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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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8. Originator Remarks: Characterization Information for Double-Shell Tank 241-AW-105. Solid and liquid composite samples. Double Shell Tank Waste. Neutralized Coating Removal Waste (NCRW).		9. Equip./Component No.: NA
		10. System/Bldg./Facility: Tank Farms
11. Receiver Remarks: Information necessary for reference and clearance of Tank Characterization Report.		12. Major Assm. Dwg. No.: NA
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(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.
2	1	Cog.Eng. B.C. Simpson [signature] R2-12 8/10/94			
2	1	Cog. Mgr. C. S. Haller [signature] 8/10			
		QA NA			
		Safety NA			
		Env. NA			
2	1	L. M. Sasaki [signature] 8/11/94			
2	1	J. M. Tingey [signature] 8/11/94			

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18.	19.	20.	21. DOE APPROVAL (if required)
B. C. Simpson [signature] Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	C. S. Haller [signature] 8/10 Cognizant Manager Date	Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments

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List attachments.

Date Release Required 8/31/94

Title Characterization Information for Double-Shell Tank 241-AW-105

Unclassified Category UC-

Impact Level NA

New or novel (patentable) subject matter? [X] No [] Yes
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[] No [] Yes Disclosure No(s).

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Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval: Name (printed)	Signature	Date
Classification/Unclassified Controlled Nuclear Information	[]	[X]			
Patent - General Counsel	[X]	[]	S.W. Berglin per O.G.C. Memo 2/4/93		
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Part 1

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SUPPORTING DOCUMENT

1. Total Pages 252

2. Title

Characterization Information for Double-Shell Tank 241-AW-105

3. Number

WHC-SD-WM-TI-649

4. Rev No.

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5. Key Words

Waste Characterization; Double-Shell Tank; AW-105; NCRW; Neutralized Cladding Removal Waste; Solid and Liquid Composite Samples

APPROVED FOR PUBLIC RELEASE

KMB 8/16/94

6. Author

Name: J.M. Tingey

Signature

Name: B.C. Simpson

Signature

Organization/Charge Code 7E720/N4D2F

7. Abstract

This document provides the essential characterization data for Double-Shell Tank AW-105

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9. Impact Level NA

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WHC-SD-WM-TI-649 REV. 0

CHARACTERIZATION OF WASTE FROM DOUBLE-SHELL TANK 241-AW-105

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October 1993

Prepared for Westinghouse Hanford Company

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

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SUMMARY

Pacific Northwest Laboratories received 7 Core segments from Hanford Tank 241-AW-105 (105-AW). The segments were received from Westinghouse Hanford Company in May and June of 1990 for measurement of select physical, rheological, chemical and radiochemical properties. Tank 105-AW is a double-shelled tank containing neutralized cladding removal waste processed at the PUREX facility on the Hanford Reservation.

The first two core segments contained tank supernate, no solids were visible. The supernate was noted to be opaque. The remaining five segments contained solids with no drainable liquids. The solids varied from a slurry at the top of segment 3 to a hard solid at the bottom of segment 7. The segments were primarily white in color with the exception of gray extending down in the first 11 inches of segment 3 and gray through all 6 inches of segment 7.

The penetration resistance of segments 5 and 7 were measured to be 3 psi and 6 psi respectively. With penetration resistances below 100 psi, both of these segments are classified as cohesive. The shear strengths of segment 5 and 7 were measured at 1.6×10^4 dyne/cm^2 and 6.3×10^3 dyne/cm^2 respectively.

Three composites were prepared for the analysis. A core composite, produced by combining equal masses of segments 3 through 6, had a measured density of 1.39 g/ml. A supernate composite, prepared by mixing equal masses of segment 1 and 2, had a density of 1.08 g/ml. The final composite was prepared from equal masses of segments 3 and 4. The density of the segments increased from 1.35 g/ml in composite 3-4 to 1.50 g/ml in segment 7. The wt% solids increased as well from 31.2% in composite 3-4 to 58.5% in segment 7. The pH was measured at 13.2, 12.8 and 13.4 in composite 1-2, segment 7 and composite 3-6 respectively.

Dilutions of segment 5 material were prepared at 1:1 and 1:2 mass ratios of sample to composite supernate. The dilutions were analyzed for shear stress as a function of shear rate. These dilutions displayed bingham properties with yield points at 10 Pa and 3.3 Pa for the 1:1 and 1:2 dilutions respectively followed by Newtonian behavior at stresses above the yield point.

Elemental and anionic analyses were preformed on select solids and supernates. The predominant elements were found to be Al, K, Na and P in the supernates (>200 μg/ml) and Al, K, Na, P, U and Zr in the solids (>0.5 wt%).

Analysis of the anions showed the major anions to be F^-, NO_2^- and NO_3^- in both the supernates and solids with concentrations between 4900-49000 μg/ml in the supernates and 7700-170000 μg/g in the solids.

Previous studies have been conducted on actual waste (Scheele, McCarthy 1986)and simulated waste from tank 105-AW (McCarthy, Chan, Lokken 1986). The study of actual tank waste concluded that the sludge should to be classified as TRU due to high $Pu^{239,240}$ activity, 560 nCi/g. The results of our analysis confirm this conclusion finding a $Pu^{239,240}$ activity of 280 nCi/g in the centrifuged solids from the composite 3-6.

The activity of fission products in the sludge from the composite 3-6 was observed to be 150 μCi/g. The activity of fission products in the composite supernate in segments 1 and 2 was observed to be 48 μCi/ml. These fission product activities are slightly lower than the results of the previous study of actual waste, 310 μCi/g in the sludge and 56 μCi/ml in the supernate. Although the activities measured in this tank core are 15% to 70% lower than the previous core samples measured, our conclusions are the same. The transuranic elements have activities in excess of 100 nCi/g and will have to be partially removed for the waste to be classified as non-TRU.

INTRODUCTION

Pacific Northwest Laboratories (PNL) received seven core segments in May and June of 1990 from Westinghouse Hanford Company (WHC) sampled from Tank 241-AW-105 (105-AW), riser 16B. Tank 105-AW contains neutralized zirconium cladding removal waste generated by the PUREX process at Hanford. The current waste remediation plan calls for the mechanical retrieval of this waste, followed by suitable chemical processing to separate the components into three classes: transuranic waste (TRU), high-level waste (HLW) and low-level waste (LLW). The TRU and HLW fractions are to be immobilized as either grout or glass, and stored within deep geologic repositories. The LLW fraction is to made into grout for storage in near-surface facilities. Pursuant to the goals of retrieval, separation, immobilization and storage, information on the chemical, radiological, physical and rheological properties of the waste must be determined.

The summary of work received from WHC specified select physical, rheological, chemical and radiochemical analyses to be performed on the segments and composites, to be prepared from the segments. Table 1 lists most of the requested analyses. In addition to the analyses listed in Table 1, WHC requested tests of particle size, miller number, x-ray diffraction, Ni^{63}, Zr^{93} and Pu isotope ratios on select samples and composites. Currently, no method exists for determining the miller number, Ni^{63} and Zr^{93}. Additionally, no method exists for measuring HLW for particle size or x-ray diffraction. Isotopic composition of Pu by MS analysis requires 30 μg/10 ml. All samples contained less than 30 μg/10 ml, so Pu isotopic ratios were not determined. The remaining samples were archived for future analyses should method development make analysis for these or other properties possible. Measurement of pH was requested on composite 3-6 solids. This measurement was carried out instead on the centrifuged supernate of this composite.

Table 1. Summary of Analyses Requested by Westinghouse Hanford Company.

Analysis	1-2	3-4	5 AR	5 1:1	5 1:2	6	7	3-6
Physical and Rheological								
Shear Strength			X				X	
Penetration Resistance			X				X	
Density	X	1	X	X	X	1	X	1
Settling Rate			X	X	X			
vol% Settled Solids		X	X	X	X	X		X
wt% Settled Solids		X				X		
vol% Cent. Solids		X	X	X	X	X		X
wt% Cent. Solids		X				X		X
wt% Water	X	X	X	X	X	X	X	X
wt% Oxides							X	X
Shear Stress vs. Shear Rate			X	X	X			
Chemical								
IC	X	X	X			LS	X	LS
ICP	X	X	X			LS	X	LS
TC,TOC	X	X	X			LS	X	LS
pH	X						X	LS
OH	X						X	LS
NH_2/NH_4^+	X	X	X			L	X	L
Cr(III)/Cr(VI)	X						X	LS
Hg	X						X	LS
As	X						X	LS
Se	X						X	LS
CN	X						X	L
Noble Metals (RU, Rh, Pd)							A	A
Total U	X						X	LS
Radiochemical								
Total β	X						X	X

GEA	X	X	X			LS	X	LS
AEA	X	X	X			LS		
H-3	X						X	LS
C-14	X						X	LS
Se-79	X						X	LS
Sr-90	X						X	LS
Nb-94	X						X	LS
Tc-99	X						X	LS
I-129	X						X	S
Np-237	X						X	LS
Am-241	X						X	LS
Cm-244	X						X	LS

SAMPLE RECEIVING, EXTRUSION AND COMPOSITING

Pacific Northwest Laboratories received seven core segments from WHC composing a single core of tank 105-AW. The seal on cask 1002C, containing segment 5, was damaged by a loose chain on the truck during transport. This damage prevented verification of seal data. All other casks were received with seals intact, and the data on the cask seals matching the information on the chain-of-custodies. Table 2 lists the segments received along with WHC sample number, shipment number, cask number and date received.

Table 2. Tank 105-AW sample receiving information.

Segment	Sample Number	Shipment	Cask	Date Received
1	90-014	90-S-006	C1022	5-17-90
2	90-015	90-S-006	1006C	5-17-90
3	90-016	90-S-006	C1025	5-17-90
4	90-017	90-S-007	C1024	5-23-90
5	90-018	90-S-007	1002C	5-23-90
6	90-019	90-S-007	C1026	5-23-90
7	90-020	90-S-008	1009C	6-06-90

The samples were extruded in PNL's High-Level Radiochemical Facility (325-A Hot-Cell facility). Segments 1 and 2 contained 205 ml and 245 ml of liquid respectively. No solids were observed for either segment. Segments 3, 4, 5, 6 and 7 contained no free liquids. The solids in segment 5 and the top 7 inches of segment 6 appeared drier than the other solids in this core. Table 3 lists segment extrusion dates, density and mass of solid or volume of liquid.

Segment 3 appeared as a gray slurry on the top 11 inches that could not hold its shape. With increasing depth in the segment 3, the color lightened from a gray to a white by 11 inches down. Additionally, the material became more of a sludge, able to retain its shape after extrusion. Segment 4 was a white sludge, similar to the material at the bottom of segment 3. The material in segment 5 was dry and broke off into chunks upon extrusion. Segment 5 was white with the exception of some brown and black spots. The first 7 inches of segment 6 appeared similar to segment 5, a dry white

material with streaks of brown. The bottom 12 inches were grayish white in color and had a margarine-like consistency. The material in segment 7 was harder than in the previous segments. The material was very dark in color with white marbling in the top 4 inches. Photographs of the segments which contained solids (segments 3, 4, 5, 6 and 7) are provided in Figures 1 through 5.

Three composite samples were prepared in equal ratios by weight as per the letter of instruction. The first, 1-2, was a mixture of segments 1 and 2; the second, 3-4, was a mixture of segments 3 and 4; the third, 3-6, was a mixture of segments 3,4,5 and 6.

Two dilutions, at 1:1 and 1:2 sample to supernate ratios, were prepared using the as-received material from segment 5 and the supernate from composite 1-2. These dilutions were made on a volume percent basis.

Table 3. Extrusion Data for Tank 105-AW.

Segment	Date Extruded	Volume Recovered (ml)	Mass Recovered (g)	Density (g/ml)
1	5-23-90	205		1.08*
2	5-23-90	245		1.08*
3	5-23-90		294	1.35**
4	6-13-90		314	1.35**
5	6-14-90		307	1.40
6	6-15-90		323	1.44
7	6-15-90		122	1.50

* Measurement made on composite of segments 1 and 2
** Measurement made on composite of segments 3 and 4

EXPERIMENTAL DESIGN AND PROCEDURES

PHYSICAL AND RHEOLOGICAL

Physical and rheological measurements were made on the as-received material from the seven segments, on the 1:1 and 1:2 solid to supernate dilutions of segment 5 and on the three composites: 1-2, 3-4 and 3-6. Shear strength and penetration resistance were measured on the as-received material from segments 5 and 7. Shear stress as a function of shear rate was measured on the dilutions of segment 5. Density, settling rates, volume percent (vol%) and weight percent (wt%) settled solids, vol% and wt% centrifuged solids, wt% water and wt% oxides were measured on the segments, composites and dilutions as per the letter of instruction, see Table 1.

Density: Density determination were made by placing the samples in preweighed, volume-graduated, centrifuge tubes where they were weighed and then centrifuged for one hour at greater than 1000 gravities to remove voids. This ensured accurate volume measurements and allowed division of the sample mass by sample volume to obtain density. The density of the centrifuged supernate was obtained by transferring the centrifuged supernate to a preweighed graduated cylinder. The volume and mass of the sample were recorded and the density was calculated by dividing the mass of the sample by the volume of the sample.

Settling Behavior: Settling rates and volume percent settled solids measurements were conducted in preweighed, volume-graduated, centrifuge tubes. The cross-sectional area in the upper portion of the centrifuge tubes was constant thus allowing the conversion of settling rate data from ml/hr to cm/hr. After settling rates were determined, the volume percent settled solids were calculated by dividing the final settled solids volume by the total sample volume.

Weight Percent Solids and Oxides: Samples for determination of weight percent solids and weight percent oxides were place into preweighed vials, weighed and allowed to air-dry overnight to remove free liquid to prevent splattering upon heating. Weight percent solid samples were then transferred to a drying oven at 105°C where they were dried for 24 hours. The dried

samples were removed from the oven, placed in a desiccator to cool to room temperature, reweighed, and the weight percent solids calculated. Weight percent oxides samples were transferred to a muffle furnace at between 1000°C and 1050°C for 30 minutes. The dried samples were removed from the furnace, placed in a desiccator to cool to room temperature reweighed, and the weight percent oxides was calculated.

pH: Measurements of pH were made on the centrifuged supernates from segment 7 and the composites 1-2 and 3-6. The electrode was calibrated with NIST traceable pH buffer solutions at pH 4 and pH 10. The calibration was checked with a pH 7 buffer before the samples were measured.

Rheogram: Shear stress as a function of shear rate was measured on the 1:1 and 1:2 dilutions of segment 5 at 31C. The samples were analyzed in duplicate for shear stress as a function of shear rate using a Haake Rotovisco® viscometer modified for Hot-Cell operation with an M5 measuring head and an MV-I sensor. The sample was thoroughly agitated, and 40 ml of the sample was transferred to the viscometer cup. The shear rate was gradually ramped from 0 s^{-1} to 468 s^{-1}. Shear stress as a function of shear rate data was obtained by measuring the shear stress produced at the specific shear rates. Calibration checks were made with certified 25 cP and 10 cP viscosity standards to ensure that the viscometer was operating properly.

Shear Strength: Shear strength, τ_s, is a semiquantitative measure of the force required to move the sample. Since this property is dependent upon sample history, the shear strength was measured before the sample was disturbed, three months following extrusion. Segments 5 and 7 were analyzed in duplicate for shear strength using a Haake Rotovisco® viscometer modified for Hot-Cell operation with an M5 head and a shear vane manufactures at PNL. The shear vane, #3, had a height of H_v=1.588 cm and a diameter of D_v=0.800 cm. The shear strength was then calculated according to Equation 1 where 4.9 x 10^5 dyne·cm is the maximum torque of the M5 head and $\%\tau/100$ is the ratio of the total torque which is recorded as full scale on the plot of the shear stress.

(1)

$$\tau_s = \frac{\frac{\%\tau}{100} \times S_t \times 4.90 \times 10^5}{\frac{\pi \times H_v \times D_v^2}{2} + \frac{\pi \times D_v^3}{6}}$$

Penetration Resistance: Penetration resistance was measured in duplicate on segments 5 and 7 to determine whether these solids exhibited dilatant or cohesive properties. The penetration resistance measurement is a qualitative indicator of a sludge's cohesive of dilatant behavior and does not provide a quantitative measurement. Knowledge of cohesive of dilatant properties of a sludge are useful for 1) interpreting shear strength data, 2) applying pilot-scale sludge mobilization equations and 3) determining full-scale mixer pump performance for sludge retrieval. A dilatant sludge will tend to be eroded by the mixer pumps whereas a cohesive sludge will be broken down into large chunks of sludge by the mixer pump.

The difference between the penetration resistance of a dilatant material and a cohesive material is large (a factor of 10) which makes the penetration resistance a good indicator of this property. A low penetration resistance (0-10 psi) indicates that a sludge is cohesive. A high penetration resistance (100 psi or greater) suggests that a sludge is dilatant, but it must be known whether the sludge is composed of finely divided material and not some other type of material such as a solid crystal mass to make a final determination.

A Soil Test Inc. CT-421 penetrometer equipped with a 1" diameter probe tip was used for these measurements. The penetration resistance was measured after the tip had been inserted to a depth of 1".

CHEMICAL AND RADIOCHEMICAL

Select segments, composites and dilutions were prepared for analysis of chemical and radiochemical components. Before analysis, two fusions of each of the solids were preformed, and the liquids were filtered through a 0.2 μm filter. The first fusion was a sodium peroxide fusion in a zirconium crucible and the second fusion was a potassium hydroxide fusion in a nickel crucible. Both fusions are needed to determine the sodium, potassium, zirconium and nickel concentrations. The fusions were dissolved in hydrochloric acid and the chemical and radiochemical analyses performed on these solutions.

Transuranic: All of the segments or their composites were analyzed for transuranic content. The analysis of the solids was run on a sodium peroxide fusion of the samples, and the liquids were run directly. The concentrations of the transuranics were measured by alpha energy analysis (AEA). The Am and Cm isotopes were separated from Pu by anion exchange. Both Pu and Am/Cm fractions were analyzed by alpha counting followed by AEA to determine the concentrations of ^{241}Am, ^{242}Cm, $^{243+244}Cm$, ^{238}Pu and $^{239+240}Pu$. Current MS techniques require 3 μg/ml of Pu to determine Pu isotopic ratio. The concentration of Pu was less than 3 μg/ml in all samples; therefore, MS could not be used to determine the isotopic composition.

Chemical and radiochemical analysis was performed on the segments and composites as requested. For the solids, these analyses were preformed on acid dissolutions of the fused composites or water leachates of the composite material. On the liquids, these analyses were performed on the as-received samples or dilutions of these samples.

Elemental Analysis: Inductively coupled argon plasma atomic emission spectroscopy (ICP) was used to determine the concentration of a majority of the elements in the waste. For the solids, both fusions were analyzed by ICP to determine the concentrations of all the elements of interest. A water leach of each solid and a dilution of each liquid was used to measure the anions. The anions were measured by ion chromatography (IC) using an AS4A anion exchange column.

Fission Products: The ^{14}C activity was measured directly on segment 7 and composites 1-2 and 3-6. Oxidation and extraction of the carbon was accomplished by the hot acidic persulfate method using a Coulometric Inc. carbon analyzer. The ^{14}C was measured on the extract by liquid scintillation counting.

The Trituim (^{3}H) analysis was performed on water leaches of the solid samples and dilutions of the liquid samples. The leachates of dilutions were distilled, and the distillates were analyzed by scintillation counting.

Due to the volatility of iodine, the waste samples were prepared for analysis of iodine using a distillation technique. A known amount of I^- was added to the liquid samples or to the acid dissolutions of the KOH fusion of

the solid samples. Sodium sulfite was then added and the sample acidified to reduce all iodine to I^-. The sample was then transferred to a distillation apparatus where sodium nitrate was added to oxidize the I^- to I^2. The I^2 was distilled and the distillate acidified. The iodine was then precipitated as AgI, collected on a filter, dried and weighed to determine the iodine recovery. The solids were then dissolved in deionized water and counted in a Ge(Li) diode well detector to measure ^{129}I.

The ^{79}Se and ^{99}Tc were purified using either precipitation or ion exchange and measured by β counting or liquid scintillation counting. The ^{237}Np was measured directly by AEA. No analytical methods were available for the measurement of ^{63}Ni and ^{93}Zr.

EXPERIMENTAL RESULTS

PHYSICAL CHARACTERIZATION

The physical properties of the as-received material, composites and dilutions are given in Table 4.

Table 4: Physical properties of material from tank 105-AW.

Property	1-2	3-4	5	5 1:1	5 1:2	6	7	3-6
Density (g/ml)								
Sample	1.08	1.35	1.40	1.22	1.16	1.44	1.50	1.39
Centrifuged Supernate	1.08	1.21				1.09		1.01
Centrifuged Solids	NS	1.42				1.59		1.58
Settled Solids (vol%)	NS	100*	100*	96.9	85.6	100*		100*
(wt%)	NS	100	100			100		100
Centrifuged Solids (vol%)	NS	63.1	75	38	26	70		71
(wt%)	NS	66.8				77.3		78
Solids (wt%)	~~7.84~~	31.2	39.3	25.7	23.0	42.8	58.5	41.6
~~Oxides (wt%)~~							35.8	35.6
pH	13.2						12.8	13.4
Shear Strength (10^4 dyne/cm^2)			1.64					
Penetration Resistance (PSI)			3				6	

NS No solids in segments 1 and 2
* No Settling Observed for 2 Days

As shown in Table 4, the as-received material did not settle, although settling was observed in the segment 5 dilutions, see Figure 6. The settling in the segment 5 dilutions was noted over the entire 30 hour period; however, settling appeared 75% and 97% complete after 26 hours for the 1:1 and 1:3 dilutions respectively. Volume percent centrifuged solids dropped by a factor of 2.0 from the as-received material to the 1:1 dilution, and by a factor of

1.5 from the 1:1 to the 1:2 dilution, suggesting the supernate is saturated with respect to the solid.

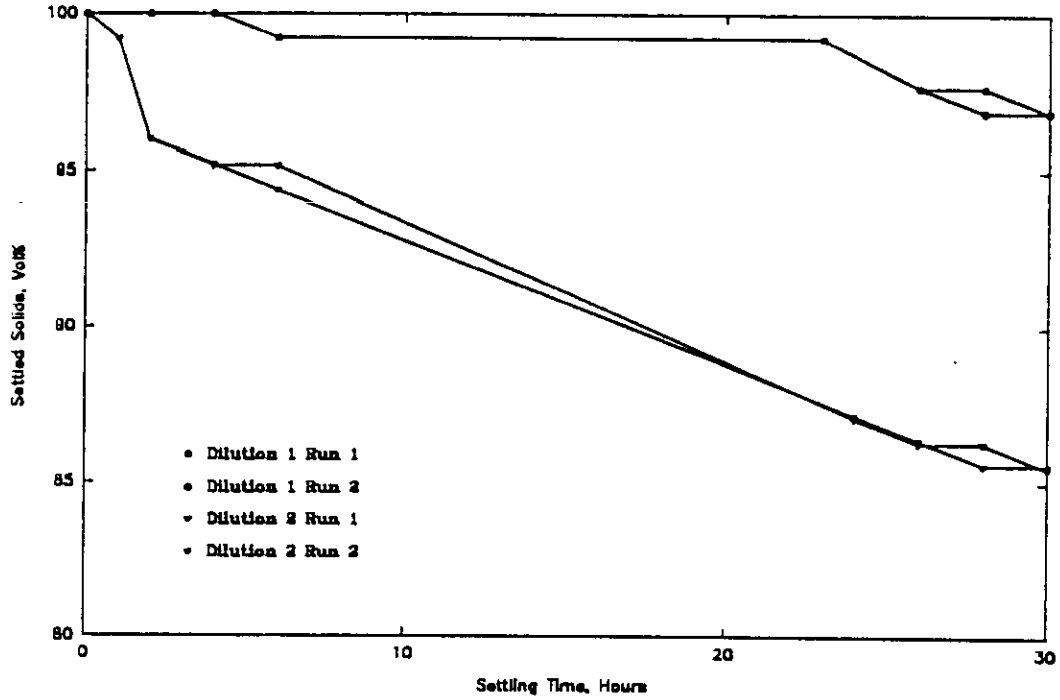

Figure 6. Settling Behavior for the 1:1 and 1:2 Dilutions of Segment 5.

The penetration resistance of segments 5 and 7 were determined to be 2.5 and 6.0 respectively. Therefore, the material in both segments exhibit cohesive properties. Penetration resistance measurements were made at the ambient hot-cell temperature of 37C.

Sample Density and wt% solids increased with segment depth suggesting a) the exclusion of supernate with depth and/or b) a change in the density of the solids resulting from either the compression of the solids or a change in the chemistry of the solid. If supernate exclusion were the only factor, one would expect the vol% centrifuged solids to increase with depth; however, vol% centrifuged solids reaches a maximum of 75% in segment 5. Therefore, it is logical to assume the increase in sample density and wt% solids involve an increase in solid density resulting from either compression of the solids and/or a change in the solid composition.

Shear stress as a function of shear rate was measured in duplicate on the 1:1 and 1:2 sample to supernate dilutions of segment 5. The rheograms are

given in Figures 7 to 10. A rheogram for a material will have two portions. The first appears as a nearly vertical line beginning at the origin and running up the ordinate. This portion of the rheogram is recording the behavior of the material as it acts like a solid or gel. When sufficient force is transmitted to the material to break the gel or make it yield, the rheogram will angle sharply to the right, and from then on the behavior of the material as a fluid is recorded. The point in the curve at which the sample transfers from a solid or a gel to a fluid is the yield point. The stress at this point measured in Pascal (Pa) on the ordinate is the value of the yield stress. Shear stress as a function of shear rate is only applicable to materials which flow. Segment 5 as-received was a solid that did not flow, therefore, shear stress as a function of shear rate was not measured on the as-received material.

Both dilutions of segment 5 displayed yield points. These yield points correspond to yield stresses of 9.6 Pa and 3.0 Pa for the 1:1 and 1:2 dilutions respectively. Past the yield stress, both dilutions displayed a near linear increase in shear stress with shear rate. The linear fit for the shear stress (τ) versus the shear rate (γ) is given in Table 5 according to equation 2.

$$\tau = a + b\gamma \qquad (2)$$

where a = Yield Stress (Pa)

b = Slope (Pa·s)

Table 5. Linear Fit Parameters for Shear Stress Versus Shear Rate on 1:1 and 1:2 Dilutions of Segment 5.

Dilution	a	b	R^2
1:1 Run 1	10.3	0.0122	0.9804
1:1 Run 2	9.62	0.0124	0.9899
1:2 Run 1	3.29	0.00806	0.9736
1:2 Run 2	3.37	0.00759	0.9896

A material which displays a linear relationship between shear stress and shear rate, provided a defined yield stress is exceeded, is defined as displaying bingham properties. As shown in Table 5, The linear fit parameters for the dilutions yield an R^2 of approximately one. Therefore, the dilutions of segment 5 can be considered displaying bingham properties.

The viscosity of a material is found by taking the ratio of the shear stress divided by the shear rate. If the shear stress increases linearly with the shear rate, then the viscosity is independent of the shear rate. Viscosity is reported in cP (1cP=1mPa·s). As near bingham materials, the viscosities of the dilutions varied only slightly with shear rate beyond the yield point. The viscosity of the 1:1 dilution decreased slightly from 130 cp to 30 cp over the shear rate range 100 s^{-1} to 450 s^{-1}, and the viscosity of the 1:2 dilution decreased from 42 cP to 15 cP in the same range.

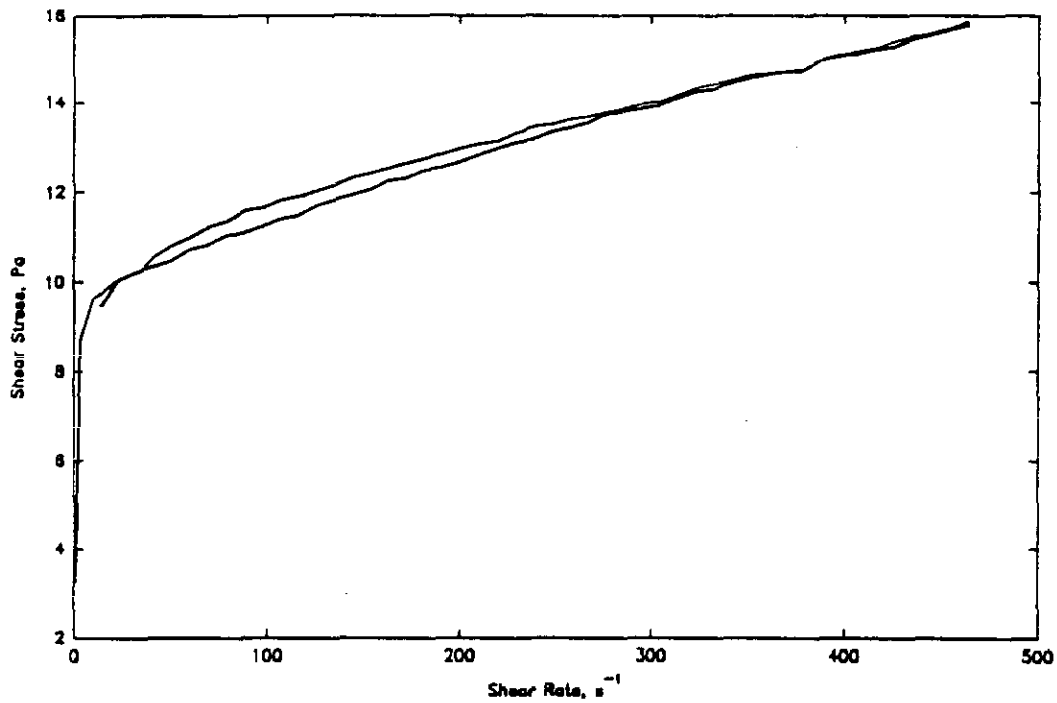

Figure 7. Shear Stress as a Function of Shear Rate for the 1:1 Dilution of Segment 5.

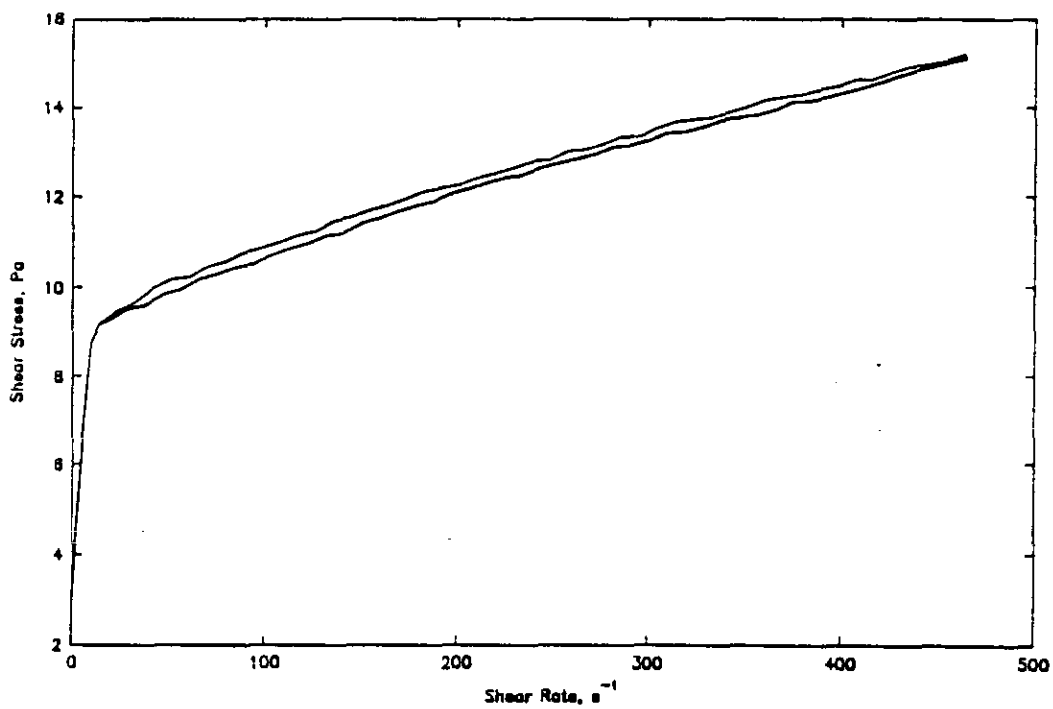

Figure 8. Shear Stress as a Function of Shear Rate for the Duplicate 1:1 Dilution of Segment 5.

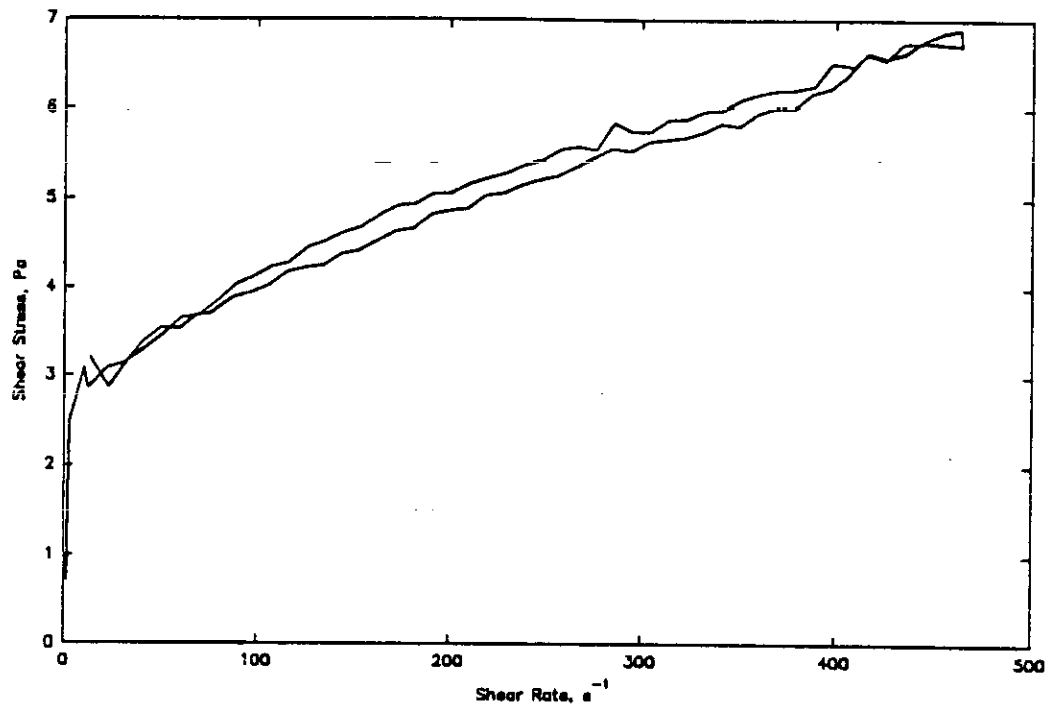

Figure 9. Shear Stress as a Function of Shear Rate for the 1:2 Dilution of Segment 5.

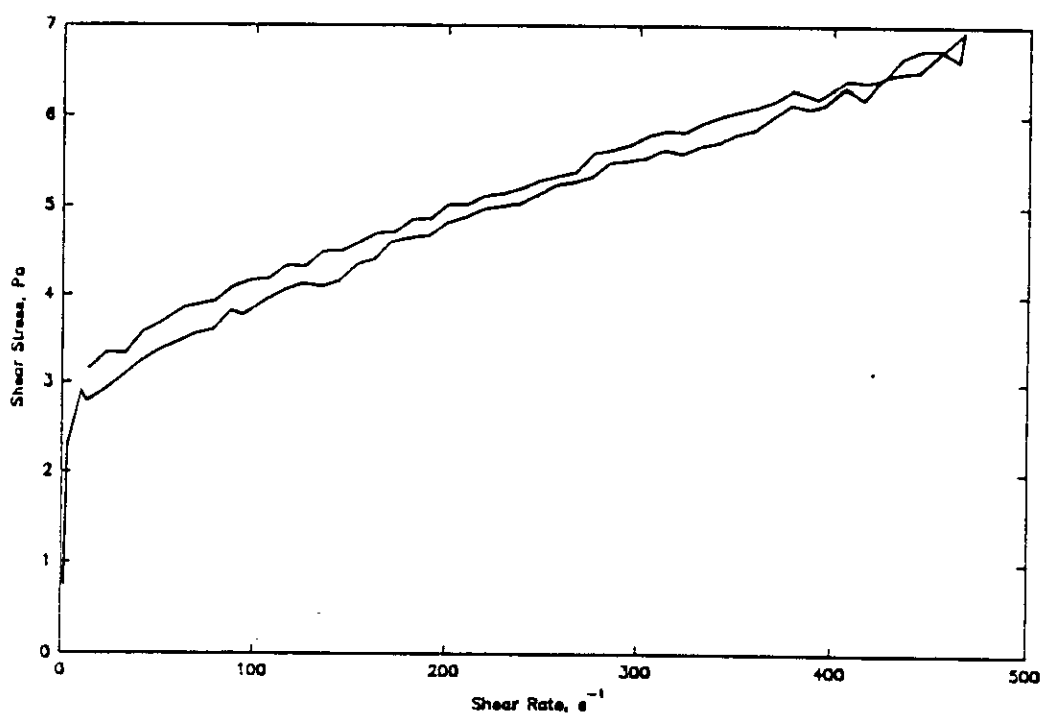

Figure 10. Shear Stress as a Function of Shear Rate for the Duplicate 1:2 Dilution of Segment 5.

Chemical Characterization

The results of the ICP analysis for the segments and composites from tank 105-AW are presented in Table 6. A value in parenthesis indicates the element was not detected. The values listed in parenthesis are the instrumental detection limit achievable for samples that contain low concentrations of all elements. Figure 11 presents the results of the elemental analysis for the seven elements with the highest concentrations. The main elements in the solids (>0.5%) include aluminum, potassium, sodium, phosphorus, uranium and zirconium. The main elements in the supernates (>1000 μg/ml) include aluminum, potassium, sodium and phosphorus. As shown in Table 6, the supernates contain less than 20 μg/ml of uranium and zirconium. Silicon appears to be a major component in the solids and supernates, however, the actual concentrations of silicon in these samples is not known because the samples were stored in glass bottles that may have reacted with the highly alkaline waste.

The results of the chemical analyses are presented in Table 7. The results for F through SO_4 are in μg/ml for the supernates and μg/g for the solids.

Table 6. Elemental Analysis of 105-AW Waste

	Supernate concentration (ug/ml)			Solids Concentration (wt%)				
	1-2	6	3-6	3-4	5	6	7	3-6
Ag	(0.169)	(0.169)	(0.169)	(0.0017)	0.0218	0.0314	0.0119	0.0144
Al	906	1130	684	0.324	0.252	0.332	3.66	0.352
As	6.76	9.12	11.1	0.0476	0.0817	0.0616	0.0509	0.0509
B	3.27	19.9	5.96	(0.12)	0.0467	0.0467	0.0467	0.0467
Ba	0.25	4.54	2.13	0.0209	0.0184	0.0168	0.0086	0.0194
Be	0.785	2.65	2.7	0.016	0.0138	0.0139	0.00155	0.0172
Ca	7.86	8.03	19.4	0.0944	0.0694	0.0696	0.0977	0.134
Cd	0.1	0.29	0.12	(0.0024)	0.0116	0.0116	0.0116	0.0116
Ce	(1.2)	(1.2)	(1.2)	(0.063)	(0.13)	(0.13)	(0.13)	(0.13)
Co	(2.2)	(2.2)	(2.2)	0.0903	0.29	0.29	0.29	0.29
Cr	32.5	28.9	133	0.0676	0.0522	0.0477	1.75	0.0868
Cr^{+6}	22.2		(4.5)				0.283	0.0170

Cu	0.45	23.7	15.2	0.0273	0.0130	0.0176	0.0294	0.0285
Dy	(0.051)	(0.051)	(0.051)	0.00355	0.0075	0.0075	0.0075	0.0075
Fe	0.665	1.27	1.27	0.359	0.172	0.158	1.94	0.568
K	13700	8910	14900	2.02	2.37	1.029	0.471	3.65
La	(0.13)	(0.13)	(0.13)	0.180	.200	0.0213	0.0165	0.255
Li	(0.086)	(0.086)	(0.086)	(0.014)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Mg	0.355	0.34	0.525	0.0091	0.0041	0.0081	0.058	0.0131
Mn	0.04	0.09	0.07	0.0954	0.0106	0.0152	0.55	0.211
Mo	2.78	11.9	7.45	0.003	0.0051	0.0051	0.0079	0.0051
Na	34200	58600	50500	27.0	27.0	28.7	25.5	25.8
Nd	(0.28)	(0.28)	(0.28)	0.0949	0.0627	0.0351	0.042	0.0658
Ni	0.99	200.	70.9	0.0377	0.0178	0.0288	0.0556	0.0261
P	317	959	1180	0.432	0.586	0.123	0.250	0.285
Pb	1.76	1.1	1.1	0.0337	0.0700	0.0598	0.136	0.0598
Re	(0.11)	0.3	0.3	0.0089	0.0105	0.0105	0.0105	0.0105
Rh	0.4	1.68	(.28)	0.0449	0.109	0.0801	0.0587	0.0587
Ru	0.5	3.84	1.5	(0.034)	0.0397	0.0397	0.0397	0.0397
Sb	(0.51)	1.2	0.5	(0.080)	0.0611	0.0611	0.0611	0.0611
Se	(1.23)	1.4	(1.24)	(0.096)	0.124	0.124	0.124	0.124
Si	213	2030	5340	0.888	0.827	0.492	0.306	0.659
Sr	0.02	0.105	0.04	0.0024	0.0019	0.00205	0.0023	0.00255
Te	(0.41)	(0.41)	(0.41)	0.0433	0.0566	0.0566	0.0566	0.0566
Th	(0.78)	(0.78)	(0.79)	0.0936	0.129	0.129	0.129	0.129
Ti	(0.091)	(0.091)	(0.092)	0.0047	0.0196	0.0162	0.0068	0.0141
Tl	(12)	(12)	(12)	(0.98)	(1.4)	(1.4)	(1.4)	(1.4)
U	16.7	11	(5.8)	0.310	2.44	3.06	1.25	1.90
V	0.1	(0.069)	(0.070)	0.00725	0.0081	0.0081	0.0081	0.0081
Zn	4.75	2.78	1.73	0.0747	0.0251	0.0138	0.032	0.0171
Zr	0.45	5.27	0.74	23.8	21.0	21.6	2.36	23.2

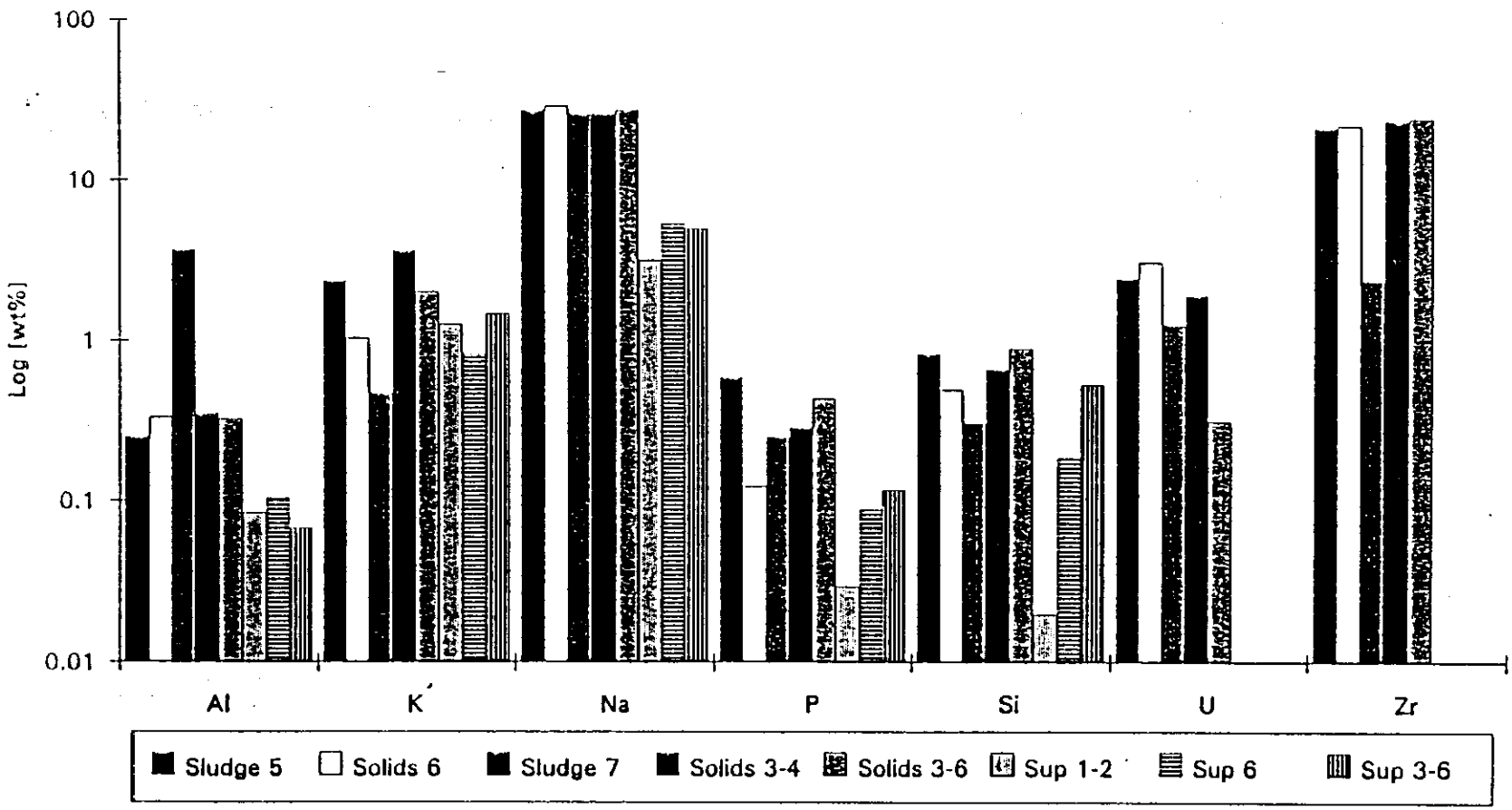

Figure 11. Major Elemental Components of Tank 105-AW Waste.

