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

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

by

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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

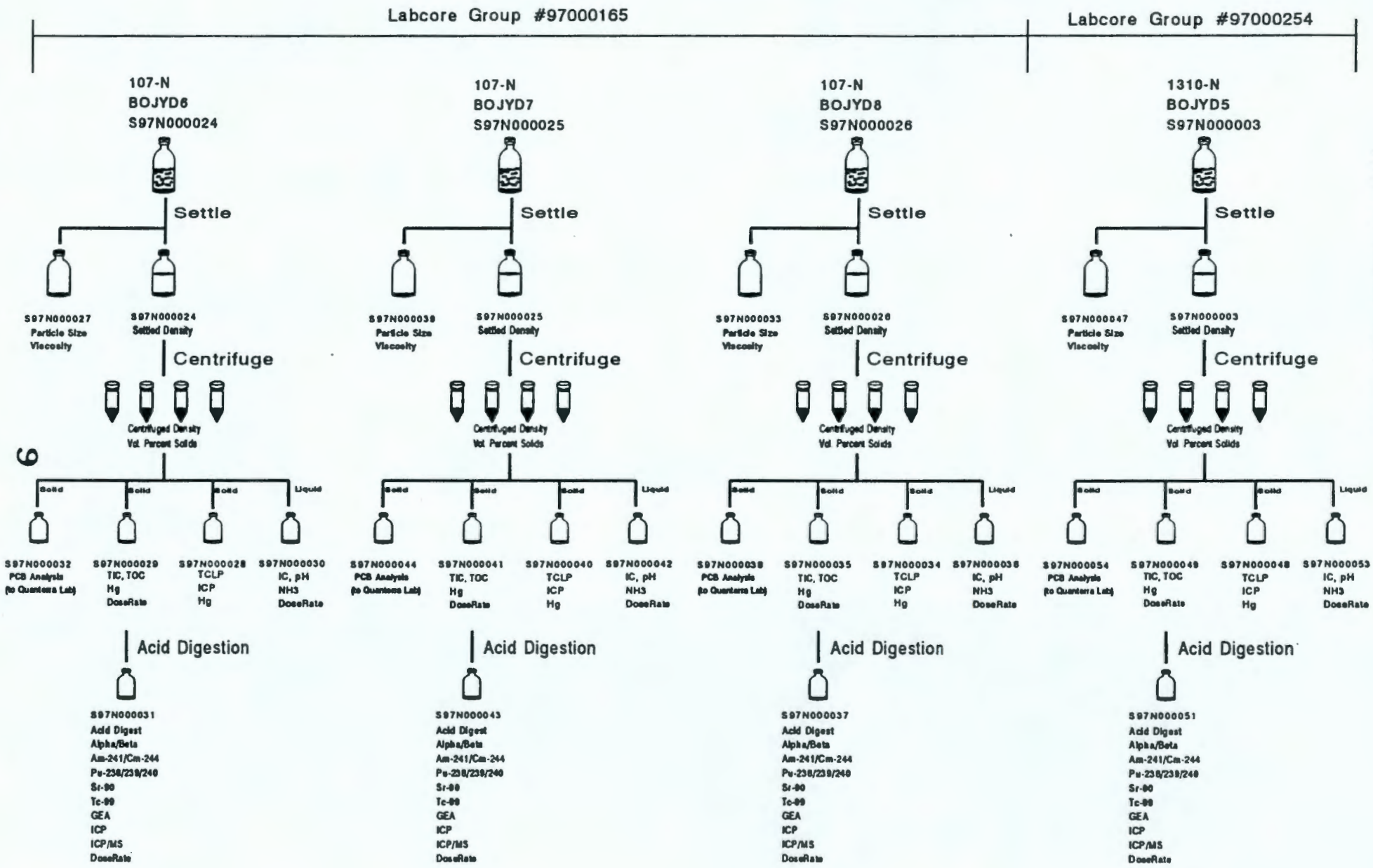
Note 1. Although the project requested this analysis, the regulatory definition of TCLP in SW-846, section 7.4.3, does not include these metals.

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: 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

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: 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

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:	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

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:	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

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

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
Phone: 373-4995 T6-07
Date: May 22, 1997
Subject: 107-N PHYSICAL TESTING RESULTS

8C510-97-011

To: G. L. Miller T6-06

cc: D. L. Herting DLH 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)

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

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHE
. LABS)

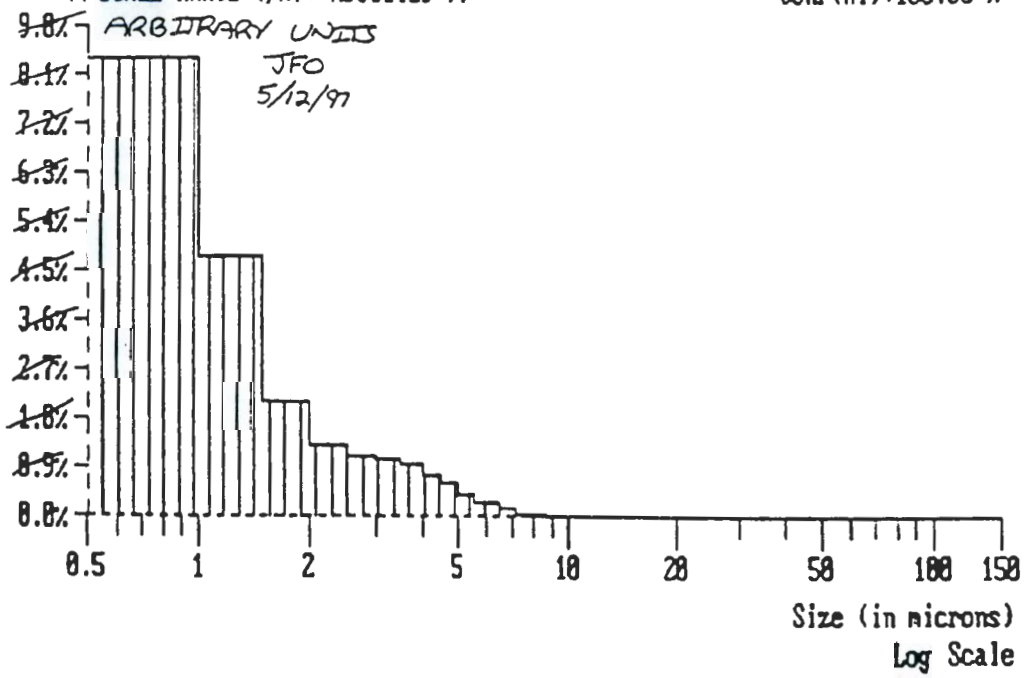
SAMPLE NAME : S97N000047 107N HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N47

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 %



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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

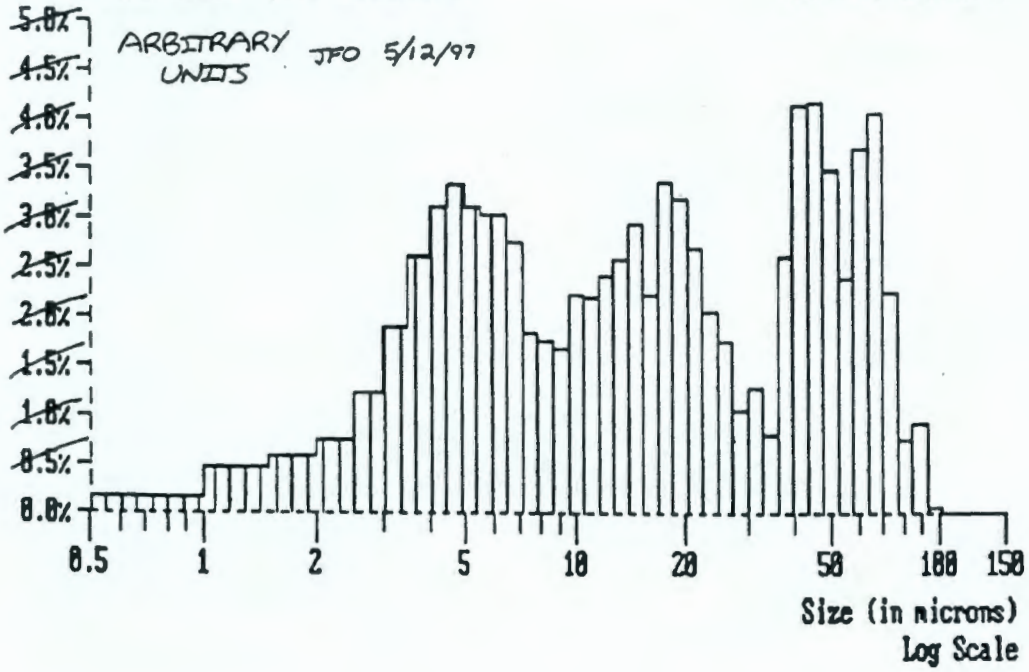
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 525913
TIME	: 11:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.68
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 870 SEC	S.D.U.	: 4798
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 5.2E+06 #/r
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY VOLUME DENSITY GRAPH

