.733	23.880	3.61	33.3
43	238.900	5.765	24.130	3.62	33.2
44	236.500	5.736	24.250	3.65	33.0
45	235.300	5.666	24.070	3.66	33.4
46	234.200	5.604	23.930	3.67	33.3
47	233.000	5.614	24.090	3.68	33.1
48	230.500	5.719	24.810	3.71	33.1
49	229.300	5.800	25.290	3.72	33.3
50	228.200	5.730	25.110	3.73	33.4
51	227.000	5.589	24.620	3.74	33.3

55	221.000	5.409	24.470	3.80	33.4
56	218.500	5.462	24.990	3.83	33.2
57	217.400	5.474	25.170	3.84	33.1
58	216.300	5.362	24.790	3.85	33.1
59	213.900	5.355	25.030	3.87	33.2
60	212.700	5.285	24.850	3.89	33.2
61	211.600	5.221	24.660	3.90	33.2
62	210.400	5.254	24.980	3.91	33.2
63	207.900	5.172	24.870	3.93	33.3
64	206.700	5.164	24.980	3.95	33.2
65	205.600	5.170	25.150	3.96	33.1
66	204.400	5.123	25.070	3.97	32.9
67	202.100	5.083	25.160	3.99	33.2
68	200.900	5.100	25.390	4.01	33.2
69	199.600	5.017	25.140	4.02	33.1
70	198.400	5.083	25.620	4.03	33.0
71	196.000	5.011	25.560	4.05	33.3
72	194.900	4.961	25.460	4.07	33.2
73	193.700	4.959	25.600	4.08	33.2
74	191.300	4.954	25.890	4.10	33.3
75	190.200	4.910	25.820	4.11	33.1
76	188.900	4.872	25.800	4.12	33.2
77	187.700	4.820	25.660	4.14	33.1
78	185.300	4.851	26.170	4.16	33.1
79	184.200	4.777	25.940	4.17	32.7
80	183.000	4.841	26.450	4.18	33.3
81	181.800	4.787	26.330	4.20	32.9
82	179.400	4.752	26.490	4.22	33.2
83	178.200	4.732	26.560	4.23	32.9
84	177.000	4.785	27.030	4.24	33.3
85	175.800	4.703	26.760	4.26	33.4
86	173.400	4.756	27.430	4.28	33.2
87	172.300	4.714	27.360	4.29	33.1
88	171.100	4.684	27.380	4.30	33.3
89	168.600	4.594	27.250	4.33	32.9
90	167.400	4.829	28.840	4.34	33.2
91	166.300	4.826	29.030	4.35	33.2
92	165.100	4.109	24.890	4.36	32.9
93	162.800	4.477	27.510	4.39	32.9
94	161.600	4.460	27.600	4.40	33.1
95	160.400	4.491	28.000	4.41	33.2
96	159.200	4.439	27.890	4.42	33.3
97	156.700	4.358	27.810	4.45	33.2
98	155.500	4.386	28.200	4.46	33.0
99	154.400	4.368	28.290	4.47	33.4
100	153.200	4.328	28.260	4.48	33.2
101	150.900	4.288	28.420	4.51	33.2
102	149.700	4.275	28.560	4.52	33.2
103	148.400	4.224	28.470	4.53	33.1
104	146.000	4.244	28.060	4.55	33.0
105	144.900	4.233	29.220	4.56	33.3
106	143.700	4.207	29.280	4.58	33.0
107	142.500	4.164	29.220	4.59	33.1
108	140.200	4.142	29.550	4.61	33.1
109	139.000	4.149	29.850	4.62	32.9
110	137.700	4.150	30.140	4.64	33.2
111	136.500	4.192	30.710	4.65	33.2
112	134.200	4.209	31.370	4.67	33.1
113	133.000	4.267	32.090	4.68	33.1
114	131.800	4.262	32.330	4.70	33.2
115	130.600	4.233	32.400	4.71	33.2
116	128.300	4.102	31.870	4.73	33.0

121	121.100	3.898	32.150	4.80	33.0
122	119.900	3.901	32.520	4.81	33.2
123	117.400	3.634	32.650	4.84	33.2
124	116.300	3.902	33.560	4.85	33.2
125	115.100	3.868	33.610	4.86	33.0
126	113.900	3.842	33.730	4.87	33.2
127	111.600	4.117	36.900	4.90	33.0
128	110.400	4.094	37.080	4.91	33.3
129	109.200	3.907	35.770	4.92	33.2
130	108.100	3.793	35.100	4.93	33.2
131	105.500	3.700	35.070	4.96	33.1
132	104.400	3.742	35.840	4.97	33.3
133	103.200	3.618	35.050	4.98	33.1
134	100.900	3.548	35.170	5.01	33.1
135	99.710	3.472	34.820	5.02	33.3
136	98.530	3.507	35.600	5.03	33.1
137	97.210	3.518	36.190	5.04	32.7
138	94.870	3.494	36.830	5.06	33.2
139	93.700	3.369	35.960	5.08	33.1
140	92.520	3.373	36.460	5.09	33.2
141	91.350	3.374	36.940	5.10	33.3
142	89.000	3.347	37.610	5.12	33.1
143	87.830	3.360	38.260	5.14	33.2
144	86.510	3.367	38.920	5.15	33.2
145	85.340	3.368	39.470	5.16	33.2
146	82.990	3.313	39.920	5.18	33.1
147	81.820	3.247	39.680	5.20	33.2
148	80.650	3.208	39.770	5.21	33.1
149	78.300	3.214	41.050	5.23	33.0
150	77.130	3.081	39.950	5.24	33.2
151	75.810	3.114	41.070	5.26	33.1
152	74.630	3.128	41.910	5.27	33.0
153	72.290	3.086	42.700	5.29	33.2
154	71.110	3.115	43.800	5.30	33.2
155	69.940	3.124	44.670	5.31	33.2
156	68.770	3.054	44.410	5.33	33.2
157	66.280	3.032	45.740	5.35	33.0
158	65.100	2.998	46.050	5.36	33.1
159	63.930	3.000	46.930	5.37	33.1
160	62.760	2.920	46.520	5.39	33.1
161	60.360	2.929	48.520	5.41	33.1
162	59.240	2.948	49.770	5.42	33.1
163	58.020	2.870	49.470	5.43	33.1
164	55.570	3.460	62.270	5.46	33.3
165	54.400	3.080	56.620	5.47	33.1
166	53.230	2.949	55.410	5.48	33.1
167	52.050	2.886	55.440	5.49	33.1
168	49.660	2.815	56.690	5.52	33.1
169	48.480	2.747	56.670	5.53	33.2
170	47.360	2.753	58.120	5.54	33.1
171	46.040	2.710	58.850	5.55	33.2
172	43.650	2.628	60.200	5.58	33.1
173	42.520	2.573	60.510	5.59	33.1
174	41.350	2.596	62.790	5.60	33.1
175	39.000	2.569	65.860	5.62	33.1
176	37.830	2.538	67.080	5.64	33.1
177	36.560	2.564	70.120	5.65	33.0
178	35.340	2.505	70.890	5.66	33.0
179	32.990	2.416	73.240	5.68	33.1
180	31.820	2.547	80.040	5.70	33.1
181	30.600	2.545	83.190	5.71	33.1
182					

186	23.010	2.209	96.030	5.78	33.0
187	21.850	2.306	105.500	5.80	33.2
188	19.500	2.010	103.100	5.82	33.1
189	18.310	1.976	107.900	5.83	33.0
190	17.120	1.999	116.600	5.84	33.1
191	15.840	2.027	127.900	5.85	32.9
192	13.430	1.949	145.100	5.88	33.0
193	12.270	2.032	165.600	5.89	33.0
194	11.090	1.855	167.300	5.90	33.0
195	9.907	1.831	184.800	5.91	33.2
196	7.566	1.711	226.200	5.94	33.0
197	6.329	1.680	265.400	5.95	33.0
198	5.073	1.608	317.000	5.96	33.0
199	3.856	1.440	373.500	5.97	33.0
200	1.500	1.094	728.800	6.00	32.9

107-N Project Summary Data Tables
1310-N

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: BOJYD5

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Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S97N000049			Mercury by CVAA (Perkin Elmer)	ug/g	100.0	<5.00e-03	2.340	n/a	n/a	n/a	n/a	1.00e-01	n/a
S97N000049			TIC by Acid/Coulometry	ug/g	92.36	1.500	2.37e+02	n/a	n/a	n/a	n/a	5.000	n/a
S97N000049			TOC by Persulfate/Coulometry	ug/g	91.33	10.60	1.69e+03	n/a	n/a	n/a	n/a	40.00	n/a
S97N000051		J	Technetium-99 Liq. Scint.	uCi/g	101.0	<2.38e-03	2.47e-03	n/a	n/a	n/a	n/a	2.00e-03	7.19E+00
S97N000051		J	Strontium-89/90 High Level	uCi/g	102.4	<3.13e-04	4.56e-02	n/a	n/a	n/a	n/a	1.00e-03	4.35E+00
S97N000051		J	Silver -ICP-Acid Digest	ug/g	99.20	<1.00e-02	< 9.570	n/a	n/a	n/a	n/a	9.550	n/a
S97N000051		J	Aluminium -ICP-Acid Digest	ug/g	98.20	9.70e-02	1.35e+03	n/a	n/a	n/a	n/a	47.90	n/a
S97N000051		J	Arsenic -ICP-Acid Digest	ug/g	103.0	<1.00e-01	< 95.70	n/a	n/a	n/a	n/a	95.50	n/a
S97N000051		J	Barium -ICP-Acid Digest	ug/g	99.80	<5.00e-02	< 47.90	n/a	n/a	n/a	n/a	47.90	n/a
S97N000051		J	Beryllium -ICP-Acid Digest	ug/g	104.0	<5.00e-03	< 4.790	n/a	n/a	n/a	n/a	4.790	n/a
S97N000051		J	Cadmium -ICP-Acid Digest	ug/g	97.20	<5.00e-03	7.760	n/a	n/a	n/a	n/a	4.790	n/a
S97N000051		J	Chromium -ICP-Acid Digest	ug/g	97.60	<1.00e-02	2.68e+02	n/a	n/a	n/a	n/a	9.550	n/a
S97N000051		J	Iron -ICP-Acid Digest	ug/g	91.80	<5.00e-02	1.10e+05	n/a	n/a	n/a	n/a	47.90	n/a
S97N000051		J	Manganese -ICP-Acid Digest	ug/g	95.60	<1.00e-02	6.61e+03	n/a	n/a	n/a	n/a	9.550	n/a
S97N000051		J	Sodium -ICP-Acid Digest	ug/g	112.0	7.37e-01	2.43e+04	n/a	n/a	n/a	n/a	95.50	n/a
S97N000051		J	Nickel -ICP-Acid Digest	ug/g	100.4	<2.00e-02	1.71e+02	n/a	n/a	n/a	n/a	19.10	n/a
S97N000051		J	Lead -ICP-Acid Digest	ug/g	95.20	<1.00e-01	5.84e+02	n/a	n/a	n/a	n/a	95.50	n/a
S97N000051		J	Antimony -ICP-Acid Digest	ug/g	97.60	<6.00e-02	< 57.40	n/a	n/a	n/a	n/a	57.50	n/a
S97N000051		J	Selenium -ICP-Acid Digest	ug/g	92.80	<1.00e-01	< 95.70	n/a	n/a	n/a	n/a	95.50	n/a
S97N000051		J	Silicon -ICP-Acid Digest	ug/g	145.6	1.080	1.54e+03	n/a	n/a	n/a	n/a	47.90	n/a
S97N000051		J	Thallium -ICP-Acid Digest	ug/g	92.60	<2.00e-01	<1.91e+02	n/a	n/a	n/a	n/a	192.0	n/a
S97N000051		J	Vanadium -ICP-Acid Digest	ug/g	97.80	<5.00e-02	< 47.90	n/a	n/a	n/a	n/a	47.90	n/a
S97N000051		J	Zinc -ICP-Acid Digest	ug/g	89.20	1.10e-02	7.96e+02	n/a	n/a	n/a	n/a	9.550	n/a
S97N000051		J	Cobalt-60 by GEA	uCi/g	98.55	<7.14e-03	1.185	n/a	n/a	n/a	n/a	n/a	2.45
S97N000051		J	Cesium-134 by GEA	uCi/g	n/a	<4.35e-03	<1.02e-02	n/a	n/a	n/a	n/a	1.00e-02	n/a
S97N000051		J	Cesium-137 by GEA	uCi/g	102.4	<8.12e-03	3.43e-02	n/a	n/a	n/a	n/a	n/a	39.9
S97N000051		J	Europium-152 by GEA	uCi/g	n/a	<2.35e-02	<2.89e-02	n/a	n/a	n/a	n/a	2.90e-02	n/a
S97N000051		J	Europium-154 by GEA	uCi/g	n/a	<1.71e-02	<2.50e-02	n/a	n/a	n/a	n/a	2.50e-02	n/a
S97N000051		J	Europium-155 by GEA	uCi/g	n/a	<1.26e-02	<2.29e-02	n/a	n/a	n/a	n/a	2.30e-02	n/a
S97N000051		J	Radium-226 by GEA	uCi/g	n/a	<8.52e-02	<1.43e-01	n/a	n/a	n/a	n/a	1.43e-01	n/a
S97N000051		J	Actinium-228 by GEA	uCi/g	n/a	<2.60e-02	<6.81e-02	n/a	n/a	n/a	n/a	6.80e-02	n/a
S97N000051		J	Americium-241 by GEA	uCi/g	n/a	<3.28e-02	<6.06e-02	n/a	n/a	n/a	n/a	6.10e-02	n/a
S97N000051		J	Alpha of Digested Solid	uCi/g	69.00	<8.70e-05	4.31e-03	n/a	n/a	n/a	n/a	1.28e-04	9.93E+00
S97N000051		J	Beta of Solid Sample	uCi/g	86.69	<1.48e-03	1.050	n/a	n/a	n/a	n/a	1.00e-03	5.06E-01
S97N000053			Ammonia by ISE-Std Additions	ug/mL	107.8	<1.000	< 1.000	n/a	n/a	n/a	n/a	1.000	n/a
S97N000053			pH Direct	pH	100.3	n/a	8.630	n/a	n/a	n/a	n/a	1.00e-02	n/a
S97N000053			Fluoride-IC-Dionex 4000/4500	ug/mL	88.98	<1.20e-02	4.36e-01	n/a	n/a	n/a	n/a	1.32e-01	n/a
S97N000053			Chloride-IC-Dionex 4000/4500	ug/mL	96.33	<1.70e-02	35.13	n/a	n/a	n/a	n/a	1.87e-01	n/a
S97N000053			Nitrite-IC - Dionex 4000/4500	ug/mL	100.2	<1.08e-01	< 1.188	n/a	n/a	n/a	n/a	1.188	n/a
S97N000053			Bromide by Ion Chromatograph	ug/mL	95.76	<1.25e-01	< 1.375	n/a	n/a	n/a	n/a	1.375	n/a
S97N000053			Nitrate by IC-Dionex 4000/4500	ug/mL	96.80	<1.39e-01	< 1.529	n/a	n/a	n/a	n/a	1.529	n/a
S97N000053			Phosphate-IC-Dionex 4000/4500	ug/mL	95.23	<1.20e-01	95.61	n/a	n/a	n/a	n/a	1.320	n/a
S97N000053			Sulfate by IC-Dionex 4000/4500	ug/mL	98.73	<1.38e-01	83.70	n/a	n/a	n/a	n/a	1.518	n/a

107-N Project Summary Data Tables
107 N

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: BOJYD6

CUSTOMER SAMPLE NUMBER: BOJYD6

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S97N000029			Mercury by CVAA (Perkin Elmer)	ug/g	114.0	<5.00e-03	1.960	1.770	1.865	10.2	86.70	9.60e-02	n/a
S97N000029			TIC by Acid/Coulometry	ug/g	92.36	1.500	5.06e+02	482.0	494.0	4.86	97.60	5.000	n/a
S97N000029			TOC by Persulfate/Coulometry	ug/g	91.33	10.60	7.86e+03	7.84e+03	7.85e+03	0.25	126.0	40.00	n/a
S97N000030			Ammonia by ISE-Std Additions	ug/mL	107.8	<1.000	< 1.000	<1.00E+0	n/a	n/a	100.8	1.000	n/a
S97N000030			pH Direct	pH	100.3	n/a	8.120	8.140	8.130	0.25	n/a	1.00e-02	n/a
S97N000030			Fluoride-IC-Dionex 4000/4500	ug/mL	88.98	<1.20e-02	1.443	1.430	1.437	0.70	100.8	1.32e-01	n/a
S97N000030			Chloride-IC-Dionex 4000/4500	ug/mL	96.33	<1.70e-02	9.012	9.210	9.111	2.20	88.61	1.87e-01	n/a
S97N000030			Nitrite-IC - Dionex 4000/4500	ug/mL	100.2	<1.08e-01	< 1.188	<1.19e0	n/a	n/a	95.40	1.188	n/a
S97N000030			Bromide by Ion Chromatograph	ug/mL	95.76	<1.25e-01	< 1.375	<1.38e0	n/a	n/a	95.93	1.375	n/a
S97N000030			Nitrate by IC-Dionex 4000/4500	ug/mL	96.80	<1.39e-01	5.289	5.700	5.495	7.46	93.43	1.529	n/a
S97N000030			Phosphate-IC-Dionex 4000/4500	ug/mL	95.23	<1.20e-01	< 1.320	<1.32e0	n/a	n/a	93.58	1.320	n/a
S97N000030			Sulfate by IC-Dionex 4000/4500	ug/mL	98.73	<1.38e-01	2.19e+02	219.0	219.2	0.00	96.51	1.518	n/a
S97N000031		J	Technetium-99 Liq. Scint.	uCi/g	104.0	<2.69e-03	<2.45e-03	<2.60E-3	n/a	n/a	n/a	2.00e-03	9.66E+00
S97N000031		J	Strontium-89/90 High Level	uCi/g	102.4	<3.13e-04	2.37e-02	2.24e-02	2.31e-02	5.64	n/a	1.00e-03	6.18E+00
S97N000031		J	Silver -ICP-Acid Digest	ug/g	99.20	<1.00e-02	< 9.600	<9.59e0	n/a	n/a	92.40	9.600	n/a
S97N000031		J	Aluminium -ICP-Acid Digest	ug/g	98.20	9.70e-02	1.00e+03	908.0	954.0	9.64	112.4	48.00	n/a
S97N000031		J	Arsenic -ICP-Acid Digest	ug/g	103.0	<1.00e-01	< 96.00	<9.59e1	n/a	n/a	106.6	96.00	n/a
S97N000031		J	Barium -ICP-Acid Digest	ug/g	99.80	<5.00e-02	1.28e+02	115.0	121.5	10.7	99.40	48.00	n/a
S97N000031		J	Beryllium -ICP-Acid Digest	ug/g	104.0	<5.00e-03	< 4.800	<4.80e0	n/a	n/a	102.4	4.800	n/a
S97N000031		J	Cadmium -ICP-Acid Digest	ug/g	97.20	<5.00e-03	5.220	6.540	5.880	22.4	99.60	4.800	n/a
S97N000031		J	Chromium -ICP-Acid Digest	ug/g	97.60	<1.00e-02	2.31e+02	223.0	227.0	3.52	100.0	9.600	n/a
S97N000031		J	Iron -ICP-Acid Digest	ug/g	91.80	<5.00e-02	1.48e+05	1.38e+05	1.43e+05	6.99	-4.400e2	48.00	n/a
S97N000031		J	Manganese -ICP-Acid Digest	ug/g	95.60	<1.00e-02	7.61e+02	725.0	743.0	4.85	95.60	9.600	n/a
S97N000031		J	Sodium -ICP-Acid Digest	ug/g	112.0	7.37e-01	7.46e+02	611.0	678.5	19.9	93.80	96.00	n/a
S97N000031		J	Nickel -ICP-Acid Digest	ug/g	100.4	<2.00e-02	1.22e+02	120.0	121.0	1.65	102.8	19.20	n/a
S97N000031		J	Lead -ICP-Acid Digest	ug/g	95.20	<1.00e-01	1.03e+02	97.20	100.1	5.79	97.80	96.00	n/a
S97N000031		J	Antimony -ICP-Acid Digest	ug/g	97.60	<6.00e-02	< 57.60	<5.76e1	n/a	n/a	99.60	57.50	n/a
S97N000031		J	Selenium -ICP-Acid Digest	ug/g	92.80	<1.00e-01	< 96.00	<9.59e1	n/a	n/a	96.00	96.00	n/a
S97N000031		J	Silicon -ICP-Acid Digest	ug/g	145.6	1.080	4.84e+03	4.74e+03	4.79e+03	2.09	132.6	48.00	n/a
S97N000031		J	Thallium -ICP-Acid Digest	ug/g	92.60	<2.00e-01	<1.92e+02	<1.92e2	n/a	n/a	93.60	192.0	n/a
S97N000031		J	Vanadium -ICP-Acid Digest	ug/g	97.80	<5.00e-02	< 48.00	<4.80e1	n/a	n/a	101.6	48.00	n/a
S97N000031		J	Zinc -ICP-Acid Digest	ug/g	89.20	1.10e-02	1.60e+03	1.56e+03	1.58e+03	2.53	89.80	9.600	n/a
S97N000031		J	Cobalt-60 by GEA	uCi/g	98.55	<7.14e-03	<8.16e-03	<7.89e-3	n/a	n/a	n/a	8.00e-03	n/a
S97N000031		J	Cesium-134 by GEA	uCi/g	n/a	<4.35e-03	<4.11e-03	<4.34e-3	n/a	n/a	n/a	4.00e-03	n/a
S97N000031		J	Cesium-137 by GEA	uCi/g	102.4	<8.12e-03	<1.48e-02	1.79e-02	n/a	n/a	n/a	1.50e-02	n/a
S97N000031		J	Europium-152 by GEA	uCi/g	n/a	<2.35e-02	<2.52e-02	<2.37e-2	n/a	n/a	n/a	2.50e-02	n/a
S97N000031		J	Europium-154 by GEA	uCi/g	n/a	<1.71e-02	<1.08e-02	<1.88e-2	n/a	n/a	n/a	1.10e-02	n/a
S97N000031		J	Europium-155 by GEA	uCi/g	n/a	<1.26e-02	<1.32e-02	<1.34e-2	n/a	n/a	n/a	1.30e-02	n/a
S97N000031		J	Radium-226 by GEA	uCi/g	n/a	<8.52e-02	<9.11e-02	<8.88e-2	n/a	n/a	n/a	9.10e-02	n/a
S97N000031		J	Actinium-228 by GEA	uCi/g	n/a	<2.60e-02	<2.87e-02	<2.50e-2	n/a	n/a	n/a	2.90e-02	n/a
S97N000031		J	Americium-241 by GEA	uCi/g	n/a	<3.28e-02	<3.35e-02	<3.43e-2	n/a	n/a	n/a	3.30e-02	n/a
S97N000031		J	Alpha of Digested Solid	uCi/g	69.00	<8.70e-05	1.45e-03	1.35e-03	1.40e-03	7.14	101.5	1.28e-04	1.74E+01
S97N000031		J	Beta of Solid Sample	uCi/g	86.69	<1.48e-03	7.17e-02	6.40e-02	6.78e-02	11.3	106.8	1.00e-03	2.00E+00

