**Westinghouse
Hanford Company**

P.O. Box 1970 Richland, WA 99352

222-S ANALYTICAL LABORATORY

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A,

**Project: ANALYSES AND CHARACTERIZATION
OF DOUBLE SHELL TANK**

Tank: 241-AP-108

Date Printed: OCTOBER 4, 1994

VALIDATION REPORT

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223

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WHC-SD-WM-DP-065, ADDENDUM 1A, REV. 0

TABLE OF CONTENTS

Laboratory Case Narrative	1
Laboratory Form #1's	73
Volatile Organics	74
Semi-Volatile Organics	83
Total Organic Carbon	103
General Chemistry and Metals	105
Radiochemistry	127
Data Assessment Forms	150
Volatile Organics	151
Semi-Volatile Organics	156
Total Organic Carbon	161
General Chemistry and Metals	166
Radiochemistry	174
Chain of Custody Forms	188

This document consists of pages 1 through 201.

WHC-SD-WM-DP-065, ADDENDUM 1A, REV. 0

LABORATORY CASE NARRATIVE

WHC-SD-WM-DB-065 REV. 0
ADDENDUM 1A,
ANALYSIS AND CHARACTERIZATION OF DOUBLE
SHELL TANK 241-AP-108

CASE NARRATIVE

INTRODUCTION

SOURCE DOCUMENTATION

Evaporator candidate feed from tank 241-AP-108 (hereafter referred to as 108-AP) was sampled under the protocol described in 242-A Evaporator Waste Analysis Plan, WHC-SD-WM-EV-060, Rev. 3 and in 242-A Evaporator Quality Assurance Project Plan, WHC-SD-WM-QAPP-009, Rev. 0. Waste contained in tank 108-AP was characterized chemically by the Westinghouse Hanford Company 222-S Laboratory as directed by four documents:

1. 242-A Evaporator Waste Analysis Plan (WAP), WHC-SD-WM-EV-060, Rev.3
2. 242-A Evaporator Quality Assurance Project Plan (QAPjP), WHC-SD-M-QAPP-009, Rev. 0,
3. 242-A Evaporator Project Analytical Services, Statement of Work (SOW), (WHC-SOW-93-0006, Rev. 1,
4. Technical Project Plan for the 222-S Laboratory in Support of the 242-A Evaporator Waste Analysis Plan, WHC-SD-WM-EV-060, Revision 2, WHC-SD-WM-TPP-048, Rev. 0, Technical Project Plan (TPP), and
5. Technical Project Plan for the 222-S Laboratory in Support of the 242-A Evaporator Waste Analysis Plan, WHC-SD-WM-EV-060, Revision 2, WHC-SD-WM-TPP-048, Rev. 0-A, a partial modification of the original TPP per Engineering Change Notice, number 600949.

Laboratory operations at the 222-S Laboratory were/are performed according to the Technical Project Plan (TPP). For those activities not defined or specified in the TPP, the successive document priority (in high to low order) is WAP, QAPjP, SOW, QAPP-002 (Quality Assurance Project Plan for the Analysis of Highly Radioactive Samples in Support of Environmental Activities on the Hanford Site, WHC-SD-CP-QAPP-002). Deviations from these documented instructions are discussed in this narrative and are generally supported with additional documentation.

Physical, inorganic, and radiochemical analyses were performed on tank 108-AP by the 222-S Laboratory. Organic analyses on this tank were performed by Battelle Pacific Northwest Laboratory's (PNL) 325 Laboratory and are not discussed.

1A-2

ADDENDUM 1A,

Characterization of evaporator feed tank waste is needed primarily for an evaluation of its suitability to be safely processed through the evaporator. Such analyses should provide sufficient information regarding the waste composition to confidently determine whether constituent concentrations are within not only safe operating limits (e.g., nonflammable, nonexplosive), but should also be relevant to functional limits (e.g., solids formation) for operation of the evaporator. Characterization of tank constituent concentrations should provide data which enable a prediction of where the types and amounts of environmentally hazardous waste are likely to occur in the evaporator product streams.

RELEVANCE TO SW-846 PROCEDURES

Although SW-846 methods are mentioned in the source documents as examples of the desired analytical technology to use in this characterization effort, it is clear that the evaporator program anticipated the use of in-house controlled procedures within the 222-S Laboratory. The WAP, section 5.1.2 states, "Laboratory operations and test procedures that are performed in carrying out the requested characterization activities will be determined by laboratory personnel and will be defined in the TPP".

Each inorganic chemical analyses performed by the 222-S Laboratory was conducted using a controlled procedure. Some procedures were consistent with SW-846 guidance and others were patterned after U.S. Environmental Protection Agency, Contract Laboratory Program (CLP) methods. All procedures, however, use SW-846 *analytical technology*. Deviations from exact SW-846 procedures (such as sampling, aliquot size, sample holding time and sample preservation) are essential when handling samples containing dangerous levels of radioactive material, and are consistent with the final rule regarding "Hazardous Waste Management System; Testing and Monitoring Activities, 40 CFR Parts 260, 261, 264, 265, 268, and 270 as stated in the Federal Register, volume 58, number 167, Tuesday, August 31, 1993. Generally these deviations are practiced to limit exposure of personnel to ionizing radiation to an amount that is "as low as reasonably achievable" (ALARA).

SAMPLING

The WAP provided instructions regarding sampling procedures for waste samples collected from Hanford tanks. The "bottle-on-a-string" method was used to collect the liquid samples from the tank. Each glass sample bottle contained approximately 100 milliliters and was closed with a teflon seal cap.

Field blanks plus the initial tank samples from the first (1W) of three vertical risers within tank 108-AP were collected on March 17 and 18. The remaining tank samples from the other two risers, 1(NE) and 1(SE), were collected on March 21, 1994. Duplicate samples were collected at each of the five tank sampling locations and the field blank, of which one set was for the 222-S Laboratory and one set was for PNL's 325 Laboratory. Two sample locations were selected at random depths within tank 108-AP from risers 1(W)

ADDENDUM 1A,

and 1(NE). The fifth tank sample location was within the remaining riser 1(SE).

Field blanks were generated by placing deionized water into sampling bottles and closed with the same caps used for the tank samples.

One additional sample was collected from the surface of the tank waste for which the PNL 325 Laboratory was to perform a total organic carbon analysis.

Samples were not preserved (neither acidified nor refrigerated) nor was there an attempt to assure the complete filling of the bottles so as to exclude all headspace. These actions were consistent with safety procedures, which attempt to limit personnel exposure to hazardous ionizing radiation.

Chain-of-Custody forms were generated by the sample collector. Samples were transported to the laboratory receiving door in pigs by the B-Plant sample truck.

The two tank samples from riser 1(W), which were collected on March 17 and 18, were received into the laboratory on March 21, 1994 but were held until the following day to be opened with the other samples. The remaining tank samples from risers 1(NE) and 1(SE) and the field blank were received into the 222-S Laboratory on March 22, 1994, when all samples were inspected and the bottles were transferred from the large pigs to smaller pigs.

On March 22, 1994, it was discovered that an error had been made during sample collection by noting that all samples, *including the field blank* had similar visual appearances and dose rates. Various communication documents discussing this situation in detail and its resolution are provided in the Communications section of this narrative, marked as Items 1 through 11. In summary, however, it was determined that the error associated with samples delivered to the 222-S Laboratory concerned the field blank. Because duplicate samples were collected to provide one set for each laboratory (WHC's 222-S and PNL's 325), a potential for mixup in samples was possible and did happen. One of the tank samples that was to be delivered to the PNL 325 Laboratory was accidentally delivered to the 222-S Laboratory, complete with a incorrect chain-of-custody form, as the "field blank". To rectify the situation, the field blank was "recollected" on June 29, 1994 and was given the revised sample number of R3643-A. The 136-day clock for generation of complete data package for tank 108-AP started on June, 29, 1994, as per directions in the Tri-Party Agreement, which states that the time begins on the collection date of the last sample.

The sample from tank riser 1(W), which was misidentified as being the field blank, was discarded as directed by Nonconformance Report number 050650 (shown as item number 7 in the Communication section of this data package).

Because of the initial uncertainty regarding sample integrity and the subsequent course of recovery that would be taken, analytical work was placed on hold until March 31, 1994. On that date a notice was issued to proceed with analyses on all tank samples that were currently at 222-S. This action

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

caused a 13 to 14 day delay in analyses, and did impact the sample holding time in some cases.

LABORATORY OPERATIONS

SAMPLE TRACKING

RECEIVING PROCEDURES/CHAIN-OF-CUSTODY

Tank 108-AP samples were received into the laboratory at door 13, where the laboratory sample custodian signed the Chain-of-Custody form as the new sample custodian. The Chain-of-Custody form is a legal document, which tracks the transfer of samples between individuals or organizations to establish sample ownership.

The pigs containing the samples were transported to a hood. The radioactive dose rate "over the top" of each pig's opening was measured by a Health Physics Technician (HPT). It was determined that the corrected dose rate for all tank samples was approximately 125 mRad per hour. Samples were removed from the pigs, relabeled to include the laboratory identification number, and transferred to the metal storage cabinets in a secured area.

Subsequently, a determination was made to not process the samples through the hot cell, thus expediting the analyses. Hot cell processing of samples is required when the "over-the-top" dose rate exceeds 2 rem per hour or 25 rad per hour.

REQUEST FOR SPECIAL ANALYSIS

Request for Special Analysis (RSA) forms were generated for each sample, which provided a laboratory identification number, stated the preparative and analytical procedures, set groups of samples into analytical batches, and stated the degree of quality control. RSAs served as the controlling documents for analytical operations. Sample preparation instructions on the RSAs included such things as dilutions, acid digestions, and compositing. Hydroxide, arsenic, and tritium are examples of analytical procedures shown on the RSA sheet. Generally a maximum of three samples were included in a sample batch so that quality control determinations (such as a blank, standard(s), duplicate sample, spiked sample, and duplicate spiked sample) may be included. From the instructions on the RSA, traveler cards were generated.

SAMPLE IDENTIFICATION

The 108-AP samples were identified by the sample collector using a shipping number which began with "R". Table 1 references the shipping number to the sampling location within tank 108-AP. As can be seen in Table 1, duplicate samples from each location were given unique shipping numbers and were sent to

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

either the Westinghouse Hanford Company's (WHC) 222-S Laboratory or to the Battelle, Pacific Northwest Laboratory's 325 Laboratory.

Table 1. Tank 108-AP Sample Sources and Identification				
Shipping Number	Riser	Sample Elevation (inches)	Sample Type	String Length (inches)
R3632	1(W)	132	inorg/rad (WHC)	432
R3633-A		132	organic (PNL)	432
R3634		204 note 1	inorg/rad (WHC)	360
R3635-A		204 note 1	organic (PNL)	360
R3636	1(NE)	96	inorg/rad (WHC)	468
R3637		96	organic (PNL)	468
R3638		228	inorg/rad (WHC)	336
R3639		228	organic (PNL)	336
R3640	1(SE)	180	inorg/rad (WHC)	384
R3641		180	organic (PNL)	384
R3911 note 2		144	organic (WHC)	420
R3642		411	surface sample TOC/appr (PNL)	153
R3643-A	- - -	- - -	field blank inorg/rad (WHC)	- - -
R3644	- - -	- - -	field blank organic (PNL)	- - -

Note 1. At the time of this writing, it was uncertain whether this elevation was or was not correct. The actual elevation may have been 348 inches as was stated in the J-4 document (see item #1 in the Correspondence section). It is known that the originally designated elevation for this sample was above the surface of the waste and had to be redesignated and recollected.

Note 2. This sample was collected coincidentally as an organic analysis practice sample for the 222-S Laboratory, and was never intended to be a part of the protocol sampling for tank 108-AP characterization. Consequently, data for this sample are not included with this data package.

Upon arrival at the 222-S Laboratory, each sample was given a laboratory identification number, which began with "V", and a description.

Each of the five samples were analyzed for physical parameters and for inorganic constituents. A composite sample was generated from each of the five samples in equal proportions for radiochemical analyses.

ADDENDUM 1A

Table 2 shows the relationship between the original sample number, the laboratory sample identification number, and the laboratory sample description.

The sample description was a letter designation, A through E, added as a suffix to the tank number. For example, "108-AP-A" served as an easy way to remember the sample identification for R3632 from riser 1(W), 132 inches elevation. It was shown on the RSA in the "Customer ID" column.

Table 2. Laboratory Identification of Tank 108-AP Samples		
Original Sample Number	Lab Sample Number	Lab Sample Description
- - -	V60	LMCS Standard for V62, V63
- - -	V61	Reagent Blank for V62, V63
R3632	V62	108-AP-A
R3634	V63	108-AP-B
- - -	V64	Ending LMCS Std for V62, V63
- - -	V65	LMCS Standard for V67 - V69
- - -	V66	Reagent Blank for V67 - V69
R3636	V67	108-AP-C
R3638	V68	108-AP-D
R3640	V69	108-AP-E
- - -	V70	Ending LMCS Std for V67-V69
- - -	V71	LMCS Standard for V73
- - -	V72	Reagent Blank for V73
R3643-A	V73	Field Blank, 108-AP-FB
- - -	V74	Ending LMCS Std for V73
- - -	V75	LMCS Standard for V77
- - -	V76	Reagent Blank for V77
Composite of R3632, R3634, R3636, R3638, and R3640	V77	108-AP-COM

TRAVELER CARDS

Analyses were tracked in the laboratory using a serial number coding system placed on a "traveler" card. One card was generated for each analytical

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

determination (sample, duplicate, spike, blank, and standard). Each card was identified with unique serial numbers, which allowed tracking within the Laboratory Customer Communication System (LCCS), a computerized information base.

The current coding system was modified for samples originating from the 242-A Evaporator project, which use a "V" as the initial code prefix. Following the V is a sequential number, which coded the sample source (e.g., original sample, composite sample, Laboratory Measurement Control System (LMCS) standard, reagent blank, etc.). This sequential number is listed on the RSA form.

An extension (a decimal point followed by four numbers) was added to every serial number. The first digits coded the type of sample preparation (e.g., acid digestion, fusion, direct, etc.). The second digit coded the quality control function of the sample (e.g., sample, spike, spike duplicate, blank, etc.). The last two digits coded the analysis type (e.g., ammonia, specific gravity, tritium, selenium, etc.).

An example of the serial number, which coded for direct analysis (no sample dilution or digestion) of a duplicate sample for total inorganic carbon on Laboratory's evaporator sample number 62 (108-AP-A, original sample number R3632) was V62.5827.

Example:

V62.5827

Lab sample number	—				Analysis type (27=total inorganic carbon)
					Quality control function (8=sample duplicate)
					Sample preparation (5=direct)

Table 3 shows the coding used to identify each traveler card serial number.

Table 3. Serial Number Extension Codes for Evaporator Samples		
Sample Preparation	Direct	Vxx.5xxx
	Water Leach (water dil'n)	Vxx.7xxx
	Acid Digest	Vxx.8xxx
Quality Control Function	LMCS Standard	Vxx.x5xx
	Reagent Blank	Vxx.x6xx
	Sample	Vxx.x7xx
	Sample Duplicate	Vxx.x8xx
	Spike	Vxx.x9xx
	Spike Duplicate	Vxx.x0xx
Analysis Type	Appearance	Vxx.xx01
	Specific Gravity	Vxx.xx06
	Differ. Scanning Calorimetry	Vxx.xx11
	Total Beta	Vxx.xx20
	Total Alpha	Vxx.xx25
	Total Inorganic Carbon	Vxx.xx27
	Ammonia	Vxx.xx28
	Hydroxide	Vxx.xx29
	Gamma Energy Analysis	Vxx.xx30
	Uranium, total	Vxx.xx40
	Inductively Coupled Plasma	Vxx.xx50
	Ion Chromatography	Vxx.xx71
	Cyanide	Vxx.xx78
	Pu ^{239/240}	Vxx.xx81
	Am ²⁴¹	Vxx.xx82
	Np ²³⁷	Vxx.xx83
	Tc ⁹⁹	Vxx.xx84
	I ¹²⁹	Vxx.xx85
	Sr ⁹⁰	Vxx.xx86
	H ³	Vxx.xx87
	C ¹⁴	Vxx.xx88
	Se ⁷⁹	Vxx.xx89
	Arsenic	Vxx.xx95
	Selenium	Vxx.xx96
	Mercury	Vxx.xx97

ADDENDUM 1A,

There were exceptions to the coding system shown above. For visual appearance, the extension was always Vxx.1001. No extension code number was generated for curium-244, because it did not have a specific procedure number. It was determined, however, as a by-product of americium-241 analysis. The same situation occurred for plutonium-238 (for which data were provided, but not required), which was determined when Pu^{239/240} was analyzed.

When the codes for the evaporator project were generated on the computer, a code for a simple sample dilution was omitted because no controlled procedure for sample dilution was available. It was necessary to track all sample handling within the laboratory, including dilution factors, consequently the code for a water digestion (actually a water leach procedure for solid samples, LA-504-101) was used. It should be clearly understood that the tank samples were *not* subjected to a leaching procedure, but the traveler cards which were generated with the water digestion code were used simply to document the dilution factors acquired during the sample preparation phase.

ANALYTICAL BATCH SHEET

An Analytical Batch sheet was prepared for each batch of traveler cards by a Lab Leader. Data were added to this sheet by the technician, who performed the analysis, which described analytical conditions (e.g., analyst, instrument, date, time, temperature, etc.) and procedures used (e.g., type of sample preparation, analytical procedure, and revision numbers).

ANALYTICAL BATCH SUMMARY SHEETS

Upon completion of each analytical batch, several data calculation or evaluation steps were performed. Raw data were converted to final values by technicians. Chemists reviewed the calculations for approval and then generated an Analytical Batch Summary Sheet for all analyses (except for inductively coupled plasma/emission spectrometry) (ICP). This sheet brought together the final data from each of the traveler cards (representing each determination). Additional information from calculations of quality assurance parameters, such as percent recovery, relative percent difference (RPD), etc., were added to the summary sheet by the chemists. Occasionally, chemists included descriptive information regarding the batch on these sheets. This narrative information was generally included in this case narrative.

All data were reviewed by the chemists and the project coordinator to determine that correct values were transcribed from the traveler cards to the analytical batch summary sheets.

Instead of generating an Analytical Batch Summary Sheet for ICP, raw analytical data as well as analytical quality control parameters were summarized into an independent report known as the "Ward's¹ package". It was necessary to use this Ward's package in place of the batch summary sheet because of the significantly greater quantity of data generated by ICP analyses.

¹ Ward's is a trademark of Ward's Scientific, LTD.

ADDENDUM 1A,

ANALYTICAL AND REPORT SCHEDULING

A computerized logic schedule was generated to plan each major event necessary to produce the final validated data package. Responsible individuals were assigned to each event. During the weekly scheduling meeting, each assignee was responsible for reporting progress on assigned actions. Milestones were closely monitored to assure that targeted schedule dates were being met. Reports, which tracked the scheduling status, were published and distributed weekly throughout the WHC, Analytical Laboratories division.

A preliminary report of data through the use of the LCCS was scheduled by the Statement of Work (SOW) to be due to the customer (the evaporator program) 85 days after collection of the last sample from tank 108-AP. That date was September 22, 1994. In discussions with the customer in mid July, it was mutually agreed that an LCCS report would not be required. Instead the data would be provided to the customer as preliminary summary tables for only selected analytes. It was also understood that these data would be neither final nor validated, because validation would be performed by Analytical Services, Office of Quality Assessment upon completion of the entire data package. Summary data tables were provided to the program on August 1, 1994 for the following analytes:

DSC, TIC, NH_4^+ , OH^- , Al, F^- , NO_2^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , total uranium, tritium, C^{14} , Pu^{238} , $\text{Pu}^{239/240}$, Am^{241} , $\text{Cm}^{243/244}$, Se^{79} , I^{129} , Np^{237} , Sr^{90} , Tc^{99} , Co^{60} , Nb^{94} , Ru/Rh^{106} , Cs^{134} , Cs^{137} , Ce^{144} , Eu^{154} , Eu^{155} , and Ra^{226} .

QUALITY ASSURANCE OF THE ANALYTICAL SYSTEM AND DATA

CONTROLLED PROCEDURES

Every analytical procedure used to develop data for the evaporator project was performed under the direction of written procedures (except for the dilution procedure, as discussed above) which were/are reviewed and approved at least every two years. Revisions to existing procedures were and are generated for corrections or updating as needed, and were/are distributed promptly to replace obsolete versions.

STATISTICAL EVALUATION

Performance data have been gathered historically on each analytical procedure for which there is a Laboratory Measurement Control System (LMCS) standard available. The percent recovery (an assessment of procedure accuracy) has been determined and stored in the LMCS computer data base for each LMCS standard. On a yearly basis, a statistical evaluation of these data has been made to generate new acceptance control limits for future analyses of LMCS standards.

An evaluation of the mean and standard deviation values for each of the procedures has also been used to signal needed improvements in these procedures, when means deviate significantly from 100 percent or when standard deviations are relatively large.

REVIEW OF DATA

Each batch was reviewed for accuracy at several levels. Chemists reviewed not only analytical calculations, but checked to determine that the analytical system was performing appropriately and that the laboratory technicians were following written procedures.

A team of technicians recalculated values on the traveler cards, and checked the information reported by the chemists for completeness.

The Quality Control Officer, within 222-S Laboratory's Program Support Group performed the second general review of analytical data, by recalculating final values from the raw data and checking the information reported by the chemists and technicians for completeness.

A third general review was performed by the project coordinator, which included those items checked previously by others, but also included checking of tabular data summaries. A peer review of this narrative was performed by other project coordinators in the Program Support Group.

The Sample Data and Laboratory Administration group within Analytical Services performed a final review of the data package immediately prior to data package validation.

ANALYTICAL DATA REPORTING

LABORATORY CUSTOMER COMPUTER SYSTEM

Following the completion of Analytical Batch Summary Sheets, all data within each batch were taken to a Lab Leader for keyboard entry of final values into the Laboratory Customer Computer System (LCCS).

ANALYTICAL DATA SPREADSHEETS

Computer generated summary data tables were created from a spreadsheet program to facilitate evaluation of both sample and quality control data. All data were reviewed by the project coordinator to determine that these data were transcribed correctly from the batch summary sheets and Ward's™ package to the spreadsheets. These spreadsheets were incorporated into the Results of Analyses section of this data package.

CASE NARRATIVE

This case narrative was prepared in accordance with the following source documents:

- WAP, section 5.1.7,
- QAPjP, sections 3.1, 3.2, 3.4, 3.6, 7.1, 7.3, and 8.1 (with the exception as stated in the TPP that the "QA Report" which was generated was not produced by a QA Officer),
- SOW, sections 4.0 through 4.3, and
- TPP, sections 2.2.4, 5.1 and 5.3.

The intent of this narrative is to:

- Present required analytical data,
- Evaluate the quality of these data,

- Document problems encountered while performing the analytical procedures,
- Characterize the nature of the constituents within tank 108-AP, and
- Interpret, whenever possible, the relevance or impact of these findings on the evaporator program.

ANALYTICAL REQUIREMENTS AND PROCEDURES

SAMPLE PRESERVATION

As per directions in the WAP, section 5.1.5.1, no preservation of samples (acidification or refrigeration) was performed at the time of sampling.

No attempt was made to preserve the samples while they were held in the laboratory because of the small initial sample volume (100 ml). The project coordinator was concerned that if part of the sample was split for acid preservation, that there would likely be insufficient sample volume remaining to perform all of the requested analyses. See the discussion below on Analytical Aliquots for further details.

SAMPLE HOLDING TIME

The QAPjP, section 3.6 states the following:

"Holding times for samples that need not require processing in the hot cell shall be equivalent to SW-846 (EPA 1986) defined times. If no SW-846 holding time exists for a specific constituent, the holding time will be three months."

The 1986 version of SW-846 was superseded by the 1992 revision. For this project, the SW-846 maximum sample holding time limits that were applicable are found in volume IA, Table 2-21 (revision 1, July 1992). Table 4 below shows these sample holding times.

Table 4. Maximum SW-846 Sample Holding Limits		
Parameter	Maximum Holding Time	Preservation
Chloride	28 days	none
Cyanide	14 days	4°C
Nitrate	48 hours	4°C
Sulfate	28 days	4°C
Mercury	38 days (in glass)	HNO ₃ to pH<2
Metals *	6 months	HNO ₃ to pH<2
Total Alpha	6 months	HNO ₃ to pH<2
Total Beta	6 months	HNO ₃ to pH<2
Radium **	6 months	HNO ₃ to pH<2

* Other than Hg & Cr⁶⁺

** Radiological

Agreement within the scientific community is divided with regard to reasonable sample holding times. SW-846 holding times are based on worst-case scenarios and in many cases are excessively short. Note that SW-846 protocol expects that samples are to be preserved at the time of collection for SW-846 holding times to be valid. However, Tank 108-AP samples were intentionally not preserved so as to limit the exposure dosage of ionizing radiation to personnel.