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

Mean(nv): 2.69µm
S.D.(nv): 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 CHEM. LABS)

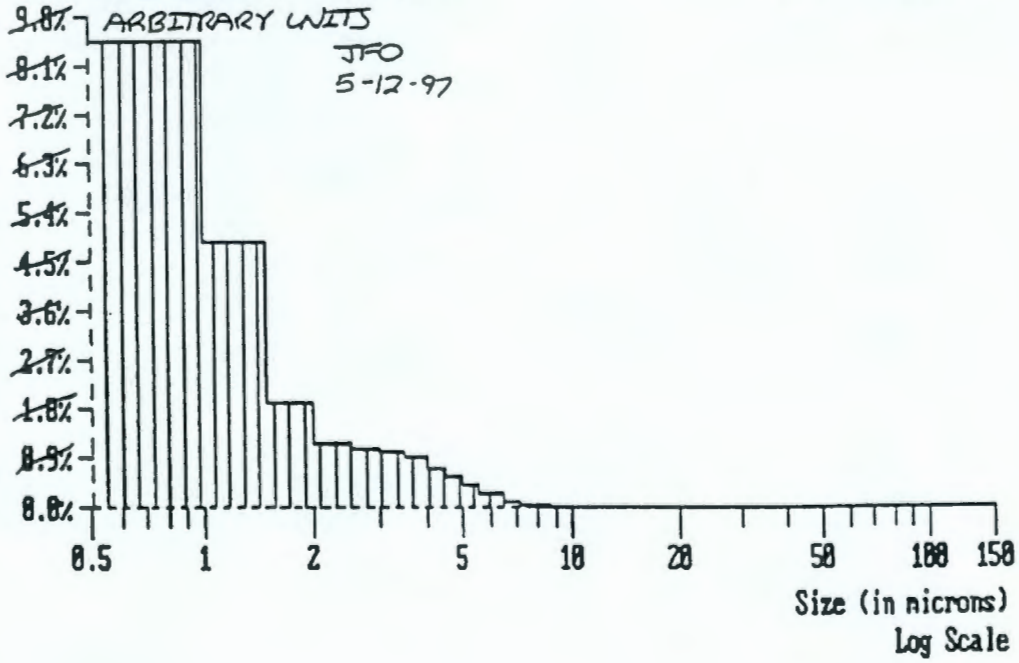
SAMPLE NAME : S97N000027 107N BOJYD6 HNF-SD-WM-DP-245, REV. 0
FILE NAME : S97N27

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 : 0.98µm
Mean(nl): 1.24µm
S.D.(nl): 1.23µm
Conf(nl):100.00 %



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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

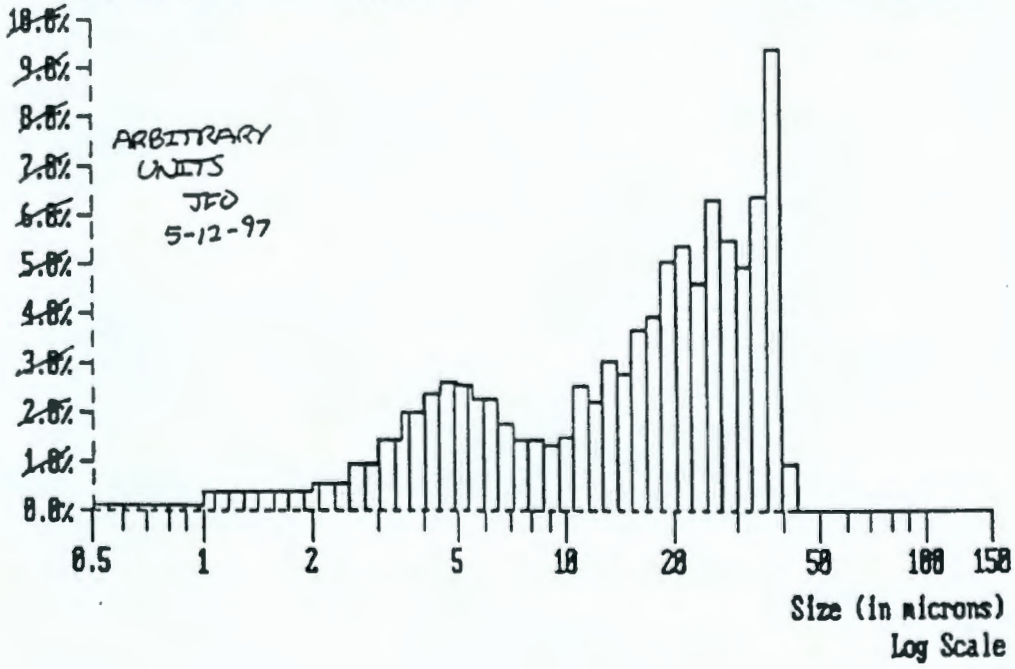
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 618902
TIME	: 12:34	ACQ. MODE	: SAMPLE	S.N.F.	: 0.98
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1040 SEC	S.D.U.	: 3981
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 4.2E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 5.2E-03 %

PROBABILITY VOLUME DENSITY GRAPH

Name: S97N000027 107N BOJYD6
5.2E-05 cc/ml(100.0%)
Mode at 37.84 µm
<< SCALE RANGE (µm): ADJUSTED >>

Mean(nv): 2.87µm
S.D.(nv): 2.84µm

Median : 18.83µm
Mean(vm): 18.39µm
S.D.(vm): 11.85µm
Conf(vm):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHEM. LABS)

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

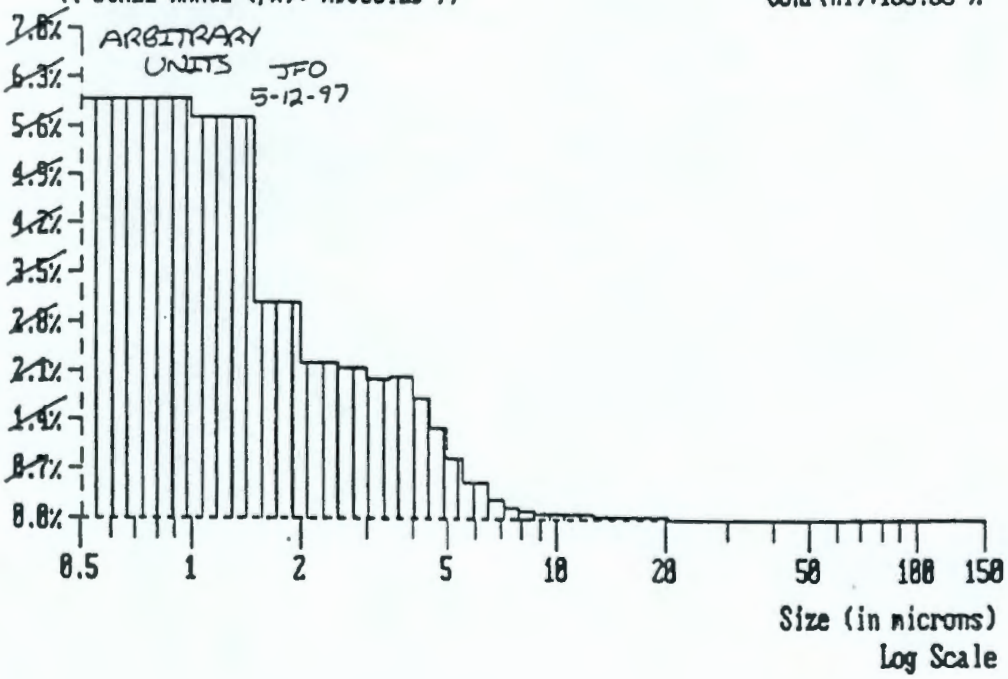
SAMPLE NAME : S97N000039 107N BOJYD7
FILE NAME : S97N39