107-N Project Summary Data Tables
107 N

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: BOJYD7

CUSTOMER SAMPLE NUMBER: BOJYD7

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S97N000041			Mercury by CVAA (Perkin Elmer)	ug/g	100.0	<5.00e-03	3.39e-01	n/a	n/a	n/a	n/a	7.60e-02	n/a
S97N000041			TIC by Acid/Coulometry	ug/g	92.36	1.500	5.01e+02	n/a	n/a	n/a	n/a	5.000	n/a
S97N000041			TOC by Persulfate/Coulometry	ug/g	91.33	10.60	3.58e+03	n/a	n/a	n/a	n/a	40.00	n/a
S97N000042			Ammonia by ISE-Std Additions	ug/mL	107.8	<1.000	< 1.000	n/a	n/a	n/a	n/a	1.000	n/a
S97N000042			pH Direct	pH	100.3	n/a	7.730	n/a	n/a	n/a	n/a	1.00e-02	n/a
S97N000042			Fluoride-IC-Dionex 4000/4500	ug/mL	88.98	<1.20e-02	3.65e-01	n/a	n/a	n/a	n/a	1.32e-01	n/a
S97N000042			Chloride-IC-Dionex 4000/4500	ug/mL	96.33	<1.70e-02	6.356	n/a	n/a	n/a	n/a	1.87e-01	n/a
S97N000042			Nitrite-IC - Dionex 4000/4500	ug/mL	100.2	<1.08e-01	< 1.188	n/a	n/a	n/a	n/a	1.188	n/a
S97N000042			Bromide by Ion Chromatograph	ug/mL	95.76	<1.25e-01	< 1.375	n/a	n/a	n/a	n/a	1.375	n/a
S97N000042			Nitrate by IC-Dionex 4000/4500	ug/mL	96.80	<1.39e-01	< 1.529	n/a	n/a	n/a	n/a	1.529	n/a
S97N000042			Phosphate-IC-Dionex 4000/4500	ug/mL	95.23	<1.20e-01	< 1.320	n/a	n/a	n/a	n/a	1.320	n/a
S97N000042			Sulfate by IC-Dionex 4000/4500	ug/mL	98.73	<1.38e-01	11.82	n/a	n/a	n/a	n/a	1.518	n/a
S97N000043		J	Technetium-99 Liq. Scint.	uCi/g	104.0	<2.69e-03	8.09e-03	n/a	n/a	n/a	n/a	3.00e-03	6.42E+00
S97N000043		J	Strontium-89/90 High Level	uCi/g	102.4	<3.13e-04	1.97e-01	n/a	n/a	n/a	n/a	1.00e-03	2.16E+00
S97N000043		J	Silver -ICP-Acid Digest	ug/g	99.20	<1.00e-02	< 19.10	n/a	n/a	n/a	n/a	19.10	n/a
S97N000043		J	Aluminium -ICP-Acid Digest	ug/g	98.20	9.70e-02	2.06e+03	n/a	n/a	n/a	n/a	95.50	n/a
S97N000043		J	Arsenic -ICP-Acid Digest	ug/g	103.0	<1.00e-01	<1.91e+02	n/a	n/a	n/a	n/a	191.0	n/a
S97N000043		J	Barium -ICP-Acid Digest	ug/g	99.80	<5.00e-02	4.79e+02	n/a	n/a	n/a	n/a	95.50	n/a
S97N000043		J	Beryllium -ICP-Acid Digest	ug/g	104.0	<5.00e-03	< 9.550	n/a	n/a	n/a	n/a	9.550	n/a
S97N000043		J	Cadmium -ICP-Acid Digest	ug/g	97.20	<5.00e-03	24.70	n/a	n/a	n/a	n/a	9.550	n/a
S97N000043		J	Chromium -ICP-Acid Digest	ug/g	97.60	<1.00e-02	33.10	n/a	n/a	n/a	n/a	19.10	n/a
S97N000043		J	Iron -ICP-Acid Digest	ug/g	91.80	<5.00e-02	1.68e+05	n/a	n/a	n/a	n/a	95.50	n/a
S97N000043		J	Manganese -ICP-Acid Digest	ug/g	95.60	<1.00e-02	3.20e+02	n/a	n/a	n/a	n/a	19.10	n/a
S97N000043		J	Sodium -ICP-Acid Digest	ug/g	112.0	7.37e-01	<1.91e+02	n/a	n/a	n/a	n/a	191.0	n/a
S97N000043		J	Nickel -ICP-Acid Digest	ug/g	100.4	<2.00e-02	< 38.20	n/a	n/a	n/a	n/a	38.20	n/a
S97N000043		J	Lead -ICP-Acid Digest	ug/g	95.20	<1.00e-01	2.39e+02	n/a	n/a	n/a	n/a	191.0	n/a
S97N000043		J	Antimony -ICP-Acid Digest	ug/g	97.60	<6.00e-02	<1.15e+02	n/a	n/a	n/a	n/a	115.0	n/a
S97N000043		J	Selenium -ICP-Acid Digest	ug/g	92.80	<1.00e-01	<1.91e+02	n/a	n/a	n/a	n/a	191.0	n/a
S97N000043		J	Silicon -ICP-Acid Digest	ug/g	145.6	1.080	2.12e+03	n/a	n/a	n/a	n/a	95.50	n/a
S97N000043		J	Thallium -ICP-Acid Digest	ug/g	92.60	<2.00e-01	<3.82e+02	n/a	n/a	n/a	n/a	382.0	n/a
S97N000043		J	Vanadium -ICP-Acid Digest	ug/g	97.80	<5.00e-02	< 95.50	n/a	n/a	n/a	n/a	95.50	n/a
S97N000043		J	Zinc -ICP-Acid Digest	ug/g	89.20	1.10e-02	3.66e+02	n/a	n/a	n/a	n/a	19.10	n/a
S97N000043		J	Cobalt-60 by GEA	uCi/g	98.55	<7.14e-03	4.09e-01	n/a	n/a	n/a	n/a	n/a	4.12
S97N000043		J	Cesium-134 by GEA	uCi/g	n/a	<4.35e-03	<6.95e-03	n/a	n/a	n/a	n/a	7.00e-03	n/a
S97N000043		J	Cesium-137 by GEA	uCi/g	102.4	<8.12e-03	2.60e-01	n/a	n/a	n/a	n/a	n/a	7.10
S97N000043		J	Europium-152 by GEA	uCi/g	n/a	<2.35e-02	<2.48e-02	n/a	n/a	n/a	n/a	2.50e-02	n/a
S97N000043		J	Europium-154 by GEA	uCi/g	n/a	<1.71e-02	<2.77e-02	n/a	n/a	n/a	n/a	2.80e-02	n/a
S97N000043		J	Europium-155 by GEA	uCi/g	n/a	<1.26e-02	<1.97e-02	n/a	n/a	n/a	n/a	2.00e-02	n/a
S97N000043		J	Radium-226 by GEA	uCi/g	n/a	<8.52e-02	<1.32e-01	n/a	n/a	n/a	n/a	1.32e-01	n/a
S97N000043		J	Actinium-228 by GEA	uCi/g	n/a	<2.60e-02	<4.54e-02	n/a	n/a	n/a	n/a	4.50e-02	n/a
S97N000043		J	Americium-241 by GEA	uCi/g	n/a	<3.28e-02	<8.66e-02	n/a	n/a	n/a	n/a	8.70e-02	n/a
S97N000043		J	Alpha of Digested Solid	uCi/g	69.00	<8.70e-05	1.11e-01	n/a	n/a	n/a	n/a	1.28e-04	1.96E+00
S97N000043		J	Beta of Solid Sample	uCi/g	86.69	<1.48e-03	1.410	n/a	n/a	n/a	n/a	1.00e-03	4.35E-01

107-N Project Summary Data Tables
107 N

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: BOJYD8

CUSTOMER SAMPLE NUMBER: BOJYD8

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S97N000035			Mercury by CVAA (Perkin Elmer)	ug/g	100.0	<5.00e-03	3.91e-01	n/a	n/a	n/a	n/a	9.20e-02	n/a
S97N000035			TIC by Acid/Coulometry	ug/g	92.36	1.500	7.45e+02	n/a	n/a	n/a	n/a	5.000	n/a
S97N000035			TOC by Persulfate/Coulometry	ug/g	91.33	10.60	6.85e+03	n/a	n/a	n/a	n/a	40.00	n/a
S97N000036			Ammonia by ISE-Std Additions	ug/mL	107.8	<1.000	< 1.000	n/a	n/a	n/a	n/a	1.000	n/a
S97N000036			pH Direct	pH	100.3	n/a	7.460	n/a	n/a	n/a	n/a	1.00e-02	n/a
S97N000036			Fluoride-IC-Dionex 4000/4500	ug/mL	88.98	<1.20e-02	<1.32e-01	n/a	n/a	n/a	n/a	1.32e-01	n/a
S97N000036			Chloride-IC-Dionex 4000/4500	ug/mL	96.33	<1.70e-02	4.744	n/a	n/a	n/a	n/a	1.87e-01	n/a
S97N000036			Nitrite-IC - Dionex 4000/4500	ug/mL	100.2	<1.08e-01	< 1.188	n/a	n/a	n/a	n/a	1.188	n/a
S97N000036			Bromide by Ion Chromatograph	ug/mL	95.76	<1.25e-01	< 1.375	n/a	n/a	n/a	n/a	1.375	n/a
S97N000036			Nitrate by IC-Dionex 4000/4500	ug/mL	96.80	<1.39e-01	< 1.529	n/a	n/a	n/a	n/a	1.529	n/a
S97N000036			Phosphate-IC-Dionex 4000/4500	ug/mL	95.23	<1.20e-01	< 1.320	n/a	n/a	n/a	n/a	1.320	n/a
S97N000036			Sulfate by IC-Dionex 4000/4500	ug/mL	98.73	<1.38e-01	17.34	n/a	n/a	n/a	n/a	1.518	n/a
S97N000037		J	Technetium-99 Liq. Scint.	uCi/g	104.0	<2.69e-03	1.06e-02	n/a	n/a	n/a	n/a	3.00e-03	6.16E+00
S97N000037		J	Strontium-89/90 High Level	uCi/g	102.4	<3.13e-04	3.02e-01	n/a	n/a	n/a	n/a	1.00e-03	1.69E+00
S97N000037		J	Silver -ICP-Acid Digest	ug/g	99.20	<1.00e-02	< 19.40	n/a	n/a	n/a	n/a	19.40	n/a
S97N000037		J	Aluminium -ICP-Acid Digest	ug/g	98.20	9.70e-02	4.85e+03	n/a	n/a	n/a	n/a	96.80	n/a
S97N000037		J	Arsenic -ICP-Acid Digest	ug/g	103.0	<1.00e-01	<1.94e+02	n/a	n/a	n/a	n/a	194.0	n/a
S97N000037		J	Barium -ICP-Acid Digest	ug/g	99.80	<5.00e-02	3.76e+02	n/a	n/a	n/a	n/a	96.80	n/a
S97N000037		J	Beryllium -ICP-Acid Digest	ug/g	104.0	<5.00e-03	< 9.680	n/a	n/a	n/a	n/a	9.680	n/a
S97N000037		J	Cadmium -ICP-Acid Digest	ug/g	97.20	<5.00e-03	17.60	n/a	n/a	n/a	n/a	9.680	n/a
S97N000037		J	Chromium -ICP-Acid Digest	ug/g	97.60	<1.00e-02	80.30	n/a	n/a	n/a	n/a	19.40	n/a
S97N000037		J	Iron -ICP-Acid Digest	ug/g	91.80	<5.00e-02	1.79e+05	n/a	n/a	n/a	n/a	96.80	n/a
S97N000037		J	Manganese -ICP-Acid Digest	ug/g	95.60	<1.00e-02	3.40e+02	n/a	n/a	n/a	n/a	19.40	n/a
S97N000037		J	Sodium -ICP-Acid Digest	ug/g	112.0	7.37e-01	2.37e+02	n/a	n/a	n/a	n/a	194.0	n/a
S97N000037		J	Nickel -ICP-Acid Digest	ug/g	100.4	<2.00e-02	52.40	n/a	n/a	n/a	n/a	38.70	n/a
S97N000037		J	Lead -ICP-Acid Digest	ug/g	95.20	<1.00e-01	2.73e+02	n/a	n/a	n/a	n/a	194.0	n/a
S97N000037		J	Antimony -ICP-Acid Digest	ug/g	97.60	<6.00e-02	<1.16e+02	n/a	n/a	n/a	n/a	116.0	n/a
S97N000037		J	Selenium -ICP-Acid Digest	ug/g	92.80	<1.00e-01	<1.94e+02	n/a	n/a	n/a	n/a	194.0	n/a
S97N000037		J	Silicon -ICP-Acid Digest	ug/g	145.6	1.080	3.56e+03	n/a	n/a	n/a	n/a	96.80	n/a
S97N000037		J	Thallium -ICP-Acid Digest	ug/g	92.60	<2.00e-01	<3.87e+02	n/a	n/a	n/a	n/a	387.0	n/a
S97N000037		J	Vanadium -ICP-Acid Digest	ug/g	97.80	<5.00e-02	< 96.80	n/a	n/a	n/a	n/a	96.80	n/a
S97N000037		J	Zinc -ICP-Acid Digest	ug/g	89.20	1.10e-02	5.83e+02	n/a	n/a	n/a	n/a	19.40	n/a
S97N000037		J	Cobalt-60 by GEA	uCi/g	98.55	<7.14e-03	1.919	n/a	n/a	n/a	n/a	n/a	1.91
S97N000037		J	Cesium-134 by GEA	uCi/g	n/a	<4.35e-03	<1.29e-02	n/a	n/a	n/a	n/a	1.30e-02	n/a
S97N000037		J	Cesium-137 by GEA	uCi/g	102.4	<8.12e-03	8.15e-01	n/a	n/a	n/a	n/a	n/a	3.84
S97N000037		J	Europium-152 by GEA	uCi/g	n/a	<2.35e-02	<3.77e-02	n/a	n/a	n/a	n/a	3.80e-02	n/a
S97N000037		J	Europium-154 by GEA	uCi/g	n/a	<1.71e-02	<3.56e-02	n/a	n/a	n/a	n/a	3.60e-02	n/a
S97N000037		J	Europium-155 by GEA	uCi/g	n/a	<1.26e-02	<3.15e-02	n/a	n/a	n/a	n/a	3.20e-02	n/a
S97N000037		J	Radium-226 by GEA	uCi/g	n/a	<8.52e-02	<2.03e-01	n/a	n/a	n/a	n/a	2.03e-01	n/a
S97N000037		J	Actinium-228 by GEA	uCi/g	n/a	<2.60e-02	<8.96e-02	n/a	n/a	n/a	n/a	9.00e-02	n/a
S97N000037		J	Americium-241 by GEA	uCi/g	n/a	<3.28e-02	<1.15e-01	n/a	n/a	n/a	n/a	1.15e-01	n/a
S97N000037		J	Alpha of Digested Solid	uCi/g	69.00	<8.70e-05	2.40e-01	n/a	n/a	n/a	n/a	1.29e-04	1.3
S97N000037		J	Beta of Solid Sample	uCi/g	86.69	<1.48e-03	5.140	n/a	n/a	n/a	n/a	1.00e-03	.2

NHC
Numatec
Hanford Corporation
An SGN/Cogema, Inc. Company

Internal Memo

From: Chemistry, Analysis, Technology Support
Phone: 373-1972 T6-50
Date: May 28, 1997
Subject: Final Toxicity Characteristic Leach Results from N-107 Basin Samples

To: G. L. Miller

cc: W. I. Winters (w/o attachment)
J. Y. Bourges (w/o attachment)
C. M. Seidel (w/o attachment)
R. Akita (w/o attachment)
A. D. Rice (w/o attachment)
2 copies for files

Four 107-N basin samples and four quality control samples have been analyzed after leaching according to LA-544-134 "Toxicity Characteristic Leach Procedure (TCLP) - Nonvolatile Samples. The results for these samples are provided in Attachment 1. Logbook data and ICP raw data are provided on Attachments 2 and 3, respectively.

Centrifuged solids were obtained from customer sample BOJYD-5. The sample was fine sand and passed the <9.5 mm particle size criterion on inspection. Sample was weighed onto a suction filtration system. An 11.001 g. subsample of the waste was filtered on pre-washed borosilicate glass filters with 0.6 to 0.8 um pore size. No water separated from the solids. The pre-weighed filter paper containing the wet sample was then transferred to a drying oven set at 105°C and allowed to dry overnight. The pH of the solids from this sample was 7.95 after adding 27.0 mL of Q-water to 1.397 g. of solids and stirring for 5 minutes. Upon adding 980 ul of HCl to the slurry and heating to 53°C and cooling to 22°C (room temperature), the pH dropped to 3.80. This pH was less than 5.0, so extract #1 was selected for the leaching procedure. After drying was complete, the solids remaining from the first sample aliquot were 3.529 g (32.08 wt. % in the original 11.001 g sample).

The remaining sample from BOJYD-5 (S97N000048) was divided into two subsamples: 12.077 g of sample was transferred to a pre-rinsed polyethylene extraction bottle labeled S97N000048S (for sample) and 13.493 g of sample was transferred to an extraction bottle labeled S97N000048D (for duplicate). The sample and duplicate were extracted for 18 hours in 77.461 g and 86.591 g of extract #1, respectively.

A preparation blank was obtained by pouring approximately 15 mL of extract #1 in a vial labeled "Prep. Blank." A preparation standard was also prepared by adding 2.0 mL of a TCLP standard containing Ba, As, Cr, Pb, Ag, Cd and Se and 100 ul of a standard containing Hg to 10 mL of extract #1. This extract was then acidified to pH 1.76 by addition of 2.0 mL of 1 N HNO_3 to the spiked extract. The values for the standard are corrected for the

acid addition on the attached spreadsheet. The values have also been added to LabCore under Standards Book Number 8IN10A.

A matrix spike was prepared by splitting S97N000048D into two equal volume aliquots of 30.0 mL each. One sample S97N000048D was set aside. The second sample, labeled S97N000048 Spike, was spiked with 4.0 mL of the TCLP multielement standard and 200 ul of the Hg standard. The pH of the sample after spiking was 4.32 and it was acidified to 1.68 with addition of 4.0 mL of 1 N HNO_3. The pH of the duplicate sample was 5.07 and 5.0 mL of 1 N HNO_3 was added to obtain a pH of 1.70. The analytical results for these samples and expected values for the spiked extract are provided on the attached spreadsheet with corrections for the acid additions.

The three remaining samples BOJYD-6 (S97N000028), BOJYD-7 (S97N000040) and BOJYD-8 (S97N000034) were handled in similar fashion to sample S97N000048 without preparation of the quality control samples. Though the pH of the samples were different, in all cases the samples required extraction in extract #1. Solids contents for these samples were 34.00%, 24.63% and 19.14% respectively. Sample of 20.829 g, 11.972 g, and 17.002 g were extracted in 144.1 g, 59.0 g and -65.0 g of extract #1 respectively for 18 hours. Results from these extraction are also provided in the attached spreadsheet.