Table 7. Anion Analysis of 105-AW

Analyte			Supernate						Solids		
	1-2	3-4	5	6	7	3-6	3-4	5	6	7	3-6
NH3 (mM)	59.99	0.79	48.26	44.01	8.94	5.57					
F (ug/ml)	8300			8000		7700	86800	170000	150000	22000	71800
Cl	440			1300		880	1820	2800	2500	1900	1500
Br	(40)			(200)		(500)	(300)	(200)	(200)	(200)	(5)
NO2	4900			19500		11000	12100	18000	19000	30000	7700
NO3	24000			49000		37000	41500	46000	42000	81000	21500
PO4	660			(400)		900	1120	2900	(500)	1300	(1000)
SO4	1760			1800		2100	2600	3100	1800	5600	1000
OH (N)	0.76					0.768					
CO3 (wt% C)	0.12			0.1		0.26	1.6	0.24	0.42	0.57	0.19
TOC	0.06			0.002		0.485	0.3	0.41	0.35	2.93	0.29
Total C	0.18			0.1		0.745	1.9	0.65	0.77	3.68	0.48
pH	13.18				12.8	13.43					

Radiochemical Analyses

The results of the radiochemical measurements are presented in Table 8. The major nontransuranic activities are shown in Figure 12 for the supernates and Figure 13 for the solids and sludges. As seen in Figure 12, all supernates measured showed greater than 1 nCi/ml of $Cs^{134,137}$, Ru^{106} and Co^{60}. Most of the solids, as seen in Figure 13, contained greater than 1 nCi/g of Sr^{90}, Co^{60}, Ru^{106}, Sb^{125}, $Cs^{134,137}$, Ce^{144} and $Eu^{154,155}$.

The results of the transuranic analyses are listed in Table 8. The major transuranics are presented in Figure 14 for the supernates and in Figure 15 for the solids and sludges. As shown in Table 8, the activity of $Pu^{239,240}$ in the solids from composite 3-6 is 290 nCi/g. This value is ~50% lower than the value of 560 nCi/g measured previously in this tank (Scheele, McCarthy 1986). Since Pu^{239} and Pu^{240} both have half-lives greater than 5,000 years, the difference between these studies is most likely the result of differences in the locations of the corings. Regardless of the difference, both studies find the activities of the transuranics in excess of 100 nCi/g, and if the waste from Tank 241-AW-105 is to be classified as non-transuranic, these isotopes must be removed.

Table 8. Radiochemical Analyses of Waste from Tank 105-AW.

Analyte	Activity(nCi/ml) 1&2	6-sup	Comp-sup	Activity (nCi/g) 3&4	5	6-sol	7	Comp-sol
H-3	6.58E+00	NR	5.90E+00	NR	NR	NR	1.68E+01	5.41E+00
C-14	1.24E-01	NR	9.10E-01	NR	NR	NR	2.70E+00	3.00E-01
Se-79	2.15E-02	NR	(3.38E-02)	NR	NR	NR	(3.24E+01	(2.66E+00)
Sr-90	3.82E-01	NR	(1.17E+01	NR	NR	NR	3.00E+05	8.15E+04
Nb-94	(4.82E-03)	NR	(3.76E-03)	NR	NR	NR	(2.26E+00	2.72E-01
Tc-99	6.85E+00	NR	3.12E+01	NR	NR	NR	(9.01E+01	5.36E+01
I-129	2.69E-02	NR	2.41E-02	NR	NR	NR	(3.47E+00	1.52E+00
Np-237	(1.89E-03)	NR	1.55E-02	NR	NR	NR	3.45E+00	2.47E+00
Am-241	9.91E-02	ND	4.19E-03	1.50E+03	1.95E+03	7.45E+02	5.43E+03	1.04E+03
Cm-243&244	2.86E-02	2.87E-01	6.53E-04	1.62E+01	ND	ND	3.76E+02	3.09E+01
Pu238 & Am-241	NA	7.30E-01	NA	1.02E+03	2.00E+03	4.37E+02	NA	NA
Pu-239&240	(4.50E-02)	4.02E-01	9.46E-03	3.04E+03	2.98E+03	1.78E+03	2.37E+02	2.87E+03
Pu-238	(4.50E-02)	NA	2.36E-03	NA	NA	NA	(6.08E+02	2.91E+02
Co-60	2.10E+01	1.31E+02	1.02E+02	5.60E+02	5.32E+02	4.96E+02	5.97E+02	4.30E+02
Ru-106	9.35E+02	1.73E+03	9.23E+02	1.91E+04	8.22E+03	5.24E+03	ND	5.99E+03
Sb-125	ND	ND	ND	1.39E+04	1.25E+04	1.48E+04	ND	1.08E+04
Cs-134	5.83E+02	3.74E+02	4.93E+02	1.71E+03	9.94E+02	6.13E+02	ND	5.48E+02
Cs-137	4.68E+04	8.51E+04	6.71E+04	1.04E+05	8.29E+04	8.32E+04	1.76E+05	6.92E+04
Ce-144	ND	ND	ND	2.99E+04	4.14E+03	3.61E+03	ND	6.58E+03
Eu-154	ND	ND	ND	ND	9.39E+02	ND	8.90E+03	4.10E+02
Eu-155	ND	ND	ND	1.55E+03	4.33E+02	8.21E+02	1.11E+04	6.49E+02
Total alpha	NA	1.44E+00	NA	4.14E+03	4.95E+03	2.22E+03	NA	NA
Total Beta	4.95E+04	NR	7.07E+04	NR	NR	NR	8.20E+05	2.54E+05

NR = Not requested
ND = Not detected
NA = No analysis available

Insufficient Pu was available in the samples to perform Pu isotopic analyses.
Methods for Zr-93 and Ni-63 were not available.

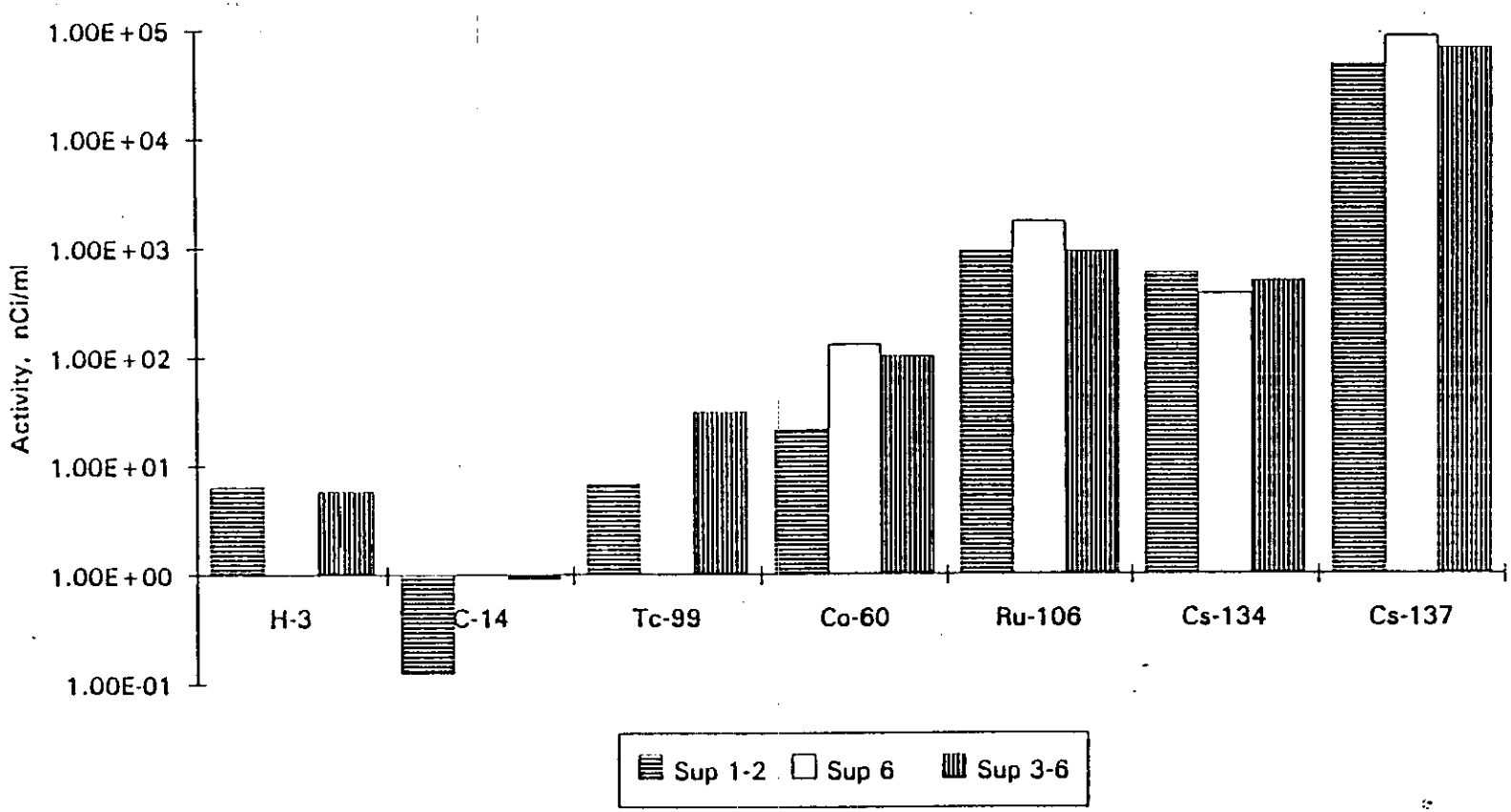

Figure 12. Main Nontransuranic Isotopes in the Supernate Waste from Tank 105-AW.

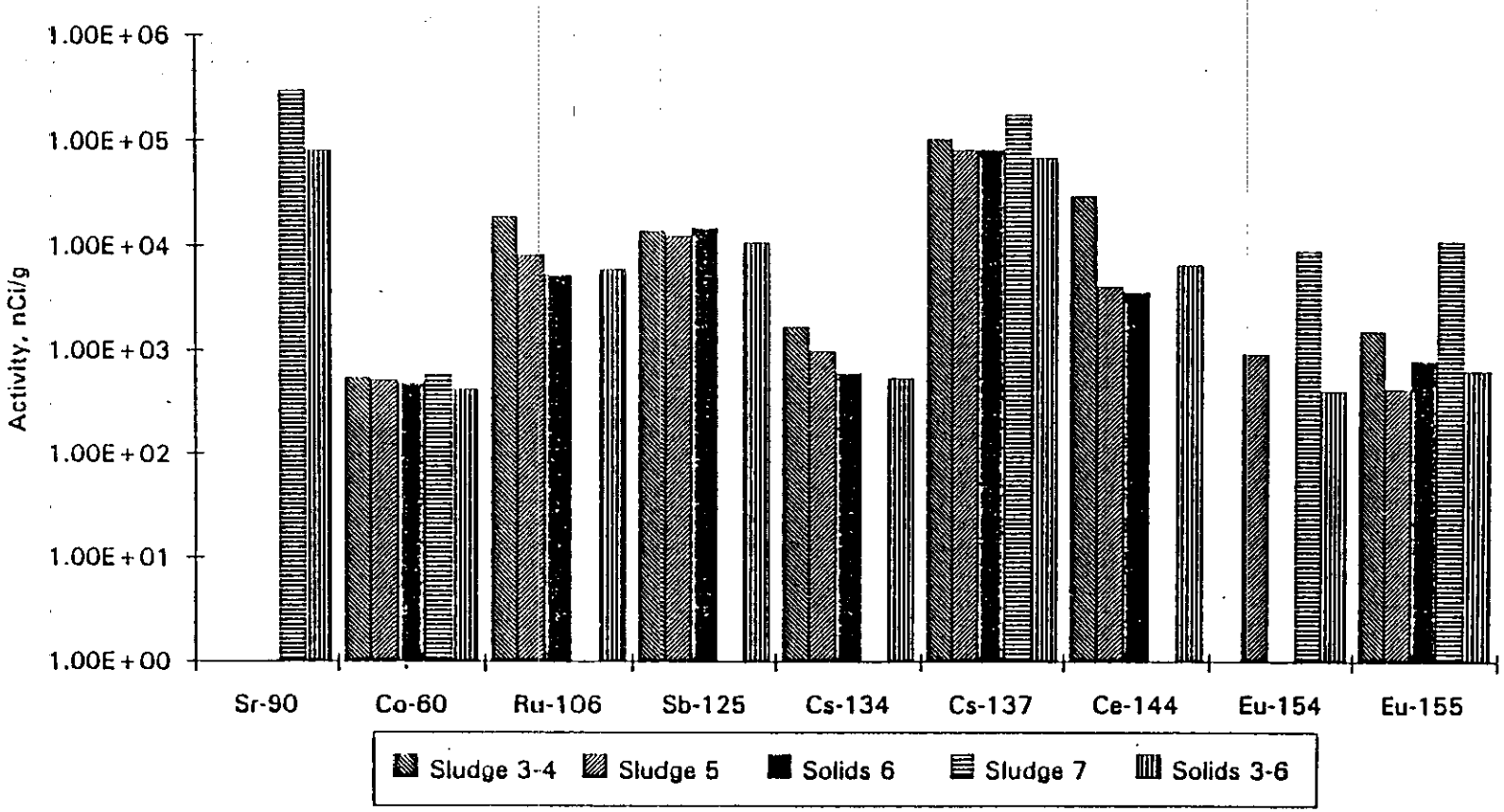

Figure 13. Main Nontransuranic Isotopes in the Solid Waste from Tank 105-AW.

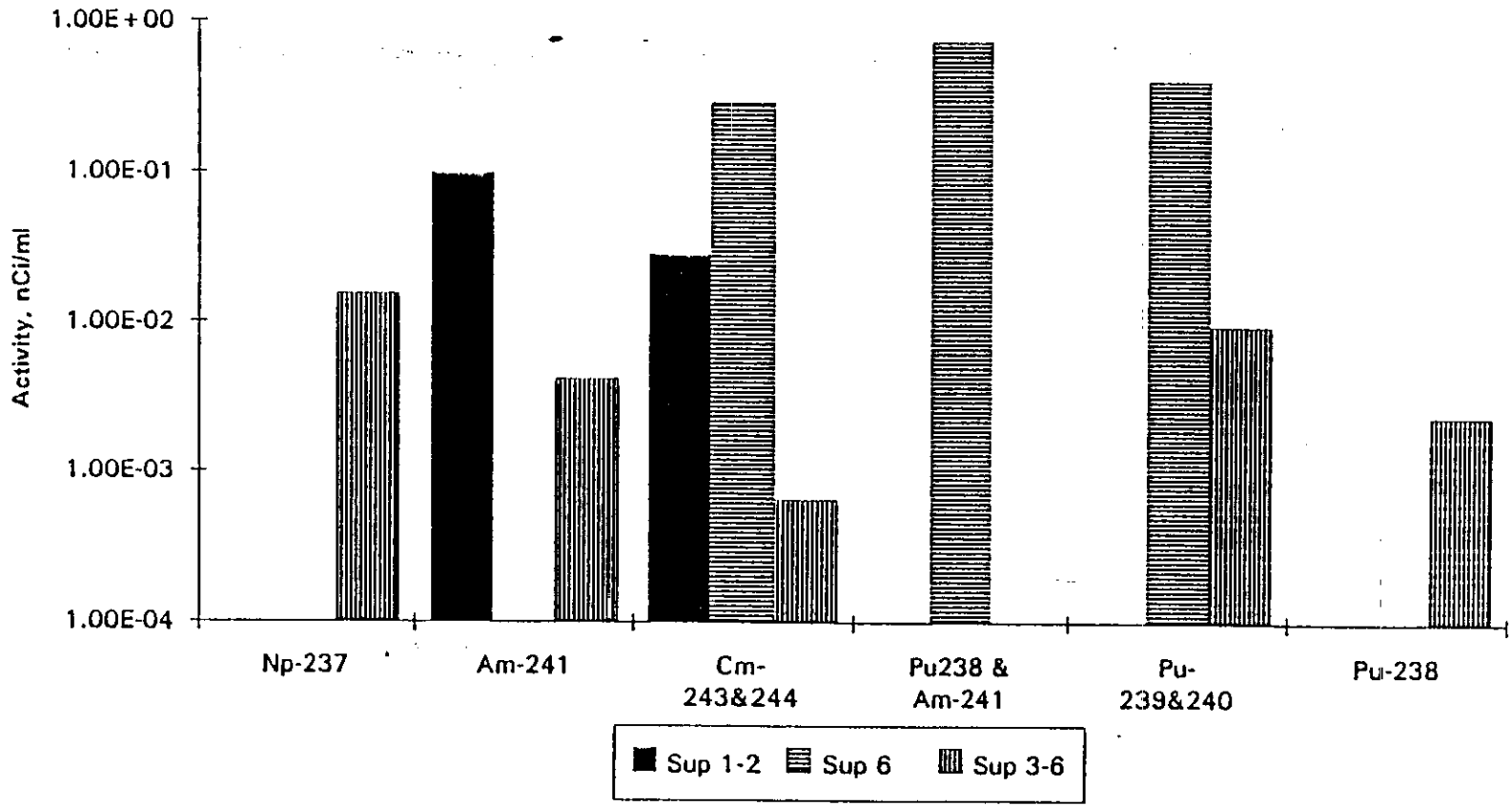

Figure 14. Transuranic Isotopes in Supernate Waste from Tank 105-AW.

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REFERENCES

McCarthy, D., M. K. C. Chan, R. O. Lokken. 1986. Rheological Evaluation of Pretreated Cladding Removal Waste. PNL-5584, Pacific Northwest Laboratory, Richland, Washington.

Scheele, R. D., D. McCarthy. 1986. Characterization of Actual Zirflex Decladding Sludge. Letter Report for Rockwell Hanford Operations, Pacific Northwest Laboratory, Richland, Washington.

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FACSIMILE TRANSMITTAL

DATE: 16. July 1992

To: Leela Sasaki
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Facsimile #: 3-4095
Telephone #: 3-1027

From: Joel Tingey
Chemical Sciences Department
Facsimile #: 6-1517
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Transmittal Consists of [3] Page(s) including cover page.

COMMENTS:

Attached are the preliminary data for the anions and cations. I am currently reviewing the radiochemical data and will send it to you tomorrow.

EA-1950-231 (6/91)

PRELIMINARY

Analyte			Supernate						Solids		
	1 & 2	3 & 4	5	6	7	COMP	3 & 4	5	6	7	COMP
NH3 (mM)	59.99	0.79	48.26	44.01	8.94	5.57					
F (ug/ml)	8300			8000		700	86800	170000	150000	22000	700
Cl	440			1300		80	1820	2800	2500	1900	15
Br	40			200		50	300	200	200	200	5
NO2	4900			19500		1000	12100	18000	19000	30000	75
NO3	24000			49000		3400	41500	46000	42000	81000	210
PO4	660			400		90	1120	2900	500	1300	10
SO4	1760			1800		190	2600	3100	1800	5600	10
OH (N)	0.76					0.768					
CO3 (wt% C)	0.12			0.1		0.26	1.6	0.24	0.42	0.57	0.19
TOC	0.06			0.002		0.485	0.3	0.41	0.35	2.93	0.29
Total Carbon	0.18			0.1		0.745	1.9	0.65	0.77	3.68	0.48
pH	13.18				12.8	13.43					
F (mM)	436.84			421.05		404.53	4,568.42	8,947.37	7,894.74	1,157.89	3,333.70
Cl	12.41			36.67		24.78	51.34	78.98	70.52	53.60	38.29
Br	0.50			2.50		6.87	3.75	2.50	2.50	2.50	5.66
NO2	106.50			423.82		238.64	262.99	391.22	412.95	652.03	147.50
NO3	387.03			790.20		602.03	669.25	741.82	677.31	1,306.24	306.44
PO4	6.95			4.21		10.41	11.79	30.54	5.26	13.69	9.53
SO4	18.32			18.74		21.72	27.07	32.27	18.74	58.30	9.42
CO3	0.09			0.08		0.20	1.23	0.18	0.32	0.44	0.15

The shaded values are less than values.

The units for the solid samples are umoles/g.

PRELIMINARY

OK

	Concentration (ug/ml)			Concentration (wt%)				
	1/2-sup	6-sup	C-L	5	6-SOL	7	3/4-SOL	C-S
Ag	0.169	0.17	0.17	0.022	0.031	0.012	0.014	0.002
Al	906.5	1135	684	0.252	0.332	3.661	0.352	0.324
As	6.755	9.12	11.16	0.082	0.062	0.051	0.051	0.048
B	3.27	19.86	5.955	0.047	0.047	0.047	0.047	0.123
Ba	0.25	4.535	2.13	0.018	0.017	0.009	0.019	0.021
Be	0.785	2.65	2.7	0.014	0.014	0.002	0.017	0.016
Ca	7.86	8.03	19.4	0.069	0.07	0.098	0.134	0.094
Cd	0.1	0.29	0.12	0.012	0.012	0.012	0.012	0.002
Ce	1.186	1.188	1.193	0.128	0.128	0.128	0.128	0.063
Co	2.206	2.21	2.219	0.29	0.29	0.29	0.29	0.09
Cr	32.54	28.91	132.9	0.052	0.048	1.75	0.087	0.068
Cu	0.45	23.75	15.16	0.013	0.018	0.029	0.028	0.027
Dy	0.051	0.051	0.051	0.008	0.008	0.008	0.008	0.004
Fe	0.665	1.265	1.265	0.172	0.158	1.937	0.568	0.359
K	13667	8905	14888	2.368	1.029	0.471	3.651	2.02
La	0.133	0.133	0.134	0.2	0.021	0.017	0.255	0.18
Li	0.086	0.086	0.086	0.003	0.003	0.003	0.003	0.014
Mg	0.355	0.34	0.525	0.004	0.008	0.058	0.013	0.009
Mn	0.04	0.09	0.07	0.011	0.015	0.548	0.211	0.095
Mo	2.78	11.93	7.45	0.005	0.005	0.006	0.005	0.003
Na	34220	58607	50452	27.01	28.72	25.5	25.78	27.02
Nd	0.283	0.283	0.284	0.063	0.035	0.042	0.066	0.095
Ni	0.99	200.1	70.91	0.018	0.029	0.056	0.026	0.038
P	317	958.5	1181	0.586	0.123	0.25	0.285	0.432
Pb	1.76	1.1	1.1	0.067	0.06	0.136	0.06	0.034
Re	0.117	0.3	0.3	0.011	0.011	0.011	0.011	0.009
Rh	0.4	1.68	0.275	0.109	0.08	0.059	0.059	0.045
Ru	0.5	3.84	1.5	0.04	0.04	0.04	0.04	0.034
Sb	0.51	1.2	0.5	0.061	0.061	0.061	0.061	0.08
Se	1.231	1.4	1.238	0.124	0.124	0.124	0.124	0.096
Si	213	2030	5343	0.827	0.492	0.306	0.659	0.888
Sr	0.02	0.105	0.04	0.002	0.002	0.002	0.003	0.002
Te	0.412	0.413	0.415	0.057	0.057	0.057	0.057	0.043
Th	0.784	0.785	0.788	0.129	0.129	0.129	0.129	0.094
Ti	0.091	0.091	0.092	0.02	0.016	0.007	0.014	0.005
Tl	12.17	12.18	12.24	1.418	1.418	1.418	1.418	0.98
U	16.7	11	5.801	2.445	3.056	1.25	1.904	0.31
V	0.1	0.069	0.07	0.008	0.008	0.008	0.008	0.007
Zn	4.745	2.775	1.725	0.025	0.014	0.032	0.017	0.075
Zr	0.49	5.265	0.74	21.03	21.56	2.364	23.25	23.84
U	12.0	—	3.24	—	—	—	1.51	2.16

Shaded areas indicate that the concentration is below detection limits, and the values reported are the detection limits. The actual concentrations are less than the reported values.

Uranium by fluorescence is red value at bottom of Table

Date: Jan 29, 1991

To: Tingey
From: Urie

OH^- Titration Analysis

Lab ID	Customer ID	pH/End Point	Normality
90-6010	102SY 3/4 Solids Water Leach	Init pH 8.12	----
		EP1 pH 6.55	0.002
		EP2 pH 4.74	0.007
90-6842	D105AW 1-2 SUP	Init pH 11.2	---
		to pH 10.0	0.76
		EP1 pH 8.78	0.84
		EP2 pH 5.01	1.13

Samples are titrated with dilute HCl and the acid required to titrate to a pH of 10.0 is, by mutual agreement with customer ascribed to be OH^-. Other end points and acid requirements are due to HCO_3^-, CO_3^{-2} and hydrolyzable metals. Data is recorded in LRB 52846 page 17. Analysis performed Oct 25, 1990.

Analyte			Supernate			90-7704			Solids		90-7703
	1 & 2	3 & 4	5	6	7	COMP	3 & 4	5	6	7	COMP
NH3 (mM)	59.99	0.79	48.26	44.01	8.94	5.57					
F (ug/ml)	8300			8000		700	86800	170000	150000	22000	700
Cl	440			1300		80	1820	2800	2500	1900	15
Br	40			200		50	300	200	200	200	5
NO2	4900			19500		1000	12100	18000	19000	30000	75
NO3	24000			49000		3400	41500	46000	42000	81000	210
PO4	660			400		90	1120	2900	500	1300	10
SO4	1760			1800		190	2600	3100	1800	5600	10
OH (N)	0.76					0.768					
CO3 (wt% C)	0.12			0.1		0.26	1.6	0.24	0.42	0.57	0.19
TOC	0.06			0.002		0.485	0.3	0.41	0.35	2.93	0.29
Total Carbon	0.18			0.1		0.745	1.9	0.65	0.77	3.68	0.48
pH	13.18				12.8	13.43					
F (mM)	436.84			421.05		36.84	4,568.42	8,947.37	7,894.74	1,157.89	36.84
Cl	12.41			36.67		2.26	51.34	78.98	70.52	53.60	0.42
Br	< 0.50			< 2.50		< 0.63	< 3.75	< 2.50	< 2.50	< 2.50	< 0.06
NO2	106.50			423.82		21.73	262.99	391.22	412.95	652.03	1.63
NO3	387.03			790.20		54.83	669.25	741.82	677.31	1,306.24	3.39
PO4	6.95			< 4.21		0.95	11.79	30.54	< 5.26	13.69	< 0.11
SO4	18.32			18.74		1.98	27.07	32.27	18.74	58.30	0.10
CO3	0.09			0.08		0.20	1.23	0.18	0.32	0.44	0.15

Anal Anions on Comp

Dilution Factor

SUP 10 10.98x

1.1251 g + 101.8060 g H_2O

Battelle
Pacific Northwest Laboratories

Project Number 14598

Internal Distribution

File/LB

Date September 28, 1993

To J. M. Tingey

From M. W. Urie

Subject Revised Ion Chromatography Results for D105-AW-C-L and D105-AW-C-S

Based on an evaluation of the originally reported results (attached) and information obtained from the SAL files related the preparation of the samples prior to distribution to the laboratory for analysis, it is obvious that reported results failed to incorporate the SAL preparation factors. The liquid supernate was diluted by 11x and the solid underwent a 102.6x leach with water. Therefore, the actual results calculated back to the "original" sample are:

	90-7703 D105-AW-C-S (μg/g)	90-7704 D105-AW-C-L (μg/mL)	90-7704 Dup D105-AW-C-L (μg/mL)
Fluoride	71800	7700	7700
Chloride	1500	770	990
Nitrite	7700	11000	11000
Bromide	<500	<500	<500
Nitrate	21500	36000	37000
Phosphate	<1000	500	1300
Sulfate	1000	2100	2100

Please note that the same qualifications apply to the above results as applied to the originally reported results (e.g., matrix interference affecting quantitation). Also, the spike recoveries originally reported are valid.

E54-1900-001 (10/89)

***** ION CHROMATOGRAPHY *****
***** ANALYTICAL RESULTS *****

Customer: J. TINGEY

325-400: ANIONS SYSTEM-3 100 µL Sample Loop

WP #: M85187

SAMPLE ID / LAB NUMBER	Units (a)	F	Cl	NO_2	Br	NO_3	PO_4	SO_4
		<<<<<<<<<<<<<<<<<<<< CONCENTRATION >>>>>>>>>>>>>>>>>>>>						
90-7703 D105-AW-C-S		700	15 [1]	75	<5	210	<10	10
MATRIX SPIKE & DUP. XSpike Recovery MATRIX SPIKE	%	96,101	76,78	80,84	84,88	90,92	83,91	90,94
BLANK (90-7703)		<0.2	0.2 [2]	<0.4	<0.2	<0.4	<0.4	<0.4
XSpike Recovery	%							
90-7704 [3] D105-AW-C-L		700	70	1000	<50	3300	50 [1]	190
XSpike Recovery	%							
DUP 90-7704 [4] D105-AW-C-L.		700	90	1000	<50	3400	120 [1,4]	190
XSpike Recovery	%							
XSpike Recovery	%							
XSpike Recovery	%							
XSpike Recovery	%							

COMMENTS

1: MATRIX INTERFERENCE AFFECTS QUANTITATION
2: VERIFICATION STD. FAILURE OF ~12%; POTENTIAL UNDERESTIMATION.
3: MATRIX COMPONENTS RESULT IN FLUCTUATING/ERRATIC BASELINE; RUN @ X25 DILUT
4: RUN @ X250 DILUTION; PRECISION AFFECTED BY DIFFERENCES IN DILUTION FACTORS.

M&TE: WM00474 WA83665
P/N-F02993 P/N-B11620

Analyst: Padmanabhan Mahadevan Date: 9/24/91

Method: PNL-MA599-ALO-212

Reviewer: MW Thomas Date: 9/26/91

(a) Units = µg/mL, unless otherwise noted.
(b) Spike recovery analysis requirements defined by ALO-212, SOW, or TI -- or performed at operator's discretion.
(c) Calibration, Verification, & Spike Std data in IC Std Binder.

***** ION CHROMATOGRAPHY *****
***** ANALYTICAL RESULTS *****

Customer: Walt Gray

WP #: M-45324

SAMPLE ID / LAB NUMBER	Units (a)	F	Cl	NO2	Br	NO3	PO4	SO4
		<<<<<<<<<<<<<<<<<<<< CONCENTRATION >>>>>>>>>>>>>>>>>>>>						
90-7700 D105-AW/6-Sup		8000	1300	19,500	<200	49,000	<400	1800
%Spike Recovery	%	102	99	106	106	105	110	99
90-7691 1023Y-½-AN		700	200	2400	<200	17,300	<400	200
%Spike Recovery	%							
90-7692 D101-A2-C2 wash 2		230	20	5000	<20	3800	<40	1670
%Spike Recovery	%							
90-7693 D101-A2-C2-wash 1		780	60	18,100	<20	13,900	360	5800
%Spike Recovery	%							
90-7694 D102-A2-C1-wash 2		70	10	1900	<20	310	<40	790
%Spike Recovery	%							
90-7695 D102-A2-C1-wash 1		230	20	7200	<20	1200	<40	2940
%Spike Recovery	%							
%Spike Recovery	%							
%Spike Recovery	%							

LRB/Pg#: 53730-83

Analyst: John Carver Date: 12-10-90

M&TE: WB76878 & WB76880
Method: PNL-MA599-ALO-212

Reviewer: Padmaja Mehtiel Date: 1/23/91

(a): Units = µg/mL, unless otherwise noted.
(b): Spike recovery analysis requirements defined by ALO-212, SOW, or TI -- or performed at operator's discretion.

***** ION CHROMATOGRAPHY *****
***** ANALYTICAL RESULTS *****

Customer: J. TINGEY

325-400: ANIONS SYSTEM-3 100 µL Sample Loop WP #: M85187

SAMPLE ID / LAE NUMBER	Units (a)	<<<<<<<<<<<<<<<<<<<< CONCENTRATION >>>>>>>>>>>>>>>>>>>>						
		F	Cl	NO_2	Br	NO_3	PO_4	SO_4
90-7703 D105-AW-C-S		700	15 [1]	75	<5	210	<10	10
MATRIX SPIKE & DUP. %Spike Recovery MATRIX SPIKE	%	96,101	76,78	80,84	84,88	90,92	83,91	90,94
BLANK (90-7703)		<0.2	0.2 [2]	<0.4	<0.2	<0.4	<0.4	<0.4
%Spike Recovery	%							
90-7704 [3] D105-AW-C-L		700	70	1000	<50	3300	50 [1]	190
%Spike Recovery	%							
DUP 90-7704 [4] D105-AW-C-L		700	90	1000	<50	3400	120 [1,4]	190
%Spike Recovery	%							
%Spike Recovery	%							
%Spike Recovery	%							
%Spike Recovery	%							

COMMENTS
1: MATRIX INTERFERENCE AFFECTS QUANTITATION
2: VERIFICATION STD. FAILURE OF ~12%; POTENTIAL UNDERESTIMATION.
3: MATRIX COMPONENTS RESULT IN FLUCTUATING/ERRATIC BASELINE; RUN @ x25 DILUT.
4: RUN @ x250 DILUTION; PRECISION AFFECTED BY DIFFERENCES IN DILUTION FACTORS.

M&TE: WM00474 WA83665
P/N-F02993 P/N-B11620

Analyst: Padmanabhan Mallikarjun Date: 9/24/91

Method: PNL-MA599-ALO-212 Reviewer: [signature] Date: 9/26/91

(a) Units = µg/mL, unless otherwise noted.
(b) Spike recovery analysis requirements defined by ALO-212, SOW, or TI -- or performed at operator's discretion.
(c) Calibration, Verification, & Spike Std data in IC Std Binder.

☆☆☆☆☆ ION CHROMATOGRAPHY ☆☆☆☆☆
☆☆☆☆☆ ANALYTICAL RESULTS ☆☆☆☆☆

Customer: W. GRAY

WP #: M45324

SAMPLE ID / LAB NUMBER	Units (a)	F	Cl	NO2	Br	NO3	PO4	SO4
90-7701 BLANK		* <0.2	0.2	<0.4	<0.2	<0.4	<0.4	0.5
%Spike Recovery	%							
90-7701 D105-AW-7		22,000	1900	30,000	<200	81,000	1300	5600
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							

COMMENTS: * MATRIX INTERFERENCE

LRB/Pg#: 53870-85

Analyst: [signature] Date: 12-14-91

M&TE: WB76878 & WB76880

Method: PNL-MA599-ALO-212

Reviewer: Padmanabhan Melethil Date: 7/22/91

(a): Units = μg/mL, unless otherwise noted.
(b): Spike recovery analysis requirements defined by ALO-212, SOW, or TI -- or performed at operator's discretion.

***** IC ANALYSIS RESULTS *****

Customer: Walt Gray
WP No: M-15 324

SAMPLE ID / LAB NUMBER	CONCENTRATION (µg/mL) // [Opt: Spike Recovery (%)]						
	F	Cl	NO2	Br	NO3	PO4	SO4
90-6844 BLANK	0.5	0.2	<0.4	<0.4	<0.4	<0.4	1.0
90-6844 D-105AW-3-4-SOL	1000	MATRIX INTERFERENCE 20	140	<4	480	13	30
Hot cell dilution Factor 86.44	86,800	1820	12,100	<300	41,500	1120	2,600

LRB & Pg#: 53730 - 69
M&TE: WB76878 and WB76880
Method: PNL-MA599-ALO-212

Analyst: John Curran Date
Reviewer: J Hamelettrel 12/20/90

***** IC ANALYSIS RESULTS *****

Customer: Walt Gray
WP No: M-45324

SAMPLE ID / LAB NUMBER	CONCENTRATION (µg/mL) // [Opt: Spike Recovery (%)]						
	F	Cl	NO2	Br	NO3	PO3	SO4
90-6842 D-105AW-1-2-SUP	760	MATRIX INTERFERENCE 40	450	<4	2200	60	160
Hot cell dilution 10.98	8300	440	4900	<40	24,000	660	1760

LRB & Pg#: 53730-69
M&TE: WB76878 and WB76880
Method: PNL-MA599-ALO-212

Analyst: John Enver / Date 10-29-90
Reviewer: [illegible] / 12/20/90

***** ION CHROMATOGRAPHY *****
***** ANALYTICAL RESULTS *****

Customer: W. GRAY

WP #: M-4532-4

SAMPLE ID - - - - - - - - LAB NUMBER	Units (a)	<<<<<<<<<<<<<<<<<<<<<< CONCENTRATION >>>>>>>>>>>>>>>>>>>>>>						
		F	Cl	NO2	Br	NO3	PO4	SO4
BLANK FOR 90-7696 90-7698		* 0.3	<0.2	<0.4	<0.2	<0.4	<0.4	0.5
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
90-7696 wg-5 solid D105-AW-5		170,000	2800	18,000	<200	46,000	2900	3100
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
90-7698 wg-6 solid D105-AW-6		150,000	2500	19,000	<200	42,000	<500	1800
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							
- - - - - - - -								
%Spike Recovery	%							

COMMENTS: * MATRIX INTERFERENCE

LRB/Pg#: 53730-90

Analyst: [signature] Date: 12-21-90

M&TE: WB76878 & WB76880

Method: PNL-MA599-ALO-212

Reviewer: [signature] Date: 6/27/91

(a): Units = µg/mL, unless otherwise noted.
(b): Spike recovery analysis requirements defined by ALO-212, SOW, or TI -- or performed at operator's discretion.

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352
Telephone (509)

Nov. 5,1991

WJ Gray
Pacific Northwest Laboratories
P.O. Box 999
Richland, Wa. 99352

Dear Walt

RESULTS OF OH^- DETERMINATION ON DST SAMPLES

Titrations were performed on the solutions listed below according to the method specified for alkalinity determination in Standard Methods for Examination of Water and Wastewater, 1985, pp.269-273 and PNL procedure 597-7:40.22 (modified). Differentiation between carbonate, bicarbonate and hydroxyl alkalinity is made according to the scheme in Standard Methods.

M & TE List-	Brinkmann Titroprocessor	WB 76834
	Brinkmann Dosimat	WB 76839
	Balance	362-06091-038

Data recorded in PNL LRB 52846 pp.25,27.

ACL DESIGNATION	IDENTIFICATION	ALKALINITY AS OH^-, M
90-7701	105 AW-7	0.054

Questions regarding results or interpretation should be directed to MC Burt on 376-3762.

Sincerely,

MC Burt
Sr. Research Scientist

SAMPLE PREP DATA SHEET
(325-B Hot Cells)

Date: 10/31/91

Analyst: [illegible]
6-3089 P7-22

Review: [illegible]

	Project #1	Project #2	Project #3
Program:	DST		
Customer:	W Gray		
Acct. or WP#:	M85187		
LRB#:			
M&TE:			

Program	ALO #	Sample #	Analyte or Analysis	Sample Wt Wet (g)	Sample Wt Dry (g)	Water Wt (g)	Total Vol (ml)	Spike ID	Spike Vol (ml)	Dilution Factor	Diluent Matrix	Pipet Calib (ml)	Miscellaneous
DST	90-7701	105AW-7	OH										

Date: Sept 29, 1993
To: Tingey/Gray
From: MW Urie

Analyzed: Aug 14, 1991

DST Chromium (+6) Results
Logbook BNW-52921
Pages 48-51

Revision 1 (M. W. Urie)

File: DST5CR6
PROJECT 14598

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Weight (g)	Sample Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/g)	Spike %rec
25ug Control Std				5.00		1.00			0.217		26.40			104%
90-7815	102-AN-Sol	0.2374	23.09	7.00		14.04			0.010		<2.0		<30.0	
90-7815	Blank (*)	0.2374	25.15	5.00		21.39			0.005		<2.0		<40.0	
90-7703	D105AW-C-S	0.9500	96.93	5.00	5.00	20.61	5.000	5.00	0.068	0.294	8.27	35.77	170.4	110.0%
90-7703	Blank		99.93	10.00		9.99			0.003		<2.0		<20.0	

(*) Sample weight of 90-7815 used to calc ug/g equivalence.

MWUrie
9/29/93

Cal Slope 121.68
Intcpt -0.0025

Date: Jan 29, 1991
To: Tingey/Gray
From: MW Urie

Analyzed: Jan 25, 1991

DST Chromium (+6) Results
Logbook BNW-52921
Pages 30-35

File: DST4CR6

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Weight (g)	Sample Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/g)	Spike %rec
90-7701	D105AW-7	0.9363	98.61	0.50	0.50	212.64	5.000	5.00	0.130	0.331	13.29	37.39	2827.0	96.4%
90-7701	Blank (*)	0.9363	90.48	5.00		19.53					<2.0		<40.0	

(*) Sample weight of 90-7701 used to calc ug/g equivalence.

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
25ug Control Std				5.00		1.00			0.236		26.00			104%
90-7691	** 102SY *** 1/2-AN	5.0787	49.86	10.00		1.08			0.036		2.03		2.2	
90-7704	** D105AW ** C-L	0.9943	10.09	5.00		2.23					<2.0		<4.5	
90-7714	** D102AN ** SUP	0.9946	10.09	5.00		2.23					<2.0		<4.5	

Cal Slope 119.89
Intcpt -2.29

Date: Jan 29, 1991
To: Gray
From: MW Urie MWU

Analyzed: Oct 25, 1990

DST Chromium (+6) Results
Logbook BNW-52921
Pages 28-29,365

File: DST3CR6

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
24.8 ug Control Std				4.98		1.00			0.233		28.67			115.6%
90-6842	** D105AW ** 1-2 SUP	1.0007	49.95	10.50	10.00	4.85	4.980	9.99	0.042	0.468	4.58	58.31	22.2	108.4%
49.75 ug Control Std				9.99		1.00			0.443		55.15			110.8%

Cal Slope 126.12
Intcpt -0.72

Date: Aug 23, 1991
To: Tingey/Gray
From: MW Urie

Analyzed: Aug 14, 1991

DST Chromium (+6) Results
Logbook BNW-52921
Pages 48-51

File: DST5CR6

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Weight (g)	Sample Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/g)	Spike %rec
25ug Control Std [See below]														
90-7815	102-AN-Sol	0.2374	23.09	7.00		14.04			0.010		<2.0		<30.0	
90-7815	Blank (*)	0.2374	25.15	5.00		21.39			0.005		<2.0		<40.0	

(*) Sample weight of 90-7815 used to calc ug/g equivalence.

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
25ug Control Std				5.00		1.00			0.217		26.40			104%
	** D105AW **													
90-7703	C-S	0.9500	96.93	5.00	5.00	20.61	5.000	5.00	0.068	0.294	8.27	35.77	170.4	110.0%
90-7703	Blank		99.93	10.00		9.99			0.003		<2.0		<20.0	

this is a Solid,

See revision 1

9/29/93

Cal Slope 121.68
Intcpt -0.0025

Date: Jan 29, 1991
To: Tingey/Gray
From: MW Urie

DST Chromium (+6) Results
Logbook BNW-52921
Pages 30-35

File: DST4CR6

Analyzed: Jan 25, 1991

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Weight (g)	Sample Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/g)	Spike %rec
90-7701	D105AW-7	0.9363	98.61	0.50	0.50	212.64	5.000	5.00	0.130	0.331	13.29	37.39	2827.0	96.4%
90-7701	Blank (*)	0.9363	90.48	5.00		19.53					<2.0		<40.0	

(*) Sample weight of 90-7701 used to calc ug/g equivalence.

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
25ug Control Std				5.00		1.00			0.236		26.00			104%
90-7691	** 102SY *** 1/2-AN	5.0787	49.86	10.00		1.08			0.036		2.03		2.2	
90-7704	** D105AW ** C-L	0.9943	10.09	5.00		2.23					<2.0		<4.5	
90-7714	** D102AN ** SUP	0.9946	10.09	5.00		2.23					<2.0		<4.5	

Cal Slope 119.89
Intcpt -2.29

Date: Jan 29, 1991
To: Gray
From: MW Urie

Analyzed: Oct 25, 1990

DST Chromium (+6) Results
Logbook BNW-52921
Pages 28-29,~~35~~

File: DST3CR6

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
24.8 ug Control Std				4.98		1.00			0.233		28.67			115.6%
90-6842	** D105AW ** 1-2 SUP	1.0007	49.95	10.50	10.00	4.85	4.980	9.99	0.042	0.468	4.58	58.31	22.2	108.4%
49.75 ug Control Std				9.99		1.00			0.443		55.15			110.8%

Cal Slope 126.12
Intcpt -0.72

Date: Aug 23, 1991.
To: Tingey/Gray
From: MW Urie

DST Chromium (+6) Results
Logbook BNW-52921
Pages 48-51

File: DSTSCR6

Analyzed: Aug 14, 1991

Cr(+6) D.L. = 2 ug

Log #	Sample ID	Sample Weight (g)	Sample Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/g)	Spike %rec
25ug Control Std [See below]														
90-7815	102-AW-Sol	0.2374	23.09	7.00		14.04			0.010		<2.0		<30.0	
90-7815	Blank (*)	0.2374	25.15	5.00		21.39			0.005		<2.0		<40.0	

(*) Sample weight of 90-7815 used to calc ug/g equivalence.