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 #/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 0.75 µm
<< SCALE RANGE (µm): ADJUSTED >>

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



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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

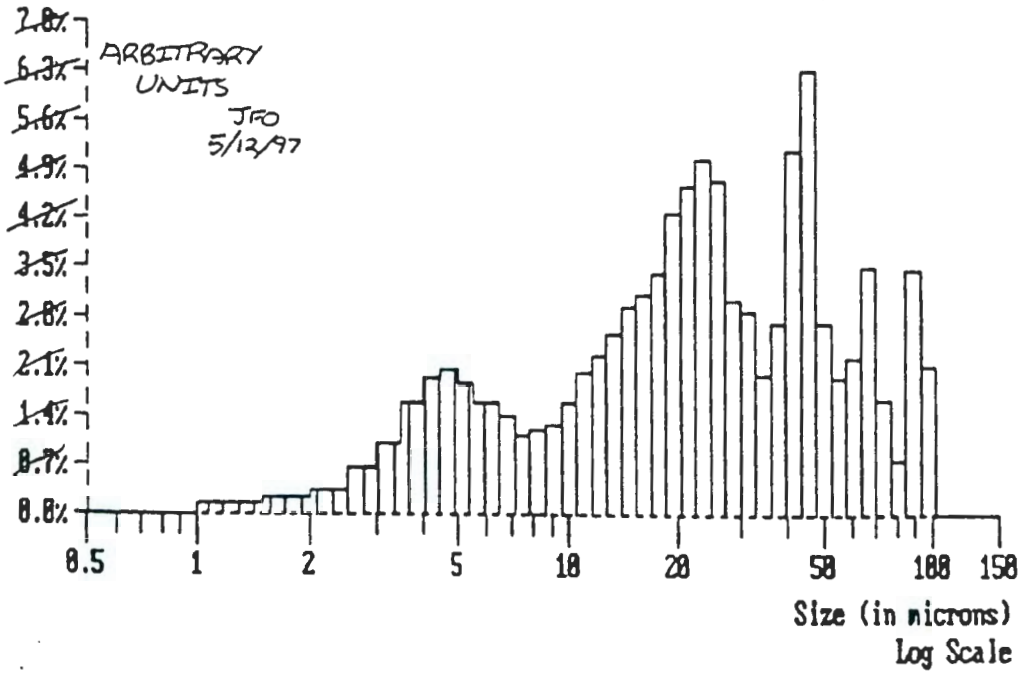
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 403722
TIME	: 12:13	ACQ. MODE	: SAMPLE	S.N.F.	: 0.84
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1000 SEC	S.D.U.	: 3177
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 3.7E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.3E-02 %

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(vm): 29.62µm
S.D.(vm): 24.23µm
Conf(vm):100.00 %



GALAI CIS1 VERSION 4.3 (WHC PROCESS CHEM. LABS)

33 JFD 5/14/97

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

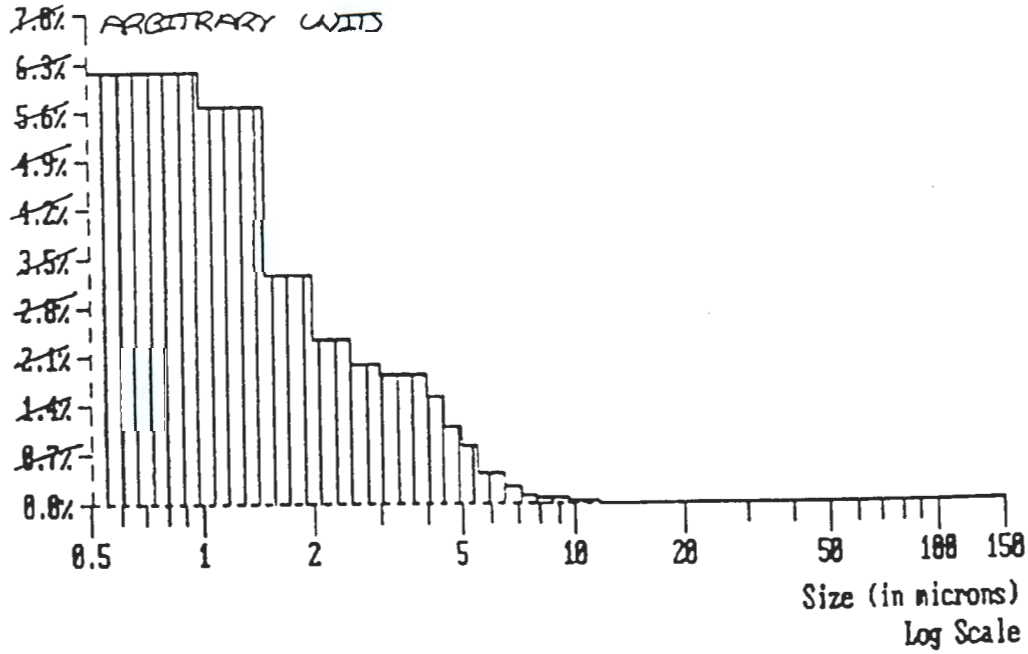
SAMPLE NAME : S97N000053 107N BOJYD8
FILE NAME : S97N53

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 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 %



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Computerized Inspection System

GALAI CIS1 VERSION 4.3 (WHC PROCESS CHEM. LABS)

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

SAMPLE NAME : S97N000053 107N BOJYD8 (33 JFO 5/14/97)
FILE NAME : S97N53

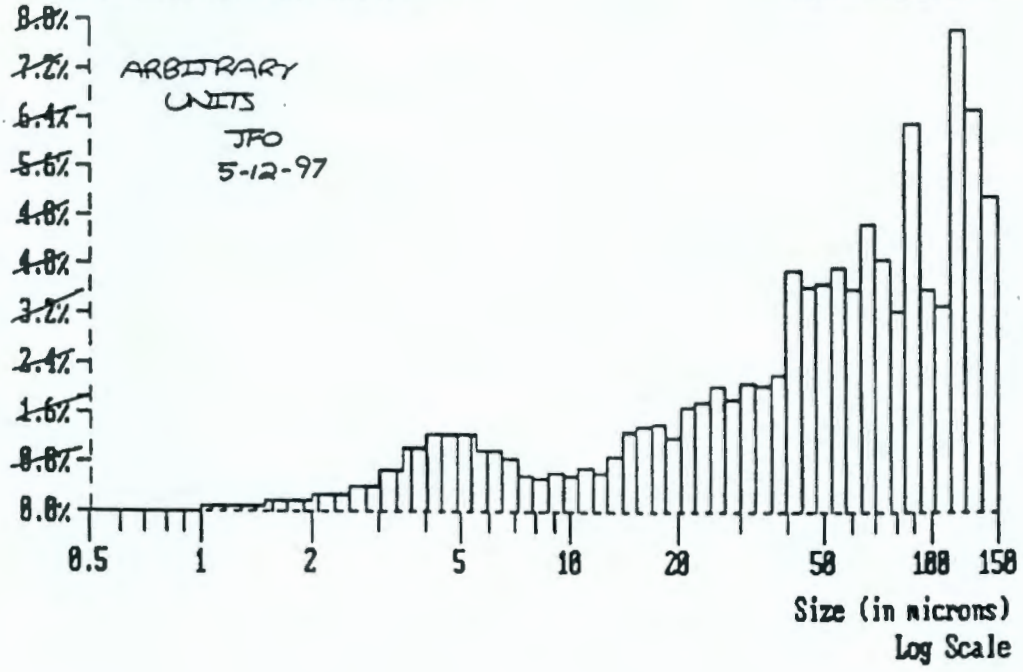
DATE	: 12/05/1997	ACQ. RANGE	: 0.5-150	COUNTS	: 600370
TIME	: 12:53	ACQ. MODE	: SAMPLE	S.N.F.	: 0.85
CONFIG.	: 1 (0.7 S1)	ACQ. TIME	: 1277 SEC	S.D.U.	: 3675
CELL TYPE	: MAGNETIC (2)	SAMPLE SIZE	: 5	CONCENTR.	: 2.9E+06 #/m
SAMPLE TYPE	: REGULAR	REQ. CONF.	: None	SOLIDS	: 1.5E-02 %