Results from the matrix spike sample indicate all ICP elements are near 100% recovery with the exception of Ag which shows a spike recovery after correction for the Ag found in the sample extract of 59%. The Hg spike result was 52% (see Attachment 4, Hg Data). Since the spike recovery requirements of > 50% were met for the matrix, no further standard additions were performed.

The process notes from the extraction of these samples are attached to this report if additional information is needed. Further questions may also be addressed by Bev Crawford 373-1972 or Keith Fuller 373-1883.

B. A. Crawford
Numatec Hanford Corp.

Keith Fuller

R. K. Fuller
Rust Federal Services

Attachment 1

Sample Results

N-Basin TCLP Final Results

	Final Results in ug/ml				
Element	S97N000048 sample	S97N000048 dup	S97N000028	S97N000040	S97N000034
As	ND	ND	ND	ND	ND
Ba	0.9979	0.5907	2.3793	8.6618	5.326
Cd	ND	ND	0.0592	0.3406	0.4991
Cr	ND	ND	ND	ND	ND
Pb	ND	ND	ND	ND	ND
Se	ND	ND	ND	ND	ND
Ag	0.2072	0.2057	0.1894	0.1828	0.1906
*Hg	ND	ND	ND	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

LCS Standard

Customer i.d.	Labcore #	Elements	TCLP-1 Std Conc. (ppm)	ICP Raw Data @ 5X Dilution (ppm)	LCS % Recovery
LCS Standard	LCS Standard				
Extract Volume added (mLs	10	As	25	0.7242	102.11
ICP Spk added (mLs):	2	Ba	500	14.64	103.21
Hg Spk added (mLs):	0.1	Cd	5	0.1391	98.07
Nitric Acid Added (mLs):	2	Cr	25	0.7063	99.59
Total Volume (mLs):	14.1	Pb	25	0.7356	103.72
		Se	5	0.2025	142.76
Hg Dilution Factor:	141	Ag	25	0.1187	16.74
ICP elements DF:	7.05	*Hg	20	0.118	83.19

NOTE: All elements show non-detect (ND) in the prep blank.

***Hg performed by Cold Vapor Atomic Absorption**

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
Prep Blank				
		As	ND	ND
		Ba	ND	ND
		Cd	ND	ND
Amt of extract (mLs):	10.00	Cr	ND	ND
Amt of Nitric added (mLs)	0.00	Pb	ND	ND
Total volume (mLs):	10.00	Se	ND	ND
		Ag	ND	ND
Dilution Factor:	1.000	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000048 Sample (Customer i.d. BOJYD5)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
BOJYD5	S97N000048 sam	As	ND	ND
		Ba	0.8091	0.9979
		Cd	ND	ND
Amt of extract (mLs):	30.00	Cr	ND	ND
Amt of Nitric added (mLs):	7.00	Pb	ND	ND
Total volume (mLs):	37.00	Se	ND	ND
		Ag	0.168	0.2072
Dilution Factor:	1.233	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000048 Dup (Customer i.d. BOJYD5)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
BOJYD5	S97N000048 dup	As	ND	ND
		Ba	0.5063	0.5907
		Cd	ND	ND
Amt of extract (mLs):	30.00	Cr	ND	ND
Amt of Nitric added (mLs)	5.00	Pb	ND	ND
Total volume (mLs):	35.00	Se	ND	ND
		Ag	0.1763	0.2057
Dilution Factor:	1.167	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000048 Spike (Customer i.d. BOJYD5)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm) Sample + Spk	ICP Raw Data (ppm) Sample (dup)	Percent Recovery TCLP-1 STD
BOJYD5	S97N000048 spk	As	2.654	ND	109.34
		Ba	54.03	0.5063	110.42
		Cd	0.5244	ND	108.03
Amt of extract (mLs):	30.000	Cr	2.603	ND	107.24
Amt of Nitric added (mLs):	7.000	Pb	2.675	ND	110.21
Amt of TCLP-1 ICP std (mLs):	4.000	Se	0.8128	ND	167.44
Amt of TCLP-1 Hg std (mLs):	0.200	Ag	1.588	0.1763	59.26
		*Hg	0.05077	ND	52.29
Total volume (mLs):	41.20				
Sample Dilution Factor:	1.373				
TCLP-1 ICP std DF:	10.3				
TCLP-1 Hg std DF:	206				
DF of the sample that was spiked:	1.167				

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000028 (Customer i.d. BOJYD6)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
BOJYD6	S97N000028 sam	As	ND	ND
		Ba	2.067	2.3793
		Cd	0.0514	0.0592
Amt of extract (mLs):	139.00	Cr	ND	ND
Amt of Nitric added (mLs):	21.00	Pb	ND	ND
Total volume (mLs):	160.00	Se	ND	ND
		Ag	0.1645	0.1894
Dilution Factor:	1.151	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000040 (Customer i.d. BOJYD7)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
BOJYD7	S97N000040 sam			
		As	ND	ND
		Ba	7.5	8.6618
		Cd	0.2949	0.3406
Amt of extract (mLs):	58.10	Cr	ND	ND
Amt of Nitric added (mLs)	9.00	Pb	ND	ND
Total volume (mLs):	67.10	Se	ND	ND
		Ag	0.1583	0.1828
Dilution Factor:	1.155	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

S97N000034 (Customer i.d. BOJYD8)

Customer i.d.	Labcore #	Elements of Interest	ICP Raw Data (ppm)	Final Result (ppm)
BOJYD8	S97N000034 sam			
		As	ND	ND
		Ba	3.482	5.3260
		Cd	0.3263	0.4991
Amt of extract (mLs):	64.20	Cr	ND	ND
Amt of Nitric added (mLs)	34.00	Pb	ND	ND
Total volume (mLs):	98.20	Se	ND	ND
		Ag	0.1246	0.1906
Dilution Factor:	1.530	*Hg	ND	ND

ND = Non Detect (element measured below the detection limit)

***Hg performed by Cold Vapor Atomic Absorption**

Attachment 2

Logbook Notes

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TCLP – N-basin Samples   Procedure = LA-544-134 Rev B-0   4/30/97

Operating pH meter from Vendor

OPERATING INSTRUCTIONS
CORNING® pH-30 Sensor

The pH-30 (Chek-mite) is a portable pH meter in a moisture and chemical resistant case. This meter features a large LCD display for easy viewing. The replaceable epoxy body electrode is 8mm in diameter which allows testing in even the narrowest of containers.

Specifications:

Range:	0.0 to 14.0 pH
Resolution:	0.01 pH
Accuracy:	±0.2 pH
Operating Temp.:	0 to 50°C
Power Supply:	2 x 1.4V Duracell (MP675H)
Battery Life:	6000 Hrs. (Approx.)
Dimensions (in):	6.7L x 2W x 1D
Weight:	3 Ounces

Conditioning:

Do not be alarmed if white crystals have formed around the cap. This is a normal occurance with pH electrodes. The crystals will be dissolved during conditioning.

Always condition the unit prior to using. To condition, remove the cap and soak the tip of the probe in 7.0 buffer for ten (10) minutes.

Calibration:

Daily calibration is recommended.
To calibrate use 7.00 and 4.00 or 7.00 and 10.01 buffers, and deionized or distilled rinse water. Calibrate the meter as follows:

1. Remove the sensor cap, put the tip of the electrode in 7.00 buffer.
2. Turn the meter on using on/off switch at top of meter.
3. When the value on the display is stable, adjust the 7pH trim screw until the display reads 7.00.
4. Rinse the electrode with distilled or deionized water.
5. Repeat steps 1 through 3 using 4.00 or 10.01 buffer and the 4/10 trim screw.

9:00 Working on bring hood up for running N-basin samples.

- Still need stir plate and beaker in hood to support pH determination on matrix, also filtering apparatus and filter paper.
- Until vessels are ordered that are pre-washed will perform 3 acid washes on 2 vessels for 1st analysis.

Largest sample will be used for duplicate extractions.

Will perform the extraction twice preliminary evaluation will be performed only once.

10:30 Hood close to ready for inspection. Still needs hotplate and filters for filtration unit.

5/2/97 N-107 basin sample
Aruit: S96N000047 N000048 : Sample Rec 5/2/97

9:00 30ml Solid
37ml total

poured off 7 mls of cloudy brown water. Dispensed liquid in vial to go back to original sample for return to customer.

Dose: 15 mR/hr
20 mRad/hr.

preliminary wt. of total w/ liquid: gross: 54.289 grams in centrifuge cone.

 wt. of filter 0.208 grams

9:07 Set up a side arm flask for filtering sand for smaller sample.

Performed 3 rinses on filter paper 5044-0001 90mm GF/F filter

doesn't delineate whether rinsed or not used 1N HNO_3 in rinse

Weighed rinsed filter + buchner funnel top: 33.332 grams

weighed out 10 grams for moisture determination

Particle size determination: Sand: all < 9.5mm in diameter.

gross wt: 44.333 grams.

33.332 grams

sample wt: 11.001 grams.

Spread sand on filter and reweighed.

44.341 grams gross

9:15 Turned on filter: No water came through filter through sludge.

Turned on oven to warm to 100°C.

Weighed watch glass which will be used to cover filter over the weekend before determining water content.

watch glass wt 28.510 grams

watch glass filter + material: 36.639 grams

9:20 Placed sample in oven.

9:25 Weighed out 1.0 grams of waste solids to 100ml beaker

beaker + stir bar + sample 64.1[illegible]

– beaker + stir bar: ~~62.734~~ 62.7[illegible] [initials] 5/2/97

sample: 1.39[illegible]

Sample wt. evaluated 1.377 grams

B.A. [signature] 5/2/97

Evaluation of SY241000048 (cont.) 5/2/97 103

Adjusted water for sample based on 1.0 grams requiring 19.3mL to determine pH:

9:30 $1.397\left(\frac{1.0g}{19.3mL}\right)^{-1} = x\,mL = 26.96mL \rightarrow 27.0mL$ of water

Added 27.0mL of Q-water to solid and began rigorous stirring.

Calibrated pH meter on buffer 7 and 4.

pH 7.00 reads 7.01
pH 4.00 reads 4.00

Measured pH: 9.95 ± .01

9:40 pH > 5.0 added 978μL HCl. $\frac{.7mL}{1.0gram} = \frac{x}{1.397grams}$ $x = .98mL$ (.978mL) 1N HNO3 BAC

9:45 Oven temp = 70°C
Solution stirring after adding acid. temp = 22°C (Room temp)

9:50 solution temp: 40°C

9:53 Reached 50°C to 53°C. Held temp at 53°C for 10 minutes.

10:03 temp of solution: 53°C Turned off the hotplate.

10:20 measured temp on oven. Noticed up to 105°C so turned down slightly.

10:26 still going up temp: 110°C turned down some more since oven had come back on

10:30 Solution is at pH = 3.80 which is < 5.0 So we will use Extract #1 for the extraction.
temp: 22°C

10:35 Temperature of oven. 105°C slight adjustment over comes on So returned to original position.

13:45 Watched sample: (in oven 4 hrs 25 minutes) after cooling for 5 minutes 128 wt. of solid = 32.264 grams

N-107 back sample Preliminary evaluation (cont.) 5/2/97

2:35PM Reweighed sand after 50 minutes wt. of solids: 32.265 grams

2:45 Placed cover on solids and placed back in the oven.
~~2:45PM~~ Turned Oven off. Temp: 105°C
BAC 5/2

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HNF-SD-WM-DP-245, REV. 0

B.A. Crawford
5/2/97

5-5-97 (Cont.) N-107 basin sample S97N000048 Extraction

0800 Placed sample back in oven to continue drying initial weight 32.340
09:30 1. 32.258

Weighed buchner funnel top: 32.468 g

Wt. of ~~sample on~~ wet filter (p. 103): 33.332
BAC 5/5/97
− 32.468
1.864 wet filter

10:30 Sample wt: 32.248 g. < 0.120 wt. change from previous weight

Wt. of original sample after drying: 11.001 grams (p. 102)

Do not need to wt. filter when drying sample (eliminates need to account for filter as originally thought) Sample is determined by difference of buchner funnel top.
Obtained and labeled 250 ml wide mouthed jars as S97N000485 S97N000480
Rinsed twice with 6 ml each 1N HNO_3 acid.
Rinsed one last time in 1N HNO_3 and weighed.

Weight of ~~S9~~ BAC 5/5/97 S97N000485: 35.868 g
wt of S97N000480: 37.799 g

Checked pH of Extract #1: Should be
buffer pH 4.00 reads 4.00
pH 7.00 reads 6.95 Adjusted to 7.00
and pH 4.00 reads 4.01 ± .01
Extract #1 4.91 within 4.93 ± .05

B.A. Crawford 5/5/97

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Weighed sample into S97N000048S jar : 44.668 grams
weighed sample into S97N000048D jar : 47.155 grams

Finished dispensing solids equally between sample and duplicate until there were no solids left.

wt. S97N000048S : 47.945 grams
- 35.868 grams
12.077 grams

wt. S97N000048D 51.292 grams
- 37.799 grams
13.493 grams

Obtained 2 EPA cleaned 15 mL vials for LCS Prep Std and Prep Blank.

10 mL of extract will be used. Hg spike will use for standard. 100 µl to 10 mL extract
will use 0.8 mL of metals std to 10 mL extract.

1130 Second wt 32.247 <0.1% difference from previous weighing of 32.248 grams.
wt solids in sample : 32.248 g
- watchglass : 28510 5/5/97
- filter : 0.208 g
solids : 3.529 g

% solids = 3.529 g × 100 / 11.00 g (from p.102)
= 32.08 % solids

Amount extract #1 to use:

20 × (% solids)/100 × (wt. of filtered waste) = ?

For S97N000048S: 20 × (32.08) × (12.077 g) / 100 = 77.49 grams
actual 77.522
- .061 residue
77.461

For S97N000048D: 20 × (32.08) × (13.493 g) / 100 = 86.57 grams
actual 86.610
- .009 residue

1430 started turning

LCS Std Prep. For Nibasin (107-N) 5/5/97

11:45 Added 100μL of Std. BAC 5/5/97 to 10mL of extract #1 and 2mL standard containing Ba, As, Cr, Pb, Ag, Cd & Se. for Prep Std. Resulting concentrations:

Hg: 20μg/mL x 0.1mL/12.10mL = .165μg/mL

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Ba: 500μg/mL x 2mL/12.10mL = 82.6μg/mL

As, Cr, Pb, Ag: 25μg/mL x 2mL/12.10mL = 4.13μg/mL

Cd and Se: 5μg/mL x 2mL/12.10mL = 0.826μg/mL

3:30PM Examined three samples.
15:30 BOJYD6 — All three samples
BOJYD7 — Particle size < 9.5mm.
BOJYD8 — Samples do not pass water through suction filtration.

Weighed out 5 grams from each one:

BOJYD6 5.347 gram
− .203 grams filter
Waste wt: 5.144 grams

BOJYD8 4.829 grams
− .205 grams
wst wt.: 4.624 grams

BOJYD7 6.649 grams
− .206 grams
waste wt.: 6.443 grams

3:40 Placed all three samples in oven at 105°C

B.A. Crawford 5/6/97

5-6-97 N-Basin (107-N) Samples TCLP (cont.) 5/5/97

		Wt.	Laboratory #
0710	BOJY6	0.885	S97N000028
	BOJY7	1.586	S97N000040
	BOJY8	1.754	S97N000054

0820 Reweighing samples you added control. (2nd weighing).

S97N000054 (BOJY08) = 1.748 grams
S97N000040 (BOJY07) = 1.587 grams <1% difference from 1.586 grams
S97N000028 (BOJY06) = 0.885 grams. <1% difference from 0.885 g.

0830 Turned off agitators on S97N000048S and S97N000049

Rinsed Erlenmeyer receiving vessels, 3x in Nitric Acid. Filtered 1st time set of solids came through. So, refiltered on second filter paper. Second filtering apparatus did not work as efficiently as 1st one.

Packed filtered solids in centrifuged cone labelled BOJY0-8 (customer ID for parent sample) to be returned to ACL for disposal.

Labelled 1st sample S97N000048S for sample. 2nd sample into filtered on rinsed filter into rinsed and dried Erlenmeyer flask.

Prepared Spike for S97N000048
added 4 mL of Ba, As, Cr, Pb, Ag, Cd and Se Std
added 200 µL of Hg to 40mL vial.
BAC 5/6/97
Added 30mL of extract to spike and duplicate sample.

0915 Checked pH of all samples obtained thus far:

4.00 buffer reads 4.01 ± .01
7.00 buffer reads 7.00 ± .01
received pH: S97N000048 Spike 4.32 acidified to 1.68 with 4mL of 1N HNO3.

N-107 basin samples (Continued.) 5/6/9[illegible]

S97N000048D pH = 5.07 added 5mL of 1N HNO_3 to pH = 1.70

S97N000048S pH = 4.30 added 7mL of 1N HNO_3 to pH = 1.84

Prep Std. pH = 4.50 added 2mL of 1N HNO_3 to pH = 1.76

9:30 Reweighed S97N000034 (BOJY8): 1.747 grams <.1% diff in weight.

Tare Ph beakers + Digestion Vessels

Tare Beakers	6	56.267 g	S97N000028
	7	58.484 g	S97N000040
	8	58.277 g	S97N000034

Tare Vessels	6	36.510 g	8	37.699
	7	35.539 g		

Sample Wt ~~Gross~~ J.K. 5-6-97 Ph beakers + Digestion vessels

beakers	6	1.055 g
	7	59.666 g (gross) − 59.666 / 58.484 → 1.182 g sample
	8	60.104 g (gross) − 58.277 g beaker = 1.727 g sample
Vessels	6	57.339 g − 36.510 g = 20.829 g
	7	47.511 g − 35.539 g = 11.972 g
	8	54.701 g − 37.699 = 17.002 g

1:30 PM (1330) Sample in beaker 6 added 19.3 mL of water pH = 4.77 Will use extract #1. buffer readings: 4.00 → 4.01 7.00 → 7.01

Sample in beaker 7 (S97N000040) added.

$\frac{1.182 g}{1.00 g} = \frac{x}{19.3 mL\ H_2O}$ x = 22.8 mL H_2O.

2:00 PM (14:00) measured pH of beaker 7: pH = 2.67 < 5.0 Will use extract #1 for this sample.

2:10 PM To beaker #8 added $19.3 \times \frac{1.727 g}{1.0 g}$ → 33.3 mL H_2O

2:15 PM measured pH = 3.35 Will also use extract #1.

B.A. Crawford 5/6/97

N-107 Basin TCLP Samples (cont.)

Amount of Extract #1 to add to S97N000028 in vessel #6

Solids: 5.144 grams initial
1.749 grams dry

$$\frac{1.749\,g}{5.144\,g} \times 100 = 34.00\%$$

$$g.\,extract = \frac{20(34.00)(20.82\,g)}{100} = 141.6\,g.\ extract\ \#1$$

1 Btl 5/6/97

Added: 144.4 g extract

Amount of Extract #1 to add to S97N000040 in vessel #7.

$$\%\ solids = \frac{1.587\ grams}{6.443\ grams} \times 100 = 24.63\%$$

$$g\ extract = \frac{20(24.63)(11.97\,g)}{100} = 58.97\,g\ (59.0\,g)$$

Added: 59.0 grams extract #1

Amount of Extract #1 to add to S97N000034 in vessel #8.

$$\%\ solids = \frac{0.885\,g}{4.629\,g} = 19.14\%$$

$$g\ extract = \frac{20(19.14)(17.002\,g)}{100} = 65.08\,g\ (65.1\,g)$$

2:45 Started agitator vessels rotated.