Sample degradation can occur due to many factors. One of these factors, biological degradation, is typically controlled by the addition of a strong acid, creating a hostile biological environment due to extreme pH. For biological degradation of tank 108-AP samples, it can be argued that sample preservation with the use of acid was unnecessary because of ionizing radiation lethal to micro-organisms. In the case of cyanide, the native sample pH (approximately 8.5 to 9) was a natural preservative because it prevented the formation of volatile HCN.

The sample holding time for each analyte is discussed individually in the Results of Analyses section later in this narrative.

ANALYTICAL ALIQUOTS

Because of the possibility of exhausting the sample before all of the analyses could be analyzed and accepted, analytical aliquots were minimized whenever possible. Aliquot size was generally not minimized when the analyte was considered by the project coordinator to be a significant constituent and the analyte concentration in the sample was expected to approach the detection limit.

A check was made of the original sample volume remaining upon completion of all analyses. It was evident in retrospect that this conservative approach was warranted. Otherwise, it is likely that analyses on sample V62 would not have been completed. The final sample volumes are shown in Table 5.

Table 5. Final Sample Volumes		
Sample ID	Sample Description	Final Volume (ml)
V62	108-AP-A	5
V63	108-AP-B	50
V67	108-AP-C	30
V68	108-AP-D	35
V69	108-AP-E	30
V73	108-AP-FB	60

PREPARATIVE METHODS

The TPP, which was the implementation document, was written prior to sample collection, consequently it was necessary to decide which preparative procedures to use on the samples without having an opportunity to see them in advance. Such visual observations generally yield significant information;

ADDENDUM 1A,

allowing better decisions regarding sample digestions, and so forth. For this reason, directions given in the TPP on preparative procedures should be considered as general guidance only.

A TPP appendix table specified which preparative method was to be used for each constituent. All sample preparations conformed to the TPP specifications except for ammonia, strontium-90, selenium-79, technetium-99 and total alpha. Ammonia analyses were performed on dilutions to preserve the limited volume of available sample. When the samples were received, it was decided by the project coordinator and the cognizant scientist that an acid digestion of the samples for Sr^{90} , Se^{79} , Tc^{99} , and total alpha would more completely solubilize the sample analytes (rather than a direct or acid dilution preparation as directed in the TPP). It was expected that better homogenization through solubilization would produce better analytical precision and accuracy.

Table 6 shows a comparison of the preparative procedures stated in the TPP with preparative procedures actually performed:

ADDENDUM 1A,

Table 6. TPP Cited Preparation Procedures vs. Actual Procedure Used		
Analytical Procedure	Procedure Stated in TPP	Actual Procedure Used
Appearance	direct	direct
Diff. Scanning Calorimetry	direct	direct
Specific Gravity	direct	direct
Induct Coupled Plasma	acid digestion	acid digestion
Arsenic	acid digestion	acid digestion
Selenium	acid digestion	acid digestion
Mercury	direct	direct
Uranium	direct	direct
Ion Chromatography	direct or H ₂ O dilution	direct & H ₂ O dilution
Ammonia *	direct or acid dilution	H ₂ O dilution
Cyanide	direct or H ₂ O dilution	direct & H ₂ O dilution
CO ₂ (TIC)	direct or H ₂ O dilution	direct
Hydroxide	direct or H ₂ O dilution	direct
Gamma Energy Analysis	acid dig, direct, or acid dil	acid digest
Pu ^{239/240}	acid dig, direct, or acid dil	acid digest
Am ²⁴¹	acid dig, direct, or acid dil	acid digest
Cm ²⁴⁴	acid dig, direct, or acid dil	acid digest
Np ²³⁷	acid dig, direct, or acid dil	direct
Sr ⁹⁰ *	direct or acid dilution	acid digest
Tc ⁹⁹ *	direct or acid dilution	acid digest
Se ⁷⁹ *	direct or acid dilution	acid digest
C ¹⁴	direct or H ₂ O dilution	direct
H ³	direct or H ₂ O dilution	direct
I ¹²⁹	direct or H ₂ O dilution	direct
Total Alpha *	direct or acid dilution	acid digest
Total Beta	acid dig, direct, or acid dil	acid digest

* Deviations from stated procedure in TPP.

ADDENDUM 1A,

ANALYTICAL PROCEDURES

Each procedure used for this project was a controlled procedure. All procedures were evaluated and approved for a maximum period of two years. Procedures may be modified, or deleted as appropriate. Each time a procedure was modified, however, a new revision number was added to the procedure number. Upon review (at the end of the two year period), a procedure approval may be extended for another two year period without a change in revision number. During this project the following procedures were reviewed, approved, and extended without a revision number change to meet the 2-year requirement.

Strontium-90	LA-220-101/D-0	Reviewed 6/22/93
Specific gravity	LA-510-112/C-2	Reviewed 6/26/92
Gamma energy analysis	LA-548-121/D-0	Reviewed 6/10/93
Gamma energy analysis	LA-508-052/B-4	Reviewed 6/9/93
Ion Chromatography	LA-533-105/C-1	Reviewed 8/24/93
Uranium	LA-925-106/B-1	Reviewed 2/14/94
Liquid Scintillation	LA-508-121/B-0	Reviewed 8/11/93
Carbonate	LA-622-102/B-2	Reviewed 4/14/94

Analytical procedures used for the evaporator project were listed initially in the TPP and are shown in Table 7. Several of those listed in the TPP were for process control sample analyses (nonprotocol) and were not used for the evaporator feed tank samples.

ADDENDUM 1A,

Table 7. 108-AP Procedure Listing

JPP Cited Procedure		Actual Procedure Used				
Procedure #	Procedure Title	Procedure #	Rev #	Procedure Title	Issue Date	Analysis Dates
LA-505-151	ICP Emission Spectrometer Method for Trace Element Analysis	LA-505-151	D-1	ICP Emission Spectrometer Method for Trace Element Analysis	02-17-93	04-28 to 05-03-94
	Not Cited	LA-505-161	A-0	Inductively Coupled Plasma (ICP) Emission Spectrometric Method for the Thermal Jarrell Ash (TJA), Type 61E	03-22-94	07-21-94
LA-325-104	Mercury Analysis by Atomic Absorption (Manual Cold Vapor Technique)	LA-325-104	A-1	Mercury Analysis by Atomic Absorption (Manual Cold Vapor Technique)	03-12-93	04-15 to 07-07-94
LA-695-102	Microdistillation and Spectrophotometric Determination of CN	LA-695-102	B-2	Microdistillation and Spectrophotometric Determination of CN	02-24-94	04-17 to 07-29-94
LA-510-112	Specific Gravity of High Beta Gamma Caustic Samples	LA-510-112	C-2	Specific Gravity of High Beta Gamma Caustic Samples	Reviewed 06-26-92	04-07 to 04-16-94
LA-519-151	Visual Check and Over-The-Top Reading	LA-519-151	E-1	Visual Check and Over-The-Top Reading	02-22-93	04-07-94
LA-533-105	Anion Analysis of Dionex Model 4000i	LA-533-105	C-1	Anion Analysis of Dionex Model 4000i	Reviewed 08-24-93	04-13 to 04-21-94
LA-533-105	Anion Analysis of Dionex Model 4000i	LA-533-105	C-2	Anion Analysis of Dionex Model 4000i	06-30-94	07-24-94
LA-355-131	Arsenic Analysis by Hydride Generation Atomic Absorption	LA-355-131	B-1	Arsenic Analysis by Hydride Generation Atomic Absorption	12-09-92	06-15 to 08-10-94
LA-365-131	Selenium Analysis by Hydride Generation Atomic Absorption	LA-365-131	B-2	Selenium Analysis by Hydride Generation Atomic Absorption	12-09-92	05-10 to 08-03-94
LA-514-113	Differential Thermal Analysis of Caustic Samples	LA-514-113	B-0	Differential Thermal Analysis of Caustic Samples	12-14-93	04-08 to 04-25-94
LA-925-106	Determination of Uranium by Laser Fluorimetry	LA-925-106	B-1	Determination of Uranium by Laser Fluorimetry	Reviewed 02-14-94	04-10 to 07-04-94
LA-661-102 or LA-661-103	Determination of Hydroxide Ion in solutions containing Hydrolyzable Anions (Auto) Determination of OH Ion in Solutions by Potentiometric Titration Manual	LA-211-102	B-1	Determination of Acid/Base/pH Using Metrohm 682 Titrprocessor (Hydroxide)	08-18-93	04-26 to 07-03-94
LA-634-102	Ammonia by Kjeldahl	LA-634-102	D-2	Ammonia by Kjeldahl	10-18-93	04-16 to 07-22-94
	Not Cited	LA-631-001	A-0	Determination of Ammonia by Selective Ion Electrode Using a Double Increment Known Additions Method	04-13-94	05-29 to 08-31-94

ADDENDUM 1A,

Table 7. 108-AP Procedure Listing

YPP Cited Procedure		Actual Procedure Used				
Procedure #	Procedure Title	Procedure #	Rev #	Procedure Title	Issue Date	Analysis Dates
LA-622-102	Determination of Carbonate in Solutions by Coulometry	LA-622-102	B-2	Determination of Carbonate in Solutions by Coulometry	Reviewed 04-14-94	04-12 to 07-18-94
	Not Cited	LA-505-158	A-3	Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by FLAA and ICP Spectroscopy	09-14-93	04-14 to 07-18-94
	Not Cited	LA-504-101	C-0	Water Leach of Solids with Residual Solids Collection.	06-22-93	04-08 to 07-18-94
LA-548-121	Preparation of Sample Mounts for GE(Li) GEA - Low Level	LA-548-121	D-0	Preparation of Sample Mounts for GE(Li) GEA - Low Level (preparation for LA-508-052)	Reviewed 06-10-93	05-03 to 07-18-94
LA-508-052	Gamma Energy Analysis on the Canberra Jupiter System	LA-508-052	B-4	Gamma Energy Analysis on the Canberra Jupiter System (subsequent to LA-548-121)	Reviewed 06-09-93	
LA-508-052	Gamma Energy Analysis on the Canberra Jupiter System	LA-508-052	B-5	Gamma Energy Analysis on the Canberra Jupiter System (subsequent to LA-548-121)	06-20-94	
LA-508-101	Low Level Alpha and Beta in Water Samples (prep)	LA-508-101	D-0	Low Level Alpha and Beta in Water Samples (preparation for LA-508-114)	08-19-92	05-10-94
LA-508-101	Low Level Alpha and Beta in Water Samples (prep)	LA-508-101	D-1	Low Level Alpha and Beta in Water Samples (preparation for LA-508-114)	07-19-94	07-23-94
	Not Cited	LA-508-114	A-1	Operation of Gamma Products Alpha Beta Counting Systems Using PC Control (Subsequent to LA-508-101)	Reviewed 05-15-92	
LA-503-156	Determination of Pu and Ion Exchange Solvent Extraction	LA-503-156	D-0	Determination of Pu and Ion Exchange Solvent Extraction (also Am-241 and Cm-244)	12-03-91	04-28-94
LA-503-156	Determination of Pu and Ion Exchange Solvent Extraction	LA-503-156	D-1	Determination of Pu and Ion Exchange Solvent Extraction (also Am-241 and Cm-244)	05-23-94	08-05-94
LA-365-132	Determination of Se-79	LA-365-132	B-0	Determination of Se-79	09-25-91	05-04-94
LA-933-141	Determination of Np-237 by ToIOA/TTA Extraction and Alpha Counting	LA-933-141	H-0	Determination of Np-237 by ToIOA/TTA Extraction and Alpha Counting	09-09-91	04-20-94
LA-220-101	High Level Strontium-89, 90 in Aqueous Samples	LA-220-101	D-0	High Level Strontium-89, 90 in Aqueous Samples	Reviewed 06-22-93	05-04-94
LA-438-101	Determination of Tc-99 by Solvent Extraction and Liq. Scint Counting	LA-438-101	D-1	Determination of Tc-99 by Solvent Extraction and Liq. Scint Counting	09-04-91	04-29-94
LA-378-103	Determination of Iodine-129 in Waste Tank Samples	LA-378-103	B-3	Determination of Iodine-129 in Waste Tank Samples	11-02-93	04-09-94

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Table 7. 108-AP Procedure Listing						
JPP Cited Procedure		Actual Procedure Used				
Procedure #	Procedure Title	Procedure #	Rev #	Procedure Title	Issue Date	Analysis Dates
LA-348-104	C-14 in Small Volume Samples by Persulfate Oxidation and Liq. Scint.	LA-348-104	B-0	C-14 in Small Volume Samples by Persulfate Oxidation and Liq. Scint.	07-31-91	04-12-94
LA-218-114	Tritium by Lachat Micro-Dist. and Liquid Scintillation Counting (LS)	LA-218-114	A-2	Tritium by Lachat Micro-Dist. and Liquid Scintillation Counting (LS)	01-14-93	04-13-94
LA-508-121	Operation of the Beckman Liquid Scintillation Counter	LA-508-121	B-0	Operation of the Beckman Liquid Scintillation Counter (subsequent to LA-218-114 & LA-348-104)	Reviewed 08-11-93	
LA-645-001	Spectrophotometric Determination of Nitrite	Not Used		See LA-533-105		
LA-212-101	Set Up and Standardization of pH Meter and Glass Electrode	Not Used		See LA-211-102		
LA-212-102	Determination of pH Direct Measurement	Not Used		See LA-211-102		

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

DETECTION LIMITS

Detection limits were defined for each procedure without reference to a uniform laboratory protocol to determine such limits. ICP detection limits were derived from CLP protocol. Some of the procedures used the reagent blank value as the detection limit. Some procedures used the concentration of the lowest standard in the calibration curve as the detection limit. In no case was the matrix considered in generating the detection limit and therefore would not qualify as a "method detection limit". Wherever possible, and unless stated differently in the discussion of each analyte, the detection limit was modified by the typical dilution factor of the samples to provide a more representative value relative to the samples. All of those practices described above are allowed as estimated quantitation limits by SW-846 protocol.

SIGNIFICANT FIGURES

The QAPjP, page 6, states that the report must not contain a greater number of significant figures than is defined in the procedure. A review was made of each controlled procedure to insure compliance with any stated significant figure requirements. The only procedure which specified significant figures was specific gravity. For this parameter, the reported value must have three digits to the right of the decimal in standard numerical notation (not scientific notation) format. Specific gravity was reported with the specified number of significant figures.

CALIBRATION DATA

The QAPjP states that for manually generated calibration curves, sufficient data will be placed into the data package that will allow the recalculation of the slope, Y-intercept, and correlation coefficient (r^2); and that the r^2 is within specifications given in the procedure.

Raw calibration data can be found on instrumentation printouts, copies of logbook pages, traveler cards and/or summary sheets, but are not given in this narrative. These data were incorporated in the raw data portion of this data package for reference. Of those analytes for which a standard curve was manually generated, summary data [i.e. slope, Y-intercept, and correlation coefficient (r^2)] are provided in the Results of Analyses section of the narrative.

Only two of the 222-S analytical procedures stated a required correlation coefficient (r^2). The required correlation coefficient for mercury was $r^2 > 0.995$. Cyanide had a required r^2 of > 0.999 . During analyses, both cyanide and mercury had r^2 values greater than the required value for all batches.

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

EVAPORATOR BOUNDARY CONDITION LIMITS

To evaluate compliance with required boundary conditions, final values for Differential Scanning Calorimeter, nitrate, nitrite and hydroxide concentrations have been used. These are shown and evaluated in the Results of Analyses section and in the Summary Tables.

Those boundary conditions given in section 4 of the Waste Analysis Plan which were relevant to the analyses performed by the 222-S Laboratory are shown in Table 8.

Table 8. Relevant Boundary Conditions for Tank 108-AP	
Parameter	Boundary Condition
DSC	No exotherms <450°F
Nitrate	<40% by weight
Nitrite	<40% by weight
Condition 1 Hydroxide Nitrite	When $[NO_3] \leq 1.0 \text{ M}$: $0.01\text{M} \leq [\text{OH}] \leq 5.0\text{M}$ $0.011\text{M} \leq [\text{NO}_2] \leq 5.5\text{M}$
Condition 2 Hydroxide Nitrite	When $1.0\text{M} < [NO_3] < 3.0 \text{ M}$: $0.01 \times [NO_3] \leq [\text{OH}] \leq 10\text{M}$ $[\text{OH}] + [\text{NO}_2] \geq 0.4 \times [NO_3]$
Condition 3 Hydroxide Nitrite	When $3.0\text{M} < [NO_3] < 5.0 \text{ M}$: $0.3\text{M} \leq [\text{OH}] \leq 10\text{M}$ $[\text{OH}] + [\text{NO}_2] \geq 1.2$

No DSC exotherms were observed on any of the Tank 108-AP samples.

Nitrate was determined to be approximately 1560 $\mu\text{g/ml}$, which equates to 0.0252M or 0.16 percent (w/v).

Hydroxide was determined to be less than 125 $\mu\text{g/ml}$ for each of the samples (except for V62, which was <250 $\mu\text{g/ml}$). If it is assumed that the hydroxide concentration of all samples is the same (<125 $\mu\text{g/ml}$), then the average concentration is <125 $\mu\text{g/ml}$, which is <0.0073M.

The tank's mean nitrite concentration was determined to be approximately 1,012 $\mu\text{g/ml}$, which equates to 0.0220M or 0.10 percent (w/v).

The nitrate molar concentration of 0.0252 places condition 1 (Table 8) into effect. Under condition 1, the boundary condition for hydroxide concentration (which was determined to be <0.0073M in Tank 108-AP) was not within limits because it was less than the lower limit of 0.01M. Under condition 1, the

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

boundary condition for nitrite concentration (which was determined to be 0.0220M in Tank 108-AP) was within limits, because it was greater than the lower limit of 0.011M and less than the upper limit of 5.5M.

QUALITY CONTROL REQUIREMENTS

STANDARDS

The laboratory control standards (LCS), which were discussed in numerous places of the source documents (WAP, QAPjP, SOW, and TPP), were interpreted to mean Laboratory Measurement Control System (LMCS) standards, which are specific to the 222-S Laboratory. Statistical data on LMCS standards were discussed previously in the Statistical Evaluation section. These standards were generated in house by a special group within 222-S Laboratory using controlled procedures. Analyte concentrations within these standards were known to the analysts.

LMCS control limits (typically the statistical mean $\pm 3\sigma$) existing at the time of analysis were used to meet laboratory control standard (LCS) control limit requirements, as described in the TPP, section 4.2. For some procedures (for example ICP), an administrative control limit was used rather than a statistically derived limit. In the case of ICP, not enough analytical data had been produced on the Thermal Jarrell Ash instrument to generate statistically valid control limits, so limits of 85 to 115 percent were set for all batches analyzed on that instrument.

Nondigested LMCS standards were used to assess the quality control status of procedures. If an LMCS standard failed to meet the control criteria, an Off Standard Condition existed. As a consequence, no data were allowed to be reported from that batch.

No LMCS standard was available for the following analytes: appearance, Cs¹³⁴, Ce¹⁴⁴, Ru¹⁰³, Ru¹⁰⁶, Nb⁹⁴, Eu¹⁵⁴, Eu¹⁵⁵, Se⁷⁹, Cm²⁴⁴, Ra²²⁶ and Pu²³⁸.

The QAPjP, section 3.1, states the following regarding acceptance criteria of LMCS standard data generated by ICP.

"When at least 10 analytes fail to meet the LCS recovery, the sample must be rerun. Only one rerun will be performed. If the rerun results are unacceptable and remain outside the QC specifications, the rerun set of results will be reported in the data package narrative as a potential quality control problem."

This statement was interpreted to mean that if 10 or more of the 12 required analytes determined by ICP fail to meet the 85 to 115 percent control limit criteria for LMCS standards, then those data will be rejected and one rerun be performed.

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

LMCS control limits for each analyte are discussed in the Results of Analyses section later in the narrative.

BLANKS

One reagent blank was analyzed with each batch of non-digested samples except for appearance and DSC. One preparation blank was analyzed with each batch of acid digested samples.

The QAPjP, section 8.2, required that the field blank be analyzed for only these ICP parameters: Ag, Al, As, Ba, Cd, Cr, Na, and Pb. During a telephone conversation in late June, 1993, between the evaporator project cognizant engineer and the 222-S Laboratory project coordinator, it was agreed that a single determination of the field blank for each radiochemistry analysis would be performed whenever possible. It was also agreed that duplicate analyses of the field blank would be performed on each inorganic analysis whenever possible.

A field blank was analyzed for the following constituents: Ag, Al, Ba, Ca, Cd, Cr, Fe, Mg, Mn, Na, Pb, Zn, As, Se, Hg, OH⁻, TIC, CN⁻, U, NH₄⁺, F⁻, Cl⁻, NO₃⁻, NO₂⁻, PO₄⁻³, SO₄⁻², Ce¹⁴⁴, Cs¹³⁴, Cs¹³⁷, Co⁶⁰, Eu¹⁵⁴, Eu¹⁵⁵, Nb⁹⁴, Ra²²⁶, Ru¹⁰⁶, total alpha, and total beta.

No field blank was analyzed for the following constituents: appearance, DSC, specific gravity, H³, C¹⁴, Se⁷⁹, Tc⁹⁹, Sr⁹⁰, I¹²⁹, Np²³⁷, ^{239/240}Pu, Pu²³⁸, Am²⁴¹, and Cm²⁴⁴.

Blanks were considered by the project coordinator to be contaminated when any constituent was determined to be equal to or greater than 20 percent of the average concentration of that analyte in the sample. If both the blank and sample were detectable but very near the detection limit, the preceding criterion did not apply.

The definition given by the QAPjP, section 8.3, to contamination of blanks applied only to field blanks. It stated:

"Contamination shall be evaluated by comparison to a reagent blank run at the same time. The field blank is acceptable if the concentration of all analytes in the reagent blank is less than 20% of the concentration of the corresponding analytes in the field blank."

The mathematical interpretation of the QAPjP definition is that the field blank's constituents must be no greater than 5 times the reagent blank concentration. Although this definition is certainly more conservative than the definition used by the project coordinator, it is unrelated to the sample concentrations. The purpose of analyzing a field blank is to determine

WMC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

whether sampling conditions (in the field) inadvertently increase the sample's true concentration. Unless field blank analyte concentrations are relevant to the sample (rather than to a reagent blank), the designation of "contamination" is meaningless.

DUPLICATE ANALYSIS

Duplicate analyses were performed on every sample for every analyte except for appearance. No quality control criteria were specified in any of the source documents, and generally no reruns were performed when it appeared that a significant difference occurred between a sample and its duplicate.

SPIKE/SPIKE DUPLICATE ANALYSIS

The QAPJP, section 8.4, 8.5, and 8.7, required spike/spike duplicate analyses on the following parameters: each of the analytes by the ICP, atomic absorption spectrophotometry and ion chromatography procedures, and for TIC, CN^- , U, NH_4^+ , H^3 , C^{14} , total alpha, total beta, Nb^{94} , and Ru^{106} . Table 15A of the QAPJP has inconsistencies compared with the narrative in its sections 8.4, 8.5 and 8.7. When inconsistencies appeared, priority was given to the narrated sections.

One spike and one spike duplicate were performed for each of the procedures above for each sampling event. Sampling event was defined (consistent with QAPJP, section 8.2, paragraph 1) to mean all sample collections from a tank. In practice, one spike/spike duplicate was analyzed for each of the analytes by the ICP, atomic absorption spectrophotometry and ion chromatography procedures, and for TIC, CN^- , U, NH_4^+ , Am^{241} , H^3 , C^{14} , Tc^{99} , Sr^{90} , I^{129} , Np^{237} , $\text{Pu}^{239/240}$, total alpha, and total beta.

No spikes and spike duplicates were performed for the following analytes: OH^- , DSC, specific gravity, Cs^{137} , Co^{60} , Nb^{94} , Ru^{106} , Ce^{144} , Cs^{134} , Eu^{154} , Eu^{155} , Ra^{226} , Se^{79} , Pu^{238} , and Cm^{244} .

It was not necessary to perform a spike/spike duplicate on Nb^{94} and Ru^{106} because they were analyzed by gamma energy analysis, for which the only LMCS standards that exist are for Cs^{137} and Co^{60} . The cognitive chemist has stated that for analytes determined by gamma energy analysis, a spike was unnecessary. This was because the purpose of spiking was to determine the impact of the sample matrix on analyte recovery, yet the chemist claimed that the matrix does not interfere with gamma counting when quantifying these radionuclides.