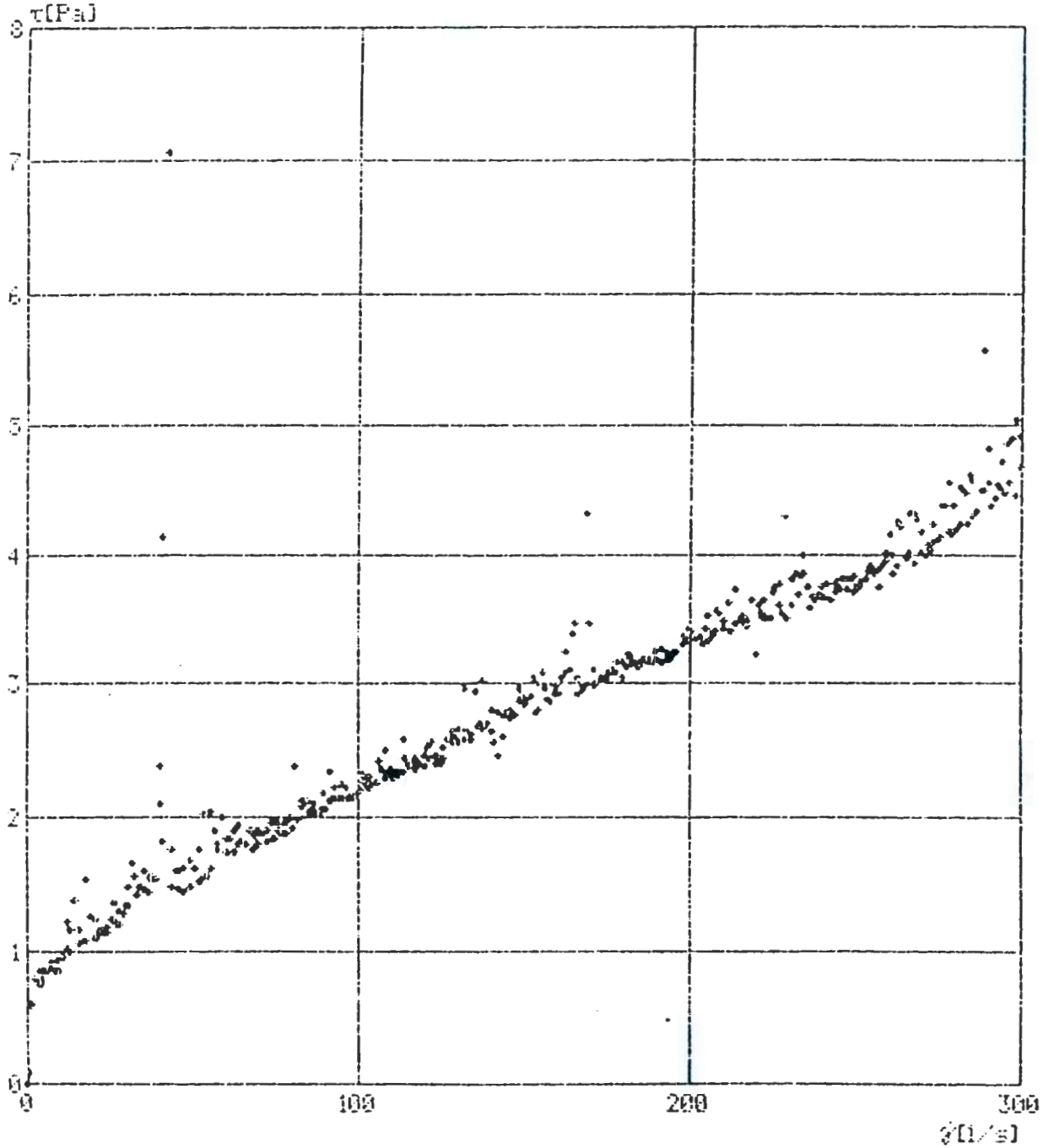
PROBABILITY VOLUME DENSITY GRAPH

Name: S97N000053 107N BOJYD8
1.5E-04 cc/ml(100.0%)
Mode at 118.40 µm
<< SCALE RANGE (µm): ADJUSTED >>