5-7-97 BEST AVAILABLE COPY HNF-SD-WM-DP-245, REV. 0

0850 Filtering samples 6 & 7

0930 adjusted ph on sample. Ph 4 = 4.01 PH 7 = 7.01

S97N000028	Bottle 1	Bottle 2
~~initial~~ J.K. 5-6-97		
initial Ph	4.95	5.01
acid added	12.0 ml	9.0 ml
final Ph	~~1.96~~ 1.96 mjg 6/9/97	1.95

S97N000040

initial Ph	4.73
acid ~~Ph~~ added	9.0 ml
final Ph	1.88

1545 added extract to last sample and started rotating

Beaker	Tare	58.167	58.256
	gross	123.257	58.167
		65.090	.089 residue
		.089	
		65.001 grams	

Jerry M. Dunkel 5-7-97

5-8-97

Density on 1ml acid		Density 1ml #1 extract	
Beaker Tare	58.145	Beaker tare	58.157
" Gross	59.189	" gross	59.171
Wt 1ml acid	1.044	Wt 1ml extract	1.014

1000 Filtered sample and did acid adjustment.

S97N000034

initial Ph 4.62 Ph 4 = 4.01 PH 7 = 7.01

final Ph 1.37

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Attachment 3

ICP Raw Data

ug/mg

Sample #	As	Ba	Cd	Cr	Pb	Se	Ag	Hg
97N000028	ND	2.067	0.0514	ND	ND	ND	0.1645	—
28_D	ND	2.075	0.0491	ND	ND	ND	0.1648	—
97N000040	ND	7.50	0.2948	ND	ND	ND	0.1583	—
40_D	ND	7.531	0.3039	ND	ND	ND	0.1540	—
97N000048	ND	0.8091	ND	ND	ND	0.1648	0.1680	—
48_D	ND	0.5063	ND	ND	ND	0.2698	0.1763	—
48_S	2.654	54.03	0.5244	2.603	2.675	0.8128	1.588	—
D. Limit	0.50	0.25	0.025	0.05	0.50	0.50	0.05	

Spike Recovery:

$$\%\ As = \frac{2.654 - 0}{2.618} \times 100 = 101.4\%$$

$$Se = \frac{0.8128 - 0.1648}{0.524} \times 100 = 123$$

$$Ag = \frac{1.588 - 0.168}{2.618} \times 100$$

Rough Calculations

$$\%\ Ba = \frac{54.03 - 0.8091}{52.3} \times 100 = 101.8\%$$

54.2

$$\%\ Cd = \frac{0.5244 - 0}{0.524} \times 100 = 100.1\%$$

$$\%\ Cr = \frac{2.603 - 0}{2.618} \times 100 = 99.0\%$$

$$Pb = \frac{2.675 - 0}{2.618} \times 100 = 102.2\%$$

S/R # 9705076.TXT HNF-SD-WM-DP-245, REV. 0

05/06/97 15:28
A-0004-1

LABCORE Data Entry Template for Worklist# 17960

Analyst: D.K.Sato **Instrument:** ICP01 **Book#** GGB 98 B

Method: LA-505-151/161 Rev/Mod C-1

Worklist Comment: ICP 107-N (TCLP DIGEST) PCB Samples

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	PREPSTDTJA				@ICP-T01	LIQUID		
7	PREPBLKTJA				@ICP-T01	LIQUID		
8	SAMPLE	S97N000028	0	T	@ICP-T01	LIQUID	97000165 107 N	
	Analytes Requested:	AG-T-01 , AL-T-01 , AS-T-01 , B-T-01 , BA-T-01 , BE-T-01 , BI-T-01 , CA-T-01 , CD-T-01 , CE-T-01 , CO-T-01 , CR-T-01 , CU-T-01 , FE-T-01 , K-T-01 , LA-T-01 , LI-T-01 , MG-T-01 , MN-T-01 , MO-T-01 , NA-T-01 , ND-T-01 , NI-T-01 , P-T-01 , PB-T-01 , S-T-01 , SB-T-01 , SE-T-01 , SI-T-01 , SM-T-01 , SR-T-01 , TI-T-01 , TL-T-01 , U-T-01 , V-T-01 , ZN-T-01 , ZR-T-01						
9	DUP	S97N000028	0	T	@ICP-T01	LIQUID		
10	SAMPLE	S97N000034	0	T	@ICP-T01	LIQUID	97000165 107 N	
	Analytes Requested:	AG-T-01 , AL-T-01 , AS-T-01 , B-T-01 , BA-T-01 , BE-T-01 , BI-T-01 , CA-T-01 , CD-T-01 , CE-T-01 , CO-T-01 , CR-T-01 , CU-T-01 , FE-T-01 , K-T-01 , LA-T-01 , LI-T-01 , MG-T-01 , MN-T-01 , MO-T-01 , NA-T-01 , ND-T-01 , NI-T-01 , P-T-01 , PB-T-01 , S-T-01 , SB-T-01 , SE-T-01 , SI-T-01 , SM-T-01 , SR-T-01 , TI-T-01 , TL-T-01 , U-T-01 , V-T-01 , ZN-T-01 , ZR-T-01						
11	DUP	S97N000034	0	T	@ICP-T01	LIQUID		
12	CCV				@ICP-QC	QC		

Data Entry Comments:

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

05/06/97 15:28
A-0004-1

LABCORE Data Entry Template for Worklist# 17960

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
13	CCB				@ICP-QC	QC		
14	SERDIL	S97N000048	0	T	@ICP-T01	LIQUID		
15	SAMPLE	S97N000048	0	T	@ICP-T01	LIQUID	97000254 1310-N	
	Analytes Requested:	AG-T-01 , AL-T-01 , AS-T-01 , B-T-01 , BA-T-01 , BE-T-01 , BI-T-01 , CA-T-01 , CD-T-01 , CE-T-01 , CO-T-01 , CR-T-01 , CU-T-01 , FE-T-01 , K-T-01 , LA-T-01 , LI-T-01 , MG-T-01 , MN-T-01 , MO-T-01 , NA-T-01 , ND-T-01 , NI-T-01 , P-T-01 , PB-T-01 , S-T-01 , SB-T-01 , SE-T-01 , SI-T-01 , SM-T-01 , SR-T-01 , TI-T-01 , TL-T-01 , U-T-01 , V-T-01 , ZN-T-01 , ZR-T-01						
16	DUP	S97N000048	0	T	@ICP-T01	LIQUID		
17	SPK-PREDIG	S97N000048	0	T	@ICP-T01	LIQUID		
18	ICSA				@ICP-QC	QC		
19	ICSAB				@ICP-QC	QC		
20	CCV				@ICP-QC	QC		
21	CCB				@ICP-QC	QC		

Final page for worklist # 17960

for Sarah Pang 5/8/97
Analyst Signature Date

Reviewed by:
Sarah Pang 5/8/97
Analyst Signature Date

Kathy S. Tollefson 5/6/97
Labeled & manage per Standing Order 97-008, Rev. 1 waste

Data Entry Comments:

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

Analysis Report Summary Wed 05-07-97 01:48:55 PM page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	970507A	ICP2	05/07/97	12:31	DKS	Q	CONC
2	ICB	970507A	ICP2	05/07/97	12:35	DKS	Q	CONC
3	LLS	970507A	ICP2	05/07/97	12:38	DKS	Q	CONC
4	ICSA	970507A	ICP2	05/07/97	12:41	DKS	Q	CONC
5	ICSAB	970507A	ICP2	05/07/97	12:44	DKS	Q	CONC
6	PREPSTDTJA	970507A	ICP2	05/07/97	12:48	DKS	S	CONC
7	PREPBLKTJA	970507A	ICP2	05/07/97	12:52	DKS	Q	CONC
8	PREPBLKTJA	970507A	ICP2	05/07/97	12:58	DKS	S	CONC
9	S97N000028	970507A	ICP2	05/07/97	13:02	DKS	S	CONC
10	S97N000028_D	970507A	ICP2	05/07/97	13:04	DKS	S	CONC
11	S97N000040	970507A	ICP2	05/07/97	13:07	DKS	S	CONC
12	S97N000040_D	970507A	ICP2	05/07/97	13:10	DKS	S	CONC
13	CCV	970507A	ICP2	05/07/97	13:13	DKS	Q	CONC
14	CCB	970507A	ICP2	05/07/97	13:17	DKS	Q	CONC
15	S97N000048	970507A	ICP2	05/07/97	13:21	DKS	S	CONC
16	S97N000048_D	970507A	ICP2	05/07/97	13:24	DKS	S	CONC
17	S97N000048_S	970507A	ICP2	05/07/97	13:26	DKS	S	CONC
18	ICSA	970507A	ICP2	05/07/97	13:32	DKS	Q	CONC
19	ICSAB	970507A	ICP2	05/07/97	13:35	DKS	Q	CONC
20	CCV_1	970507A	ICP2	05/07/97	13:39	DKS	Q	CONC
21	CCB_1	970507A	ICP2	05/07/97	13:43	DKS	Q	CONC

DK KP
05-07-97
107-H

S97N000028
S97N000040
S97N000048

Analysis Report Averages Wed 05-07-97 01:48:55 PM page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.868	4.938	5.153	5.022	5.013	5.114
2	ICB	.0011	.0121	-.0081	-.0005	.0001	.0005
3	LLS	.0219	.1183	.2102	.1016	.0998	.0112
4	ICSA	.0023	243.6	-.0583	.0021	.0005	.0008
5	ICSAB	.9552	242.0	.0013	-.0025	.4767	.4793
6	PREPSTDTJA	.1187	.0386	.7242	.3414	14.64	.0005
7	PREPBLKTJA	Q.1641	.0205	.0247	Q1.315	.0044	.0006
8	PREPBLKTJA	.0338	.0126	-.0186	.2307	.0007	.0004
9	S97N000028	.1645	.2066	.0481	1.568	2.067	.0025
10	S97N000028_D	.1648	.2252	-.0634	1.599	2.075	.0023
11	S97N000040	.1583	.5240	-.0602	3.345	7.500	.0034
12	S97N000040_D	.1540	.5197	.0406	3.362	7.531	.0036
13	CCV	4.846	4.884	5.105	4.968	5.000	5.084
14	CCB	.0004	.0166	.0001	.0029	.0001	.0006
15	S97N000048	.1680	.2370	-.0369	1.328	.8091	.0034
16	S97N000048_D	.1763	.2639	-.0287	1.290	.5063	.0029
17	S97N000048_S	1.588	.2611	2.654	1.206	54.03	.0027
18	ICSA	.0021	241.3	-.0161	.0012	.0004	.0008
19	ICSAB	.9449	240.0	-.0126	-.0047	.4774	.4747
20	CCV_1	4.828	4.880	5.151	4.998	5.019	5.108
21	CCB_1	.0004	.0102	-.0234	.0014	-.0000	.0005

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	5.052	4.863	4.931	4.966	5.058	4.931
2	ICB	-.0180	-.0039	-.0007	.0071	.0003	-.0008
3	LLS	Q.1344	.2111	.0099	.2033	.0421	.0205
4	ICSA	-.0214	246.6	.0000	.0160	.0011	-.0008
5	ICSAB	-.0378	246.0	.9194	.0140	.4652	.4661
6	PREPSTDTJA	.0012	.0719	.1391	-.0032	.0117	.7063
7	PREPBLKTJA	-.0188	Q.4000	.0005	-.0024	.0003	-.0010
8	PREPBLKTJA	-.0419	.0643	-.0007	-.0031	.0010	-.0011
9	S97N000028	-.1621	67.19	.0514	.0213	.1830	.0115
10	S97N000028_D	-.1639	67.17	.0491	.0384	.1867	.0133
11	S97N000040	.0285	77.11	.2949	-.0080	.0570	.0063
12	S97N000040_D	-.1612	77.91	.3030	.0036	.0570	.0093
13	CCV	5.062	4.929	4.906	4.890	5.040	4.917
14	CCB	.0013	-.0036	-.0010	.0045	-.0001	.0008
15	S97N000048	-.1336	173.0	.0298	.0246	.1357	.0196
16	S97N000048_D	-.1077	166.8	.0222	.0375	.1237	.0080
17	S97N000048_S	-.1505	152.9	.5244	.0367	.1527	2.603
18	ICSA	-.0373	245.0	.0012	.0128	.0017	-.0025
19	ICSAB	-.0175	243.7	.9063	.0116	.4565	.4574
20	CCV_1	4.993	4.912	4.899	4.900	5.021	4.899
21	CCB_1	.0146	-.0045	-.0013	.0098	.0004	-.0006

Analysis Report Averages Wed 05-07-97 01:48:55 PM page 3

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	5.050	-.0032	4.640	5.076	5.058	5.044
2	ICB	-.0006	-.0022	.0032	.0972	.0005	-.0017
3	LLS	.0180	-.0014	.0982	.3889	.1022	.0198
4	ICSA	-.0092	-.0197	93.80	.0420	-.0043	.0016
5	ICSAB	.4476	-.0185	93.04	.0003	-.0043	1.018
6	PREPSTDTJA	.0007	-.0025	.0049	.3728	-.0005	-.0028
7	PREPBLKTJA	.0027	-.0038	-.0079	Q1.442	.0015	-.0009
8	PREPBLKTJA	.0004	-.0019	-.0008	.2867	.0004	-.0015
9	S97N000028	.4904	.0457	1.005	7.983	.0025	-.0081
10	S97N000028_D	.4902	.0456	1.035	7.985	.0015	-.0094
11	S97N000040	.1523	.0470	.2907	5.163	.0015	-.0066
12	S97N000040_D	.1533	.0476	.2856	4.868	-.0004	-.0054
13	CCV	4.971	-.0025	4.634	5.056	4.991	4.952
14	CCB	.0008	-.0018	.0024	.2713	.0002	-.0016
15	S97N000048	-.0057	.1150	29.84	21.07	-.0028	-.0069
16	S97N000048_D	-.0071	.1127	13.12	18.82	-.0006	-.0050
17	S97N000048_S	-.0109	.1057	12.01	17.89	-.0007	-.0032
18	ICSA	-.0095	-.0199	92.65	.1825	-.0047	.0011
19	ICSAB	.4443	-.0175	92.11	.1374	-.0041	1.012
20	CCV_1	5.005	-.0028	4.619	4.839	4.997	4.994
21	CCB_1	-.0002	-.0013	.0021	.1020	.0003	-.0010

#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	5.038	4.859	5.031	5.204	5.058	4.941
2	ICB	.0060	-.0007	-.0002	-.0147	-.0013	-.0041
3	LLS	.2134	.0193	.0987	Q.1472	.2010	.0319
4	ICSA	256.1	-.0065	-.0056	199.5	.0091	-.0109
5	ICSAB	254.0	.4397	-.0088	198.8	.0021	.9073
6	PREPSTDTJA	.0035	.0003	-.0006	408.2	.0003	.0007
7	PREPBLKTJA	.0232	-.0012	-.0004	Q2298.	-.0040	-.0008
8	PREPBLKTJA	.0012	-.0007	-.0031	481.5	.0016	-.0062
9	S97N000028	5.762	17.56	-.0226	2250.	.0130	1.286
10	S97N000028_D	5.803	17.66	-.0108	2265.	.0086	1.305
11	S97N000040	3.909	5.898	-.0029	2141.	.0063	.4584
12	S97N000040_D	3.923	5.934	-.0083	2139.	.0025	.4097
13	CCV	4.992	4.847	5.006	5.112	4.991	4.956
14	CCB	.0014	-.0004	-.0026	-.0126	.0026	-.0065
15	S97N000048	36.00	151.7	-.0105	2343.	.0033	1.783
16	S97N000048_D	38.10	140.8	.0031	2314.	.0037	1.840
17	S97N000048_S	34.77	127.9	.0013	2107.	-.0015	1.699
18	ICSA	254.0	-.0066	-.0144	197.4	.0026	-.0125
19	ICSAB	252.4	.4349	-.0071	197.0	.0056	.8921
20	CCV_1	4.996	4.831	5.006	5.142	4.992	4.915
21	CCB_1	-.0048	-.0004	.0007	-.0087	-.0012	-.0025

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	4.978	4.793	4.862	4.788	4.699	5.098
2	ICB	-.0040	-.0023	.0095	-.0047	.0262	-.0075
3	LLS	.4045	.2303	.1955	.1073	.2151	.1181
4	ICSA	.0125	.0504	-.0127	.0033	-.0204	.0114
5	ICSAB	.0064	.9833	-.0483	.0074	.0027	-.0060
6	PREPSTDTJA	.0963	.7356	.0024	-.0036	.2025	.0700
7	PREPBLKTJA	.1472	.0088	-.0047	.0128	Q.2821	Q.2210
8	PREPBLKTJA	.0240	.0062	-.0012	-.0086	.0600	.0310
9	S97N000028	.2007	.0878	9.622	-.0028	.2449	15.16
10	S97N000028_D	.1309	.0666	9.723	.0124	.2508	15.24
11	S97N000040	-.0041	.2663	1.059	-.0414	.2548	7.714
12	S97N000040_D	.0646	.2700	1.115	.0166	.2855	7.755
13	CCV	5.003	4.816	4.873	4.763	4.764	5.085
14	CCB	.0084	.0079	.0107	-.0013	.0288	-.0044
15	S97N000048	37.03	.0240	3.900	-.0020	.1648	4.858
16	S97N000048_D	25.49	.0411	2.081	-.0047	.2696	5.227
17	S97N000048_S	23.78	2.675	1.955	.0272	.8128	4.830
18	ICSA	.0020	.0444	-.0559	-.0068	-.0002	.0099
19	ICSAB	.0188	.9572	-.0271	-.0083	-.0208	-.0073
20	CCV_1	4.955	4.792	4.862	4.765	4.747	5.073
21	CCB_1	-.0034	.0039	.0063	-.0043	.0347	-.0043

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	4.948	5.010	.0310	4.944	4.751	9.765
2	ICB	-.0273	-.0004	.0143	-.0004	.0059	-.1024
3	LLS	.1823	.0200	.0120	.0206	.4177	.4266
4	ICSA	-.0137	.0020	.0097	.0008	.0164	-.0099
5	ICSAB	-.0167	.0021	.0052	.0015	.0270	-.0142
6	PREPSTDTJA	-.0336	.0017	.0109	.0010	.0058	-.0461
7	PREPBLKTJA	-.0446	Q.0108	-.0216	-.0014	-.0045	Q.5416
8	PREPBLKTJA	-.0267	.0016	.0023	.0004	.0046	.0224
9	S97N000028	-.1483	.5727	.0518	.0023	-.0160	.2421
10	S97N000028_D	-.1776	.5748	.0412	.0035	-.0197	.1869
11	S97N000040	-.1639	.6273	.0308	.0016	-.0010	18.14
12	S97N000040_D	-.1600	.6291	.0261	-.0022	.0096	18.25
13	CCV	4.878	4.945	.0312	4.896	4.750	9.659
14	CCB	-.0237	-.0003	.0152	.0003	-.0061	-.0745
15	S97N000048	-.1440	.5454	.0208	.0020	.1096	.6385
16	S97N000048_D	-.1557	.4394	.0224	.0020	-.0770	.5963
17	S97N000048_S	-.1226	.4016	.0155	.0044	.0075	.6123
18	ICSA	-.0167	.0018	.0068	.0007	-.0019	-.0243
19	ICSAB	-.0231	.0019	.0080	.0015	.0081	-.0302
20	CCV_1	4.889	4.949	.0262	4.911	4.725	9.676
21	CCB_1	-.0162	-.0001	.0104	.0003	-.0124	-.0567

Analysis Report Averages Wed 05-07-97 01:48:55 PM page 5

#	Sample Name	V	Y	Zn	Zr
1	ICV	5.063	.0039	4.749	4.975
2	ICB	-.0051	-.0014	.0007	-.0042
3	LLS	.0991	-.0006	.0218	.0183
4	ICSA	-.0031	.0058	.0074	-.0053
5	ICSAB	.4633	.0056	.9125	-.0054
6	PREPSTDTJA	-.0071	-.0018	.0022	-.0051
7	PREPBLKTJA	-.0107	-.0024	.0023	-.0050
8	PREPBLKTJA	-.0047	-.0012	.0006	-.0034
9	S97N000028	-.0316	-.0056	13.71	-.0252
10	S97N000028_D	-.0352	-.0060	13.75	-.0280
11	S97N000040	-.0316	-.0073	3.810	-.0286
12	S97N000040_D	-.0290	-.0070	3.832	-.0229
13	CCV	5.041	.0043	4.746	4.928
14	CCB	-.0048	-.0010	.0009	-.0036
15	S97N000048	-.0131	-.0018	7.020	-.0262
16	S97N000048_D	-.0133	-.0014	4.455	-.0233
17	S97N000048_S	-.0107	-.0018	4.094	-.0225
18	ICSA	-.0043	.0055	.0067	-.0057
19	ICSAB	.4560	.0053	.8988	-.0066
20	CCV_1	5.034	.0041	4.727	4.925
21	CCB_1	-.0033	-.0008	.0004	-.0022

JK [illegible]
05-07-97

ug/ml

	As	Ba	Cd	Cr	Pb	Se	Ag
S97N000034	ND	3.482	0.3263	ND	0.1553	0.1694	0.1046
D. Limit	0.40	0.20	0.020	0.04	0.40	0.40	0.04

Rough Calculations

05/08/97 10:15
A-0004-1

F/c #: 970508B.TXT

LABCORE Data Entry Template for Worklist# 18002

Analyst: JK Soto Instrument: ICP01-1 JK 5-8-97 Book# 66848B

Method: LA-505-~~151~~/161 Rev/Mod C-1

Worklist Comment: JK 5-8-97 ICP 107-N (TCLP DIGEST) PCB sample

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	S97N000034	0	T	@ICP-T01	LIQUID	97000165 107 N	
	Analytes Requested:	AG-T-01 , AL-T-01 , AS-T-01 , B-T-01 , BA-T-01 , BE-T-01 , BI-T-01 , CA-T-01 , CD-T-01 , CE-T-01 , CO-T-01 , CR-T-01 , CU-T-01 , FE-T-01 , K-T-01 , LA-T-01 , LI-T-01 , MG-T-01 , MN-T-01 , MO-T-01 , NA-T-01 , ND-T-01 , NI-T-01 , P-T-01 , PB-T-01 , S-T-01 , SB-T-01 , SE-T-01 , SI-T-01 , SM-T-01 , SR-T-01 , TI-T-01 , TL-T-01 , U-T-01 , V-T-01 , ZN-T-01 , ZR-T-01						
7	DUP	S97N000034	0	T	@ICP-T01	LIQUID		
8	ICSA				@ICP-QC	QC		
9	ICSAB				@ICP-QC	QC		
10	CCV				@ICP-QC	QC		
11	CCB				@ICP-QC	QC		

Final page for worklist # 18002

JK Soto 05-08-97
Analyst Signature Date

Reviewed by: Carl L. Berg 5/8/97
Analyst Signature Date

S97N000034, 1-6 NL, DF 4

Data Entry Comments: Approved by K.S. Tollefson 5/6/97 for PCB ICP analysis. See worklist # 17960.