For an evaluation of accuracy, the QAPJP required a recovery on all spiked samples of 75 to 125 percent, except for DSC (which required recovery limits of 90 to 110 percent). A stipulation was made in the TPP that the 75 - 125 percent recovery criteria were valid only when the analyte

1A-25

ADDENDUM 1A,

concentration in the spiked sample was increased by at least 25 percent more than the original sample concentration. In the case of DSC, it was not possible to measure percent recovery, not only because there is no spiking standard available for DSC, but also because the data are qualitative. That is to say, that data generated by DSC on each sample either detected exotherms or did not detect exotherms. As is noted later in the Results of Analyses section, no DSC exotherms were observed in any sample.

To evaluate precision, the QAPjP required a relative percent difference (RPD) between the spike and spike duplicate of equal to or less than 20 percent. A stipulation was made in the TPP that this criterion was valid only when the analyte concentrations of the spike and spike duplicate were greater than ten times the detection limit.

RESULTS OF ANALYSES (DATA SUMMARY AND EVALUATION)

PHYSICAL ANALYSES

APPEARANCE/HOMOGENEITY

Observations were performed on the direct (unmodified) sample. No instruments were used, consequently there was no instrument calibration. No quality control criteria were defined in the source documents nor were they required.

All analyses were performed on 4/7/94. SW-846 does not define a holding time criteria for this parameter.

Analyses were performed by procedure number LA-519-151/E-1 at approximately 24°C and are shown in Table 9.

ADDENDUM 1A,

Table 9. Appearance/Homogeneity Analysis Summary				
Sample ID	Lab ID	Visual Observations	Dose Rate/hr	Sample Size
V62	108-AP-A	Cream color, clear, no solids, single phase: liquid	8 mRad at 4"	≈100 ml
V63	108-AP-B	Pale yellow color, clear, small amount of solids, single phase: liquid	7 mRad at 4"	≈100 ml
V67	108-AP-C	Pale yellow color, clear, small amount of solids, single phase: liquid	7 mRad at 4"	≈100 ml
V68	108-AP-D	Pale yellow color, clear, no solids, single phase: liquid	7 mRad at 4"	≈100 ml
V69	108-AP-E	Pale yellow color, clear, small amount of solids, single phase: liquid	7 mRad at 4"	≈100 ml
V77	108-AP-COM	Pale yellow color, clear, small amount of solids, single phase: liquid	4 mRad at 4"	≈45 ml

From the visual appearance, the samples were nearly homogeneous. The precipitated solids that were seen in samples V63, V67, V69 and V77 constituted a minor fraction of the sample. These samples did not require heating or dilution to maintain solubility.

DIFFERENTIAL SCANNING CALORIMETRY

Analyses were performed on the direct sample using procedure/revision number LA-514-113/B-1 (Differential Thermal Analysis) and instrument number WC16134.

No unusual instances or problems occurred during the analyses of DSC. SW-846 protocol do not specify a hold time for DSC. Sample holding times ranged from 18 to 39 days.

The QAPjP requires an LMCS percent recovery of 90 to 110 percent. The new LMCS control limits for DSC are 27 to 30 joules per gram, which is equivalent to 94.9 to 105.4 percent recovery for electronic data processing (EDP) code number R230. DSC analyses of LMCS standards for tank 108-AP yielded recoveries ranging from 97.0 to 103.7 percent, and met QAPjP and LMCS quality control criteria.

WMC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Endotherms were observed as expected in the standards, as well as in all samples. The sample endotherms were due to the presence of water, but because no exotherms were present, the water endotherms were not integrated. No blank was run for DSC, because it was unnecessary for the Mettler DSC instrument, which is sufficiently stable that baseline aberration would be observable on the sample thermogram.

Although sample precision was not quantifiable, there were no deviations between the sample data and the corresponding duplicate sample data. Because no standard exists that can be spiked into the samples, the evaluation of spike accuracy and duplicate spike precision was not possible.

Table 10 summarizes the DSC data.

Table 10. Summary of DSC Results	
Sample	Analytical Results
V60 (STD), 4/11/94	endotherm occurred between approximately 155°C and 163°C, 102.6% recovery.
V62	no exotherms
V62 dup1	no exotherms
V60 (STD), 4/25/94	endotherm occurred between approximately 155°C and 163°C, 101.2% recovery.
V63	no exotherms
V63 dup1	no exotherms
V65 (STD)	endotherm occurred between approximately 155°C and 163°C, 103.7% recovery.
V67	no exotherms
V67 dup1	no exotherms
S7954 (STD)	endotherm occurred between approximately 155°C and 163°C, 97.0% recovery.
V68	no exotherms
V68 dup1	no exotherms
V69	no exotherms
V69 dup1	no exotherms

ADDENDUM 1A,

SPECIFIC GRAVITY

Specific gravity analyses were performed on direct samples using procedure/revision number LA-510-112/C-2 (reviewed on 6/26/92) and instrument number WA90787.

No unusual instances or problems occurred during the analyses of specific gravity.

For specific gravity EDP code number S332, the LMCS control limits are 96.81 to 100.53 percent recovery. The historic mean recovery was 98.65 percent. For Tank 108-AP samples, LMCS standard recoveries (99.4 and 99.0 percent) were within acceptance limits.

Because a spiking standard was not available and spiking was not required, spikes and spike duplicates were not performed. As a consequence, data for spike accuracy and spike duplicate precision were not available.

The reagent blank values were 0.984 and 0.976 (relative to an expected value of 1.000 for pure water). Precision between each sample and its duplicate ranged from 0.20 to 0.91 relative percent difference. No Relative Percent Difference (RPD) quality control criteria were specified in the source documents between samples and their duplicates.

Specific gravity values for the samples were nearly equivalent to blank values, indicating that Tank 108-AP constituents were low in dissolved solids. The grand average of sample averages was 0.988.

INORGANIC ANALYSES

ION CHROMATOGRAPHY

All ion chromatography (IC) analyses were performed on dilutions of the direct samples, using procedure/revision numbers LA-533-105/C-1 and LA-533-105/C-2, and instruments numbered WB54428 and WC41533. As was discussed above, Tank 108-AP samples were not preserved. Due, however, to the characteristic high radioactivity of the waste, the samples were not likely to be subject to biodegradation, which is generally the greatest source of nitrate deterioration.

The detection limit for all of the IC analytes was set at the concentration equivalent to the lowest standard within the calibration curve multiplied by the dilution factor from the "water leach" pretreatment. For some analytes, the sample detection limit was generated by multiplying the above detection limit by an additional factor based on the sample aliquot that was injected into the IC (that is to say, 11 or 101).

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

FLUORIDE

For Fluoride (EDP code R974), the LMCS control limits ranged from 84.01 to 114.39 percent recovery. The historic mean recovery within the data base was 98.94 percent. LMCS standard recoveries for all Tank 108-AP samples were acceptable with values ranging from 95.2 percent to 100.5 percent.

Sample holding times ranged from 24 to 27 days. Because SW-846 does not specify a holding time for fluoride, all sample holding times were met.

A partially coeluting peak (unidentified compound) interfered with the quantitation of fluoride peaks. The chemist noted that oxalate interference occurred for the V68 duplicate sample. A rerun was performed for V62 and V63, however the spike recoveries were worse than the original run, consequently the original data were reported. Fluoride accuracy using the ion chromatography procedure was a problem for wastes from tanks 101-AP and 107-AP and continued to be a problem for tank 108-AP as evidenced by the unacceptable spike recovery of 142.2 percent.

Precision between the V62 spike and spike duplicate was unacceptable with 26.2 RPD, which was slightly over the acceptance limit of 25%. RPDs between the samples and their duplicates ranged from 2.6 to 17.6, indicating reasonable precision.

The reagent blanks and field blank fluoride concentrations were less than the detection limits of 0.1 $\mu\text{g/ml}$ and 1 $\mu\text{g/ml}$, respectively, indicating the absence of contamination.

Average fluoride concentrations of the samples ranged from 19.4 to 51.3 $\mu\text{g/ml}$, with the grand average of 34.1 $\mu\text{g/ml}$. These fluoride values are questionable with regard to accuracy and should be used as estimates only.

CHLORIDE

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 24 to 27 days. SW-846 specifies a holding time for chloride of 28 days, consequently all sample holding times were met.

For chloride (EDP code R972), the LMCS control limits ranged from 89.67 to 115.08 percent recovery. The historic mean recovery within the data base was 99.66 percent. LMCS standard recoveries were acceptable at 100.7 percent, 100.0 percent and 109.6 percent.

Acceptable accuracy as indicated by recoveries of the spike and spike duplicate were 112.9 percent and 97.7 percent, respectively.

Precision between the spike and spike duplicate was acceptable with 14.4 RPD. Precision between the tank samples and their duplicates was reasonable with values ranging from 0.9 to 14.0 relative percent difference.

A precision problem was noted in the field blank where the RPD was 95.7 between the sample and its duplicate. Although this situation was noted, it was determined to be insignificant because the sample values were less than 10-fold greater than the detection limit. Additionally, the source documents do not specify precision quality control criteria which apply to the sample/sample duplicate. Despite these qualifications a discussion of this situation follows. These two sample preparations were reinjected into the ion chromatograph with essentially the same results as for the initial injections. The cognitive chemist speculated in the batch narrative that there was a problem with either sample homogeneity or with contamination of the sample duplicate during sample preparation. Because the field blank was generated from laboratory derived reagent grade water, non-homogeneity was not likely, indicating that the imprecision occurred during sample preparation. Due to the qualifications discussed above, it was, however, determined that the field blank was not contaminated.

The reagent blank chloride concentrations were uniformly less than the detection limit of 0.2 $\mu\text{g/ml}$, and were determined to not be contaminated.

Average sample chloride concentrations ranged from 29.4 to 60.0 $\mu\text{g/ml}$, with a grand average of 56.3 $\mu\text{g/ml}$.

NITRATE

There did appear to be a matrix interference for nitrate as noted by spike recoveries for sample V62, which was the reason for rerunning the test. The rerun data were of equivalent quality, consequently data from the original run were reported.

Sample holding times ranged from 24 to 27 days. SW-846 specifies a holding time for nitrate of 48 hours, consequently none of the sample holding times were met.

For nitrate (EDP code R978), the LMCS control limits ranged from 87.36 to 114.65 percent recovery. The historic mean recovery within the data base was 98.56 percent. LMCS recoveries were acceptable at 96.9 percent, 102.9 percent and 100.5 percent.

Acceptable accuracy was indicated for spiked sample V63 with a recovery of 104.2 percent recovery. Although this technically meets program requirements for accuracy, it must be noted that the spike duplicate's recovery was an unacceptable 169.5 percent.

Precision between the spike and spike duplicate failed to meet the program's precision criterion of 20%, by yielding a 47.7 relative percent difference.

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

RPDs between the samples and their duplicates ranged from 2.5 to 13.9, indicating reasonable precision.

The reagent blank nitrate concentrations were less than the detection limit of 1 $\mu\text{g/ml}$, and were determined to not be contaminated. Although the field blank failed to meet the program's 20% criterion for contamination (relative to the reagent blank), its chloride concentration was two orders of magnitude less than average sample concentrations, and would constitute an insignificant fraction of the sample concentration. As a consequence, the field blank was determined to not be contaminated.

Average nitrate concentrations of the samples ranged from 1,170 to 1,920 $\mu\text{g/ml}$, with the grand average of 1,560 $\mu\text{g/ml}$, which equates to 0.0252M or 0.16 percent (w/v).

Relative to environmental levels, Tank 108-AP nitrate concentrations are high. As a point of reference, the maximum contaminant level for nitrate in drinking water is 44 $\mu\text{g/ml}$. Relative to typical double shell tanks, however, Tank 108-AP nitrate values are low.

NITRITE

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 24 to 27 days. SW-846 does not specify a sample holding time for nitrite, consequently all sample holding times were met. It is known nonetheless that in the environment, nitrite is chemically less stable than nitrate, suggesting that at least for environmental samples, a sample holding time of short duration is reasonable. Tank 108-AP matrix is significantly different from that encountered environmentally, and may, however, have such conditions that nitrite could be chemically stable.

For nitrite (EDP code R968), the LMCS control limits ranged from 90.15 to 113.68 percent recovery. The historic mean recovery within the data base was 100.74 percent. LMCS standard recoveries were acceptable at 101.3, 99.8 and 101.9 percent.

Accuracy, as indicated by recoveries of the spike and spike duplicate, was acceptable with 84.5 percent and 112.7 percent, respectively.

Precision between the spike and spike duplicate failed to meet the acceptance criterion, where the value for V62 was 28.6 RPD. This condition occurred because although the spike and spike duplicate were within the accuracy range of 75 to 125 percent recovery, the recovery of the spike was on the low end of the range yet the spike duplicate's recovery was on the upper end. RPDs between the samples and their duplicates ranged from 0.5 to 12.7, indicating reasonable precision.

ADDENDUM 1A,

The reagent blanks and field blank nitrite concentrations were less than the detection limits of 1 and 10 $\mu\text{g/ml}$, respectively. These blanks were determined to not be contaminated.

Average nitrite concentrations of the samples ranged from 764 to 1,160 $\mu\text{g/ml}$, with the grand average of 1,012 $\mu\text{g/ml}$, which equates to 0.0220M or 0.10 percent (w/v).

Environmentally, nitrite is usually undetectable ($<0.1 \mu\text{g/ml}$). Tank 108-AP nitrite concentrations are high, but relative to typical double shell tanks, the values are low.

PHOSPHATE (ORTHO-PHOSPHATE)

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 24 to 27 days. Because SW-846 does not specify a holding time for phosphate, all sample holding times were met.

For phosphate (EDP code R976), the LMCS control limits ranged from 87.80 to 115.45 percent recovery. The historic mean recovery within the data base was 99.97 percent. LMCS standard recoveries were acceptable at 109.1, 108.5 and 105.6 percent.

Accuracy was acceptable as indicated by recoveries of the spike and spike duplicate with 98.3 percent and 91.3 percent, respectively.

Precision between the spike and spike duplicate was an acceptable 7.4 RPD. RPDs between the samples and their duplicates were good, ranging from 0.4 to 8.6 RPD.

The reagent blanks and field blank phosphate concentrations were less than the detection limits of 1 and 10 $\mu\text{g/ml}$, respectively.

Average sample phosphate concentrations ranged from 79.8 to 98.2 $\mu\text{g/ml}$, with a grand average of 92.7 $\mu\text{g/ml}$.

SULFATE

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 24 to 27 days. Because the SW-846 specified sample holding time for sulfate is 28 days, all sample holding times were met.

For sulfate (EDP code R970), the LMCS control limits ranged from 95.15 to 112.14 percent recovery. The historic mean recovery within the data base was

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

97.63 percent. LMCS standard recoveries were acceptable at 103.8 percent, 103.2 percent and 103.7 percent.

Accuracy was acceptable as indicated by percent recoveries of 106.5 and 93.3 for the spike and spike duplicate, respectively.

Precision between the spike and spike duplicate was an acceptable 13.2 RPD. RPDs between the samples and their duplicates was reasonable with values ranging from 6.5 to 11.1 relative percent difference.

Tank 108-AP reagent blank sulfate concentrations were less than the detection limit of 1 $\mu\text{g/ml}$. The field blank concentrations were less than the detection limit of 10 $\mu\text{g/ml}$, while the reagent blank for the field blank had a concentration of 1.5 $\mu\text{g/ml}$. All blanks were determined to not be contaminated.

Average sulfate concentrations of the samples ranged from 155 to 234 $\mu\text{g/ml}$, with the grand average of 201 $\mu\text{g/ml}$.

The sulfate concentration in Tank 108-AP is within the range of many western USA drinking water sources.

AMMONIA (by KJELDAHL/TITRATION and by ION SELECTIVE ELECTRODE)

Protocol analyses of ammonia were performed using procedure/revision number LA-634-102/D-2 (a kjeldahl/titration procedure) on "water digestion" samples. Instruments numbered AL-10696 and AL-10665 were used for all samples by this procedure. Because the kjeldahl procedure was relatively insensitive, an alternative procedure using ion selective electrode (ISE), LA-631-001/A-0, was also used. An instrument number was not assigned to the ISE instrumentation, but "water digestion" samples were also analyzed in this procedure. To prevent confusing these two sets of analyses, the analytical data will be discussed separately.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte by either procedure.

SW-846 does not specify a sample holding time for ammonia. Sample holding times ranged from 23 to 30 days for the kjeldahl procedure. Sample holding times ranged from 66 to 73 days for the ISE procedure. Although all sample holding times were officially met, these sample holding times for ammonia seemed unacceptably long, especially for unpreserved samples. The accepted method for ammonia preservation is to acidify samples at the time of collection to pH <2 with nitric acid. Although biodegradation was not expected to be a significant factor in decomposition of Tank 108-AP samples due to lethal radioactivity, it was expected and quite likely that, due to the slightly high pH of these samples, sample degradation could occur due to chemical reactions. At higher pH, ionic ammonia reacts with hydroxide to generate NH_3 , which is volatile and readily is dissipated at ambient temperature. Hydroxide concentration of these samples was less than the

ADDENDUM 1A,

detection limit. Thus due to sample matrix conditions, it is not certain that ammonia data are biased low due to the lengthy holding time.

The statistically derived LMCS control limits for the ammonia standard by the kjeldahl procedure (EDP code number S235) were 77.16 and 122.40 percent recovery. The historic mean recovery of that standard by that procedure was 99.49 percent. Actual LMCS standard recoveries were acceptable at 106.0 percent, 93.8 percent, and 96.9 percent for the three batches.

Ammonia accuracy by the kjeldahl procedure was determined to be acceptable, where the spike and spike duplicate recoveries were 101.4 percent and 100.4 percent, respectively.

Precision using the kjeldahl procedure was determined to be acceptable with a 1.0 RPD between the spike and its duplicate. Precision between samples and their duplicates was not able to be calculated because all values were "less than" values.

Ammonia concentration by the kjeldahl procedure was less than the detection limit for all reagent blanks and for the field blank, indicating that contamination was not a problem for the ammonia analysis.

Average sample concentrations using the kjeldahl procedure were all less than the detection limit of 800 $\mu\text{g/ml}$ NH_3 . It was because the detection limit by this procedure was so high that the ISE procedure was used in an attempt to better define the actual ammonia concentration in the samples.

No spike or spike duplicate was prepared to evaluate accuracy and precision using the ISE procedure. No LMCS standard control limits have been established because the procedure was only recently developed, allowing insufficient time to acquire a statistical data base. LMCS standards were analyzed, however, yielding good recoveries of 97.9, 95.3 and 103.9 percent.

Using the ISE procedure, the precision between samples and their duplicates appeared to be poor with values ranging from 5.8 to 35.8 RPD. These relative percent differences, however, were not valid, per TPP criteria, because the ammonia concentration of every sample was less than 10-fold greater than the detection limit. The TPP criterion is applied because analytical variability is expected to be much greater as values approach the detection limit.

Using the ISE procedure, all preparation blanks and the field blank had ammonia concentrations less than the detection limit.

Using the ISE procedure, the average sample concentrations ranged from 3.21 to 14.1 $\mu\text{g/ml}$, with a grand average of 8.22 $\mu\text{g/ml}$. These data were generated using a non-protocol procedure, consequently the sample values should be considered to be estimated.

ADDENDUM 1A,

HYDROXIDE (by TITRATION)

Hydroxide by procedure/revision number LA-211-102/B-1 was performed on the direct samples, using instruments numbered AL10636, AL10666 and AL10711.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 4 to 45 days. SW-846 did not specify a sample holding time for hydroxide, consequently all sample holding times were met.

The autotitrator pH was calibrated using standards of pH 7.00 and 10.00. During sample analyses, all titration endpoints were within the calibration range of pH 7 to 10 (except for the blanks as expected, where the pH shift was extreme with a minute addition of HNO_3 titrant).

Typical titration curves were seen in the analyses of Tank 108-AP samples in contrast to Tank 101-AP samples (which was discussed in the Tank 101-AP case narrative). It was believed that the cause of this situation was due to the relative absence of ammonia in tank 108-AP, which was shown to be the cause of interference with Tank 101-AP samples using this procedure.

No spikes were required by the source documents, consequently, no percent recovery data are available because no spikes were analyzed.

The statistically derived LMCS control limits for the hydroxide standard (EDP code number S273) were 93.28 and 108.71 percent recovery. The historic mean recovery was 101.20 percent. Actual LMCS standard recoveries for 108-AP analyses were acceptable with values of 103.4 percent, 98.8 percent and 102.0 percent for the three batches.

Precision of the sample and sample duplicate was not able to be calculated due to the "less than" sample values.

Reagent blanks are used to correct sample values, consequently it is not possible to "analyze" a reagent blank since a blank would be subtracted from the blank to yield a result of zero. Field blank hydroxide concentrations were less than their detection limits, which were dependent on the determination's aliquot size. All blanks were determined to not be contaminated.

Average hydroxide concentrations were not able to be calculated because of the "less than" sample values, however the estimated hydroxide concentration of all samples was $<125 \mu\text{g/ml}$. It was not possible to analyze sample V62 in duplicate because of insufficient sample.

**ADDENDUM 1A,
CYANIDE (by DISTILLATION/SPECTROPHOTOMETRY)**

Cyanide analyses were performed on direct and water diluted samples using procedure/revision number LA-695-102/B-2, and instrument number AL10724.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Sample holding times ranged from 27 to 54 days. Because the SW-846 specified sample holding time for cyanide was 14 days, each sample failed to meet the required sample holding time.

For this procedure, full calibration curves were not generated at the time of each batch analysis. A standard curve was generated on December 16, 1993, for the tank samples where the following curve statistics were obtained: Y intercept = - 0.00313, slope = 0.157645, and the correlation coefficient (r^2) = 0.999898. A second standard curve was generated on June 20, 1994, for the field blank where the following curve statistics were obtained: Y intercept = 0.006250, slope = 0.160059, and the correlation coefficient (r^2) = 0.999803. For Tank 108-AP cyanide analyses, the LMCS standard had additional importance because it was used to check the validity of the standard curve which was generated several months prior.

The statistically derived LMCS control limits for the cyanide standard (EDP code number S244) were 89.24 and 104.92 percent recovery. The historic mean recovery was 98.50 percent. LMCS standard recoveries were acceptable with percent recoveries of 100.3, 99.1, and 91.5.

Accuracy of the spike and spike duplicate determinations were within acceptance limits with percent recoveries of 100.3 and 99.9.

Precision between the spike and spike duplicate was acceptable with 0.4 RPD. Precision between the samples and their duplicates was good for samples V62 and V63, with RPDs ranging from 0.0 to 1.7 percent. Precision RPD values were not able to be calculated for samples V67, V68 and V69 as well as the field blank because the sample concentrations were less than the detection limit.

The concentrations of reagent blanks and field blanks were determined to be less than their detection limits, indicating the absence of contamination.

Average sample values ranged from <0.1 to 1.03 $\mu\text{g}/\text{ml}$ with a grand average of $\leq 0.45 \mu\text{g}/\text{ml}$.

TOTAL INORGANIC CARBON (CARBONATE)

Total inorganic carbon (TIC) analyses were performed using instruments numbered WB39927 and AL10656 on "water digest" samples with procedure/revision number LA-622-102/B-2.

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

A maximum sample holding time for this analyte was not specified in SW-846 protocol, but the holding times ranged from 19 to 103 days.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the carbonate standard (EDP code number S223) were 86.93 and 108.01 percent recovery. The historic mean recovery was 102.22 percent. LMCS standard recoveries were acceptable with values of 96.4, 99.0 and 97.0 percent.

Accuracy for the spike and spike duplicate was acceptable with percent recoveries of 83.7 and 91.6, respectively.

Precision between the spike and spike duplicate was acceptable with an RPD of 12.6. Precision between samples and their duplicates was quite good with values ranging from 0.4 to 6.4 RPD.

The field blank's carbonate concentration was less than the detection limit of 50 $\mu\text{g/ml}$. The preparation blank concentrations were all less than the detection limit of 25 $\mu\text{g/ml}$. The detection limit shown on the data summary sheet was based on a standard volume of 0.20 milliliters (an optimal value). Generally the least amount of inorganic carbon detectable was 1 μg . Thus, one microgram of carbon divided by 0.20 ml equaled 5.00 $\mu\text{g C/ml}$, which, when multiplied by the "water digestion" dilution factor of 5 for the tank samples, yielded the detection limit for this procedure of 25 $\mu\text{g C/ml}$.

In calculating the sample carbonate concentrations, an instrument blank value was subtracted from the sample value. Values shown on the data summary sheet for each reagent blank were uncorrected because, if the result blank value was subtracted from itself, it would yield an erroneously corrected blank value of zero.

Average carbonate concentration of the samples ranged from 417 to 572 $\mu\text{g/ml}$. The grand average concentration of all samples was 486 $\mu\text{g/ml}$.

