RELEASE AUTHORIZATION

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6. Author

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7. Abstract

THIS PLAN OUTLINES THE APPROACH TO BE TAKEN ON OBTAINING THE SECOND CORE FROM 241-BY-106, RISER 10B, USING THE ROTARY MODE CORE SAMPLE TRUCK (RMCST). THE PURPOSE FOR OBTAINING THE SECOND CORE IS TO RETRIEVE THE FINAL SEGMENTS TO DETERMINE FERROCYANIDE CONTENT. THE FIRST CORE ACQUIRED FROM RISER 10B RESULTED IN INADEQUATE SAMPLE RECOVERY FOR THE LABS TO PERFORM THE REQUIRED ANALYSIS. THIRTEEN SAMPLES WERE TAKEN, WITH RECOVERY VARYING FROM 0 TO 100%. THE MOST LIKELY CONTRIBUTORS TO POOR SAMPLE RECOVERY HAVE BEEN IDENTIFIED AND EXPLAINED ON A SAMPLE-BY SAMPLE BASIS AS OUTLINED IN THIS REPORT. THIS INFORMATION HAS BEEN USED TO DEVISE THE APPROACH TO BE TAKEN IN OBTAINING THE SECOND CORE.

DISCLAIMER

8. RELEASE STAMP

241-BY-106
TEST PLAN

SUPPORTING DOCUMENT
WHC-SD-WM-TP-298

AUTHOR

G. J. BOGEN

JANUARY, 1995

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1.0 PURPOSE

This plan outlines the approach to be taken on obtaining the second core from 241-BY-106, riser 10b, using the Rotary Mode Core Sample Truck (RMCST). The purpose for obtaining the second core is to retrieve the final segments to determine ferrocyanide content. The first core acquired from riser 10b resulted in inadequate sample recovery for the labs to perform the required analysis. Thirteen samples were taken, with recovery varying from 0 to 100%. The most likely contributors to poor sample recovery have been identified and explained on a sample-by sample basis as outlined in this report. This information has been used to devise the approach to be taken in obtaining the second core.

2.0 JUSTIFICATION

Letters of justification for obtaining a second core from 241-BY-106, riser 10b, are provided (see attachments 1 and 2).

3.0 EXPLANATION OF RECOVERY

Numerous items have been identified as contributing to the less than satisfactory recovery (see figure 1) obtained on the first core taken from 241-BY-106, riser 10b. Major influences include; limited information on the waste consistency, lack of adequate operator experience/training, and equipment failures. Included with Engineering's explanation of recovery percentage, is the intended method of eliminating the problem on the second core.

Sample 1, 26% recovery Prior to taking the first sample, Engineering must determine which method of sampling will be used to start the core. Based upon estimates of waste consistency, it was decided that the first sample, at least, would be taken in rotary mode. A surface level measurement was not taken at the riser (10b). The drill string was to be lowered until a increase in the down force was observed, per procedure. The increase in force was not noticed, and the operator assumed the preliminary predictions of hard waste to be in error, and sampling commenced in the push mode.

After scrutiny of the information taken from the strip chart recorder, Engineering concluded that a solid surface was contacted. The hard surface was not capable of supporting the weight of the drill string, no positive down force was observed, and the 'crust' layer was broken. As noted in the Acceptance Test Report for rotary sampling (WHC-SD-WM-ATR-048), recovery in a transition zone going from a hard to soft material has been poor. When the crust broke, Engineering suspects a hard plug was pushed through the waste obstructing the drill bit opening.

It is not expected that a new crust has formed under riser 10b. The first sample on the second core will be taken in the push mode. A zip cord measurement will be taken to determine at which point the first sample should start.

Sample 2, 41% recovery
Sample 3, 43% recovery Recovery continued to be poor on both the second and third samples as a result of the obstruction produced on the first sample. The waste recovered on the third sample consisted mostly of drainable liquids. Engineering concluded that the obstruction dissolved in this layer during the delay before taking the fourth sample.

Sample 4, 86% recovery The sample extrusion evidence indicates a transition zone was encountered between the end of the third and start of the fourth sample. No drainable liquids were recovered in the fourth sample.

Sample 5, 01% recovery
Sample 6, 06% recovery Eight days elapsed between taking the fourth and fifth sample. Because the medium was moist, it is speculated that a plug formed in the opening of the drill bit preventing waste from entering the sampler. Before it was identified that virtually no recovery was obtained on the fifth sample, the sixth and seventh sample had been taken. If it had been determined in the field that the bit was plugged, measures could have been taken to prevent poor recovery on the sixth sample.