Mean(nv): 4.55µm
S.D.(nv): 3.43µm

Median : 54.76µm
Mean(vn): 62.07µm
S.D.(vn): 43.23µm
Conf(vn): 100.00 %





numetec

Operator:
jwc

Substance:
~~std 10 cps~~
597N0000047
JPO 5/13/97

Test No.:
010

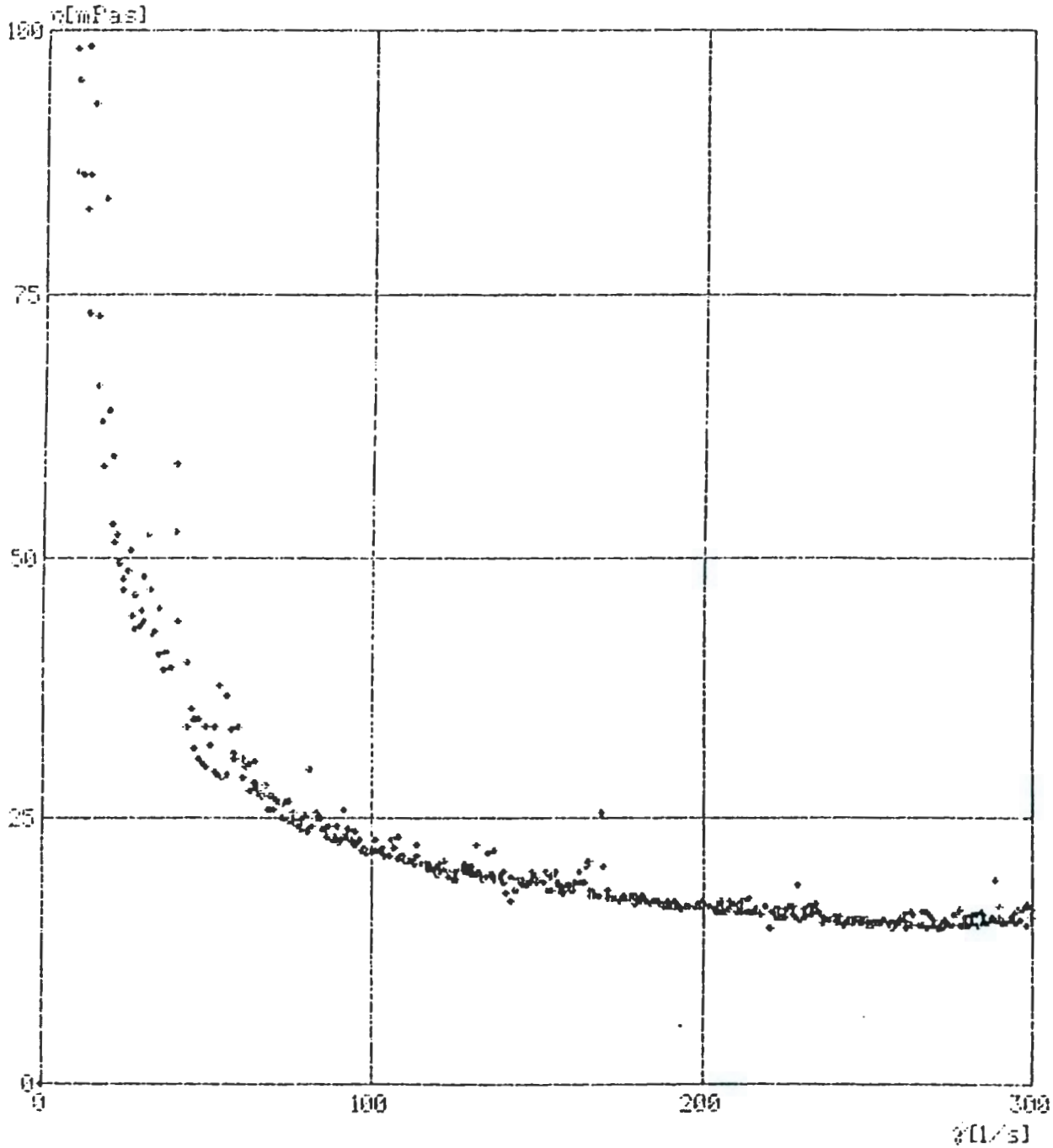
Test of:
05-13-1997

System:
CV20/ME45

Temperature:
25.0°C

*** S97N47.ROT

NAVE Rot 2.4



numetec

Operator:
jwc

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

Test No.:
010

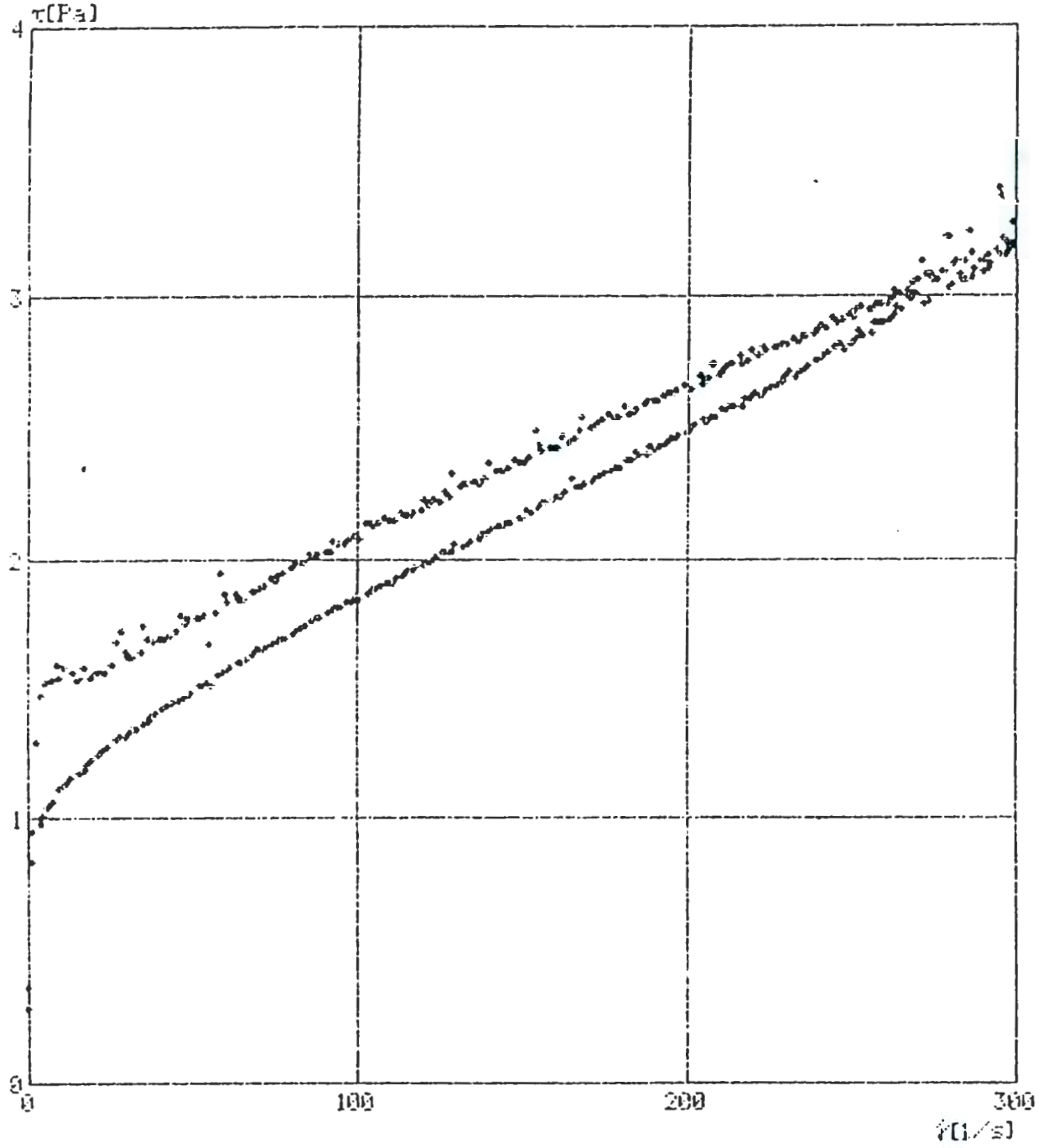
Test of:
05-13-1997

System:
CV20/ME45

Temperature:
25.0°C

••• S97N47.RCT

HAAKE Rot 2.4



numetec

Operator:
jwc

Substance:
s97n000027
bojgd6

Test No.:
012

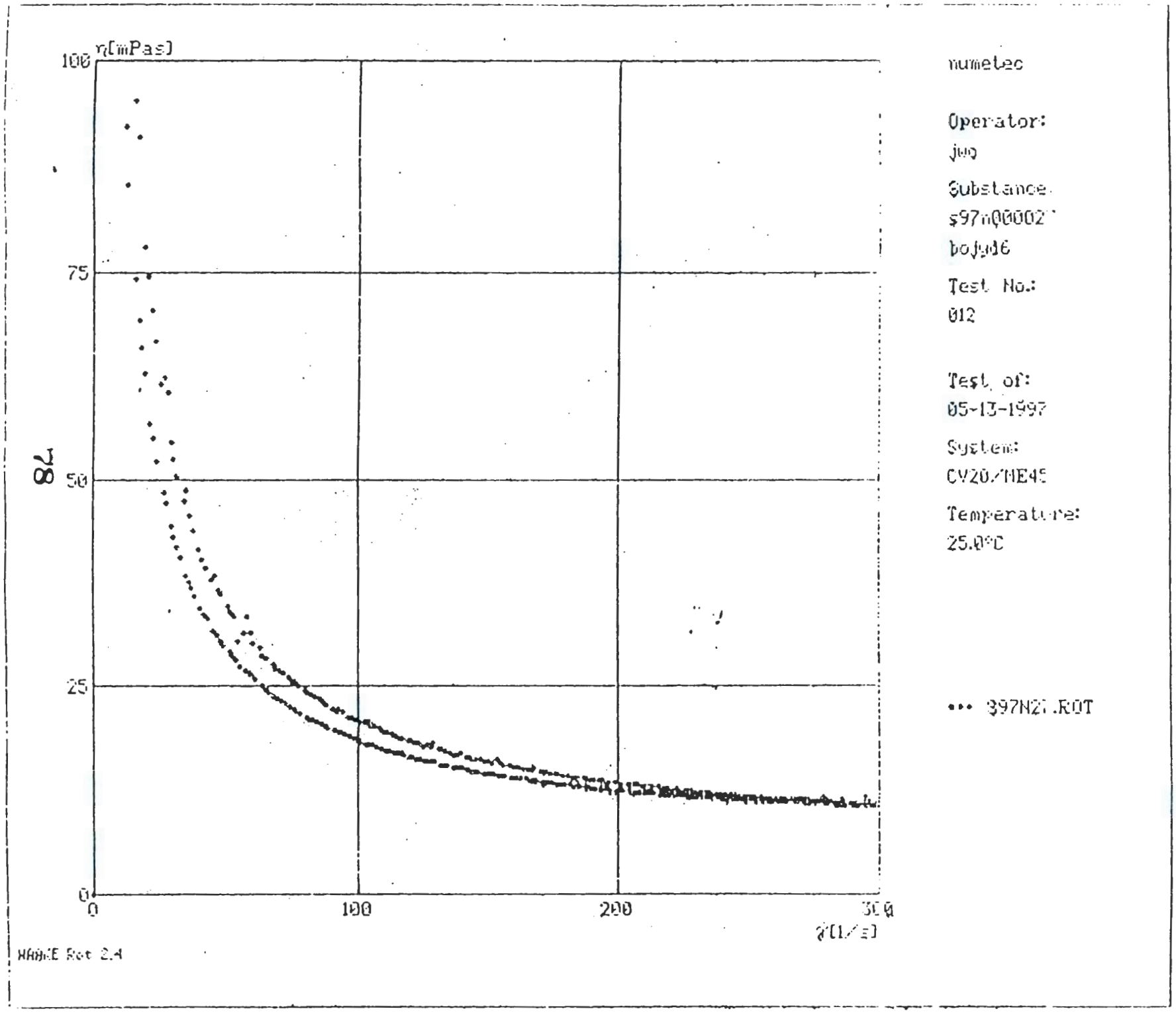
Test of:
05-13-1997

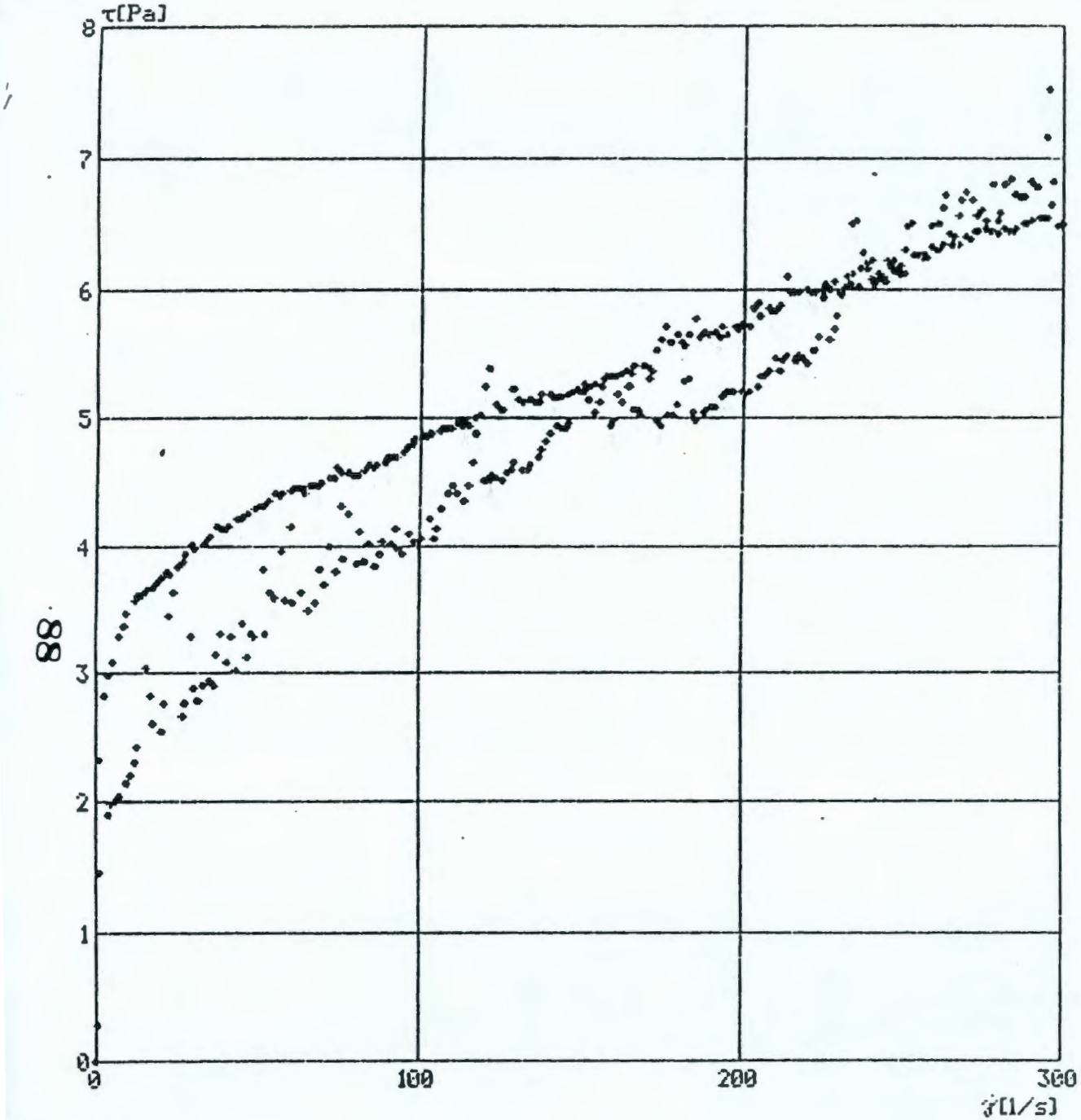
System:
CV20/ME45

Temperature:
25.0°C

••• S97N27.ROT

HAAKE Rot 2.4


η[mPas]
100
75
50
25
0
0
100
200
300
γ[1/s]
numetec
Operator:
jwo
Substance:
s97n00002
bo jw16
Test No.:
012
Test of:
05-13-1997
System:
CV20/ME45
Temperature:
25.0°C
••• 397N2?.RDT
WABE Rot 2.4