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

Analysis Report Summary Thu 05-08-97 01:48:28 PM page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	970508B	ICP2	05/08/97	13:02	DKS	Q	CONC
2	ICB	970508B	ICP2	05/08/97	13:06	DKS	Q	CONC
3	LLS	970508B	ICP2	05/08/97	13:09	DKS	Q	CONC
4	ICSA	970508B	ICP2	05/08/97	13:12	DKS	Q	CONC
5	ICSAB	970508B	ICP2	05/08/97	13:14	DKS	Q	CONC
6	S97N000034	970508B	ICP2	05/08/97	13:18	DKS	S	CONC
7	ICSA	970508B	ICP2	05/08/97	13:23	DKS	Q	CONC
8	ICSAB	970508B	ICP2	05/08/97	13:26	DKS	Q	CONC
9	CCV	970508B	ICP2	05/08/97	13:29	DKS	Q	CONC
10	CCB	970508B	ICP2	05/08/97	13:35	DKS	Q	CONC

DK
05-08-97 S97N000034
107-N (TCLP Digest)
PCB
Worklist # 18002

Analysis Report Averages Thu 05-08-97 01:48:28 PM page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.881	4.874	5.152	5.003	4.980	5.081
2	ICB	.0002	.0026	-.0059	.0086	.0000	.0001
3	LLS	.0223	.1067	.1950	.1060	.0996	.0103
4	ICSA	.0015	244.4	-.0186	.0059	.0003	.0003
5	ICSAB	.9556	241.2	-.0285	-.0028	.4766	.4757
6	S97N000034	.1246	1.284	.0200	3.347	3.482	.0015
7	ICSA	.0014	242.8	-.0269	.0010	.0004	.0004
8	ICSAB	.9606	240.1	.0055	.0080	.4727	.4754
9	CCV	4.883	4.873	5.172	4.998	4.976	5.078
10	CCB	.0008	.0046	-.0104	.0019	.0001	.0000

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	5.074	5.013	4.987	4.906	5.095	4.972
2	ICB	.0349	.0025	.0001	-.0003	.0001	.0014
3	LLS	Q.1427	.2312	.0103	.2039	.0412	.0215
4	ICSA	.0100	254.6	.0018	.0131	.0001	-.0023
5	ICSAB	.0486	249.1	.9272	.0067	.4643	.4648
6	S97N000034	.0395	60.27	.3263	-.0154	.0855	.0272
7	ICSA	.0073	255.3	.0015	.0101	.0004	-.0015
8	ICSAB	.0098	254.0	.9296	.0135	.4638	.4715
9	CCV	5.086	5.052	4.970	4.907	5.088	4.971
10	CCB	.0328	.0037	.0005	.0008	.0000	.0010

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.958	-.0009	4.665	5.044	4.997	4.859
2	ICB	-.0003	.0008	-.0002	.0730	.0009	.0008
3	LLS	.0172	.0016	.0958	Q.7908	.1026	.0225
4	ICSA	-.0102	-.0336	94.85	.1749	-.0047	.0035
5	ICSAB	.4454	-.0263	93.04	.1892	-.0039	.9961
6	S97N000034	.0564	.0407	1.084	2.393	.0041	.0046
7	ICSA	-.0095	-.0352	94.53	.1585	-.0038	.0036
8	ICSAB	.4388	-.0342	93.59	.2046	-.0037	.9766
9	CCV	4.957	-.0001	4.656	5.022	4.992	4.870
10	CCB	.0002	.0006	.0006	.0862	.0008	.0006

#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	4.994	4.883	5.061	5.091	4.978	5.002
2	ICB	-.0025	.0003	.0011	.0814	-.0021	-.0051
3	LLS	.2167	.0200	.0978	.2008	.1999	.0356
4	ICSA	257.1	-.0060	-.0103	197.0	.0022	-.0147
5	ICSAB	253.7	.4400	-.0103	195.7	.0011	.9153
6	S97N000034	2.702	5.107	.0059	1677.	-.0006	.6048
7	ICSA	255.3	-.0057	-.0127	195.3	.0020	-.0190
8	ICSAB	252.9	.4449	-.0079	192.7	.0028	.9242
9	CCV	4.987	4.884	5.044	5.087	4.963	4.970
10	CCB	.0063	.0000	-.0033	.0755	.0003	.0010

Analysis Report Averages Thu 05-08-97 01:48:28 PM page 3

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	5.038	4.902	4.975	4.798	4.690	5.045
2	ICB	.0026	.0033	-.0116	-.0040	.0229	.0052
3	LLS	.4103	.2074	.2006	.0966	.2243	.1330
4	ICSA	.0184	.0347	-.0488	.0018	-.0184	.0058
5	ICSAB	.0296	.9748	-.0331	-.0246	-.0398	.0027
6	S97N000034	.0820	.1553	3.431	-.0207	.1694	9.530
7	ICSA	.0253	.0449	-.0511	-.0000	.0008	.0074
8	ICSAB	-.0039	.9981	-.0375	.0069	-.0064	.0063
9	CCV	5.056	4.870	4.973	4.803	4.683	5.057
10	CCB	-.0002	-.0013	-.0082	-.0089	.0397	.0022

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	4.897	4.958	.0262	4.916	4.673	9.666
2	ICB	.0106	.0001	.0017	.0000	.0112	.0426
3	LLS	.2159	.0205	.0012	.0201	.3884	.5708
4	ICSA	.0071	.0021	.0026	.0008	-.0132	-.0023
5	ICSAB	.0030	.0022	-.0022	.0012	.0309	.0073
6	S97N000034	-.0272	.4922	.0257	-.0010	-.0188	21.19
7	ICSA	.0079	.0021	-.0017	.0010	.0163	-.0119
8	ICSAB	.0144	.0022	.0068	.0018	.0171	.0074
9	CCV	4.897	4.947	.0294	4.915	4.733	9.637
10	CCB	.0035	.0000	.0079	-.0002	-.0017	.0189

#	Sample Name	V	Y	Zn	Zr
1	ICV	5.063	.0055	4.818	4.955
2	ICB	.0020	.0006	.0007	.0017
3	LLS	.1068	.0014	.0198	.0231
4	ICSA	.0016	.0071	.0068	-.0020
5	ICSAB	.4654	.0068	.9185	-.0016
6	S97N000034	-.0057	-.0015	6.008	-.0099
7	ICSA	.0020	.0072	.0068	-.0013
8	ICSAB	.4715	.0074	.9282	-.0013
9	CCV	5.058	.0055	4.820	4.945
10	CCB	.0011	.0001	-.0000	.0001

05-08-97

Attachment 4

Hg Data

LABCORE Data Entry Template for Worklist# 18095

Analyst: VLM **Instrument:** CAA01 ✓ **Book #** 73N11B

Method: LA-325-104 Rev/Mod D-0

Worklist Comment: HG-02 107N BASIN Spike is Pre-Leach-Do not Add. Use 2ml SS.

COPY

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	ICV				HG-02	LIQUID	0.1	$9.51e^{-2}$	N/A	ug/mL
		2	ICB				HG-02	LIQUID	1	<0.005	N/A	ug/mL
		3	LLS				HG-02	LIQUID	0.1	0.126	N/A	ug/mL
		4	BLNK-PREP				HG-02	LIQUID	1	<0.005	N/A	ug/mL
		5	STD-PREP				HG-02	LIQUID	0.1418	0.118	N/A	ug/mL
97000165	107 N	6	SAMPLE	S97N000028	0	T	HG-02	LIQUID	N/A	<0.003 ~~<0.005~~	0.003 ~~0.005~~	ug/mL
97000254	1310-N	7	SAMPLE	S97N000048	0	T	HG-02	LIQUID	N/A	<0.005	0.005	ug/mL
97000254	1310-N	8	DUP	S97N000048	0	T	HG-02	LIQUID	<0.005	<0.005	N/A	ug/mL
97000254	1310-N	9	SPK	S97N000048	0	T	HG-02	LIQUID	100	52	N/A	ug/mL
97000165	107 N	10	SAMPLE	S97N000034	0	T	HG-02	LIQUID	N/A	<0.003	0.003	ug/mL
97000165	107 N	11	SAMPLE	S97N000040	0	T	HG-02	LIQUID	N/A	<0.003	0.003	ug/mL
		12	CCV				HG-02	LIQUID	0.1	$9.21e^{-2}$	N/A	ug/mL
		13	CCB				HG-02	LIQUID	1	<0.005	N/A	ug/mL

HLA 5.27.97

Final page for worklist # 18095

Valerie L Massie 05-27-97
Analyst Signature Date

Analyst Signature Date

Data entry + validation by HLAnasta 5-28-97

Data Entry Comments: TCLP digest dilutions aren't taken into account. HLA 5.28.97

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.

Atomic Absorption Analysis: Hg Cold Vapor Analysis

HNF-SD-WM-DP-245, REV. 0

Analyst: VLM Date: 05-27-97

Instrument: PE2380 Property #: WB26847 Worklist #: 18095 (Rerun #2)

Calibration Data Intercept: -0.0163 Slope: 0.0112 Correlation: 0.9990

Calibration Std. Conc. 0.147 ppm

Sample Name (Std. ID#)	Sample Point	Sample Size in mL	D or A*	PKHT (Abs.)	ng Result	% Rec.	Comments
72N11B	N/A	0.000	D	.003	0.00	N/A	
"	"	0.034	D	.051	5.00	"	found speed at 10 mm/min
"	"	0.100	D	.146	14.70	"	instead of 5 mm/min
"	"	0.250	D	.002	36.75	"	corrected speed
"	"	0.500	D	.748	73.50	"	on graph.
"	"	0.750	D	1.222	110.25	"	→ graph peak
"	"	1.000	D	1.655	147.00	"	present but
ICV 73N11B	Std	.300	D	.303	28.52	95.08	not correct!
ICB Blank	Blk	1.0	D	.003	1.72		what happened?
LLS 73N11B	Std	.050	D	.054	6.28	125.56	? plugged
TCLP Std 81N10A	Prep Std	.500	D	.532	48.98		line? will
Prep Blank	Prep Blk	1.0	D	.006	1.99		leave out of
S97N000048	1310N	1.0	D	.002	1.63		cal curve.
S97N000048D	1310N	1.0	D	.001	1.54		
S97N000048S	1310N + 81N10A	1.0	D	.552	50.77		spiked during
S97N000028	107N	2.0	D	.009	2.26		digest (TCLP)
S97N000034	107N	2.0	D	.000	1.45		
S97N000040	107N	2.0	D	.000	1.45		
CCV 73N11B	Std	.300	D	.293	27.63	92.10	
CCB Blank	Blk	1.0	D	.002	1.63		

* Sample Prep. descriptors: D=direct, A=acid digest

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

		Standard	N/A
Type	Sample Size in mL SS	0.300	
Standard	Hg ng (Nanograms	28.52	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.095	N/A
18095	Conc Hg µg/L (PPB)	95.1	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
ICV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.017	
Date	Detection Limit (µg/L) =	16.7	
05/27/97			
Time	v RESULTS v	Standard	N/A
	Conc Hg µg/mL	9.51E-02	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

Data Entry by:	Hg	Date: 27-May-97
Approved by:	HAnastn	Date: 5-27-97

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type	Sample Size in mL SS	Blank	N/A
Blank	Hg ng (Nanograms	1.72	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.002	N/A
18095	Conc Hg µg/L (PPB)	1.7	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
ICB	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.005	
Date	Detection Limit (µg/L) =	5.0	
05/27/97			
Time	v RESULTS v	Blank	N/A
	Conc Hg µg/mL	<0.005	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

The Result is < Detection Limit

Data Entry by:	Hg	Date:	27-May-97
Approved by:	JAnastn	Date:	5-27-97

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT		Standard	N/A
Type	Sample Size in mL SS	0.050	
Standard	Hg ng (Nanograms	6.28	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.126	N/A
18095	Conc Hg µg/L (PPB)	125.6	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
LLS	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.100	
Date	Detection Limit (µg/L) =	100.0	
05/27/97			
Time	v RESULTS v	Standard	N/A
	Conc Hg µg/mL	1.26E-01	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

Data Entry by:	Ila Hanasto	Date:	27-May-97
Approved by:	Ila Hanasto	Date:	5.27.97

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type	Sample Size in mL SS	Blank	N/A
Blank	Hg ng (Nanograms	1.99	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.002	N/A
18095	Conc Hg µg/L (PPB)	2.0	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
Prep Blank	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.005	
Date	Detection Limit (µg/L) =	5.0	
05/27/97			
Time	v RESULTS v	Blank	N/A
	Conc Hg µg/mL	<0.005	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A
	The Result is < Detection Limit		

Data Entry by:	Hla	Date: 27-May-97
Approved by:	H Anaston	Date: 5-27-97

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

Hg true value: $\frac{20\ \mu g/ml\ ^{*}}{141DF} = 0.1418\ \mu g/ml$

$\frac{0.118\ \mu g/ml}{0.1418\ \mu g/ml} \times 100 = 83.2\%$

* Data from RK Puller data base.

HLA

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT		Standard	N/A
Type	Sample Size in mL SS	0.500	
Standard	Hg ng (Nanograms	59.98	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.118	N/A
18095	Conc Hg µg/L (PPB)	118.0	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
TCLP Std	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.010	
Date	Detection Limit (µg/L) =	10.0	
05/27/97			
Time	v RESULTS v	Standard	N/A
	Conc Hg µg/mL	1.18E-01	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

Data Entry by:	HLA	Date:	27-May-97
Approved by:	H Anasto	Date:	5-27-97

Form 1 Rev. 1.1

I:\325104\18095.WB1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

No TCLP DFs are taken into account.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type		Sample	N/A
Sample	Sample Size in mL SS	1.000	
	Hg ng (Nanograms	1.63	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.002	N/A
18095	Conc Hg µg/L (PPB)	1.6	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
S97N000048	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.005	
Date	Detection Limit (µg/L) =	5.0	
05/27/97			
Time	v RESULTS v	Sample	N/A
	Conc Hg µg/mL	<0.005	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

The Result is < Detection Limit

Data Entry by:	Hla	Date:	27-May-97
Approved by:	H Anastos	Date:	5.27.97

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

No TCLP DF data taken into account.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type		Sample	N/A
Sample	Sample Size in mL SS	2.000	
Work List	Hg ng (Nanograms	2.26	
18095	Conc Hg µg/mL (or mg/L or PPM)	0.001	ERR
Test Code	Conc Hg µg/L (PPB)	1.1	ERR
Hg-02	Average Conc (µg/mL)	N/A	ERR
Matrix	Average Conc (µg/L)	N/A	ERR
LIQUID	Relative % Difference	N/A	ERR

Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)
Average Conc.=(Sample + Duplicate)/2
Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100
Detection Limit = (5 ng/SS)*(1µg/1000ng)
Detection Limit is Corrected for Sample Prep/Dilution

Sample #		
S97N000028	Detection Limit (µg/mL) =	0.003
Instrument Code	Detection Limit (µg/L) =	2.5
CAA01		
Analyst		
vlm		
Date		
05/27/97		
Time		

v RESULTS v	Sample	N/A
Conc Hg µg/mL	<0.003	ERR
Average Conc (µg/mL)	N/A	ERR
Relative % Difference	N/A	ERR

ERR

Data Entry by:		Date: 27-May-97
Approved by:		Date: 5.27.97

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

No TCLP DFs taken into account.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type		SAMPLE	DUPLICATE
Duplicate	Sample Size in mL SS	1.000	1.000
Work List	Hg ng (Nanograms	1.63	1.54
18095	Conc Hg µg/mL (or mg/L or PPM)	0.002	0.002
Test Code	Conc Hg µg/L (PPB)	1.6	1.5
Hg-02	Average Conc (µg/mL)	N/A	N/A
Matrix	Average Conc (µg/L)	N/A	N/A
LIQUID	Relative % Difference	N/A	N/A

Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)
Average Conc.=(Sample + Duplicate)/2
Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100
Detection Limit = (5 ng/SS)*(1µg/1000ng)
Detection Limit is Corrected for Sample Prep/Dilution

Sample #		
S97N000048		
Instrument Code		
CAA01		
Analyst		
vlm	Detection Limit (µg/mL) =	0.005
Date	Detection Limit (µg/L) =	5.0
05/27/97		
Time	v RESULTS v	SAMPLE / DUPLICATE
	Conc Hg µg/mL	<0.005 / <0.005
	Average Conc (µg/mL)	N/A / N/A
	Relative % Difference	N/A / N/A

Both Results are < Detection Limit

Data Entry by:	[signature]	Date:	27-May-97
Approved by:	[signature]	Date:	5-27-97

Form 1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

Spk

$$\frac{\frac{50.77\ ng \div 1000\ \mu g/ng}{1.0\ ml} - \emptyset}{9.709e^{-2}\ \mu g/ml} \times 100 = 52\%$$

$$\text{true value} = \frac{20\ \mu g/ml}{20\text{x DF}} = 9.709e^{-2}\ \mu g/ml$$

No TCLP data taken into account on Sam + dup results below.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT		SAMPLE	DUPLICATE
Type	Sample Size in mL SS	1.000	1.000
Duplicate	Hg ng (Nanograms	1.63	1.54
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.002	0.002
18095	Conc Hg µg/L (PPB)	1.6	1.5
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
S97N000048	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.005	
Date	Detection Limit (µg/L) =	5.0	
05/27/97			
Time	v RESULTS v	SAMPLE	DUPLICATE
	Conc Hg µg/mL	<0.005	<0.005
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A
	Both Results are < Detection Limit		

Data Entry by:	HLA	Date:	27-May-97
Approved by:	HAnasto	Date:	5.27.97

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

No TCLP data taken into account.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

		Sample	N/A
Type	Sample Size in mL SS	2.000	
Sample	Hg ng (Nanograms	1.45	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.001	ERR
18095	Conc Hg µg/L (PPB)	0.7	ERR
Test Code	Average Conc (µg/mL)	N/A	ERR
Hg-02	Average Conc (µg/L)	N/A	ERR
Matrix	Relative % Difference	N/A	ERR
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
S97N000034	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.003	
Date	Detection Limit (µg/L) =	2.5	
05/27/97			
Time	v RESULTS v	Sample	N/A
	Conc Hg µg/mL	<0.003	ERR
	Average Conc (µg/mL)	N/A	ERR
	Relative % Difference	N/A	ERR

ERR

Data Entry by:	Dea	Date:	27-May-97
Approved by:	H Anaston	Date:	5.27.97

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

No TCLP data taken into account.