The sample dose rate (measured on retrieval) is currently the only field measurement that will provide the operator an indication of recovery. For the next core the dose rate will be evaluated for each sample, and corrective actions taken when it appears that recovery is less than satisfactory.

To prevent a plug from forming in the drill bit, sampling should be continuous throughout the core. In the event of a delay between samples (of four hours or more), the procedure for clearing a clogged bit will be performed.

Sample 7, 00% recovery Based upon the inspection of the sampler in the hot cells, Engineering concluded that the lack of recovery was caused by a sampler malfunction. It appears the malfunction was a result of the sampler being dropped in the drill string.

Sample 8, 100% recovery Engineering speculated that the dropping of the seventh sampler cleared the clog in the bit, accounting for the increased recovery.

Sample 9, 20% recovery Waste on the head of the sampler, observed by engineering in the hot cell, indicated that the v-groove seal had failed. It is uncertain as to the cause of the seal failure at this time.

On future cores, the values on both the mechanical and digital counters will be verified to ensure that the seal is not above the sealing surface.

Sample 10, 100% recovery There was a delay of fourteen days between the ninth and tenth sample. Since the plugged bit procedure was instituted this did not affect sample recovery.

Sample 11, 12% recovery
Sample 12, 26% recovery
Sample 13, 36% recovery A delay of one day occurred between the tenth and eleventh sample. It had not been adequately communicated to the operators that the procedure for clearing a clogged bit should have been performed. A revision to the operating procedure requires clearing of the bit following a delay of four hours, or more, between samples.

In addition to poor recovery on the thirteenth sample, an incomplete segment was taken as a result of premature activation of the hydraulic bottom detector on the RMCST.

A cognizant engineer will be present for all future sampling, until such time as it has been determined that sufficient experience has been gained to obtain an adequate core.

4.0 PREREQUISITES

Before starting to sample, the exact location of the waste surface is required to properly plan the sampling operations. Therefore, before resampling of BY-106 riser 10b a zip cord reading (see figure 2) will be acquired to determine the actual waste surface level below the riser. This value will be compared to the previous surface measurement that was used to determine the waste surface location.

This procedure will require the use of rotary mode samplers with both o-ring and v-groove seal inserts. Sampling operations shall have samplers with both the push mode (o-ring) seals and rotary mode (v-groove) seals on hand for this core.

Valuable post sampling information is obtained from the strip chart recorder. The chart recorder should be operational during all sampling. If the chart recorder fails during sampling the operator shall continue until the current segment is finished. Before additional samples are taken the chart recorder must be operational.

There is a correlation between truck down time and sample recovery. The current theory is that a plug forms in the bit if sampling operations is suspended for even a short period of time. Therefore, should sampling operations be suspended for a period of time exceeding four hours the drill bit shall be cleared per the plugged bit procedure.

During sampling there are various parameters that need to be monitored that give an indication as to material type and possible sample recovery. It is difficult to monitor all these parameters and perform sampling at the same time. Therefore, a cognizant engineer must be present for all sampling operations to provide direction and advice to the operators.

5.0 INFORMATION

Figure 2 shows an estimated profile of the tank waste based on the previous core taken from riser 10b. Since the previous sampling efforts disturbed the waste under this riser, this profile may not be an accurate representation of the sample media that **NOW** exists.

6.0 TEST PROCEDURE

The steps in this procedure are to act as a guide for sampling of tank BY-106 riser 10b. For each segment a 'Sample Data' sheet shall be completed (see attachment 3). The cognizant engineer may authorize deviations from this plan based upon actual field sampling conditions.

From information from the previous core, the first sample should be taken in push mode with the penetration rate between 1-4 in/min. Therefore, the rotary mode sampler with the o-ring seal should be used to start the core. The o-ring seal will be used to reduce the chance of air leaking by the seal and into the sampler. Operations should continue to use the "o-ring" insert sealed samplers in push mode for as many samples as possible. **THERE SHALL NOT BE ANY BUMPING OF THE DRILL RIG WHEN PUSH MODE SAMPLING.** "Bumping" refers to temporarily engaging the truck in rotary mode without the use of purge gas. When the downforce reaches 500 lbs, push mode sampling should be stopped and the current sampler removed from the drill string. A rotary mode sampler with the v-groove seal should be inserted into the drill string. Once rotary mode has been initiated it should be maintained throughout the sample. All additional samples will be taken using a rotary sampler with a v-groove seal, whether in rotary or push mode.