numetec

Operator:
JWC

Substance:
s97n000039

Test No.:
015

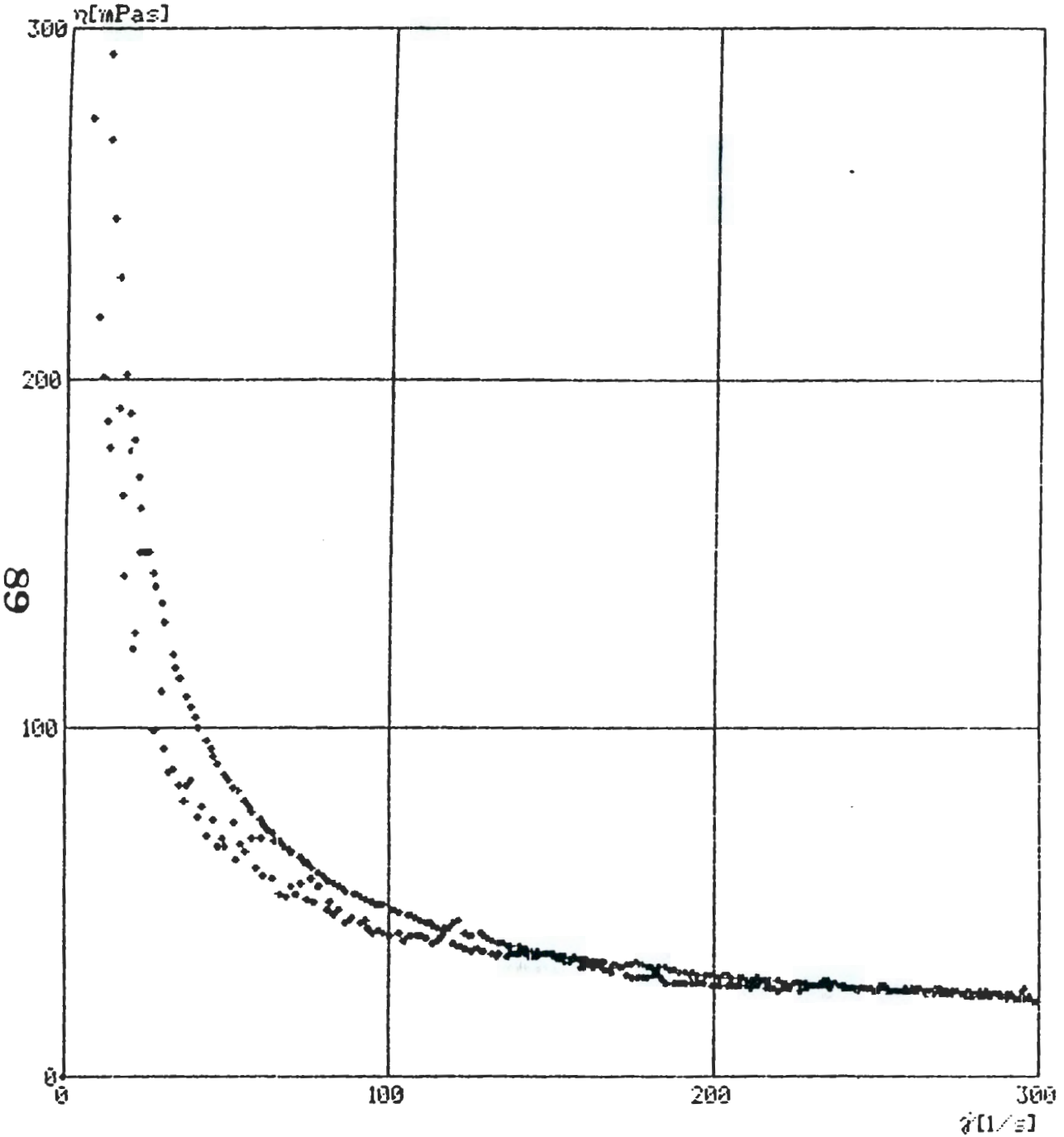
Test of:
05-19-1997

System:
CV20/ME45

Temperature:
25.0°C

••• S97N39C.ROT

RAKE Rot 2.4



numetec

Operator:
jwc

Substance:
s97n000039

Test No.:
015

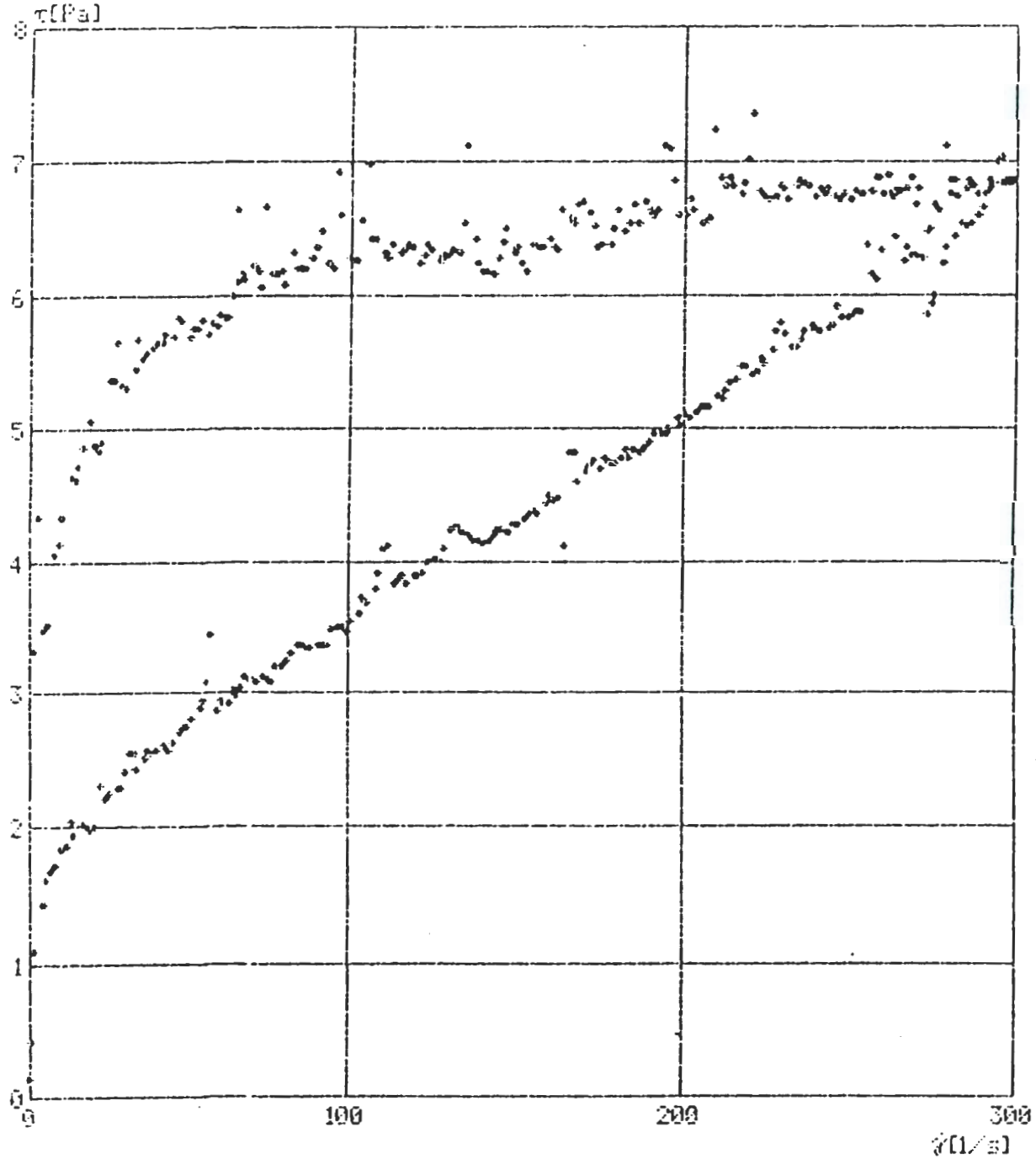
Test of:
05-19-1997

System:
CV20/ME45

Temperature:
25.0°C

••• S97N39C.ROT

MKE Rot 2.4



numetec

Operator:
jwo

Substance:
s97n000033
bojyd8

Test No.:
012

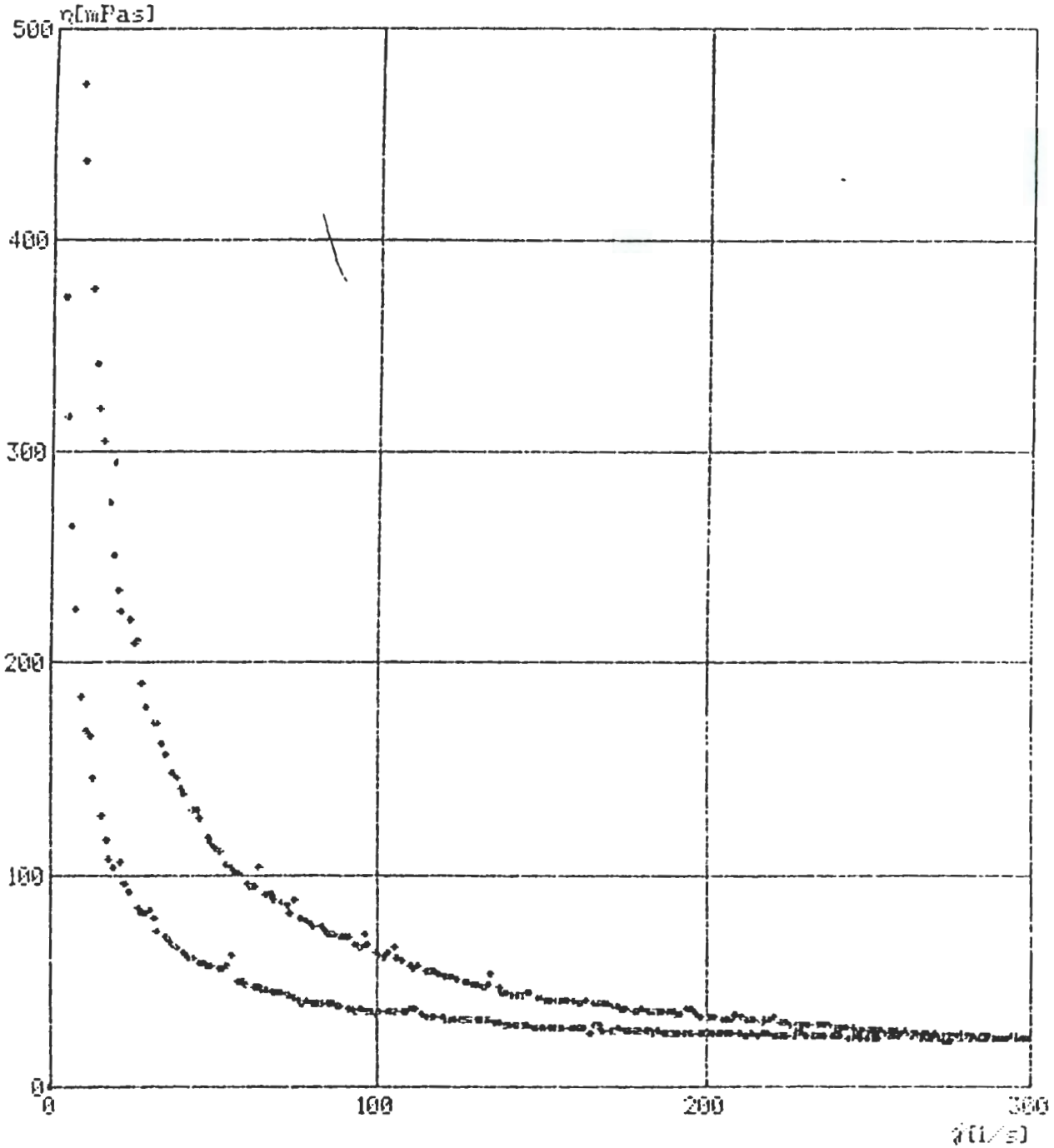
Test of:
05-13-1997

System:
CV20/ME45

Temperature:
25.0°C

••• S97N33.ROT

NAAFE Rot 2.4



numetec

Operator:
jwc

Substance:
s97n000033
bojsd8

Test No.:
012

Test of:
05-13-1997

System:
CV20 MK45

Temperature:
25.0°C

*** S97N33.ROT

HAAKE Rot 2.4

107-N Project Summary Data Tables
1310-N

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: BOJYD5

CUSTOMER SAMPLE NUMBER: BOJYD5

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

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 81N10A.

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.

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Keith Fuller

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Rust Federal Services

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

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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%

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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

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.

1.4 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.

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.

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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 3/27/97	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 (7.1, 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 <u>recommended</u>." 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 <u>can</u> 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

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~~ WST 2/24/97 2/24/97 WST

Preservation	Cool 4C										
Type of Container	P										
No. of Container(s)	1										
Volume	1L										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

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Sample No.	Matrix *	Sample Date	Sample Time										
10JYD5	Other Solid	12/24/97	1130	X									

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	2.24.97/1256	Wendy S Thompson	2/24/97 1256
Relinquished By	Date/Time	Received By	Date/Time
Wendy S Thompson	2/24/97 1830	[illegible]	2/24/97 1830
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. Analyze per LOI/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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B97-079-02	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 107 building sump		SAF No.: B97-079	
Ice Chest No.	Field Logbook No.: EFL-1133-2 N/A WST 3/17/97		Method of Shipment: Hand delivered	
Shipped To: 222-S Laboratory	Offsite Property No.: 5283-10-97 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, 2D beta

Special Handling and/or Storage: Cool to 4C

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

220

Sample No.	Matrix *	Sample Date	Sample Time										
B0JYD6	Other Solid	3-10-97	1330	X	X								

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

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Kenny L Thompson	3/17/97 1335	RL Orme	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 / 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 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 = 80mR/hr contact; 60mrad/hr
filter = 20mR/hr contact, CDhet

Special Handling and/or Storage
Cool to 4C

221

SAMPLE ANALYSIS