Log #	Sample ID	Sample Volume (mL)	Dilution Volume (mL)	Aliquot Sample (mL)	Aliquot Spk/Smpl (mL)	Dilution Factor	Spike Conc (ug/mL)	Spike Vol (mL)	Absorbance Smpl	Absorbance Spk/Smpl	Cr(+6) Sample (ug)	Cr(+6) Sample w/spk (ug)	Cr(+6) Sample (ug/mL)	Std/ Spike %rec
25ug Control Std				5.00		1.00			0.217		26.40			104%
	** D105AW **													
90-7703	C-S	0.9500	96.93	5.00	5.00	20.61	5.000	5.00	0.068	0.294	[illegible]	35.77	170.4	110.0%
90-7703	Blank		99.93	10.00		9.99			0.003		<2.0		<20.0	

← Solid (see revised report)

Cal Slope 121.68
Intcpt -0.0025

WHC-SD-WM-TI-649 REV. 0

48

8/14/91 Cr (VI) Determination

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DOCUMENT PROCESSING

Made a new NIST Calib. std
SOURCE: NIST 136c
wt: 70.72 mg
VOL: 500 ml Class A vol flask

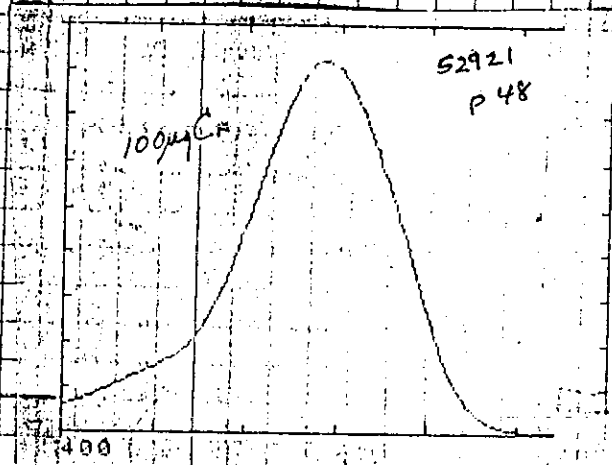
$$\text{Concentration} = \frac{70.72\,(.3535)\,1000}{500} = 49.999 \text{ or } 50.0\text{ mg Cr/l}$$

M Burt

Control std same see p. 28

Made new 10-1 dilutions of both Calib. std and Control using 10 ml pipet and 100 ml vol flasks
M+TE HP 8451A HW 72562
Brinkman 672 WB 76896
Cal with pH 4 + pH 7 buffer etc 4/92

	Calib. std		H_2O left flask	ABS
	0 ml	0 µg Cr		.0003
	2	10 µg		.080
	10	50 µg		.415
	20	100 µg		.820
Control	5	25 µg		.217




```
HOW MANY DATA POINTS?
4                    52921 p48
TYPE IN X( 1 ) AND Y( 1 )
0                          0
TYPE IN X( 2 ) AND Y( 2 )
.08                       10
TYPE IN X( 3 ) AND Y( 3 )
.415                      50
TYPE IN X( 4 ) AND Y( 4 )
.82                      100
THE LEAST SQUARES LINE IS
Y= 121.680722442 X
+.00253750275
THE CORRELATION COEFFICIE
.999970387337
```

C.S. = (.217) 121.68 − .003 = 26.4 / 25 = 105.6% Rec

Project No.
Entered By M Burt Date of Work
Date 8/14/91
Disclosed To and Understood By
Signed To Date
M Walker Date 9/16/91

8/14/91 Cont

Sample Data

Sample #	Sample Design.	Vol used	ABS.	NET. ABS.	µg Cr
90-7703	D105AW-C-S Blank	10 ml	.003		
	D105AW-C-S	5 ml	.081	.068	8.3
	D105AW-C-S (SPIKE)	5 ml + 5 ml Control Sol'n	.297	.294	35.8
	Spike Recovery	35.8 - 8.3 = 27.5 / 25 = 110%			
90-7815	102AN-SOL Blank	5 ml	.005	.000	
	102AN-SOL	7 ml	.045	.010	1.2

Insufficient sample to spike. Sample changed to purple within 5 min and to a cloudy peach color within 10 min. Sample required for IC and NH_4^+ analysis

Scans on page 50

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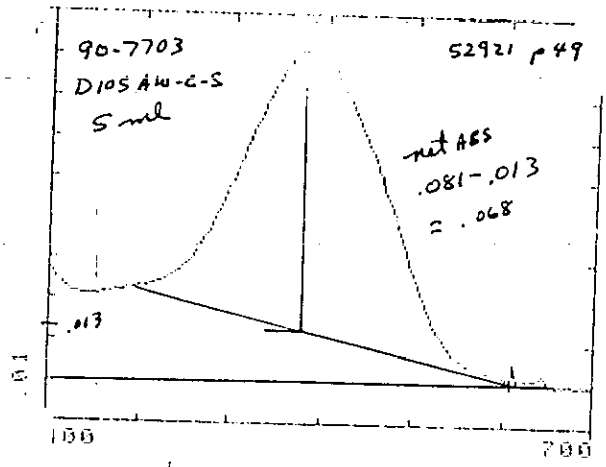
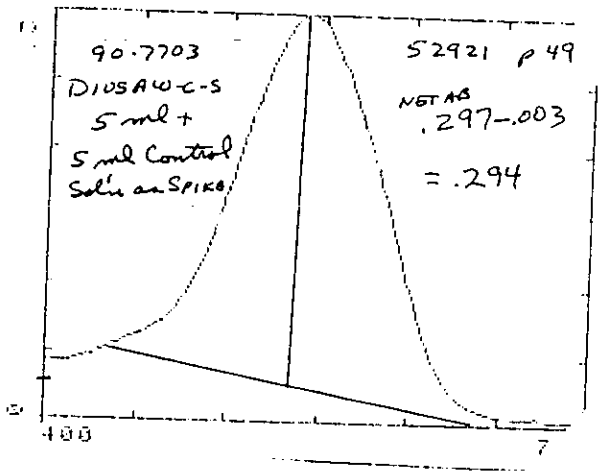
DOCUMENT PROCESSING





Cont next page

Project No. _____ Date of Work _____

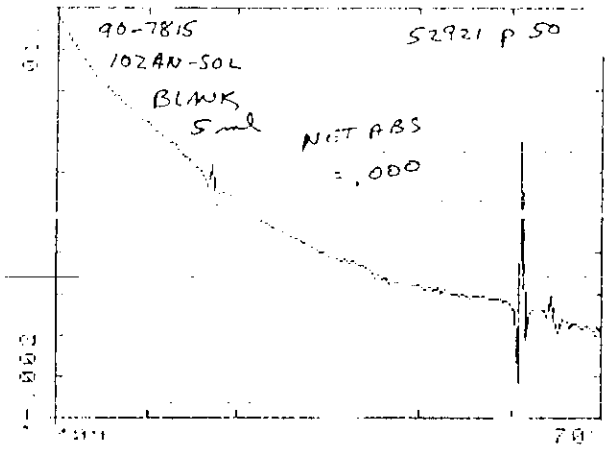
Entered By MC Bunt Date 8/14/91

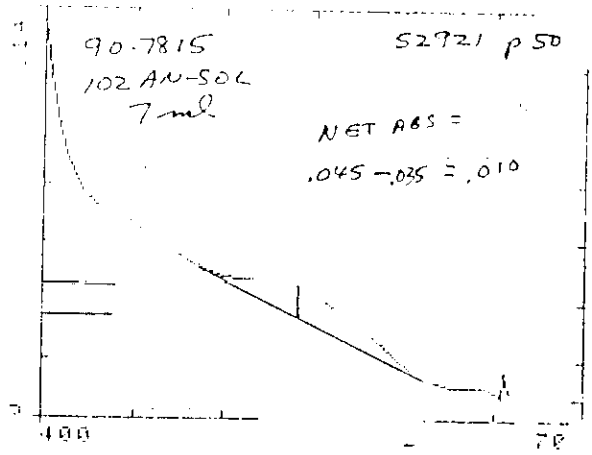
Disclosed To and Understood By

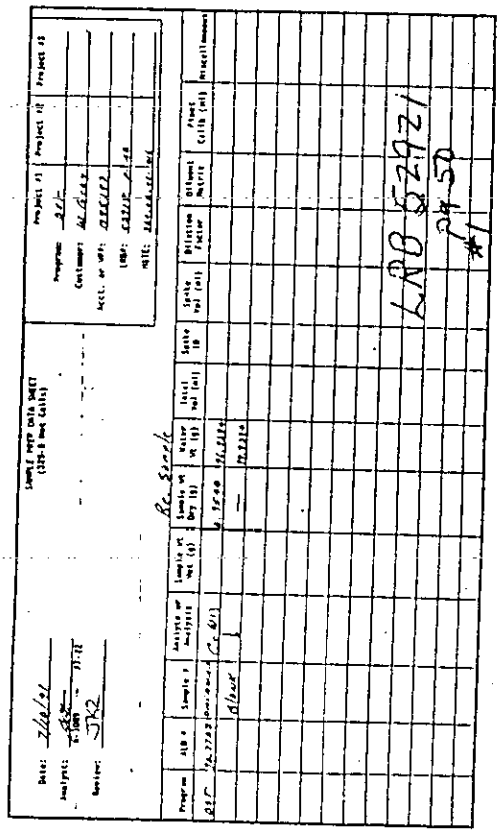
Signed 1. _____ Date _____

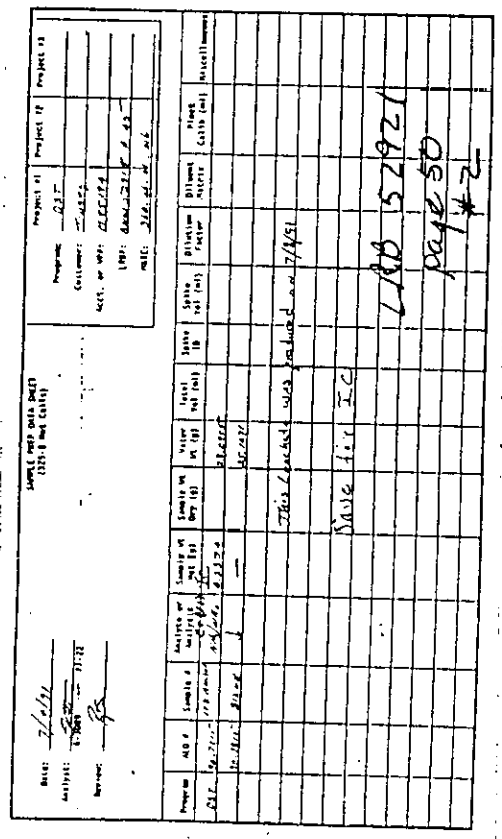
2. MW Ha Date 9/16/91

50 8/14/91









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RECORDS PROCESSING

Project No. _____ Date of Work _____

Entered By _____ Date _____

Disclosed To and Understood By

Signed 1. _____ Date 9/16/91

2. _____ Date 9/16/91

Date: Jan 31, 1991
Customer: Gray/Tingey
Approved by: MW Urie
****** Note: See Jan 29 Report

Method: EPA 350.3
Logbook: BNW5291pg 36-38

Sample ID	Sample Vol (mL)	Total Vol (mL)	Dil	Spike (mg/L)	Spike Vol (mL)	NH3-N Sample (mg/L)	NH3-N Sample w/Spk (mg/L)	NH3-N Sample (mg/L)	Spk %rec	Std %rec
Check Std 3.59 mg/L>>			1.0			4.00				111%
102SY 1/2-AN 90-7691	5.079	49.9	1.0	100.0	0.10	0.78	1.75	8.4	103%	
D105AW 6-SUP 90-7700	5.079	49.9	1.0	1000.0	0.10	57.00	67.00	616.6	109%	
Check Std 3.59 mg/L>>			1.0			4.00				111%

Note: 90-7691 and 90-7700 were rerun due to inconsistency of spike recove for Jan 29th run. Other DST samples from that run had insufficient quantity of solution for rerun. Previous results may be bias high

Aliquot vol-mL 10.00
NaOH vol-mL 0.25
Total vol-mL 10.25 NH3-N Det. Limit = 0.05 mg/L

Date: Jan 29, 1991
Customer: Gray/Tingey
Approved by: MW Urie
****** Note: See Jan 31 Reruns

Method: EPA 350.3
Logbook: BNW5291pg 32-36

Sample ID	Sample Vol (mL)	Total Vol (mL)	Dil	Spike (mg/L)	Spike Vol (mL)	NH3-N Sample (mg/L)	NH3-N Sample w/Spk (mg/L)	NH3-N Sample (mg/L)	Spk %rec	Std %rec
Check Std 23.0 mg/L>>			1.0			27.00				117%
D105AW 1-2 SUP 90-6842	1.001	50.0	1.0	1000.0	0.05	17.00	22.00	866.3	105%	
102SY 1/2-AN 90-7691	5.079	49.9	1.0	1000.0	0.10	0.86	13.10	9.3	129%	
D105AW 5-L 90-7697	1.001	10.1	1.0	1000.0	0.10	61.00	75.00	676.1	151%	
D105AW 6-SUP 90-7700	5.079	49.9	1.0	1000.0	0.10	75.00	90.00	811.4	163%	
D105AW 7-L 90-7702	1.001	10.1	1.0	1000.0	0.10	11.30	24.00	125.2	133%	
D105AW C-L 90-7704	0.994	10.1	2.0	100.0	0.10	3.50	4.50	78.0	107%	
D102AN SUP 90-7814	0.995	10.1	2.0	100.0	0.10	2.00	3.30	44.6	137%	
Check Std 23.0 mg/L>>			1.0			24.00				104%

Aliquot vol-mL 10.00
NaOH vol-mL 0.25
Total vol-mL 10.25

NH3-N Det. Limit = 0.05 mg/L

Date: Nov 1, 1990

DST Ammonia Results

Customer: WJ Gray
Approved by: MW Urie

Method: EPA 350.3
Logbook: BNW52919 pg 28-31

Sample ID	Sample Vol (mL)	Total Vol (mL)	Dil	Spike (mg/L)	Spike Vol (mL)	NH3-N Sample (mg/L)	NH3-N Sample w/Spk (mg/L)	NH3-N Sample (mg/L)	Spk %rec	Std %rec
Check Std 15.8 mg/L>>			1.0			16.00				101%
Cal Std 10.0 mg/L>>			1.0	1000.0	0.10		20.50		112%	
105AW 1-2 SUP 90-6842	1.001	50.0	1.0	1000.0	0.10	16.00	30.00	814.6	149%	
105AW 3-4 SUP 90-6843 (1)	2.001	50.0	1.0	1000.0	0.10	0.43	10.00	11.2	101%	
(2)	2.001	50.0	1.0	100.0	0.10	0.42	1.40	10.9	104%	
Cal Std 1.00 mg/L>>			1.0	100.0	0.10		2.00		107%	

Aliquot vol-mL 10.00
NaOH vol-mL 0.25
Total vol-mL 10.25

NH3-N Det. Limit = 0.05 mg/L

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352
Telephone (509)

Sept. 13,1991

J. M. Tingey
Pacific Northwest Laboratories
P.O. Box 999
Richland, Wa. 99352

Dear Joel:

RESULTS OF OH^- DETERMINATION ON DST SAMPLES

Titrations were performed on the solutions listed below according to the method specified for alkalinity determination in Standard Methods for Examination of Water and Wastewater, 1985, pp.269-273 and PNL procedure 597-7:40.22 (modified). Differentiation between carbonate, bicarbonate and hydroxyl alkalinity is made according to the scheme in Standard Methods.

M & TE List-	Brinkmann Titroprocessor	WB 76834
	Brinkmann Dosimat	WB 76839
	Balance	362-06091-038

Data recorded in PNL LRB 52846 pp.21,22.

ACL DESIGNATION	IDENTIFICATION	ALKALINITY AS OH^-, M
90-7691	102SY-1/2-AN	0
90-7703	105AW-C-S	0.001
90-7704	105AW-C-L	0.768
90-7814	102AN SUP	0
90-7815	102AN SOL	0.002

Questions regarding results or interpretation should be directed to MC Burt on 376-3762.

Sincerely,

M. C. Burt
Sr. Research Scientist
Analytical Chemistry Laboratory

AW-105

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, WA 99352

FACSIMILE TRANSMITTAL

DATE: 7/20/92

To: Leela Sasaki
Company: WHC
City/State:
Facsimile #: 373-4095
Telephone #: 373-1027

From: Joel Tingey
Chemical Sciences Department
Facsimile #: 376-1517
Telephone #: 376-2580

Transmittal Consists of [2] Page(s) including cover page.

COMMENTS:

Attached is the radionuclide data for tank 105-AW.

EA-1950-231 (6/91)

RAD105AW.XLS

PRELIMINARY

Analyte	Activity(nCi/ml) 1&2	6-sup	Comp-sup	Activity (nCi/g) 3&4	5	6-sol	7	Comp-sol
H-3	6.58E+00	NR	5.90E+00	NR	NR	NR	1.68E+01	5.41E+00
C-14	1.24E-01	NR	9.10E-01	NR	NR	NR	2.70E+00	3.00E-01
Se-79	2.15E-02	NR	3.38E-02	NR	NR	NR	3.24E+01	2.66E+00
Sr-90	3.82E-01	NR	1.17E+01	NR	NR	NR	3.00E+05	8.15E+04
Nb-94	4.82E-03	NR	3.76E-03	NR	NR	NR	2.26E+00	2.72E-01
Tc-99	6.85E+00	NR	3.12E+01	NR	NR	NR	9.01E+01	5.36E+01
I-129	2.69E-02	NR	2.41E-02	NR	NR	NR	3.47E+00	1.52E+00
Np-237	1.89E-03	NR	1.55E-02	NR	NR	NR	3.45E+00	2.47E+00
Am-241	9.91E-02	ND	4.19E-03	1.50E+03	1.95E+03	7.45E+02	5.43E+03	1.04E+03
Cm-243&244	2.86E-02	2.87E-01	6.53E-04	1.62E+01	ND	ND	3.76E+02	3.09E+01
Pu238 & Am-241	NA	7.30E-01	NA	1.02E+03	2.00E+03	4.37E+02	NA	NA
Pu-239&240	4.50E-02	4.02E-01	9.46E-03	3.04E+03	2.98E+03	1.78E+03	2.37E+02	2.87E+03
Pu-238	4.50E-02	NA	2.36E-03	NA	NA	NA	6.08E+02	2.91E+02
Co-60	2.10E+01	1.31E+02	1.02E+02	5.60E+02	5.32E+02	4.96E+02	5.97E+02	4.30E+02
Ru-106	9.35E+02	1.73E+03	9.23E+02	1.91E+04	8.22E+03	5.24E+03	ND	5.99E+03
Sb-125	ND	ND	ND	1.39E+04	1.25E+04	1.48E+04	ND	1.08E+04
Cs-134	5.83E+02	3.74E+02	4.93E+02	1.71E+03	9.94E+02	6.13E+02	ND	5.48E+02
Cs-137	4.68E+04	8.51E+04	6.71E+04	1.04E+05	8.29E+04	8.32E+04	1.76E+05	6.92E+04
Ce-144	ND	ND	ND	2.99E+04	4.14E+03	3.61E+03	ND	6.58E+03
Eu-154	ND	ND	ND	ND	9.39E+02	ND	8.90E+03	4.10E+02
Eu-155	ND	ND	ND	1.55E+03	4.33E+02	8.21E+02	1.11E+04	6.49E+02
Total alpha	NA	1.44E+00	NA	4.14E+03	4.95E+03	2.22E+03	NA	NA
Total Beta	4.95E+04	NR	7.07E+04	NR	NR	NR	8.20E+05	2.54E+05

NR = Not requested
ND = Not detected
NA = No analysis available

Insufficient Pu was available in the samples to perform Pu isotopic analyses
Methods for Zr-93 and Ni-63 were not available.

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

28 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: [signature] Date: 9-30-91

Reviewer: [signature] Date: 9-30-91

Pu isotopes

ALO #	Customer ID	Mass	ATOM %	MASS %
		Pu-238	*	*
		Pu-239	92.34	92.30
		Pu-240	6.97	7.00
		Pu-241	0.619	0.624
90-3591	102AZ-C1-COMSUP	Pu-242	0.0752	0.0761
		Pu-238	*	*
		Pu-239	92.34	92.30
		Pu-240	6.97	7.00
		Pu-241	0.619	0.624
90-3592	102AZ-C1-COMSOL Zr FUSION	Pu-242	0.0761	0.0761
		Pu-238	*	*
		Pu-239	92.06	92.03
		Pu-240	7.19	7.22
		Pu-241	0.673	0.678
90-3592	102AZ-C1-COMSOL Ni FUSION	Pu-242	0.0730	0.0739
90-1767	101AZ-C2-COMSUP	**		
90-1768	101AZ-C1-COMSOL	NA		
90-7814	12AN-SUP	**		
90-7815	102AN-SOL	**		
90-6842	105AW-1-2	**		
90-7701	105AW-7	**		
90-7703	105AW-C-S	NA		
90-7704	105AW-C-L	**		

* No Pu-238 data are available due to U+ interferance.
** Plutonium mass is too low to permit Pu Mass analysis.
NA denotes 'Not Analyzed'.

(DS91.Pu1)

14598 /T1

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 bldg.

Shannon W. Thomoson
P7-22 376-6529/3196
1/10/91

Gamma Energy Analysis for: Walt Gray

Procedure: HTA-4-9
LRBs: Bnw 52327 pp. 127, 144, 146

WP #: M45322
M&TE: WB 61069 (6/90)

Cognizant Scientist: [signature] Date: 1/16/91

Secondary Reviewer: [signature] Date: 1-15-91

Sample Information					Activities in Microcuries		
Sample	ALO # (90-)	File Name	Count Length	Aliquot size	Nuclide	Activity	% Error
(102AZ-C1-)							
Wash Zr Fus	6396	T8842	60 mins	8.275E-5 mL	Co-60	3.246E+01	4.6
					Ru-106	6.914E+03	0.5 M *
					Sb-125	4.324E+02	2.0
					Cs-134	2.551E+01	30.0 M *
					Cs-137	1.024E+03	0.5
					Ce-144	3.830E+04	1.0 M *
					Eu-154	1.737E+02	1.9
					Eu-155	6.407E+02	5.0 *
					Am-241	2.223E+02	3.1
Wash Blank	6396	T8851	15 hours	8.275E-5 mL	Cs-137	1.769E-01	46.0
(D105AW-)							
1-2 Sup	6842	T8847	60 mins	0.16677 mL	Co-60	2.103E-02	5.0 *
					Ru-106	9.345E-01	3.0
					Cs-134	5.825E-01	0.5
					Cs-137	4.683E+01	0.1
3/4-Sup	6844	T8849	100 mins	9.047E-5 G	Co-60	5.597E-01	21.9
					Ru-106	1.908E+01	11.8
					Sb-125	1.394E+01	5.9
					Cs-134	1.709E+00	18.2
					Cs-137	1.040E+02	1.1
					Ce-144	2.989E+01	9.7
					Eu-155	1.554E+00	18.6
					Am-241	1.504E+00	23.7
3-4 Sol Blk	6844	T8850	100 mins	9.047E-5 G	Cs-137	8.898E-01	24.2
5	7696	T8861	100 mins	9.524E-5 G	Co-60	5.324E-01	25.0 *
					Ru-106	8.215E+00	29.7
					Sb-125	1.246E+01	6.1
					Cs-134	9.937E-01	40.0 *
					Cs-137	8.288E+01	1.2

Sample Information					Activities in Microcuries		
Sample	ALO # (90-)	File Name	Count Length	Aliquot size	Nuclide	Activity	% Error
					Ce-144	4.139E+00	53.7
					Eu-154	9.390E-01	30.0 *
					Eu-155	4.332E-01	56.9
					Am-241	1.949E+00	15.9
5 Blank	7696	T8862	100 mins	9.524E-5 G	Cs-137	6.137E-01	32.7
6 Sup	7700	T8863	30 mins	9.2050E-2 mL	Co-60	1.306E-01	1.7
					Ru-106	1.733E+00	4.3
					Cs-134	3.739E-01	1.3
					Cs-137	8.507E+01	0.1
6 Sol	7698	T8864	100 mins	9.017 E-5 G	Co-60	4.956E-01	22.9
					Ru-106	5.242E+00	50.0 *
					Sb-125	1.479E+01	25.0 *
					Cs-134	6.129E-01	50.0 *
					Cs-137	8.322E+01	1.2
					Ce-144	3.606E+00	56.7
					Eu-155	8.206E-01	27.4
					Am-241	7.453E-01	36.0
6 Sol Blk	7698	T8865	100 mins	9.017 E-5 G	Cs-137	4.214E+00	7.3
7 Zr Fus	7701	T8866	100 mins	8.977E-5 G	Co-60	5.972E-01	25.0 *
					Cs-137	2.187E+02	0.7
					Eu-154	9.859E+00	3.7
					Eu-155	1.113E+01	4.6
					Am-241	6.385E+00	8.5
7 Blank	7701	T8867	100 mins	8.977E-5 G	Cs-134	2.299E+00	30.0 *
					Cs-137	4.233E+01	1.7
					Eu-154	9.601E-01	30.0 *
					Am-241	7.008E-01	35.4

PLEASE NOTE THE FOLLOWING:

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Reported activities are microcuries per aliquot unit, ie. per mL or per G (as listed under aliquot size). Activities for samples submitted in CY'90 have been decay corrected to January 1, 1990 00:00:00.

Asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed, for each sample, on the documents accompanying this report.

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 bldg.

Shannon W. Thompson
P7-22 376-6529
August 19, 1991

Gamma Energy Analysis for: DST, Walt Gray

Procedure: HTA-4-9 WP #: M85180
LRBs: BNW 54143 p. 9 M&TE: WB61069 (6/90)

Cognizant Scientist: Shannon Thompson Date: 8/19/91

Secondary Reviewer: L. O Chaney Date: 8/19/91

Sample Information				Activities in Microcuries/unit			
Sample	ALO # (90-)	File Name	Aliquot Size/Unit	Nuclide	Activity	% Error	Note
105AW-C-5 Zr	7703	T9098	5.029 E-3 G	Co-60	4.30 E-1	2.92	
				Ru-106	5.99 E0	3.55	
				Sb-125	1.08 E1	1.03	
				Cs-134	5.48 E-1	3.43	
				Cs-137	6.92 E1	0.22	
				Ce-144	6.58 E0	3.90	
				Eu-154	4.10 E-1	4.87	
				Eu-155	6.49 E-1	5.79	
				Am-241	1.14 E0	4.28	
105AW-C-5 Blk	7703B	T9099	9.9228 mL	Cs-137	9.24 E-5	4.99	
102 AN-Sol Zr	7815	T9100	9.507 E-4 G	Co-60	4.29 E-1	7.31	
				Cs-137	3.95 E2	0.21	
				Eu-154	1.65 E0	4.91	
				Eu-155	1.67 E0	9.81	
				Am-241	9.92 E-1	17.3	
102AN-SolZrBlk	7815B	T9101	9.9228 mL	Co-60	6.51 E-5	4.94	
				Cs-134	6.84 E-6	29.5	
				Cs-137	9.62 E-4	1.35	

PLEASE NOTE THE FOLLOWING:

Activities for samples submitted in CY '91 have been decay corrected to January 1, 1991 00:00:00 . Units are microcuries per aliquot.

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Single asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed on documents accompanying this report.

14598/T1

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 bldg.

Shannon W. Thomson
P7-22 376-6526/3196
1/30/91

Gamma Energy Analysis for: Walt Gray

Procedure: MTA-4-9
LRBs: BNW 52327 p. 146

WP #: M45322
M&TE: WB 61069 (6/90)

Cognizant Scientist: [signature] Date: 1/30/91

Secondary Reviewer: [signature] Date: 2/7/91

Sample Information

Sample (D103AW-)	ALO # (S0-)	File Name	Count Length	Aliquot size
C-L Sup	7704	T6667	25 min	9.119E-2 mL

Activities in Microcuries

Nuclide	Activity	% Error
Co-60	1.022E-01	2.0
Ru-106	9.232E-01	4.2
Cs-134	4.934E-01	0.9
Cs-137	6.713E+01	0.1

PLEASE NOTE THE FOLLOWING:

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Reported activities are microcuries per aliquot unit, ie. per mL or per G (as listed under aliquot size). Activities for samples submitted in CY'90 have been decay corrected to January 1, 1990 00:00:00.

Asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed, for each sample, on the documents accompanying this report.

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Bldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: E O Harvey Date: 9-25-91
Reviewer: Chun-Kuy Lee Date: 9-25-91

ALO #	Customer ID	Total Beta dpm/	Tc-99 dpm/	Sr-90 dpm/	Pu-238 dpm/	Pu-239 & 240 dpm/
90-7703	105AW-C-S Zr FUSION	5.63E+08 g	1.19E+05 g	1.81E+08 g	6.48E+05 g	6.38E+06 g
90-7703	105AW-C-S Zr BLANK	5.24E+05 g	< 2.6 E+04 g	< 1.2 E+07 g	3.22E+03 g	1.04E+03 g
90-6842	105AW-1-2 SUP	1.10E+08 ml	1.52E+04 ml	8.49E+02 ml	< 1.0 E+02 ml	< 1.0 E+02 ml
90-7701	105AW-7	2.15E+09 g	< 2.0 E+05 g	7.83E+08 g	1.35E+06 g	7.14E+05 g
90-7701	105AW-7 BLANK	3.28E+08 g	< 2.0 E+05 g	1.17E+08 g	1.57E+06 g	1.87E+05 g
90-7704	105AW-C-L	1.57E+08 ml	6.93E+04 ml	< 2.6 E+04 ml	5.25E+00 ml	2.10E+01 ml

(DS91.001)

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 8-30-91
Reviewer: Chungkhoh Date: 8-30-91

ALO #	Customer ID	Total Beta dpm/	Tc-99 dpm/	Sr-90 dpm/	Pu-238 dpm/	Pu-239 & 240 dpm/
90-6842	105AW-1-2	1.10E+08 ml	1.52E+04 ml		< 1.0 E+02 ml	< 1.0 E+02 ml
90-7701	105AW-7 Zr FUSION	2.15E+09 g	< 2.0 E+05 g	7.83E+08 g		
90-7701	105AW-7 Zr BLANK	3.28E+08 g	< 2.0 E+05 g	1.17E+08 g		

DATA REPORT 24 September 1991
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 9-25-91
Reviewer: Chungkuj Liu Date: 9-25-91

ALO #	Customer ID	Se-79 dpm/	Tritium dpm/	I-129 dpm/
90-7703	105AW-C-S Zr FUSION	< 5.9 E+03 g	1.73E+04 g	3.38E+03 g
90-7703	105AW-C-S Zr BLANK	< 5.5 E+03 g	5.29E+03 g	< 1.0 E+03 g
90-6842	105AW-1-2 SUP	4.77E+01 ml	1.46E+04 ml	5.97E+01 ml
90-7701	105AW-7	< 7.2 E+04 g	4.26E+04 g	< 7.7 E+03 g
90-7701	105AW-7 BLANK	< 6.7 E+04 g	5.22E+03 g	< 8.1 E+03 g
90-7704	105AW-C-L	< 7.5 E+01 ml	1.31E+04 ml	5.35E+01 ml

{DS91.017}

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 8-30-91

Reviewer: Chunshu Liu Date: 8-30-91

ALO #	Customer ID	Se-79 dpm/	Tritium dpm/	I-129 dpm/
90-7703	105AW-C-S Zr FUSION	< 5.9 E+03 g		
90-7703	105AW-C-S Zr BLANK	< 5.5 E+03 g		
90-6842	105AW-1-2 SUP	4.77E+01 ml	1.46E+04 ml	5.97E+01 ml
90-7701	105AW-7	< 7.2 E+04 g	4.26E+04 g	< 7.7 E+03 g
90-7701	105AW-7 BLANK	< 6.7 E+04 g	5.22E+03 g	< 8.1 E+03 g
90-7704	105AW-C-L	< 7.5 E+01 ml		5.35E+01 ml

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 9-25-91

Reviewer: Chuanhe Lin Date: 9-25-91

ALO #	Customer ID	Np-237 dpm/	Uranium mg/	Cm-243 & 244 dpm/	Am-241 dpm/	Cm-242 dpm/
90-7703	105AW-C-S Zr FUSION	5.48E+03 g	2.16E+01 g	7.20E+04 g	2.10E+06 g	
90-7703	105AW-C-S Zr BLANK	< 2.9 E+03 g		3.49E+03 g	3.84E+03 g	
90-6842	105AW-1-2 SUP	< 4.2 E+00 ml	1.20E-02 ml	6.35E+01 ml	2.20E+02 ml	1.85E+00 ml
90-7701	105AW-7	7.67E+03 g	1.52E+01 g	8.53E+05 g	1.15E+07 g	4.15E+04 g
90-7701	105AW-7 BLANK	< 6.7 E+03 g	1.45E-01 g	1.77E+04 g	1.06E+04 g	5.95E+03 g
90-7704	105AW-C-L	3.44E+01 ml	3.29E-03 ml	1.45E+00 ml	9.3 E+00 ml	

(DS91.002)

DATA REPORT 12 August 1991
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

Client: J. Tingey
WP #: M85180

Cognizant Scientist: L O Harvey Date: 8-30-91
Reviewer: Chungh P Lu Date: 8-30-91

ALO #	Customer ID	Cm-243 & 244 dpm/	Am-241 dpm/	Cm-242 dpm/	Np-237 dpm/	Uranium mg/
90-6842	105AW-1-2 SUP	6.35E+01 ml	2.20E+02 ml	1.85E+00 ml	< 4.2 E+00 ml	1.20E-02 ml
90-7701	105AW-7 Zr FUSION	8.53E+05 g	1.15E+07 g	4.15E+04 g	7.67E+03 g	1.52E+01 g
90-7701	105AW-7 Zr BLANK	1.77E+04 g	1.06E+04 g	5.95E+03 g	< 6.7 E+03 g	1.45E-01 g

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 9-25-91
Reviewer: Chung Kuo Liu Date: 9-25-91

ALO #	Customer ID	Total alpha dpm/	Pu-239 & 240 dpm/	Pu-238 & Am-241 dpm/	Cm-243 & 244 dpm/
90-6844	105AW-3-4 SOL	9.19E+06 g	6.74E+06 g	2.27E+06 g	3.60E+04 g
90-6844	105AW-3-4 SOL BLANK	< 2.1 E+05 g			
90-7696	105AW-3-5	1.10E+07 g	6.61E+06 g	4.43E+06 g	
90-7696	105AW-5 BLANK	< 2.1 E+03 g			
90-7698	105AW-6 SOL	4.93E+06 g	3.96E+06 g	9.71E+05 g	
90-7698	105AW-6 SOL BLANK	< 2.6 E+03 g			
90-7700	105AW-6-SUP	3.19E+03 ml	8.92E+02 ml	1.62E+03 ml	6.37E+02 ml

(DS91.014)

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: L O Harvey Date: 8-30-91
Reviewer: Chuanhuy Lui Date: 8-30-91

ALO #	Customer ID	Total alpha dpm/	Pu-239 & 240 dpm/	Pu-238 & Am-241 dpm/	Cm-243 & 244 dpm/
90-6844	105AW-3-4 SOL	9.19E+06 g	6.74E+06 g	2.27E+06 g	3.60E+04 g
90-6844	105AW-3-4 SOL BLANK	< 2.1 E+05 g			
90-7696	105AW-3-5	1.10E+07 g	6.61E+06 g	4.43E+06 g	
90-7696	105AW-5 BLANK	< 2.1 E+03 g			
90-7698	105AW-6 SOL	4.93E+06 g	3.96E+06 g	9.71E+05 g	
90-7698	105AW-6 SOL BLANK	< 2.6 E+03 g			
90-7700	105AW-6-SUP	3.19E+03 ml	8.92E+02 ml	1.62E+03 ml	6.37E+02 ml

Battelle
Pacific Northwest Laboratories

Project Number _____

Internal Distribution

LR Greenwood
File/LB

Date September 26, 1991

To JM Tingey

From SK Fadeff / NL Wynhoff

Subject Nb-94 Analysis Results for Samples from DST Cores 102-SY, 102-AN and 105-AW

Attached is a summary table containing the results of our ^{94}Nb analysis on samples from DST cores 102-SY, 102-AN and 105-AW. The samples and corresponding fusion blanks (FBL) were initially fused and/or diluted in the 325-B Hot Cells. They were then analyzed according to PNL-ALO-472, Rev.0, "Determination of ^{93m}Nb and ^{94}Nb". The gamma counting specified in the Nb procedure was conducted according to PNL-ALO-464, Rev.0, "Procedure for Gamma Counting and Data Reduction in the Low-Level Counting Room, 329 Building". ^{94}Nb analyses and calculations were performed by GG Brodaczynski, SK Fadeff and NL Wynhoff between 8/15 and 9/25/91.

After receipt from the hot cells, the samples were divided into two batches and analyzed. With each batch one reagent blank (BL) and one reagent blank spike (BS) were analyzed. The blank spike was spiked with a known quantity of ^{94}Nb. To all samples, blanks and blank spikes, a ^{95}Nb tracer was added to determine the radiochemical yield for each analysis. The results for all blanks and fusions blanks were below the minimum detectable activity. The recoveries obtained on the blank spikes were 106% and 118%. This indicates an average bias of +12%.

Results for six of the nine samples were below the minimum detectable activity. Minimum detectable activities differ depending on variations between analyses such as sample size or dilution, counting time or levels of other gamma emitters present. For all results above the minimum detectable activity, uncertainties were calculated at the 67% confidence level by propagating individual error estimates, such as counting and volume errors.

DSTNB.MEM

Nb-94 Analysis Results for DST Samples

DST Sample Id	Sample ID	Nb-94 dpm/g	Nb-94 dpm/ml	% spike recovery
Batch 1				
102-SY-PCL-Sol	90-5032	$<3.12 \times 10^3$		
	90-5032FBL[1]	$<4.57 \times 10^3$		
102-SY-1/2-AN	90-7691		$<9.61 \times 10^0$	
	BL-7691[2]	$<5.01 \times 10^3$		
	BS-7691[2]	$2.97 \times 10^6 \pm 1.09 \times 10^5$		106
105-AW-7	90-7701	$<5.01 \times 10^3$		
	90-7701FBL[1]	$<3.72 \times 10^3$		
105-AW-C-S	90-7703	$6.04 \times 10^2 \pm 5.43 \times 10^1$		
	90-7703FBL[1]	$<1.59 \times 10^2$		
Batch 2				
102-SY-PCL-Sup	90-5033		$<1.17 \times 10^1$	
	BL-5033[2]		$<2.61 \times 10^0$	
	BS-5033[2]		$3.30 \times 10^3 \pm 1.32 \times 10^2$	118
105-AW-1-2-Sup	90-6842		$<1.07 \times 10^1$	
105-AW-C-L	90-7704		$<8.34 \times 10^0$	
102-AN-Sup	90-7814		$1.43 \times 10^1 \pm 1.36 \times 10^0$	
102-AN-Sol	90-7815	$6.80 \times 10^2 \pm 1.30 \times 10^2$		
	90-7815FBL[1]	$<1.56 \times 10^2$		

1 FBL refers to a fusion blank prepared in the hot cell along with each sample that was fused. Nominal sample weights and dilutions from the associated sample were used to calculate each FBL result so they are comparable to the sample results except for variations such as counting time and other gamma emitters present.

2 BL refers to a blank and BS to a blank spike, each taken through the Nb procedure only (no hot cell prep). For Batch 1 the nominal sample weights and dilutions from sample 90-7701 were used in calculating the ^{94}Nb activity and for Batch 2 the corresponding values for 90-5033 were used. Thus the results can be compared to those sample results with the same exceptions noted in footnote 1.

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

28 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: [signature] Date: 9-30-91

Reviewer: [signature] Date: 9-30-91

Pu isotopes

ALO #	Customer ID	Mass	ATOM %	MASS %
		Pu-238	*	*
		Pu-239	92.34	92.30
		Pu-240	6.97	7.00
		Pu-241	0.619	0.624
90-3591	102AZ-C1-COMSUP	Pu-242	0.0752	0.0761
		Pu-238	*	*
		Pu-239	92.34	92.30
		Pu-240	6.97	7.00
		Pu-241	0.619	0.624
90-3592	102AZ-C1-COMSOL Zr FUSION	Pu-242	0.0761	0.0761
		Pu-238	*	*
		Pu-239	92.06	92.03
		Pu-240	7.19	7.22
		Pu-241	0.673	0.678
90-3592	102AZ-C1-COMSOL Ni FUSION	Pu-242	0.0730	0.0739
90-1767	101AZ-C2-COMSUP	**		
90-1768	101AZ-C1-COMSOL	NA		
90-7814	12AN-SUP	**		
90-7815	102AN-SOL	**		
90-6842	105AW-1-2	**		
90-7701	105AW-7	**		
90-7703	105AW-C-S	NA		
90-7704	105AW-C-L	**		

* No Pu-238 data are available due to U+ interferance.
** Plutonium mass is too low to permit Pu Mass analysis.
NA denotes 'Not Analyzed'.

(DS91.Pu1)

MEH

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Horney Date: 9-25-91
Reviewer: Chung Kuo Lin Date: 9-25-91

ALO #	Customer ID	Total alpha dpm/	Pu-239 & 240 dpm/	Pu-238 & Am-241 dpm/	Cm-243 & 244 dpm/
90-6844	105AW-3-4 SOL	9.19E+06 g	6.74E+06 g	2.27E+06 g	3.60E+04 g
90-6844	105AW-3-4 SOL BLANK	< 2.1 E+05 g			
90-7696	105AW-3-5	1.10E+07 g	6.61E+06 g	4.43E+06 g	
90-7696	105AW-5 BLANK	< 2.1 E+03 g			
90-7698	105AW-6 SOL	4.93E+06 g	3.96E+06 g	9.71E+05 g	
90-7698	105AW-6 SOL BLANK	< 2.6 E+03 g			
90-7700	105AW-6-SUP	3.19E+03 ml	8.92E+02 ml	1.62E+03 ml	6.37E+02 ml

(DS91.014)

DATA REPORT 24 September 1991
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 9-25-91
Reviewer: Chung Kung Liu Date: 9-25-91

ALO #	Customer ID	Se-79 dpm/		Tritium dpm/		I-129 dpm/	
90-7703	105AW-C-S Zr FUSION	< 5.9 E+03	g	1.73E+04	g	3.38E+03	g
90-7703	105AW-C-S Zr BLANK	< 5.5 E+03	g	5.29E+03	g	< 1.0 E+03	g
90-6842	105AW-1-2 SUP	4.77E+01	ml	1.46E+04	ml	5.97E+01	ml
90-7701	105AW-7	< 7.2 E+04	g	4.26E+04	g	< 7.7 E+03	g
90-7701	105AW-7 BLANK	< 6.7 E+04	g	5.22E+03	g	< 8.1 E+03	g
90-7704	105AW-C-L	< 7.5 E+01	ml	1.31E+04	ml	5.35E+01	ml

(DS91.017)

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: L O Harvey Date: 9-25-91

Reviewer: Chundkey Lee Date: 9-25-91

ALO #	Customer ID	Np-237 dpm/	Uranium mg/	Cm-243 & 244 dpm/	Am-241 dpm/	Cm-242 dpm/
90-7703	105AW-C-S Zr FUSION	5.48E+03 g	2.16E+01 g	7.20E+04 g	2.10E+06 g	
90-7703	105AW-C-S Zr BLANK	< 2.9 E+03 g		3.49E+03 g	3.84E+03 g	
90-6842	105AW-1-2 SUP	< 4.2 E+00 ml	1.20E-02 ml	6.35E+01 ml	2.20E+02 ml	1.85E+00 ml
90-7701	105AW-7	7.67E+03 g	1.52E+01 g	8.53E+05 g	1.15E+07 g	4.15E+04 g
90-7701	105AW-7 BLANK	< 6.7 E+03 g	1.45E-01 g	1.77E+04 g	1.06E+04 g	5.95E+03 g
90-7704	105AW-C-L	3.44E+01 ml	3.29E-03 ml	1.45E+00 ml	9.3 E+00 ml	

(DS91.002)

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

24 September 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 9-25-91

Reviewer: Chun Kuf Lee Date: 9-25-91

ALO #	Customer ID	Total Beta dpm/	Tc-99 dpm/	Sr-90 dpm/	Pu-238 dpm/	Pu-239 & 240 dpm/
90-7703	105AW-C-S Zr FUSION	5.63E+08 g	1.19E+05 g	1.81E+08 g	6.48E+05 g	6.38E+06 g
90-7703	105AW-C-S Zr BLANK	5.24E+05 g	< 2.6 E+04 g	< 1.2 E+07 g	3.22E+03 g	1.04E+03 g
90-6842	105AW-1-2 SUP	1.10E+08 ml	1.52E+04 ml	8.49E+02 ml	< 1.0 E+02 ml	< 1.0 E+02 ml
90-7701	105AW-7	2.15E+09 g	< 2.0 E+05 g	7.83E+08 g	1.35E+06 g	7.14E+05 g
90-7701	105AW-7 BLANK	3.28E+08 g	< 2.0 E+05 g	1.17E+08 g	1.57E+06 g	1.87E+05 g
90-7704	105AW-C-L	1.57E+08 ml	6.93E+04 ml	< 2.6 E+04 ml	5.25E+00 ml	2.10E+01 ml

(DS91.001)

14598 /T1

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
dioanalytical group, 325 bldg.

Shannon W. Thomoson
P7-22 376-6529/3196
1/10/91

Gamma Energy Analysis for: Walt Gray

Procedure: HTA-4-9
LRBs: Bnw 52327 pp. 127, 144, 146

WP #: M45322
M&TE: WB 61069 (6/90)

Cognizant Scientist: _____ Date: 1/16/91
Secondary Reviewer: _____ Date: 1-15-91

Sample Information					Activities in Microcuries		
Sample	ALO # (90-)	File Name	Count Length	Aliquot size	Nuclide	Activity	% Error
(102AZ-01-)							
Wash Zr Fus	6396	T8842	60 mins	8.275E-5 mL	Co-60	3.246E+01	4.6
					Ru-106	6.914E+03	0.5 M *
					Sb-125	4.324E+02	2.0
					Cs-134	2.551E+01	30.0 M *
					Cs-137	1.024E+03	0.5
					Ce-144	3.830E+04	1.0 M *
					Eu-154	1.737E+02	1.9
					Eu-155	6.407E+02	5.0 *
					Am-241	2.223E+02	3.1
Wash Blank	6396	T8851	15 hours	8.275E-5 mL	Cs-137	1.769E-01	46.0
(D105AW-)							
1-2 Sup	6842	T8847	60 mins	0.16677 mL	Co-60	2.103E-02	5.0 *
					Ru-106	9.345E-01	3.0
					Cs-134	5.825E-01	0.5
					Cs-137	4.683E+01	0.1
3/4-Sup	6844	T8849	100 mins	9.047E-5 G	Co-60	5.597E-01	21.9
					Ru-106	1.908E+01	11.8
					Sb-125	1.394E+01	5.9
					Cs-134	1.709E+00	12.2
					Cs-137	1.040E+02	1.1
					Ce-144	2.989E+01	9.7
					Eu-155	1.554E+00	18.6
					Am-241	1.504E+00	23.7
3-4 Sol Blk	6844	T8850	100 mins	9.047E-5 G	Cs-137	8.898E-01	24.2
5	7696	T8861	100 mins	9.524E-5 G	Co-60	5.324E-01	25.0 *
					Ru-106	8.215E+00	29.7
					Sb-125	1.246E+01	6.1
					Cs-134	9.937E-01	40.0 *
					Cs-137	8.288E+01	1.2

Sample Information					Activities in Microcuries		
Sample	ALO # (90-)	File Name	Count Length	Aliquot size	Nuclide	Activity	% Error
					Ce-144	4.139E+00	53.7
					Eu-154	9.390E-01	30.0 *
					Eu-155	4.332E-01	56.9
					Am-241	1.949E+00	15.9
5 Blank	7696	T8862	100 mins	9.524E-5 G	Cs-137	6.137E-01	32.7
6 Sup	7700	T8863	30 mins	9.2050E-2 mL	Co-60	1.306E-01	1.7
					Ru-106	1.733E+00	4.3
					Cs-134	3.739E-01	1.3
					Cs-137	8.507E+01	0.1
6 Sol	7698	T8864	100 mins	9.017 E-5 G	Co-60	4.956E-01	22.9
					Ru-106	5.242E+00	50.0 *
					Sb-125	1.479E+01	25.0 *
					Cs-134	6.129E-01	50.0 *
					Cs-137	8.332E+01	1.2
					Ce-144	3.606E+00	56.7
					Eu-155	8.206E-01	27.4
					Am-241	7.453E-01	36.0
6 Sol Blk	7698	T8865	100 mins	9.017 E-5 G	Cs-137	4.214E+00	7.3
7 Zr Fus	7701	T8866	100 mins	8.977E-5 G	Co-60	5.972E-01	25.0 *
					Cs-137	2.187E+02	0.7
					Eu-154	9.859E+00	3.7
					Eu-155	1.113E+01	4.6
					Am-241	6.385E+00	8.5
7 Blank	7701	T8867	100 mins	8.977E-5 G	Cs-134	2.299E+00	30.0 *
					Cs-137	4.233E+01	1.7
					Eu-154	9.601E-01	30.0 *
					Am-241	7.008E-01	35.4

PLEASE NOTE THE FOLLOWING:

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Reported activities are microcuries per aliquot unit, ie. per mL or per G (as listed under aliquot size). Activities for samples submitted in CY'90 have been decay corrected to January 1, 1990 00:00:00.

Asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed, for each sample, on the documents accompanying this report.

14598/T1

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 bldg.

Shannon W. Thomson
P7-22 376-6529/3156
1/30/91

Gamma Energy Analysis for: Walt Gray

Procedure: mTA-4-5
LRBs: BNW 52327 p. 146

WP #: M45322
M&TE: WB 61069 (6/90)

Cognizant Scientist: [signature] Date: 1/30/91

Secondary Reviewer: [signature] Date: 2/7/91

Sample Information					Activities in Microcuries		
Sample (D105AW-)	ALD # (50-)	File Name	Count Length	Aliquot size	Nuclide	Activity	% Error
C-L Sup	7704	T6687	35 min	9.1198E-2 mL	Co-60	1.022E-01	2.0
					Ru-106	9.232E-01	4.2
					Cs-134	4.934E-01	0.9
					Cs-137	6.713E+01	0.1

PLEASE NOTE THE FOLLOWING:

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Reported activities are microcuries per aliquot unit, ie. per mL or per G (as listed under aliquot size). Activities for samples submitted in CY'90 have been decay corrected to January 1, 1990 00:00:00.

Asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed, for each sample, on the documents accompanying this report.

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: T. O Harvey Date: 8-30-91
Reviewer: Chuen Khoo Date: 8-30-91

ALO #	Customer ID	Total Beta dpm/	Tc-99 dpm/	Sr-90 dpm/	Pu-238 dpm/	Pu-239 & 240 dpm/
90-6842	105AW-1-2	1.10E+08 ml	1.52E+04 ml		< 1.0 E+02 ml	< 1.0 E+02 ml
90-7701	105AW-7 Zr FUSION	2.15E+09 g	< 2.0 E+05 g	7.83E+08 g		
90-7701	105AW-7 Zr BLANK	3.28E+08 g	< 2.0 E+05 g	1.17E+08 g		

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: L O Harvey Date: 8-30-91
Reviewer: Chunkung Lin Date: 8-30-91

ALO #	Customer ID	Total alpha dpm/	Pu-239 & 240 dpm/	Pu-238 & Am-241 dpm/	Cm-243 & 244 dpm/
90-6844	105AW-3-4 SOL	9.19E+06 g	6.74E+06 g	2.27E+06 g	3.60E+04 g
90-6844	105AW-3-4 SOL BLANK	< 2.1 E+05 g			
90-7696	105AW-3-5	1.10E+07 g	6.61E+06 g	4.43E+06 g	
90-7696	105AW-5 BLANK	< 2.1 E+03 g			
90-7698	105AW-6 SOL	4.93E+06 g	3.96E+06 g	9.71E+05 g	
90-7698	105AW-6 SOL BLANK	< 2.6 E+03 g			
90-7700	105AW-6-SUP	3.19E+03 ml	8.92E+02 ml	1.62E+03 ml	6.37E+02 ml

DATA REPORT 12 August 1991
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

Client: J. Tingey
WP #: M85180

Cognizant Scientist: L O Harvey Date: 8-30-91
Reviewer: Chungkh p Lee Date: 8-30-91

ALO #	Customer ID	Cm-243 & 244 dpm/	Am-241 dpm/	Cm-242 dpm/	Np-237 dpm/	Uranium mg/
90-6842	105AW-1-2 SUP	6.35E+01 ml	2.20E+02 ml	1.85E+00 ml	< 4.2 E+00 ml	1.20E-02 ml
90-7701	105AW-7 Zr FUSION	8.53E+05 g	1.15E+07 g	4.15E+04 g	7.67E+03 g	1.52E+01 g
90-7701	105AW-7 Zr BLANK	1.77E+04 g	1.06E+04 g	5.95E+03 g	< 6.7 E+03 g	1.45E-01 g

DATA REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 Buldg.

12 August 1991

Client: J. Tingey
WP #: M85180

Cognizant Scientist: G O Harvey Date: 8-30-91
Reviewer: Chuanhui Liu Date: 8-30-91

ALO #	Customer ID	Se-79 dpm/	Tritium dpm/	I-129 dpm/
90-7703	105AW-C-S Zr FUSION	< 5.9 E+03 g		
90-7703	105AW-C-S Zr BLANK	< 5.5 E+03 g		
90-6842	105AW-1-2 SUP	4.77E+01 ml	1.46E+04 ml	5.97E+01 ml
90-7701	105AW-7	< 7.2 E+04 g	4.26E+04 g	< 7.7 E+03 g
90-7701	105AW-7 BLANK	< 6.7 E+04 g	5.22E+03 g	< 8.1 E+03 g
90-7704	105AW-C-L	< 7.5 E+01 ml		5.35E+01 ml

NUCLIDE IDENTIFICATION REPORT
PNL Analytical Chemistry Lab
Radioanalytical group, 325 bldg.

Shannon W. Thompson
P7-22 376-6529
August 19, 1991

Gamma Energy Analysis for: DST, Walt Gray

Procedure: HTA-4-9 WP #: M85180
LRBs: BNW 54143 p. 9 M&TE: WB61069 (6/90)

Cognizant Scientist: Shannon Thompson Date: 8/19/91

Secondary Reviewer: L O Harvey Date: 8/19/91

Sample Information				Activities in Microcuries/unit			
Sample	ALO # (90-)	File Name	Aliquot Size/Unit	Nuclide	Activity	% Error	Note
105AW-C-5 Zr	7703	T9098	5.029 E-3 G	Co-60	4.30 E-1	2.92	
				Ru-106	5.99 E0	3.55	
				Sb-125	1.08 E1	1.03	
				Cs-134	5.48 E-1	3.43	
				Cs-137	6.92 E1	0.22	
				Ce-144	6.58 E0	3.90	
				Eu-154	4.10 E-1	4.87	
				Eu-155	6.49 E-1	5.79	
				Am-241	1.14 E0	4.28	
105AW-C-5 Blk	7703B	T9099	9.9228 mL	Cs-137	9.24 E-5	4.99	
102 AN-Sol Zr	7815	T9100	9.507 E-4 G	Co-60	4.29 E-1	7.31	
				Cs-137	3.95 E2	0.21	
				Eu-154	1.65 E0	4.91	
				Eu-155	1.67 E0	9.81	
				Am-241	9.92 E-1	17.3	
102AN-SolZrBlk	7815B	T9101	9.9228 mL	Co-60	6.51 E-5	4.94	
				Cs-134	6.84 E-6	29.5	
				Cs-137	9.62 E-4	1.35	

PLEASE NOTE THE FOLLOWING:

Activities for samples submitted in CY '91 have been decay corrected to January 1, 1991 00:00:00 . Units are microcuries per aliquot.

Expressed errors are one-sigma counting (acquired data) errors only. We estimate that our combined sample handling and calibration errors are 5%.

Single asterisks refer to manually estimated percentage errors, based on count data. The symbol M refers to manually calculated weighted-mean activities.

"Less than" values, as minimum detectable activities for individual samples, are listed on documents accompanying this report.

Battelle
Pacific Northwest Laboratories

Project Number _____

Internal Distribution

RT Steele
MW Urie
File/LB

Date July 16, 1991

To DST Project Management Office

From DL Baldwin DL Baldwin

Subject CARBON-14 RESULTS

This work is done by the hot persulfate oxidation method, Test Procedure 7-40.42, rev. 0, "Determination of Carbon-14 in Radioactive Liquids, Soils and Sludges". The M&TE No. for liquid scintillation counting is WA82507 and the M&TE No. for weights is WB69133 or 087306-90. The data is located in LRB BNW 53268 pp 90, 98-101, 106. NIST C-14 standard, No. X-52-5, is used as internal standard for determination of %Recovery and NIST standard W-16-1 is used for determination of counting efficiency. The estimated error is ± 20%.

The samples were analyzed in duplicate. The reported result is in Ci/ml, based on the volume of the sample aliquot, or in Ci/g, based on the wet weight of sample.

Lab ID	Sample ID	smpl size	C-14
90-7691	102-SY-½-AN	0.0992 ml	1.4×10^{-8} Ci/ml
		0.0992 ml	2.0×10^{-9} Ci/ml
90-7814	102-AN-SUP	0.0992 ml	7.1×10^{-10} Ci/ml
		0.0992 ml	$< 6 \times 10^{-10}$ Ci/ml
90-7815	102 AN-SOL	0.1460 g	2.2×10^{-9} Ci/g
		0.1430 g	1.6×10^{-9} Ci/g
90-7703	105 AW-C-S	0.2784 g	3.0×10^{-10} Ci/g
		0.2322 g	2.9×10^{-10} Ci/g
90-7704	105 AW-C-L	0.200 ml	1.1×10^{-9} Ci/ml
		0.200 ml	7.1×10^{-10} Ci/ml
90-7701	105 AW-7	0.2043 g	2.6×10^{-9} Ci/g
		0.2425 g	2.7×10^{-9} Ci/g

E54-1900-001 (10/89)

DST Project Management Office
July 16, 1991
Page 2

Example calculation

$$\frac{(44.8-5.1\ \text{cpm}) \times 1.279\ \text{d/c} \times 15\text{ml}/2.018\text{ml}}{0.200\ \text{ml} \times 2.22\text{e}+12 \times 0.753\ \text{yield}} = 1.1 \times 10^{-9}\ \text{Ci/ml}$$

If you have any questions, please call.

105AW
1/2

C-14 1.24×10^{-10} Ci/ml

Characterization of NCRW from tank 105AW

1

This program is part of the Double-Shell Tank Characterization Program.

Waste from Tank 241-105AW (seven segments) will be characterized in support of retrieval, pretreatment, Hanford Waste Vitrification Plant (HWVP), and grout development activities as well as in support of transuranic extraction (TRUEX) development work.

Personnel participating in the program and authorized to enter data into the LRB or onto the test instructions are:

W. J. Gray	W J Gray	WJG
G. M. RICHARDSON	GM Richardson	GMR
H. C. Buchanan	HC Buchanan	HCB
Elmer H. Shade	Elmer H Shade	EHS
Paul R. Bredt	Paul R Bredt	PRB

Personnel authorized to perform technical & surveillance review.

J. M. Tingey	J M Tingey	JMT

1990
Ingoy

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-1-EXT
Page 4 of 5

WJS
9/26/90

19. Remove the extruder tray and weigh.

Total _____ g No solids
Extruder Tray 794.43 g
Sample _____ g

Balance 2

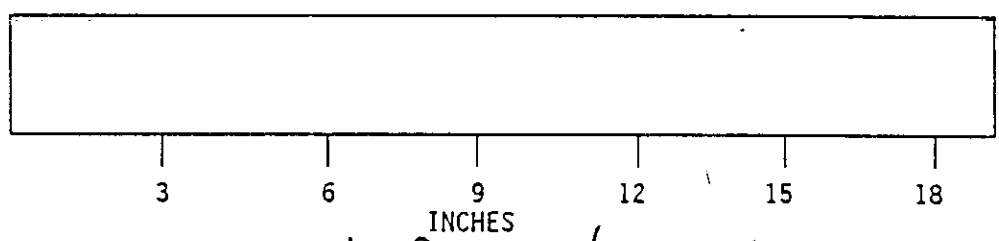
20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) no photos taken

21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinant properties of the material.

Length ~~No Auzhle~~ cm solids 90-014

BOTTOM TOP



Description Liquid Sample - clear in color

22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-1-SST. Record the position of the segment from which this sample was taken.

105AW-1-SST

Total _____ g
Jar + Lid N/A g
Sample _____ g

Balance ____

No auzhle Solids
Length _____ inches
Position from top _____ inches

Signature [illegible] Date 5-23-90 LRB 53595 Page 13

Project No. _____ Date of Work _____
Entered By [illegible] Date 9-26-90
Disclosed To and Understood By
Signed 1. _____ Date _____

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 4 of 5

✓19. Remove the extruder tray and weigh.

Total _____ g
Extruder Tray 794.43 g NO solids
Sample _____ g

Balance 2

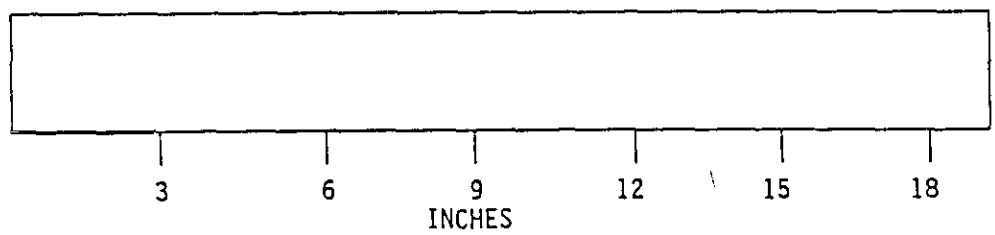
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) no photos taken

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length no available solids cm 90-015

BOTTOM TOP



Description Liquid sample, opaque

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-2-SST. Record the position of the segment from which this sample was taken.

105AW-2-SST

Total _____ g
Jar + Lid N/A g
Sample _____ g
Balance ____

no available solids
Length _____ inches
Position from top _____ inches

Signature KC Buchanan Date 5/23/90 LRB 53595 Page 18

Project No. _____ Date of Work _____
Entered By W J Gray 93 Date 9-26-90
Disclosed To and Understood By _____ Date _____

May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT
Page 4 of 5

23

✓19. Remove the extruder tray and weigh.

Total 1088.68 g
Extruder Tray 794.41 g
Sample 294.27 g

Balance 2

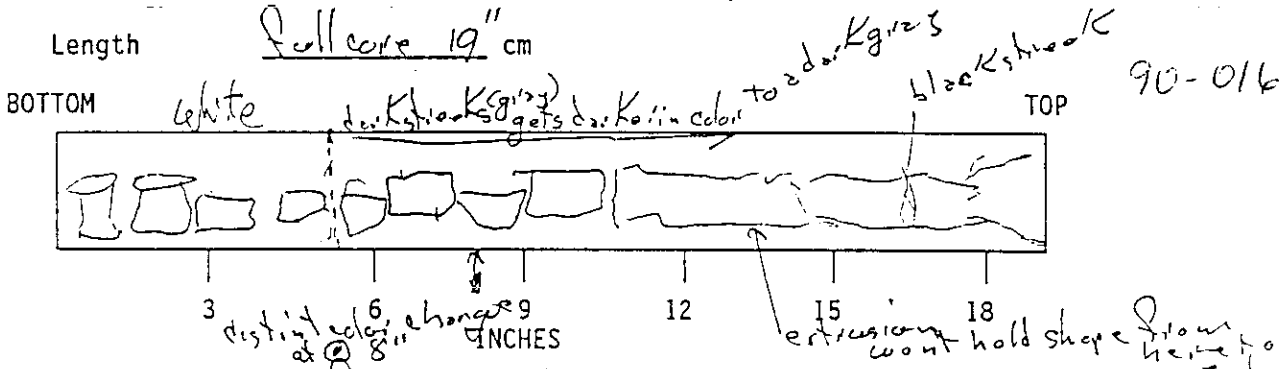
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) #7 #8

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length full core 19" cm

90-016



Description more liquid on bottom, some cut in chunks, white in color, texture becoming more liquid as extrusion progresses. Liquidous on upper sto spreading out on cotchepan

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-3-SST. Record the position of the segment from which this sample was taken.

105AW-3-SST

Total ____ g
Jar + Lid N/A g
Sample ____ g
Balance ____

Length N/A inches
Position from top ____ inches

Signature [signature] Date 5-23-90 LRB 53595 Page 23

June 13, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT

✓ 19. Remove the extruder tray and weigh.

Total 1108.30 g
Extruder Tray 794.16 g
Sample 314.14 g

Balance 2

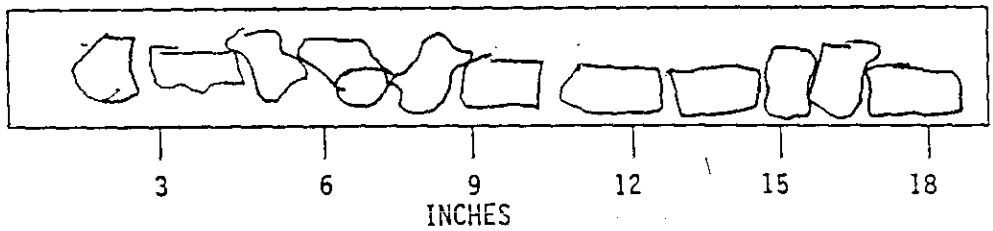
✓ 20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 9 & 10

✓ 21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 17.5 in ~~cm~~ 90-017

BOTTOM TOP



Description color is "White", consistency of margarine, retained shape upon the tray

__ 22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-4-SST. Record the position of the segment from which this sample was taken.

105AW-4-SST none taken

Total _____ g
Jar + Lid _____ g
Sample _____ g
Balance ___

Length _____ inches
Position from top _____ inches

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 28

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ Date _____

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT
Page 4 of 5

✓19. Remove the extruder tray and weigh.

Total 1101.55 g
Extruder Tray 794.13 g
Sample 307.42 g

Balance #2

✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

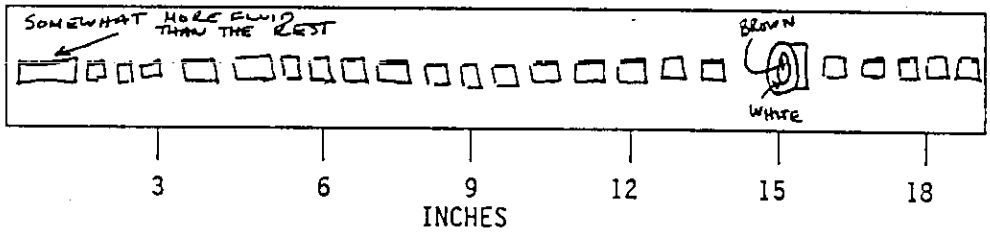
Photograph Number(s) 11 & 12

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 19"/48 cm

90-018

BOTTOM TOP



Description The sample was very dry. Upon extrusion it broke off in chunks with ragged ends. Mostly white with some brown and black spots in the sludge.

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-5-SST. Record the position of the segment from which this sample was taken.

105AW-5-SST

Total 74.07 g
Jar + Lid 42.46 g
Sample 31.61 g
Balance 2

Length 2 inches
Position from ~~top~~ bottom 9 to 11 inches

Signature HC Buchanan Date 6/14/90 LRB 53595 Page 33

Project No.
Entered By WJ Gray
Disclosed To and Understood By

96

Date of Work
Date 10-17-90

ne 14, 1990
M Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT
Page 4 of 5

✓19. Remove the extruder tray and weigh.

Total 1117.06 g
Extruder Tray 794.11 g
Sample 322.95 g

Balance 2

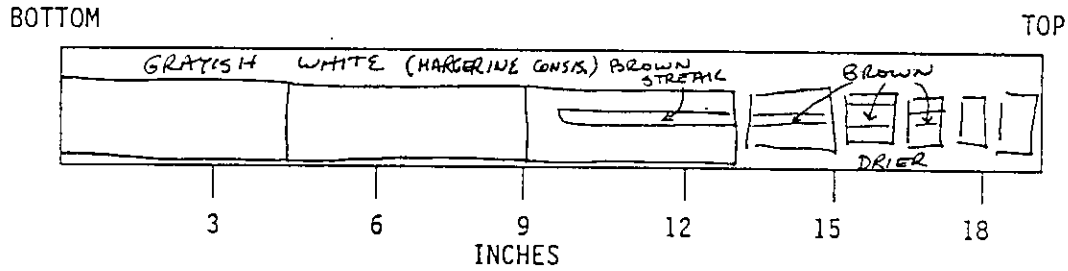
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 1 & 2

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 19 inches cm

90-019



Description THE BOTTOM 12" WERE WETTER THAN SEGMENT FIVE. GRAYISH WHITE IN COLOR W/ LONG BROWN STREAK ON TOP HALF OF SEGMENT. TOP PORTION DRIENESS MUCH LIKE SEGMENT 5.

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-6-SST. Record the position of the segment from which this sample was taken.

105AW-6-SST

Total ~~g~~
Jar + Lid ~~42.64~~ g
Sample ~~g~~
Balance 362-06-01-036, expires 8/1/90

~~Length inches~~
~~Position from top inches~~

NO SHEAR STRENGTH SAMPLE TAKEN
6/15/90
g—T

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 38

Project No. Date of Work
Entered By W J Stoy Date 12-17-90
Disclosed To and Understood By
Signed 1 Date

14, 1990
ingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT
Page 4 of 5

19. Remove the extruder tray and weigh.

Total 916.60 g
Extruder Tray 794.18 g
Sample 122.42 g

Balance #2

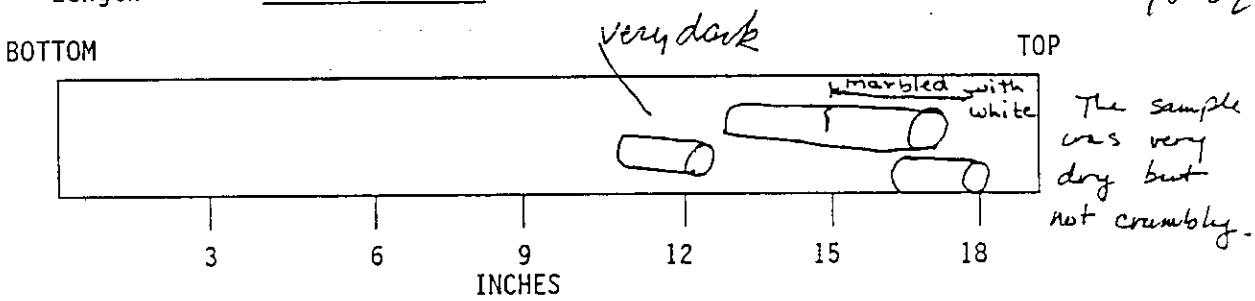
20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 3 & 4

21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 6 in ~~cm~~

90-020



The sample was very dry but not crumbly.

Description Although sample extruded at end, the sample could be seen when the valve was opened indicating that the sample was from the bottom of the segment.

22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-~~7~~ 6-SST. Record the position of the segment from which this sample was taken.

105AW-~~7~~ 6-SST 6/15/90

Total 81.71 g
Jar + Lid 42.62 g
Sample 39.09 g
Balance 2

Length 2 inches
Position from ~~top~~ Bottom 13 to 15 inches

total on 11/5/90 was 78.74 g WJG

Signature H. Craig Beckham Date 6/15/90 LRB 53595 Page 43

Project No. Date of Work
Entered By WJ Gray 98 Date 10-17-90
Disclosed To and Understood By
Signed Date

TABLE OF CONTENTS

SUBJECT MATTER	PAGE
Authorization Signitures & Reviews	1-2
Chain of Custody Reports	3-9
Extrusion of Segment 1	10-14
" " " 2	11-19
" " " 3	20-24
" " " 4	25-29
" " " 5	30-34
" " " 6	35-39
" " " 7	40-44
Characterization of Segments 1-2	45-47
" " " 3-4	48-53
" " " 5	54-~~26~~77

Characterization of NCRW from Tank 105 AW

This program is part of the Double-Shell Tank Characterization Program.

Waste from Tank 241-105 AW (Seven Segments) will be characterized in support of retrieval, pretreatment, Hanford Waste Vitrification Plant (HWVP), and grout development activities as well as in support of transuranic extraction (TRUEX) development work.

Personnel participating in the program and authorized to enter data into the LRB or onto the test instructions are:

W. J. Gray	W J Gray	WJG
G.M. Richardson	GM Richardson	GMR
H.C. Buchanan	HC Buchanan	HCB
Elmer H. Shade	Elmer H Shade	EHS
Paul R. Bredt	Paul R Bredt	PRB

Personnel authorized to perform technical or surveillance review.

J. M. Tingey	J M Tingey	JMT

Project No. _____ Date of Work _____

Entered By _____ Date _____

Disclosed To and Understood By

Signed 1. _____ Date _____

Reviews

Pages Reviewed	Reviewed By	Date	Findings
2-53	JM Tingey	1/8/91	6 arithmetic and omission errors — now corrected

Project No. _____ Date of Work _____

Entered By _____ Date _____

Disclosed To and Understood By

Signed 1. _____ Date _____

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-014 (3) Supervisor* [illegible]

(4) Tank 105 AW (5) Riser 16 B (6) Segment 1 (7) Core 019 (8) Cask Serial Number C1022

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	[illegible]	.5 mr/hr
Side Dose Rate	[illegible]	[illegible]
Bottom Dose Rate	[illegible]	2.5 mr/hr
Smearable Contamination	<D. (alpha)	<DL. (alpha)
	<D. (beta-gamma)	<DL (beta-gamma)
	RPT* [illegible] (Signature)	RPT* [illegible] (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-014
B. Cask Seal Number	N/A
C. Sampler Number Used	2-24
D. Date and Time Sampler Unseated	5-14-90, 0906
E. Expected Liquid Content	[illegible]
F. Expected Solid Content	[illegible]
G. Dose Rate Through Drill String	130 mR
H. Expected Sample Length	19

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p. 3

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241 AW 105	D.C. Hartley	5-17-90	325 Bldg. 300 Area	J M Tuttle	[illegible]/90
	(15) SENDER SIGNATURE*	(17) TIME RELEASED		(21) RECIPIENT SIGNATURE*	(23) TIME RECEIVED
	Denny C Hartley	0930		[illegible]	1050

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
☒ Yes ☐ No	☒ Yes ☐ No	Shipment No. ☒ Yes ☐ No	Cask Seal No. ☒ Yes ☐ No	Sample No. ☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Project No. ____ Date of Work ____

Entered By [illegible] Date [illegible]

Disclosed To and Understood By ____ Date ____

102

WHC-SD-WM-TI-649 REV. 0

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-015 (3) Supervisor* [illegible]

(4) Tank 105 AW (5) Riser 16 B (6) Segment 2 (7) Core 019 (8) Cask Serial Number 1006 C

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	.3 R/hr	.3 R/hr
Side Dose Rate	5 R/hr	5 R/hr
Bottom Dose Rate	3 R/hr	3 R/hr
Smearable Contamination	<D. (alpha)	<DL (alpha)
	<D. (beta-gamma)	<DL (beta-gamma)
	RPT* [illegible] (Signature)	RPT* [illegible] (Signature)

(10) Shipment Description:

A. Work Package Number	240-90 314-240
B. Cask Seal Number	N/A
C. Sampler Number Used	354
D. Date and Time Sampler Unseated	5-15-90 1028
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	175 mr/hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB53595 p.4

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	D.C. Hartley	5-17-90	325 Bldg 300 Area	J M Tinkel	5/17/90
	(15) SENDER SIGNATURE* [signature]	(17) TIME RELEASED 0930		(21) RECIPIENT SIGNATURE* [signature]	(23) TIME RECEIVED 1030

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

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

(25) Seal Data Consistent with this Record?

Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Project No. | Date of Work | Entered By [illegible] | Date 9/26/90 | Disclosed To and Understood By 103

WHC-SD-WM-TI-649 REV. 0

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number ~~90-015~~ 90-016 (3) Supervisor* Jim Bishop

(4) Tank 105 AW (5) Riser 16B (6) Segment 3 (7) Core 019 (8) Cask Serial Number C1035

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	1.5 mr/hr	~~<0.5~~
Side Dose Rate	7 mr/hr	~~7 mr/hr~~
Bottom Dose Rate	2.5 mr/hr	~~2.5 mr/hr~~
Smearable Contamination (alpha)	<D.	~~2.5 dpm~~
(beta-gamma)	<D.	~~(beta-gamma)~~
RPT* (Signature)	[illegible]	RPT* ~~(Signature)~~

(10) Shipment Description:

A. Work Package Number	240 [illegible] W
B. Cask Seal Number	N/A
C. Sampler Number Used	#9
D. Date and Time Sampler Unseated	5-15-90, 15 mr/hr
E. Expected Liquid Content	20%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	150 mr/hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p.5

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	D.C. Hartley	5-17-90	325 Bldg. 300 Area	J M Tinget	5-17-90
	(15) SENDER SIGNATURE*	(17) TIME RELEASED		(21) RECIPIENT SIGNATURE*	(23) TIME RECEIVED
	[signature]	0930		[signature]	1030

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

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

(25) Seal Data Consistent with this Record?
Shipment No. ☐ Yes ☐ No
Cask Seal No. ☒ Yes ☐ No
Sample No. ☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Entered By [signature] Date 7/25/90

Disclosed To and Understood By

Signed 1. 104 Date

2. Date

CHAIN-OF-CUSTOL . RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-007 (2) Sample Number 4 (3) Supervisor* D.C. Hartley

(4) Tank 105AW (5) Riser 16B (6) Segment 90017 (7) Core 019 (8) Cask Serial Number C1024

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	1mr/hr	1.0
Side Dose Rate	6mr/hr	6 mr/hr
Bottom Dose Rate	6mr/hr	6 mr/hr
Smearable Contamination	LDL (alpha)	LDL (alpha)
	LDL (beta-gamma)	LDL (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456/W
B. Cask Seal Number	N/A
C. Sampler Number Used	31
D. Date and Time Sampler Unseated	5-16-90, 1025
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	150 mr/hr.
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p. 6

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241/AW 105	D.C. Hartley	5-23-90	325 Bldg. 300 Area	TK Hodrews	5-23-90
	(15) SENDER SIGNATURE* D.C. Hartley	(17) TIME RELEASED 0915		(21) RECIPIENT SIGNATURE* J.K. Hodrews	(23) TIME RECEIVED 10:10

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

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

(25) Seal Data Consistent with this Record?
Shipment No. ☒ Yes ☐ No
Cask Seal No. ☒ Yes ☐ No
Sample No. ☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Project No. ____ Date of Work ____
Entered By W. J. Cl... Date 9/25/90
Disclosed To and Understood By ____ Date ____
Signed 1 105 Date ____

WHC-SD-WM-TI-649 REV. 0

CHAIN-OF-CUSTO. / RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-007 (2) Sample Number 5 (3) Supervisor* DCHartley

(4) Tank 105AW (5) Riser 16B (6) Segment 90-018 (7) Core 19 (8) Cask Serial Number 1002C

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	1mr/hr	1.[illegible] mr/hr
Side Dose Rate	4mr/hr	4.[illegible] mr/hr
Bottom Dose Rate	5mr/hr	5.[illegible] mr/hr
Smearable Contamination (alpha)	<DET.	<DL
(beta-gamma)	<DET.	<DL
RPT* (Signature)	[illegible]	[illegible]

(10) Shipment Description:	
A. Work Package Number	2W/90-01(1)GW
B. Cask Seal Number	N/A
C. Sampler Number Used	34
D. Date and Time Sampler Unseated	5-16-90, 1419
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	150 mr/hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p.7

(12) Field Comments:

(27) Laboratory Comments The cask seal wasn't on the cask – it was found mangled on the truck's Chu Hoist. Per telephone conversation with Dan Hartley – he assured us seal was correct and intact when the cask left the outer area. Based on this info we accepted the cask.

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241AW	D.C. Hartley	5-23-90	325 Bldg.	TK Andrews	5-23-90
105	(15) SENDER SIGNATURE* DCHartley	(17) TIME RELEASED 0915	300 Area	(21) RECIPIENT SIGNATURE* TKAndrews	(23) TIME RECEIVED 10:10

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

(24) Seal Intact Upon Receipt? ☐ Yes ☒ No
Seal was caught in [illegible] on the truck

(25) Seal Data Consistent with this Record?
Shipment No. ☐ Yes ☒ No
Cask Seal No. ☐ Yes ☒ No
Sample No. ☐ Yes ☒ No

Unable to verify seal data
TKA

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Entered By [illegible] Date of Work

Disclosed To and Understood By [illegible] Date 9/24/90

Signed 1. 106 Date

2. Date

WHC-SD-WM-TI-649 REV. 0

CHAIN-OF-CUSTO. RECORD FOR CORE SAMPLING

(1) Shipment Number 90-S-007 (2) Sample Number 6 (3) Supervisor* DCHartley

(4) Tank 105AW (5) Riser 16B (6) Segment 90-018 (7) Core 19 (8) Cask Serial Number C1026

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	5 mr/Hr	.5 mr/hr
Side Dose Rate	5mr/Hr	5 mr/hr
Bottom Dose Rate	5mr/Hr	5 mr/hr
Smearable Contamination	LDET. (alpha)	LDET (alpha)
	LDET. (beta-gamma)	LDET (beta-gamma)
	RPT* [signature] (Signature)	RPT* [signature] (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456/W
B. Cask Seal Number	N/A
C. Sampler Number Used	58
D. Date and Time Sampler Unseated	5-17-90 0952
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	250 mr/Hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p. 8

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241AW 105	D.C. Hartley	5-23-90	325 Bldg. 300 Area	T.K. Andrews	5-23-90
	(15) SENDER SIGNATURE* D.C. Hartley	(17) TIME RELEASED 0915		(21) RECIPIENT SIGNATURE* T.K. Andrews	(23) TIME RECEIVED 10:10

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

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

(25) Seal Data Consistent with this Record?
Shipment No. ☒ Yes ☐ No
Cask Seal No. ☒ Yes ☐ No
Sample No. ☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Entered By [signature] Date 7-24-90

Disclosed To and Understood By

Signed 1. Date

2. Date

107

Date of Work

WHC-SD-WM-TI-649 REV. 0

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-008 (2) Sample Number 90-020 (3) Supervisor* DC Hartley

(4) Tank 105AW (5) Riser 16B (6) Segment 7 (7) Core #19 1 (8) Cask Serial Number 1009d

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	0.5mr/hr	0.5mr/hr
Side Dose Rate	15mr/hr.	15mr/hr
Bottom Dose Rate	9mr/hr.	9mr/hr
Smearable Contamination	<DET. (alpha)	<DET (alpha)
	<DET. (beta-gamma)	<DL (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:

A. Work Package Number	2W-90-01456/W
B. Cask Seal Number	N/A
C. Sampler Number Used	#27
D. Date and Time Sampler Unseated	5-16-90, 1356
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	450mr/hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

LRB 53595 p. 9

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241AW R16B	D.C. Hartley	6/6/90	325 Bldg. Zodiac	T K Andrews	6-6-90
	(15) SENDER SIGNATURE* DC Hartley	(17) TIME RELEASED 0940		(21) RECIPIENT SIGNATURE* TK Andrews	(23) TIME RECEIVED 1040

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

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

(25) Seal Data Consistent with this Record?
Shipment No. ☒ Yes ☐ No
Cask Seal No. ☒ Yes ☐ No
Sample No. ☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

Project No. 2W-90-01456/W
Entered By
Date of Work 9/26/90
Disclosed To and Understood By
Date
108

6

Controlled Document
Copy NO. 01

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-1-EXT
Page 1 of 5

Extrusion of Sample
Tank 105-AW Segment 1

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
3) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature [signature] Date 5-23-90 LRB 53595 Page 10

Project No. Date of Work
Entered By [signature] Date 9/26/90
Disclosed To and Understood By

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-1-EXT
Page 2 of 5

RECEIPT OF 105-AW SEGMENT 1

✓1. Record the sampler number provided on the chain-of-custody record for sample 90-014 and compare this sampler number to the number inscribed on the sampler.

Sampler # 24 α

✓2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 1

✓3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL1 and 105AW-SOL1, respectively.

	105AW-DL1	105AW-SOL1
Jar + Lid	264.13 g	355.02 g

Balance 2

✓4. Measure cell temperature.

32 °C

Thermometer ID ~~6929~~ 01225 5-23-90 Thermocouple ID 6929

✓5. Weigh the extruder tray.

Extruder Tray 794.43 g

Balance 2

✓6. Prepare the camera for use. N.A no photos taken

✓7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample ~~~15-20 mL~~ none Amount of oil ~15-20 mL 5-23-90

✓9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature Elmer A Shole Date 5-23-90 LRB 53595 Page 11

Project No. Date of Work
Entered By W J Gray Date 9-26-90
Disclosed To and Understood By
Signed T. Date

2

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 3 of 5

1 WJS 9/26/90

10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

13. Place the sampler valve wrench into closed valve slot. (Horizontal is closed and vertical is open.)

14. Place the weighed 250 mL jar **105AW-DL1** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

18. Drain the free liquid into the 250 mL jar **105AW-DL1**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL1

Total	463.76	g	Volume	205	mL
Jar + Lid	264.13	g			
Sample	199.63	g			
Balance	2				

$\rho = \frac{199.63 gm}{205 ml} = 0.974 gm/ml$

Signature [signature] Date 5-23-90 LRB 53595 Page 12

Project No. _____ Date of Work _____
Entered By WJ Gray Date 9-26-90
Disclosed To and Understood By 111
Signed 1. _____ Date _____

13

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-~~2~~1-EXT
Page 4 of 5

WJS 9/26/90

✓19. Remove the extruder tray and weigh.

Total _____ g
Extruder Tray 294.43 g
Sample _____ g

No solids

Balance 2

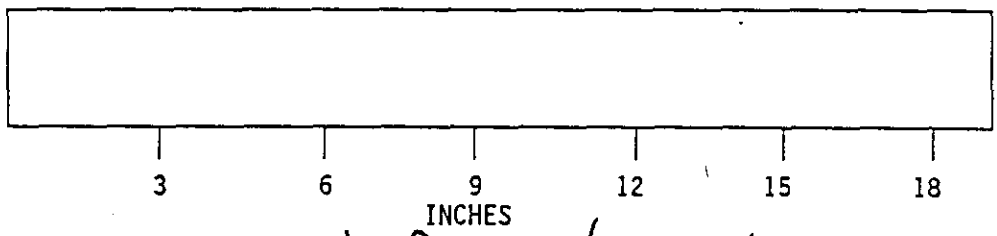
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) no photos taken

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinant properties of the material.

Length ~~No Auizhle~~ cm solids

BOTTOM TOP



Description Liquid Sample - clear in color

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-1-SST. Record the position of the segment from which this sample was taken.

105AW-1-SST

Total ~~N/A~~ g
Jar + Lid ~~N/A~~ g
Sample _____ g

Balance ___

No auizhle Solids
Length _____ inches
Position from top _____ inches

Signature Chris A Shade Date 5-23-90 LRB 53595 Page 13

Project No. _____ Date of Work _____
Entered By W J Gray Date 9-26-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

14

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-1-EXT
Page 5 of 5

✓23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL1. Seal and weigh.

	105AW-SOL1	
Total	NA	g
Jar + Lid	355.02	g
Sample		g
Balance	2	

no Auisble Solids

Signature [signature] Date 5-23-90 LRB 53595 Page 14

Project No. Date of Work
Entered By [signature] Date 9-26-90
Disclosed To and Understood By
Signed 1. Date

15

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May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 1 of 5

Extrusion of Sample
Tank 105-AW Segment 2

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
3) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature [illegible] Date 5-23-90 LRB 53595 Page 15

Project No. Date of Work
Entered By [illegible] Date 9-26-90
Disclosed To and Understood By
Signed 1. Date

16

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 2 of 5

RECEIPT OF 105-AW SEGMENT 2

✓ 1. Record the sampler number provided on the chain-of-custody record for sample 90-015 and compare this sampler number to the number inscribed on the sampler.

Sampler # 54

✓ 2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 2

✓ 3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL2 and 105AW-SOL2, respectively.

	105AW-DL2	105AW-SOL2
Jar + Lid	266.37 g	352.83 g

Balance 1

✓ 4. Measure cell temperature.

32 °C

Thermometer ID 01225 Thermocouple ID 6929

✓ 5. Weigh the extruder tray.

Extruder Tray 794.43 g

Balance 2

✓ 6. Prepare the camera for use.

✓ 7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓ 8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample none Amount of oil 10-15 ml

✓ 9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature [illegible] Date 5-24-90 LRB 535595 Page 16

Project No. Date of Work
Entered By W J Gray Date 9-26-90
Disclosed To and Understood By
Signed 1. Date
Date

17

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 3 of 5

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

✓ 13. Place the sampler valve wrench into closed valve slot. **(Horizontal is closed and vertical is open.)**

✓ 14. Place the weighed 250 mL jar **105AW-DL2** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. <u>Confirm that the valve is open before proceeding.</u>

✓ 16. To extrude the sample, switch the directional switch to <u>reverse</u> and set the torque at less than or equal to <u>30</u>. <u>Do not exceed a torque setting of 30!</u> Gradually increase the speed. Do not exceed a speed setting of <u>50</u>.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

✓ 18. Drain the free liquid into the 250 mL jar **105AW-DL2**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL2

Total	519.10	g	Volume	245 mL
Jar + Lid	266.37	g		
Sample	~~252.873~~ 252.73	g	$\rho = \frac{253.73\ gm}{245\ ml} = 1.04\ gm/ml$	
Balance	2			

Signature HC Buchanan Date 5/23/90 LRB 53595 Page 17

Project No. _____ Date of Work _____
Entered By W J Chang Date 9-26-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 4 of 5

✓ 19. Remove the extruder tray and weigh.

Total _____ g
Extruder Tray 794.43 g NO solids
Sample _____ g

Balance 2

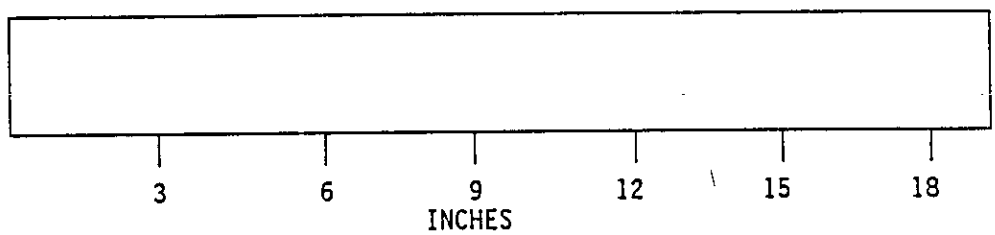
✓ 20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) no photos taken

✓ 21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length no available solids cm

BOTTOM TOP



Description Liquid sample, opaque

✓ 22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-2-SST. Record the position of the segment from which this sample was taken.

105AW-2-SST

Total _____ g
Jar + Lid N/A g
Sample _____ g
Balance ____

no available solids
Length _____ inches
Position from top _____ inches

Signature KC Buchanan Date 5/23/90 LRB 53595 Page 18

Project No. _____ Date of Work _____
Entered By W J Stray Date 9-26-90
Disclosed To and Understood By _____
Signed 1 _____ Date _____

May 21, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-2-EXT
Page 5 of 5

✓23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL2. Seal and weigh.

	105AW-SOL2	
Total	_____	g
Jar + Lid	352.83	g
Sample	_____	g
Balance	____	

no solids

Signature HC Buchanan Date 5/23/90 LRB 53595 Page 19

Project No. _____ Date of Work _____
Entered By W J Gray Date 9-26-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

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May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT
Page 1 of 5

Extrusion of Sample
Tank 105-AW Segment 3

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
3) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature Jm Richardson Date 5-23-90 LRB 53595 Page 20

Project No. Date of Work
Entered By W J Gray Date 10-11-90
Disclosed To and Understood By
Signed 1. Date

May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT

RECEIPT OF 105-AW SEGMENT 3

✓1. Record the sampler number provided on the chain-of-custody record for sample 90-016 and compare this sampler number to the number inscribed on the sampler.

Sampler # 8 JMR 5-23-90

✓2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 3

✓3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL3 and 105AW-SOL3, respectively.

	105AW-DL3	105AW-SOL3
Jar + Lid	261.03 g	353.27 g

Balance #2

✓4. Measure cell temperature.

33 °C

Thermometer ID 01225 Thermocouple ID 6929

✓5. Weigh the extruder tray.

Extruder Tray 794.41 g

Balance #2

✓6. Prepare the camera for use.

✓7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample 0 Amount of oil 20 ml

✓9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature JM Richardson Date 5-23-90 LRB 53595 Page 21

Project No. Date of Work
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By 120
Signed 1. Date

22

May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT
Page 3 of 5

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

✓ 13. Place the sampler valve wrench into closed valve slot. (Horizontal is closed and vertical is open.)

✓ 14. Place the weighed 250 mL jar **105AW-DL3** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

✓ 16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

✓ 18. Drain the free liquid into the 250 mL jar **105AW-DL3**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL3

Total _____ g Volume _____ mL
Jar + Lid N/A g
Sample _____ g no free liquids

Balance ____

Signature [signature] Date 5-23-90 LRB 53595 Page 22

Project No. _____ Date of Work _____
Entered By [signature] Date 10-11-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT
Page 4 of 5

23

✓19. Remove the extruder tray and weigh.