After completing each sample, review the downward force from the strip chart recorder to determine the value at the end of that sample. If the downforce is greater than 500 lbs then continue in rotary mode. If the downforce is less than 500 lbs then proceed in push mode. Once the downforce exceeds 500 lbs rotary mode drilling should be initiated and the penetration rate increased to maintain the downward force.

The dose rate correlates fairly accurately with sample recovery, therefore, the dose rate of each sample will be documented on the sample data sheet provided (see attachment 3). Based upon the dose rate the cognizant engineer should adjust the drilling parameters as necessary to increase recovery.

7.0 ENGINEERING RECOMMENDATIONS

Numerous tests were conducted during the development of the RMCST. Drilling in simulants while varying the drilling rate, down force, RPMs and gas flow were conducted. The Acceptance Test Report for the RMCST, WHC-SD-WM-ATR-048, and Rotary Mode Core Sampling Development Test Report, WHC-SD-WM-TRP-076, document these findings. From these reports table 1 has been formulated as a recommended guideline for the operation of the RMCST.

TABLE 1 Suggested Drilling Parameters

Material	Penetration Rate (in/min)	Downforce (lbs)	RPM	Gas Flow (scfm)
ROTARY MODE				
Hard Salt Cake	2 - 7	500 - 1000	50	50
Medium Salt Cake	6 - 10	300 - 500	50	40
Soft Salt Cake	6 - 10	100 - 300	50	30
PUSH MODE				
Sludges	1 - 4	100 - 500	0	0
Liquids	1 - 4	Below 100	0	0

Operating Strategy:

- Try push mode sampling at the beginning of each segment when the last segment was a push mode.
- Try push mode sampling when the down force is below 500 lbs in the previous rotary mode segment.
- If down force is below 500 lb, continue in push mode at 1-4 in./min.
- If down force is above 500 lb, initiate rotary mode.
- If down force drops off and builds up slowly "MEDIUM TO SOFT SALT CAKE". Go into rotary mode (see above parameters).
- If down force drops off and builds up quickly "HARD SALT CAKE". Go into rotary mode (see above parameters).

8.0 EXPECTATIONS

Because of the uncertainty in waste layering (transition zones), it is not assumed that high recovery will be obtained on every sample. Previous recovery results will be compared to the results obtained on the second core as a means of measuring the improvement of sampling operations. The results of this comparison and conclusions drawn from them, will be released in a Sampling Test Report, WHC-SD-WM-TRP-228.