TOTAL URANIUM (by LASER FLUORIMETRY)

Chemical (not radiochemical) analyses for total uranium were performed on direct samples. These determinations were performed using instrument number WB88807 by procedure/revision number LA-925-106/B-1.

The sample holding times for uranium ranged from 5 to 25 days. A maximum sample holding time was not specified for this analyte in SW-846 protocol.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

The LMCS standard recovery control limits for uranium (EDP code number S267) were 77.19 and 121.70 percent. The historic mean percent recovery was 99.45.

1A-38

LMCS standard accuracy was acceptable for Tank 108-AP samples with percent recoveries of 91.5, 95.8, and 104.9. Note that in the data summary spreadsheets, standard results are in g/L of uranium.

Spike/duplicate-spike recoveries were acceptable with both having a percent recovery of 98.5 percent.

Precision between the spike and spike duplicate was acceptable with a value of 0.0 relative percent difference. Precision between samples and duplicates was reasonable with values ranging from 0.0 to 18.0 RPD.

Preparation blank and field blank concentrations were uniformly less than the detection limit. The blank were determined to not be contaminated.

The average sample concentrations ranged from 2.29 µg/ml to 23.4 µg/ml, with a grand average of 13.5 µg/ml of uranium.

ARSENIC (by HYDRIDE ATOMIC ABSORPTION SPECTROPHOTOMETRY)

Samples were acid digested prior to arsenic analyses to ensure complete solubility and better recovery. Arsenic analyses were performed using procedure/revision number LA-355-131/B-1 and instrument numbers PE2280 (hydride AA) and WB27979. Instrument calibration data are as follows:

<u>Samples</u>	<u>Batch</u>	<u>Y-intercept</u>	<u>Slope</u>	<u>r²</u>
V60-V63	3516	0.0239	0.0800	0.9989
V65-V69	3512	-0.0138	0.0246	0.9999
V71-V73	3021	0.0689	0.0223	0.9981

SW-846 protocol require a sample holding time of six months or less for arsenic. Sample holding times for arsenic analyses ranging from 42 to 97 days were within the SW-846 required holding time.

Two major difficulties were encountered with arsenic analyses, causing three reruns. Ultimately one of the problems (differences in final hydrochloric acid concentration for various types of samples being acid digested) was resolved following extensive investigation. The solution, where calibration standards were digested in the same matrix as the samples resulting in significantly improved spike and spike duplicate recoveries, reinforced the same opinion regarding the problem that was stated in the 107-AP narrative. The second difficulty, lack of adequate sample volume, was intensified because of the reruns, where finally there was not a sufficient volume of V62 to redigest the samples, standards and blank once the problem of varying HCl concentration was solved. A full discussion of these difficulties was provided in the chemist's narrative for batch #3516 (samples V60-V63).

The LMCS standard (EDP code R741) control limits were 76.35 and 132.94 percent recovery. The historic mean percent recovery was 100.72 percent. The undigested LMCS standards analyzed with the field blank yielded an acceptable accuracy with a percent recovery of 99.2. Percent recoveries of digested LMCS

ADDENDUM 1A,

standards (because undigested standards were not available) for tank 108-AP samples were significantly higher, but acceptable, with percent recoveries of 105.4 and 102.4. The digested LMCS standard recoveries for the field blank was acceptable with 109.6 percent recovery.

The spike and spike duplicate values suggested that accuracy was unacceptable with percent recoveries of 53.7 and 52.1, respectively. The chemist's narrative commented that the poor recoveries were due to differences in the spiked sample matrix when digested and non-digested standard additions were used. Because of insufficient volume of sample V62, it was not possible to redigest the sample along with redigestions of the calibration standards and LMCS standard, consequently for the final rerun, the spikes that were generated for a prior digestion were to be included in that run. However, due to miscommunication, those spikes were not analyzed in that final run. It appeared from the chemist's narrative that it was necessary to use the digested duplicate sample V62 from a previous run to prepare a spike and spike duplicate (perhaps because the spikes from that run were discarded). Consequently, the only type of spikes which were available were post-digestion spikes, which exhibited the same inconsistent acid concentration problem that had been identified and corrected for the samples and standards. Thus, the V62 spike and spike duplicate results were very low (approx 50 percent recovery) despite the chemists's belief that the 108-AP sample data were OK.

Precision was acceptable between the spike and spike duplicate with an RPD of 2.4 percent. Precision between samples and their duplicates was reasonable for samples V62, V63 and V67 with values ranging from 0.0 to 15.4 RPD. The RPD for samples V68 and V69 was not able to be calculated because arsenic concentrations of these samples were less than the detection limit of 0.025 $\mu\text{g/ml}$.

The field blank and reagent blanks were uniformly below the detection limit, indicating the absence of contamination.

Average sample arsenic concentrations ranged from <0.025 to 0.0417 $\mu\text{g/ml}$, with a grand average of ≤ 0.0322 $\mu\text{g/ml}$.

SELENIUM (by HYDRIDE ATOMIC ABSORPTION SPECTROPHOTOMETRY)

Samples were acid digested prior to selenium analyses to ensure complete solubility and better recovery. Selenium analyses were performed using procedure/revision number LA-365-131/B-2 and instruments numbered PE2280(Hydride) and WB27979. Instrument calibration data are as follows:

<u>Samples</u>	<u>Batch</u>	<u>Y-intercept</u>	<u>Slope</u>	<u>r²</u>
V60-V63	2990	0.0063	0.0074	0.9999
V65-V69	3010	-0.0005	0.0074	0.9987
V71-V73	4126	0.0023	0.0071	0.9994

WMC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

SW-846 protocol require a sample holding time of six months or less for selenium. Tank 108-AP sample holding times ranged from 35 to 54 days, which was within the required holding time.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte, except for slight calibration drift at the end of the run where the field blank was analyzed, as noted in the chemist's narrative for batch 4126. Although the ending calibration check standard was not within LMCS control limits for that batch, the program does not require the analysis of ending standards.

LMCS standard (EDP code R743) control limits were 59.48 and 140.47 percent recovery. The historic mean percent recovery was 101.95 percent. Undigested LMCS standards which are required to be analyzed with 108-AP samples yielded acceptable accuracy with percent recoveries of 100.0, 107.0, and 105.8. Percent recoveries of digested LMCS standards were 111.1, 105.0 and 108.9.

Accuracy of spike and spike duplicates were acceptable with percent recoveries of 97.5 and 88.8, respectively.

Precision was acceptable between the spike and spike duplicate with an RPD of 9.3 percent. It was not possible to determine precision between samples and their duplicates because sample selenium concentrations were determined to be less than the detection limit of 0.0130 $\mu\text{g/ml}$.

The preparation blanks were uniformly below the detection limit of 0.013 $\mu\text{g/ml}$. The average field blank concentration was determined to be 0.0266 $\mu\text{g/ml}$ which was only slightly greater than the detection limit of 0.025 $\mu\text{g/ml}$. All of the blanks were determined to not be contaminated.

MERCURY (by COLD VAPOR ATOMIC ABSORPTION SPECTROPHOTOMETRY)

Although mercury analyses are noted on the batch sheets as being done on the direct sample (because no preparative work was performed by the Sample Preparations Group), procedure/revision number LA-325-104/A-1, a CLP derived procedure, includes a substantial digestion phase. The instruments used were PE2380 (Hydride AA) and WB26847.

Sample holding times for mercury analyses ranged from 8 and 32 days. SW-846 protocol require a maximum holding time of 38 days, consequently all mercury analyses were performed within the required holding time.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

The correlation coefficient for each batch was acceptable with values greater than the minimum procedure required value of 0.995.

<u>Samples</u>	<u>Batch</u>	<u>Y-intercept</u>	<u>Slope</u>	<u>r²</u>
V60-V63	2986	-0.0190	0.0104	0.9995
V65-V69	3103	0.0041	0.0101	0.9996
V71-V73	3013	-0.0025	0.0097	1.0000

Statistically derived LMCS control limits for the mercury standard (EDP code number R716) were 76.57 to 121.40 percent recovery. The historic mean recovery was 98.70 percent. Actual LMCS standard recoveries were acceptable with 100.0, 93.1 and 106.0 percent recovery.

Accuracy of the spike and duplicate spike was acceptable with percent recoveries of 95.9 and 101.0.

Precision between the spike and spike duplicate was an acceptable 5.2 relative percent difference. Precision between samples V67, V68 and V69 and their duplicates was not measurable because their mercury concentrations were less than the detection limit of 0.005 µg/ml. Precision between samples and duplicates for samples V62 and V63 was on the high side, ranging from 19.7 to 20.0 RPD. Program requirements for precision do not specify acceptance criteria for samples/sample duplicates. Even if there were criteria, the sample mercury values are so near to the detection limit that they would be exempted per specifications in the TPP.

The field blank mercury concentration was determined to be less than the sample detection limit of 0.005 µg/ml. The mercury concentration of reagent blanks for samples V67, V68, and V69 were less than 0.005 µg/ml. The concentration of reagent blanks for samples V62 and V63 were less than 0.0002 µg/ml. All blanks were determined to not be contaminated.

INDUCTIVELY COUPLED PLASMA/EMISSION SPECTROSCOPY (ICP)

An acid predigestion was performed on ICP samples prior to analysis. Because two different ICP instruments were used, this work was performed under two separate procedures. Samples V60-V70 were analyzed by procedure/revision number LA-505-151/D-1, using instrument number WB39939. Samples V71-V74 were analyzed by procedure/revision number LA-505-161/A-0, using instrument number WC38935.

Sample holding times for ICP analyses ranged from 22 to 47 days. SW-846 protocol require that the holding time for these metals may not exceed six months. All ICP analyses were completed within the required holding time.

ICP data were reported using a CLP deliverable package. The software which converted the instrument generated data to the reporting format was referred to as the "Wards™" package*.

* Ward is a registered trademark of Ward Scientific, Ltd.

ADDENDUM 1A,

The Wards™ package uses the concept of a sample delivery group (SDG), which includes samples, duplicates, spikes, blanks, instrument control standards and blanks, interference checks, serial dilutions and narrative information within a batch. The designations for initial calibration verification and continuing calibration verification are ICB and CCV, respectively. These are undigested LMCS control standards. The acronyms, ICB and CCB, denote initial calibration blank and continuing calibration blank (undigested reagent blanks).

Undigested blanks were used to initially calibrate the ICP instrument and to check calibration on a continuing basis. A digested reagent blank included with each batch, however, was used to determine the extent of blank contamination introduced during sample preparation (and by inference, the estimated amount of sample contamination).

As was specified in the TPP, section 4.2, sample accuracy evaluation criteria for ICP LMCS standards was to be based on the undigested initial calibration verification (ICV) standards. Although the same control standard, ICP-SST-4, was used for initial and continuing LMCS calibration checks for both ICP instruments, the control limits were different. The older ICP instrument, an ARL (WB39939), had acquired a base of data sufficient to generate statistically derived limits. No such base of data was available for the new ICP instrument, a Thermo-Jarrell Ash (WC38935), consequently the control limits were administratively set at 85% and 115% recovery. LMCS control limits are shown in table 11 for analytes as determined by each instrument.

Table 11. ICP LMCS Control Limits					
Analyte	ARL [old instrument] (WB39939)			Thermo-Jarrell Ash (WC38935) [new instrument]	
	EDP Code	Control Limits, RPD	Historical Mean	EDP Code	Control Limits, RPD
Ag	S157	88.96-111.34	99.00	S058	85 - 115
Al	S101	82.33-108.70	96.71	S002	85 - 115
Ba	S107	90.41-105.59	99.32	S008	85 - 115
Ca	S117	86.34-108.81	97.36	S018	85 - 115
Cd	S115	88.48-109.42	96.67	S016	85 - 115
Cr	S121	92.66-110.71	98.90	S022	85 - 115
Fe	S129	89.00-106.47	98.68	S030	85 - 115
Mg	S137	88.71-106.88	99.97	S038	85 - 115
Mn	S139	86.96-102.65	96.73	S040	85 - 115
Na	S159	89.36-104.26	97.53	S060	85 - 115
Pb	S133	88.37-111.10	98.08	S034	85 - 115
Zn	S179	81.53-106.91	98.67	S080	85 - 115

ADDENDUM 1A,

In the Wards™ package, if the reported values were less than the detection limit, precision for duplicate analyses was reported as 200 percent RPD and as 100 percent for serial dilution RPDs.

The ARL ICP (old instrument) performed interelement data corrections for aluminum, cadmium, chromium, lead, manganese, silver and zinc. The Thermo-Jarrell Ash ICP (new instrument) performed interelement data corrections for aluminum, cadmium, chromium, iron, lead, manganese, silver and zinc.

Because each ICP determination generated analytical values for 12 metals simultaneously, generally there were quality control failures within each run. Those failures were discussed in the Wards™ package narratives. In the Wards™ package, form VII-IN misleadingly identifies the *digested* LMCS standard as a "Laboratory Control Sample". This occurs because this is a "CLP type" data package, and CLP protocol designates the digested standard as the "Laboratory Control Sample". Header information in this package is not able to be edited. Similarly, a footer incorrectly identifies the control limits for the laboratory control sample as 90 to 110 percent recovery.

It is important to note that the units reported for ICP are $\mu\text{g/L}$ (or parts per billion), which is 1000 fold lower than the units of $\mu\text{g/ml}$, which are used elsewhere in this data package.

In the tabular data summaries, a column is included which is entitled, "Detection Limit, $\mu\text{g/L}$ ". This column indicates the instrument detection limit, which is the lowest detectable concentration by ICP without a sample dilution factor being applied. For several analytes, "less than" values are given for samples. These "less than" values represent the *sample's* detection limit which is equal to the instrument detection limit multiplied by the sample dilution factor. Sample dilutions will cause the sample detection limit to be greater than the instrument detection limit.

The linear concentration range was determined for ICP analytes. The maximum concentration within the linear range (defined as the highest concentration in which the percent recovery of a standard deviates less than five percent from 100 percent) is listed in table 12.

The percent recovery for spikes and spike duplicates tended to be biased low. Although the program's criterion for accuracy (75 to 125 % recovery) was generally met, these data suggest that matrix interference with the quantitation may be present. In the absence of data on other analytes, this premise is reasonable, however the general tendency for spike recovery of nearly all ICP analytes appeared to be biased low, indicating the possibility of problems with either the preparation of the spike and spike duplicate, or perhaps more likely with a poor spiking standard (having analyte concentrations other than the stated value). The chemist's narrative states that spike recovery bias may be attributed to a volumetric transfer error made during preparation of the spike.

ADDENDUM 1A,

Table 12. ICP Linear Concentration Ranges				
Analyte	ARL (WB39939) [old instrument] 3/31/94		Thermo-Jarrell Ash (WC38935) [new instrument] 1/10/94	
	Integration Time (Sec.)	Concentration ($\mu\text{g/L}$)	Integration Time (Sec.)	Concentration ($\mu\text{g/L}$)
Ag	5	50000.0	5	100000.0
Al	5	250000.0	5	1000000.0
Ba	5	100000.0	5	100000.0
Ca	5	50000.0	5	1000000.0
Cd	5	50000.0	5	100000.0
Cr	5	300000.0	5	100000.0
Fe	5	200000.0	5	500000.0
Mg	5	20000.0	5	1000000.0
Mn	5	100000.0	5	100000.0
Na	5	1000000.0	5	500000.0
Pb	5	50000.0	5	100000.0
Zn	5	100000.0	5	100000.0

ALUMINUM

Percent recoveries of all undigested LMCS standards (which ranged from 94.7 to 100.4) were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy was unacceptable as indicated by the spike with 126.2 percent recovery, but the spike duplicate recovery of 120.4 percent recovery was good. The chemist's narrative indicated that aluminum recovery may have been impacted by the high level of sodium in the samples.

Precision between the spike and spike duplicate was an acceptable 3.2 relative percent difference. RPDs between the samples and their duplicates ranged from 0.7 to 16.8 percent.

All preparation blanks had aluminum concentrations which were less than the detection limit of 29 $\mu\text{g/L}$, indicating the absence of contamination. The

/A-45

field blank's aluminum concentration was two orders of magnitude less than that of the samples, but more than an order of magnitude greater than its preparation blank. The field blank failed the 20% criterion for contamination as defined in the QAPjP, however, because the concentration is insignificant relative to the aluminum concentration of the samples it was determined that the field blank was not contaminated.

Average aluminum concentrations of the samples ranged from 32,500 to 54,700 $\mu\text{g/L}$, with a grand average of 41,700 $\mu\text{g/L}$.

BARIUM

Percent recovery of all undigested LMCS standards (which ranged from 95.1 to 101.1) were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy was acceptable (but very near the limit) as indicated by spike and spike duplicate recoveries of 78.6 percent and 75.7 percent, respectively.

Precision between the spike and spike duplicate was an acceptable 3.8 relative percent difference.

RPD between the samples and their duplicates was not able to be calculated because all sample barium concentrations were less than the detection limit of 20 $\mu\text{g/L}$.

Preparation blank concentrations were all less than the detection limit of 4.0 $\mu\text{g/L}$. The field blank appeared to be contaminated because its average concentration, 81.6 $\mu\text{g/L}$, was greater than that of the samples. Despite being contaminated, it appears that it was not indicative of sample contamination because the sample concentrations were less than the detection limit.

CADMIUM

The percent recoveries of all undigested LMCS standards (which ranged from 97.3 to 102.0) were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy was acceptable as indicated by the spike recovery of 76.0 percent, which was marginal. The percent recovery for the spike duplicate was 72.8. Although the program's criterion for accuracy was technically met, these data

indicate the occurrence of generally low spike recoveries, which suggests that matrix interference with the quantitation of cadmium may be present. In the absence of other data, this premise is reasonable, however the general tendency for spike recovery of nearly all ICP analytes appeared to be biased low, indicating the possibility of problems with either the preparation of the spike and spike duplicate, or perhaps more likely a poor spiking standard (having analyte concentrations other than the stated value). The chemist's narrative states that spike recovery failure may be attributed to a volumetric transfer error made during preparation of the spike.

Precision between the spike and spike duplicate was an acceptable 4.7 relative percent difference. RPDs between the samples and their duplicates were generally quite good with RPDs ranging from 1.4 to 5.7 for samples V62, V63, V67 and V69. Only sample V68 had a high precision deviation with 33.2 RPD.

Field blank and preparation blank concentrations were less than the detection limit, indicating the absence of contamination.

The average cadmium concentrations of the samples ranged from 129 to 158 $\mu\text{g/L}$, with a grand average of 141 $\mu\text{g/L}$.

CALCIUM

Percent recoveries of all undigested LMCS standards, which ranged from 94.6 to 102.4, were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy appeared to be acceptable with recoveries of the spike and spike duplicate of 80.2 percent and 77.3 percent, respectively.

Precision between spike and spike duplicate was acceptable with a 3.6 relative percent difference. RPDs between the samples and their duplicates ranged from 12.4 to 69.9 percent. Only tank samples V63 and V67 had an RPD less than 20 percent. The poor precision pointed to contamination which may have occurred during the digestion or in the field.

The chemist noted variability of the continuing calibration blanks for samples V62 and V63, but indicated that there was "no impact on data quality". Preparation blank concentrations were generally two orders of magnitude less than the sample concentrations, indicating that any contamination due to sample preparation was insignificant. The average field blank concentration (1,300 $\mu\text{g/L}$) was 6.5 fold greater than its sample detection limit, and in some cases was greater than the sample concentrations, indicating the existence of contamination. Sample contamination in the field was indicated, because the samples and field blank had approximately the same concentrations, while the preparation blank's calcium concentration was much less.

ADDENDUM 1A,

Average calcium concentrations of the samples ranged from 875 to 2,260 $\mu\text{g/L}$, with a grand average of 1,710 $\mu\text{g/L}$. Because of significant contamination, these data should be considered as estimated values.

CHROMIUM

The percent recoveries of all undigested LMCS standards (which ranged from 97.1 to 102.1) were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy was acceptable as indicated by recoveries of the spike and spike duplicate, which were 81.1 and 77.7 percent, respectively.

Precision between the spike and spike duplicate was an acceptable 4.1 relative percent difference. RPDs between the samples and their duplicates were good, with values ranging from 0.3 to 11.1 RPD.

The field blank and all sample preparation blank concentrations were either less than the detection limit or very near to the detection limit, indicating the absence of contamination.

Average sample chromium concentrations ranged from 1,960 to 2,110 $\mu\text{g/L}$, with a grand average of 2,030 $\mu\text{g/L}$.

IRON

Percent recovery of all undigested LMCS standards were within control limits, ranging from 95.5 to 101.5 percent.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Acceptable accuracy was indicated by recoveries of the spike and spike duplicate, which were 79.3 and 76.0 percent, respectively.

Precision between the spike and spike duplicate was acceptable with an RPD of 4.2 percent. RPDs between the samples and their duplicates was very poor, ranging from 5.0 to 142.5 percent.

All digested preparation blank concentrations were greater than the detection limit, but they were approximately 10-fold less than the sample concentrations.

ADDENDUM 1A,

The average field blank concentration (168 $\mu\text{g/L}$) was 8.4 fold greater than its sample detection limit, and in some cases was greater than the sample concentrations, indicating the existence of significant contamination. Sample contamination in the field was indicated, because the samples and field blank had approximately the same concentrations, although the possibility of contamination occurring during sample preparation in the laboratory was not ruled out because the preparation blank's iron concentrations were only about ten fold less.

Average iron concentrations of the samples ranged from 122 to 1,040 $\mu\text{g/L}$, with a grand average of 510 $\mu\text{g/L}$. Because of significant contamination, these data should be considered as estimated values.

LEAD

The percent recoveries of all undigested LMCS standards (which ranged from 97.8 to 101.4) were within control limits.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Acceptable accuracy was obtained for the spike with a 77.0 percent recovery. The spike duplicate recovery was 73.6 percent. Although the program's criterion for accuracy was technically met, these data indicate the occurrence of generally low spike recoveries, which suggests that matrix interference with the quantitation of lead may be present. In the absence of other data, this premise is reasonable, however the general tendency for spike recovery of nearly all ICP analytes appeared to be biased low, indicating the possibility of problems with either the preparation of the spike and spike duplicate, or perhaps more likely a poor spiking standard (having analyte concentrations other than the stated value). The chemist's narrative states that spike recovery failure may be attributed to a volumetric transfer error made during preparation of the spike.

Precision between the spike and spike duplicate was acceptable with a relative percent difference of 4.4. RPDs between the samples and their duplicates were not able to be calculated (except for V68 with a 196.2 percent RPD), because one or both of the determinations from each sample was less than the sample detection limit of 120 $\mu\text{g/L}$. It appeared that the duplicate sample of V68 was contaminated because its lead concentration was 100-fold greater than sample V68 as well as the other samples and duplicates. In his response to QA comments, the chemist indicated that the absence of lead in V68 duplicate was "verified".

All preparation blanks had lead concentrations that were less than the detection limit of 24.0 $\mu\text{g/L}$. Field blank values were less than its detection limit of 28 $\mu\text{g/L}$, indicating the absence of contamination in all blanks.

ADDENDUM 1A,

When the probably erroneous value for V68 duplicate was deleted, the average sample lead concentrations ranged from <120 to 138 $\mu\text{g/L}$, with a grand average of $\leq 126 \mu\text{g/L}$.

MAGNESIUM

Percent recovery of all undigested LMCS standards were within control limits, ranging from 94.2 to 98.5 percent.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Acceptable accuracy was obtained for the spike with 76.3 percent recovery, but the spike duplicate was low with 73.5 percent recovery. Although the program's criterion for accuracy was technically met, these data indicate the occurrence of generally low spike recoveries, which suggests that matrix interference with the quantitation of magnesium may be present. In the absence of other data, this premise is reasonable, however the general tendency for spike recovery of nearly all ICP analytes appeared to be biased low, indicating the possibility of problems with either preparation of the spike and spike duplicate, or perhaps more likely a poor spiking standard (having analyte concentrations other than the stated value). The chemist's narrative states that spike recovery failure may be attributed to a volumetric transfer error made during preparation of the spike.

Precision between the spike and spike duplicate was acceptable with an RPD of 3.8 percent. RPDs between the samples and their duplicates ranged between 6.5 and 57.5 percent. The poor sample precision pointed to the possibility of contamination.

The chemist noted variability of the continuing calibration blanks for samples V62 and V63, but also indicated that there was "no impact on data quality". Additional evidence of the contamination of samples was observable in the field blank. The field blank's magnesium concentration was greater than that of all of the samples (and almost four times greater than the average sample concentration). The preparation blank magnesium concentrations for all samples as well as for the field blank were less than the detection limit, indicating that the source of contamination was not from sample handling in the laboratory, but was derived in the field. All sample preparation blank concentrations were $<3 \mu\text{g/L}$, and the preparation blank for the field blank was $<19 \mu\text{g/L}$.