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type		Sample	N/A
Sample	Sample Size in mL SS	2.000	
Work List	Hg ng (Nanograms	1.45	
18095	Conc Hg µg/mL (or mg/L or PPM)	0.001	ERR
Test Code	Conc Hg µg/L (PPB)	0.7	ERR
Hg-02	Average Conc (µg/mL)	N/A	ERR
Matrix	Average Conc (µg/L)	N/A	ERR
LIQUID	Relative % Difference	N/A	ERR

Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)
Average Conc.=(Sample + Duplicate)/2
Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100
Detection Limit = (5 ng/SS)*(1µg/1000ng)
Detection Limit is Corrected for Sample Prep/Dilution

Sample #		
S97N000040	Detection Limit (µg/mL) =	0.003
Instrument Code	Detection Limit (µg/L) =	2.5
CAA01		
Analyst		
vlm		
Date		
05/27/97		
Time		

v RESULTS v	Sample	N/A
Conc Hg µg/mL	<0.003	ERR
Average Conc (µg/mL)	N/A	ERR
Relative % Difference	N/A	ERR

ERR

Data Entry by:	Hg	Date: 27-May-97
Approved by:	Hairston	Date: 5.27.97

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT		Standard	N/A
Type	Sample Size in mL SS	0.300	
Standard	Hg ng (Nanograms	27.63	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.092	N/A
18095	Conc Hg µg/L (PPB)	92.1	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
CCV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.017	
Date	Detection Limit (µg/L) =	16.7	
05/27/97			
Time	v RESULTS v	Standard	N/A
	Conc Hg µg/mL	9.21E-02	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A

Data Entry by:	Hla	Date: 27-May-97
Approved by:	Hla master	Date: 5.27.97

Form 1 Rev. 1.1

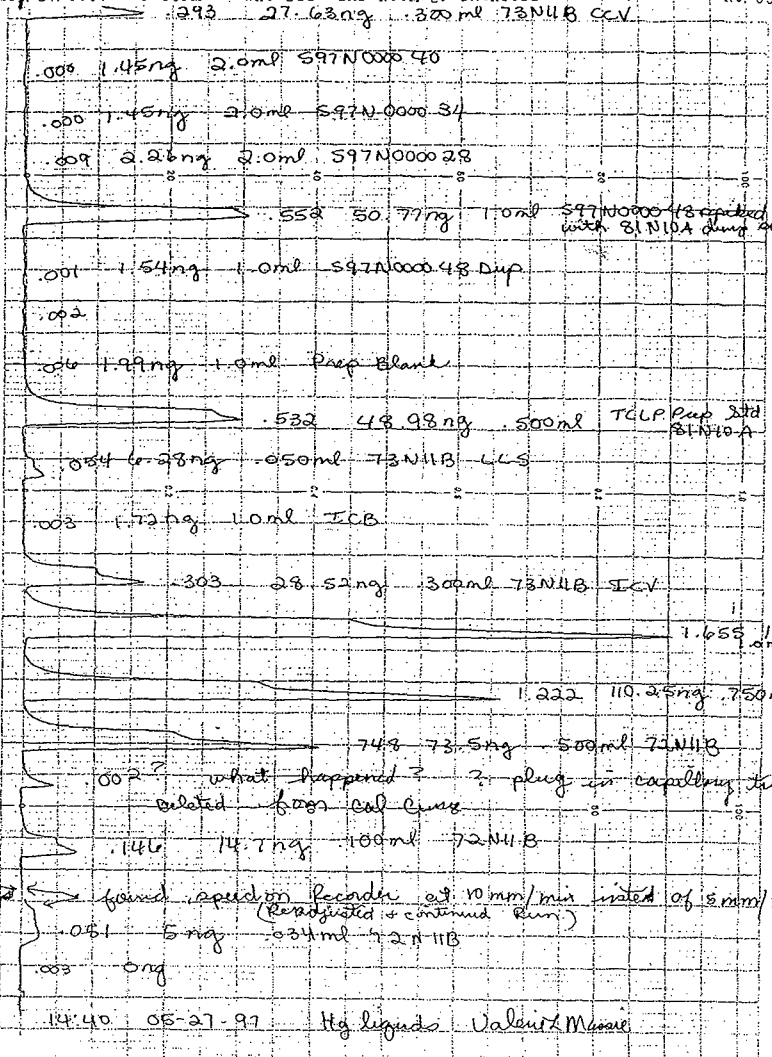
PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

CVAA : LA-325-104 (C-0) Hg LIQUIDS-DIRECT

Type	Sample Size in mL SS	Blank	N/A
Blank	Hg ng (Nanograms	1.63	
Work List	Conc Hg µg/mL (or mg/L or PPM)	0.002	N/A
18095	Conc Hg µg/L (PPB)	1.6	N/A
Test Code	Average Conc (µg/mL)	N/A	N/A
Hg-02	Average Conc (µg/L)	N/A	N/A
Matrix	Relative % Difference	N/A	N/A
LIQUID	Conc Hg µg/mL=(Hg ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
CCB	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Instrument Code	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
CAA01	Detection Limit is Corrected for Sample Prep/Dilution		
Analyst			
vlm	Detection Limit (µg/mL) =	0.005	
Date	Detection Limit (µg/L) =	5.0	
05/27/97			
Time	v RESULTS v	Blank	N/A
	Conc Hg µg/mL	<0.005	N/A
	Average Conc (µg/mL)	N/A	N/A
	Relative % Difference	N/A	N/A
	The Result is < Detection Limit		

Data Entry by:	Hg	Date:	27-May-97
Approved by:	HAnarta	Date:	5-27-97

Form 1 Rev. 1.1



PERKIN-ELMER

PERKIN-ELMER

Analyte: Hg Analyst: Valeur L Massie
Date: 05-27-97 Start Time: 08:15 End Time: 14:40

MHS 20 Data:

Signal: Concentration Purge I: 40
Mode: PKHT Purge II: 90
Recorder: TC3 Reaction: 16 sec.
Time: 55 sec. Temperature: 175 C
Expansion: 10 EDL Power: 5 Watts

Chart Recorder Data:

Chart speed: 5 mm/min Chart full scale: 20 mV

Calibration Data:

Intercept: -0.0163 absorbance units
Slope: 0.0112 abs. units / concentration

Intercept: -0.0163
Slope: 0.0112

Valeur L Massie
05-27-97

NHC
Numatec
Hanford Corporation
An SGN/Cogema, Inc. Company

Internal
Memo

From: Analytical Technology
Phone: 372-2653 T6-50
Date: May 15, 1997
Subject: Inductively Coupled Plasma Mass Spectrometry (ICP/MS) Results for 105-N and 107-N Basin Samples

To: G. L. Miller T6-06

cc: J. Y. Bourges T6-07
B. A. Crawford T6-50
C. M. Seidel T6-14
G. L. Troyer T6-50
W. I. Winters T6-50
JWB File/LB

Attached is the ICP/MS data for 105-N and 107-N Basin samples. Isotopic thorium and uranium data were collected on May 2, 1997. The instrument was mass and response calibrated in the actinide region using thorium and uranium calibration standards. The preliminary data was distributed on May 5, 1997 for the customer to review.

In order to monitor the isotopic uranium performance, a certified natural uranium test standard was utilized (NIST SRM-4321B). As indicated by the data tables, recoveries within 1% of the certified value were achieved for the U-235/U-238 ratio.

Although the levels of U-235 and U-238 can be accurately computed, the U-234 concentrations are estimated based on the U-234 response relative to U-235. The mass response at 234 was not directly calibrated due to the small concentration of U-234 in available standards. As a result, the U-234 results are estimated to be accurate within 50%.

Only one sample, S97N0000051, indicated U-235 enrichment above 1%. SRM-4321B was analyzed with a 99.4 % recovery immediately following the analysis of this sample. It was concluded that the instrument calibration hadn't drifted and that the isotopic uranium determination for sample S97N000051 remained within calibration.

As indicated by the data tables, detection limits may vary between samples. This is due to different digest and dilution factors that were necessary for each sample. The results collected using the smallest dilution (lowest detection limit) were reported wherever possible.

Scans of these samples indicated appreciable levels of copper (Cu-63 and Cu-65). As a result, Ni-63 could not be recorded with this isobaric interference present. Although a Ni-63 separation is under development, laboratory tests indicate that it is not capable of removing copper. In order to determine Ni-63 in these copper containing samples, radiochemical methods must be utilized rather than ICP/MS.

If you have any questions regarding these results, please feel free to call me at 372-2653.

J. W. Ball, Ph.D.
Scientist I

cw

Attachment

ICP/MS RESULTS FOR 107-N BASIN

INSTRUMENT QC (initial)

	Th-228	Th-230	Th-232	U-234	U-235	U-238
ICB	< 45 ppt	< 45 ppt	< 45 ppt	< 20 ppt	< 20 ppt	< 20 ppt
ICV	NA	NA	101%	NA	NA	102%

ISOTOPIC URANIUM CERTIFIED CHECK STANDARD

	U-234	U-235	U-238	235/238	235/238 (certified ratio)	Recovery
SRM 4321B	< 20 ppt	0.698 ppb	96.4 ppb	0.00724	0.00725	99.9%

SAMPLE RESULTS

	Th-228	Th-230	Th-232	U-234	U-235	U-238	235/238
S97N000031	< 0.12 ppm	< 0.12 ppm	0.138 ppm	< 0.054 ppm	0.137 ppm	17.3 ppm	0.00792
S97N...31_DUP	< 0.12 ppm	< 0.12 ppm	0.120 ppm	< 0.054 ppm	0.118 ppm	15.2 ppm	0.00776
S97N000037	< 0.12 ppm	< 0.12 ppm	0.21 ppm	0.13 ppm	8.97 ppm	1150 ppm	0.00780
S97N000043	< 1.20 ppm	< 1.20 ppm	< 1.20 ppm	< 0.54 ppm	6.94 ppm	927 ppm	0.00749
S97N000051	< 0.12 ppm	< 0.12 ppm	0.151 ppm	< 0.054 ppm	0.111 ppm	9.64 ppm	0.0115

ISOTOPIC URANIUM CERTIFIED CHECK STANDARD

	U-234	U-235	U-238	235/238	235/238 (certified)	Recovery
SRM 4321B	< 20 ppt	0.694 ppb	96.3 ppb	0.00721	0.00725	99.4%

PREP QC

	Th-228	Th-230	Th-232	U-234	U-235	U-238	U-238 Rec.
Prep Blank	< 45 ppt	< 45 ppt	< 45 ppt	< 20 ppt	< 20 ppt	0.120 ppb	NA
LCS Std	NA	NA	NA	NA	NA	9710 ppb	97.1%
S97N...31_SPK	NA	NA	NA	NA	NA	9860 ppb	98.6%

INSTRUMENT QC (final)

	Th-228	Th-230	Th-232	U-234	U-235	U-238
CCB	< 45 ppt	< 45 ppt	< 45 ppt	< 20 ppt	< 20 ppt	< 20 ppt
CCV	NA	NA	98.5%	NA	NA	99.9%

Customer #	Sample#	Prep	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
BOJYD5	S97N000051	Acidigst	Am-241 by Extraction	uCi/g	111.7	<1.15e-03	3.40E-03	n/a	n/a	n/a	n/a	1.00E-03	3.40E+00
BOJYD6	S97N000031	Acidigst	Am-241 by Extraction	uCi/g	111.7	<1.15e-03	<1.42e-03	<1.26E-3	n/a	n/a	n/a	1.00E-03	1.00E+02
BOJYD7	S97N000043	Acidigst	Am-241 by Extraction	uCi/g	111.7	<1.15e-03	5.10E-01	n/a	n/a	n/a	n/a	3.40E-02	1.37E+00
BOJYD8	S97N000037	Acidigst	Am-241 by Extraction	uCi/g	111.7	<1.15e-03	1.70E-01	n/a	n/a	n/a	n/a	1.70E-02	1.63E+00

Customer #	Sample#	Prep	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
BOJYD5	S97N000051	Acidigst	Cm-243/244 by Extraction	uCi/g	n/a	<1.15e-03	<1.42e-03	n/a	n/a	n/a	n/a	1.00E-03	9.04E+00
BOJYD6	S97N000031	Acidigst	Cm-243/244 by Extraction	uCi/g	n/a	<1.15e-03	<1.42e-03	<1.26E-3	n/a	n/a	n/a	1.00E-03	1.00E+02
BOJYD7	S97N000043	Acidigst	Cm-243/244 by Extraction	uCi/g	n/a	<1.15e-03	<3.42e-02	n/a	n/a	n/a	n/a	3.40E-02	1.00E+02
BOJYD8	S97N000037	Acidigst	Cm-243/244 by Extraction	uCi/g	n/a	<1.15e-03	<1.66e-02	n/a	n/a	n/a	n/a	1.70E-02	1.00E+02

Customer #	Sample#	Prep	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
BOJYD5	S97N000051	Acidigst	Pu-238 by Ion Exchange	uCi/g	n/a	1.00E-03	1.36E-03	n/a	n/a	n/a	n/a	1.00E-03	4.92E+00
BOJYD6	S97N000031	Acidigst	Pu-238 by Ion Exchange	uCi/g	n/a	1.00E-03	1.11E-03	1.14E-03	1.13E-03	2.67	n/a	1.00E-03	5.54E+00
BOJYD7	S97N000043	Acidigst	Pu-238 by Ion Exchange	uCi/g	n/a	1.00E-03	1.02E-01	n/a	n/a	n/a	n/a	2.70E-02	1.75E+00
BOJYD8	S97N000037	Acidigst	Pu-238 by Ion Exchange	uCi/g	n/a	1.00E-03	3.44E-02	n/a	n/a	n/a	n/a	1.10E-02	2.51E+00

Customer #	Sample#	Prep	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
BOJYD5	S97N000051	Acidigst	Pu-239/240 by TRU-SPEC Re	uCi/g	100.9	<6.41e-04	2.31E-03	n/a	n/a	n/a	n/a	1.00E-03	3.85E+00
BOJYD6	S97N000031	Acidigst	Pu-239/240 by TRU-SPEC Re	uCi/g	100.9	<6.41e-04	1.11E-03	1.12E-03	1.12E-03	0.9	n/a	1.00E-03	5.53E+00
BOJYD7	S97N000043	Acidigst	Pu-239/240 by TRU-SPEC Re	uCi/g	100.9	<6.41e-04	5.89E-01	n/a	n/a	n/a	n/a	2.70E-02	1.35E+00
BOJYD8	S97N000037	Acidigst	Pu-239/240 by TRU-SPEC Re	uCi/g	100.9	<6.41e-04	1.96E-01	n/a	n/a	n/a	n/a	1.10E-02	1.56E+00

Customer #	Sample#	Prep	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
BOJYD5	S97N000051	Acidigst	Antimony-125 by GEA	uCi/g	n/a	<1.42e-02	<2.83e-02	n/a	n/a	n/a	n/a	2.83E-02	n/a
BOJYD6	S97N000031	Acidigst	Antimony-125 by GEA	uCi/g	n/a	<1.42e-02	<1.45e-02	<1.37e-2	n/a	n/a	n/a	1.45E-02	n/a
BOJYD7	S97N000043	Acidigst	Antimony-125 by GEA	uCi/g	n/a	<1.42e-02	<2.45e-02	n/a	n/a	n/a	n/a	2.45E-02	n/a
BOJYD8	S97N000037	Acidigst	Antimony-125 by GEA	uCi/g	n/a	<1.42e-02	<4.04e-02	n/a	n/a	n/a	n/a	4.04E-02	n/a

APPENDIX 1

TEST PLAN FOR PROCESSING SEDIMENT SAMPLES FROM 105-N BASIN

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Numatec Hanford Corporation | **Internal Memo**

From: Process Chemistry 8C510-97-003
Phone: 373-6322 T6-09
Date: March 12, 1997
Subject: TEST PLAN FOR PROCESSING SEDIMENT SAMPLES FROM 105-N BASIN (Revision 1)

To: G. L. Miller T6-06

cc: J. W. Chenault T6-07
G. B. Griffin T6-12
D. L. Herting T6-07
J. R. Jewett T6-07
J. M. Kunkel T6-07
D. S. Mantooth T6-03
L. F. Perkins Jr. T6-14
C. M. Seidel T6-14
R. T. Steele T6-20
K. S. Tollefson T6-12
G. J. Warwick T6-12
JFO File/LB

This test plan describes the processing methods to support the 105-N Basin Sediment Disposition project for the Environmental Restoration Contractor (ERC). This plan will be used by the Process Chemistry group to determine the settled and centrifuged densities of the sediment samples. This plan will also provide instructions for preparing settled and centrifuged subsamples for analysis by the 222-S Laboratory.

Samples will be collected from the 105-N Basin, 1310-N Pump House Valve Pit, the 1314-N Waste Pump Tank, the 105-N Lift Station Pump Well, and the 107-N Basin Recirculation Building. One or more 1 to 4-liter containers will be collected from each sample location. If multiple samples are collected from one location, the excess water will be removed and the remaining sample will be composited by Process Chemistry. Prior to arriving at 222-S Laboratory, a water sample will have been withdrawn through a 5 μm cartridge filter for analysis at another laboratory. The particulates collected on the filters will be washed into the appropriate composite sample by Process Chemistry.

Assumptions implicit in this procedure are:

- The sludge settles to a sharp layer within 24 hours, leaving clear water.
- The clear water is essentially free of particulates.

PROCEDURE

1.0 Combine Samples

1.1 If multiple sample containers are transported from an individual sample location, remove and save the excess water and combine the remaining samples into one container.

1.1.1 Allow the containers to sit undisturbed overnight.

1.1.2 For each container, remove as much water as possible by vacuum (i.e., slurp) without disturbing the sediment.

1.1.3 Slurp all of the remaining water and sediment into a single container.

1.2 If a filter was transported with the samples, wash as many particles from the filter as possible.

1.2.1 Remove cartridge filter from the filter housing.

1.2.2 Rinse cartridge filter with excess water collected in Step 1.1.

1.2.3 Add rinsate and any remaining sample in the filter housing to the composite sample.

1.2.4 Package filter and filter housing for return to the customer.

1.3 Allow the composite sample to sit undisturbed overnight.

I.4 Slurp as much water as possible from the container without disturbing the sediment.

NOTE: The unused sample collected in this test plan is not waste and should not be recorded on the waste inventory sheet. The unused sample will be returned to the point of origin. The unused sample from individual sample locations should be segregated into separate containers.

1.5 Collect excess water for return to the customer.

2.0 Determine Density of Settled Sediment

2.1 Record the tare weight (to ±0.001 g) of an appropriate number of uniquely labeled 50 mL centrifuge cones.

2.2 Transfer the water and sediment from the sample container into the centrifuge cones.

2.3 Allow the sediment to settle fully.

NOTE: The sediment will be assumed to have fully settled when the volume of sediment has not changed by 2.5 mL over a 24 hour period.

2.4 Remove the excess water from the centrifuge cones and collect for return to the customer.

CAUTION

The dose rates of the samples will increase as water is removed.

2.5 Verify the dose rates of the centifuge cones are within the appropriate radiation work permit (RWP) limits.

2.6 Record the final volumes of the settled sediment to the nearest mL.

2.7 Record the final weights of the settled sediment and centrifuge cones to ±0.001 g.

2.8 Obtain photographs or videos of any layers present in the settled sediment.

NOTE: If viscosity and particle size distribution analyses are required, the project coordinator may request a larger subsample of settled sediment.

2.9 Notify project coordinator of the total volume of settled sediment.

2.10 Obtain 20 mL (or an amount requested by the project coordinator) of well mixed sediment in a labelled vial for analyses specified by the project coordinator.

3.0 Determine Density of Centrifuged Sediment

3.1 Centrifuge the remaining sediment for roughly one hour.

CAUTION

The dose rates of the samples will increase as water is removed.

3.2 Verify the dose rates of the centifuge cones are within the appropriate radiation work permit (RWP) limits.

3.3 Decant the water from the centrifuge cones into labelled bottles for the analyses specified by the project coordinator.

3.4 Record the final volume of the centrifuged sediment in each cone to the nearest mL.

3.5 Record the final weights of the centrifuged sediment and cones to ±0.001 g.

3.6 Obtain photographs or videos of any layers present in the centrifuged sediment.

3.7 Homogenize the sediment in the centrifuge cones using a spatula.

3.8 Scoop the centrifuged sediment from all cones into labelled bottles for analyses specified by the project coordinator.

WASTE MANAGEMENT

The excess water from the samples will be returned to the point of origin. Any additions to the waste collection bottles (e.g., rinse water) will be recorded on the appropriate Development/Trouble Shooting Container Inventory Sheet per LAP-106-100 *Waste Stream Fact Sheet Development and Issuance (Predesignation of Waste)* and maintained as described in LO-110-128 *Use and Change Trap Bottles, Wall Traps, and Waste Collection Bottles.* The sediment collected from this test plan will be submitted for analysis by 222-S Laboratory. Any unused sediment will be returned to the point of origin.

If the Letter of Instruction or other documentation indicates a listed waste component, solid waste material (gloves, paper, etc.) generated during the course of this test plan will be assumed to be mixed waste and handled as described in LO-100-151 *Segregate and Manage Solid Laboratory Wastes.* If no listed waste components are identified in the customer's documents, the solid waste material will be managed as low-level radioactive waste per LO-100-151.

SAFETY

The dose rates of the samples will likely represent the most significant safety concern. The sample dose rates are expected to allow RWP S-401 to be used for all activities described in these instructions. If the sample dose rates exceed the limitations of RWP S-401, the testing will be transferred to a hot cell or a special RWP will be written. The approval designators for this work has been determined to be "ES".

J. F. O'Rourke, Advanced Engineer
Process Chemistry
Numatec Hanford Corporation

Approval by:

G. L. Miller, Project Coordinator
222-S Production
Rust Federal Services of Hanford, Inc.

D. S. Penfield, Industrial Hygiene
222-S Industrial Safety and Health
Rust Federal Services of Hanford, Inc.

Kathy S Tollefson

K. S. Tollefson, Manager
Environmental Compliance
Rust Federal Services of Hanford, Inc.

APPENDIX 2

PROJECT CHANGES

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046386

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8610

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

TO: S. J. Trent X0-37

DATE: May 23, 1997

COPIES: See Below

FROM: J. H. Kessner
Laboratory and Analytical Services
B1-35/372-9538

SUBJECT: **CLARIFICATION OF ACCURACY REQUIREMENTS - 107N ANALYSIS**

A need for clarification has been identified for the "Sampling and Analysis Plan for the 107-N Basin Recirculation Building Liquid/Sediment," BHI-00973 (SAP). The QA section on Accuracy requirements for sample analyses does not clearly identify how Laboratory Control Sample (LCS) and spiked sample results are to be evaluated. Section 4.7.2 of the SAP may be clarified as per the following:

> "Accuracy is a measure of bias in a measurement system. The closer the value of the measurement agrees with the true value, the more accurate the measurement. This will be expressed as the percent recovery of a known spike analyte or a standard reference sample. For all laboratory analyses, accuracy is +/-3 sigma for the laboratory control sample or +/- 25% recovery for spiked samples. Deviations will be documented in the data report."

Any revisions of the document should incorporate the above in place of the existing Section 4.7.2. This internal memo shall be used guidance and authority for evaluation of LCS and spiked sample results from analyses performed in accordance to the SAP until revisions are made.