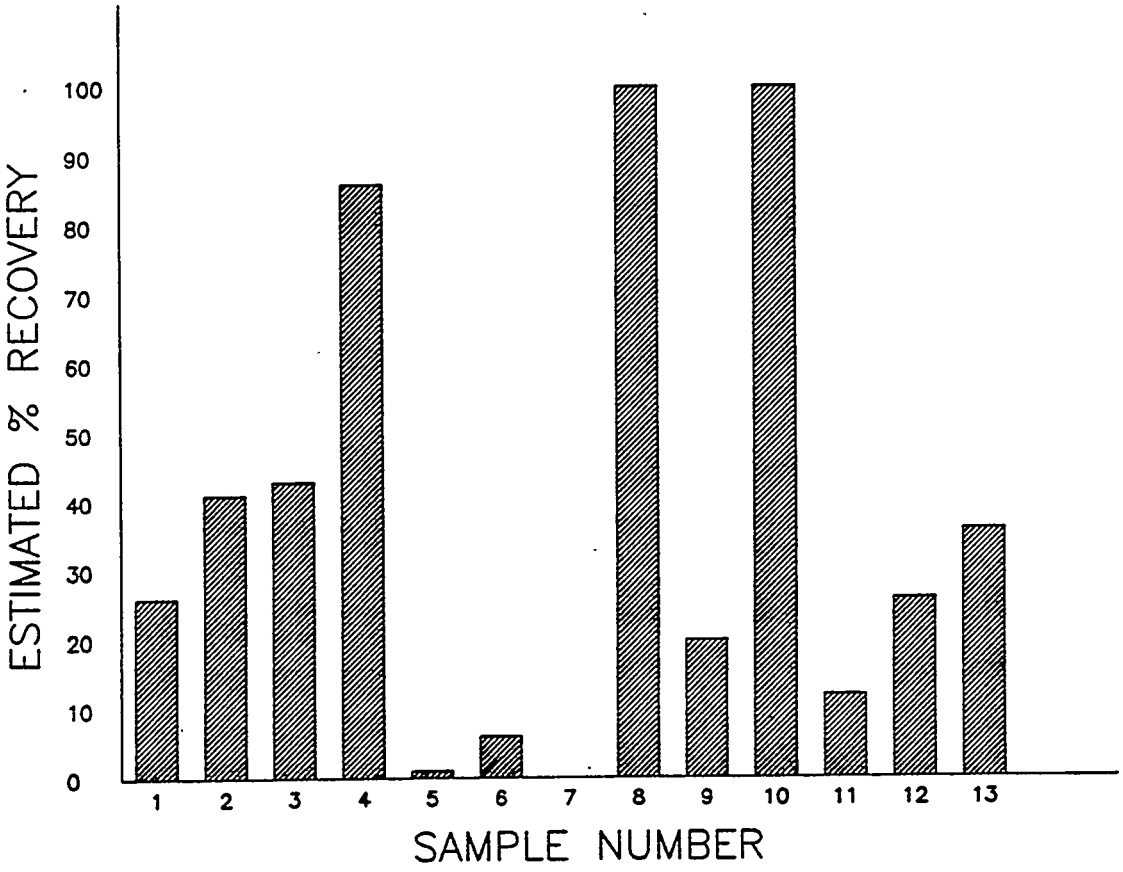

FIGURE 1 Recovery

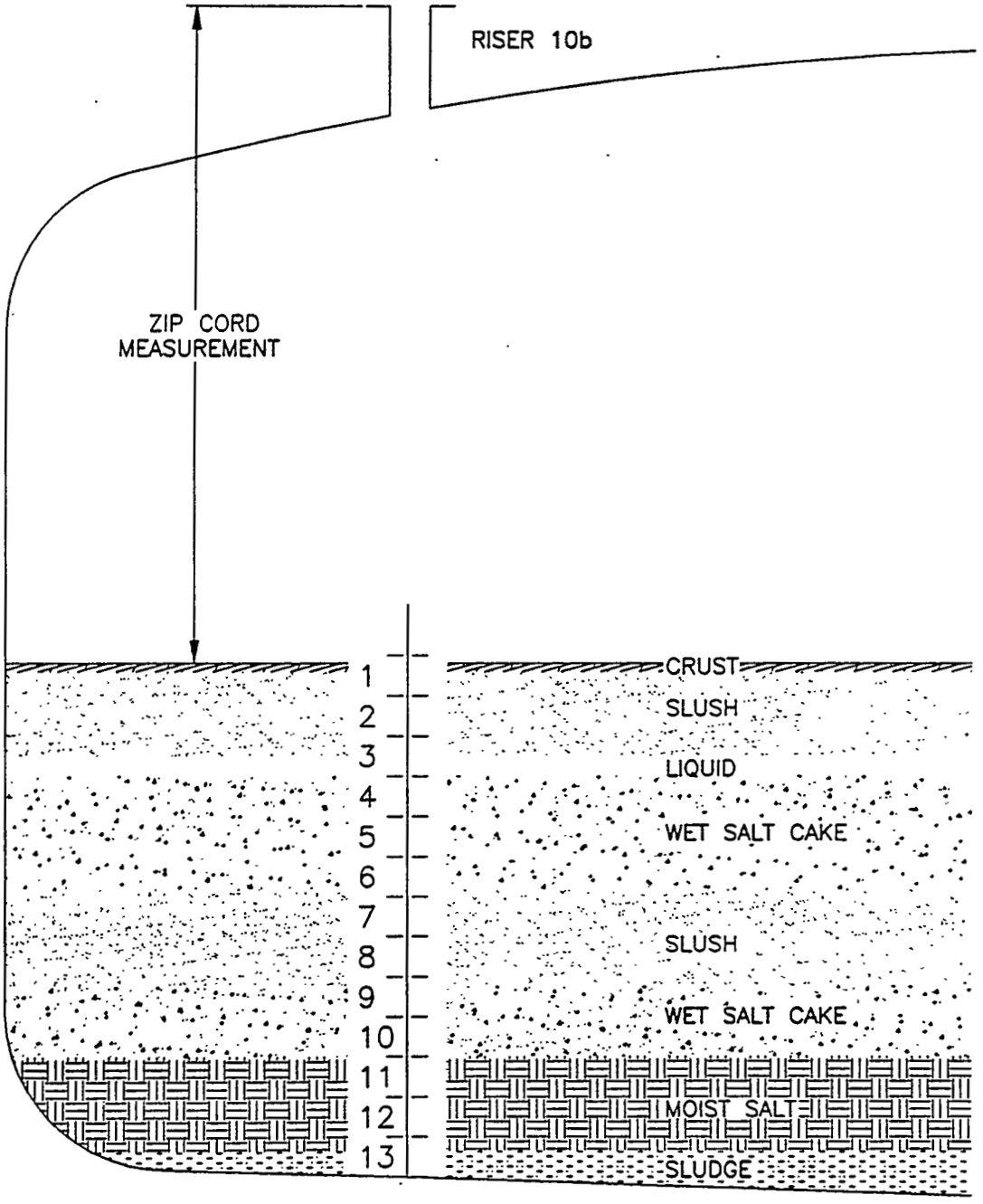

FIGURE 2 Waste Profile

Westinghouse Hanford Company **Internal Memo**

From: Ferrocyanide Safety Program 74260-95-009
Phone: 373-3132
Date: January 17, 1995
Subject: **REVISION 3A:** ANALYSES REQUESTED ON SECOND SET OF CORE SEGMENT SAMPLES FROM TANK BY-106, RISER 10B

To: R. J. Blanchard

cc:mail - DR Bratzel
GT Dukelow
JE Meacham
RD Schreiber
RJC-LB/File

FAX - G. Westleigh, LATA (943-6740)

This memorandum has been revised (Revision 3A) to remove the requirement for Total Alpha on saltcake material in the top segments. The Safety Screening DQO does not require Total Alpha on saltcake material. We are still requesting it on the bottom three segments, even if it appears to be saltcake, as pointed out below.

Analyses on the second set of segments should only be run on those segments with good recovery (> 60%), except the bottom three segments, as follows:

(1) FOR ALL SEGMENTS EXCEPT THE BOTTOM THREE (3) SEGMENTS FROM RISER 10B:

For ≥ 60% recovery for a particular segment:

SLUDGE (None Expected) - If noticeable sludge IS present, divide segment into ~ 4.75 inch subsegments and run DSC/TGA and Ni on each.[1] Total Alpha should be run on a half-segment basis.

SALTCAKE - If there is NO noticeable sludge, divide segment into approximately equal halves; run DSC/TGA on each of the two halves.

DRAINABLE LIQUID - DSC on segment basis; i.e., treat any drainable liquid from an extruded segment as one sample.

Archive approximately 20 mL of each sample after analyses are complete.