Preservation	~~Cool 4C~~ DAB 3-11-97 none	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

Sample No.	Matrix *	Sample Date	Sample Time		
B0JYD7	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**

Relinquished By	Date/Time	Received By	Date/Time
Wendy S Thompson	3/17/97 1335	[illegible]	3-17-97/1335

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
SS	=	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 1:47PM WHC 222S LAB ROOM 2F BACKSIDE No. 0975 P. 3/4

222-S Laboratory

N/A N/A

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

Special Handling and/or Storage
Cool to 4C

Preservation	None	None								
Type of Container	P	P								
No. of Container(s)	1	1								
Volume	1L	~3L								

222

SAMPLE ANALYSIS

See item (1) in Special Instructions. | See item #1 below container is a filter housing 203-M-17

Sample No.	Matrix *	Sample Date	Sample Time										
B0JYD8	Other Solid	3-12-97	0910	X	X								

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

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Kendyl Thompson	3/17/97 1335	RL Chenlu	3-17-97 1335

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

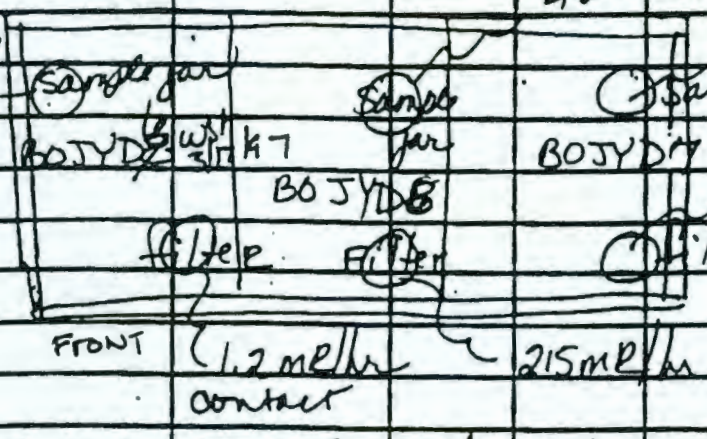
Name/MSN/FAX: 376-8875 Thompson/N1-28
PCN/Org. Code: B7275
Sample Bottle #: 0 4426 97
Customer: LDI/SDW/SAP
Turnaround Time: 30 days
Yes, but as an attachment
contain listed waste?
Sample Disposal
Sample Remarks: 1 sample 750 ml
Lt brown/tan/gray
Sediment
Sample Receipt: 223
N/A

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 W.S. Thompson	5. Requestor's Phone/MSIN/FAX	376-8031/N1-28/6-8851

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
BOJYD6			≈3L	Sludge	See Chain of	
BOJYD7			≈3L	Sludge	Custody and	
BOJYD8			≈3L	sludge	LOI/SOW #042697	
					for analysis	

Each sample consists of a 1000ml 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 ~~[illegible]~~ WST 3/17/97 and sample jar for each sample is in a unique foam compartment.

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)

Special Storage Requirements
- ☐ No
- ☒ Yes

If Yes, Specify: Keep secure.

17. Do samples contain listed wastes?
- ☒ No
- ☐ Yes (If Yes, list as an attachment)

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

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

18. Requested Turnaround Time
- ☐ 2 Weeks
- ☐ 4 Weeks
- ☐ Other per LOI/SAP/SOW

Sample Received By: [illegible] Date: 3-17-97 Time: 1335

21. Chain of Custody
- ☐ No
- ☒ Yes

Number: 224

N/A

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

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

Sample Disposition Record

Control #: B97-040
Revision#: 0
Date Initiated: 3/27/97

Section 1 - BACKGROUND

SAF#: B97-079
OU: N/A
Project ID: 107 N
Task ID: 2
Sampling Event: 107-N Deactivation - Sediment Sampling
Laboratory: 222-S Laboratory
Project Coordinator: Weiss, RL
Task Manager: Day, RS

Section 2 - SAMPLE INFORMATION

Number of Samples: 4
ID Numbers: B0JYD5, B0JYD6, B0JYD7, B0JYD8
MATRIX: Other Solid
Collection Date: 02/24/97 - 03/12/97

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Clarification of Direction
Description: "TCLP Analysis of Sediments" -- For SAF B97-079, samples B0JYD5, B0JYD6, B0JYD7, and B0JYD8, due to ALARA concerns, the laboratory has requested that smaller volumes of sample than specified in the referenced protocol documents be used.

N/A
NCR Validation (Print/Sign) — Date

Section 4 - DISPOSITION

Type: Use As Is
Description: The laboratory may use reduced sample volumes to perform TCLP. The Target Detection Limits specified in the Analytical Instruction remain in effect.

Weiss, RL — 3-28-97
Project Coordinator (Print/Sign) — Date

Day, RS — 4-29-97
Task Manager (Print/Sign) — Date

N/A
QA (Print/Sign) — Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A
Inspector (Print/Sign) — Date