Average sample magnesium concentrations ranged from 28.4 to 144 $\mu\text{g/L}$, with a grand average of 87.0 $\mu\text{g/L}$. These data should be considered to be estimates because of the probability of contamination.

ADDENDUM 1A,

MANGANESE

Percent recovery of all undigested LMCS standards were within control limits, ranging from 96.5 to 101.2.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Acceptable accuracy was obtained for the V62 spike with 78.0 percent recovery and for its spike duplicate with 75.0 percent recovery.

Precision between the spike and spike duplicate was acceptable with a relative percent difference of 3.9. RPDs between samples V62, V67 and V68 and their duplicates were not able to be calculated because one or both of the determinations from each sample was less than the sample detection limit of 15.0 $\mu\text{g/L}$. For samples V63 and V69, the sample/duplicate precision values were 33.3 and 23.3 RPD, respectively. These sample precision values were not unreasonable because all sample concentrations that were greater than the detection limit were at most 1.9 times greater. At this low level, significant imprecision is expected and is reasonable.

Manganese concentrations for the field blank and its duplicate were less than the detection limit of 10.0 $\mu\text{g/L}$. None of the preparation blanks had detectable manganese concentrations, where the detection limit was 3.0 $\mu\text{g/L}$. All blanks were determined to not be contaminated.

The average sample concentrations for manganese ranged from <15.0 $\mu\text{g/L}$ to 25.1 $\mu\text{g/L}$. The grand average sample concentration was ≤ 18.0 $\mu\text{g/L}$. "Less than" values were deleted to enable mathematical calculations.

SILVER

All LMCS standard (undigested) percent recoveries were within acceptable accuracy control limits, ranging from 96.3 to 101.0.

The digested laboratory control samples, however, suggested that there may be a potential problem with the digestion. Such digestion problems were seen with samples from Tanks 101-AP and 107-AP. Tank 108-AP samples were prepared by the same procedure. The digestion procedure (LA-505-158), through which all ICP samples were processed, includes a step where samples were exposed to hydrochloric acid. Because silver precipitates in a matrix with high chloride concentration, it was expected that silver recovery during analysis would be negatively impacted. Significantly high silver concentrations were seen in the initial calibration blank and the continuing calibration blanks. This appeared to be related to the silver precipitation problem, because as indicated in the chemist's batch narratives, instrument carryover was occurring from digested standards.

Accuracy failed to meet the control limit criterion, where the spike and the spike duplicate had exceedingly low percent recovery values of 13.3 and 14.2

ADDENDUM 1A,

percent. This failure was again attributed to silver incompatibility with the hydrochloric acid, which was used in the sample digestion procedure.

Precision between the spike and spike duplicate was acceptable with a 7.0 relative percent difference.

RPDs between the samples and their duplicates ranged from 0.3 to 140.9 relative percent difference. Although program acceptance criteria do not apply to sample duplicate analyses, the very large sample RPDs point to a significant problem.

Silver concentrations for the field blank were essentially at or less than the detection limit of 40.0 µg/L. Silver concentration in all preparation blanks was less than the detection limit of 4.00 µg/L, indicating the absence of contamination.

The average silver concentration for tank samples ranged from 43.4 µg/L to 79.8 µg/L. The grand average for all samples was 63.2 µg/L. All values for silver are highly suspect because of a failure in the analytical system. These data are to be used at the user's judgement.

SODIUM

The recovery of all undigested LMCS standards were within control limits, ranging from 96.3 to 101.0 percent recovery.

The digested "laboratory control samples" for those batches which contained the tank samples had percent recoveries which were within the LMCS undigested standard control limits. The digested "laboratory control sample" which was run with the field blank was prepared incorrectly, consequently these data were invalid. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

When sample analyte concentrations exceed 1000 µg/ml (1,000,000 µg/L), the normal accuracy control limits of 75 to 125 percent recovery are not applicable to ICP analyses, as stated in the TPP, section 4.5. The sodium concentration of each sample was determined to exceed 1000 µg/ml, consequently the alternative evaluation of accuracy was applied using serial dilution. Following serial dilution and reanalysis of each sample, a dilution RPD value was determined. The formula for this calculation follows:

$$\text{Dilution RPD} = \frac{[\text{initial conc.}] - ([\text{serial dil'n conc.}] \times \text{dilution factor})}{[\text{initial concentration}]} \times 100$$

Using a dilution rather than a spike has advantages and disadvantages as a data quality evaluation tool. Although an evaluation of the deviation between the actually derived concentration and the expected concentration following dilution does not definitively indicate the degree of matrix interference within a sample, it does establish whether or not the analysis was performed within the linear portion of the calibration curve. Conversely, a spike is not particularly useful when the initial sample concentration is very high.

ADDENDUM 1A,

To be distinguishable above the initial sample concentration, spiking must generate a final concentration at least 25 percent greater than the initial concentration, yet this frequently places the analyte concentration within the region of calibration non-linearity. The result is that percent recovery is significantly underestimated. For example, accuracy was not acceptable as indicated by spike and spike duplicate recoveries of 2256.1 and 2103.1 percent, respectively. The dilution method was applied to sodium (the only ICP analyte in which the sample concentrations exceeded 1000 $\mu\text{g/ml}$). Dilution RPD values less than five percent indicate that measurements are within the linear portion of the calibration curve. Samples V62, V63 and V67 had dilution RPD failures with values of 8.4, 6.4 and 5.5 percent (greater than the 5% limit). Dilution RPD values for samples V68 and V69 were acceptable with values of 2.2 and 2.6 percent.

Precision between the spike and spike duplicate was meaningless but technically acceptable with a 3.0 relative percent difference. RPDs between tank samples and their duplicates was good, ranging from 0.8 to 3.1.

The chemist noted variability of the continuing calibration blanks for samples V62 and V63, but also indicated that there was "no impact on data quality". All preparation blank concentrations were less than the detection limit of 29 $\mu\text{g/L}$. Because the field blank did not meet the program's 20 percent criterion, it was determined to be contaminated by program criteria. They were determined to not be contaminated. The field blank's sodium concentration was, however, approximately 3660 times lower than the sample's sodium content. Under this condition, field "contamination" of the samples was trivial.

Average sodium concentrations of the samples ranged from 2,590,000 $\mu\text{g/L}$ to 3,030,000 $\mu\text{g/L}$, with a grand average of 2,770,000 $\mu\text{g/L}$ (2,770 $\mu\text{g/ml}$). Sodium concentrations for samples V62, V63 and V67 are estimated values because they did not meet dilution RPD criteria.

ZINC

Percent recovery of all undigested LMCS standards were within control limits, ranging from 100.1 to 103.1 percent.

All digested "laboratory control samples" had percent recoveries which were within the LMCS undigested standard control limits. The program does not require the use of digested control standards nor were control criteria specified for digested control standards.

Accuracy was acceptable as indicated by the spike and spike duplicate recoveries of 94.1 percent and 91.4 percent, respectively.

Precision between the spikes and spike duplicates was acceptable with a relative percent difference of 2.9 percent. RPDs between the samples and their duplicates were good to poor, ranging from 0.5 to 43.6 percent, however no acceptance criteria apply to the duplicate analyses. Such variability does indicate a potential problem.

All initial and continuing calibration blanks for all tank samples showed significant variability, tending to indicate excessive instrument instability.

ADDENDUM 1A,

(noise). Such noise was also seen in the preparation blank for samples V62 and V63, where the reported zinc concentration was a negative value.

The preparation blank zinc concentrations were low, but not less than the detection limit. Conversely, the field blank concentration was approximately the same as the sample concentrations, indicating the presence of significant contamination. Imprecision between sample and sample duplicate values may be due to variable field contamination.

Average zinc concentrations in the samples ranged from 103 $\mu\text{g/L}$ to 615 $\mu\text{g/L}$, with an grand average of 299 $\mu\text{g/L}$. Zinc data should be considered estimates, because of the evidence of contamination.

RADIOCHEMICAL ANALYSES

For radiochemical analyses only, the five samples (V62, V63, V67, V68 and V69) were combined in equal portions to generate composite sample, V77. Except for the field blank, no radiochemical analyses were performed on non-composited samples, as directed in the WAP.

March 17, 1994 (the sample collection date of V62, the first sample to be collected) was used to calculate sample holding time of the composite sample.

When the field blank was analyzed (for GEA, total alpha and total beta), it was not analyzed in duplicate, as was discussed in the TPP, however the composite sample, V77, was analyzed in duplicate.

GAMMA ENERGY ANALYSES (GEA)

Samples were acid predigested and analyzed using procedure/revision number LA-548-121/D-0, and instrument number WC38931. The composite sample, V77, was tested on 5/3/94, a holding time of 47 days. The field blank, sample V73 was analyzed on 7/18/94, with a sample holding time of 18 days. Except for radium-226 with a maximum holding time of six months, there were no specified maximum holding times in SW-846 protocol. All GEA analytes were, therefore, within holding time criteria.

The GEA procedure does not use an LMCS quality control standard for every isotope. The LMCS standard, which contained Co^{60} and Cs^{137} as surrogate standards, was determined with both batches. Quality control parameters for all of the GEA analytes were expressed relative to these two isotopes.

Statistically derived LMCS control limits for the Cs^{137} standard (EDP code number R901) were 94.39 and 111.05 percent recovery. The historic mean recovery was 101.09 percent. Actual Cs^{137} LMCS standard recoveries for both GEA analyses were acceptable with 101.4 and 101.8 percent.

Statistically derived LMCS control limits for the Co^{60} standard (EDP code number R905) were 93.02 to 110.78 percent recovery. The historic mean recovery was 101.67 percent. Actual Co^{60} LMCS standard recoveries for both GEA analyses were acceptable with 103.7 and 101.9 percent.

ADDENDUM 1A,

Each of the 9 GEA analytes (Ce/Pr^{144} , Cs^{134} , Co^{60} , Cs^{137} , Eu^{154} , Eu^{155} , Nb^{94} , Ra^{226} Ru/Rh^{106}) were determined in two batches. Sample V77 (the composite sample) and sample V73 (the field blank) were analyzed in separate batches, where each batch had a reagent blank and an LMCS standard.

Because not every analyte was included in the LMCS standard, it was not possible to spike the sample to determine percent recoveries for each analyte. The GEA procedure is sufficiently free of matrix interference with analyte quantitation that the procedure does not require spiking to assess matrix effects. Consequently, another quality control parameter, percent counting error was determined. It was found to be acceptable for both Co^{60} and Cs^{137} , with percent counting errors ranged in value from 1.28 to 4.84 for both batches.

There did not appear to be any analytical anomalies or difficulties during these analyses.

CERIUM-144 [includes PRASEODYMIUM-144] (by GEA)

Cerium-144 was requested in the WAP. Pr^{144} was included with Ce^{144} , because both are measured coincidentally in the GEA procedure. Pr^{144} is the decay daughter product of Ce^{144} . The combined activity was determined from the Pr^{144} gamma energy line when the parent and daughter were at secular equilibrium.

Ce/Pr^{144} was less than the sample detection limit for both the composite sample ($<0.00904 \mu\text{Ci/ml}$), and for the field blank ($<0.00126 \mu\text{Ci/ml}$). Thus, the field blank was shown not to be contaminated.

Because Ce/Pr^{144} was less than the detection limit, it was not possible to calculate a RPD value as an estimation of precision. An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

Reagent blank activities for both V77 and V73 were less than the detection limit.

CESIUM-134 (by GEA)

Cs^{134} activity was $<0.000721 \mu\text{Ci/ml}$ for the sample, but the duplicate had an activity of $0.00149 \mu\text{Ci/ml}$. The chemist's narrative noted that the activity reported for the duplicate sample had high uncertainty. The field blank with an activity of $<0.000245 \mu\text{Ci/ml}$, was determined to not be contaminated. Reagent blank activities for both V77 and V73 were less than the detection limit.

Because Cs^{134} activity was detectable only in the sample duplicate (not in the sample), it was not possible to calculate a RPD value as an estimation of precision. An evaluation of accuracy was discussed above in the general GEA discussion.

ADDENDUM 1A,

The detection limit shown in the data summary table was based on the reagent blank value.

CESIUM-137 (by GEA)

Average Cs¹³⁷ activity for the composite was 4.29 $\mu\text{Ci/ml}$, with the precision value of 0.68 relative percent difference. Field blank Cs¹³⁷ activity was $<0.000341 \mu\text{Ci/ml}$.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

COBALT-60 (by GEA)

Co⁶⁰ activity was $<0.000202 \mu\text{Ci/ml}$ for the composite sample and was $<0.000281 \mu\text{Ci/ml}$ for the field blank.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

Because Co⁶⁰ was not detectable, it was not possible to calculate a RPD value as an estimation of precision.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

EUROPIUM-154 (by GEA)

Eu¹⁵⁴ activity was $<0.000901 \mu\text{Ci/ml}$ for the composite sample and was $<0.000751 \mu\text{Ci/ml}$ for the field blank.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

Because Eu¹⁵⁴ was not detectable, it was not possible to calculate an RPD value as an estimation of precision.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

EUROPIUM-155 (by GEA)

Eu¹⁵⁵ activity was <0.00487 $\mu\text{Ci/ml}$ for the composite and was <0.000633 $\mu\text{Ci/ml}$ for the field blank.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

Because Eu¹⁵⁵ was not detectable, it was not possible to calculate a sample RPD value as an estimation of precision.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

NIOBIUM-94 (by GEA)

Nb⁹⁴ activity was <0.000481 for the composite sample and was <0.000228 $\mu\text{Ci/ml}$ for the field blank.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

Because Nb⁹⁴ was not detectable, it was not possible to calculate a sample RPD value as an estimation of precision.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

RADIUM-226 (by GEA)

Ra²²⁶ activity was <0.0374 $\mu\text{Ci/ml}$ for the composite sample and was <0.00430 $\mu\text{Ci/ml}$ for the field blank.

Because Ra²²⁶ was not detectable, it was not possible to calculate a sample RPD value as an estimation of precision.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit of Ra²²⁶ is approximately 10 fold greater than most other analytes by this procedure, and consequently is not the best available procedure. Prior to generation of the TPP, the customer was aware of this limitation and stated on May 11, 1993 that the GEA procedure would be acceptable for this isotope. 222-S Laboratory could analyze for Ra²²⁶ by only that procedure. The detection limit shown in the data summary table was based on the reagent blank value.

RUTHENIUM-106 (by GEA) [includes RHODIUM-106]

Ruthenium-106 was requested in the WAP. Rh¹⁰⁶ was included with Ru¹⁰⁶ because Ru¹⁰⁶ is detected in the presence of its daughter, Rh¹⁰⁶. Radioactivity values were shown in the spread sheet as the sum of Rh¹⁰⁶ and Ru¹⁰⁶ activities at secular equilibrium.

Ru/Rh¹⁰⁶ activity was <0.0272 $\mu\text{Ci/ml}$ for the composite sample and was <0.00328 $\mu\text{Ci/ml}$ for the field blank.

Reagent blank activities for both V77 and V73 were less than the detection limit, indicating the absence of contamination.

Because Ru/Rh¹⁰³ was not detectable, it was not possible to calculate a RPD value as an estimation of precision.

An evaluation of accuracy was discussed above in the general GEA discussion.

The detection limit shown in the data summary table was based on the reagent blank value.

TRITIUM (by LIQUID SCINTILLATION)

This procedure was performed on the direct sample using procedure/revision number LA-218-114/A-2. Tritium analysis was performed on 4/13/94 (a holding time of 28 days). A required sample holding time was not specified in SW-846 protocol for this analyte. Field blank analysis was not performed because it was not required.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the H³ standard (EDP code number R907) were 75.55 and 118.04 percent recovery. The historic mean recovery was 91.80 percent. The 96.9 percent recovery of the H³ LMCS standard for sample V77 was within acceptance limits.

Accuracy was acceptable for both the spike and spike duplicate with values of 105.5 and 98.2 percent recoveries, respectively.

Precision as measured by the relative percent difference between the spike and spike duplicate was within acceptance limits at 2.3 percent. Precision was good between the sample and its duplicate with 1.78 RPD.

The reagent blank activity was less than the detection limit, indicating the absence of contamination.

H³ activities for the sample and sample duplicate were 0.0111 $\mu\text{Ci/ml}$ and 0.0113 $\mu\text{Ci/ml}$ for the duplicate sample respectively, with an average activity of 0.0112 $\mu\text{Ci/ml}$.

ADDENDUM 1A, CARBON-14 (by LIQUID SCINTILLATION)

C¹⁴ was performed on direct samples using procedure/revision number LA-348-104/B-0 and instrument number WB27818 on 4/12/94, a sample holding time of 26 days. A required maximum sample holding time is not specified in SW-846 protocol for C¹⁴. Field blank analysis was not required in the source documents and was not performed.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the C¹⁴ standard (EDP code number R909) were 61.78 and 115.72 percent recovery. The historic mean recovery was 93.44 percent. Percent recovery of the LMCS standard was within acceptance limits at 80.8 percent. Accuracy as measured by percent recovery of the spike and spike duplicate was within acceptance limits with values of 89.0 and 85.4 percent recovery, respectively.

Precision as measured by the relative percent difference between the spike and spike duplicate was within acceptance limits at 4.54 percent. The RPD between the sample and its duplicate was not able to be calculated because the sample value was less than the detection limit.

The reagent blank activity was less than the detection limit, indicating the absence of contamination.

C¹⁴ activities were <0.00000219 µCi/ml and <0.00000218 µCi/ml for the sample and sample duplicate, respectively. C¹⁴ activity (2,190 pCi/L in equivalent units) is approaching environmental levels.

SELENIUM-79 (by ION EXCHANGE/DIST/LIQUID SCINTILLATION)

Se⁷⁹ analysis was performed on an acid digestion instead of direct, as specified in the TPP, because acid digestion would ensure that the analyte was fully dissolved to facilitate detection. Additionally, this procedure requires an acid matrix, and the initial sample pH was basic.

The analysis was done on 5/4/94 (a sample holding time of 48 days) using procedure/revision number LA-365-132/B-0 and instrument number WB27818. A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

Se⁷⁹ activity was based upon calibration with a C¹⁴ standard, since both nuclides have approximately the same beta energy. This was necessary because no Se⁷⁹ standard exists. It was only possible to generate data for a reagent blank and for the composited sample in duplicate.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Isotopic recovery through the preparative procedure was estimated gravimetrically through the use of a carrier for both the sample and the

ADDENDUM 1A,

blank. Carrier recoveries for the sample and duplicate were 92.9 and 95.6 percent, which were quite good.

The reagent blank's activity was $<0.0000122 \mu\text{Ci/ml}$, indicating the absence of contamination.

Se^{79} activity was $<0.0000121 \mu\text{Ci/ml}$ for the sample and was $<0.0000118 \mu\text{Ci/ml}$ for the sample duplicate. Because Se^{79} was not detectable, it was not possible to calculate a RPD value as an estimation of precision.

TECHNETIUM-99 (by EXTRACTION/LIQUID SCINTILLATION)

Tc^{99} analyses were prepared by performing an acid predigestion of samples instead of direct analysis or acid dilution as was specified in the TPP. This alternative method was recommended because acid digestion would insure that the analyte was fully dissolved to facilitate detection.

Analyses were performed on 4/29/94 (a sample holding time of 43 days) using procedure/revision number LA-438-101/D-1 and instrument number WB-27818. A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the Tc^{99} standard (EDP code number S363) were 71.90 and 135.03 percent recovery. The historic mean recovery was 97.43 percent. LMCS standard recovery for sample V77 was acceptable with 97.4 percent recovery.

Accuracy as evaluated by percent recovery of spike and spike duplicate was acceptable, with values of 100.9 percent and 101.5 percent, respectively.

Tc^{99} precision, as measured by the relative percent difference between the spike and its duplicate was acceptable at 0.6 percent. Precision between the sample and sample duplicate was good with 0.3 relative percent difference.

The field blank's activity was $<0.0000425 \mu\text{Ci/ml}$, indicating the absence of contamination.

Tc^{99} activities for the sample and sample duplicate were $0.000308 \mu\text{Ci/ml}$ and $0.000307 \mu\text{Ci/ml}$, respectively, with a grand average of $0.000308 \mu\text{Ci/ml}$.

STRONTIUM-90 (by SEPARATION/PROPORTIONAL COUNTING)

Sr^{90} analyses were prepared by performing an acid predigestion of samples instead of direct analysis or acid dilution as was specified in the TPP. This alternative method was recommended because acid digestion would insure that the analyte was fully dissolved to facilitate detection.

Analyses were performed on 5/4/94 (a sample holding time of 48 days) using procedure/revision number LA-220-101/D-0 and instrument number WA45676. A

ADDENDUM 1A,

required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the Sr^{90} standard (EDP code number S376) were 79.76 and 113.11 percent recovery. The historic mean recovery was 100.11 percent. The LMCS standard recovery for sample V77 was 85.5 percent recovery.

Accuracy, as measured by the percent recovery of the spike and spike duplicate, was acceptable with 99.9 percent and 101.9 percent, respectively.

Precision between the spike and spike duplicate was acceptable with an RPD of 2.1 percent. The relative percent difference of 2.2 between the sample and duplicate was good.

A field blank was not analyzed (not required), however the reagent blank was less than the detection limit of $0.000325 \mu\text{Ci/ml}$, indicating the absence of contamination.

Sr^{90} activities for the composite sample and duplicate sample were $0.0763 \mu\text{Ci/ml}$ and $0.0780 \mu\text{Ci/ml}$, respectively, with an average of $0.0772 \mu\text{Ci/ml}$.

IODINE-129 (by DISTILLATION/ION EXCHANGE/GEA)

I^{129} analysis was performed on direct samples on 4/9/94 (a sample holding time of 23 days), using procedure/revision LA-378-103/B-3 and instrument numbers WB57237 and WB57265. Required maximum sample holding times are not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

The chemist noted in the batch narrative that carrier recoveries (which ranged from 30.8 percent to 58.4 percent) were low, although acceptable. Other than this, there did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the I^{129} standard (EDP code number S928) were very broad at 45.69 and 147.85 percent recovery. The historic mean recovery was 105.03 percent. Accuracy as determined by the recovery of the LMCS standard for sample V77 was acceptable at 103.8 percent recovery. Accuracy was acceptable for both the spike and spike duplicate with percent recoveries of 88.2 and 94.3, respectively.

Precision as measured by relative percent difference between the spike and its duplicate was acceptable with 6.7 percent. Because I^{129} activity was less than the detection limit, it was not possible to calculate an RPD value between the sample and duplicate.

The reagent blank activity was less than the detection limit of $0.0000590 \mu\text{Ci/ml}$, indicating the absence of contamination.

I^{129} activity was $<0.0000630 \mu\text{Ci/ml}$ for the sample, and was $<0.0000580 \mu\text{Ci/ml}$ for the sample duplicate.

NEPTUNIUM-237 (by EXTRACTION/INTERNAL PROPORTIONAL COUNTER)

Np^{237} analysis was performed on direct samples, using procedure/revision LA-933-141/H-0, and instrument number WB57237.

This analysis was performed on 4/20/94, resulting in sample holding time of 34 days. A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

There did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the Np^{237} standard (EDP code number S380) were very broad at 36.87 to 112.63 percent recovery. The historic mean recovery was 70.48 percent. Accuracy as measured by the recovery of the LMCS standard for V77 was acceptable at 86.3 percent recovery. Accuracy was acceptable for both the spike and spike duplicate with percent recoveries of 82.4 and 83.8, respectively.

Precision was acceptable between the spike and spike duplicate with a 1.5 relative percent difference. Because sample Np^{237} activity was less than the detection limit, it was not possible to calculate a RPD value between the sample and duplicate.

The preparation blank activity was $<0.000201 \mu\text{Ci/ml}$, indicating the absence of contamination.

Np^{237} activity was $<0.000164 \mu\text{Ci/ml}$ and $<0.000163 \mu\text{Ci/ml}$ for the sample and sample duplicate, respectively.

PLUTONIUM-239/240 (By ALPHA ENERGY ANALYSIS)

$\text{Pu}^{239/240}$ analysis was performed on acid digested samples using procedure/revision LA-503-156/D-0 and instrument number WB57237.

Analyses were performed on 4/28/94 (a sample holding time of 42 days). A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

Carrier recovery was marginal for the sample and duplicate with percent recoveries of 41.2 and 33.9, respectively. Other than this, there did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

Statistically derived LMCS control limits for the $\text{Pu}^{239/240}$ standard (EDP code number R211) were 74.04 and 120.82 percent recovery. The historic mean recovery was 106.72 percent.

ADDENDUM 1A,

Accuracy as determined by recovery of the LMCS standard for V77 was acceptable at 102.8 percent recovery. Accuracy was acceptable for both the spike and spike duplicate with percent recoveries of 103.7 and 102.4 percent, respectively.