For < 60% recovery for a particular segment: Homogenize total amount of whatever sample is obtained and archive 20 mL.

[1]Try to divide sample into at least 3 or 4 subsegments depending on amount of material and position in the sampling tube. Each subsegment except the last should be approximately 4.75 inches long.

(2) FOR BOTTOM THREE (3) SEGMENTS FROM RISER 10B:

For ≥ 60% recovery for a particular segment:

SLUDGE or SALTCAKE - Run DSC/TGA and Ni on 1/4 segment basis[1] and Total alpha on 1/2 segment basis - even if it appears to be saltcake.

DRAINABLE LIQUID - DSC on segment basis; i.e., treat any drainable liquid from an extruded segment as one sample.

For < 60% recovery for a particular segment:

Recovery: 0% to ~30% - Treat solids as one sample and do DSC/TGA, Ni, and Total Alpha analyses on the one sample.

Recovery: 31% to 60% - Break total solids in segment into two approximately equal subsegments and do DSC/TGA, Ni, and Total Alpha analyses on each of the two samples.

DRAINABLE LIQUID - DSC on segment basis; i.e., treat any drainable liquid from an extruded segment as one sample.

Archive approximately 20 mL of each sample regardless of recovery (except zero) after analyses are complete.

(3) FOR ALL SAMPLES:

If any sample DSC shows exothermic activity ≥ 115 cal/g (dry weight basis), run TOC on the sample. If any sample from the bottom three (3) segments show energies ≥ 115 cal/g (dry weight basis), also run a total cyanide analysis on that sample.

Archive approximately 20 mL of each sample regardless of recovery (except zero) after any analyses are complete; remainder of sample may be given to Pretreatment Program.