Total 1088.68 g
Extruder Tray 794.41 g
Sample 294.27 g

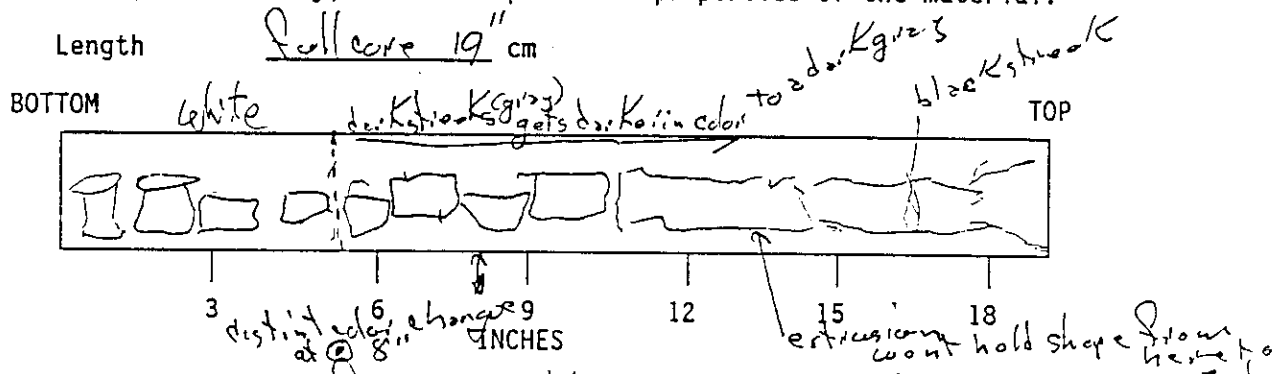
Balance 2

✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) #7 #8

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length full core 19" cm



Description more liquid on bottom, cement in chunks, white in color, texture becoming more liquid as extrusion progresses. Liquid on upper side spreading out on catchpan

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-3-SST. Record the position of the segment from which this sample was taken.

105AW-3-SST

Total ____ g
Jar + Lid N/A g
Sample ____ g
Balance ____

Length N/A inches
Position from top ____ inches

Signature [signature] Date 5-23-90 LRB 53595 Page 23

Project No. ____ Date of Work ____
Entered By [signature] 122 Date 10-17-90
Disclosed To and Understood By

24

May 24, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-3-EXT
Page 5 of 5

✓23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL3. Seal and weigh.

	105AW-SOL3	
Total	633.95	g
Jar + Lid	353.27	g
Sample	280.68	g

Balance 2

Photo removed for enlargement 9-23-93

Signature [illegible] Date 5-23-90 LRB 53595 Page 24

Project No.
Entered By W J Gray
Disclosed To and Understood By
Date of Work
Date 10-17-90

June 13, 1990
JM Tingey

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Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT

Extrusion of Sample
Tank 105-AW Segment 4

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
2) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 25

Project No. Date of Work
Entered By WJ Tingey Date 10-17-90
Disclosed To and Understood By
Signed 1. Date
2. Date

6

June 13, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT
Page 2 of 5

RECEIPT OF 105-AW SEGMENT 4

✓ 1. Record the sampler number provided on the chain-of-custody record for sample 90-017 and compare this sampler number to the number inscribed on the sampler.

Sampler # 31

✓ 2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 4

✓ 3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL4 and 105AW-SOL4, respectively.

	105AW-DL4	105AW-SOL4
Jar + Lid	261.74 g	351.54 g

Balance 2

✓ 4. Measure cell temperature.

32 °C

Thermometer ID 01225 Thermocouple ID 1

✓ 5. Weigh the extruder tray.

Extruder Tray 794.16 g

Balance 2

✓ 6. Prepare the camera for use.

✓ 7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓ 8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample none Amount of oil ~15 ml

✓ 9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 26

Project No. _____ Date of Work _____

Entered By W J Gray Date 10-17-90

Disclosed To and Understood By

Signed 1 _____ 125 _____ Date _____

2 _____ Date _____

2

June 13, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT
Page 3 of 5

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

✓ 13. Place the sampler valve wrench into closed valve slot. (Horizontal is closed and vertical is open.)

✓ 14. Place the weighed 250 mL jar 105AW-DL4 into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

✓ 16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

18. Drain the free liquid into the 250 mL jar 105AW-DL4. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

no free liquid present

105AW-DL4

Total	_____	g	Volume	_____	mL
Jar + Lid	_____	g			
Sample	_____	g			
Balance	___				

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 27

Project No. _____ Date of Work _____
Entered By W J Long Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ 126 _____ Date _____
2. _____ Date _____

June 13, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT

✓ 19. Remove the extruder tray and weigh.

Total 1108.30 g
Extruder Tray 794.16 g
Sample 314.14 g

Balance 2

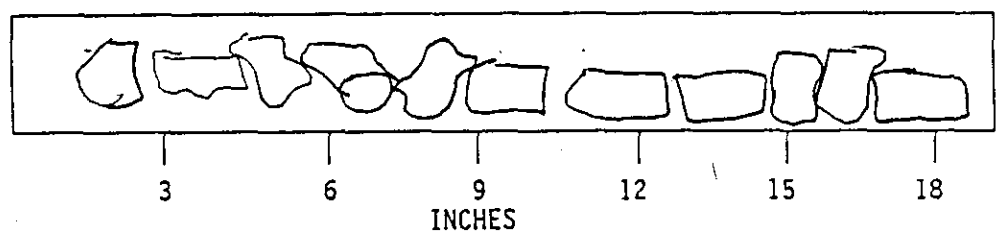
✓ 20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 9 & 10

✓ 21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 17.5 in ~~cm~~

BOTTOM TOP



Description color is "white", consistency of margarine, retained shape upon the tray

__ 22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-4-SST. Record the position of the segment from which this sample was taken.

105AW-4-SST none taken

Total _____ g
Jar + Lid _____ g
Sample _____ g
Balance ____

Length _____ inches
Position from top _____ inches

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 28

Project No. _____ Date of Work _____
Entered By WJ Stacy Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

June 13, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-4-EXT
Page 5 of 5

✓ 23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL4. Seal and weigh.

	105AW-SOL4	
Total	648.98	g
Jar + Lid	351.54	g
Sample	297.44	g

Balance 2

Photo removed for enlargement 9-23-~~92~~ 93

Signature HC Buchanan Date 6/13/90 LRB 53595 Page 29

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By _____
Signed 1.

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June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT

Extrusion of Sample
Tank 105-AW Segment 5

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
2) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature HC Buchanan Date 6/14/90 LRB 53595 Page 30

Project No. Date of Work
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT
Page 2 of 5

RECEIPT OF 105-AW SEGMENT 5

✓ 1. Record the sampler number provided on the chain-of-custody record for sample 90-018 and compare this sampler number to the number inscribed on the sampler.

Sampler # 34

✓ 2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 5

✓ 3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL5 and 105AW-SOL5, respectively.

	105AW-DL5	105AW-SOL5
Jar + Lid	_____ g	351.03 g

Balance 2

✓ 4. Measure cell temperature.

33 °C

Thermometer ID 01225 Thermocouple ID 6929

✓ 5. Weigh the extruder tray.

Extruder Tray 794.13 g

Balance 2

✓ 6. Prepare the camera for use.

✓ 7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓ 8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample ~25 ml Amount of oil ~20 ml

✓ 9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature H C Buchanan Date 6/14/90 LRB 53595 Page 31

Project No. _____ Date of Work _____
Entered By W J Stagg Date 10-17-90
Disclosed to and Understood By
Signed 1. _____ Date _____

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT
Page 3 of 5

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

✓ 13. Place the sampler valve wrench into closed valve slot. (Horizontal is closed and vertical is open.)

✓ 14. Place the weighed 250 mL jar **105AW-DL5** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

✓ 16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

__ 18. Drain the free liquid into the 250 mL jar **105AW-DL5**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL5

Total	_____	g	Volume	_____	mL
Jar + Lid	_____	g			
Sample	_____	g			
Balance	____				

No Free Liquid
JMT 6/14/90

Signature HC Buchanan Date 6/14/90 LRB 53595 Page 32

Project No. ____ Date of Work ____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By ____ Date ____

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT
Page 4 of 5

✓19. Remove the extruder tray and weigh.

Total 1101.55 g
Extruder Tray 794.13 g
Sample 307.42 g

Balance #2

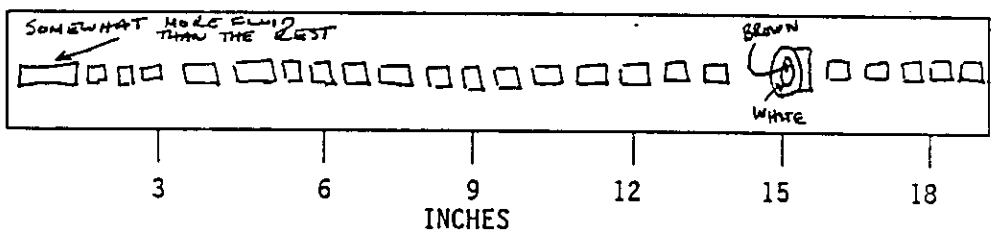
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 11 & 12

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 19"/48 cm

BOTTOM TOP



Description The sample was very dry. Upon extrusion it broke off in chunks with ragged ends. Mostly white with some brown and black spots in the sludge.

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-5-SST. Record the position of the segment from which this sample was taken.

105AW-5-SST

Total 74.07 g
Jar + Lid 42.46 g
Sample 31.61 g
Balance 2

Length 2 inches
Position from ~~top~~ bottom 9 to 11 inches

Signature HC Buchanan Date 6/14/90 LRB 53595 Page 33

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

34

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-5-EXT
Page 5 of 5

23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL5. Seal and weigh.

105AW-SOL5

Total	609.83	g
Jar + Lid	351.03	g
Sample	258.80	g

Balance 2

Photo removed for enlargement 9-23-93

Signature HC Buchanan Date 6/14/90 LRB 53595 Page 34

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-11-90
Disclosed To and Understood By _____
Signed T _____ Date _____

Controlled Document
Copy NO. 01

35

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT
Page 1 of 5

Extrusion of Sample
Tank 105-AW Segment 6

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
2) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

✓ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

✓ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

✓ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

✓ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 35

Project No. Date of Work
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT
Page 2 of 5

RECEIPT OF 105-AW SEGMENT 6

✓ 1. Record the sampler number provided on the chain-of-custody record for sample 90-019 and compare this sampler number to the number inscribed on the sampler.

Sampler # 58

✓ 2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 6

✓ 3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL6 and 105AW-SOL6, respectively.

	105AW-DL6	105AW-SOL6
Jar + Lid	g	354.21 g

CB 6/14/90 62
Balance 326-06-06-036, expires 8/1/90

✓ 4. Measure cell temperature.

33 °C

Thermometer ID 01225 Thermocouple ID 6929

✓ 5. Weigh the extruder tray.

Extruder Tray 794.11 g

Balance 2

6. Prepare the camera for use.

✓ 7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample ~10 ml Amount of oil ~15 ml

✓ 9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature HC Buchanan Date 6/15/90 LRB 53595 Page 36

Project No. Date of Work
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By Date

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

__ 13. Place the sampler valve wrench into closed valve slot. (Horizontal is closed and vertical is open.)

✓ 14. Place the weighed 250 mL jar **105AW-DL6** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

✓ 16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

__ 18. Drain the free liquid into the 250 mL jar **105AW-DL6**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL6

Total _____ g Volume _____ mL

Jar + Lid _____ g No drainable liquid

Sample _____ g

Balance ____

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 37

Project No. _____ Date of Work _____

Entered By W J Gray Date 10-17-90

Disclosed To and Understood By

Signed 1. _____ Date _____

2. _____ Date _____

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT

✓19. Remove the extruder tray and weigh.

Total 1117.06 g
Extruder Tray 794.11 g
Sample 322.95 g

Balance 2

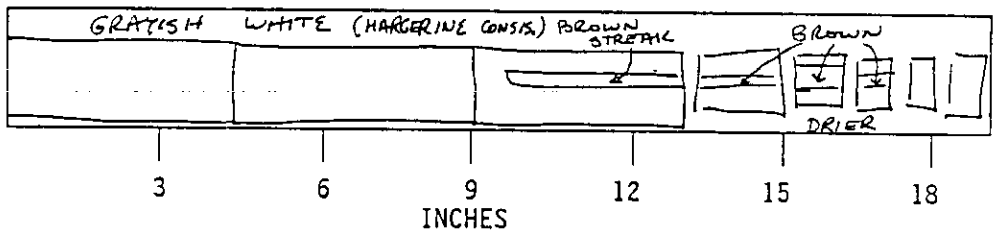
✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 1 & 2

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 19 inches cm

BOTTOM TOP



Description THE BOTTOM 12" WERE WETTER THAN SEGMENT FIVE. GRAYISH WHITE IN COLOR W/ LONG BROWN STREAK ON TOP HALF OF SEGMENT. TOP PORTION DRIENESS MUCH LIKE SEGMENT 5.

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-6-SST. Record the position of the segment from which this sample was taken.

105AW-6-SST

Total ~~_____ g~~
Jar + Lid ~~42.64 g~~
Sample ~~_____ g~~
Balance 362-06-01-036, expires 8/1/90

~~Length _____ inches~~
~~Position from top _____ inches~~

NO SHEAR STRENGTH SAMPLE TAKEN
6/15/90
g—T

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 38

Project No. _____ Date of Work _____
Entered By D J Shay Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-6-EXT

23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL6. Seal and weigh.

105AW-SOL6 6/15/90 The Lid says 105AW-SOL6

Total	657.30	g
Jar + Lid	~~354.21~~ 355.02	g
Sample	302.28	g

Balance 2

Photo removed for enlargement 9-23-93

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 39

Project No. Date of Work
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By
Signed 1. Date
2. Date

Controlled Document
Copy NO. 01

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT

Extrusion of Sample
Tank 105-AW Segment 7

When you have finished an instruction, put a check in from of the item.

General Instructions:

1) Keep the sample in a sealed container as much as possible to prevent it from drying out.
2) After centrifuging the solids volume is the average of the high and low volumes of the solids.
3) All requested weights for sample + container are for a closed container.
4) Identify the instrument used for any measurement by reference number or by the calibration ID and provide the calibration expiration date.

M&TE List

__ Balance 1:
Calib ID 388-06-01-016 Calib Exp Date 08-07-90
Location "A" Cell

__ Balance 2:
Calib ID 362-06-01-035 Calib Exp Date 08-07-90
Location "B" Cell

__ Thermocouple 1:
Calib ID 6929 Calib Exp Date 09-08-91
Type K Location "B" Cell

__ Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-90

Signature H. Craig Buchanan Date 9/15/90 LRB 53595 Page 40

Project No. Date of Work
Entered By W J Lang Date 10-17-90
Disclosed To and Understood By
Signed T. Date
Date

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT

RECEIPT OF 105-AW SEGMENT 7

✓ 1. Record the sampler number provided on the chain-of-custody record for sample 90-020 and compare this sampler number to the number inscribed on the sampler.

Sampler # 27

✓ 2. Receive and transfer the samplers and liners into B-Cell and extrude using SOP No 325-EXT-1, RECEIPT AND EXTRUSION OF CORE SAMPLES AT THE 325A SHIELDED FACILITY; 325-A-29, RECEIVING OF WASTE TANK SAMPLES IN ONSITE TRANSFER CASK; and PNL Technical Procedure PNL-ALO-130, PROCEDURE FOR THE RECEIPT AND INSPECTION OF SINGLE SHELL TANK (SST) SAMPLES.

EXTRUSION AND SAMPLING OF 105-AW SEGMENT 7

___ 3. Weigh a 250 mL and a 500 mL safety jar labeled 105AW-DL7 and 105AW-SOL7, respectively.

	105AW-DL7	105AW-SOL7
Jar + Lid	____ g	352.20 g
Balance	___	

✓ 4. Measure cell temperature.

34 °C

Thermometer ID 01225 Thermocouple ID 6929

✓ 5. Weigh the extruder tray.

Extruder Tray 794.18 g

Balance 2

✓ 6. Prepare the camera for use.

✓ 7. Lift the bottom end of the liner and drain any oil from the liner into the dish. Be careful the sampler doesn't slide out of the liner.

✓ 8. When all of the oil has drained from the liner, remove the dish and inspect the oil collected to determine whether any sample is present.

Amount of Sample ~5 ml Amount of oil 15-20 ml

✓ 9. Wipe the sampler with rags to remove any residual oil, if needed.

Signature H Craig Buchanan Date 6/15/90 LRB 53595 Page 41

HCB 6/15/90

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT
Page 3 of 5

✓ 10. Remove the V-Ring seal from the valve end of sampler with a 3/32" allen wrench.

✓ 11. Move the extruder platform to the forward position. Set the torque and speed switches to 0 and the directional switch to brake.

✓ 12. Transfer the sampler to the extruder making sure that the valve closure wires are at top, put a wooden block under the rear of the sampler, insert push rod into the sampler, and remove wooden block. Seat and lock the push rod in back of extruder. Clamp the sampler into position.

✓ 13. Place the sampler valve wrench into closed valve slot. **(Horizontal is closed and vertical is open.)**

✓ 14. Place the weighed 250 mL jar **105AW-DL7** into position under the drain spout of the extruder collection tray to collect any free liquid from the sample.

✓ 15. Open the sampler valve. With the valve closure wires at top, turn the valve counterclockwise (towards the front) to open the valve. Confirm that the valve is open before proceeding.

✓ 16. To extrude the sample, switch the directional switch to reverse and set the torque at less than or equal to 30. Do not exceed a torque setting of 30! Gradually increase the speed. Do not exceed a speed setting of 50.

✓ 17. Watch carefully as the rod and piston approach the valve, paying close attention that the extruder does not bind or catch. Continue extruding until the piston falls into the tray.

✓ 18. Drain the free liquid into the 250 mL jar **105AW-DL7**. Seal and weigh. Measure the height (ht) of sample from the bottom of the jar in mm. Estimate the volume using: Volume = (ht - 5) mm X 50mL/15 mm.

105AW-DL7

Total	_____	g	Volume	_____	mL
Jar + Lid	_____	g			
Sample	_____	g			
Balance	___				

No Drainable Liquids
JMT 6/15/90

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 42

Project No. _____ Date of Work _____
Entered By W J Gray 141 Date 10-12-90

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT

✓19. Remove the extruder tray and weigh.

Total 916.60 g
Extruder Tray 794.18 g
Sample 122.42 g

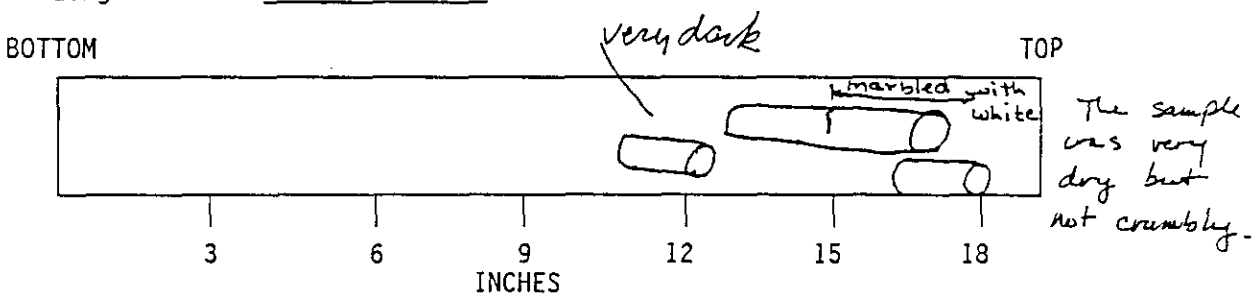
Balance #2

✓20. Position the extruder tray for photographs. Place a color bar beside the sample. Photograph the extruded sample. Record the picture number(s).

Photograph Number(s) 3 & 4

✓21. Measure the dimensions of the solids in the sample and describe the color, consistency, and other pertinent properties of the material.

Length 6 in ~~cm~~



The sample was very dry but not crumbly.

Description Although sample extruded at end, the sample could be seen when the valve was opened indicating that the sample was from the bottom of the segment.

✓22. After the cognizant WHC scientist has selected a sample for shear strength and penetration resistance measurements, transfer this sample to a weighed 100 ml bottle labeled 105AW-~~7~~ 6-SST. Record the position of the segment from which this sample was taken.

105AW-~~7~~ 6-SST 6/15/90

Total 81.71 g
Jar + Lid 42.62 g
Sample 39.09 g
Balance 2

Length 2 inches
Position from ~~top~~ Bottom 13 to 15 inches

Total on 11/5/90 was 78.74 g WJG

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 43

Project No. _____ Date of Work _____
Entered By W J Gray Date 10-17-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

4

June 14, 1990
JM Tingey

Reference Tech Procedure: WHC-053-1
Test Instructions: 105AW-7-EXT

✓23. Transfer the remaining sample to a weighed 500 mL jar labeled 105AW-SOL7. Seal and weigh.

	105AW-SOL7	
Total	430.65	g
Jar + Lid	352.20	g
Sample	78.45	g

Balance #2

Photo removed for enlargement 9-23-93

Signature H. Craig Buchanan Date 6/15/90 LRB 53595 Page 44

Project No. _____ Date of Work _____
Entered By W J Tingey Date 10-17-90
Disclosed To and Understood By _____ 143
Signed 1. _____ Date _____

August 8, 1990
WJ Gray

Reference Tech. Procedure:
Test Instruction: 105AW-C1-SEG 1,2
Page 1 of 3

45

CHARACTERIZATION OF 105AW SEGMENTS 1 AND 2

M&TE List

Balance 1: Calib ID 388-06-01-016 Calib Exp Date ~~8~~ 11-7-90 ds 8-10-90
Location "A" Cell

Balance 2: Calib ID 362-06-01-035 Calib Exp Date ~~8~~ 11-7-90 ds 8-10-90
Location "B" Cell

Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-~~90~~ 91 ds 8-10-90

Thermocouple: Calib ID 999-78-025 Calib Exp Date 9-8-91
Location "B" Cell Type K Ser.# 40

pH Buffers: pH 7 Lot No 9308 Expiration Date 10-91
Manufacturer VWR Scientific

pH 10 Lot No 820911 Expiration Date 4-6-91
Manufacturer Baxter Scientific

CONTROLLED DOCUMENT
COPY NO. 1

Elmer W. Shade 8-10-90 LRB 53595 p.45

Project No.
Entered By WJ Gray
Disclosed To and Understood By
Signed 1

Date of Work
Date 10-11-90
Date

August 8, 1990
WJ Gray

Reference Tech. Procedure:
Test Instruction: 105AW-C1-SEG 1,2

When you have finished an instruction, put a check in front of the item.

✓1. Transfer 25 g of liquid from 105AW DL1 and from 105AW DL2 to a weighed bottle labeled **105AW 1-2**.

Bottle plus **105AW DL1** and **105AW DL2**		g 91.48
Bottle plus **105AW DL1**		g 66.40
Bottle	~~49.894~~ 8 22.90	g 41.397
105AW DL1	25.003	g
105AW DL2	25.08	g

✓2. Thoroughly mix the contents of **105AW 1-2** by stirring or agitation. m@084°

✓3. Centrifuge the entire contents of **105AW 1-2** at high speed.

✓4. Carefully decant or pipet the centrifuged supernate without disturbing the solids and place in a clean bottle labeled **105AW 1-2**. Discard the original bottle and the centrifuged solids.

✓5. Fill two weighed 10-mL volumetric flasks to the mark with **105AW 1-2** and weigh.

	105AW-1	105AW-2
Total	23.105 g	22.960 g
Flask	12.306 g	12.148 g
Liquid	10.799 g	10.812 g

✓6. Calculate the sample densities.

Density = weight/volume

P.R.B. 9-20-93
Av. 1.08069 g/ml

105AW-1	105AW-2
Density = 10.799 g/10 mL	Density = 10.812 g/10 mL
= 1.0799 g/mL	= 1.0812 g/mL

✓7. Return the samples to the bottle **105AW 1-2**.

✓8. Again agitate the contents of the bottle **105AW 1-2** before transferring about 3 g to each of two weighed glass vials labeled **105AW-1** and **105AW-2**.

	105AW-1	105AW-2
Total	22.491 g 8-24-90	~~22.475~~ 22.669 g 8-24-90
Vial	20.825 g 25	19.772 19.782 g 72
Sample	1.666 g	~~2.892~~ 2.703 g 8-24-90

Clarence N. Rhode 8-24-90 LRB-53595 p. 46

Project No. _____ Date of Work _____
Entered By WJ Gray Date 10-17-90
Disclosed To and Understood By _____
Signed 1. _____ Date _____

August 8, 1990
WJ Gray

Reference Tech. Procedure:
Test Instruction: 105AW-C1-SEG 1,2
Page 3 of 3

47

✓9. Transfer 105AW-1 and 105AW-2 to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from desiccator and weigh.

	105AW-1		105AW-2	
Total	20.971	g	19.985	g
Vial	20.835	g	19.782	g
Dry Sample	0.136	g	0.203	g

✓10. Discard the dried samples.

✓11. Calculate the wt% solids.

105AW-1

wt% solids = dried sample weight/total sample weight X 100%
0.136 g/1.6666 g X 100%
= 8.16 %

P.R.B. 9-20-93
AU 7.84%

105AW-2

wt% solids = 0.203 g/2.703 g X 100%
= 7.51 %

✓12. Again agitate the contents of 105AW 1-2 before placing about 20 g in a vial labeled 105AW 1-2 for transfer to the 325B hot cells for chemical analyses.

8-24-90 56.38 total
vial = ~~30.338~~ 30.318 vial
26.057 sample

Date delivered 9-13-90

✓13. Calibrate the pH meter using pH standards 7 and 10.

✓14. Measure the pH of 105AW 1-2.

pH = 13.180

✓15. Retain the remaining sample 105AW 1-2 for possible later use.

Elmer Vo Shade 8-24-90 LRB 53595 p. 47

Project No. _____ Date of Work _____
Entered By WJ Gray 146 Date 10-17-90
Disclosed To and Understood By

August 28, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 3,4

8

CHARACTERIZATION OF 105AW SEGMENTS 3 AND 4

M&TE List

Balance 1:	Calib ID	388-06-01-016	Calib Exp Date 11-7-90
	Location	"A" Cell	
Balance 2:	Calib ID	362-06-01-035	Calib Exp Date 11-7-90
	Location	"B" Cell	
Digital Thermometer:			
	Calib ID	01225	Calib Exp Date 7-12-91
Thermocouple:	Calib ID	999-78-025	Calib Exp Date 9-8-91
	Location	"B" Cell	Type K Ser.# 40

CONTROLLED
DOCUMENT
COPY NO. 1

Chemistry Shade 8-31-90 LRB 53595 p. 48

Project No.
Entered By W J Gray
Disclosed To and Understood By

Date of Work
Date 10-17-90
Date

August 28, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 3,4
Page 2 of 6

When you have finished an instruction, put a check in front of the item.

PREPARATION AND CHARACTERIZATION OF SEGMENTS 3 AND 4 COMPOSITE

g/105 wt 631.58 gms

in = 10:45 out = 11:00 ✓1. Place the waste solids from **105AW-SOL 3** in the homogenizer and blend to a uniform consistency.

✓2. Return the material to the original container **105AW-SOL 3** and shake or stir to remove as much of the solids adhering to the container walls as possible.

in = 11:15 out = 11:30 ✓3. Again transfer as much as possible of the material from **105AW-SOL 3** to the homogenizer and blend to uniform consistency.

✓4. Return the material from the homogenizer to the original container **105AW-SOL 3** for storage.

8-31-90 ✓5. Clean the homogenizer parts by rinsing with deionized water or other suitable method.

13 Start 11:45

g/105 wt 646.8 gms

✓6. Repeat Steps 1 to 5 with the waste solids from **105AW-SOL 4**.

✓7. Thoroughly agitate the contents of **105AW-SOL 3** and **101AW-SOL 4** and then transfer equal amounts (~50 g) of each to a separate vial or jar labeled **105AW 3-4**. Agitate **105AW 3-4** thoroughly to blend the two samples. Sol #4 = 49.81 Sol #3 = 50.10

wt = 265.42
w/sl = 272.66

total 105AW 3-4 = 99.91 gms

✓8. Place about 20 g of **105AW 3-4** in a glass vial labeled **105AW 3-4 SOL** and transfer to the 325B hot cells for chemical analyses. vial + cap = 22.358 total 42.28 sample = 19.922

Date delivered 9-13-90

✓9. Agitate **105AW 3-4** and transfer about 1 g to each of two weighed glass vials labeled **105AW-3** and **105AW-4**. Allow to air dry overnight.

105AW-3			105AW-4		
Total	21.134	g	Total	21.525	g
Vial	20.113	g	Vial	20.519	g
Sample	1.021	g	Sample	1.0046	g

9-5-90

✓10. Transfer **105AW-3** and **105AW-4** to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-3			105AW-4		
Total	20.429	g	Total	20.835	g
Vial	20.113	g	Vial	20.519	g
Dry Sample	0.316	g	Dry Sample	0.316	g

9-7-90

9-10-90

Elmer H. Shade 9-13-90 LRB 53595 p. 49

Project No. _____ Date of Work _____

Entered By W J Gray Date 10-17-90

Disclosed To and Understood By

Signed 1. _____ Date _____

2. _____ Date _____

August 28, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 3,4

✓11. Discard the dried samples.

✓12. Agitate **105AW 3-4** thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled **CC1** and **CC2** and weigh the samples. Also measure the total volume.

CC1			CC2		
Total	23.575	g	Total	23.446	g
Cone	5.672	g	Cone	5.635	g
Sample	17.903	g	Sample	17.811	g
Total	NA	mL	Total	NA	mL

✓13. Place the lids on the cones and allow to stand undisturbed for 2 days. Note the start and end times and measure the total, solids, and liquid volumes at the end of the 2 days.

Start date 9-6-90 Time 11:00 AM
End date 9-7-90 Time 0800

Samples not liquid enough to move down sides of centrifuge tube - So after discussion with W. Gray terminated #13 #14

Not able to determine solid liquid differential

CC1			CC2		
Total		mL	Total		mL
Solids	NA	mL	Solids	NA	mL
Liquid		mL	Liquid		mL

✓14. Decant the settled supernate from both centrifuge cones into a weighed glass vial labeled **105AW 3-4 SUP**. Weigh the solids remaining in the 22.812 centrifuge cones.

CC1			CC2		
Total	NA	g	Total	NA	g
Cone		g	Cone		g
Solids		g	Solids		g

✓15. Discard the solids in the centrifuge cones. NA.

✓16. Again agitate **105AW 3-4** thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled **CC3** and **CC4** and weigh the samples.

CC3 CS 9-7-90 CC4 CS 9-7-90

these are tubes originally made up for #12

CC3			CC4		
Total	23.543	g	Total	23.325	g
Cone	5.672	g	Cone	5.635	g
Sample	17.871	g	Sample	17.690	g

Chem Analysis 9-7-90 LRB 53595 p.50

Project No. Date of Work
Entered By W J Gray Date 10-12-90
Disclosed To and Understood By
Signed 1 Date

August 28, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 3,4
Page 4 of 6

51

17. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes.

Centrifuge start 0900

CC#1 9-7-90 CB

Total 13.2 mL
Solids ~~5.672~~ mL 8.3
Liquid 4.9 mL

CC#2 9-7-90 CB

Total 13.25 mL
Solids 8.40 mL
Liquid 4.85 mL

18. Decant the centrifuged supernate from both centrifuge cones into the labeled vial **105AW 3-4 SUP** (from Step 14). Weigh the solids remaining in the centrifuge cones.

CC#1 9-7-90 CB

Total 17.743 g
Cone 5.672 g
Solids 12.071 g

CC#2 9-7-90 CB

Total 17.332 g
Cone 5.635 g
Solids 11.697 g

19. Weigh the glass vial labeled **105AW 3-4 SUP** and transfer it to the 325B hot cells for chemical analyses.

22.808

Total 32.519 g
Vial 22.808 g
Supernate 9.711 g

Date delivered 9-13-90

CALCULATIONS

20. Density of sludge, centrifuged liquid and solids.

Sludge density (from Step 12) = sample mass/sample volume

~~CC1~~ ρ = mass (step 16)/sample volume (step 17)

CC1

Density = NA g/NA mL
= _____ g/mL

$\rho = \frac{17.971}{13.2} = 1.35$ gm/ml

CC2

Density = NA g/NA mL
= _____ g/mL

$\rho = \frac{17.690}{13.25} = 1.34$ gm/ml

AV = 1.35 gm/ml

RRB 9-21-93

Clemmer D. Shade 9-13-90 LRB 53595 p. 51

Project No. _____ Date of Work _____
Entered By WJ Gray Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

Centrifuged liquid density
= [sample mass (Step 16) - solids mass (Step 18)]/liquid volume (Step 17)

CC3

Density = (17.871 g - 12.021 g)/ 4.9 mL
= 1.184 g/mL

AU - 1.21 g/ml

CC4

Density = (17.690 g - 11.697 g)/ 4.85 mL
= ~~1.23~~ g/mL
4 P.R.B 9-20-93

Centrifuged solids density
= solids mass (Step 18)/solids volume (Step 17)

CC3

Density = 12.021 g/ ~~4.9~~ 8.3 mL
= 1.454 g/mL
ds 9-7-90

AU = 1.42

CC4

Density = 11.697 g/ 8.40 mL
= 1.392 g/mL
3 P.R.B. 9-20-93

✓21. Volume % and weight % settled solids

Volume % solids (Step 13) = solids vol./total vol. x 100%

CC1

Volume % solids = NA mL/ NA mL X 100%
= _____ %

CC2

Volume % solids = NA mL/ NA mL X 100%
= _____ %

Weight % solids = solids mass (Step 14)/sample mass (Step 12) X 100%

CC1

Weight % solids = NA g/ NA g X 100%
= _____ %

Elmer D Shade 9-7-90 LRB 53595 p.52

Project No. _____ Date of Work _____
Entered By WJ Gray Date 10-17-90
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

August 28, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 3,4
Page 6 of 6

53

CC2

Weight % solids = NA g/ NA g X 100%
= NA %

✓22. Volume % and weight % centrifuged solids

Volume % solids (Step 17) = solids vol./total vol. x 100%

CC1

Volume % solids = 8.30 mL/ 13.2 mL X 100%
= 62.88 %

PB 9-20-93
Av. 63.14 %

CC2

Volume % solids = 8.40 mL/ 13.25 mL X 100%
= 63.40 %

Weight % solids = solids mass (Step 18)/sample mass (Step 16) X 100%

CC1

Weight % solids = 12.021 g/ 17.871 g X 100%
= 67.54 %
5 PRB. 9-20-93

PRB. 9-20-93
Av 66.84 %

CC2

Weight % solids = 11.697 g/ 17.690 g X 100%
= 66.12 %

✓23. Weight % dried solids

weight % dried solids
= dry sample weight (Step 10)/total sample weight (Step 9) X 100%

105AW-3

0.316 PRB 9-20-93
60 9.788

Weight % solids ~~0.306~~ g/ 1.021 g X 100%
~~35.25~~ %
8-7-90
~~30.31~~ ~~30.45~~ WJG 10/17/90
~~30~~ PB 9-20-93
31.0 PRB 9-20-93

9-20-93
Av. 31.2 %

105AW-4

Weight % solids = 0.316 g/ 1.006 g X 100%
= 31.42 %
PRB 9-20-93

Elmer A Shade 9-7-90 LRB 53595 p. 53

Project No. _____ Date of Work _____
Entered By WJ Gray Date 10-17-90
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Signed 1

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5

CHARACTERIZATION OF 105AW SEGMENT 5

M&TE List

Balance 1:	Calib ID	388-06-01-016	Calib Exp Date 11-7-90
	Location	"A" Cell	
Balance 2:	Calib ID	362-06-01-035	Calib Exp Date 11-7-90
	Location	"B" Cell	
Digital Thermometer:			
	Calib ID	01225	Calib Exp Date 7-12-91
Thermocouple:	Calib ID	999-78-025	Calib Exp Date 9-8-91
	Location	"B" Cell	Type K Ser.# 40

CONTROLLED
DOCUMENT
COPY NO. 1

Signature [illegible] Date 9-26-90 LRB 53595 Page 54

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Discussed To and Understood By

September 18, 1990
J Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 2 of 18

When you have finished an instruction, put a check in front of the item.

DESCRIPTION

✓1. Describe the solids present in **105AW-SOL 5**.

Light gray in color, granular in texture, thick in density, non pulverizable, few loose pieces loose on top of solids, voids visable thruout sample

SHEAR STRENGTH OF 105AW SEG 5 SOLIDS

Because the shear-strength sample **105AW-5-SST** has dried out, both the shear strength and penetration resistance measurements will be made on the solids in the bottle labeled **105AW-SOL 5**.

✓2. Install shear vane #3 on Haake Viscometer. Set %D at 0.06, %tau at 10%, t_2 at 5 min, up/down run mode, and tau vs time mode. Start, adjust the zero, and complete the run recording only the up run.

✓3. Put in a new chart, fill in the requested information noting below the signature block that the x-axis is time, and with the help of the cognizant scientist, select the location to insert the shear vane into sample **105AW-SOL 5**. Insert the vane into the sample to fully cover the blades. Using the same settings as in Step 1, start the shear strength measurement. It may be necessary to adjust the %tau if the trace is going to go off scale or is not sensitive enough.

Record the cell temperature 32 °C See pp 71 & 72 for results

✓4. If a second site is available for a second shear strength measurement, consistent with the requirements for penetration-resistance measurements below, repeat Step 2.

✓5. Remove and clean the shear vane.

MEASUREMENT OF THE PENETRATION RESISTANCE OF 105AW-SOL 5 SOLIDS

✓6. Using the Soil Test Inc. CT-421 penetrometer, insert the 1"-diameter probe tip to a depth of 1 inch. Record the penetrometer reading. Repeat in another location, if available.

Penetrometer Reading #1 3

Penetrometer Reading #1 2 See p. 71 for results

Signature [illegible] Date 9-25-90 LRB 53595 Page 55

Project No. Date of Work
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By:
Signed 1. Date

6

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 3 of 18

MEASUREMENT OF DENSITY, SETTLING RATE, AND VOL% CENTRIFUGED SOLIDS

✓7. Place the waste solids from 105AW-SOL 5 in the homogenizer and blend to a uniform consistency using as low a stirring rate as possible consistent with achieving good homogenization. Start - 2:00 Stop - 2:15 603.96 gross wt

✓8. Return the material to the original container 105AW-SOL 5 and shake or stir to remove as much of the solids adhering to the container walls as possible. Use this material for the following characterizations.

✓9. Clean the homogenizer parts by rinsing with deionized water or other suitable method.

✓10. Agitate 105AW-SOL 5 and transfer about 1 g to each of two weighed glass vials labeled 105AW-1 and 105AW-2. Allow to air dry overnight.

386.37 g gross wt

105AW-1		105AW-2	
Total	21.727 g	Total	23.631 g
Vial	20.702 g	Vial	21.405 g
Sample	1.025 g	Sample	2.226 g

✓11. Transfer 105AW-1 and 105AW-2 to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-1		105AW-2	
Total	21.107 g	Total	22.223 g
Vial	20.702 g	Vial	21.405 g
Dry Sample	0.405 g	Dry Sample	0.868 g

✓12. Discard the dried samples.

✓13. Transfer about 15 g of solids from 105AW-SOL 5 to a glass vial labeled 105AW-5 and deliver to 325B hot cells for chemical, radiochemical, and particle-size analyses. 37.856 − 22.539 = 15.497

Date Delivered 30 Dec 1990

✓14. Agitate 105AW-SOL 5 thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled CC1 and CC2 and weigh the samples. Measure the distance between 4 and 14 mL on the graduated centrifuge cones. 58.8 mm

remaining 1 .82

Solids have voids throughout sample due to loading of tubes in small portions

Signature [signature] Date 30 Dec 90 LRB 53595 Page 56

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By _____ Date _____
Signed 1 _____

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 4 of 18

CC1			CC2		
Total	23.079	g	Total	23.022	g
Cone	5.753	g	Cone	5.720	g
Sample	17.326	g	Sample	17.302	g

15. Place the lids on the cones and begin the settling rate measurement by setting the two samples in an isolated location. For the duration of the settling behavior, the samples should be allowed to settle with little or no disturbance. This portion of the characterization should be started no later than Tuesday morning within 2 h of the start of the working day.

Start time 14:00 Date 9-27-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	12.5	mL	Solids	12.4	mL
Liquid	0	mL	Liquid	0	mL

16. Record the volumes every 2 hours until the end of the day or there is no change in solids volume for three successive measurements.

Time: NA Date: NA

CC1			CC2		
Total		mL	Total		mL
Solids	NA	mL	Solids	NA	mL
Liquid	NA	mL	Liquid	NA	mL

Time: Date:

CC1			CC2		
Total		mL	Total		mL
Solids	NA	mL	Solids	NA	mL
Liquid	NA	mL	Liquid	NA	mL

Time: Date:

CC1			CC2		
Total		mL	Total		mL
Solids	NA	mL	Solids	NA	mL
Liquid	NA	mL	Liquid	NA	mL

no settling observed so p.6 not attached to LRB. WJG 1-9-91

Signature [illegible] Date 9-27-90 LRB 53595 Page 57

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 6 of 18

18. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes. on @ 0810 off @ 0915

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	9.3	mL	Solids	9.35	mL
Liquid	3.2	mL	Liquid	3.05	mL

19. Transfer 5 to 10 g of centrifuged liquid to a glass vial labeled 105AW-5-L and deliver to 325B hot cells for chemical analyses.

Total 22.142 g
Vial 20.864 g
Sample 6.278 g

Date Delivered 12-3-90

20. Discard the remaining solids and liquid remaining in the centrifuge tubes.

CALCULATIONS

21. Density, Vol% Settled Solids, Vol% Centrifuged Solids.

Sludge density = sample mass (Step 14)/sample volume (Step 15)

CC1

Density = 17.326 g/ 12.5 mL
= 1.39 g/mL

PRB. 9-20-93
AV 1.40 gm/ml

CC2

Density = 17.302 g/ 12.4 mL
= 1.40 g/mL

Vol% settled solids (Step 17) = settled solids vol/total vol x 100%

CC1

Vol% settled solids = NA mL/ NA mL X 100%
= NA %

CC2

Vol% settled solids = NA mL/ NA mL X 100%
= NA %

Signature [illegible] Date 12-3-90 LRB 53595 Page 58

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By
Signed T Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 7 of 18

59

Vol% centrifuged solids (Step 18)
= centrifuged solids vol/total vol x 100%

CC1

Vol% centrifuged solids = 9.3 mL/ 12.5 mL X 100%
= ~~74.40~~ % PRB 9-20-93

PRB 9-20-93
AV. 75%

CC2

Vol% centrifuged solids = 9.35 mL/ 12.4 mL X 100%
= ~~75.00~~ % 75.4 PRB 9-20-93

✓22. Weight % dried solids

weight % dried solids
= dry sample weight (Step 11)/total sample weight (Step 10) X 100%

105AW-1

Weight % solids = 0.405 g/ 1.025 g X 100%
= 39.5% PB 9-20-93

PRB 9-20-93
AV. 39.3%

105AW-2

Weight % solids = 0.868 g/ 2.226 g X 100%
= ~~38.99~~ % ~~38~~ 39.0 PRB 9-20-93

PREPARATION OF SOLIDS/SUPERNATE SLURRY

✓23. Transfer 50 g of liquid from 105AW DL1 and from 105AW DL2 to a weighed bottle labeled 105AW 1-2.

Bottle plus 105AW DL1 and 105AW DL2	375.40	g
Bottle plus 105AW DL1	325.36	g
Bottle	275.34	g
105AW DL1	50.02	g
105AW DL2	50.04	g

✓24. Thoroughly mix the contents of 105AW 1-2 by stirring or agitation.

✓25. Centrifuge the entire contents of 105AW 1-2 at high speed.

Signature Elmer H Shade Date 10-16-90 LRB 53595 Page 59

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 8 of 18

bottle H.d + Stir bar 225.40

✓ 26. Carefully decant or pipet the centrifuged supernate without disturbing the solids and place in a clean bottle labeled **105AW 1-2**. Combine with the centrifuged supernate **105AW 1-2** prepared earlier. In fact, the two supernate samples can be combined in the bottle used earlier if desired. Discard the original bottle and the centrifuged solids.

✓ 27. Place about 50 g of solids from **105AW-SOL 5** in a weighed bottle labeled **105AW-5-SL1** and add an equal volume of supernate from **105AW 1-2**. Stir gently consistent with thorough mixing of the slurry.

105AW-5-SL1 with Stir bar 240.6
total 190.9

105AW-SOL 5

weight 50.25 g

volume = weight/density (Step 21)
= 50.25 g/ 1.40 g/mL
= 35.89 mL

105AW 1-2

volume 35.89 mL (same volume as **105AW-SOL 5**)

calculated weight = volume X density = volume X 1.08 g/mL
= 38.76 g

actual weight = 38.80 g

105AW-5-SL1

bottle plus slurry 229.70 g
bottle 140.66 g
slurry 89.04 g

MEASUREMENT OF DENSITY, SETTLING RATE, AND VOL% CENTRIFUGED SOLIDS of 105AW-5-SL1

✓ 28. Agitate **105AW-5-SL1** and transfer about 1 g to each of two weighed glass vials labeled **105AW-1** and **105AW-2**. Allow to air dry overnight.

105AW-1		105AW-2	
Total	22.371 g	Total	22.431 g
Vial	20.428 g	Vial	20.399 g
Sample	1.943 g	Sample	2.032 g

✓ 29. Transfer **105AW-1** and **105AW-2** to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

Signature [illegible] Date 10-18-90 LRB 53595 Page 60

Project No.
Entered By WJ Gray
Disclosed To and Understood By
Date of Work
Date 1-9-91
Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page ~~9~~ of 18

105AW-1			105AW-2		
Total	20.928	g	Total	20.920	g
Vial	20.428	g	Vial	20.399	g
Dry Sample	0.500	g	Dry Sample	0.5210	g

PRB. 9-20-93

✓30. Discard the dried samples.

✓31. Agitate 105AW-5-SL1 thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled CC1 and CC2 and weigh the samples. Measure the distance between 4 and 14 mL on the graduated centrifuge cones. 58.80 mm 4-14 mL

CC1			CC2		
Total	21.252	g	Total	21213	g
Cone	5.697	g	Cone	5.699	g
Sample	15.5655	g	Sample	15.514	g

P.R.B. 9-20-93

✓32. Place the lids on the cones and begin the settling rate measurement by setting the two samples in an isolated location. For the duration of the settling behavior, the samples should be allowed to settle with little or no disturbance. This portion of the characterization should be started no later than Tuesday morning within 2 h of the start of the working day.

Start time 0900 Date 10-23-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.8	mL	Solids	12.8	mL
Liquid	0	mL	Liquid	0	mL

✓33. Record the volumes every 2 hours until the end of the day or there is no change in solids volume for three successive measurements.