Precision evaluation, as a function of the relative percent difference between the spike and its duplicate, was acceptable with 1.4 RPD. Because $\text{Pu}^{239/240}$ activity was less than the detection limit, it was not possible to calculate an RPD value between the sample and its duplicate.

The reagent blank activity was less than the detection limit of 0.00101 $\mu\text{Ci/ml}$, indicating the absence of contamination.

$\text{Pu}^{239/240}$ activity was $<0.000413 \mu\text{Ci/ml}$ for the sample and was $<0.000510 \mu\text{Ci/ml}$ for the sample duplicate. The reported sample result for $\text{Pu}^{239/240}$ was a "less than" value using 0.05 for the $\text{Pu}^{239/240}$ peak height.

PLUTONIUM-238 [not requested in WAP] (by ALPHA ENERGY ANALYSIS)

Although this analyte was not requested in the source documents, it was provided in this data package by a subsequent request over the telephone from the evaporator program. Pu^{238} was generated coincidentally with Pu^{240} in the $\text{Pu}^{239/240}$ procedure.

Pu^{238} analysis was performed on acid digested samples using procedure/revision LA-503-156/D-0 and instrument number WB57237.

Analyses were performed on 4/28/94, a sample holding time of 42 days). A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

Carrier recovery was marginal for the sample and duplicate with percent recoveries of 41.2 and 33.9, respectively. Other than this, there did not appear to be any analytical anomalies or difficulties during the analyses of this analyte.

The assessment of accuracy for this method was based on the recovery of the $\text{Pu}^{239/240}$ LMCS standard because no Pu^{238} LMCS standard was available. The recovery of this surrogate LMCS standard was acceptable with a recovery of 102.8 percent.

Because Pu^{238} activity was less than the detection limit for the sample and its duplicate, it was not possible to calculate a RPD value between them. Because no standard was unavailable to generate spikes, it was not possible to provide a precision value between a spike and a spike duplicate.

The reagent blank activity based on $\text{Pu}^{239/240}$ was less than the detection limit of 0.00101 $\mu\text{Ci/ml}$, indicating the absence of contamination.

Pu^{238} activity for the sample was $<0.000565 \mu\text{Ci/ml}$ and was $<0.000663 \mu\text{Ci/ml}$ for the duplicate sample. The Pu^{238} reported "less than" value was generated using 20 dpm for the Pu^{238} sample activity.

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

AMERICIUM-241 (by ALPHA ENERGY ANALYSIS)

Am^{241} analysis was performed on acid digested samples using procedure/revision LA-503-156/D-1 and instrument number WB57237.

The sample holding time was 141 days. A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

Because of analytical anomalies and difficulties, Am^{241} analysis was performed on V77 five separate times. These reruns were performed because of problems with chemical separation, low tracer recovery and low spike recovery. Data from the batch that was reported did not appear to be have analytical anomalies, and there were no difficulties during analysis.

Statistically derived LMCS control limits for the Am^{241} standard (EDP code number R201) were 62.61 and 128.86 percent recovery. The historic mean recovery was 106.38 percent. Accuracy of the LMCS standard for V77 was acceptable with 102.0 percent recovery.

Accuracy for the spike and spike duplicate was acceptable with recoveries of 100.3 and 106.2 percent, respectively.

Precision was acceptable between the spike and spike duplicate with a relative percent difference of 5.7 percent. Am^{241} activities for the sample and sample duplicate were determined to be less than the detection limit, consequently it was not possible to calculate the relative percent difference.

The preparation blank activity was $<0.000311 \mu\text{Ci/ml}$, indicating the absence of contamination.

Am^{241} activity was $<0.000287 \mu\text{Ci/ml}$, and was $<0.000774 \mu\text{Ci/ml}$ for the sample duplicate. These "less than" values were determined using 5 percent of the Am^{243} tracer peak as the Am^{241} peak.

CURIUM-244/243 (by ALPHA ENERGY ANALYSIS)

$\text{Cm}^{243/244}$ analytical data were generated as a byproduct of the Am^{241} procedure/revision LA-503-156/D-1 on acid digested samples using instrument number WB57237.

The sample holding time was 141 days. A required maximum sample holding time was not specified in SW-846 protocol for this analyte, and no field blank was analyzed because it was not required in the source documents.

Because of analytical anomalies and difficulties with the Am^{241} analysis, five reruns were performed on V77. These reruns were performed because of problems with chemical separation, low tracer recovery and low spike recovery of Am^{241} . Data from the batch that was reported did not appear to be have analytical anomalies, and there were no difficulties during analysis.

Although $\text{Cm}^{243/244}$ and Am^{241} were analyzed simultaneously in the same procedure, there was no standard, spike or tracer available for $\text{Cm}^{243/244}$. Because of this, Am^{241} was used as a tracer (surrogate standard). When the counter was

ADDENDUM 1A,

calibrated for efficiency, it was determined that this efficiency was uniform across the entire energy counting spectrum. An approximate value for other nuclides can also be determined with the use of a tracer, such as Am^{243} .

$\text{Cm}^{243/244}$ accuracy was measured as a function of percent recovery of the surrogate Am^{241} LMCS standard and was acceptable with a recovery of 102.0 percent. $\text{Cm}^{243/244}$ relative counting errors for the sample and sample duplicate were 138.6 and 138.7 percent, respectively.

Precision (based on Am^{241}) was acceptable between the spike and spike duplicate with a relative percent difference of 5.7 percent. Am^{241} activities for the sample and sample duplicate were determined to be less than the detection limit, consequently it was not possible to calculate the relative percent difference.

The preparation blank activity was less than the detection limit, indicating the absence of contamination.

$\text{Cm}^{243/244}$ activity was $<0.000287 \mu\text{Ci/ml}$, and was $<0.000774 \mu\text{Ci/ml}$ for the sample duplicate. These "less than" values were determined using 5 percent of the Am^{243} tracer peak as the $\text{Cm}^{243/244}$ and Am^{241} peaks.

TOTAL ALPHA (by proportional counter)

Total alpha analyses were performed on acid predigested samples rather than directly or by acid dilution as was specified in the TPP. This alternative method was recommended because acid digestion would insure that the analyte was fully dissolved to facilitate detection.

Analyses of samples V75 through V77 were performed on 5/10/94 (a sample holding time of 54 days) using procedure/revision number LA-508-101/D-0 and instrument number WA45709. Samples V71 through V73 were analyzed on 7/23/94 (a sample holding time of 24 days) using instrument number WB27810, and procedure/revision number LA-508-101/D-1. The required maximum sample holding time for total alpha activity as specified in SW-846 protocol is six months. Tank 108-AP analyses for total alpha were analyzed within the required holding time.

The field blank was analyzed without a sample duplicate, as was specified in the TPP.

Detection limits and "less than" values were determined using procedure LA-508-002.

There did not appear to be any analytical anomalies or difficulties during these analyses.

Statistically derived LMCS control limits for the total alpha standard (EDP code number S510) were 66.12 and 132.91 percent recovery. The historic mean recovery was 99.22 percent.

LMCS standard recoveries were acceptable for V77 and V73 batch with values of 89.0 and 98.0 percent, respectively.

ADDENDUM 1A,

The accuracy of the spike and its duplicate were acceptable, with recoveries of 90.0 and 93.2 percent, respectively.

Precision between the spike and spike duplicate was acceptable with 3.49 RPD. Precision between sample V77 and its duplicate was good with 8.17 RPD.

Field blank alpha activity was $<0.00000648 \mu\text{Ci/ml}$ ($<6.48 \text{ pCi/ml}$). The reagent blanks were less than the detection limit, indicating the absence of contamination.

Total alpha activity was $0.000293 \mu\text{Ci/ml}$ for the sample, and was $0.000270 \mu\text{Ci/ml}$ for the duplicate, with a grand average of $0.000282 \mu\text{Ci/ml}$ (282 pCi/ml).

TOTAL BETA (by proportional counter)

Total beta analyses were performed on acid predigested samples. Analyses of samples V75 through V77 were performed on 5/10/94 (a sample holding time of 54 days) using procedure/revision number LA-508-101/D-0 and instrument number WA57276. Samples V71 through V73 were analyzed on 7/23/94 (a sample holding time of 24 days) using instrument number WB27810, and procedure/revision number LA-508-101/D-1. The required maximum sample holding time for total beta activity as specified in SW-846 protocol is six months. Tank 108-AP analyses for total beta were analyzed within the required holding time.

The field blank was analyzed without a sample duplicate, as was specified in the TPP.

Detection limits and "less than" values were determined using procedure LA-508-002.

There did not appear to be any analytical anomalies or difficulties during these analyses.

Statistically derived LMCS control limits for the total beta standard (EDP code number S515) were 81.66 and 120.68 percent recovery. The historic mean recovery was 92.21 percent. LMCS standard recovery was acceptable for V77 and V73 with percent recoveries of 89.1 and 89.0 percent.

Total beta accuracy for the spike and the spike duplicate was acceptable with 87.4 and 87.1 percent recoveries, respectively.

Precision between the spike and duplicate spike was acceptable with 0.34 relative percent difference. Precision between sample V77 and its duplicate was good with an RPD of 2.24 percent.

The beta activity of the preparation blank for V77 was $<0.0134 \mu\text{Ci/ml}$. The activity of the preparation blank for V73 was $0.000100 \mu\text{Ci/ml}$, which was 2.4 fold greater than the detection limit. These blanks were determined to not be contaminated.

The field blank activity was $0.000153 \mu\text{Ci/ml}$, but was determined to not be contaminated as per the criteria specified in the QAPJP.

ADDENDUM 1A,

Beta activity was 6.18 $\mu\text{Ci/ml}$ for the sample and was 6.32 $\mu\text{Ci/ml}$ for the sample duplicate, with a grand average of 6.25 $\mu\text{Ci/ml}$.

CONCLUSIONS

Waste in tank 108-AP appeared to be relatively homogeneous. In general, inorganic analyte concentrations in each of the samples, which were collected from five separate locations within the tank, were approximately the same (generally less than a ten-fold difference between the samples of highest and lowest concentrations). It was not possible to draw such a conclusion from radiochemical analyses because the five samples were composited.

Table 13 gives a rough evaluation of sample heterogeneity by comparing variability between samples versus analytical variability. The relative percent difference between the greatest and least of average concentrations of the five individual samples was shown for selected analytes in Column 2. The maximum relative percent difference, which existed between any of the five samples and their duplicates for the corresponding analyte, was shown in Column 3. The comparative ratio between columns 2 and 3 was displayed in column 4.

Table 13. Homogeneity Analysis, a Comparison of RPD Data			
Column 1 Analyte	Column 2 Max. RPD Range between highest & lowest samples	Column 3 Max. RPD between any sample and its duplicate	Column 4 Comparative Precision (Col 2 ÷ Col 3)
Specific Gravity	1.6	0.91	1.8
Cadmium	20.2	33.2	0.6
Sodium	15.7	3.1	5.1
Nitrate	48.5	13.9	3.5
Nitrite	41.2	12.7	3.2
Chromium	7.4	11.1	0.7
Carbonate	31.3	6.4	4.9
Chloride	68.5	14.0	4.9

Analytes were selected for which the concentration was significantly greater than the detection limit and for which there were five sample locations analyzed within the tank. For the above analytes, the maximum range of relative percent differences between each of the five analyses per analyte (Column 2) was less than or approximately equal to 5.0 fold the maximum relative percent difference between any of the five replicate analyses (Column 3). Column 4 equals Column 2 divided by Column 3. The maximum five fold difference between column 3 and column 4 is not a major difference, indicating that variability between samples was at most only five fold greater than the maximal amount of analytical precision. Because precision appears to be primarily a function of experimental error, differences between sample

ADDENDUM 1A,

concentrations appear to be as much a function of experimental error as actual heterogeneity of tank contents.

A summary of analyte grand average concentrations is shown in Table 14. Results shown are values derived by averaging the average results of each of the five individual samples for inorganics, or are simply the composite values for radiochemical analyses.

Table 14. Summary of Analytical Data for Tank 108-AP	
Parameter	Results
Visual appearance	Samples were nearly homogeneous
DSC	No exotherms were observed
Specific gravity, grand average	0.988
Fluoride, grand average	34.1 $\mu\text{g}/\text{ml}$ (estimated)
Chloride, grand average	56.3 $\mu\text{g}/\text{ml}$
Nitrate, grand average	1,560 $\mu\text{g}/\text{ml}$
Nitrite, grand average	1,010 $\mu\text{g}/\text{ml}$
Phosphate, grand average	92.7 $\mu\text{g}/\text{ml}$
Sulfate, grand average	201 $\mu\text{g}/\text{ml}$
Ammonia (by ISE), grand average	8.2 $\mu\text{g}/\text{ml}$ (estimated)
Hydroxide	<125 $\mu\text{g}/\text{ml}$
Cyanide,	≤ 0.45 $\mu\text{g}/\text{ml}$
Carbonate, grand average	486 $\mu\text{g}/\text{ml}$
Uranium, grand average	13.5 $\mu\text{g}/\text{ml}$
Arsenic	<0.0322 $\mu\text{g}/\text{ml}$
Selenium	<0.0130 $\mu\text{g}/\text{ml}$
Mercury	<0.005 $\mu\text{g}/\text{ml}$
Aluminum, grand average	41,700 $\mu\text{g}/\text{L}$
Barium	<20.0 $\mu\text{g}/\text{L}$
Cadmium, grand average	141 $\mu\text{g}/\text{L}$
Calcium, grand average	1,710 $\mu\text{g}/\text{L}$ (estimated)
Chromium, grand average	2,030 $\mu\text{g}/\text{L}$
Iron, grand average	510 $\mu\text{g}/\text{L}$ (estimated)
Lead	≤ 126 $\mu\text{g}/\text{L}$
Magnesium, grand average	87.0 $\mu\text{g}/\text{L}$ (estimated)
Manganese	≤ 18.0 $\mu\text{g}/\text{L}$

Table 14. Summary of Analytical Data for Tank 108-AP	
Parameter	Results
Silver, grand average	(63.2 $\mu\text{g/L}$)
Sodium, grand average	2,770,000 $\mu\text{g/L}$ (2770 $\mu\text{g/ml}$)
Zinc, grand average	299 $\mu\text{g/L}$ (estimated)
Ce/Pr ¹⁴⁴	<0.00904 $\mu\text{Ci/ml}$
Cs ¹³⁴	<0.00149 $\mu\text{Ci/ml}$ (estimated)
Cs ¹³⁷	4.29 $\mu\text{Ci/ml}$
Co ⁶⁰	<0.000202 $\mu\text{Ci/ml}$
Eu ¹⁵⁴	<0.000901 $\mu\text{Ci/ml}$
Eu ¹⁵⁵	<0.00487 $\mu\text{Ci/ml}$
Nb ⁹⁴	<0.000481 $\mu\text{Ci/ml}$
Ra ²²⁶	<0.0374 $\mu\text{Ci/ml}$
Ru/Rh ¹⁰⁶	<0.0272 $\mu\text{Ci/ml}$
H ³	0.0112 $\mu\text{Ci/ml}$
C ¹⁴	<0.00000219 $\mu\text{Ci/ml}$
Se ⁷⁹	<0.0000121 $\mu\text{Ci/ml}$
Tc ⁹⁹	0.000308 $\mu\text{Ci/ml}$
Sr ⁹⁰	0.0772 $\mu\text{Ci/ml}$
I ¹²⁹	<0.0000630 $\mu\text{Ci/ml}$
Np ²³⁷	<0.000164 $\mu\text{Ci/ml}$
Pu ^{239/240}	<0.000413 $\mu\text{Ci/ml}$
Pu ²³⁸	<0.000565 $\mu\text{Ci/ml}$
Am ²⁴¹	<0.000287 $\mu\text{Ci/ml}$
Cm ^{243/244}	<0.000287 $\mu\text{Ci/ml}$
Total alpha	0.000293 $\mu\text{Ci/ml}$ (estimated)
Total beta	6.18 $\mu\text{Ci/ml}$

Total beta analysis yielded a value of 6.18 $\mu\text{Ci/ml}$. The sum of activities by beta emitting radionuclides (Cs¹³⁷ with 4.29 $\mu\text{Ci/ml}$, Tc⁹⁹ with 0.000308 $\mu\text{Ci/ml}$, and Sr⁹⁰ with 0.0772 $\mu\text{Ci/ml}$) accounted for 71 percent of the activity detected by the total beta analysis.

Total alpha analysis yielded a value of 0.000293 $\mu\text{Ci/ml}$. Because the activities of all of the alpha emitters were less than the detection limits,

ADDENDUM 1A,

it was not possible to compare the individual sums to the total alpha activity.

The major ionic constituents of tank 108-AP waste were predominantly sodium, carbonate (or bicarbonate), nitrate and nitrite with lesser amounts of sulfate, phosphate and aluminum. Table 15 shows the ionic concentrations of each of these major components, and it compares the ratio of the sum of anions to the sum of cations for each sample.

Several characteristics of the analytes were not determined by the analyses that were reported here, consequently some assumptions were necessary to perform the calculations. The assumptions included estimations of analyte valence states, the number of oxygen (and other) atoms associated with each analyte, and the pH was determined from analyses.

An estimation of the pH was derived from the initial pH measurement that was taken during the analysis of hydroxide. This pH is only an estimation because the sample (generally a μL amount) was diluted with reagent grade water (generally a few ml) to accommodate the titration. Consequently the initial pH may be effected by dilution, the amount of carbonate in the reagent water and by the carryover of acid and salts from the prior titration. Using these data to estimate sample pH values, it is observed that the pH values were unexpectedly low, ranging from approximately 8.15 to 9.5. In this range, it would be expected that bicarbonate would predominate over carbonate by an estimated 5.3 to 118 fold (the inverse of the ratio value in the ratio table below). By rearranging the equation for the second dissociation constant for carbonic acid (equation 2) and substituting the sample's hydrogen ion concentration (determined from pH), it is possible to calculate (using formula 1) the ratio of carbonate to bicarbonate, as shown in the table of ratios.

$$\text{Formula 1} \quad \frac{[\text{CO}_3^{2-}]}{[\text{HCO}_3^-]} = \frac{6 \times 10^{-11}}{[\text{H}^+]}$$

1A-70

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

pH	Ratio $\text{CO}_3^{2-}/\text{HCO}_3^-$
8.0	0.006
8.5	0.02
9.0	0.06
9.5	0.19
9.75	0.34
10.0	0.60
10.25	1.07

Although the bicarbonate ion predominates significantly, because the ratio varies with pH, it was assumed that all of the inorganic carbon present was carbonate because the only pH data that were available were not particularly reliable.

All aluminum μ equivalent/L values were based on the assumption that aluminum was present as a trivalent cation without associated oxygen or hydrogen.

In table 15, the ratios of anions to cations (which ranged from 0.93 to 1.3) for each of the samples indicated that most of the major ionic constituents were accounted for with the analyses that were requested. For tank 108-AP's waste constituents, the activities that were determined by gross radiochemical procedures were compared with the summation of individual analyses.

/H-71

Table 15.
Cation/Anion Ion Balance

Analyte	V62		V63		V67		V68		V69	
	$\mu\text{g/mL}$	$\mu\text{eq/L}$	$\mu\text{g/mL}$	$\mu\text{eq/L}$	$\mu\text{g/mL}$	$\mu\text{eq/L}$	$\mu\text{g/mL}$	$\mu\text{eq/L}$	$\mu\text{g/mL}$	$\mu\text{eq/L}$
Na	3030	$(R/10^6)/$ $0.02299 = 0.132$	2650	$(R/10^6)/$ $0.02299 = 0.116$	2970	$(R/10^6)/$ $0.02299 = 0.129$	2590	$(R/10^6)/$ $0.02299 = 0.113$	2610	$(R/10^6)/$ $0.02299 = 0.114$
Al	55	$(R/10^6)/$ $0.00899 = 0.006$	34	$(R/10^6)/$ $0.00899 = 0.004$	54	$(R/10^6)/$ $0.00899 = 0.006$	33	$(R/10^6)/$ $0.00899 = 0.004$	31	$(R/10^6)/$ $0.00899 = 0.003$
Total Cation		0.138		0.120		0.135		0.117		0.117
NO3	1920	$(R/10^6)/$ $0.06201 = 0.031$	1170	$(R/10^6)/$ $0.06201 = 0.019$	1890	$(R/10^6)/$ $0.06201 = 0.030$	1590	$(R/10^6)/$ $0.06201 = 0.025$	1230	$(R/10^6)/$ $0.06201 = 0.020$
NO2	1160	$(R/10^6)/$ $0.046 = 0.025$	764	$(R/10^6)/$ $0.046 = 0.017$	996	$(R/10^6)/$ $0.046 = 0.022$	1110	$(R/10^6)/$ $0.046 = 0.024$	1030	$(R/10^6)/$ $0.046 = 0.022$
PO4	98	$(R/10^6)/$ $0.031 = 0.003$	80	$(R/10^6)/$ $0.031 = 0.003$	94	$(R/10^6)/$ $0.031 = 0.003$	97	$(R/10^6)/$ $0.031 = 0.003$	95	$(R/10^6)/$ $0.031 = 0.003$
SO4	234	$(R/10^6)/$ $0.048 = 0.005$	155	$(R/10^6)/$ $0.048 = 0.003$	216	$(R/10^6)/$ $0.048 = 0.005$	202	$(R/10^6)/$ $0.048 = 0.005$	200	$(R/10^6)/$ $0.048 = 0.004$
CO3=	2085	$(R/10^6)/$ $0.026 = 0.069$	2110	$(R/10^6)/$ $0.026 = 0.070$	2430	$(R/10^6)/$ $0.026 = 0.081$	2860	$(R/10^6)/$ $0.026 = 0.095$	2670	$(R/10^6)/$ $0.026 = 0.089$
Total Anion		0.133		0.112		0.141		0.152		0.138
Ratio A/C		0.96		0.93		1.04		1.30		1.18

	V62	V63	V67	V68	V69
pH	9.5	8.67	9.16	8.15	8.29

MHC-SD-MM-DP-065, REV. 0
ADDENDUM 1A,

1A-72

WHC-SD-WM-DP-065, ADDENDUM 1A, REV. 0

LABORATORY FORM #1's

1A-73

Volatile Organics - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A-74

082

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V133

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 1 (g/mL) ML

Lab File ID: >AF30G

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NO.

COMPOUND

Q

74-87-3	Chloromethane	50.	U D
74-83-9	Bromomethane	50.	U D
75-01-4	Vinyl Chloride	50.	U D
75-00-3	Chloroethane	50.	U D
75-09-2	Methylene Chloride	50.	U D
67-64-1	Acetone	340.	D
75-15-0	Carbon Disulfide	50.	U D
75-35-4	1,1-Dichloroethene	50.	U D
75-34-3	1,1-Dichloroethane	50.	U D
540-59-0	1,2-Dichloroethene (total)	50.	U D
67-66-3	Chloroform	50.	U D
107-02-2	1,2-Dichloroethane	50.	U D
78-93-3	2-Butanone	36.	J D
71-55-6	1,1,1-Trichloroethane	50.	U D
56-23-5	Carbon Tetrachloride	50.	U D
75-27-4	Bromodichloromethane	50.	U D
78-87-5	1,2-Dichloropropane	50.	U D
10061-01-5	cis-1,3-Dichloropropene	50.	U D
79-01-6	Trichloroethene	50.	U D
124-48-1	Dibromochloromethane	50.	U D
79-00-5	1,1,2-Trichloroethane	50.	U D
71-43-2	Benzene	50.	U D
10061-02-6	trans-1,3-Dichloropropene	50.	U D
75-25-2	Bromoform	50.	U D
108-10-1	4-Methyl-2-pentanone	50.	U D
591-78-6	2-Hexanone	3.	J D
127-18-4	Tetrachloroethene	50.	U D
79-34-5	1,1,2,2-Tetrachloroethane	50.	U D
108-88-3	Toluene	50.	U D
108-90-7	Chlorobenzene	50.	U D
100-41-4	Ethylbenzene	50.	U D
100-42-5	Styrene	50.	U D
133-02-7	Xylene (total)	50.	U D
109-99-9	Tetrahydrofuran	16.	J D
98-82-8	Isopropylbenzene	50.	U D
108-67-8	1,3,5-Trimethylbenzene	50.	U D
95-63-6	1,2,4-Trimethylbenzene	50.	U D
526-73-8	1,2,3-Trimethylbenzene	50.	U D

FORM I VOA

3/90

E02-054

1A-75

083

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

V133

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 1 (g/mL) ML

Lab File ID: >AF30G

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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FORM I VOA-TIC

3/90

E02-008

1A-76

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WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V133DUP

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V133DUP

Sample wt/vol: 1 (g/mL) ML

Lab File ID: >AF30H

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NO.