RLW:jmd

Copies
R. S. Day X5-54
G. M. Duncan X5-54
W. H. Price H0-20
W. S. Thompson N1-28
R. L. Weiss B1-35
Document and Info Services H0-09

Rust Federal Services of Hanford Inc. **Internal Memo**

From: 222-S Laboratory 31120-97-017
Phone: 373-2944 T6-14
Date: May 15, 1997
Subject: POLYCHLORINATED BIPHENYL SAMPLES ON-HOLD

To: J. H. Kessner B1-35

cc: G. B. Griffin T6-12
A. G. King T6-03
J. R. Prilucik T6-20
A. D. Rice T6-06
LFP File/LB

As per your telephone conference with J. R. Prilucik, all suspected polychlorinated biphenyl (PCB) containing samples are currently on hold until a PCB waste management plan can be developed. The 222-S Laboratory is forming a project management team to track the development and documentation of this program. This will include customer interface and customer commitments that are impacted by the PCB management issue.

Please contact J. R. Prilucik at 373-3830, if you have any questions. We will keep you apprised as the situation develops.

L. F. Perking, Manager
222-S Laboratory

jrp:lab

Author: Janice M Kier at ~WHC295
Date: 5/21/97 3:22 PM
Subject: Re: 222-S Analysis of 107N and 1310 N Sediment
---------- Message Contents ----------

Please let me know the amount of overtime hours that will be expended on this work. Thanks, Janice Kier 372-2525
****

The customer has approved the use of overtime to complete the 107 samples analyses as soon as possible.

Cary

---------- Forward Header ----------
Subject: 222-S Analysis of 107N and 1310 N Sediment
Author: William H Price at ~BHI009
Date: 5/21/97 2:13 PM

A meeting was held on May 20, 1997 with the PHMC's 222-S laboratory personnel to discuss the scheduled completion of analyses for the subject samples. Joan Kessner reiterated that the final laboratory data was due to the ERC on May 16, 1997, and that their proposed 3 week slip in delivery of the final report (June 6, 1997) was unacceptable to ERC management.

Joan requested that the PHMC reevaluate their schedule and take the necessary efforts to provide all preliminary data by Friday, May 23, 1997 and provide the final data report by May 30, 1997. Overtime and running tasks in parallel should be done to expedite the schedule. Completion of the rad data should take precedence over other data. Joan committed to provide PCB data on the samples to the laboratory by 8:00 am on May 21, 1997 (This action was completed on schedule).

Bill Price explained to the PHMC that the slip was on the projects critical path and that delays will impact the projects completion schedule. Bill ask for daily status reports from the PHMC starting on May 21, 1997. Bill stated that the PHMC had agreed to a 60 day schedule.

PHMC explained that the laboratory was working the recovery as their top priority and will make every effort to meet our need dates.

Note: Lew Pamplin ask Bill Price (today, May 21, 1997) if he explained to the PHMC that due to their missed commitment, we (the ERC) are in jeapody of missing a POC. Bill stated that he had not informed them of this.

APPENDIX 3

DEVIATION FROM REGULATORY REQUIREMENTS FOR TOXICITY CHARACTERISTIC LEACH PROCEDURE

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NHC
Numatec
Hanford Corporation
An SGN/Cogema, Inc. Company

Internal
Memo

From: Analytical Chemistry
Phone: 373-1972 T6-50
Date: March 24, 1997
Subject: DEVIATION FROM REGULATORY REQUIREMENTS FOR TOXICITY CHARACTERISTIC LEACH PROCEDURE

To:	G. L. Miller	T6-06	R. L. Weiss		B1-35
	A. D. Rice	T6-06			
cc:	R. Akita	T6-20	L. P. Markel		T6-16
	J. Y. Bourges	T6-07	R. T. Steele		T6-20
	R. K. Fuller	T6-50	T. L. Tung		T6-04
	J. E. Hyatt	T6-03	W. I. Winters	3/24/97	T6-50
	A. G. King	T6-03	BAC File/LB		

A new procedure, LA-544-134 (Attachment 1) has been issued for the use of the Toxicity Characteristic Leach Procedure (TCLP) for non-volatile analysis of N-Basin samples at the 222-S Laboratory. This letter serves to inform you that according to the latest version of the SW-846, method number 1311 (dated July 1992), the requirement for 100 gram minimum samples of waste be used in TCLP, appears to still be binding. However, as was previously stated in correspondence concerning the same procedure on grout samples (Westinghouse Hanford Company Internal Memo 12200-A093-021), the sample size is still not clearly defined for solids. In particular, the TCLP indicates in some sections (7.I, 7.1.5, 7.2, 7.2.1 and 7.2.5) that a minimum sample size of 100 grams is required. However, section 7.2 for metal extraction, which is the subject of the new procedure, also states that, "A minimum sample size of 100 grams (solid and liquid phases) is recommended." The guidance continues to state that, "enough solids should be generated for extraction such that the volume of TCLP extract will be sufficient to support all the analyses required." Based on these statements rendered in the SW-846 document and a jointly drafted guidance from the EPA and U.S. Nuclear Regulatory Commission (NRC), titled "Clarification of RCRA Hazardous Waste Testing Requirements for Mixed Waste," dated March 1992, which states, "The TCLP recommends a minimum sample size of 100 grams (section 7.2), but samples sizes of less than 100g can be used if the result is that the test is still sufficiently sensitive, and can measure the constituents of interest at the regulatory levels prescribed by the Toxic Characteristic," sample sizes of 10 grams have been delineated in the procedure above without reference to minimum quantities. Smaller sample sizes are used in this case and have been used in others to manage radiation exposure to personnel handling mixed wastes.

If there is further concern that these changes affect regulatory requirements for land disposal, it is strongly recommended that the Washington Department of Ecology be notified for concurrence prior to analysis.

B. A. Crawford

B. A. Crawford, PhD.
Principal Scientist
Analytical Chemistry

pad

HANFORD ANALYTICAL SERVICES
Laboratory Analytical Procedure

Issued By: W. I. Winters
Manager

B. A. Crawford
Author

Title: TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP) — NONVOLATILE SAMPLES

Approval Designator ESQ

1.0 SUMMARY

The Toxic Characteristic Leaching Procedure (TCLP) is one of four characteristics used to identify hazardous waste; the other three are ignitability, corrosivity, and reactivity. The TCLP is a test designed to simulate the climatic leaching action expected to occur in landfills. The leaching procedure determines the mobility of organic and inorganic analytes present in liquid, solid, and multiphase wastes. The mobility of these analytes makes them available to the environment causing a waste to be listed as hazardous waste. An extraction fluid is added to a sample of waste and the mixture is agitated for 18 hours. The extractant solution is then filtered and submitted for the required analysis. The extract is analyzed, and those results are compared against the regulatory level for that analyte. This procedure is based on *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*; SW-846, Method 1311 (EPA 1992) as related to nonvolatile sample analysis.

2.0 APPLICATIONS/LIMITATIONS

2.1 TCLP is used to determine the mobility of both organic and inorganic analytes in liquid, solid, and multi-phased wastes.

2.2 If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP is not necessary.

2.3 If an analysis of any one of the liquid fractions of the TCLP extract indicates that a regulated compound is present at such high concentrations that, even after accounting for dilution from the other fractions of the extract, the concentration would be above the regulatory level for that compound, then the waste is hazardous and it is not necessary to analyze the remaining fractions of the extract.

2.4 It is the requestor's responsibility, using "process knowledge," to clearly determine which analytes are of interest (that is, metals, semi- and non-volatiles,) in the sample to be tested. This procedure is intended for use when only metals analysis has been requested.

3.0 QUALITY CONTROL PROTOCOL (Continued)

3.4.1 The method of standard additions requires taking four identical aliquots of the solution and adding known amounts of standard to three of these aliquots. The fourth aliquot is the unknown. Preferably, the first addition should be prepared so that the resulting concentration is approximately 50% of the expected concentration of the sample. The second and third additions should be prepared so that the concentrations are approximately 100% and 150% of the expected concentration of the sample. All four aliquots are maintained at the same final volume by adding reagent water or a blank solution, and may need dilution adjustment to maintain the signals in the linear range of the instrument technique. All four aliquots are analyzed.

3.4.2 Prepare a plot, or subject data to linear regression. Use instrument signals or external-calibration-derived concentrations as the dependant variable (y-axis) versus concentrations of the additions of standard as the independent variable (x-axis). Solve for the intercept of the abscissa (the independent variable, x-axis) which is the concentration in the unknown.

Samples must undergo TCLP extraction within the following time periods:

Table 1. Sample Maximum Holding Times (days).

	From: Field collection To: TCLP extraction	From: TCLP extraction To: Preparative extraction	From: Preparative extraction To: Determinative analysis	Total elapsed time
Mercury	28	N/A	28	56
Metals, except mercury	180	N/A	180	360

N/A = Not applicable

If sample holding times are exceeded, the values obtained will be considered minimal concentrations. Exceeding the holding time is not acceptable in establishing that a waste does not exceed the regulatory level. Exceeding the holding time will not invalidate characterization if the waste exceeds the regulatory level.

4.0 SAFETY

The Occupational Safety and Health Administration requires that Material Safety Data Sheets (MSDSs) be provided to customers by any manufacturer of chemicals. The MSDSs are a good source of information for safety, handling, and spill cleanup. Before chemicals are used, the person handling them should be familiar with the information provided by the particular vendor in the MSDS. If the required MSDS is not available, contact the Analytical Services Standards Laboratory.

5.0 REAGENTS (Continued)

Extraction Fluid #2

Dilute 5.7 mL glacial CH_3CH_2OOH with reagent water to a volume of 1 liter. The pH of this fluid should be 2.88 ±0.05.

Monitor the extraction fluids frequently for impurities. Check the pH prior to use to ensure that these fluids are accurately made. If impurities are found or the pH is not within the above specifications, discard the fluid and prepare fresh extraction fluid.

6.0 EQUIPMENT

Agitation apparatus

The agitation apparatus must be capable of rotating the extraction vessel in an end-over-end fashion at 30 ±2 rpm.

Beaker or Erlenmeyer flask, glass, 50 or 100 mL.

Bottle Extraction vessels

A bottle with sufficient capacity to hold the sample and the extraction fluid is needed. Headspace is allowed in this vessel.

The extraction bottles may be constructed from various materials, depending on the analytes to be analyzed and the nature of the waste.

Filters

Filters shall be made of borosilicate glass fiber, contain no binder materials, and have an effective pore size of 0.6 to 0.8 μm, or equivalent.

Filtration Devices

Any filter holder capable of supporting a glass fiber filter and able to withstand the pressure needed to accomplish separation may be used. Suitable filter holders range from simple vacuum units to relatively complex systems capable of exerting pressures of up to 50 psi or more. These devices shall have a minimum internal volume of 300 mL and be equipped to accommodate a minimum filter size of 47 mm.

Hotplate with stirrer

Laboratory Balance

Any laboratory balance accurate to within ±0.01 grams may be used (all weight measurements are to be within ±0.1 grams).

Laboratory notebooks, controlled

7.0 PROCEDURE STEPS

NOTE: Figure 1 is a quick reference or flow chart for this procedure.

7.1 Preliminary Evaluations

7.1.1 Perform preliminary TCLP evaluations on a 10 gram aliquot of waste.

- This aliquot may not actually undergo TCLP extraction.

NOTE: Percent solids is defined as that fraction of a waste sample (as a percentage of the total sample) from which no liquid may be forced out by an applied pressure.

7.1.2 Determine percent solids according to the following steps:

1. If the sample contains no drainable liquid (100% solids), go to Step 7.1.5.
2. If the sample has both solids and liquids determine percent solids as outlined in Step 7.1.2.
3. Pre-weigh the filter and the container that will receive the filtrate.
   a. Record weights in notebook or worksheet.
4. Weigh out a subsample of the waste (10 gram).
   a. Record the weight in notebook or worksheet.

NOTE: Wastes that settle slowly may be centrifuged prior to filtration. Centrifugation is to be used only as an aid to filtration.

5. Allow slurries to stand to permit the solids to settle.
   a. Decant the liquid, and save.
6. If waste is centrifuged, decant liquid, and save.
7. Quantitatively transfer the solid waste (both liquid and solid phases) to the filter holder.

CAUTION

Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.0 PROCEDURE STEPS (Continued)

- If the particle size is larger than described above, particle size reduction is required.

7.1.6 Prepare the solid portion of the waste for extraction by crushing, cutting, or grinding the waste to a particle size as described above.

7.1.7 Determine appropriate extraction fluid:

1. Weigh a small subsample of the solid phase of the waste.
2. Reduce the solid (if necessary) to a particle size of approximately 1 mm in diameter or less.
3. Transfer 1.0 gram of the solid phase of the waste to a beaker or Erlenmeyer flask.
4. Add 19.3 mL of reagent water to the beaker and cover with a watchglass.
5. Stir vigorously for 5 minutes using a magnetic stirrer.
6. Measure and record the pH.
7. If the pH is <5.0, use extraction fluid #1.
   a. Proceed to Section 7.2.
8. If the pH is >5.0, add 0.7 mL 1*N* HCl.
   a. Slurry briefly; cover with a watchglass.
   b. Heat to 50 °C.
   c. Hold at 50 °C for 10 minutes.
   d. Let the solution cool to room temperature.
9. Measure and record the pH.
   a. If the pH is <5.0, use extraction fluid #1.
   b. If the pH is >5.0, use extraction fluid #2.
   c. Proceed to Section 7.2.

7.0 PROCEDURE STEPS (Continued)

1. Close the extractor bottle tightly.

   - Teflon tape is recommended to ensure a tight seal.

2. Secure in rotary agitation device.

3. Rotate at 30 to 32 rpm for 18 to 20 hours.

CAUTION

Pressure can build up in the extractor bottle during agitation.

4. To relieve pressure build up in the extractor bottle, periodically stop agitation.

5. Open bottle in a vented hood.

7.2.8 Following the extraction, separate the material in the extractor vessel into its component liquid and solid phases by filtering through a new glass fiber filter.

7.2.9 Prepare the TCLP extract as follows:

NOTE: Under most conditions liquids will be compatible. If not compatible, multiple phases will result on combination. Extraction for volatile components may be required. The filtered liquid combined with the original liquid removed from the waste is defined as the TCLP extract.

1. If the waste contained no initial liquid phase, the filtered liquid material obtained is defined as the TCLP extract.

   a. Proceed to Step 7.2.10.

2. If compatible combine the filtered liquid with the original liquid removed from the waste.

   a. Proceed to Step 7.2.10.

3. If the initial liquid phase of the waste is not or may not be compatible with the filtered liquid, do not combine these liquids.

   a. Store separately at 4 °C.

   b. If multiple phases occur consult the cognizant scientist.

      - Scientist will combine results mathematically according to CALCULATIONS, equation 8.5.

7.2.10 Perform the following on waste containing < 0.5 % solids:

8.0 CALCULATIONS (Continued)

8.2 Calculate the percent solids as follows:

$$\% \text{ solids} = \frac{\text{Wt of solid}}{\text{total wt of waste}} \times 100\%$$

8.3 Calculate the percent dry solids as follows:

$$\% \text{ dry solids} = \frac{(\text{Wt of dry waste + filter}) - \text{weight of filter}}{\text{Initial wt of waste}} \times 100\%$$

8.4 Determine the amount of extraction fluid to add to the extractor vessel as follows:

$$\text{Wt of extraction fluid} = \frac{20 \times \% \text{ solids} \times \text{wt of waste filtered}}{100}$$

For example, the amount of extract required for a 100 gram sample of 30% dry solids would be:

$$\text{Wt of extraction fluid or 600 grams} = \frac{20 \times 30 \times 100\text{g}}{100}$$

8.5 Determine the volume of the individual phases (to ±0.5%) that are to be analyzed separately as follows:

$$\text{Final Analyte Concentration} = \frac{(V_1)\ (C_1) + (V_2)\ (C_2)}{V_1 + V_2}$$

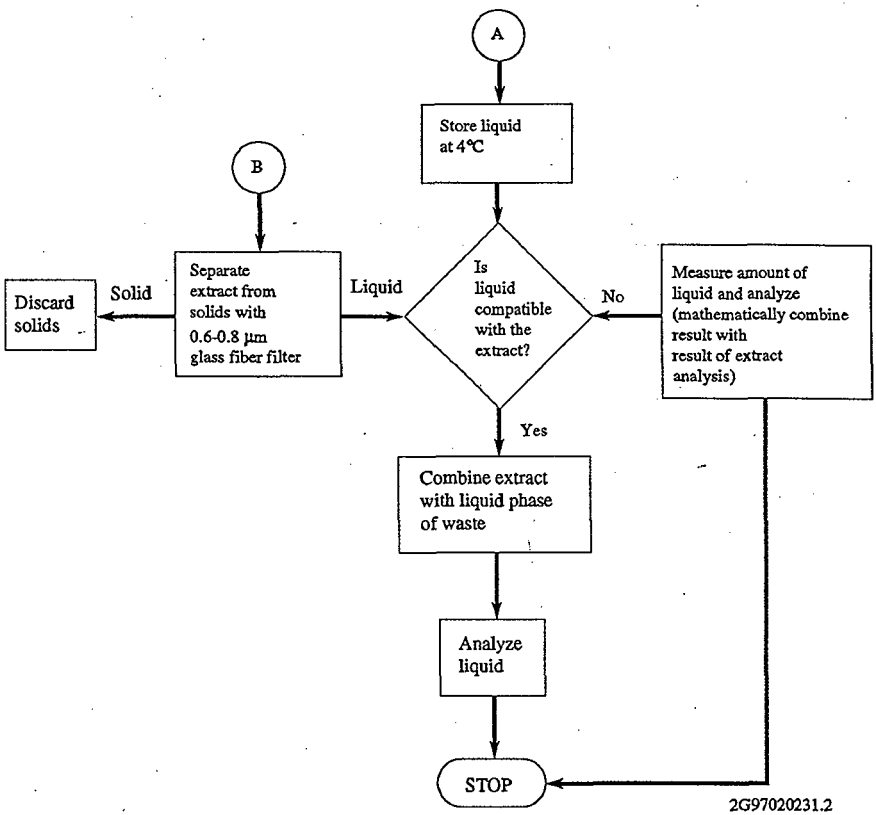
Where:

V_1 = Volume of the first phase (L)
C_1 = Concentration of the analyte of concern in the first phase (mg/L)
V_2 = Volume of the second phase (L)
C_2 = Concentration of the analyte of concern in the second phase (mg/L).

Table 2. Maximum Concentration of Contaminants.