Time: 1100 Date: 10-23-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.8	mL	Solids	12.8	mL
Liquid	0	mL	Liquid	0	mL

Signature [signature] Date 10 23 90 LRB 53595 Page 61

Project No. Date of Work
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date
2. Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 10 of 18

Time: 1300 Date: 10-23-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.8	mL	Solids	12.8	mL
Liquid	0	mL	Liquid	0	mL

Time: 1500 Date: 10-23-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.7	mL	Solids	12.7	mL
Liquid	0.1	mL	Liquid	0.1	mL

Time: Date:

CC1			CC2		
Total	N/A	mL	Total	N/A	mL
Solids		mL	Solids		mL
Liquid		mL	Liquid		mL

34. Continue the settling rate measurements at the beginning of the next day.

Time: 0800 Date: 10-24-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.7	mL	Solids	12.7	mL
Liquid	0.1	mL	Liquid	0.1	mL

Time: 11:00 Date: 10-24-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.5	mL	Solids	12.5	mL
Liquid	0.3	mL	Liquid	0.3	mL

~~0.3~~

Time: 13:00 Date: 10-24-90

$\frac{0.3}{0.4} = 75\%$

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.4	mL	Solids	12.5	mL
Liquid	0.4	mL	Liquid	0.3	mL

Signature [illegible] Date 10-24-90 LRB 53595 Page 62

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date
2. Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 11 of 18

CLS 10-24-90

Time: 1500 Date: ~~12~~-24-90 10

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.4	mL	Solids	12.4	mL
Liquid	0.4	mL	Liquid	0.4	mL

Time: 0800 Date: 10-25-90

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	12.4	mL	Solids	12.4	mL
Liquid	0.4	mL	Liquid	0.4	mL

✓35. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes. on @ 0830

CC1			CC2		
Total	12.8	mL	Total	12.8	mL
Solids	4.8	mL	Solids	4.7	mL
Liquid	8.00	mL	Liquid	8.1	mL

✓36. Discard the solids and liquid in the centrifuge tubes.

CALCULATIONS

✓37. Density, Vol% Settled Solids, Vol% Centrifuged Solids of 105AW-5-SL1.

Slurry density = sample mass (Step 31)/sample volume (Step 32)

CC1

P.R.B 9-20-93

Density = 15.56 55 g/ 12.8 mL
= 1.22 g/mL

P.R.D. 9-20-93

Av. 1.22 g/ml

CC2

P.R.B 9-20-93

Density = 15.514 g/ 12.8 mL
= 1.21 g/mL

Vol% settled solids (Step 34) = settled solids vol/total vol x 100%

CC1

Vol% settled solids = 12.4 mL/ 12.8 mL X 100%
= ~~96.88~~ %
96.9 P.R.B 9-20-93

Signature Clarence A Shado Date 10.25-90 LRB 53595 Page 63

Project No. Date of Work
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date
2 Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 12 of 18

P.R.B. 9-20-93

CC2

Av. 96.9%

Vol% settled solids = 12.4 mL/ 12.8 mL X 100%
= ~~96.88~~ % 96.9 PRB 9-20-93

Vol% centrifuged solids (Step 35)
= centrifuged solids vol/total vol x 100%

CC1

Vol% centrifuged solids = 4.8 mL/ 12.8 mL X 100% P.R.B. 9-20-93
= ~~37.5~~ % 38. 9-20-93 PRB

Av. 38%

CC2

Vol% centrifuged solids = ~~12.5~~ 4.7 mL/ ~~4.7~~ 12.8 mL X 100%
= ~~36.72~~ % 37 P.R.B. 9-20-93

10-25-90 10-25-90

38. Weight % dried solids in 105AW-5-SL1.

weight % dried solids
= dry sample weight (Step 29)/total sample weight (Step 28) X 100%

105AW-1

10-18-90

Weight % solids = ~~1.943~~ 0.500 g/ 1.943 g X 100%
= ~~25.73~~ % PRB 9-20-93

P.R.B 9-20-93

Av. 25.7%

105AW-2

Weight % solids = 0.521 g/ 2.032 g X 100%
= 25.64 % PRB 9-20-93

MEASUREMENT OF SHEAR STRESS VS SHEAR RATE of 105AW-5-SL1

39. Install an MV-I sensor on the In-Cell Haake. Tap the M5 measuring head. Set the %D at 40%, t_2 to 5 min, the mode to tau vs D, and the % tau to 10%. Zero the instrument, and run the 10 and 25 cP standards. Calculate the viscosity from the curve at a S_D of 0.5 and check to see if the instrument has an accuracy of ± 10%. If the standards have been run within the month, record the previous standardization and do not run the standards.

10 cP Standard:
measured viscosity 10.29 cP

Signature [signature] Date 10-25-90 LRB 53595 Page 64

Project No. Date of Work
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date
Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 13 of 18

25 cP Standard:
measured viscosity 25.09 cP

✓40. Measure the cell temperature using the digital or mercury thermometer.

Cell Temperature 29 °C

✓41. Transfer 40 ml by weight of 105AW-5-SL1 to the Haake Beaker. Install the beaker into the Haake, raising the beaker to the point where the mix is level with the top of the MV-I sensor. Initially set %D at 40%, %tau at ~~10%~~ 20 t_1 at 2 min, t_2 at 5 min, and mode in tau vs D. Obtain up/down rheogram. You may adjust %tau as needed.

10-22

40 ml of Sample = Density (Step 37) X 40 mL
= 1.32 g/mL X 40 mL
= 52.998 g
PRB 9-20-93

Enter all the requested information on the Haake form. Label the rheogram 105AW-5-SL1-1.

✓42. Obtain a second rheogram, adjusting the % tau as needed. Label the rheogram 105AW-5-SL1-2.

see pp 73-74 for results

✓43. Transfer the sample in the beaker back to the bottle 105AW-5-SL1.

PREPARATION OF SECOND SOLIDS/SUPERNATE SLURRY

✓44. Reweigh the bottle labeled 105AW-5-SL1.

105AW-5-SL1

bottle plus slurry 192.30 g
bottle 140.66 g
slurry 51.64 g

slurry volume = weight/density (Step 37)
= 51.64 g/ 1.215 g/mL
= 42.50 mL

✓45. Add about half the slurry volume (Step 44) of supernate from 105AW 1-2 to the bottle 105AW-5-SL1. Transfer the entire amount of slurry to a new, weighed, bottle labeled 105AW-5-SL2.

105AW 1-2

volume = slurry volume/2 = 42.50 mL/2 = 21.25 mL

Signature [illegible] Date 10-26-90 LRB 53595 Page 65

Project No. Date of Work
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By
Signed 1.

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 14 of 18

calculated weight = volume X density = volume X 1.08 g/mL
= 22.95 g 21.25 X 1.08 = 22.95

actual weight = 22.10 g

105AW-5-SL2

bottle plus slurry	~~214.90~~ (CS 10-26-90)	g 212.00
bottle	~~140.66~~ (CS 10-26-90)	g 140.25
slurry	~~73.74~~ (CS 10-26-90)	g 71.75

MEASUREMENT OF DENSITY, SETTLING RATE, AND VOL% CENTRIFUGED SOLIDS of 105AW-5-SL2

46. Agitate 105AW-5-SL2 and transfer about 1 g to each of two weighed glass vials labeled 105AW-1 and 105AW-2. Allow to air dry overnight.

105AW-1 (CS 10-26-90)			105AW-2 (CS 10-26-90)		
Total	~~20.262~~	g 21.757	Total	~~20.793~~	g 22.628
Vial	20.262	g	Vial	20.793	g
Sample	1.495	g	Sample	1.835	g

5.7 grams

47. Transfer 105AW-1 and 105AW-2 to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-1			105AW-2		
Total	20.603	g	Total	21.219	g
Vial	20.262	g	Vial	20.793	g
Dry Sample	0.341	g	Dry Sample	0.426	g

48. Discard the dried samples.

49. Agitate 105AW-5-SL2 thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled CC1 and CC2 and weigh the samples. Measure the distance between 4 and 14 mL on the graduated centrifuge cones. 58.8 grams

CC1			CC2 (CS 10-30-90)		
Total	~~12.4cc~~ (CS 10-30-90)	g 20.211	Total	~~12.4cc~~	g 20.029
Cone	5.714	g	Cone	5.700	g
Sample	14.497	g	Sample	14.329	g

slurry = 178.24

50. Place the lids on the cones and begin the settling rate measurement by setting the two samples in an isolated location. For the duration of

Signature Elmer H. Shade Date 10-30-90 LRB 53595 Page 66

Project No. Date of Work
Entered By W J Gray 165 Date 1-9-91

September 18, 1990
J Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 15 of 18

50. Place the lids on the cones and begin the settling rate measurement by setting the two samples in an isolated location. For the duration of the settling behavior, the samples should be allowed to settle with little or no disturbance. This portion of the characterization should be started no later than Tuesday morning within 2 h of the start of the working day.

Start time 0845 Date 10-30-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	12.5	mL	Solids	12.4	mL
Liquid	0	mL	Liquid	0	mL

51. Record the volumes every 2 hours until the end of the day or there is no change in solids volume for three successive measurements.

Time: 0945 Date: 10-30-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	12.4	mL	Solids	12.3	mL
Liquid	.1	mL	Liquid	.1	mL

Time: 1045 Date: 10-30-90

CC1			CC2		
Total	~~12.00~~ 12.5	mL	Total	12.4	mL
Solids	12.00	mL	Solids	11.9	mL
Liquid	0.5	mL	Liquid	0.5	mL

Time: 1245 Date: 10-30-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	11.9	mL	Solids	11.8	mL
Liquid	0.6	mL	Liquid	0.6	mL

Time: 14:45 Date: 10-30-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	11.8	mL	Solids	11.8	mL
Liquid	0.7	mL	Liquid	0.6	mL

Signature [illegible] Date 10-30-90 LRB 53595 Page 67

Project No. Date of Work
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By
Signed 1. Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 16 of 18

✓ 52. Continue the settling rate measurements at the beginning of the next day.

Time: 0815 Date: 10-31-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	10.9	mL	Solids	10.8	mL
Liquid	1.6	mL	Liquid	1.6	mL

Time: 1015 Date: 10-31-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	10.8	mL	Solids	10.7	mL
Liquid	1.7	mL	Liquid	1.7	mL

$\frac{1.75}{1.8}$ = ~97% complete after

Time: 1215 Date: 10-31-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	10.7	mL	Solids	10.7	mL
Liquid	1.8	mL	Liquid	1.7	mL

Time: 1415 Date: 10-31-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	10.7	mL	Solids	10.6	mL
Liquid	1.8	mL	Liquid	1.8	mL

Time: 1515 Date: 10-31-90

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	10.7	mL	Solids	10.6	mL
Liquid	1.8	mL	Liquid	1.8	mL

✓ 53. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes.

CC1			CC2		
Total	12.5	mL	Total	12.4	mL
Solids	3.3	mL	Solids	3.2	mL
Liquid	9.2	mL	Liquid	9.2	mL

✓ 54. Discard the solids and liquid remaining in the centrifuge tubes.

Signature [signature] Date 11-2-90 LRB 53595 Page 68

Project No.
Entered By WJ Gray
Disclosed To and Understood By
Signed 1

Date of Work
Date 1-9-91
Date

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 17 of 18

CALCULATIONS

✓55. Density, Vol% Settled Solids, Vol% Centrifuged Solids of 105AW-5-SL2.

Slurry density = sample mass (Step 49)/sample volume (Step 50)

CC1

Density = 14.497 g/ 12.5 mL
= 1.16 g/mL

PRB 9-20-93
AV 1.16 gm/ml

CC2

Density = 14.329 g/ 12.4 mL
= 1.16 g/mL

Vol% settled solids (Step 52) = settled solids vol/total vol x 100%

CC1

Vol% settled solids = 10.7 mL/ 12.5 mL X 100%
= 85.6 %

PRB 9-20-93 → av 85.6%

CC2

Vol% settled solids = 10.6 mL/ 12.4 mL X 100%
= 85.5 %

Vol% centrifuged solids (Step 53)
= centrifuged solids vol/total vol x 100%

CC1

Vol% centrifuged solids = 3.3 mL/ 12.5 mL X 100%
= 26.4 %

PRB 9-20-93 Av 26%

CC2

Vol% centrifuged solids = 3.2 mL/ 12.4 mL X 100%
= ~~25.81~~ 26 %

PRB 9-20-93

✓56. Weight % dried solids

weight % dried solids
= dry sample weight (Step 47)/total sample weight (Step 46) X 100%

Signature [signature] Date 11-2-90 LRB 53595 Page 69

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-9-91
Disclosed To and Understood By _____
Signed 1 _____ Date _____

September 18, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 5
Page 18 of 18

105AW-1

P.R.B 9-30-93

Weight % solids = 0.3410 g/ 1.495 g X 100%
= 22.87 %

P.R.B. 9-20-93
Av. 23.0%

105AW-2

Weight % solids = 0.426 g/ 1.835 g X 100%
= 23.28 %
P.R.B. 9-20-93

MEASUREMENT OF SHEAR STRESS VS SHEAR RATE of 105AW-5-SL2

57. Install an MV-I sensor on the In-Cell Haake. Tap the M5 measuring head. Set the %D at 40%, t_2 to 5 min, the mode to tau vs D, and the % tau to 10%. Zero the instrument, and run the 10 and 25 cP standards. Calculate the viscosity from the curve at a S_D of 0.5 and check to see if the instrument has an accuracy of ± 10%. If the standards have been run within the month, record the previous standardization and do not run the standards.

10 cP Standard:
measured viscosity 10.29 cP

25 cP Standard:
measured viscosity 25.09 cP

58. Measure the cell temperature using the digital or mercury thermometer.

Cell Temperature 31 °C

59. Transfer 40 ml by weight of **105AW-5-SL2** to the Haake Beaker. Install the beaker into the Haake, raising the beaker to the point where the mix is level with the top of the MV-I sensor. Initially set %D at 40%, %tau at ~~10%~~ 5, t_1 at 2 min, t_2 at 5 min, and mode in tau vs D. Obtain up/down rheogram. You may adjust %tau as needed.

Slurry g/cc wt 188.49

11-3-90

40 ml of Sample = (Density) X (40 ml)
= 1.16 g/ml X 40 ml
= 46.4 g

Enter all the requested information on the Haake form. Label the rheogram **105AW-5-SL2-1**.

See pp. 75-76 for results

60. Obtain a second rheogram, adjusting the % tau as needed. Label the rheogram **105AW-5-SL2-2**.

61. Transfer the sample in the beaker back to the bottle **105AW-5-SL2**.

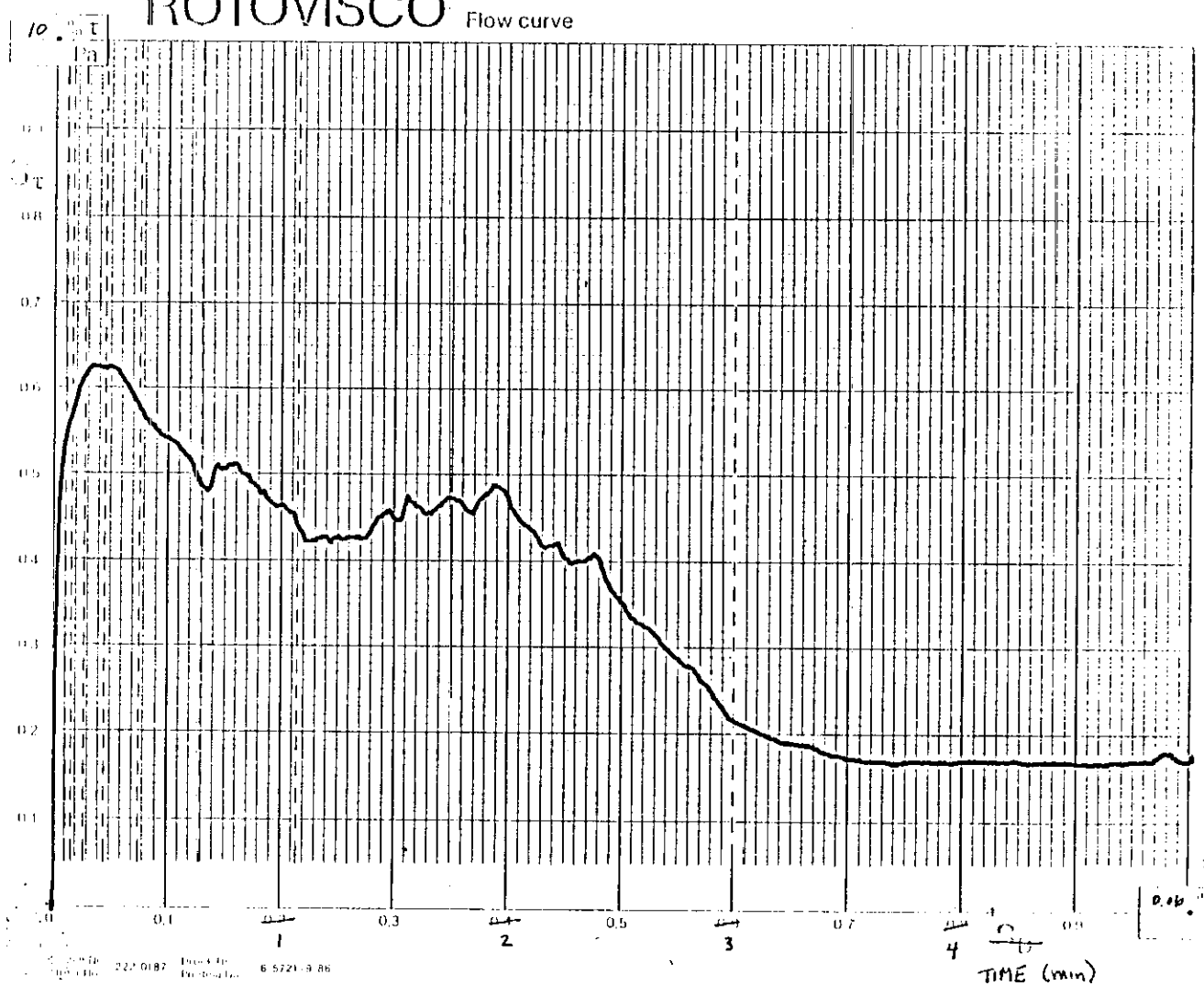
188.49 gross wt

Signature [signature] Date 11-3-90 LRB 53595 Page 70

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-9-91
Disclosed To and Understood By _____
Signed T _____ Date _____

See p. 55 for sample description LRB 53595 p. 71

ROTOVISCO Flow curve



Date 9/24/9
No 2
Substance 105AN-C1
Temperature 37 °
Rotor speed 100
System VANE #
Sensor system M5
A N/A
M N/A
Program: t_1 0
t_2 5
t_3 0
Signature gmT

Project No.
Entered By
Date of Work
Disclosed To and Understood By
Date

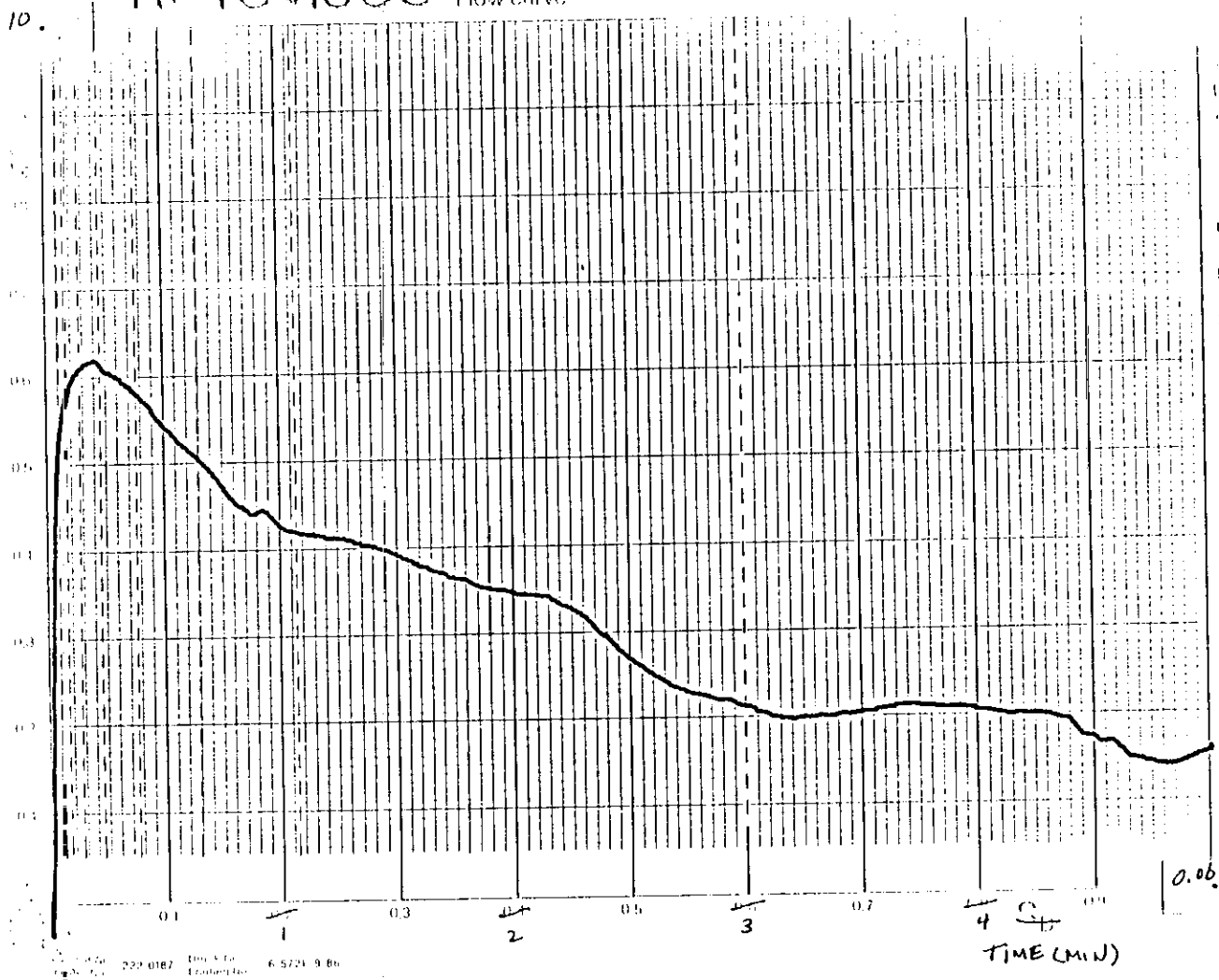
170

WHC-SD-WM-TI-649 REV. 0

71

See p. 55 for sample description LRB 53595 p. 72

ROTOVISCO Flow curve



Date	9/24/9
No.	3
Solution	105AW-C
Temperature	37
ROTOVISCO	100
System	M5
Spindle	VANE #
A	N/A
B	N/A
Programmer	
	1. 0
	5
	0
Operator	JMT

0.06 % D
S

Project No.

Entered By

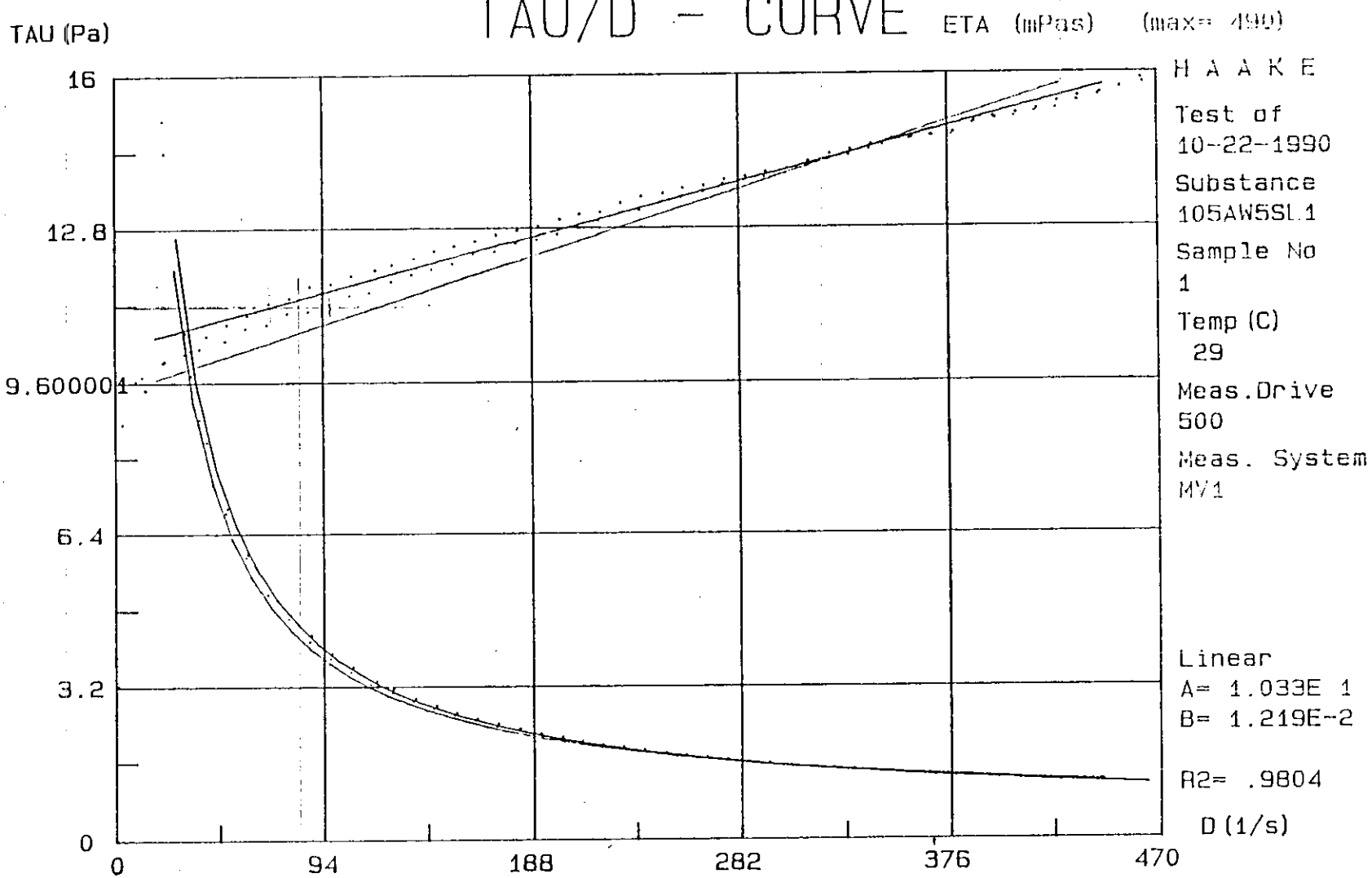
Date of Work

Disclosed To and Understood By

Date 1-9-91

LRB 53595 p. 73 see p. 65 for description of sample

TAU/D - CURVE



Project No. ____ Date of Work ____

Entered By [signature] Date 11/9/91

Disclosed To and Understood By

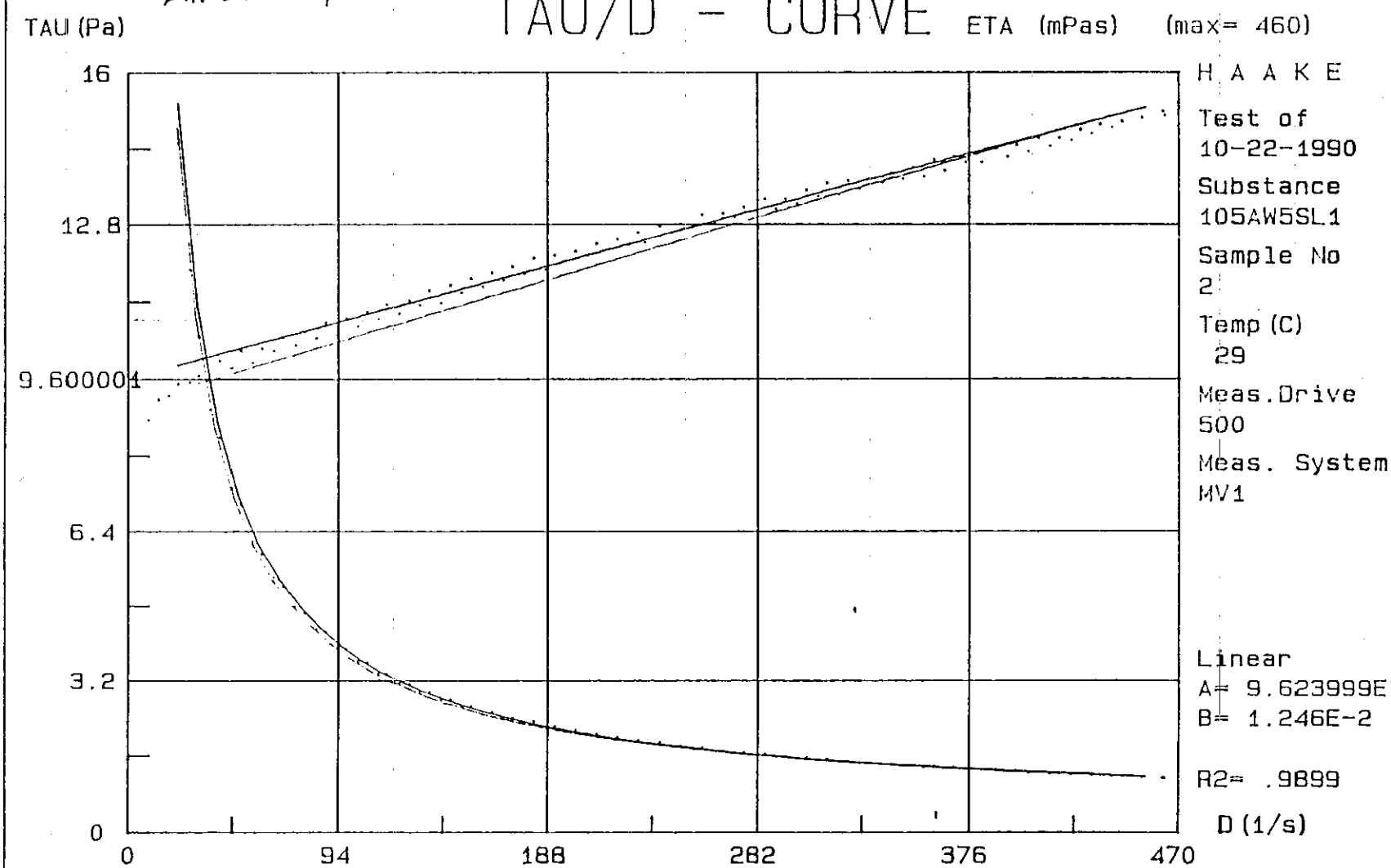
Signed 1. 172 Date

2. Date

LRB 53595 p. 74

See p. 65 for description of sample

TAU/D - CURVE



Project No.

Date of Work

Entered By W. L. Gray

Disclosed To and Understood By

Date 1/9/91

Signed 1 173

Date

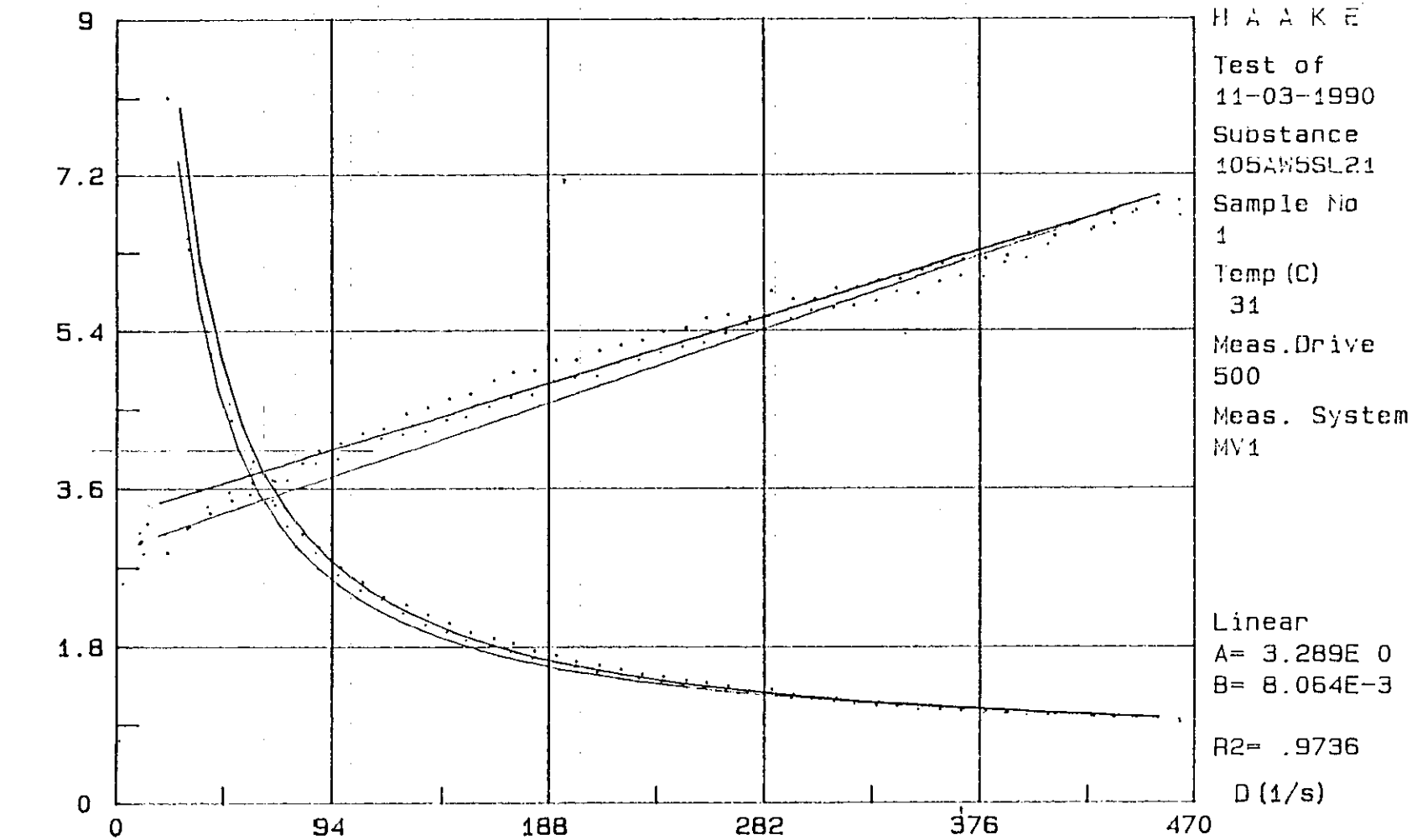
2

Date

WHC-SD-WM-TI-649 REV. 0

LRB 53595 p. 75 see p. 70 for description of sample

TAU/D - CURVE



Project No. ____ Date of Work ____

Entered By [signature] Date 12-9-91

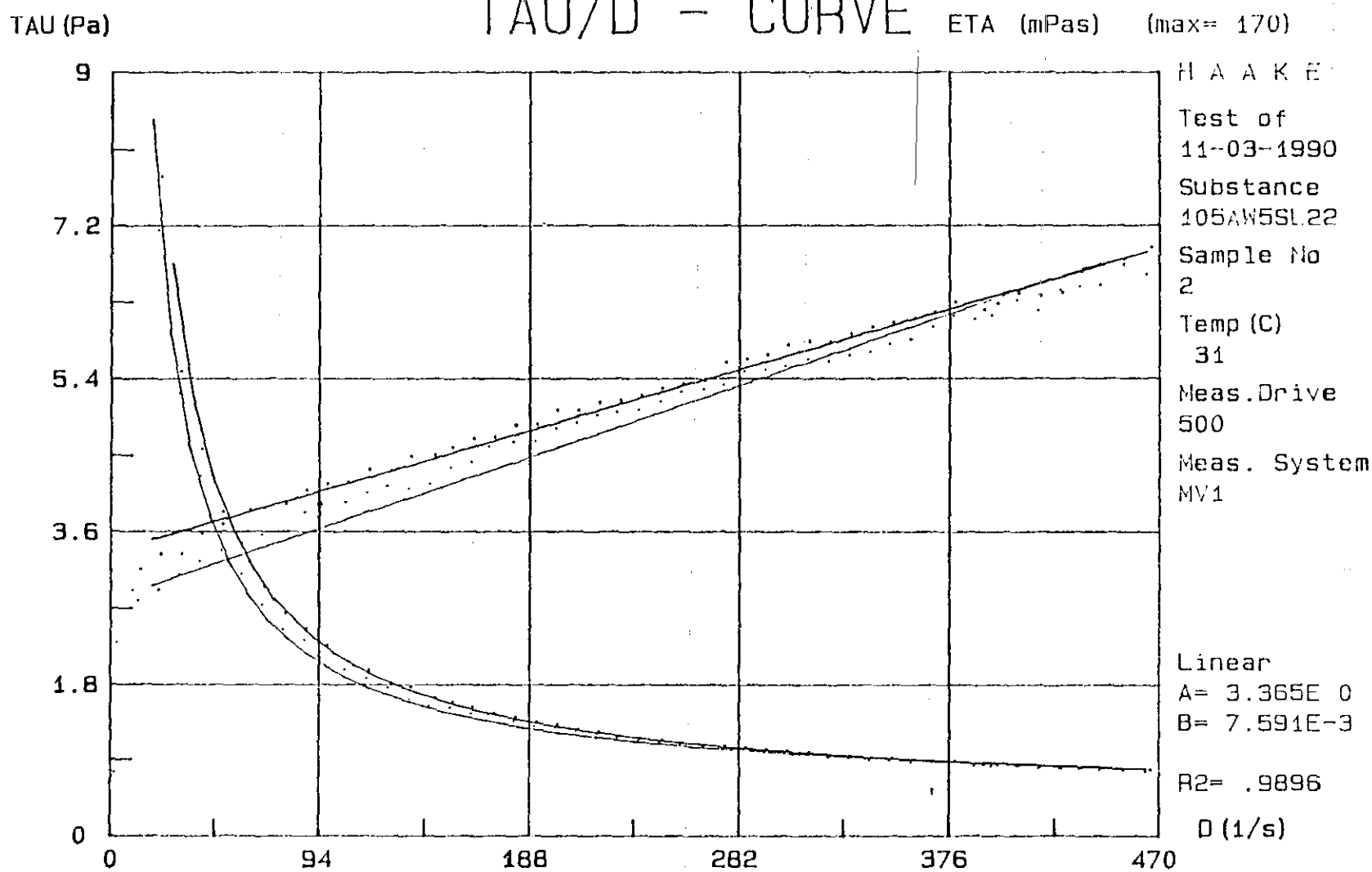
Disclosed To and Understood By ____ Date ____

Signed 1: 174 Date ____

2: ____ Date ____

LRB53595 p. 76 see p. 70 for description of sample

TAU/D - CURVE



Project No. ____ Date of Work ____

Entered By [signature] Date 1-9-91

Disclosed To and Understood By ____ Date ____

Signed 175 ____ Date ____

Date ____

PENETRATION RESISTANCE DATA SHEET

77

See p. 55 for sample description

Date: 9-24-90

Measurement Obtained By: [illegible]

Sample No.: 1

Sample Description:

Diameter: 2 1/2" Height: 2 1/2"

Physical Appearance: Light gray in color, granular, tertiary, visable voids on edges, rough on top surface

Remarks: test taken from area of no visual voids

Penetrometer No.: CT-421A

Diameter of End: 1"

Penetration Resistance: 3 psi

Date: 9-24-90

Measurement Obtained By: CHS

Sample No.: 2 CHS 9-24-90

Sample Description:

Diameter: 2 1/2" Height: 2 1/2"

Physical Appearance: Lt gray in color, granular, tertiary, visable voids on edges

Remarks: test taken in area of no visual voids Rough top surface

Penetrometer No.: CT-421A

Diameter of End: 1"

Penetration Resistance: 2 psi

2nd sample was taken from same sample, and a new area of undisturbed surface area

Signature [illegible] Date 9-24-90 IRB 53595 Page 77

Project No. _____ Date of Work _____

Entered By _____ Date _____

Disclosed To and Understood By _____

Signed _____

3

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 1 of 7

CHARACTERIZATION OF 105AW SEGMENT 6

M&TE List

Balance 1:	Calib ID	388-06-01-016	Calib Exp Date 11-7-90
	Location	"A" Cell	
Balance 2:	Calib ID	362-06-01-035	Calib Exp Date 11-7-90
	Location	"B" Cell	
Digital Thermometer:			
	Calib ID	01225	Calib Exp Date 7-12-91
Thermocouple:	Calib ID	999-78-025	Calib Exp Date 9-8-91
	Location	"B" Cell	Type K Ser.# 40

CONTROLLED
DOCUMENT
DN NO. 1

LRB 53595 p. 78

Charles Shale
9-10-90

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-30-91
Disclosed To and Understood By

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 2 of 7

When you have finished an instruction, put a check in front of the item.

PREPARATION AND CHARACTERIZATION OF SEGMENT 6

start -1355
stop =14:10

✓1. Place the waste solids from **105AW-SOL 1** (this is actually segment 6) in the homogenizer and blend to a uniform consistency.

✓2. Return the material to the original container **105AW-SOL 1** and shake or stir to remove as much of the solids adhering to the container walls as possible. Use this material for the following characterizations.

✓3. Clean the homogenizer parts by rinsing with deionized water or other suitable method.

✓4. Agitate **105AW-SOL 1** and transfer about 1 g to each of two weighed glass vials labeled **105AW-1** and **105AW-2**. Allow to air dry overnight.

105AW-1		105AW-2	
Total	22.006 g	Total	21.650 g
Vial	20.671 g	Vial	20.399 g
Sample	1.335 g	Sample	1.251 g

✓5. Transfer **105AW-1** and **105AW-2** to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-1		105AW-2	
Total	21.241 g	Total	20.935 g
Vial	20.671 g	Vial	20.399 g
Dry Sample	0.570 g	Dry Sample	0.536 g

✓6. Discard the dried samples.

✓7. Agitate **105AW-SOL 1** thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled **CC1** and **CC2** and weigh the samples. Also measure the total volume.

CC1		CC2	
Total	26.151 g	Total	26.123 g
Cone	5.747 g	Cone	5.641 g
Sample	20.404 g	Sample	20.482 g
Total	NA mL	Total	NA mL

Elmer H. Shade
9-11-90

LRB 53595 p. 79

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-30-91
Disclosed To and Understood By
Signed 1. _____ Date _____

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 3 of 7

✓8. Place the lids on the cones and allow to stand undisturbed for 2 days. Note the start and end times and measure the total, solids, and liquid volumes at the end of the 2 days.

Start date 9-11-90 Time 15:00
End date 9-12-90 Time 0900

Sample is to thick to settle in centrifuge tubes - has oids in tube, no visual settling

CC1			CC2		
Total	NA	mL	Total	NA	mL
Solids	NA	mL	Solids	NA	mL
Liquid	NA	mL	Liquid	NA	mL

✓9. Decant the settled supernate from both centrifuge cones into a weighed glass vial labeled **105AW-6-SUP**. Weigh the solids remaining in the centrifuge cones.

CC1			CC2		
Total	NA	g	Total	NA	g
Cone	NA	g	Cone	NA	g
Solids		g	Solids		g

✓10. Transfer the solids in the centrifuge cones to a weighed glass vial labeled **105AW-6-SOL**. NA

✓11. Again agitate **105AW-SOL 1** thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled **CC3** and **CC4** and weigh the samples. these are CC1 and CC2 tubes with never settled in #8

Start @ 0845
Stop 00945

CC3			CC4		
Total	26.151	g	Total	26.123	g
Cone	5.747	g	Cone	5.641	g
Sample	20.404	g	Sample	20.482	g

✓12. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes.

CC3			CC4		
Total	14.3	mL	Total	14.20	mL
Solids	9.8	mL	Solids	10.11	mL
Liquid	4.5	mL	Liquid	4.09	mL

Elmer A. Shade
9-11-90

LRB 53595 p.80

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-30-91
Disclosed To and Understood By _____
Signed 1. _____ Date _____

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 4 of 7

✓13. Decant the centrifuged supernate from both centrifuge cones into the labeled vial **105AW-6-SUP** (from Step 9). Weigh the solids remaining in the centrifuge cones.

105AW-6-SUP 22.602

CC3			CC4		
Total	21.402	g	Total	21.568	g
Cone	5.747	g	Cone	5.641	g
Solids	15.655	g	Solids	15.927	g

✓14. Transfer the solids from the centrifuge cones to the vial labeled **105AW-6-SOL** (from Step 10). Weigh the vial **105AW-6-SOL** and transfer it to the 325B hot cells for chemical analyses. If there are less than 15 g of solids, centrifuge additional **105AW-SOL 1** sludge until sufficient solids are available for transfer.

9-13-90 ~~22.602~~

Total		g 51.192
Vial		g 22.657
Solids		g 28.535

Date delivered 12-3-90

✓15. In addition to the solids in Step 14, an additional 100 g of centrifuged solids are required for Miller Number determination. Centrifuge material from **105AW-SOL 1**, place the centrifuged solids in a bottle labeled **105AW-6-SOL**, and transfer it to the 325B hot cells for Miller Number determination. ok @ 13 ok 14

Total	231.58	g
Bottle	135.25	g
Solids	96.33	g

Date delivered 12-3-90

✓16. The centrifuged liquid from Step 15 can be added to the vial **105AW-6-SUP**, if necessary to bring the total weight of supernate in the vial to 20 g. Additional centrifuged liquid may be discarded.

✓17. Weigh the glass vial labeled **105AW-6-SUP** and transfer it to the 325B hot cells for chemical analyses.