COMPOUND

Q

74-87-3	Chloromethane	50.	U D
74-83-9	Bromomethane	50.	U D
75-01-4	Vinyl Chloride	50.	U D
75-00-3	Chloroethane	50.	U D
75-09-2	Methylene Chloride	50.	U D
67-64-1	Acetone	370.	D
75-15-0	Carbon Disulfide	50.	U D
75-35-4	1,1-Dichloroethene	50.	U D
75-34-3	1,1-Dichloroethane	50.	U D
540-59-0	1,2-Dichloroethene (total)	50.	U D
67-66-3	Chloroform	50.	U D
107-02-2	1,2-Dichloroethane	50.	U D
78-93-3	2-Butanone	34.	J D
71-55-6	1,1,1-Trichloroethane	50.	U D
56-23-5	Carbon Tetrachloride	50.	U D
75-27-4	Bromodichloromethane	50.	U D
78-87-5	1,2-Dichloropropane	50.	U D
10061-01-5	cis-1,3-Dichloropropene	50.	U D
79-01-6	Trichloroethene	50.	U D
124-48-1	Dibromochloromethane	50.	U D
79-00-5	1,1,2-Trichloroethane	50.	U D
71-43-2	Benzene	50.	U D
10061-02-6	trans-1,3-Dichloropropene	50.	U D
75-25-2	Bromoform	50.	U D
108-10-1	4-Methyl-2-pentanone	50.	U D
591-78-6	2-Hexanone	50.	U D
127-18-4	Tetrachloroethene	50.	U D
79-34-5	1,1,2,2-Tetrachloroethane	50.	U D
108-88-3	Toluene	50.	U D
108-90-7	Chlorobenzene	50.	U D
100-41-4	Ethylbenzene	50.	U D
100-42-5	Styrene	50.	U D
133-02-7	Xylene (total)	50.	U D
109-99-9	Tetrahydrofuran	15.	J D
98-82-8	Isopropylbenzene	50.	U D
108-67-8	1,3,5-Trimethylbenzene	50.	U D
95-63-6	1,2,4-Trimethylbenzene	50.	J D
526-73-8	1,2,3-Trimethylbenzene	50.	U D

FORM I VOA

3/90

E02-032

1A-77

085

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

V133DUP

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V133DUP

Sample wt/vol: 1 (g/mL) ML

Lab File ID: >AF30H

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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E02-033

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086

**WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V134

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 1

(g/mL) ML

Lab File ID: >AF30I

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624

ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume:

(uL)

Soil Aliquot Volume:

(uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) ug/L

Q

74-87-3	Chloromethane	50.	U D
74-83-9	Bromomethane	50.	U D
75-01-4	Vinyl Chloride	50.	U D
75-00-3	Chloroethane	50.	U D
75-09-2	Methylene Chloride	50.	U D
67-64-1	Acetone	530.	D
75-15-0	Carbon Disulfide	50.	U D
75-35-4	1,1-Dichloroethene	50.	U D
75-34-3	1,1-Dichloroethane	50.	U D
540-59-0	1,2-Dichloroethene (total)	50.	U D
67-66-3	Chloroform	50.	U D
107-02-2	1,2-Dichloroethane	50.	U D
78-93-3	2-Butanone	62.	D
71-55-6	1,1,1-Trichloroethane	50.	U D
56-23-5	Carbon Tetrachloride	50.	U D
75-27-4	Bromodichloromethane	50.	U D
78-87-5	1,2-Dichloropropane	50.	U D
10061-01-5	cis-1,3-Dichloropropene	50.	U D
79-01-6	Trichloroethene	50.	U D
124-48-1	Dibromochloromethane	50.	U D
79-00-5	1,1,2-Trichloroethane	50.	U D
71-43-2	Benzene	50.	U D
10061-02-6	trans-1,3-Dichloropropene	50.	U D
75-25-2	Bromoform	50.	U D
108-10-1	4-Methyl-2-pentanone	50.	U D
591-78-6	2-Hexanone	5.	J D
127-18-4	Tetrachloroethene	50.	U D
79-34-5	1,1,2,2-Tetrachloroethane	50.	U D
108-88-3	Toluene	50.	U D
108-90-7	Chlorobenzene	50.	U D
100-41-4	Ethylbenzene	50.	U D
100-42-5	Styrene	50.	U D
133-02-7	Xylene (total)	50.	U D
109-99-9	Tetrahydrofuran	50.	U D
98-82-8	Isopropylbenzene	50.	U D
108-67-8	1,3,5-Trimethylbenzene	50.	U D
95-63-6	1,2,4-Trimethylbenzene	50.	U D
526-73-8	1,2,3-Trimethylbenzene	50.	U D

FORM I VOA

3/90

E02-055

1A-79

087

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

V134

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 1 (g/mL) ML

Lab File ID: >AF30I

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 5

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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FORM I VOA-TIC

3/90

E02-056
1A80

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088

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V135

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V135

Sample wt/vol: 5 (g/mL) ML

Lab File ID: >AF30F

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 1

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) ug/L

Q

74-87-3	-----Chloromethane	10.	U
74-83-9	-----Bromomethane	10.	U
75-01-4	-----Vinyl Chloride	10.	U
75-00-3	-----Chloroethane	10.	U
75-09-2	-----Methylene Chloride	.5	J
67-64-1	-----Acetone	3.	J
75-15-0	-----Carbon Disulfide	10.	U
75-35-4	-----1,1-Dichloroethene	10.	U
75-34-3	-----1,1-Dichloroethane	10.	U
540-59-0	-----1,2-Dichloroethene (total)	10.	U
67-66-3	-----Chloroform	10.	U
107-02-2	-----1,2-Dichloroethane	10.	U
78-93-3	-----2-Butanone	10.	U
71-55-6	-----1,1,1-Trichloroethane	10.	U
56-23-5	-----Carbon Tetrachloride	10.	U
75-27-4	-----Bromodichloromethane	10.	U
78-87-5	-----1,2-Dichloropropane	10.	U
10061-01-5	-----cis-1,3-Dichloropropene	10.	U
79-01-6	-----Trichloroethene	10.	U
124-48-1	-----Dibromochloromethane	10.	U
79-00-5	-----1,1,2-Trichloroethane	10.	U
71-43-2	-----Benzene	10.	U
10061-02-6	-----trans-1,3-Dichloropropene	10.	U
75-25-2	-----Bromoform	10.	U
108-10-1	-----4-Methyl-2-pentanone	10.	U
591-78-6	-----2-Hexanone	10.	U
127-18-4	-----Tetrachloroethene	10.	U
79-34-5	-----1,1,2,2-Tetrachloroethane	10.	U
108-88-3	-----Toluene	10.	U
108-90-7	-----Chlorobenzene	10.	U
100-41-4	-----Ethylbenzene	10.	U
100-42-5	-----Styrene	10.	U
133-02-7	-----Xylene (total)	10.	U
109-99-9	-----Tetrahydrofuran	2.	J
98-82-8	-----Isopropylbenzene	10.	U
108-67-8	-----1,3,5-Trimethylbenzene	10.	U
95-63-6	-----1,2,4-Trimethylbenzene	10.	U
526-73-8	-----1,2,3-Trimethylbenzene	10.	U

FORM I VOA

3/90

E02-077

1A-81

089

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

V135

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: V133

Matrix: (soil/water) WATER

Lab Sample ID: V135

Sample wt/vol: 5 (g/mL) ML

Lab File ID: >AF30F

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: not dec.

Date Analyzed: 6/30/94

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 1

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
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FORM I VOA-TIC

3/90

E02-078

1A 82

11/1/94

090

Semivolatile Organics - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APA

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000	✓
111-44-4	bis(-2-Chloroethyl) Ether	2000	✓
95-57-8	2-Chlorophenol	1000	✓
541-73-1	1,3-Dichlorobenzene	1000	✓
106-46-7	1,4-Dichlorobenzene	1000	✓
95-50-1	1,2-Dichlorobenzene	1000	✓
95-48-7	2-Methylphenol	1000	✓
108-60-1	2,2'-oxybis(1-Chloropropane)	2000	✓
106-44-5	4-Methylphenol	1000	✓
621-64-7	N-Nitroso-di-n-propylamine	2000	✓
67-72-1	Hexachloroethane	1000	✓
98-95-3	Nitrobenzene	1000	✓
78-59-1	Isophorone	1000	✓
88-75-5	2-Nitrophenol	1000	✓
105-67-9	2,4-Dimethylphenol	1000	✓
111-91-1	bis(-2-Chloroethoxy)methane	2000	✓
120-83-2	2,4-Dichlorophenol	1000	✓
120-82-1	1,2,4-Trichlorobenzene	1000	✓
91-20-3	Naphthalene	1000	✓
106-47-8	4-Chloroaniline	1000	✓
87-68-3	Hexachlorobutadiene	1000	✓
59-50-7	4-Chloro-3-Methylphenol	1000	✓
91-57-6	2-Methylnaphthalene	1000	✓
77-47-4	Hexachlorocyclopentadiene	1000	✓
88-06-2	2,4,6-Trichlorophenol	1000	✓
95-95-4	2,4,5-Trichlorophenol	1000	✓
91-58-7	2-Chloronaphthalene	2000	✓
88-74-4	2-Nitroaniline	1000	✓
131-11-3	Dimethylphthalate	2000	✓
208-96-8	Acenaphthylene	1000	✓
606-20-2	2,6-Dinitrotoluene	1000	✓
99-09-2	3-Nitroaniline	1000	✓
83-32-9	Acenaphthene	1000	✓

FORM I SV-1

3/90

E03-015

1184

092

WHC-SD-WM-DP-065 ADDENDUM 1A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APA

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5-----	2,4-Dinitrophenol	1000	U
100-02-7-----	4-Nitrophenol	1000	U
132-64-9-----	Dibenzofuran	1000	U
121-14-2-----	2,4-Dinitrotoluene	1000	U
84-66-2-----	Diethylphthalate	1000	U
7005-72-3-----	4-Chlorophenyl-phenylether	2000	U
86-73-7-----	Fluorene	1000	U
100-01-6-----	4-Nitroaniline	1000	U
534-52-1-----	4,6-Dinitro-2-methylphenol	1000	U
86-30-6-----	N-nitrosodiphenylamine (1)	2000	U
101-55-3-----	4-Bromophenyl-phenylether	2000	U
118-74-1-----	Hexachlorobenzene	1000	U
87-86-5-----	Pentachlorophenol	1000	U
85-01-8-----	Phenanthrene	1000	U
120-12-7-----	Anthracene	1000	U
86-74-8-----	Carbazole	1000	U
84-74-2-----	Di-n-butylphthalate	2000	U
206-44-0-----	Fluoranthene	1000	U
129-00-0-----	Pyrene	1000	U
85-68-7-----	Butylbenzylphthalate	2000	U
91-94-1-----	3,3'-Dichlorobenzidine	1000	U
56-55-3-----	Benzo(a)anthracene	1000	U
218-01-9-----	Chrysene	1000	U
117-81-7-----	bis(2-Ethylhexyl)phthalate	2000	U
117-84-0-----	Di-n-octylphthalate	2000	U
205-99-2-----	Benzo(b)fluoranthene	1000	U
207-08-9-----	Benzo(k)fluoranthene	1000	U
50-32-8-----	Benzo(a)pyrene	1000	U
193-39-5-----	Indeno(1,2,3-cd)pyrene	1000	U
53-70-3-----	Dibenzo(a,h)anthracene	1000	U
191-24-2-----	Benzo(g,h,i)perylene	1000	U
110-86-1-----	Pyridine	1000	U
111-76-2-----	2-Butoxyethanol	1800	J

FORM I SV-2

3/90

E03-016

1A-85

093

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APA

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

126-73-8-----	Phosphoric acid, tributyleste	7000	✓	5
108-39-4-----	3-Methylphenol	1000	✓	u5
71-36-3-----	1-Butanol	1000	✓	+
100-51-6-----	Benzyl alcohol	1000	✓	

FORM I SV-3

3/90

EO3-017

1/86

094

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APA

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/27/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

629-50-5-----	Tridecane	1000	Q	Q
629-59-4-----	tetradecane	1000	Q	Q

FORM I SV-1

3/90

E03-018

1A87

095

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

108apa

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: v133

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 3 -

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-82-7	Cyclohexane	2.000	2100	NJB
2. 67-71-0	Dimethyl sulfone	5.678	850	NJ
3. 122-99-6	Ethanol, 2-phenoxy-	8.682	660	NJ
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FORM I SV-TIC

3/90

EC3-019

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11/1/94

1/88

096

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APADU

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133DU

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133DU.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(-2-Chloroethyl) Ether	2000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	2,2'-oxybis(1-Chloropropane)	2000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	2000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(-2-Chloroethoxy)methane	2000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-Methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	1000
91-58-7	2-Chloronaphthalene	2000
88-74-4	2-Nitroaniline	1000
131-11-3	Dimethylphthalate	2000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	1000
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

E03-036

1789

097

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APADU

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133DU

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133DU.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)* N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	1000
100-02-7	4-Nitrophenol	1000
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	2000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	1000
534-52-1	4,6-Dinitro-2-methylphenol	1000
86-30-6	N-nitrosodiphenylamine (1)	2000
101-55-3	4-Bromophenyl-phenylether	2000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	1000
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
86-74-8	Carbazole	1000
84-74-2	Di-n-butylphthalate	2000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	2000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	bis(2-Ethylhexyl)phthalate	2000
117-84-0	Di-n-octylphthalate	2000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenzo(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
110-86-1	Pyridine	1000
111-76-2	2-Butoxyethanol	1600

FORM I SV-2

3/90

~~E03-037~~

1A-90

098

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

108APADU

Lab Name: WHCWA Contract:
Lab Code: Case No.: SAS No.: SDG No.: 108AP
Matrix: (soil/water) WATER Lab Sample ID: V133DU
Sample wt/vol: 10 (g/mL) ML Lab File ID: V133DU.D
Level: (low/med) LOW Date Received: 06/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 06/30/94
Concentrated Extract Volume: 1000(UL) Date Analyzed: 07/26/94
Injection Volume: 2.0(uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	Q
126-73-8-----	Phosphoric acid, tributyleste	5900	-	5
108-39-4-----	3-Methylphenol	1000	u	u
71-36-3-----	1-Butanol	1000	u	u
100-51-6-----	Benzyl alcohol	1000	u	u

FORM I SV-3

3/90

~~E03-038~~

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u/u/94

099

1A91

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APDU

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V133DU

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133DU.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/27/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

629-50-5-----	Tridecane	1000	Q	Q
629-59-4-----	tetradecane	1000	Q	Q

FORM I SV-1

3/90

EO3-039

7A-92

100

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

108apadu

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: v133du

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V133DU.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-82-7	Cyclohexane	2.049	2100	NJ R
2. 67-71-0	Dimethyl sulfone	5.687	860	NJ
3. 122-99-6	Ethanol, 2-phenoxy-	8.682	580	NJ
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FORM I SV-TIC

3/90

~~EO3-040~~

1A93

101

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V134.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000	U
111-44-4	bis(-2-Chloroethyl) Ether	2000	U
95-57-8	2-Chlorophenol	1000	U
541-73-1	1,3-Dichlorobenzene	1000	U
106-46-7	1,4-Dichlorobenzene	1000	U
95-50-1	1,2-Dichlorobenzene	1000	U
95-48-7	2-Methylphenol	1000	U
108-60-1	2,2'-oxybis(1-Chloropropane)	2000	U
106-44-5	4-Methylphenol	1000	U
621-64-7	N-Nitroso-di-n-propylamine	2000	U
67-72-1	Hexachloroethane	1000	U
98-95-3	Nitrobenzene	1000	U
78-59-1	Isophorone	1000	U
88-75-5	2-Nitrophenol	1000	U
105-67-9	2,4-Dimethylphenol	1000	U
111-91-1	bis(-2-Chloroethoxy)methane	2000	U
120-83-2	2,4-Dichlorophenol	1000	U
120-82-1	1,2,4-Trichlorobenzene	1000	U
91-20-3	Naphthalene	1000	U
106-47-8	4-Chloroaniline	1000	U
87-68-3	Hexachlorobutadiene	1000	U
59-50-7	4-Chloro-3-Methylphenol	1000	U
91-57-6	2-Methylnaphthalene	1000	U
77-47-4	Hexachlorocyclopentadiene	1000	U
88-06-2	2,4,6-Trichlorophenol	1000	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	2000	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	2000	U
208-96-8	Acenaphthylene	1000	U
606-20-2	2,6-Dinitrotoluene	1000	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	1000	U

FORM I SV-1

3/90

E03-056

1/94

102

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

108APB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V134.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	1000
100-02-7	4-Nitrophenol	1000
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	2000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	1000
534-52-1	4,6-Dinitro-2-methylphenol	1000
86-30-6	N-nitrosodiphenylamine (1)	2000
101-55-3	4-Bromophenyl-phenylether	2000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	1000
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
86-74-8	Carbazole	1000
84-74-2	Di-n-butylphthalate	2000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	2000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	bis(2-Ethylhexyl)phthalate	2000
117-84-0	Di-n-octylphthalate	2000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenzo(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
110-86-1	Pyridine	1000
111-76-2	2-Butoxyethanol	600

FORM I SV-2

3/90

E03-057

1A-95

103

108APB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V134.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

126-73-8-----	Phosphoric acid, tributyleste	3500	
108-39-4-----	3-Methylphenol	1000	
71-36-3-----	1-Butanol	1000	
100-51-6-----	Benzyl alcohol	1000	

J
W
I

~~E03-058~~

1A-96

104

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V134

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V134.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/27/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
629-50-5-----	Tridecane	1000	Y UJ
629-59-4-----	tetradecane	1000	Y UJ

FORM I SV-1

3/90

~~E03-059~~

1A-97

105

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

108apb

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: v134

Sample wt/vol: 10

(g/mL) ML

Lab File ID: V134.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 7.0

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-82-7	Cyclohexane	2.137	1400	NT
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I SV-TIC

3/90

~~E03-060~~

1A-38

Handwritten signature
11/1/94

106

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APBFB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V136

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V136.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Q

108-95-2-----	Phenol	1000	U
111-44-4-----	bis(-2-Chloroethyl) Ether	2000	U
95-57-8-----	2-Chlorophenol	1000	U
541-73-1-----	1,3-Dichlorobenzene	1000	U
106-46-7-----	1,4-Dichlorobenzene	1000	U
95-50-1-----	1,2-Dichlorobenzene	1000	U
95-48-7-----	2-Methylphenol	1000	U
108-60-1-----	2,2'-oxybis(1-Chloropropane)	2000	U
106-44-5-----	4-Methylphenol	1000	U
621-64-7-----	N-Nitroso-di-n-propylamine	2000	U
67-72-1-----	Hexachloroethane	1000	U
98-95-3-----	Nitrobenzene	1000	U
78-59-1-----	Isophorone	1000	U
88-75-5-----	2-Nitrophenol	1000	U
105-67-9-----	2,4-Dimethylphenol	1000	U
111-91-1-----	bis(-2-Chloroethoxy) methane	2000	U
120-83-2-----	2,4-Dichlorophenol	1000	U
120-82-1-----	1,2,4-Trichlorobenzene	1000	U
91-20-3-----	Naphthalene	1000	U
106-47-8-----	4-Chloroaniline	1000	U
87-68-3-----	Hexachlorobutadiene	1000	U
59-50-7-----	4-Chloro-3-Methylphenol	1000	U
91-57-6-----	2-Methylnaphthalene	1000	U
77-47-4-----	Hexachlorocyclopentadiene	1000	U
88-06-2-----	2,4,6-Trichlorophenol	1000	U
95-95-4-----	2,4,5-Trichlorophenol	1000	U
91-58-7-----	2-Chloronaphthalene	2000	U
88-74-4-----	2-Nitroaniline	1000	U
131-11-3-----	Dimethylphthalate	2000	U
208-96-8-----	Acenaphthylene	1000	U
606-20-2-----	2,6-Dinitrotoluene	1000	U
99-09-2-----	3-Nitroaniline	1000	U
83-32-9-----	Acenaphthene	1000	U

FORM I SV-1

3/90

~~EO3-074~~

1/99

107

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APBFB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water) WATER

Lab Sample ID: V136

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V136.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	1000	U
121-14-2	2,4-Dinitrotoluene	1000	U
84-66-2	Diethylphthalate	1000	U
7005-72-3	4-Chlorophenyl-phenylether	2000	U
86-73-7	Fluorene	1000	U
100-01-6	4-Nitroaniline	1000	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
86-30-6	N-nitrosodiphenylamine (1)	2000	U
101-55-3	4-Bromophenyl-phenylether	2000	U
118-74-1	Hexachlorobenzene	1000	U
87-86-5	Pentachlorophenol	1000	U
85-01-8	Phenanthrene	1000	U
120-12-7	Anthracene	1000	U
86-74-8	Carbazole	1000	U
84-74-2	Di-n-butylphthalate	2000	U
206-44-0	Fluoranthene	1000	U
129-00-0	Pyrene	1000	U
85-68-7	Butylbenzylphthalate	2000	U
91-94-1	3,3'-Dichlorobenzidine	1000	U
56-55-3	Benzo(a)anthracene	1000	U
218-01-9	Chrysene	1000	U
117-81-7	bis(2-Ethylhexyl)phthalate	2000	U
117-84-0	Di-n-octylphthalate	2000	U
205-99-2	Benzo(b)fluoranthene	1000	U
207-08-9	Benzo(k)fluoranthene	1000	U
50-32-8	Benzo(a)pyrene	1000	U
193-39-5	Indeno(1,2,3-cd)pyrene	1000	U
53-70-3	Dibenzo(a,h)anthracene	1000	U
191-24-2	Benzo(g,h,i)perylene	1000	U
110-86-1	Pyridine	1000	U
111-76-2	2-Butoxyethanol	1000	U

FORM I SV-2

3/5

E03-075

1A-100

108

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APBFB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 102AP

Matrix: (soil/water) WATER

Lab Sample ID: V136

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V136.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 07/26/94

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
126-73-3	Phosphoric acid, tributyleste	1000	U
108-39-4	3-Methylphenol	1000	U
71-36-3	1-Butanol	1000	U
100-51-6	Benzyl alcohol	1000	U

FORM I SV-3

3790

~~EO3-876~~

1A-101

109

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

108APBFB

Lab Name: WHCWA

Contract:

Lab Code:

Case No.:

SAS No.:

SDG No.: 108AP

Matrix: (soil/water).WATER

Lab Sample ID: V136

Sample wt/vol: 10 (g/mL) ML

Lab File ID: V136.D

Level: (low/med) LOW

Date Received: 06/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 06/30/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 07/27/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

Q

629-50-5-----	Tridecane	1000	U
629-59-4-----	tetradecane	1000	U

FORM I SV-1

37

~~E03-077~~

1A102

110

Total Organic Carbon - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

[illegible]

NO SPECIAL PROBLEMS / METHOD VARIATIONS IN THIS BATCH

NARRATIVE -- LIST SPECIFIC PROBLEMS / VARIATIONS FOR THIS BATCH

Robert W. Schroeder
7-7-94

~~E01-C02~~

1A-104

112

General Chemistry and Metals - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1

INORGANIC ANALYSES DATA SHEET

V62

Contract:

Lab Code:

Case No.: 108AP

SAS No.:

SDG No.: V62A

Matrix (soil/water): WATER

Lab Sample ID: V62

Level (low/med): LOW

Date Received: 05/09/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

[illegible]

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A,

Color Before: _____
Color After: _____

Clarity Before: _____
Clarity After: _____

Texture: _____
Artifacts: _____

ments:

858

114

1
INORGANIC ANALYSES DATA SHEET

V63

Lab Name: WHC _____ Contract: _____ V63
Lab Code: _____ Case No.: 108AP SAS No.: _____ SDG No.: V62 A
Matrix (soil/water): WATER Lab Sample ID: V63 *BW 5/10/94*
Level (low/med): LOW Date Received: 05/09/94
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

[illegible]

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

~~855~~

1
INORGANIC ANALYSES DATA SHEET

V67

% Solids: 0.0

[illegible]

10/31/99

1

INORGANIC ANALYSES DATA SHEET

V68

Lab Name: WHC	Contract:	V68
Lab Code:	Case No.: 108AP	SAS No.: SDG No.: V65A
Matrix (soil/water): WATER	Lab Sample ID: V68	
Level (low/med): LOW	Date Received: 03/18/94	
% Solids: 0.0		

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A,

[illegible]

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

117
91817
11/28/94

1
INORGANIC ANALYSES DATA SHEET

V69

Lab Name: WHC Contract: _____
Lab Code: _____ Case No.: 108AP SAS No.: _____ SDG No.: V65A
Matrix (soil/water): WATER Lab Sample ID: V69
Level (low/med): LOW Date Received: 03/18/94
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A.