Duplicates of each analysis are to performed by the Analytical Laboratory as per previous instructions. Duplicates for each sample are still needed from a statistic point of view and the meeting today did not change that conclusion.

Please call if there are questions.

Thank you,

R. J. Cash

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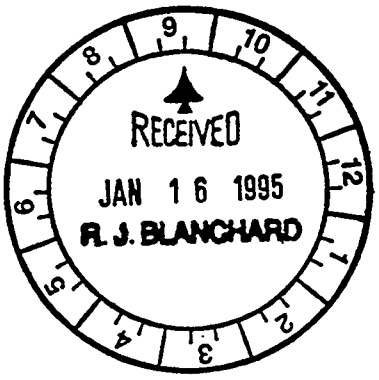

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352
Telephone (509) 372-6373

January 12, 1995

Ms. Ruth D. Schreiber
Westinghouse Hanford Company
P.O. Box 1970, MS R2-12
Richland, WA 99352

Dear Ruth,

This is a confirmation of previous discussions and cc:mail messages on the need for the Pretreatment Program to use additional sample from BY-106. Pretreatment fully supports taking more material from the same riser and finds this to be an excellent target-of-opportunity to obtain needed sample material for process investigations.

With regard to the sludge, this tank has been identified by Pretreatment in a letter to you dated December 19, 1994 as satisfactory for sample to support enhanced sludge washing investigations while simultaneously satisfying Safety Program sample needs. The tank was identified as a primary alternate/phase II sample in the recently revised Disposal Sampling Strategy. Sample from this tank can readily fill the need for a phase I sample (initial set of samples to be further evaluated). Pretreatment would still require 125 grams.

Pretreatment could definitely use the sludge from the second proposed core for the Pretreatment enhanced sludge washing scaling task plus any left from the first core. Pretreatment has identified the need for seven different one-liter sludge samples to support a programmed 3.3 million dollar program which is now in its first year of funding at 1.3 million dollars. This sample should fill one of those needs or at least allow a more exact determination of actual sample quantity to provide accurate scaling data. Pretreatment does not care whether the material has been disturbed--all we need is sample material for process investigation and actual test sample size optimization. We will gain needed information on sample size to optimize the experiment and will acquire scaling data on settling, compaction rates, and supernatant content (particulate and radionuclide amount/form).

With regard to saltcake, this is an excellent tank to sample. Brett Simpson states that this tank is representative of the BY tank farm saltcakes, which comprise over one-third the total tank saltcake inventory. Additionally, Brett points out that this saltcake is high in organic content based on previous process

history and recent vapor sample results.

Thanks again for all of your efforts, as well as that of others in the Characterization Program, to identify and use opportunities such as this that increase efficiency and cut schedule. This letter has been coordinated with the Pretreatment Program Office and Disposal Engineering.

Sincerely,

John T Slankas

John T. Slankas
Program Element Manager, Pretreatment
Technology Development Program Office

JTS/mfm

cc: JN Appel G3-21
RJ Blanchard R1-17
KA Gasper G3-21
DJ Washenfelder H5-27
File/LB

UNIVERSAL SAMPLER PRE-USE INSPECTION / SAMPLING SHEET

Wednesday January 18, 1995 (4:03)

SAMPLER SERIAL NUMBER							
CORE NUMBER / SEGMENT NUMBER		CORE:			SEGMENT:		
SHOP INSPECTION DATE							
SAMPLER TYPE							
SHOP PACKAGE #							
FORCE TO FIRST START PISTON MOVING							
RESISTANCE FOR FULL PISTON STROKE							
PINTLE ROD GUIDE SCREWS TIGHT							
SHEAR WIRE							
OTHER CONDITIONS NOTED							
FINAL SEAL TYPE (o-ring / v-groove)							
SHEAR WIRE REPLACED							
PISTON FLUSH WITH SEAL BOTTOM							
ROD GUIDE DOWN AND SCREWS TIGHT							
OTHER CONDITIONS							
DATE OF INSPECTION							
INSPECTION BY							
LEAD OPERATOR (circle)		MC		LD		JG	PK
SAMPLE START TIME	SAMPLE END TIME	TIME:		DATE:		TIME:	DATE:
DEPTH							
DOWN FORCE							
PENETRATION RATE							
PG FLOW							
PG PRESSURE							
RPM							
HYDROSTATIC PRESSURE & FLOW		PRESSURE:				FLOW:	
DOSE RATE							
DATA RECORDED BY (SIGN/DATE)							

Special Engineering instructions given: _____