Environmental Protection Agency (EPA) Hazardous Waste Number	Contaminant	Chemical Abstracts Service (CAS) Number	Regulatory Level (mg/L)
Inorganics			
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-9	1.0
D007	Chromium	7440-47-3	5.0
D008	Lead	7439-92-1	5.0
D009	Mercury	7439-97-6	0.2
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0

Figure 1. (Continued)



APPENDIX 4

LAB NOTEBOOK PAGES

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Sample ~~S97N000025 (B0JYD7)~~
S97N00003 (B0JID5)

Centrifuge Cone ~~#~~ 59

Tare Weight 13.484 g

Initial Settled Volume 35.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 27.5 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) ____ g JFO 4/17/97

Centrifuged Volume ____ g JFO 4/17/97

Centrifuged Weight (Excess Water Removed) ____ g JFO 4/17/97

Comments:

SINGLE BOTTLE 20 mR (BEFORE WATER IS REMOVED)
~150 mL SETTLED SEDIMENT

Centrifuge Cone ~~#~~ 58

Tare Weight 13.470 g

Initial Settled Volume 37.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 35.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 57.17 g

Centrifuged Volume 25.0 ~~8~~ mL

Centrifuged Weight (Excess Water Removed) 49.26g

Comments:

FOR TCLP

Sample ~~S97N000025 (B0JYD7)~~ S97N000003 B0JYD5

Centrifuge Cone ~~7E~~ 5C

Tare Weight 13.476 g

Initial Settled Volume 40.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JPO 4/17/97 Date/Time ____ JPO 4/17/97

Final Settled Volume 35.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) ____ g JPO 4/17/97

Centrifuged Volume ____ g JPO 4/17/97

Centrifuged Weight (Excess Water Removed) ____ g JPO 4/17/97

Comments: FOR PARTICLE SIZE + VISCOSITY

Centrifuge Cone ~~7F~~ 5D

Tare Weight 13.570 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JPO 4/17/97 Date/Time ____ JPO 4/17/97

Final Settled Volume 38.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 64.21 g

Centrifuged Volume 30.0 ~~g~~ mL

Centrifuged Weight (Excess Water Removed) 54.56 g

Comments:

	TARE		FINAL 10 mRAD/8 HR
S97N000054	29.883 g		33.94g (FROM CONE D)
S97N000049	18.372g	SOLIDS	38.03g (FROM CONE D)
S97N000053	18.371g	LIQ	

Sample S97N000024 (B0JYD6)

Centrifuge Cone 6A

Tare Weight 13.60 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 37.5 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) ____ g JFO 4/17/97

Centrifuged Volume ____ g JFO 4/17/97

Centrifuged Weight (Excess Water Removed) ____ g JFO 4/17/97

Comments: SAVED FOR VISCOSITY + PARTICLE SIZE (NOT CENTRIFUGE

BOTTLE ~300 mL SETTLED SEDIMENT (~700 mL WATER)
FILTER ~2" SETTLED SEDIMENT
FILTERS CAKED W/ PARTICULATES } FIRST SET OF PICTURES

50 mR ~400 mL SETTLED SEDIMENT COMBINED

Centrifuge Cone 6B

Tare Weight 14.00 g

Initial Settled Volume 45.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 40.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 56.96 g

Centrifuged Volume 15.0 / 17.5 mL JFO 4/16/97

Centrifuged Weight (Excess Water Removed) 33.47 / 35.11 g JFO 4/16/97

Comments:

Centrifuge Cone 6C

Tare Weight 13.55 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____/____ JFO 4/17/97

Final Settled Volume 37.5 mL Date/Time 4/15/97 ____

Final Settled Weight (Excess Water Removed) 58.00 g

Centrifuged Volume 15.0 g

Centrifuged Weight (Excess Water Removed) 33.49 g

Comments:

Centrifuge Cone 6D

Tare Weight ____ g JFO 4/17/97

Initial Settled Volume ____ mL Date/Time ____/____

Interim Settled Volume ____ mL Date/Time ____/____

Final Settled Volume ____ mL Date/Time ____/____

Final Settled Weight (Excess Water Removed) ____ g

Centrifuged Volume ____ g

Centrifuged Weight (Excess Water Removed) ____ g

Comments:

	TARE		FINAL 8 mRAD/4 mR
S97N000032	30.676 g		34.24 g (CONE C)
S97N000029	18.141 g	SOLID	34.84 g (CONE B)
S97N000030	18.296 g	LIQ	

Sample S97N000025 (BOJYD7)

Centrifuge Cone 7A

Tare Weight 13.164 g

Initial Settled Volume 37.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFD 4/17/97 Date/Time ____ JFD 4/17/97

Final Settled Volume 22.5 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) ____ g JFD 4/17/97

Centrifuged Volume ____ g JFD 4/17/97

Centrifuged Weight (Excess Water Removed) ____ g JFD 4/17/97

Comments: BOTTLE ~1½" SETTLED SEDIMENT } 3RD PICTURES
FILTER ~2" SETTLED SEDIMENT }
20 mR ~200 mL SETTLED SEDIMENT COMBINED FOR VISCOSITY + PARTICLE SIZE

Centrifuge Cone 7B

Tare Weight 13.48 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFD 4/17/97 Date/Time ____ JFD 4/17/97

Final Settled Volume 25.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 41.97 g

Centrifuged Volume 12.5 mL

Centrifuged Weight (Excess Water Removed) 30.03 g

Comments:

Centrifuge Cone 7C

Tare Weight 13.49 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFD 4/17/97 Date/Time ____/____ JFD 4/17/97

Final Settled Volume 25.0 mL Date/Time 4/15/97 0945

Final Settled Weight (Excess Water Removed) ~~44~~ 42.26 g JFD 4/15/97

Centrifuged Volume 12.5 ~~8~~ mL

Centrifuged Weight (Excess Water Removed) 31.47 g

Comments:

Centrifuge Cone 7D JFD 4/17/97

Tare Weight ____ g

Initial Settled Volume ____ mL Date/Time ____/____

Interim Settled Volume ____ mL Date/Time ____/____

Final Settled Volume ____ mL Date/Time ____/____

Final Settled Weight (Excess Water Removed) ____ g

Centrifuged Volume ____ g

Centrifuged Weight (Excess Water Removed) ____ g

Comments:

TARE

S97N000044 30.627g

S97N000041 16.929g (2ND VIAL) 18.325g SOLID

S97N000042 17.213g LIQ

FINAL 20mRAD/10mR

33.69 g (CONE B)

35.32 g (CONES B+C)

BOTTOM FELL OUT OF SAMPLE S97N000041 VIAL INITIALLY A SECOND VIAL WAS USED IN ITS PLACE. SOME MATERIAL WAS UNDOUBTABLY LOST IN THE PROCESS.

Sample S97N000026 (BOJYD8) HNF-SD-WM-DP-245, REV. 0

Centrifuge Cone 8A

Tare Weight 13.919 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 28.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 46.01 g

Centrifuged Volume 15.0 g mL

Centrifuged Weight (Excess Water Removed) 34.14 g

Comments: BOTTLE - 3/4" OF SANDY SEDIMENT } SECOND SET OF PICTURES
FILTER - 1½" SETTLED SEDIMENT
30 mR ~200 mL SETTLED SEDIMENT COMBINED
* EXCESS WATER MISTAKENLY LABELLED BOJYD7 (ONE BOTTLE ONLY)
FINAL DOSE RATE OF FILTER 130 JFO 4/17/97 WO/190 WC
ORIGINAL DOSE RATE OF FILTER 150 WO/140 WC

Centrifuge Cone 8B

Tare Weight 13.475 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____ JFO 4/17/97

Final Settled Volume 30.0 mL Date/Time 4/15/97 0845

Final Settled Weight (Excess Water Removed) 49.49 g

Centrifuged Volume 15.0 g mL

Centrifuged Weight (Excess Water Removed) 35.48 g

Comments:

Sample S97N000026 (BOJYD8) HNF-SD-WM-DP-245, REV. 0

Centrifuge Cone 8C

Tare Weight 13.471 g

Initial Settled Volume 42.0 mL Date/Time 4/14/97 1410

Interim Settled Volume ____ mL JFO 4/17/97 Date/Time ____/____ JFO 4/17/97

Final Settled Volume 30.0 mL Date/Time 4/14/97 0845

Final Settled Weight (Excess Water Removed) 48.71 g

Centrifuged Volume ____ g JFO 4/17/97

Centrifuged Weight (Excess Water Removed) ____ g JFO 4/17/97

Comments: OBJECT THE SIZE OF A "GOLDFISH" WAS OBSERVED PASSING INTO THE CONE FOR VISCOSITY + PARTICLE SIZE

Centrifuge Cone 8D

Tare Weight _____ g JFO 4/17/97

Initial Settled Volume _____ mL Date/Time ____/____

Interim Settled Volume _____ mL Date/Time ____/____

Final Settled Volume _____ mL Date/Time ____/____

Final Settled Weight (Excess Water Removed) _____ g

Centrifuged Volume _____ g

Centrifuged Weight (Excess Water Removed) _____ g

Comments:

	TARE	
S97N000038	30.998 g	25 mRAD/15 mR
S97N000035	18.257 g SOLID	34.57 g (CONE A)
S97N000036	18.257 g LIQ	37.07 g (CONE B)
		~~31.03 g (CONE~~

JFO 4/16/97

CHAIN OF CUSTODYS/RSA'S

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Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Wendy S. Thompson 6-8031

B97-079-01 | Page 1 of 1

Collector: Doug Bowers / W.S. Thompson	Company Contact: Steve Trent	Telephone No.: 373-1482	Project Coordinator: Weiss, RL	Data Turnaround: 30 Days
Project Designation: 107-N Deactivation - Sediment Samples	Sampling Location: 100 Area		SAF No.: B97-079	
Ice Chest No.: DOT-7A / 3M Safe Send package	Field Logbook No.: EFL-1133-2		Method of Shipment: Hand delivered	
Shipped To: 222-S Laboratory	Offsite Property No.		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS (1000ml plastic) inner sample jar reads 50mR/hr contact; 15mrad/hr

Special Handling and/or Storage: cool to 4C 1454 2/24/97 2/24/97

Preservation	Cool 4C												
Type of Container	P												
No. of Container(s)	1												
Volume	1L												

219

SAMPLE ANALYSIS

See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time										
00JYD5	Other Solid	12/24/97	1130	X									

CHAIN OF POSSESSION

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	2.24.97/1256	Wendy S Thompson	2/24/97 1256
Wendy S Thompson	2/24/97 1830	[illegible]	2/24/97 1830

Sign/Print Names

SPECIAL INSTRUCTIONS

**Fax results to Doris Ayres 372-9052.

**222-S Deliverable: Interim results shall be faxed to Sample Management as completed. A summary report will be provided 30 days after the last sample has been received by 222-S.

(1) Pest/PCBs - 8080 (TCL); ICP Metals - 6010A (Add-on); ICP Metals - 6010A (SW-846); Lead - 7421- (GFAA); Mercury - 7471 - (CV); Selenium - 7740 - (GFAA); Thallium - 7841 - (GFAA); Density; IC Anions - 300.0; Ammonia - 350.1; TIC - 415.1M; pH (Soil) - 9045;

Refer to SAF B97-079 for complete list of analysis. Analyze per LMI/SOW described in Bechtel letter # 042697 to 222-S

Matrix *

S	= Soil
SE	= Sediment
SO	= Solid
SL	= Sludge
W	= Water
O	= Oil
A	= Air
DS	= Drum Solids
DL	= Drum Liquids
T	= Tissue
WI	= Wipe
L	= Liquid
V	= Vegetation
X	= Other

LABORATORY SECTION

Received By | Title | Date/Time

FINAL SAMPLE DISPOSITION

Disposal Method | Disposed By | Date/Time

HNF-SD-WM-DP-245, REV. 0

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | **B97-079-02** | Page 1 of 1

Collector: Doug Bowers / L. S. Thompson
Company Contact: Steve Trent | Telephone No.: 373-1482
Project Coordinator: Weiss, RL
Data Turnaround: 30 Days

Project Designation: 107-N Deactivation - Sediment Samples
Sampling Location: 100 Area 107 building sump
SAF No.: B97-079

Ice Chest No.:
Field Logbook No.: EFL-1133-2 N/A WSS 3/17/97
Method of Shipment: Hand delivered

Shipped To: 222-S Laboratory
Offsite Property No.: 3-10-97 N/A
Bill of Lading/Air Bill No.: N/A

POSSIBLE SAMPLE HAZARDS/REMARKS: Radioactive Bottle = 1 1/2 mR/hr contact, 3 mrad/hr contact; filter = 1.2 mR/hr contact, 2 D beta

Special Handling and Storage: Cool to 4C

Preservation	Cool to 4C	None										
Type of Container	P	P										
No. of Container(s)	1	1										
Volume	1L	~1L										

220

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	See item (1) in Special Instructions.	See item #1 below container is a filter housing							
0JVD0	Other Solid	3-10-97	1330	X	X							

Combine bottle and filter contents into one sediment sample prior to analysis. Follow LOI/SAP for 107-N Project

CHAIN OF POSSESSION — Sign/Print Names: 1335

	Date/Time	Received By	Date/Time
Relinquished By: L. S. Thompson	3/17/97	RL Ormsbee	3/17/97 1335
Relinquished By:	Date/Time	Received By	Date/Time
Relinquished By:	Date/Time	Received By	Date/Time
Relinquished By:	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

**Fax results to Doris Ayres 372-9052.

**222-S Deliverable: Interim results shall be faxed to Sample Management as completed. A summary report will be provided 30 days after the last sample has been received by 222-S.

(1) Pest/PCBs - 8080 (TCL); ICP Metals - 6010A (Add-on); ICP Metals - 6010A (SW-846); Lead - 7421- (GFAA); Mercury - 7471 - (CV); Selenium - 7740 - (GFAA); Thallium - 7841 - (GFAA); Density; IC Anions - 300.0; Ammonia - 350.1; TIC - 415.1M; pH (Soil) - 9045;

Refer to SAF B97-079 for complete list of analysis

Matrix *

S	= Soil
SE	= Sediment
SO	= Solid
SL	= Sludge
W	= Water
O	= Oil
A	= Air
DS	= Drum Solids
DL	= Drum Liquids
T	= Tissue
WI	= Wipe
L	= Liquid
V	= Vegetation
X	= Other

LABORATORY SECTION | Received By | Title | Date/Time

FINAL SAMPLE DISPOSITION | Disposal Method | Disposed By | Date/Time

Mar. 17, 1997 1:45PM WHC 222S LAB ROOM 2F BACKSIDE No. 0975 P. 1/4

HNF-SD-WM-DP-245, REV. 0

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B97-079-03 | Page 1 of 1

Collector: Doug Bowers / S. Thompson

Company Contact: Steve Trent | Telephone No.: 373-1482

Project Coordinator: Weiss, RL

Data Turnaround: 30 Days

Project Designation: 107-N Deactivation - Sediment Samples

Sampling Location: 100 Area — 107 pump well

SAF No.: B97-079

Ice Chest No.:

Field Logbook No.: EFL-1133-2

Method of Shipment: Hand delivered

Shipped To: 222-S Laboratory

Offsite Property No.: N/A

Bill of Lading/Air Bill No.: N/A

POSSIBLE SAMPLE HAZARDS/REMARKS: bottle = 80 mR/hr contact, 60 mrad/hr filter = 20 mR/hr contact, CDhaz

Special Handling and/or Storage: Cool to 4C

Preservation	~~Cool 4C~~ 3-11-97	None								
Type of Container	P	P								
No. of Container(s)	1	1								
Volume	1L	~3L								
See item (1) in Special Instructions.	See item #1 below container is a filter housing									

221

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time								
0JVD7	Other Solid	3-11-97	1344	X	X						

Combine bottle and filter contents into one sediment sample prior to analysis. Follow LOI/SOW/SAP for 107-N Project

CHAIN OF POSSESSION

	Sign/Print Names	Date/Time	Received By	Date/Time
Collected By	S. Thompson	3/10/97 1335	Richards	3-17-97/1335
Relinquished By		Date/Time	Received By	Date/Time
Relinquished By		Date/Time	Received By	Date/Time
Relinquished By		Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

**Fax results to Doris Ayres 372-9052.

**222-S Deliverable: Interim results shall be faxed to Sample Management as completed. A summary report will be provided 30 days after the last sample has been received by 222-S.

(1) Pest/PCBs - 8080 (TCL); ICP Metals - 6010A (Add-on); ICP Metals - 6010A (SW-846); Lead - 7421- (GFAA); Mercury - 7471 - (CV); Selenium - 7740 - (GFAA); Thallium - 7841 - (GFAA); Density; IC Anions - 300.0; Ammonia - 350.1; TIC - 415.1M; pH (Soil) - 9045;

Refer to SAF B97-079 for complete list of analysis.

Matrix *

S	= Soil
SE	= Sediment
SO	= Solid
SL	= Sludge
W	= Water
O	= Oil
A	= Air
DS	= Drum Solids
DL	= Drum Liquids
T	= Tissue
WI	= Wipe
L	= Liquid
V	= Vegetation
X	= Other

LABORATORY SECTION: Received By | Title | Date/Time

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | **B97-079-04** | Page 1 of 1

Collector: Doug Bowers / ... S. Thompson	Company Contact: Steve Trent	Telephone No.: 373-1482	Project Coordinator: Weiss, RL	Data Turnaround: 60 Days 30 ... 3-12-97
Project Designation: 107-N Deactivation - Sediment Samples	Sampling Location: 100 Area 107 pump well		SAF No.: B97-079	
Ice Chest No.	Field Logbook No.: EFL-1133-2		Method of Shipment: Hand delivered	
Shipped To: 222-S Laboratory	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS
bottle = 42 mR/hr, contact; 66 mrad/hr contact
filter = 215 mR/hr, contact (β beta)

Special Handling and/or Storage: Cool to 4C

222

Preservation	None	None	
Type of Container	P	P	
No. of Container(s)	1	1	
Volume	1L	~3L	
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item #1 below container is a filter housing. ... 3-12-97	

Sample No.	Matrix*	Sample Date	Sample Time		
...0JYD8	Other Solid	3-12-97	0910	X	X

Combine bottle and filter contents into one sediment sample prior to analysis. Follow LOI/SOW SAP for 107-N Project

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
... S. Thompson	3/17/97 1335	RL Chenler	3-17-97 - 1335
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
**Fax results to Doris Ayres 372-9052.

**222-S Deliverable: Interim results shall be faxed to Sample Management as completed. A summary report will be provided 30 days after the last sample has been received by 222-S.

(1) Pest/PCBs - 8080 (TCL); ICP Metals - 6010A (SW-846) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Iron, Manganese, Nickel, Silicon, Silver, Sodium, Vanadium, Zinc); Lead - 7421- (GFAA); Selenium - 7740 - (GFAA); Thallium - 7841 - (GF

Refer to SAF B97-079 For complete list of Analysis

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

REQUEST FOR SAMPLE ANALYSIS (RSA)

RSA No.:

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. TPCN/Org. Code
1310-N Silo Valve Pit	2/24/97	W.S. Thompson	DB7275
	3. Submitted By	5. Requestor's Phone/MSIN/FAX	
	Wendy S. Thompson	Wendy Thompson / N1-28 376-8851	

7. Customer ID No.	8. Laboratory ID No.	9. Group ID No.	10. Volume of Sample	11. Matrix of Sample	12. Determination(s)	13. Expected Range
B0JYD5			1000ml	liquid/solid (sludge)	See chain of Custody and LOI/SOW #042697 for analysis	

Sample is contained in a one-liter plastic sample jar. It consists of about 250ml solids and 750ml liquid. The jar reads ≈ 50mR/hr contact and 15mrad/hr and is still settling solids which may increase dose rate on container.

Caution: Sludge - may settle or resuspend during transportation. Inner jar reading 50mR/hr, contact; 15mrad/hr

14. QC Required

- ☐ Per 222-S Laboratory Quality Assurance Plan (WHC-SD-CP-QAPP-016)
- ☒ Other (list reference document or attach) Letter of Instruction/SAP#

15. Chemical Constituents

- ☒ Unknown
- ☐ Known (MSDS required)

16. Special Storage Requirements

- ☐ No
- ☒ Yes

If Yes, Specify: Keep secure

17. Do samples contain listed waste?

- ☒ No
- ☐ Yes (If Yes, list as an attachment)

18. Special Instructions (Reporting format, holding times, etc.)

Analyze per SOW/LOI/SAP
BHI memo to FDH, dated, 2/13/97
#042697

19. Requested Turnaround Time

- ☐ 2 Weeks
- ☐ 4 Weeks
- ☐ Other

per LOI/SOW/SAP

20. Sample Received By:

Date Time

21. Chain of Custody

- ☐ No
- ☒ Yes

Number: N/A

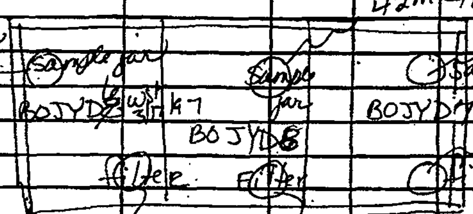
223

REQUEST FOR SAMPLE ANALYSIS (RSA)

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. TPCN/Org. Code
107-N Building	3/10/97; 3/11/97	W.S. Thompson	DB7275
	3. Submitted By 3/12/97		5. Requestor's Phone/MSIN/FAX
	WS. Thompson		376-8031/N1-28/6-8857

7. Customer ID No.	8. Laboratory ID No.	9. Group ID No.	10. Volume of Sample	11. Matrix of Sample	12. Determination(s)	13. Expected Range
BOJYD6			~3L	Sludge	See Chain of	
BOJYD7			~3L	Sludge	Custody and	
BOJYD8			~3L	sludge	LOI/SOW #042697	
					for analysis	

Each sample consists of a 1000 ml plastic sample jar (with settled solids) and a filter cartridge housing containing liquid and settled solids.



The poly-ice chest has three foam "compartments" separately bagged inside. The associated filter ~~housing~~ WST 3/17/97 and sample jar for each sample is in a unique foam compartment.

14. QC Required

- ☐ Per 222-S Laboratory Quality Assurance Plan (WHC-SD-CP-QAPP-016)
- ☒ Other (list reference document or attach) LOI/SAP

15. Chemical Constituents

- ☒ Unknown
- ☐ Known (MSDS required)

16. Special Storage Requirements

- ☐ No
- ☒ Yes

If Yes, Specify: Keep secure

17. Do samples contain listed waste?

- ☒ No
- ☐ Yes (If Yes, list as an attachment)

18. Special Instructions (Reporting format, holding times, etc.)

Analyze per SOW-LOI-SAP
BHI memo to FDH, dated 2/13/97
#042697

19. Requested Turnaround Time

- ☐ 2 Weeks
- ☐ 4 Weeks
- ☐ Other

per LOI/SAP/SOW

20. Sample Received By: [signature] 3-17-97 1335

21. Chain of Custody

- ☐ No
- ☒ Yes

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Production Planning & Control	Date: 05/30/97
Project Title/Work Order HNF-SD-WM-DP-245, Rev. 0 "Analytical Results for the 107-N Basin and 1310-N Basin Sediment Disposition Sample Characterization Project.		EDT NO.: EDT-620403 ECN NO.: N/A

Name	MSIN	Text With all Attach	EDT/ECN ONLY
Bechtel Hanford, Inc. J. H. Kessner	B1-35	X	
Lockheed Martin Hanford Corp. A. E. Young	~~R1-08~~ Ecn 620403 R1-10		X*
Lockheed Martin Services, Inc. Central Files	A3-88	X	
Los Alamos Technical Associates M. T. Ellsworth	T6-06		X*
Rust Federal Services of Hanford, Inc. G. L. Miller	T6-06	X	

* Needs only releasing paperwork, not a copy of the released document.