Total	52.129	g
Vial	~~22.602~~	g
Supernate	29.527	g

Date delivered 12-3-90

Clarence H. Shade
9-12-90

LAB 53595 p.81

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-30-91
Disclosed To and Understood By
Signed 1. _____ Date _____

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 5 of 7

CALCULATIONS

18. Density of sludge, centrifuged liquid and solids.

Sludge density (from Step 7) = sample mass/sample volume

CC1

Density = 20.404 g/ 14.3 mL
= 1.43 g/mL

PRB 9-20-93

AV 1.44 gm/ml

CC2

Density = 20.482 g/ 14.2 mL
= 1.44 g/mL

Centrifuged liquid density
= [sample mass (Step 11) - solids mass (Step 13)]/liquid volume (Step 12)

CC3

Density = (20.404 g - 15.655 g)/ 4.5 mL
= 1.056 g/mL

P.R.B. 9-20-93

P.R.B. 9-20-93

AV 1.09 gm/ml

CC4

Density = (20.482 g - 15.927 g)/ 4.09 mL
= 1.11 g/mL

Centrifuged solids density
= solids mass (Step 13)/solids volume (Step 12)

CC3

Density = 15.655 g/ 9.8 mL
= ~~1.599~~ g/mL
1.60 P.R.B. 9-20-93

P.R.B. 9-20-93

AV. 1.59 gm/ml

CC4

Density = 15.927 g/ 10.11 mL
= 1.57745 g/mL
P.R.B. 9-20-93

Clemente Shale
9-13-90

LRB53595 p. 82

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-30-91
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August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 6 of 7

83

✓19. Volume % and weight % settled solids

✓ Volume % solids (Step 8) = solids vol./total vol. x 100%

CC1

✓ Volume % solids = 14.3 mL/ 14.3 mL X 100%
= 100.0 %

CC2

✓ Volume % solids = 14.2 mL/ 14.2 mL X 100%
= 100 %

Weight % solids = solids mass (Step 9)/sample mass (Step 7) X 100%

CC1

Weight % solids = NA g/ _____ g X 100%
= _____ %

CC2

Weight % solids = NA g/ _____ g X 100%
= _____ %

✓20. Volume % and weight % centrifuged solids

Volume % solids (Step 12) = solids vol./total vol. x 100%

CC1

Volume % solids = 9.8 mL/ 14.3 mL X 100%
= ~~68.53~~ %
69 P.R.B. 9-20-93

P.R.B. 9-20-93
Av. 70%

CC2

Volume % solids = 10.11 mL/ 14.2 mL X 100%
= ~~71.19~~ %
71.2 P.R.B. 9-20-93

Clemente Shale
9-13-90

LRB 53595 p. 83

Project No. _____ Date of Work _____
Entered By W.J. Gray Date 1-30-91
Disclosed To and Understood By

August 31, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 6
Page 7 of 7

Weight % solids = solids mass (Step 13)/sample mass (Step 11) X 100%

CC1

Weight % solids = 15.655 g/ 20.404 g X 100%
= 76.73 %

PRB 9-20-93

AV. 77.25%

CC2

Weight % solids = 15.927 g/ 20.482 g X 100%
= 77.76 %

21. Weight % dried solids

weight % dried solids
= dry sample weight (Step 5)/total sample weight (Step 4) X 100%

105AW-3

Weight % solids = 0.570 g/ 1.335 g X 100%
= ~~42.70~~ %
42.7 P.R.B. 9-20-93

PRB 9-20-93

Av 42.8%

105AW-4

Weight % solids = 0.536 g/ 1.251 g X 100%
= 42.85 %
P.R.B. 9-20-93

Clarence H. Shade
9-13-90

wt% cont. Liquids
22.75%

LRB 53595 p. 84

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-30-91
Disclosed To and Understood By _____ Date _____

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 7

CHARACTERIZATION OF 105AW SEGMENT 7

M&TE List

CLS - 11-20-90

Balance 1:	Calib ID	388-06-01-016	Calib Exp Date ~~11-7-90~~ 2-7-91
	Location	"A" Cell	
Balance 2:	Calib ID	362-06-01-035	Calib Exp Date ~~11-7-90~~ CLS 11-20-90 2-7-91
	Location	"B" Cell	
Digital Thermometer:	Calib ID	01225	Calib Exp Date 7-12-91
Thermocouple:	Calib ID	999-78-025	Calib Exp Date 9-8-91
	Location	"B" Cell	Type K Ser.# 40

CONTROLLED
DOCUMENT
COPY NO. 1

Signature [illegible] Date 11-05-90 LRB 53595 Page 85

Project No. _____ Date of Work _____
Entered By W J Gray Date 1-31-91
Disclosed To and Understood By
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2. _____ Date _____

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 7
Page 2 of 5

When you have finished an instruction, put a check in front of the item.

SHEAR STRENGTH OF 105AW SEG 7 SOLIDS

The shear strength measurements will be made on the solids in the bottle labeled **105AW-6-SST**.

✓1. Install shear vane #3 on Haake Viscometer. Set %D at 0.06, %tau at 10%, t_2 at 5 min, up/down run mode, and tau vs time mode. Start, adjust the zero, and complete the run recording only the up run. 11-06-90 OB

✓2. Put in a new chart, fill in the requested information noting below the signature block that the x-axis is time, and with the help of the cognizant scientist, select the location to insert the shear vane into sample **105AW-6-SST**. Insert the vane into the sample to fully cover the blades. Using the same settings as in Step 1, start the shear strength measurement. It may be necessary to adjust the %tau if the trace is going to go off scale or is not sensitive enough. Sample very granular and did broke up when the vane was inserted
Record the cell temperature 30 °C

results on pp. 90-91

✓3. If a second site is available for a second shear strength measurement, consistent with the requirements for penetration-resistance measurements below, repeat Step 2. this was Run on 105AW-7

✓4. Remove and clean the shear vane.

MEASUREMENT OF THE PENETRATION RESISTANCE OF 105AW-SOL 7 SOLIDS

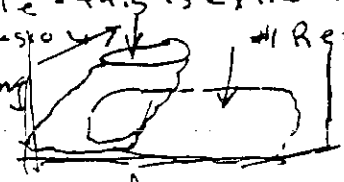
The penetration resistance measurements will be made on the solids in the bottle labeled **105AW-SOL 7**. 11-06-90

✓5. Using the Soil Test Inc. CT-421 penetrometer, insert the ~~1"~~ 1/4"-diameter probe tip to a depth of 1 inch. Record the penetrometer reading. Repeat in another location, if available.

Penetrometer Reading #1 5

Penetrometer Reading #1 7

105AW-Sol 7 - dark brown in color with some white (grayish) areas through sample - this is extruded material and is the diameter of the extrusion



Penetrometer #CT421A
diameter of end = 1/4"
Sample dia = 1"

Signature [signature] Date 11-06-90 LRB 53595 Page 86

Project No. Date of Work
Entered By W J Gray Date 1-31-91
Disclosed To and Understood By
Signed 1 Date
Date

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 7
Page 3 of 5

MEASUREMENT OF DENSITY, Wt% Solids, and Wt% Oxides

11 08
11 23

6. Place the waste solids from 105AW-6-SST and 105AW-SOL 7 in the homogenizer and blend to a uniform consistency using as low a stirring rate as possible consistent with achieving good homogenization. 200 cc 4.73 gm D.I. H_2O

7. Return the material to the original container 105AW-SOL 7 and shake or stir to remove as much of the solids adhering to the container walls as possible. Use this material for the following characterizations.

8. Clean the homogenizer parts by rinsing with deionized water or other suitable method.

9. Agitate 105AW-SOL 7 and transfer about 1 g to each of two weighed ceramic crucibles labeled 105AW-1 and 105AW-2. Allow to air dry overnight. Total seg 7 wt Total = 444.98 Sat = 352.20 92.78 gms

105AW-1			105AW-2		
Total	26.081	g	Total	24.315	g
Crucible	24.879	g	Crucible	23.069	g
Sample	1.202	g	Sample	1.246	g

10. Transfer 105AW-1 and 105AW-2 to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-1			105AW-2		
Total	25.584	g	Total	23.795	g
Crucible	24.879	g	Crucible	23.069	g
Dry Sample	~~.58~~ 0.7050	g	Dry Sample	0.726	g

11 .1390

11. Transfer 105AW-1 and 105AW-2 to a >1000°C muffle furnace. Remove after 1 h at temperature and place in a desiccator for at least 1 h to cool. Remove from desiccator and weigh.

105AW-1			105AW-2		
Total	25.309	g	Total	23.516	g
Crucible	~~1.202~~ 24.879	g	Crucible	23.069	g
Dry Sample	0.430	g	Dry Sample	0.447	g

12. Discard the dried samples.

Signature [signature] Date 11-20-90 LRB 53595 Page 87

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-31-91
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-SEG 7
Page 4 of 5

13. Transfer 15 to 20 g of solids from **105AW-SOL 7** to a glass vial labeled **D-105AW-7** and deliver to 325B hot cells for chemical and radiochemical analyses.

total = 38.393
vial = 21.181
Sample = 17.212

Date Delivered 30 Dec 1990

14. Transfer about 12 mL of **105AW-SOL 7** to each of two weighed centrifuge cones labeled **CC1** and **CC2** and weigh the samples. Centrifuge the samples at high speed if necessary to remove air pockets and develop a sharp, flat, upper surface. Record the total sample volumes.

58.8 mm = 4 x 14 cc

CC1		CC2	
Total	17.990 g	Total	17.701 g
Cone	5.751 g	Cone	5.718 g
Sample	12.239 g	Sample	11.983 g
Total	~~1.511~~ 8.1 mL (cb 11-19-90)	Total	8.0 mL

CALCULATIONS

15. Density

Sludge density = sample mass/sample volume (Step 14)

CC1

Density = 12.239 g/ 8.1 mL
= 1.511 g/mL

P.R.B 9-21-93
AV 1.50 g/mL

CC2

Density = 11.983 g/ 8.0 mL
= 1.498 g/mL

16. Weight % dried solids

weight % dried solids
= dry sample weight (Step 10)/total sample weight (Step 9) X 100%

105AW-1

Weight % solids = 0.70570 g/ 1.202 g X 100%
= 58.65 %

AV = 58.5

Signature [signature] Date 3 Dec 90 LRB 53595 Page 88

Project No. _____ Date of Work _____
Entered By [signature] Date 1-31-91
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

105AW-2

Weight % solids = 0.726 g/ 1.246 g X 100%
= 58.27 %

✓17. Weight % oxides

wt% oxides
= calcined sample weight (Step 11)/total sample Weight (Step 9) X 100%

105AW-1

Weight % oxides = 0.430 g/ 1.202 g X 100%
= 35.77 %

Av = 35.82

105AW-2

Weight % oxides = 0.447 g/ 1.246 g X 100%
= 35.87 %

PREPARATION OF CENTRIFUGED SUPERNATE SAMPLE

✓18. Place the centrifuged supernate from Step 14 in a glass vial labeled D-105AW-7-L. Centrifuge additional material from 105AW-SOL 7, if necessary, to obtain a total of about 6 mL of centrifuged supernate.

* tare wt = 21.063
total = 24.608
Sample = 3.54

✓19. Calibrate the pH meter using pH buffers 7 and 10. List expiration date of the pH buffers.

pH 7 lot No. VOR 9303 Expiration Date 10-91
pH 10 lot No. 870911 Expiration Date 4-6-91
Baxter Scientific Prod

✓20. Measure the pH of D-105AW-7-L.

pH = 12.800

✓21. Transfer D-105AW-7-L to the 325B hot cells for chemical analyses.

Date Delivered 12-3-90

* only 3.54 gms of supernate after centrifuging all the remaining 105AW-SOL7-Solid from this centrifuge and from step # 14 were put in a glass bottle labeled 105AW-C1-SEG-7-Solids

Signature [illegible] Date 12-3-90 LRB 53595 Page 89

Project No. _____ Date of Work _____
Entered By WJ Gray Date 1-31-91
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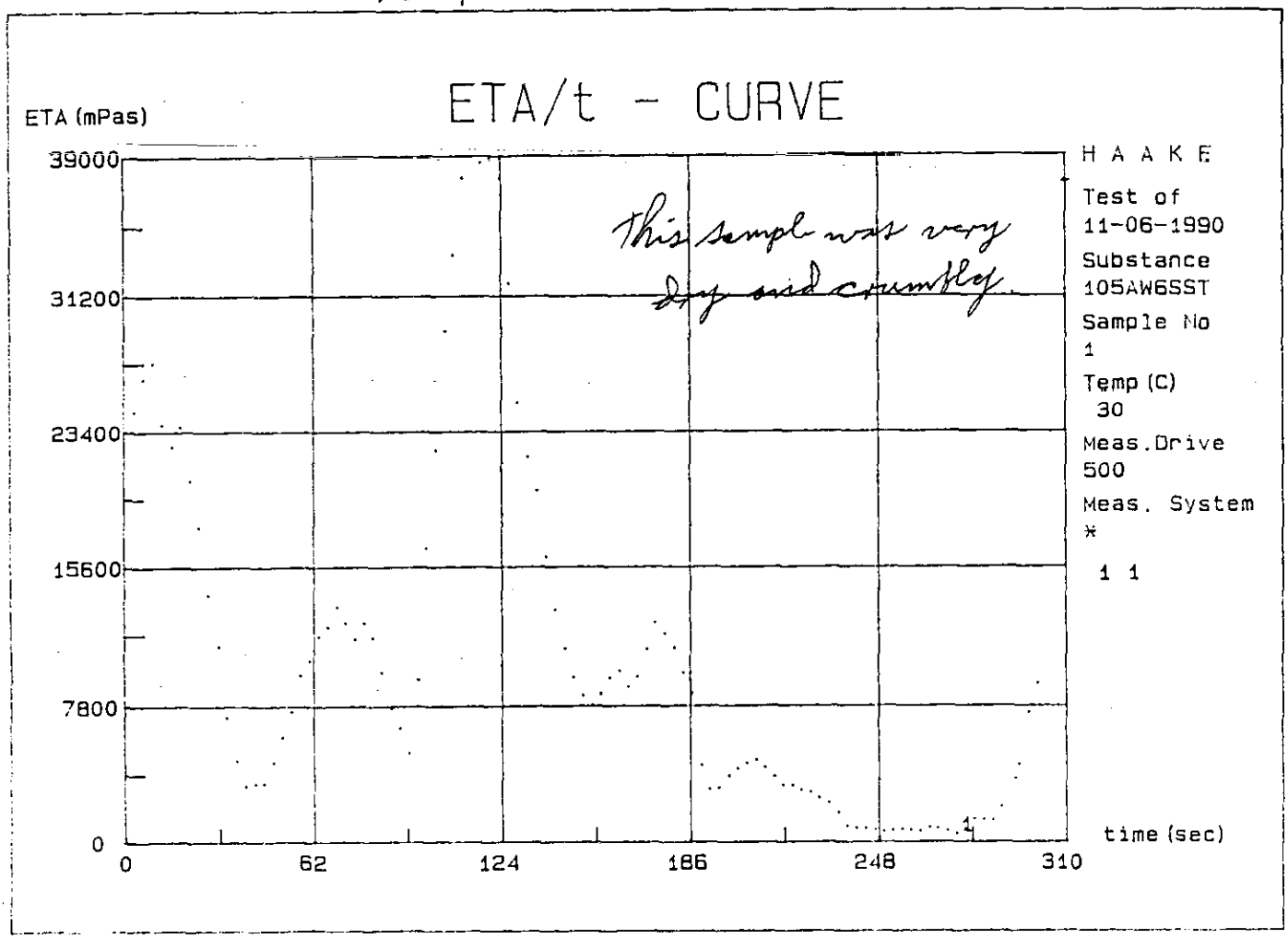
see p. 86 for sample description



LRB 53595 p. 90

$\tau_s = (\%\,\tau)(S_\tau)(2628) = 4320$ dyne/cm^2

27.37 0.06

Project No. _____ Date of Work _____

Entered By W J Gray 189 Date 1-31-91

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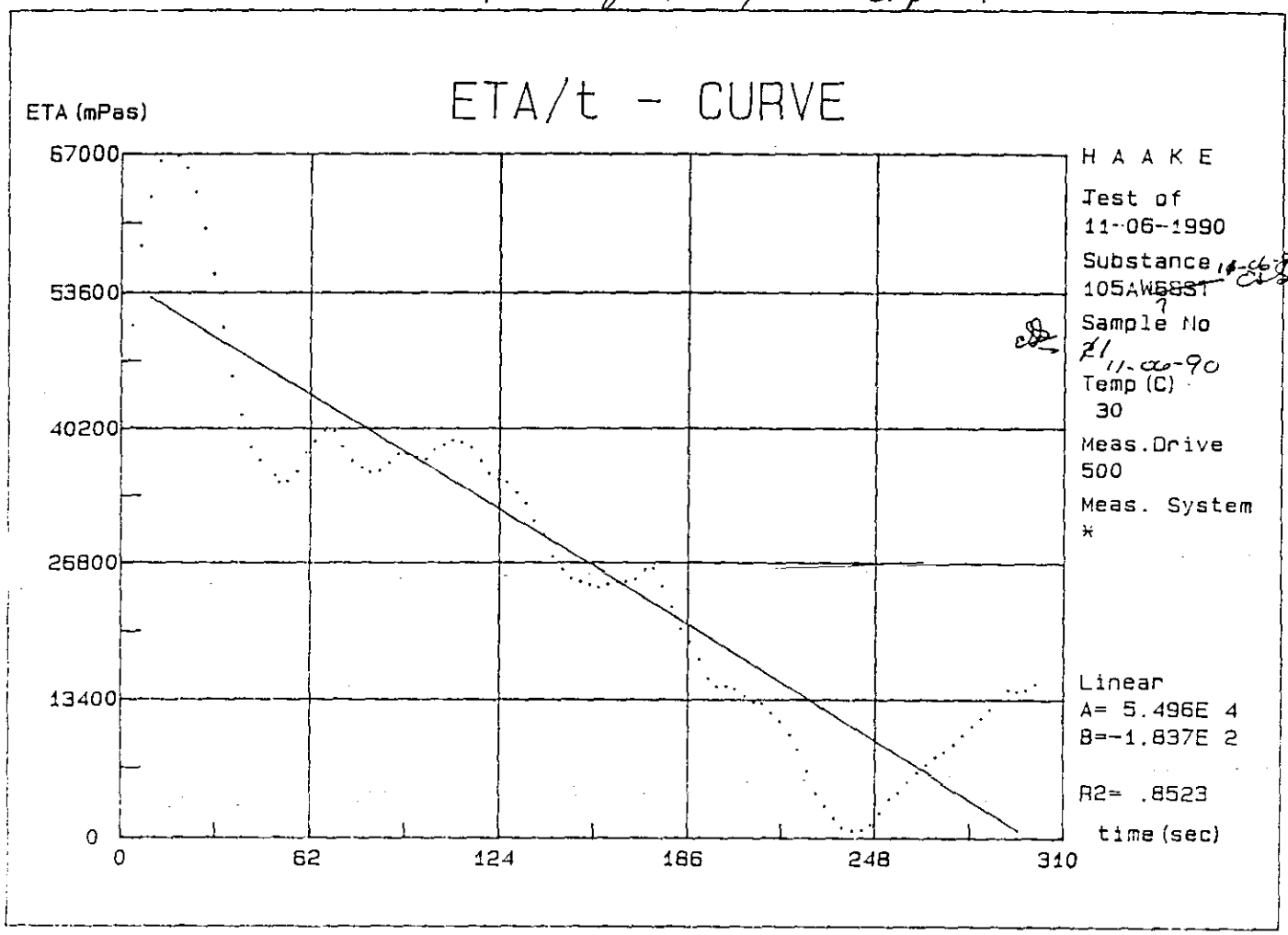
See p. 86 for sample description.



LRB53595 p. 91

$\tau_s = (10.0)(0.06)(2628) = 6300$ dyne/cm³

Project No. _____ Date of Work _____

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Signed _____ Date _____

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP

CHARACTERIZATION OF 105AW COMPOSITE

M&TE List

CB 11-20-90

Balance 1: Calib ID 388-06-01-016 Calib Exp Date ~~11-7-90~~ 2-7-91
Location "A" Cell

Balance 2: Calib ID 362-06-01-035 Calib Exp Date ~~11-7-90~~ 2-7-91 CB 11.20.90
Location "B" Cell

Digital Thermometer:
Calib ID 01225 Calib Exp Date 7-12-91

Thermocouple: Calib ID 999-78-025 Calib Exp Date 9-8-91
Location "B" Cell Type K Ser.# 40

pH Buffers: pH 7 Lot No 9303 Expiration Date 10-91
Manufacturer VWR Scientific

pH 10 Lot No 870911 Expiration Date 4-6-91
Manufacturer ~~VWR Sci~~ CB 11.20.90
Baxter Scientific

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BAW 53595 p. 92

[illegible] Shade
11-20-90

Project No.
Date of Work
Entered By WJ Gray
Date 3/5/91
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Signed 1.
Date

93

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP
Page 2 of 7

en you have finished an instruction, put a check in front of the item.

PREPARATION AND CHARACTERIZATION OF 105AW-COMP

✓1. Place about ~~40~~ 50 g 11-30-90 of the homogenized solids from 105AW 3-4 and about ~~20~~ 25 g 11-30-90 each of solids from 105AW-SOL 5 and 105AW-SOL 1 (this is actually segment 6) in the homogenizer and blend to a uniform consistency. on @ 13:07 off @ 13:22

		105AW 3-4	105AW-SOL 5	105AW-SOL 1
105AW-3				
267.93	Original wt	293.23 g	314.80 g 11-30-90	343.93 g
242.54	Final wt	267.93 g	293.23 g	318.80 g
25.39	Sample wt	25.30 g	25.57 g	25.180 g

✓2. Place the material in a bottle labeled 105AW-COMP. Use this material for the following characterizations. wt = 266.78 w/o Ld = 242.54 wt = 348.40

✓3. Clean the homogenizer parts by rinsing with deionized water or other suitable method.

✓4. Agitate 105AW-COMP and transfer about 1 g to each of two weighed ceramic crucibles labeled 105AW-1 and 105AW-2. Allow to air dry overnight.

105AW-1		105AW-2	
Total	18.377 g	Total	22.426 g
Crucible	16.482 g	Crucible	19.038 g
Sample	1.895 g	Sample	3.388 g

✓5. Transfer 105AW-1 and 105AW-2 to a 105°C oven. Remove after 24 h at temperature and place in a desiccator for at least 1 h to cool. Remove from the desiccator and weigh.

105AW-1		105AW-2	
Total	17.277 g	Total	20.435 g
Crucible	16.482 g	Crucible	19.038 g
Dry Sample	0.795 g	Dry Sample	1.397 g

✓6. Transfer 105AW-1 and 105AW-2 to a >1000°C muffle furnace. Remove after 1 h at temperature and place in a desiccator for at least 1 h to cool. Remove from desiccator and weigh.

105AW-1		105AW-2	
Total	17.161 g	Total	20.236 g
Crucible	16.482 g	Crucible	19.038 g
Dry Sample	0.679 g	Dry Sample	1.198 g

BNW 53592 p. 93

Elmer W. Shade
12-4-90

Project No. _____ Date of Work _____
Entered By W J Gray Date 3/5/91
Disclosed To and Understood By _____
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4

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP

7. Discard the dried samples.

8. Agitate 105AW-COMP thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled CC1 and CC2 and weigh the samples. Also measure the total volume.

CC1			CC2		
Total	20.830	g	Total	21.797	g
Cone	5.719	g	Cone	5.712	g
Sample	15.111	g	Sample	6.085	g
Total	10.90	mL	Total	11.50	mL

9. Place the lids on the cones and allow to stand undisturbed for 2 days. Note the start and end times and measure the total, solids, and liquid volumes at the end of the 2 days.

no indication of settling, so centrifuged samples at this time

Start date 12-4-90 Time 0945
End date 12-5-90 Time 1300

CC1 (settled)			centrifuged	CC2 (settled)			centrifuged
Total	10.9	mL	10.9	Total	11.50	mL	11.5
Solids	10.9	mL	7.7	Solids	11.50	mL	8.2
Liquid	0	mL	3.2	Liquid	0	mL	3.3

12-5-90 centrifuged

10. Decant the ~~settled~~ supernate from both centrifuge cones into a weighed glass vial labeled D-105AW-C-L. Weigh the solids remaining in the centrifuge cones.

Vial wt = → 20.44

12-4-90

CC1				CC2		
Total	~~19.194~~	g	19.409	Total	18.487	g
Cone	5.719	g	w/L 5.719	Cone	5.712	g w/L
Solids	13.475	g	11.684	Solids	12.775	g

12-4-90

11. Transfer the solids in the centrifuge cones to a weighed glass vial labeled D-105AW-C-S.

12. Again agitate 105AW-COMP thoroughly; then transfer about 12 mL to each of two weighed, graduated, centrifuge cones labeled CC3 and CC4 and weigh the samples.

CC3			CC4		
Total	19.194	g	Total	19.604	g
Cone	5.758	g w/L	Cone	5.719	g w/L
Sample	13.436	g	Sample	13.885	g

BNW 53595 p. 94

Elmer H. Shade
12-4-90

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Entered By W J Gray Date 3/5/91
Disclosed To and Understood By _____
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November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP
Page 4 of 7

95

13. Centrifuge the two samples for 1 h using the high speed on the centrifuge. Measure the solids and liquid volumes.

CC3			CC4		
Total	9.75	mL	Total	9.80	mL
Solids	6.40	mL	Solids	6.80	mL
Liquid	3.35	mL	Liquid	3.00	mL

14. Decant the centrifuged supernate from both centrifuge cones into the labeled vial D-105AW-C-L (from Step 10). Weigh the solids remaining in the centrifuge cones. D-105AW-C-L Vial = 27.05

CC3			CC4		
Total	15.662	g	Total	16.733	g
Cone	5.758	g	Cone	5.719	g
Solids	9.904	g	Solids	11.014	g

15. Transfer the solids from the centrifuge cones to the vial labeled D-105AW-C-S (from Step 11). Weigh the vial D-105AW-C-S and transfer it to the 325B hot cells for chemical analyses. If there are less than 15 g of solids, centrifuge additional 105AW-COMP sludge until sufficient solids are available for transfer.

Total	37.617	g	total	—	40.329
Vial	20.579	g	Vial	—	20.530
Solids	17.038	g	Solids	—	19.799

Date delivered 1-22-91

16. The centrifuged liquid from Step 15 can be added to the vial D-105AW-C-L, if necessary to bring the total weight of supernate in the vial to ~~20~~ 12.8 g. Additional centrifuged liquid may be discarded.

17. Calibrate the pH meter using pH standards 7 and 10.

18. Measure the pH of D-105AW-C-L.

pH = 13.429

19. Weigh the glass vial labeled D-105AW-C-L and transfer it to the 325B hot cells for chemical analyses.

Total	33.295	g
Vial	20.442	g
Supernate	12.853	g

Date delivered 1-22-91

Clarence V. Shade
1-22-91

BNW 53595 p.95

Project No. _____ Date of Work _____
Entered By W J Gray Date 3/5/91
Disclosed To and Understood By

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP
Page 5 of 7

6

CALCULATIONS

20. Density of sludge, centrifuged liquid and solids.

Sludge density (from Step 8) = sample mass/sample volume

CC1

Density = 15.111 g/ 10.90 mL
= ~~1.39~~ g/mL
1.386 PRB 9-20-93

PRB. 9-21-93
Av 1.393 gm/ml

CC2

Density = 16.085 g/ 11.50 mL
= ~~1.40~~ g/mL
~~1.399 PRB. 9-21-93~~

Centrifuged liquid density
= [sample mass (Step 12) - solids mass (Step 14)]/liquid volume (Step 13)

CC3

Density = (13.436 g - 9.904 g)/ 3.35 mL
= 1.05 g/mL

PRB 9-21-93
Av 1.01 gm/ml

CC4

Density = (13.885 g - 11.014 g)/ 3.00 mL
= 0.96 g/mL

Centrifuged solids density
= solids mass (Step 14)/solids volume (Step 13)

CC3

Density = 9.904 g/ 6.40 mL
= ~~1.547~~ g/mL
1.548 PRB 9-21-93

PRB. 9-21-93
Av 1.58 gm/ml

CC4

Density = 11.014 g/ 6.80 mL
= ~~1.619~~ g/mL
1.620 PRB 9-21-93

Clement L. Shade
1-22-91

BNW 53595 p.96

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Date of Work
Date 3/5/91
Date

November 1, 1990
WJ Gray

Reference Tech. Procedure: WHC-053-1
Test Instruction: 105AW-C1-COMP
Page 6 of 7

21. Volume % and weight % ~~settled~~ centrifuged solids CD 12-5-90 These calculations were made on centrifuged CC-1 + CC 2 as noted on step #9

Volume % solids (Step 9) = solids vol./total vol. x 100%

CC1

Volume % solids = 7.7 mL/ 10.9 mL X 100%
= ~~70.64~~ 71 PRB. 9-21-93

PRB 9-21-93
Av - 71%

CC2

Volume % solids = 8.2 mL/ 11.5 mL X 100%
= ~~71.3~~ 71 PRB 9-21-93

Weight % solids = solids mass (Step 10)/sample mass (Step 8) X 100%

CC1 CD 12-5-90

Weight % solids = ~~13.475~~ 11.684 g/ 15.111 g X 100%
= 77.32 %

P.R.B. 9-21-93
AV 78%

CC2

Weight % solids = 12.775 g/ 16.085 g X 100%
= 79.42 %

22. Volume % and weight % centrifuged solids

Volume % solids (Step 13) = solids vol./total vol. x 100%

CC1 CD 12-5-90

Volume % solids = 6.40 mL/ 9.75 mL X 100%
= 65.64 %

P.R.B. 9-21-93
AV. 68%

CC2 CD 12-5-90

Volume % solids = 6.80 mL/ 9.80 mL X 100%
= 69.39 %

Clinton Shade
1-22-91

BNW 535 95 p.97

Project No. _____ Date of Work _____
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Weight % solids = solids mass (Step 14)/sample mass (Step 12) X 100%

CC/3 CSB 12-5-90

Weight % solids = 9.904 g/ 13.436 g X 100%
= 73.71 %

PRB. 9-21-93

CSB 12-5-90 CC/4

AV 77%

Weight % solids = 11.014 g/ 13.885 g X 100%
= 79.32 %

23. Weight % dried solids

~~vol%~~ ~~sol.~~ wt% cont liquids 23%

weight % dried solids
= dry sample weight (Step 5)/total sample weight (Step 4) X 100%

105AW-1/ CSB 12-5-90

Weight % solids = 0.795 g/ 1.895 g X 100%
= 41.95 %

PRB. 9-21-93

105AW-2 CSB 12-5-90

Av. 41.6 %

Weight % solids = 1.397 g/ 3.388 g X 100%
= 41.23 %

24. Weight % oxides

wt% oxides
= calcined sample weight (Step 6)/total sample Weight (Step 4) X 100%

105AW-1

Weight % oxides = 0.679 g/ 1.895 g X 100% PRB. 9-21-93
= 35.83 %

Av. 35.6 %

105AW-2

Weight % oxides = 1.198 g/ 3.388 g X 100%
= 35.36 %

Chuck A Shade
12-5-90

BNW 53595 p. 98

Project No. _____ Date of Work _____
Entered By WJ Gray Date 3/5/91
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

gross wt of remaining Samples 12-3-90

Elmer Walsh

105AW-SOL-1 = 412.94

105AW-SOL-5 = 443.64

105AW-SOL 4 = 524.50

BNW 53395 p.99

105AW-SOL 3 = 478.98

105AW-3-4 = 284.05

5AW-Comp = 276.60

12

LAST PAGE

Project No. _____ Date of Work _____

Entered By W J Gray Date 3/5/91

Disclosed To and Understood By

Signed 1. _____ Date _____

2. _____ Date _____

MS K2-38

375-2015

July 12, 1990

Ms. L. M. Sasaki
Tank Waste Characterization Section
Westinghouse Hanford Company
MS R2-12
Richland, WA 99352

Dear Leela:

As we discussed during our monthly meeting July 10, 1990, I am providing you with a summary description of the work planned for the characterization of the 105-AW core sample we recently received. Your written concurrence with this summary is requested so that the technical work is not delayed pending completion of a formal Technical Program Plan.

The attached page presents, in spreadsheet form, the various analyses that we understand from your letter dated July 2, 1990 are to be performed on the seven segments of the 105-AW core sample. Segments 1 and 2 will be combined and analyzed as a single sample. Segments 3 and 4 will be combined and also analyzed as a single sample. Segment 5 will be analyzed in as-received (AR) form and also after 1:1 and 2:1 dilutions with supernate from segments 1 and 2. In addition, equal aliquots of segments 3, 4, 5, and 6 will be combined and analyzed as a single composite sample called "Comp" on the attached page.

If you have any questions on this work summary, please call me at the above number.

Sincerely,

B. P. McGrail
Project Manager
DST Waste Characterization

POOR COPY RECEIVED
DOCUMENT PROCESSING

Table 4-2.

M. Sasaki
12, 1990

Segment and Composite Sample

	1,2	3,4	5			6	7	Comp
			AR	1:1	2:1			
Abrasiveness								
Miller Number						S		
XRD						S		
Physical and Rheological								
shear strength			X				X	
penetration resistance			X				X	
particle size dist.			X					
density	X	1	X	X	X	1	X	1
settling rate			X	X	X			
vol. % settled solids		X	X	X	X	X		X
wt. % settled solids		X				X		
vol. % cent. solids		X	X	X	X	X		X
wt. % cent. solids		X				X		X
wt. % water	X	X	X	X	X	X	X	X
wt. % oxides							X	X
rheogram			X	X	X			
Chemical								
IC (anions)	X	X	X			LS	X	LS
ICP	X	X	X			LS	X	LS
TC, TOC	X	X	X			LS	X	LS
pH	X						(X)	(LS)
OH	X						X	LS
NH3/NH4+	X	X	X			L	X	L
Cr(III)/Cr(VI)	X						X	LS
Hg	X						X	LS
As	X						X	LS
Se	X						X	LS
CN	X						X	L
Noble Metals (Ru, Rh, Pd)							A	A
Total U							X	LS

pH on Cent. Solids?

pH on Sol

1 sludge, centrifuged solids and liquids
A archive for ICP/MS
L centrifuged liquid
S centrifuged solids

Ms. L. M. Sasaki
July 12, 1990
Page 3

Segment and Composite Sample

	1,2	3,4	5			6	7	Comp
			AR	1:1	2:1			
Radiochemical								
GEA	X	X	X			LS	X	LS
AEA	X	X	X			LS		
H-3	X						X	LS
C-14	X						X	LS
Ni-63	X						X	LS
Se-79	X						X	LS
Sr-90	X						X	LS
Zr-93	X						X	LS
Nb-94	X						X	LS
Tc-99	X						X	LS
I-129	A						A	A
Np-237	X						X	LS
Am-241	X						X	LS
Cm-244	X						X	LS
total beta	X						X	LS
Pu Isotopes	2						(X)	(LS)

ONLY IF JUSTIFIED BY AEA.

30ug Pu in 10ml solid matrix.

2 if justified by AEA
A archive for ICP/MS
L centrifuged liquid
S centrifuged solids

54-3000-101 (9-89)

DON'T SAY IT --- *Write It!*

DATE 2/3/92

TO Joel

FROM GMR

Sample #105-AW Comp. Seg. 3-6 is empty. Will dispose of 250ml jar.

"TO MAKE LIFE LAST, PUT SAFETY FIRST"

105AW SAMPLES

SAMPLE	LABEL	MASS (g) TOTAL	BOTTLE	SAMPLE	LOCATION	COMMENTS
SEGMENT 1	DL-1	372	263	109	TOP	SUPERNATE
SEGMENT 2	DL-2	439	263	176	MIDDLE	SUPERNATE
SEGMENT 3 SOLIDS	SOL #3	448	338	110	TOP	
SEGMENT 4 SOLIDS	SOL #4	519	338	181	MIDDLE	
SEGMENT 5 SOLIDS	SOL #5	442	338	104	MIDDLE	
SEGMENT 6 SOLIDS	SOL #1	408	338	70	MIDDLE	
SEGMENT 7 SOLIDS	SEG #7 SOLIDS	172	135	37	MIDDLE	
SEGMENT 3 & 4 COMPOSITE	3-4	282	263	19	MIDDLE	
SEGMENTS 3-6 COMPOSITE	COMP	275	263	12	MIDDLE	EQUAL QUANTITIES OF 3-4, SOL #5, & SOL #1 (SEGMENT 6)
SEGMENT 5 DILUTED	5 SL-2	187	135	52	MIDDLE	40 WT% SOL #5, 60WT% 1-2
SEGMENT 5 SHEAR STRENGTH	5 SST	55	40	15	MIDDLE	SAMPLE IS DRY
SEGMENT 1 & 2 COMPOSITE	1-2	309	263	46	TOP	EQUAL QUANTITIES OF DL-1 AND DL-2

All the samples are found in B-Cell in the Rack on the South wall.

ANALYTICAL SAMPLES

105AW

	SAMPLE NAME	ALO #	ANALYSIS	REQUEST	DATE RESULT	LAB
1	D105AW 1-2	90-6842,	ANIONS	10/17/90	12/20/90	10/22
			ICP		2/21/91	10/22
			TC/TOC/TIC		7/22/91	—
			OH^-		1/29/91	Bur
			NH_4^+		1/29/91	10/
			→ Cr(VI)		1/29/91	10/2
			Hg			Ste
			CN^-			St
			As			—
			Se			—
			GEA		1/16/91	10/
			AEA		8/30/91	
			Total U		8/30/91	
			Total Beta		8/30/91	
			Pu Isotopic		9/30/91	
			^{3}H		8/30/91	10/2
			^{14}C		1/7/91	—
			^{63}Ni			10/
			^{79}Se		8/30/91	
			^{90}Sr		9/25/91	
			^{93}Zr			
			^{94}Nb		9/26/91	
			^{99}Tc		8/30/91	
			^{129}I		8/30/91	
			^{237}Np		8/30/91	
			^{241}Am		8/30/91	
			^{244}Cm		9/25/91	
	D 105AW 3-4 SOL	90-6844	ANIONS	10/17/90	12/20/90	10/
			ICP		2/21/91	10/
			TC/TOC/TIC		1/17/91	—
			GEA		1/15/91	10/
			AEA		8/30/91	
✓	105AW 3-4 SUP		NH_4^+	10/17/90	11/1/90	10
	105AW-5	90-7696	ICP	11/21/90	2/21/91	
			ANIONS		6/27/91	
			TC/TIC/TOC		7/30/91	
			GEA		8/19/91	
			AEA		8/30/91	

ANALYTICAL SAMPLES

105 AW

SAMPLE NAME	ALD #	ANALYSIS	DATE Request	DATE Result	DATE Close	LA
✓ 105AW-5-L	90-7697	NH_4^+	11/21/90	1/29/9		12/13
105AW-6-SOL	90-7698	ICP	11/21/90	2/21/91		12
		ANIONS	↓	6/27/91		12
		TIC/TOC/TC		7/30/91		Baldu
		GEA		1/16/91		12/
		AEA		8/30/91		12
105AW-6-SOL	90-7699	→ MILLER NUMBER	11/21/90	- Not done		
				~~TOC TIC~~ No method		
105AW-6-SUP	90-7700	ICP	11/21/90	2/21/91		12
		ANIONS	↓	1/23/91		12
		NH_4^+		1/29/91		12
		GEA		1/16/91		12
		AEA		8/30/91		12
		TC/TOC/TIC		1/10/91		12/
D-105AW-7	90-7701	ICP	11/21/90	2/21/91		12
		ANIONS	↓	7/22/91		12
		TC/TOC/TIC		7/30/91		Bald
		OH^-				Bu
		→ Cr(VI)		1/29/91		12
		Hg				Ste
		CN^-				Sa
		As				"
		Se				"
		Noble Metals				Stec
		GEA		1/16/91		12
		Total U		8/30/91		
		Total Beta		8/30/91		
		Pu Isotopic		9/30/91		
		^{3}H		8/30/91		12
		^{14}C		7/16/91		1
		^{63}Ni				
		^{79}Se		8/30/91		
		^{90}Sr		8/30/91		
		^{93}Zr				
		^{94}Nb		9/26/91		
		^{99}Tc		8/30/91		
		^{129}I		8/30/91		
		^{237}Np		8/30/91		
		^{241}Am		8/30/91		
		^{244}Cm		9/25/91		

ANALYTICAL SAMPLES

105AW

SAMPLE NAME	ALO #	ANALYSIS	REQUEST	DATE RESULTS	CLOSE	LAB
D-105AW-7-L	90-7702	NH_4^+	11/21/90	1/29/91		12/13/90
D-105AW-C-S	90-7703	ANIONS	11/21/90	9/26/91		1/28/91
		ICP		9/11/91		
		TC/TIC/TOC		7/30/91		FUH
In Progress		OH^-		9/13/91		FUH
		→ Cr(VI)		8/24/91		1/28/91
		Hg				
		As				
		Se				
		Noble Metals				
		GEA				
		Total U		9/25/91		
		Total Beta		9/25/91		
		Pu Isotopic				
		^{3}H		9/25/91		1/28/91
		^{14}C		7/16/91		
		^{63}Ni				1/22/91
		^{79}Se		8/30/91		
		^{90}Sr		9/25/91		
		^{93}Zr				1/22/91
		^{94}Nb		9/26/91		1/22/91
		^{99}Tc		9/25/91		
		^{129}I		9/25/91		
		^{237}Np		9/25/91		
		^{241}Am		9/25/91		
		^{244}Cm		9/25/91		
D-105AW-C-L	90-7704	ANIONS	11/21/90	9/26/91		1/21/91
		ICP		2/21/91		
		TC/TOC/TIC		7/22/91		
		OH^-		9/13/91		FUH
		→ Cr(VI)		1/29/91		1/23/91
		Hg				Steele
		CN^-				Steele
		NH_4^+		1/29/91		1/23/91
		As				–
		Se				–
		GEA		2/7/91		1/22/91
		Total U		9/25/91		1/22/91
		Total Beta		9/25/91		1/22/91
		Pu Isotopic		9/30/91		
		^{3}H		9/25/91		
		^{14}C		9/16/91		Steele
		^{63}Ni				
		^{79}Se (cont)		8/30/91		

ANALYTICAL RESULTS

105 AW

Sample Name	ALO #	ANALYSIS	DATE REQUEST	RESULTS	CLOSE
D-105AW-C-L	90-7704	^{90}Sr	11/21/90	9/25/91	1/21
		^{94}Nb		9/26/91	
		^{99}Tc		9/25/91	
		^{129}I		8/30/91	
		^{237}Np		9/25/91	
		^{241}Am		9/25/91	
		^{244}Cm		9/25/91	

PMR DOCT REVIEW
DOCUMENT PROCESSING

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7704

Client Sample Number(s): D-105AW-C-BL

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Wrie, Greenwood

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: GRAY Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: ___ Solid ___ Gas X Solution ___ Slurry

Sample Prep Method

___ Lab

X ~~Hot Cell~~ Shielded

X Acid Digestion
- X ICP
- X GFAA

___ Fusion
- ___ KOH
- ___ Na_2O_2
- ___ Other

X Distillation
- X Hg
- ___ CN
- ___ I

___ Water Leach

— None

___ Ion Exchange Separation

___ Solvent Extract. Sep.

___ VOA
- ___ Methanol Dilution
- ___ Hexadecane Extract.

___ Semi-VOA

___ TLCP

___ Hydrogen Analysis

___ Tritium Analysis

___ Archive

___ Burnup Dissolution

___ Other

Analysis

Radiochemical	Inorganic	Organic
X GEA	X ICP Cations	___ GC/MS VOA
___ Tot Alpha	X GFAA	___ GC/MS SVOA
X Tot Beta	X Hg (CVAA)	___ GC Organic
X U by laser fluor.	X Cr (VI)	___ PCB's
X I-129	X ISE	___ Pesticides
___ C-14	X NH4	___ TOX
X Sr-90	___ I	___ EOX
X H-3	___ F	___ POX
X Am, Cm, AEA	___ Other	___ TOC
X Np, AEA	___ EPA Toxic Metals	___ GC Screen
___ Pu, AEA	___ Wt% Solids	___ Other
X Pu, MS Isotopic	___ N/N/O/S/C (Met/Ox)	
___ U, MS Isotopic	___ Hi-Temp Gas Release	
X Se-75/79	___ Gas Chromatography	
___ Sn-126	___ Trace Metals in Na	**Shielded Lab**
___ Ra-226	X IC Anions	___ Wt% Solids
X Nb-93m/94	___ Flame AA	___ Miller Number
X Ni-59/63	X CN	___ Dosimetry Sort
___ Burnup	X OH	___ Retain Fisson Gas
___ pH	___ XRD	___ pH
X Other	___ Particle Size	___ Carbon Analysis
Zr-93	___ Surface Area	___ TC
Tc-99	___ Density - S.G.	___ TIC
	___ Conductivity	___ TOC
	___ Fe(II)/Fe(III)	X C14
	X TC/TIC/TOC (Sol)	
	___ Fuels Assay (Pu/U)	
	___ O/M	
	___ XRF Screening	

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: D-105AW-C-L

Material Description:

Centrifuged supernate from 105AW

Analyses Requested:

See attached page.

Special Storage or Handling Requirements:
Keep liquids in tightly closed container to prevent evaporation.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analyses Requested for D-105AW-C-L

WP# M45324

IC

ICP

TC, TIC, TOC

OH^-

Cr^{+6}

Hg

CN^-

NH_4^+

As, Se } if not obtained with ICP

WP# M45322

GEA

Total U

Total β

Pu isotopic

^{3}H

^{14}C

^{63}Ni

^{79}Se

^{90}Sr

^{93}Zr

^{94}Nb

^{99}Tc

^{129}I

^{237}Np

^{241}Am

^{244}Cm

SAMPLE RECEIVING/LOG-IN INFORMATION

WHC-SD-WM-TI-649 REV. 0

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7703

Client Sample Number(s): D-105AW-C-S

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Wise, Greenwood, Koppenaal

Project Number: 14598 QA Plan: WHC-033

Client Point of Contact: GINY Phone: 6-9643

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: X Solid ___ Gas ___ Solution ___ Slurry

Sample Prep Method		Analysis		
___ Lab	X ~~Hot Cell~~ Shielded	Radiochemical	Inorganic	Organic
X Acid Digestion	___ Ion Exchange Separation	X GEA	X ICP Cations	___ GC/MS VOA
___ ICP	___ Solvent Extract. Sep.	___ Tot Alpha	X GFAA	___ GC/MS SVOA
X GFAA	___ VOA	X Tot Beta	___ Hg (CVAA)	___ GC Organic
X Fusion	___ Methanol Dilution	X U by laser fluor.	X Cr (VI)	___ PCB's
X KOH	___ Hexadecane Extract.	X I-129	___ ISE	___ Pesticides
X Na_2O_2	___ Semi-VOA	___ C-14	___ NH4	___ TOX
___ Other	___ TLCP	X Sr-90	___ I	___ EOX
X Distillation	___ Hydrogen Analysis	X H-3	___ F	___ POX
X Hg	___ Tritium Analysis	X Am, Cm, AEA	___ Other	___ TOC
___ CN	___ Archive	X Np, AEA	___ EPA Toxic Metals	___ GC Screen
___ I	___ Burnup Dissolution	___ Pu, AEA	___ Wt% Solids	___ Other
X Water Leach	___ Other	X Pu, MS Isotopic	___ N/N/O/S/C (Met/Ox)	
— None		___ U, MS Isotopic	___ Hi-Temp Gas Release	
		X Se-75/79	___ Gas Chromatography	
		___ Sn-126	___ Trace Metals in Na	Shielded Lab
		___ Ra-226	X IC Anions	___ Wt% Solids
		X Nb-93m/94	___ Flame AA	___ Miller Number
		X Ni-59/63	___ CN	___ Dosimetry Sort
		___ Burnup	X OH	___ Retain Fisson Gas
		___ pH	___ XRD	___ pH
		X Other	___ Particle Size	X Carbon Analysis
		Zr-93	___ Surface Area	X TC
		Tc-99	___ Density - S.G.	X TIC
			___ Conductivity	X TOC
			___ Fe(II)/Fe(III)	X C-14
			___ TC/TIC/TOC (Sol)	
			___ Fuels Assay (Pu/U)	
			___ O/M	
			___ XRF Screening	
			X Icp/MS	

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Unic) (analytical labs)

Sample ID Number: D-105AW-C-5

Material Description:

Centrifuged solids from 105AW

Analyses Requested:

See attached page.

Special Storage or Handling Requirements:
Place solids in loosly covered container in 105°C oven for at least 3 days prior to sample preparation. Maintain in oven until all samples have been prepared.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analyses Requested for D-105AW-C-S

WP# M45324

IC

ICP

TC, TIC, TOC

OH^-

Cr^{+6}

Hg

As, Se } if not obtained with ICP

Nobel Metals (Ru, Rh, Pd), Archive Sample for ICP/MS analysis

WP# M45322

GEA

Total U

Total β

Pu isotopic

^{3}H

^{14}C

^{63}Ni

^{79}Se

^{90}Sr

^{93}Zr

^{94}Nb

^{99}Tc

^{129}I

^{237}Np

^{241}Am

^{244}Cm

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7701

Client Sample Number(s): D-105 AW-7

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Uric, Greenwood, Koppenaal

Project Number: 14598 QA Plan: WHC-033

Client Point of Contact: Gray Phone: 6-9693

Work Order Number: NAU ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: X Solid ___ Gas ___ Solution ___ Slurry

Sample Prep Method		Analysis		
___ Lab	X ~~Hot Cell~~ Shielded	Radiochemical	Inorganic	Organic
X Acid Digestion	___ Ion Exchange Separation	✓ X GEA	✓ X ICP Cations	___ GC/MS VOA
___ ICP	___ Solvent Extract. Sep.	___ Tot Alpha	X GFAA	___ GC/MS SVOA
X GFAA	___ VOA	✓ X Tot Beta	✓ X Hg (CVAA)	___ GC Organic
X Fusion	___ Methanol Dilution	✓ X U by laser fluor.	✓ X Cr (VI)	___ PCB's
X KOH	___ Hexadecane Extract.	✓ X I-129	___ ISE	___ Pesticides
X Na_2O_2	___ Semi-VOA	___ C-14	___ NH4	___ TOX
___ Other	___ TLCP	✓ X Sr-90	___ I	___ EOX
X Distillation	___ Hydrogen Analysis	✓ X H-3	___ F	___ POX
X Hg	___ Tritium Analysis	✓ X Am, Cm, AEA	___ Other	___ TOC
X CN	___ Archive	✓ X Np, AEA	___ EPA Toxic Metals	___ GC Screen
___ I	___ Burnup Dissolution	___ Pu, AEA	___ Wt% Solids	___ Other
X Water Leach	___ Other	✓ X Pu, MS Isotopic	___ N/N/O/S/C (Met/Ox)	___
— None	___	___ U, MS Isotopic	___ Hi-Temp Gas Release	___
	___	✓ X Se-75/79	___ Gas Chromatography	
		___ Sn-126	___ Trace Metals in Na	Shielded Lab
		___ Ra-226	✓ X IC Anions	___ Wt% Solids
		✓ X Nb-93m/94	___ Flame AA	___ Miller Number
		✓ X Ni-59/63	✓ X CN	___ Dosimetry Sort
		___ Burnup	✓ X OH	___ Retain Fisson Gas
		___ pH	___ XRD	___ pH
		X Other	___ Particle Size	X Carbon Analysis
		✓ Zr-93	___ Surface Area	✓ X TC
		✓ Tc-99	___ Density - S.G.	✓ X TIC
			___ Conductivity	✓ X TOC
			___ Fe(II)/Fe(III)	✓ X C-14
			___ TC/TIC/TOC (Sol)	
			___ Fuels Assay (Pu/U)	
			___ O/M	
			___ XRF Screening	
			✓ X ICP/MS	

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W L Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: D-105AW-7

Material Description:

Sludge from 105AW

Analyses Requested:

See attached page.

Special Storage or Handling Requirements:
Place solids in loosly covered container in 105°C oven for at least 3 days prior to sample preparation. Maintain in oven until all samples have been prepared.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. T. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analyses Requested for D-105AW-7

WP# M45324

IC

ICP

TC, TIC, TOC

OH^-

Cr^{+6}

Hg

CN^-

As, Se } if not obtained with ICP

Nobel Metals (Ru, Rh, Pd), Archive Sample for ICP/MS analysis

WP# M45322

GEA

Total U

Total β

Pu isotopic

^{3}H

^{14}C

^{63}Ni

^{79}Se

^{90}Sr

^{93}Zr

^{94}Nb

^{99}Tc

^{129}I

^{237}Np

^{241}Am

^{244}Cm

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: 105AW-6-SOL

Material Description:

~ 100g of centrifuged sludge from 105AW -

Analyses Requested:

Miller Number

Special Storage or Handling Requirements:

Keep in tightly capped bottle, but do not dry in oven

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analyses Requested for 105AW 1-2

WP# M45324

IC

ICP

TC, TIC, TOC

OH^-

NH_4^+

Cr^{+6}

Hg

CN^-

As, Se } if not obtained with ICP

WP# M45322

GEA

AEA

Total U

Total β

Pu isotopic (if justified by AEA)

^{3}H

^{14}C

^{63}Ni

^{79}Se

^{90}Sr

^{93}Zr

^{94}Nb

^{99}Tc

^{129}I

^{237}Np

^{241}Am

^{244}Cm

Analytical Request Form

To: Rick Steele Date: 10/17/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Rogers) M45324 (Mike Ulrich) (analytical labs)

Sample ID Number: 105AW 3-4 SOL

Material Description:

Solids from segments 3+4 of DST 105AW

Analyses Requested:

IC, ICP, (TIC, TOC, TC)

GEA, AEA

Special Storage or Handling Requirements:
Place solids in loosely covered container in 105°C oven for at least 3 days prior to sample preparation. Maintain in oven until all samples have been prepared.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analytical Request Form

To: Rick Steele Date: 10/17/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Ulrich) (analytical labs)

Sample ID Number: 105AW 3-4 SUP

Material Description:

Centrifuged supernate from segments 3 & 4 of DST 105AW

Analyses Requested:

NH_4^+

Special Storage or Handling Requirements:

Keep tightly capped to prevent evaporation.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: 105AW-5

Material Description:

Sludge from 105AW

Analyses Requested:

ICP, IC, (TIC, TOC, TC), GEA, AEA

Place "D" in front of all sample numbers to signify DST program.

Special Storage or Handling Requirements:
Place solids in loosly covered container in 105°C oven for at least 3 days prior to sample preparation. Maintain in oven until all samples have been prepared

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7696

Client Sample Number(s): 105 AW-5

-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Urie, Greenwood

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: GRAY Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: X Solid ___ Gas ___ Solution ___ Slurry

Sample Prep Method

___ Lab

X ~~Hot Cell~~ Shielded

Acid Digestion
- ___ ICP
- ___ GFAA

X Fusion
- X KOH
- X Na_2O_2
- ___ Other

___ Distillation
- ___ Hg
- ___ CN
- ___ I

X Water Leach

— None

___ Ion Exchange Separation
___ Solvent Extract. Sep.
___ VOA
- ___ Methanol Dilution
- ___ Hexadecane Extract.

___ Semi-VOA
___ TLCP
___ Hydrogen Analysis
___ Tritium Analysis
___ Archive
___ Burnup Dissolution
___ Other

Analysis

Radiochemical

X GEA
___ Tot Alpha
___ Tot Beta
___ U by laser fluor.
___ I-129
___ C-14
___ Sr-90
___ H-3
X Am, Cm, AEA
X Np, AEA
X Pu, AEA
___ Pu, MS Isotopic
___ U, MS Isotopic
___ Se-75/79
___ Sn-126
___ Ra-226
___ Nb-93m/94
___ Ni-59/63
___ Burnup
___ pH
___ Other

Inorganic

X ICP Cations
___ GFAA
___ Hg (CVAA)
___ Cr (VI)
___ ISE
- ___ NH4
- ___ I
- ___ F
- ___ Other

___ EPA Toxic Metals
___ Wt% Solids
___ N/N/O/S/C (Met/Ox)
___ Hi-Temp Gas Release
___ Gas Chromatography
___ Trace Metals in Na
X IC Anions
___ Flame AA
___ CN
___ OH
___ XRD
___ Particle Size
___ Surface Area
___ Density - S.G.
___ Conductivity
___ Fe(II)/Fe(III)
___ TC/TIC/TOC (Sol)
___ Fuels Assay (Pu/U)
___ O/M
___ XRF Screening

Organic

___ GC/MS VOA
___ GC/MS SVOA
___ GC Organic
___ PCB's
___ Pesticides
___ TOX
___ EOX
___ POX
___ TOC
___ GC Screen
___ Other

Shielded Lab

___ Wt% Solids
___ Miller Number
___ Dosimetry Sort
___ Retain Fisson Gas
___ pH
X Carbon Analysis
- X TC
- X TIC
- X TOC

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Kurie) (analytical labs)

Sample ID Number: 105AW-5-L

Material Description:

Centrifuged supernate from 105AW

Analyses Requested:

NH_3 (NH_4^+)

Place "0" in front of sample number to signify DST program.

Special Storage or Handling Requirements:
Keep liquids in tightly closed container to prevent evaporation.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7697

Client Sample Number(s): 105 AW-5-L

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Urie

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: GRAY Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: ___ Solid ___ Gas X Solution ___ Slurry

Sample Prep Method

___ Lab

___ ~~Hot Cell~~ Shielded

Acid Digestion
- ___ICP
- ___GFAA

___Fusion
- ___KOH
- ___Na_2O_2
- ___Other

___Distillation
- ___Hg
- ___CN
- ___I

___Water Leach

— None

___Ion Exchange Separation
___Solvent Extract. Sep.
___VOA
- ___Methanol Dilution
- ___Hexadecane Extract.

___Semi-VOA
___TLCP
___Hydrogen Analysis
___Tritium Analysis
___Archive
___Burnup Dissolution
___Other

Analysis

Radiochemical
___GEA
___Tot Alpha
___Tot Beta
___U by laser fluor.
___I-129
___C-14
___Sr-90
___H-3
___Am, Cm, AEA
___Np, AEA
___Pu, AEA
___Pu, MS Isotopic
___U, MS Isotopic
___Se-75/79
___Sn-126
___Ra-226
___Nb-93m/94
___Ni-59/63
___Burnup
___pH
___Other

Inorganic
___ICP Cations
___GFAA
___Hg (CVAA)
___Cr (VI)
X ISE
X NH4
___I
___F
___Other
___EPA Toxic Metals
___Wt% Solids
___N/N/O/S/C (Met/Ox)
___Hi-Temp Gas Release
___Gas Chromatography
___Trace Metals in Na
___IC Anions
___Flame AA
___CN
___OH
___XRD
___Particle Size
___Surface Area
___Density - S.G.
___Conductivity
___Fe(II)/Fe(III)
___TC/TIC/TOC (Sol)
___Fuels Assay (Pu/U)
___O/M
___XRF Screening

Organic
___GC/MS VOA
___GC/MS SVOA
___GC Organic
___PCB's
___Pesticides
___TOX
___EOX
___POX
___TOC
___GC Screen
___Other

Shielded Lab
___Wt% Solids
___Miller Number
___Dosimetry Sort
___Retain Fisson Gas
___pH
___Carbon Analysis
- ___TC
- ___TIC
- ___TOC

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: 105AW-6-SOL

Material Description:
Centrifuged Sludge from 105AW

Analyses Requested:
ICP, IC, (TIC, TOC, TC), GEA, AEA

Place "D" in front of sample numbers to signify DST program

Special Storage or Handling Requirements:
Place solids in loosly covered container in 105°C oven for at least 3 days prior to sample preparation. Maintain in oven until all samples have been prepared

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7698

Client Sample Number(s): 105 AN-6-SOL

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Urie, Greenwood

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: Gray Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: X Solid ___ Gas ___ Solution ___ Slurry

Sample Prep Method

___ Lab

X ~~Hot Cell~~ Shielded

Acid Digestion
- ___ ICP
- ___ GFAA

X Fusion
- X KOH
- X Na_2O_2
- ___ Other

___ Distillation
- ___ Hg
- ___ CN
- ___ I

X Water Leach

— None

___ Ion Exchange Separation
___ Solvent Extract. Sep.
___ VOA
- ___ Methanol Dilution
- ___ Hexadecane Extract.

___ Semi-VOA
___ TLCP
___ Hydrogen Analysis
___ Tritium Analysis
___ Archive
___ Burnup Dissolution
___ Other

Analysis

Radiochemical

X GEA
___ Tot Alpha
___ Tot Beta
___ U by laser fluor.
___ I-129
___ C-14
___ Sr-90
___ H-3
X Am, Cm, AEA
X Np, AEA
X Pu, AEA
___ Pu, MS Isotopic
___ U, MS Isotopic
___ Se-75/79
___ Sn-126
___ Ra-226
___ Nb-93m/94
___ Ni-59/63
___ Burnup
___ pH
___ Other

Inorganic

X ICP Cations
___ GFAA
___ Hg (CVAA)
___ Cr (VI)
___ ISE
- ___ NH4
- ___ I
- ___ F
- ___ Other

___ EPA Toxic Metals
___ Wt% Solids
___ N/N/O/S/C (Met/Ox)
___ Hi-Temp Gas Release
___ Gas Chromatography
___ Trace Metals in Na
X IC Anions
___ Flame AA
___ CN
___ OH
___ XRD
___ Particle Size
___ Surface Area
___ Density - S.G.
___ Conductivity
___ Fe(II)/Fe(III)
___ TC/TIC/TOC (Sol)
___ Fuels Assay (Pu/U)
___ O/H
___ XRF Screening

Organic

___ GC/MS VOA
___ GC/MS SVOA
___ GC Organic
___ PCB's
___ Pesticides
___ TOX
___ EOX
___ POX
___ TOC
___ GC Screen
___ Other

Shielded Lab

___ Wt% Solids
___ Miller Number
___ Dosimetry Sort
___ Retain Fisson Gas
___ pH
X Carbon Analysis
- X TC
- X TIC
- X TOC

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7699

Client Sample Number(s): 105 AW-6-SOL

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: GRAY Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: X Solid ___ Gas ___ Solution ___ Slurry

Sample Prep Method

___ Lab

___ ~~Hot Cell~~ Shielded

Acid Digestion
- ___ ICP
- ___ GFAA

___ Fusion
- ___ KOH
- ___ Na_2O_2
- ___ Other

___ Distillation
- ___ Hg
- ___ CN
- ___ I

___ Water Leach

— None

___ Ion Exchange Separation
___ Solvent Extract. Sep.
___ VOA
- ___ Methanol Dilution
- ___ Hexadecane Extract.

___ Semi-VOA
___ TLCP
___ Hydrogen Analysis
___ Tritium Analysis
___ Archive
___ Burnup Dissolution
___ Other
_____
_____

Analysis

Radiochemical
___ GEA
___ Tot Alpha
___ Tot Beta
___ U by laser fluor.
___ I-129
___ C-14
___ Sr-90
___ H-3
___ Am, Cm, AEA
___ Np, AEA
___ Pu, AEA
___ Pu, MS Isotopic
___ U, MS Isotopic
___ Se-75/79
___ Sn-126
___ Ra-226
___ Nb-93m/94
___ Ni-59/63
___ Burnup
___ pH
___ Other
_____
_____

Inorganic
___ ICP Cations
___ GFAA
___ Hg (CVAA)
___ Cr (VI)
___ ISE
- ___ NH4
- ___ I
- ___ F
- ___ Other

___ EPA Toxic Metals
___ Wt% Solids
___ N/N/O/S/C (Met/Ox)
___ Hi-Temp Gas Release
___ Gas Chromatography
___ Trace Metals in Na
___ IC Anions
___ Flame AA
___ CN
___ OH
___ XRD
___ Particle Size
___ Surface Area
___ Density - S.G.
___ Conductivity
___ Fe(II)/Fe(III)
___ TC/TIC/TOC (Sol)
___ Fuels Assay (Pu/U)
___ O/M
___ XRF Screening

Organic
___ GC/MS VOA
___ GC/MS SVOA
___ GC Organic
___ PCB's
___ Pesticides
___ TOX
___ EOX
___ POX
___ TOC
___ GC Screen
___ Other
_____
_____

Shielded Lab
___ Wt% Solids
X Miller Number
___ Dosimetry Sort
___ Retain Fisson Gas
___ pH
___ Carbon Analysis
- ___ TC
- ___ TIC
- ___ TOC

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Urie) (analytical labs)

Sample ID Number: 105AW-6-SUP

Material Description:

Centrifuged supernate from 105AW

Analyses Requested:

ICP, IC, (TIC, TOC, TC), NH_4^+, GEA, AEA

Place "D" in front of sample numbers to signify DST program.

Special Storage or Handling Requirements:

Keep liquids in tightly closed container to prevent evaporation.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7700

Client Sample Number(s): 105 AW -6-SUP

n-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Ihrie, Greenwood

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: Gray Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: ___ Solid ___ Gas X Solution ___ Slurry

Sample Prep Method

___ Lab X ~~Hot Cell~~ Shielded

- X Acid Digestion
  - X ICP
  - ___ GFAA
- ___ Fusion
  - ___ KOH
  - ___ Na_2O_2
  - ___ Other
- ___ Distillation
  - ___ Hg
  - ___ CN
  - ___ I
- ___ Water Leach
- — None

___ Ion Exchange Separation
___ Solvent Extract. Sep.
___ VOA
___ Methanol Dilution
___ Hexadecane Extract.
___ Semi-VOA
___ TLCP
___ Hydrogen Analysis
___ Tritium Analysis
___ Archive
___ Burnup Dissolution
___ Other

Analysis

Radiochemical	Inorganic	Organic
X GEA	X ICP Cations	___ GC/MS VOA
___ Tot Alpha	___ GFAA	___ GC/MS SVOA
___ Tot Beta	___ Hg (CVAA)	___ GC Organic
___ U by laser fluor.	___ Cr (VI)	___ PCB's
___ I-129	X ISE	___ Pesticides
___ C-14	X NH4	___ TOX
___ Sr-90	___ I	___ EOX
___ H-3	___ F	___ POX
X Am, Cm, AEA	___ Other	___ TOC
X Np, AEA	___ EPA Toxic Metals	___ GC Screen
X Pu, AEA	___ Wt% Solids	___ Other
___ Pu, MS Isotopic	___ N/N/O/S/C (Met/Ox)	___
___ U, MS Isotopic	___ Hi-Temp Gas Release	___
___ Se-75/79	___ Gas Chromatography	
___ Sn-126	___ Trace Metals in Na	**Shielded Lab**
___ Ra-226	X IC Anions	___ Wt% Solids
___ Nb-93m/94	___ Flame AA	___ Miller Number
___ Ni-59/63	___ CN	___ Dosimetry Sort
___ Burnup	___ OH	___ Retain Fisson Gas
___ pH	___ XRD	___ pH
___ Other	___ Particle Size	___ Carbon Analysis
___	___ Surface Area	___ TC
___	___ Density - S.G.	___ TIC
	___ Conductivity	___ TOC
	___ Fe(II)/Fe(III)	
	X TC/TIC/TOC (Sol)	
	___ Fuels Assay (Pu/U)	
	___ O/M	
	___ XRF Screening	

Analytical Request Form

To: Rick Steele Date: 11/21/90

Requested by: Walt Gray (name) W J Gray (signature) 6-9693 (phone) P7-14 (mail stop)

WP Numbers: M45323 (hot cell) M45322 (Jim Kaye) M45324 (Mike Wie) (analytical labs)

Sample ID Number: D-105AW-7-L

Material Description:

Centrifuged supernate from 105AW

Analyses Requested:

NH_4^+

Special Storage or Handling Requirements:

Keep tightly capped to prevent evaporation.

Disposal of Samples: ___ Discard, ___ Return

X Other: Retain until released by W. J. Gray

QA Impact Level: II

Reporting Requirements: Analytical reports must identify the measuring and test equipment and the procedure used, and the reports must be signed and dated by the analyst and reviewer.

Approved: _____ (QA representative signature/date) Required only for first ARF in series.

To the best of my knowledge, this work was accomplished in accordance with the requirements of the Analytical Request Form.

By: _____ (Responsible Analyst of Group Leader) Date: _____

(Return this form or a copy to the requester).

The report/data furnished has been reviewed and to the best of my knowledge complies with the above request.

By: _____ (Requestor) Date: _____

SAMPLE RECEIVING/LOG-IN INFORMATION

Date Sample(s) Received: 11/29/90

Sample Log-In Number(s): 90-7702

Client Sample Number(s): D-105AW-7-L

In-House Sample Number: NA

Responsible Technical Group Leader(s): Steele, Eric

Project Number: 14598 QA Plan: WTC-033

Client Point of Contact: Gray Phone: 6-9693

Work Order Number: NA ASR/RFAS/SOW/TI#: NA

MA-70 Impact Level: (Circle One) I (II) III

Environmental: X Yes ___ No Sample Archive Requirements: X Yes ___ No

Hazardous Waste Disposal Issues: X Yes ___ No Storage Requirements: X Yes ___ No

Sample Type: ___ Solid ___ Gas X Solution ___ Slurry

Sample Prep Method

___ Lab

Acid Digestion
- ___ICP
- ___GFAA

___Fusion
- ___KOH
- ___Na_2O_2
- ___Other

___Distillation
- ___Hg
- ___CN
- ___I

___Water Leach

— None

___ ~~Hot Cell~~ Shielded

___Ion Exchange Separation

___Solvent Extract. Sep.

___VOA
- ___Methanol Dilution
- ___Hexadecane Extract.

___Semi-VOA

___TLCP

___Hydrogen Analysis

___Tritium Analysis

___Archive

___Burnup Dissolution

___Other

Analysis

Radiochemical	Inorganic	Organic
___GEA	___ICP Cations	___GC/MS VOA
___Tot Alpha	___GFAA	___GC/MS SVOA
___Tot Beta	___Hg (CVAA)	___GC Organic
___U by laser fluor.	___Cr (VI)	___PCB's
___I-129	X ISE	___Pesticides
___C-14	X NH4	___TOX
___Sr-90	___I	___EOX
___H-3	___F	___POX
___Am, Cm, AEA	___Other	___TOC
___Np, AEA	___EPA Toxic Metals	___GC Screen
___Pu, AEA	___Wt% Solids	___Other
___Pu, MS Isotopic	___N/N/O/S/C (Met/Ox)	
___U, MS Isotopic	___Hi-Temp Gas Release	
___Se-75/79	___Gas Chromatography	
___Sn-126	___Trace Metals in Na	**Shielded Lab**
___Ra-226	___IC Anions	___Wt% Solids
___Nb-93m/94	___Flame AA	___Miller Number
___Ni-59/63	___CN	___Dosimetry Sort
___Burnup	___OH	___Retain Fisson Gas
___pH	___XRD	___pH
___Other	___Particle Size	___Carbon Analysis
	___Surface Area	___TC
	___Density - S.G.	___TIC
	___Conductivity	___TOC
	___Fe(II)/Fe(III)	
	___TC/TIC/TOC (Sol)	
	___Fuels Assay (Pu/U)	
	___O/M	
	___XRF Screening	

Middle Rear

105AW SOL #1 = 408 - 338 MIDDLE

105AW SOL #4 = 519 - 338 "

105AW SOL #5 = 442 - 338 "

Homogenized 105AW 3-4 = 282 - 263 equal parts of 3 & 4 "

Homogenized 105AW Comp = 275 - 263 25g 25g 25g 3 & 4, 5, 6 "

105AW-5 SL-2 = 187 - 135 SOL 5 29 g 1-2 44.6 g "

105AW Seg #7 Solids = 1722 - ~~135~~ 135 centrifuged solids "

105AW DL-2 = 439 - 263 "

105AW - 5 BST = 55 - 40 (dry Sample) "

105AW 1-2 (Liquid) = 309 - 263

105AW DL-1 = 372 - 263

105AW SOL #3 = 448 - 338

top Shelf ~~Front~~ Rear B-Cell

51.64 g SL1 ⇒ 29.14 g SOL5
22.5 g 1-2

22.10 g 1-2

50.25	SOL 5	56.43 wt %	
38.80	1-2	43.57 wt %	SL1

SAMPLE DESCRIPTION	ID	MASS (g)
DRAINABLE LIQUID SEG. 1 (ENTIRE SEG 1 SAMPLE)	105AW-DL1	194.63
	105AW-DL2	252.73
	105AW-SOL3	280.68
	105AW-SOL4	297.44
	105AW-5-SST	31.61
	105AW-SOL5	258.80
105AW SEG 6 SOLIDS	105AW-SOL1	302.28
SEG 7 Shear Strength	105AW-6-SST	39.09
	105AW-SOL7	78.45

Don't Say It -- *Write It!* 1/17/91

To: Garry Richardson GM Richardson 1-23-91

From: Gregg Lumetta Gregg

Subject: Removal of NCRW Sludge Samples from Hot Cell

Two samples of NCRW sludge waste from Tank 105-AW (segment no. 3) are required for upcoming sludge solution stability studies. As before, I would like the outer surfaces of the vials to be free of contamination, so you should use your "plastic-wrapped" vial technique. Please use the following guidelines:

- Label vial NCRW-63, and tare.
- Add approx. 7 g of well mixed sludge from 105-AW segment 3 to vial NCRW-63 and weigh 7.076 g. TOTAL = 29.4 VIAL+~~CAP~~ = 22.3 SAMPLE = 7.07
- Add approx. 16 mL of 105-AW segment 1/~~2~~ solution to vial NCRW-~~63~~ 65 and weigh 15.716 g. GMR 1-22-91 TOTAL = 38.2 ~~SAMPLE~~ + VIAL+~~CAP~~ = 22.5 SOLUTION = 15.71
- NCRW-63 can then be removed from the hot cell.
- Label another vial NCRW-64, and tare.
- Add approx. 15 g of well mixed sludge from 105-AW segment 3 to vial NCRW-64 and weigh 15.066 g. TOTAL = 37.3 VIAL+~~CAP~~ = 22.2 SAMPLE = 15.06
- NCRW-64 can then be removed from the hot cell.
- Deliver NCRW-63 and NCRW-64, NCRW-65 to Rm 516.

You may charge time spent on this effort to M32860. Thank you.

POOR COPY RECEIVED

HOT CELL CHAIN-OF-CUSTODY

DATE OF TRANSFER 17. January 1991

SENDER [illegible]

RECEIVER [illegible]

Sample Identification #	Sample Description
D-105AW-CS	105AW Composite Solids
D-105AW-CL	105AW Composite Liquid (Supernate)
102AN-SOL1	102AN Centrifuged Solids
102AN-SUSPEND	102AN Centrifuged Supernate which contains suspended solids
102AN-MILLER	102AN Centrifuged Solids which will be used for Miller Number Determination
D-105AW-CS-2	105AW Composite Solids (Bottle 2)

HOT CELL CHAIN-OF-CUSTODY

DATE OF TRANSFER 3. December 1990

SENDER Jim Richardson

RECEIVER Rick L. Steele

Sample Identification #	Sample Description
D-101AZ-C2-WASH1	101AZ Core 2 First Wash (Supernate)
D-101AZ-C2-WASH2	101AZ Core 2 Second Wash (Supernate)
D-102AZ-C1-WASH1	101AZ Core 1 First Wash (Supernate)
D-102AZ-C1-WASH2	101AZ Core 1 Second Wash (Supernate)
105AW-SOL5	105AW Segment 5 Homogenized Slurry
105AW-5-L	105AW Segment 5 Centrifuged Supernate
105AW-6-SOL	105AW Segment 6 Centrifuged Solids (100 ml bottle) for Miller Number
105AW-6-SOL	105AW Segment 6 Centrifuged Solids (20 ml vial) Chemical Analysis
105AW-6-SUP	105AW Segment 6 Centrifuged Supernate
D-105AW-7	105AW Segment 7 Homogenized Slurry
D-105AW-7-L	105AW Segment 7 Centrifuged Supernate
102SY-1/2-AN	102SY Composite of Segments 1 & 2 (Supernate)

12/3/90

CHAIN-OF-CUSTODY

DATE OF TRANSFER 9-12-90

SENDER [illegible]

RECEIVER [illegible]

Sample Identification #	Sample Description
105AW-3/4-SUP	Combined Supernate from Segments 3 and 4 of DST Core 105AW
105AW-3/4-SOL	Combined Solids from Segments 3 and 4 of DST Core 105AW
105AW-1/2	Combined Segments 1 and 2 from DST Core 105AW (Only supernate was found in these segments)
101AZ-C2-MELT-SUP	Supernate from the Melter Feed of Core 2, Tank 101AZ
101AZ-C2-MELT-AN	Melter Feed from Core 2 of Tank 101AZ

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number ~~90-015~~ 90-016 (3) Supervisor* Dan Bishop

(4) Tank 105 AW (5) Riser 16B (6) Segment 3 (7) Core 019 (8) Cask Serial Number C1025

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	<.5 mR/hr	<0.5
Side Dose Rate	7 mR/hr	7 mR/hr
Bottom Dose Rate	2.5 mR/hr	2.5 mR/hr
Smearable Contamination	<D. (alpha)	<DL (alpha)
	<D (beta-gamma)	<DL (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456 W
B. Cask Seal Number	N/A
C. Sampler Number Used	#8
D. Date and Time Sampler Unseated	5-15-90, 15 mR/hr
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	150 mR/hr
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	R. C. Hartley	5-17-90	325 Bldg, 300 Area	J M Tinget	5/17/90
	(15) SENDER SIGNATURE*	(17) TIME RELEASED		(21) RECIPIENT SIGNATURE*	(23) TIME RECEIVED
	RC Hartley	0930		J M Tinget	1030

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
		Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

WHC-SD-WM-TI-649 REV. 0

238

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number ~~90-015~~ 90-016 (3) Supervisor* Don Bishop

(4) Tank 105 AW (5) Riser 16B (6) Segment 3 (7) Core 019 (8) Cask Serial Number C1025

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	<.5 mr/hr	<0.5
Side Dose Rate	7 mr/hr	7 mr/hr
Bottom Dose Rate	2.5 mr/hr	2.5 mr/hr
Smearable Contamination	<D. (alpha)	<DL (alpha)
	<D (beta-gamma)	<DL (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456 W
B. Cask Seal Number	N/A
C. Sampler Number Used	#8
D. Date and Time Sampler Unseated	5-15-90, 15 mr/hr
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	150 MR/HR
H. Expected Sample Length	19 ft

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	R.C. Hartley	5-17-90	325 Bldg, 300 Area	J M Tinget	5/17/90
	(15) SENDER SIGNATURE* R.C. Hartley	(17) TIME RELEASED 0930		(21) RECIPIENT SIGNATURE* J M Tinget	(23) TIME RECEIVED 1030

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
		Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-015 (3) Supervisor* Dan Bishop

(4) Tank 105 AW (5) Riser 16 B (6) Segment 2 (7) Core 019 (8) Cask Serial Number 1006 C

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	.5 mr/hr	.5 mr/hr
Side Dose Rate	5 mr/hr	5 mr/hr
Bottom Dose Rate	3 mr/hr	3 mr/hr
Smearable Contamination	<0. (alpha)	<0 (alpha)
	<0. (beta-gamma)	<0 (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:

A. Work Package Number	2W-90-01452a
B. Cask Seal Number	N/A
C. Sampler Number Used	#94
D. Date and Time Sampler Unseated	5-15-90, 1028
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	175 mr/HR
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	D.C. Hartley	5-17-90	325 Bldg 300 area	J M Tinger	5/17/90
	(15) SENDER SIGNATURE*	(17) TIME RELEASED		(21) RECIPIENT SIGNATURE*	(23) TIME RECEIVED
	D.C. Hartley	0930		J M Tinger	1030

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

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

(25) Seal Data Consistent with this Record?

Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

WHC-SD-WM-TI-649 REV. 0

240

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-015 (3) Supervisor* Dan Bishop

(4) Tank 105 AW (5) Riser 16 B (6) Segment 2 (7) Core 019 (8) Cask Serial Number 1006 C

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	.5 mr/hr	.5 mr/hr
Side Dose Rate	5 mr/hr	5 mr/hr
Bottom Dose Rate	3 mr/hr	3 mr/hr
Smearable Contamination	<0. (alpha)	<0 (alpha)
	<0. (beta-gamma)	<0 (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:

A. Work Package Number	2W-90-01452a
B. Cask Seal Number	N/A
C. Sampler Number Used	#94
D. Date and Time Sampler Unseated	5-15-90, 1028
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	175 mr/HR
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241-AW 105	D.C. Hartley	5-17-90	325 Bldg 300 area	J M Tinger	5/17/90
	(15) SENDER SIGNATURE*	(17) TIME RELEASED		(21) RECIPIENT SIGNATURE*	(23) TIME RECEIVED
		0930		J M Tinger	1030

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

(24) Seal Intact Upon Receipt? ☑ Yes ☐ No

(25) Seal Data Consistent with this Record?

Shipment No.	Cask Seal No.	Sample No.
☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-014 (3) Supervisor* [signature]

(4) Tank 105 AW (5) Riser 16 B (6) Segment 1 (7) Core 019 (8) Cask Serial Number G1022

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	~~10 mR~~ 5 mR/hr	5 mR/hr
Side Dose Rate	4 mR/hr	4 mR/hr
Bottom Dose Rate	1.5 mR/hr	2.5 mR/hr
Smearable Contamination	<D. (alpha)	<DL (alpha)
	<D. (beta-gamma)	<DL (beta-gamma)
	RPT* [signature] (Signature)	RPT* [signature] (Signature)

(10) Shipment Description:

A. Work Package Number	2W-90-01956W
B. Cask Seal Number	N/A
C. Sampler Number Used	#24
D. Date and Time Sampler Unseated	5-14-90, 0906
E. Expected Liquid Content	~~19"~~ ~~75%~~ 20% 50%
F. Expected Solid Content	~~25%~~ 70% 80%
G. Dose Rate Through Drill String	150 mR
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241 AW 105	D.C. Hartley	5-17-90	325 Bldg. 300 Area	J M Tinger	5/17/90
	(15) SENDER SIGNATURE* Danny C Hartley	(17) TIME RELEASED 0930		(21) RECIPIENT SIGNATURE* J M Tinger	(23) TIME RECEIVED 1030

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

(24) Seal Intact Upon Receipt? ☑ Yes ☐ No

(25) Seal Data Consistent with this Record?

Shipment No.	Cask Seal No.	Sample No.
☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-5-006 (2) Sample Number 90-014 (3) Supervisor* [signature]

(4) Tank 105 AW (5) Riser 16 B (6) Segment 1 (7) Core 019 (8) Cask Serial Number G1022

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	~~10 mR~~ 5 mR/hr	.5 mR/hr
Side Dose Rate	4 mR/hr	[illegible]
Bottom Dose Rate	1.5 mR/hr	2.5 mR/hr
Smearable Contamination	<D. (alpha)	<DL (alpha)
	<D. (beta-gamma)	<DL (beta-gamma)
	RPT* [signature] (Signature)	RPT* [signature] (Signature)

(10) Shipment Description:

A. Work Package Number	2W-90-01956 W
B. Cask Seal Number	N/A
C. Sampler Number Used	#24
D. Date and Time Sampler Unseated	5-14-90, 0906
E. Expected Liquid Content	~~19~~ 75% 20% 30%
F. Expected Solid Content	25% 70% 80%
G. Dose Rate Through Drill String	150 mR
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241 AW 105	D.C. Hartley	5-17-90	325 Bldg. 300 Area	J M Tinger	5/17/90
	(15) SENDER SIGNATURE* Denny C Hartley	(17) TIME RELEASED 0930		(21) RECIPIENT SIGNATURE* J M Tinger	(23) TIME RECEIVED 1030

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
		Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Operations, T4-01

BC-6000-309 (02/90)

WHC-SD-WM-TI-649 REV. 0

243

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-S-008 (2) Sample Number 90-020 (3) Supervisor* D C Hartley

(4) Tank 105AW (5) Riser 16B (6) Segment 7 (7) Core #19 (8) Cask Serial Number 1009d

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	0.5mr/HR	0.5 mr/hr
Side Dose Rate	15mr/HR.	15 mr/hr
Bottom Dose Rate	9mr/HR.	9mr/hr
Smearable Contamination	<DET (alpha)	<DET (alpha)
	<DET, (beta-gamma)	<DL (beta-gamma)
	RPT* (Signature)	RPT* (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456/W
B. Cask Seal Number	N/A
C. Sampler Number Used	#27
D. Date and Time Sampler Unseated	5-16-90, 1356
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	450mr/HR
H. Expected Sample Length	19'

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241AW R16B	D.C. Hartley	6/6/90	325 Bldg. Zoolnea	TK Andrews	6-6-90
	(15) SENDER SIGNATURE* D C Hartley	(17) TIME RELEASED 0940		(21) RECIPIENT SIGNATURE* TK Andrews	(23) TIME RECEIVED 1040

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
		Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Ops, T4-01

BC-6000-309 (02/90)

CHAIN-OF-CUSTODY RECORD FOR CORE SAMPLING

(1) Shipment Number 90-S-008 (2) Sample Number 90-020 (3) Supervisor* D C Hartley

(4) Tank 105AW (5) Riser 16B (6) Segment 7 (7) Core #19 (8) Cask Serial Number 1009d

Radiation Survey Data:	(9) FIELD	(26) LABORATORY
Over Top Dose Rate	0.5mr/HR	0.5 mr/hr
Side Dose Rate	15mr/HR.	15 mr/hr
Bottom Dose Rate	9mr/HR.	9mr/hr
Smearable Contamination	<DET (alpha)	<DET (alpha)
	<DET. (beta-gamma)	<DL (beta-gamma)
	RPT* [illegible] (Signature)	RPT* [illegible] (Signature)

(10) Shipment Description:	
A. Work Package Number	2W-90-01456/W
B. Cask Seal Number	N/A
C. Sampler Number Used	#27
D. Date and Time Sampler Unseated	5-16-90, 1356
E. Expected Liquid Content	30%
F. Expected Solid Content	70%
G. Dose Rate Through Drill String	450mr/HR
H. Expected Sample Length	19"

(11) INFORMATION *(Include statement of laboratory tests to be performed.)*

(12) Field Comments:

(27) Laboratory Comments

(13) POINT OF ORIGIN	(14) SENDER NAME	(16) DATE RELEASED	(18) DESTINATION	(20) RECIPIENT NAME	(22) DATE RECEIVED
241AW R16B	D.C. Hartley	6/6/90	325 Bldg. Zodiac	T K Andrews	6-6-90
	(15) SENDER SIGNATURE* D C Hartley	(17) TIME RELEASED 0940		(21) RECIPIENT SIGNATURE* T K Andrews	(23) TIME RECEIVED 1040

(19) Seal Intact Upon Release?	(24) Seal Intact Upon Receipt?	(25) Seal Data Consistent with this Record?		
		Shipment No.	Cask Seal No.	Sample No.
☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No

DISTRIBUTION: White – Office of Sample Management; Pink – Process Engineering, R1-51; Yellow – Recipient of Sample; Goldenrod – Tank Farm Op[illegible]ons, T4-01

BC-6000-309 (02/90)

CONTROLLED DOCUMENT RECEIPT LOG

Document Number	Issued To	Date	Signature
105 AW-1-EXT	JM TINGEY	5/21/90	JM Tingey
105 AW-2-EXT	JM TINGEY	5/21/90	JM Tingey
105 AW-3-EXT	JM TINGEY	5/24/90	JM Tingey
105 AW-4-EXT	JM TINGEY	6/12/90	JM Tingey
105 AW-5-EXT	JM TINGEY	6/13/90	JM Tingey
105 AW-6-EXT	JM TINGEY	6/13/90	JM Tingey
105 AW-7-EXT	JM TINGEY	6/13/90	JM Tingey

DON'T SAY IT, WRITE IT!!!

To: Those Listed

From: P. F. Salter/6-9205

Date: 8 August 1990

Subject: Work Package Numbers for DST 102-SY Analyses

Per discussions with Pete McGrail today, you are directed to charge time spent in analyzing samples from the DST 102-SY core to the work packages issued for Cost Account XD-54. These work packages are the same work packages you used for the 101/102 AZ analyses earlier this fiscal year. Work on DST 105-AW and DST102-AN cores also are to be charged to these work packages. The authorized work packages are provided below for your information. Dollar values are not available at this time as I am waiting for the Cost Account supplement from Pete. However, Pete has authorized continued expenditures on this cost account.

Work Package	Issued To	Activity
M83428	R. Steele	Hot Cell Prep/Supplies
M83429	M. Urie	ICP Analyses
M83430	M. Urie	IC Analyses
M83431	M. Urie	TOC/TIC/TC Analyses
M83432	M. Urie	Other Inorganic Analyses
M83433	M. Urie	Lab Supplies
M83435	J. Kaye	GEA, Total Alpha, Total Beta
M83436	J. Kaye	U, Pu, Am and Np Analyses
M83437	J. Kaye	C-14, Tritium, and I-129 Analyses
M83438	J. Kaye	Se-79 Analyses
M83439	J. Kaye	Sr-90 & Tc-99 Analyses
M83440	J. Kaye	Lab Supplies

Questions relative to work packages for the 325 "A" Hot Cell activities should be referred to Joel Tingey. Should you have any questions concerning this guidance, please give me a call.

Distribution:

RT Steele	JH Kaye	MW Urie
BP McGrail	L. Greenwood	J. Tingey
W. Gray		

cc:

HH Van Tuyl	File/LB

DON'T SAY IT -- *Write It!* **Date:** January 7, 1993

To: Joel Tingey **From:** Gregg Lumetta

Subject: NCRW Samples

I have instructed Rick Steele to transfer the NCRW composite sample labeled 103AW-COMP (A and/or C) from the analytical hot cells to the 325A hot cells. I asked him to coordinate this with you.

Once you have received this sample, I'd like you to prepare a composite NCRW sample for our pretreatment studies. The recipe for this composite sample is summarized in the following table.

Tank	Core Date	Segments	Sample Label	g needed
103-AW	1989	6 to 10	103AW-COMP	5
105-AW	1990	3	SOL#3	1
105-AW	1990	4	SOL#4	1
105-AW	1990	5	SOL#5	1
105-AW	1990	6	SOL#1	1
105-AW	1990	7	SEG#7 SOLIDS	1

I will provide you with a polypropylene centrifuge tube in which this composite sample is to be prepared. Label the sample as **NCRW-77**. Weigh out the indicated quantity of each NCRW sample into this centrifuge tube. Please provide me with the actual quantity of each sample used. Because we will be doing sludge washing studies on this sample, there is no need for you to homogenize the composite sample.

It would be best for us if the outside of the centrifuge tube is kept free of smearable contamination. Please do all that you can to ensure that this is the case. Thanks!

Charge to M91968.

DON'T SAY IT--*Write It!*

Date: January 17, 1991

To: JL Swanson

From: JM Tingey

Subject: 105AW Core Samples

Some of the segment 3 and 4 material from tank 105AW has been combined to form a composite sample, but at present there is still some segregated segment 3 and segment 4 material. There is approximately 100 g of segment 3 material and 150 g of segment 4 material.

TABLE 5. Chemical and Radiochemical Analyses for Tank 105AW

ANALYSIS	1/2[a]	3/4[b]	5[c]	6[d]	7[e]	COMP[f]
Anions (IC)	X	X	X	X	X	S X
ICP	X	X	X	X	X	S X
TC/TIC/TOC	X	X	X	X	X	S X
pH ? done per Joel	X	NR[g]	NR	NR	X	S X
OH^-	X	NR	NR	NR	--[h]	S X
NH_3/NH_4^+	X	X	X	X	X	S X
Cr(IV)	X	NR	NR	NR	X	S X
Hg	--	NR	NR	NR	--	--
CN^-	--	NR	NR	NR	--	--
Noble Metals	--	NR	NR	NR	--	--
Total U	X	NR	NR	NR	X	S X
GEA	X	X	X	X	X	Sup --
AEA	X	X	X	X	X	S X
^{3}H	X	NR	NR	NR	X	S X
^{14}C	X	NR	NR	NR	X	S X
^{63}Ni	--	NR	NR	NR	--	--
^{79}Se	X	NR	NR	NR	X	S X
^{90}Sr	X	NR	NR	NR	X	S X
^{93}Zr	--	NR	NR	NR	--	--
^{94}Nb	X	NR	NR	NR	X	S X
^{99}Tc	X	NR	NR	NR	X	S X
^{129}I	X	NR	NR	NR	X	S X
^{237}Np	X	NR	NR	NR	X	S X
^{241}Am	X	NR	NR	NR	X	S X
^{244}Cm	X	NR	NR	NR	X	S X
Total Beta	X	NR	NR	NR	X	S X
Pu Isotopics	X	NR	NR	NR	X	L[i]

Table 1

Table 1

Table 2

(a) Composite of segments 1 and 2
(b) Composite of segments 3 and 4
(c) Segment 5 (NH_3/NH_4^+ analysis was performed on the centrifuged liquid)
(d) Segment 6 (Centrifuged solids and liquid)
(e) Segment 7 (NH_3/NH_4^+ analysis was performed on the centrifuged liquid)
(f) Composite Solids and Supernate
(g) Analysis Not Requested
(h) Analysis requested but not yet completed
(i) Analysis has been performed on centrifuged supernate only (Analysis has been requested for centrifuged solids).

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Characterization Support	Date August 10, 1994
Project Title/Work Order		EDT No. 157731
Characterization Information for Double-Shell Tank 241-AW-105		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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