[illegible]

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

~~914~~ 118

1A-110

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

Lab Name: WHC _____ Contract: _____

V73

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: V73A__

Matrix (soil/water): WATER

Lab Sample ID: V73

Level (low/med): LOW__

Date Received: 03/18/94

% Solids: ____0.0

WHC-SD-WM-DP-065, REV.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

ADDENDUM 1A,

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	181	B		P
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium	81.6	B		P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	50.0	U		P
7440-70-2	Calcium	1750	B		P
7440-47-3	Chromium	20.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	132	B		P
7439-92-1	Lead	280	U		P
7439-95-4	Magnesium	331	B		P
7439-96-5	Manganese	10.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver	49.9	B		P
7440-23-5	Sodium	800	B		P
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc	112	B		P
	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

FORM I - IN

ILM03.0

1A-111

964

119

F_5.WK3

FLUORIDE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	4.84E+1	5.42E+1	5.13E+1	11.3	1E-1	5.61E+1	100.2	142.2	109.3	26.2	<1E-1	V60	V61	V62
V63	108-AP-B	1.96E+1	1.91E+1	1.94E+1	2.6	1E-1	5.61E+1	100.2	NA	NA	NA	<1E-1	V60	V61	NA
V67	108-AP-C	4.29E+1	5.12E+1	4.71E+1	17.6	1E-1	5.63E+1	100.5	NA	NA	NA	<1E-1	V65	V68	NA
V68	108-AP-D	2.47E+1	2.69E+1	2.58E+1	8.5	1E-1	5.63E+1	100.5	NA	NA	NA	<1E-1	V65	V68	NA
V69	108-AP-E	2.60E+1	2.76E+1	2.68E+1	6.0	1E-1	5.63E+1	100.5	NA	NA	NA	<1E-1	V65	V68	NA
V73	108-AP-FB	*<1E+0	*<1E+0	<1E+0	N/A	1E-1	5.33E+1	95.2	NA	NA	NA	*<1E-1	V71	V72	NA

* Average of two determinations.

1A-112

V62 J
V63 J

WJ/1/20

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

76
120

CI_5.WK3

CHLORIDE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	3.14E+1	3.53E+1	3.34E+1	11.7	2E-1	7.55E+1	100.7	112.9	97.7	14.4	<2E-1	V60	V61	V62
V63	108-AP-B	4.44E+1	4.40E+1	4.42E+1	0.9	2E-1	7.55E+1	100.7	NA	NA	NA	<2E-1	V60	V61	NA
V67	108-AP-C	2.73E+1	3.14E+1	2.94E+1	14.0	2E-1	7.50E+1	100.0	NA	NA	NA	<2E-1	V65	V66	NA
V68	108-AP-D	5.70E+1	6.29E+1	6.00E+1	9.8	2E-1	7.50E+1	100.0	NA	NA	NA	<2E-1	V65	V66	NA
V69	108-AP-E	5.64E+1	6.21E+1	5.93E+1	9.6	2E-1	7.50E+1	100.0	NA	NA	NA	<2E-1	V65	V66	NA
V73	108-AP-FB	*3.14E-1	*8.90E-1	6.02E-1	95.7	2E-1	8.22E+1	109.6	NA	NA	NA	*<2E-1	V71	V72	NA

*Average of two determinations.

V73 J

1/A-113

WJ
11/1/04

121

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

NO3_5.WK3

NITRATE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	1.99E+3	1.85E+3	1.92E+3	7.3	1E+0	5.60E+2	96.9	NA	NA	NA	<1E+0	V60	V61	NA
V63	108-AP-B	1.18E+3	1.15E+3	1.17E+3	2.6	1E+0	5.60E+2	96.9	104.2	169.5	47.7	<1E+0	V60	V61	V63
V67	108-AP-C	1.84E+3	1.94E+3	1.89E+3	5.3	1E+0	5.95E+2	102.9	NA	NA	NA	<1E+0	V65	V66	NA
V68	108-AP-D	1.57E+3	1.61E+3	1.59E+3	2.5	1E+0	5.95E+2	102.9	NA	NA	NA	<1E+0	V65	V66	NA
V69	108-AP-E	1.14E+3	1.31E+3	1.23E+3	13.9	1E+0	5.95E+2	102.9	NA	NA	NA	<1E+0	V65	V66	NA
V73	108-AP-FB	*2.11E+1	*1.46E+1	1.79E+1	36.3	1E+0	5.81E+2	100.5	NA	NA	NA	*1.47E+0	V71	V72	NA

*Average of two determinations.

All results J

1/A114

11/1/94

122

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

NO2_5.WK3

NITRITE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result µg/ml	Duplicate Result µg/ml	Average Result µg/ml	Sample RPD %	Detection Limit µg/ml	Standard Result µg/ml	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank µg/ml	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	1.20E+3	1.11E+3	1.16E+3	7.8	1E+0	5.32E+2	101.3	84.5	112.7	28.8	<1E+0	V60	V61	V62
V63	108-AP-B	7.62E+2	7.66E+2	7.64E+2	0.5	1E+0	5.32E+2	101.3	NA	NA	NA	<1E+0	V60	V61	NA
V67	108-AP-C	9.62E+2	1.03E+3	9.96E+2	6.8	1E+0	5.24E+2	99.8	NA	NA	NA	<1E+0	V65	V66	NA
V68	108-AP-D	1.07E+3	1.14E+3	1.11E+3	6.3	1E+0	5.24E+2	99.8	NA	NA	NA	<1E+0	V65	V66	NA
V69	108-AP-E	9.69E+2	1.10E+3	1.03E+3	12.7	1E+0	5.24E+2	99.8	NA	NA	NA	<1E+0	V65	V66	NA
V73	108-AP-FB	*<1.0E+1	*<1.0E+1	<1.0E+1	NA	1E+0	5.40E+2	101.9	NA	NA	NA	*<1E+0	V71	V72	NA

*Average of two determinations.

All results J (detects)
V73 UJ

1A-115

WJ/1/14

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

123

PO4_5.WK3

ORTHOPHOSPHATE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	9.44E+1	1.02E+2	9.82E+1	7.7	1E+0	5.64E+2	109.1	98.3	91.3	7.4	<1E+0	V60	V61	V62
V63	108-AP-B	7.96E+1	7.99E+1	7.98E+1	0.4	1E+0	5.64E+2	109.1	NA	NA	NA	<1E+0	V60	V61	NA
V67	108-AP-C	9.03E+1	9.84E+1	9.44E+1	8.6	1E+0	5.61E+2	108.5	NA	NA	NA	<1E+0	V65	V66	NA
V68	108-AP-D	9.42E+1	9.88E+1	9.65E+1	4.8	1E+0	5.61E+2	108.5	NA	NA	NA	<1E+0	V65	V66	NA
V69	108-AP-E	9.12E+1	9.78E+1	9.45E+1	7.0	1E+0	5.61E+2	108.5	NA	NA	NA	<1E+0	V65	V66	NA
V73	108-AP-FB	*<1.0E+1	*<1.0E+1	<1.0E+1	NA	1E+0	5.46E+2	105.6	NA	NA	NA	*<1E+0	V71	V72	NA

*Average of two determinations.

All results J (detects)
V73 UT

1/11/16

11/11/16

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A.

180
124

SO4_5.WK3

SULFATE by Ion Chromatography
Direct Analysis
LA-533-105

SAMPLE INFORMATION			SAMPLE RESULTS			QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	2.21E+2	2.47E+2	2.34E+2	11.1	1E+0	6.22E+2	103.8	106.5	93.3	13.2	<1E+0	V60	V61	V62
V63	108-AP-B	1.50E+2	1.60E+2	1.55E+2	6.5	1E+0	6.22E+2	103.8	NA	NA	NA	<1E+0	V60	V61	NA
V67	108-AP-C	2.04E+2	2.28E+2	2.16E+2	11.1	1E+0	6.18E+2	103.2	NA	NA	NA	<1E+0	V65	V66	NA
V68	108-AP-D	1.94E+2	2.10E+2	2.02E+2	7.9	1E+0	6.18E+2	103.2	NA	NA	NA	<1E+0	V65	V66	NA
V69	108-AP-E	1.90E+2	2.09E+2	2.00E+2	9.5	1E+0	6.18E+2	103.2	NA	NA	NA	<1E+0	V65	V66	NA
V73	108-AP-FB	*<1.0E+1	*<1.0E+1	<1.0E+1	NA	1E+0	6.21E+2	103.7	NA	NA	NA	*1.5E+0	V71	V72	NA

*Average of two determinations.

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A,

u/1/94

1/117

125

181

NH4_3.WK1

AMMONIA (as NH4)
Direct Analysis / Kjeldahl Digestion - Titration
LA-634-102

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result M	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	<8.00E+2	<8.00E+2	<8.00E+2	N/A	8.00E+2	5.30E-2	106.0	101.4	100.4	1.0	<1.60E+2	V60	V61	N/A
V63	108-AP-B	<8.00E+2	<8.00E+2	<8.00E+2	N/A	8.00E+2	5.30E-2	106.0	N/A	N/A	N/A	<1.60E+2	V60	V61	N/A
V67	108-AP-C	<8.00E+2	<8.00E+2	<8.00E+2	N/A	8.00E+2	4.69E-2	93.8	N/A	N/A	N/A	<1.60E+2	V65	V66	N/A
V68	108-AP-D	<8.00E+2	<8.00E+2	<8.00E+2	N/A	8.00E+2	4.69E-2	93.8	N/A	N/A	N/A	<1.60E+2	V65	V66	N/A
V69	108-AP-E	<8.00E+2	<8.00E+2	<8.00E+2	N/A	8.00E+2	4.69E-2	93.8	N/A	N/A	N/A	<1.60E+2	V65	V66	N/A
V73	108-AP-FB	<4.00E+2	<4.00E+2	<4.00E+2	N/A	4.00E+2	4.94E-2	96.9	N/A	N/A	N/A	<4.00E+2	V71	V72	N/A

All results UJ for V62, V63

1/A-118

Handwritten signature
11/1/14

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

12682

NH3_5.WK1

AMMONIA (as NH3)
Direct Analysis / Ion Selective Electrode
LA-631-001

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result ug/mL	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	1.31E+1	9.50E+0	1.13E+1	32.0	2.00E+0	4.99E-2	97.9	NA	NA	NA	<2.00E+0	V60	V61	N/A
V63	108-AP-B	9.88E+0	6.88E+0	8.38E+0	35.8	2.00E+0	4.99E-2	97.9	NA	NA	NA	<2.00E+0	V60	V61	N/A
V67	108-AP-C	1.48E+1	1.34E+1	1.41E+1	9.15	2.00E+0	4.86E-2	95.3	NA	NA	NA	<2.00E+0	V65	V66	N/A
V68	108-AP-D	3.30E+0	3.11E+0	3.21E+0	5.78	2.00E+0	4.86E-2	95.3	NA	NA	NA	<2.00E+0	V65	V66	N/A
V69	108-AP-E	4.75E+0	3.45E+0	4.10E+0	31.7	2.00E+0	4.86E-2	95.3	NA	NA	NA	<2.00E+0	V65	V66	N/A
V73	108-AP-FB	<2.00E+1	<2.00E+1	<2.00E+1	NA	2.00E+1	5.30E-2	103.9	NA	NA	NA	<2.00E+1	V71	V72	N/A

All results (V62, V63, V67, V68, V69) J
Result for V73 UJ

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-119

11/1/04

127

83

OH_3.WK3

HYDROXIDE by Automated Titration
Direct Analysis
LA-211-102

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result M	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	<2.50E+2	I.S. *	NA	NA	2.50E+2	9.69E-1	103.4	NA	NA	NA	<4.2E+1	V60	V61	NA
V63	108-AP-B	<2.50E+2	<1.25E+2	NA	NA	1.25E+2	9.69E-1	103.4	NA	NA	NA	<4.2E+1	V60	V61	NA
V67	108-AP-C	<1.25E+2	<1.25E+2	<1.25E+2	NA	1.25E+2	9.27E-1	98.8	NA	NA	NA	<4.2E+1	V65	V66	NA
V68	108-AP-D	<1.25E+2	<1.25E+2	<1.25E+2	NA	1.25E+2	9.27E-1	98.8	NA	NA	NA	<4.2E+1	V65	V66	NA
V69	108-AP-E	<1.25E+2	<1.25E+2	<1.25E+2	NA	1.25E+2	9.27E-1	98.8	NA	NA	NA	<4.2E+1	V65	V66	NA
V73	108-AP-FB	<1.25E+2	<1.25E+2	<1.25E+2	NA	1.25E+2	9.58E-1	102.0	NA	NA	NA	<4.2E+1	V71	V72	NA

* I.S. denotes insufficient sample volume available

V62, V63, V67, V68, V69 UT

11-120

11/1/04

1284

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A.

Cn_4.WK3

CYANIDE
Direct and Water Dilution
LA-695-102

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	0.89	0.88	0.89	1.7	0.1	9.17E+2	100.3	100.3	99.9	0.4	<0.1	V60	V61	V62
V63	108-AP-B	1.03	1.03	1.03	0	0.02	9.17E+2	100.3	NA	NA	NA	<0.1	V60	V61	N/A
V67	108-AP-C	<0.1	<0.1	<0.1	N/A	0.1	8.91E+2	99.1	NA	NA	NA	<0.1	V65	V66	N/A
V68	108-AP-D	0.109	<0.1	N/A	N/A	0.1	8.91E+2	99.1	NA	NA	NA	<0.1	V65	V66	N/A
V69	108-AP-E	<0.1	<0.1	<0.1	N/A	0.1	8.91E+2	99.1	NA	NA	NA	<0.1	V65	V66	N/A
V73	108-AP-FB	<0.2	<0.2	<0.2	N/A	0.2	8.55E+2	91.5	NA	NA	NA	<0.2	V71	V72	N/A

V62, V63, V68 J
V67, V69, V73 UJ

1/11/12

[Handwritten signature]
1/11/12

129185

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

TIC_5.WK3

TOTAL INORGANIC CARBON
Water "Digestion"
LA-622-102

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result M	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Prep Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	4.18E+2	4.15E+2	4.17E+2	0.7	2.50E+1	4.82E-2	96.4	83.7	91.6	12.6	<2.50E+1	V60	V61	V62
V63	108-AP-B	4.35E+2	4.08E+2	4.22E+2	6.4	2.50E+1	4.82E-2	96.4	NA	NA	NA	<2.50E+1	V60	V61	NA
V67	108-AP-C	4.88E+2	4.83E+2	4.86E+2	1.0	2.50E+1	4.95E-2	99.0	NA	NA	NA	<2.50E+1	V65	V66	NA
V68	108-AP-D	5.78E+2	5.65E+2	5.72E+2	2.3	2.50E+1	4.95E-2	99.0	NA	NA	NA	<2.50E+1	V65	V66	NA
V69	108-AP-E	5.35E+2	5.33E+2	5.34E+2	0.4	2.50E+1	4.95E-2	99.0	NA	NA	NA	<2.50E+1	V65	V66	NA
V73	108-AP-FB	<5.00E+1	<5.00E+1	<5.00E+1	NA	5.00E+1	4.85E-2	97.0	NA	NA	NA	<5.00E+1	V71	V72	NA

V67, V68, V69 J

1A122

Handwritten signature/initials

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

130186

U_4.WK1

URANIUM
Direct Analysis
LA-925-106

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result ug/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	4.42E+00	4.42E+00	4.42E+00	0	7.36E-01	3.53E-02	91.5	86.5	86.5	0	<7.69E-01	V60	V61	V62
V63	108-AP-B	2.29E+01	2.38E+01	2.34E+01	0.6	3.82E+00	3.53E-02	91.5	N/A	N/A	N/A	<7.69E-01	V60	V61	N/A
V67	108-AP-C	2.08E+00	2.49E+00	2.29E+00	17.9	4.15E-01	3.70E-02	95.8	N/A	N/A	N/A	<3.57E+00	V65	V66	N/A
V68	108-AP-D	1.37E+01	1.55E+01	1.46E+01	12.3	1.52E+00	3.70E-02	95.8	N/A	N/A	N/A	<3.57E+00	V65	V66	N/A
V69	108-AP-E	2.48E+01	2.07E+01	2.28E+01	18.0	4.13E+00	3.70E-02	95.8	N/A	N/A	N/A	<3.57E+00	V65	V66	N/A
V73	108-AP-FB	<8.18E-05	<8.57E-05	N/A	N/A	8.18E-05	4.05E-02	104.9	N/A	N/A	N/A	<8.18E-05	V71	V72	N/A

WMC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-123

Handwritten signature
11/1/04

131
187

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

A=3WK1

ARSENIC
Acid Digestion
LA-355-131

SAMPLE INFORMATION		SAMPLE RESULTS						QC RESULTS						QC IDENTIFICATION			
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result ug/mL	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.		
V62	108-AP-A	4.05E-2	3.47E-2	3.80E-2	15.4	2.5E-2	1.05E-1	105.4	53.7	53.1	2.4	<2.5E-2	V60	V61	V62		
V63	108-AP-B	3.59E-2	4.17E-2	3.90E-2	15.1	2.5E-2	1.05E-1	105.4	N/A	N/A	N/A	<2.5E-2	V60	V61	NA		
V67	108-AP-C	3.4E-2	3.4E-2	3.4E-2	0	2.5E-2	1.02E-1	102.4	N/A	N/A	N/A	<2.5E-2	V65	V66	NA		
V68	108-AP-D	2.5E-2	<2.5E-2	N/A	N/A	2.5E-2	1.02E-1	102.4	N/A	N/A	N/A	<2.5E-2	V65	V66	NA		
V69	108-AP-E	<2.5E-2	<2.5E-2	<2.5E-2	N/A	2.5E-2	1.02E-1	102.4	N/A	N/A	N/A	<2.5E-2	V65	V66	NA		
V73	108-AP-FB	<2.5E-2	<2.5E-2	<2.5E-2	N/A	2.5E-2	9.92E-2	99.2	N/A	N/A	N/A	<2.0E-2	V71	V72	NA		

V62, V63 J

11/11/04

1A124

188
132

So_3.WK1

SELENIUM
Acid Digestion
LA-355-131

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Sample RPD %	Detection Limit ug/mL	Standard Result ug/mL	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank ug/mL	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	<1.3E-2	<1.3E-2	<1.3E-2	N/A	1.3E-2	1.00E-1	100.0	97.5	88.8	9.3	<1.3E-2	V60	V61	V62
V63	108-AP-B	<1.3E-2	<1.3E-2	<1.3E-2	N/A	1.3E-2	1.00E-1	100.0	N/A	N/A	N/A	<1.3E-2	V60	V61	NA
V67	108-AP-C	<1.3E-2	<1.3E-2	<1.3E-2	N/A	1.3E-2	1.07E-1	107.0	N/A	N/A	N/A	<1.3E-2	V65	V66	NA
V68	108-AP-D	<1.3E-2	<1.3E-2	<1.3E-2	N/A	1.3E-2	1.07E-1	107.0	N/A	N/A	N/A	<1.3E-2	V65	V66	NA
V69	108-AP-E	<1.3E-2	<1.3E-2	<1.3E-2	N/A	1.3E-2	1.07E-1	107.0	N/A	N/A	N/A	<1.3E-2	V65	V66	NA
V73	108-AP-FB	2.52E-2	2.80E-2	2.66E-2	10.5	2.5E-2	1.06E-1	105.8	N/A	N/A	N/A	<2.5E-2	V71	V72	NA

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

14-125

133

Hg_4.WK3

MERCURY
Direct Analysis
LA-325-104

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Average Result $\mu\text{g/ml}$	Sample RPD %	Detection Limit $\mu\text{g/ml}$	Standard Result $\mu\text{g/ml}$	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Reagent Blank $\mu\text{g/ml}$	Standard I.D.	Blank I.D.	Spike I.D.
V62	108-AP-A	7E-3	6E-3	7E-3	19.7	5E-3	0.100	100.0	95.9	101.0	5.2	<2E-4	V60	V61	V62
V63	108-AP-B	6E-3	5E-3	6E-3	20.0	5E-3	0.100	100.0	N/A	N/A	N/A	<2E-4	V60	V61	NA
V67	108-AP-C	<5E-3	<5E-3	<5E-3	N/A	5E-3	0.093	93.1	N/A	N/A	N/A	<5E-3	V65	V66	NA
V68	108-AP-D	<5E-3	<5E-3	<5E-3	N/A	5E-3	0.093	93.1	N/A	N/A	N/A	<5E-3	V65	V66	NA
V69	108-AP-E	<5E-3	<5E-3	<5E-3	N/A	5E-3	0.093	93.1	N/A	N/A	N/A	<5E-3	V65	V66	NA
V73	108-AP-FB	<5E-3	<5E-3	<5E-3	N/A	5E-3	0.106	106.0	N/A	N/A	N/A	<5E-3	V71	V72	NA

V62 J
V67, V68, V69 UJ

11-1-26

11/1/94

134 390

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Radiochemistry - 222S Laboratory

WHC-SD-WM-DP-065
REV. 0

ADDENDUM 1A,

1A-127

Ce144_2.WK1

Cerium-144 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<8.98E-3	<9.04E-3	N/A	N/A	5.56E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<5.56E-4	V75	V76
V73	108-AP-FB	<1.26E-3	N/A	N/A	N/A	1.11E-3	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<1.11E-3	V71	V72

1A-128

10/1/04 136
10886

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Cs134_1.WK1

Cesium-134 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS					QC RESULTS							QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<7.21E-4	1.49E-3	N/A	N/A	1.17E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<1.17E-4	V75	V78
V73	108-AP-FB	<2.45E-4	N/A	N/A	N/A	2.91E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<2.91E-4	V71	V72

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1/H-129

104
104
104

104
137

Cs137_1.WK1

Cesium - 137 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	4.30E+0	4.27E+0	4.29E+0	0.68	1.81E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<1.81E-4	V75	V76
V73	108-AP-FB	<3.41E-4	N/A	N/A	N/A	3.03E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<3.03E-4	V71	V72

WMC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

/H-130

10/29/94
105
138

Co60_1.WK1

Cobalt-60 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<1.22E-4	<2.02E-4	N/A	N/A	1.13E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<1.13E-4	V75	V76
V73	108-AP-FB	<2.81E-4	N/A	N/A	N/A	2.79E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<2.79E-4	V71	V72

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

119-131

10/24/14
13
106

Eu154_1.WK1

Europium-154 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS					QC RESULTS							QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<8.91E-4	<9.01E-4	N/A	N/A	3.96E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<3.96E-4	V75	V76
V73	108-AP-FB	<7.51E-4	N/A	N/A	N/A	7.74E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<7.74E-4	V71	V72

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

1A-132

140
107

Eu155_1.WK1

Europium - 155 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<4.87E-3	<4.85E-3	N/A	N/A	3.20E-4	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<3.20E-4	V75	V76
V73	108-AP-FB	<6.33E-4	N/A	N/A	N/A	6.36E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<6.36E-4	V71	V72

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-133

Handwritten:
141
108

Nb94_1.WK1

Niobium-94 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<4.81E-4	<4.54E-4	N/A	N/A	9.91E-5	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<9.91E-5	V75	V76
V73	108-AP-FB	<2.28E-4	N/A	N/A	N/A	1.70E-4	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<1.70E-4	V71	V72

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1/19-134

109
142
1009

Ra226_1.WK1

Radium-226 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<3.73E-2	<3.74E-2	N/A	N/A	2.18E-3	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<2.18E-3	V75	V76
V73	108-AP-FB	<4.30E-3	N/A	N/A	N/A	4.28E-3	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<4.28E-3	V71	V72

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

11-135

10/29/94
14
110

Ru106_1.WK1

Ruthenium/Rhodium - 106 by Gamma Energy Analysis
Acid Digestion
LA-548-121

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS								QC IDENTIFICATION	
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	CS-137 Standard uCi/L	CS-137 Standard % Rec.	CS-137 % Counting Error	CO-60 Standard uCi/L	CO-60 Standard % Rec.	CO-60 % Counting Error	Reagent Blank uCi/mL	Standard I.D.	Blank I.D.
V77	108-AP-COM	<2.72E-2	<2.70E-2	N/A	N/A	1.88E-3	2.55E+1	101.4	1.52	2.18E+1	103.7	1.28	<1.88E-3	V75	V76
V73	108-AP-FB	<3.28E-3	N/A	N/A	N/A	3.36E-3	2.46E+1	101.8	4.84	2.09E+1	101.9	4.23	<3.36E-3	V71	V72

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

11436

1144
111

H3_4.WK1

TRITIUM
Direct Analysis
LA-218-114

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	1.11E-2	1.13E-2	1.12E-2	1.78	1.81E-5	8.23E-1	96.9	105.5	98.2	2.3	<1.81E-5	V75	V76	V77

WHC-SD-WM-DP-065, REV.0

ADDENDUM 1A,

1A-137

10/2/94 145
112

C14_4.WK1

CARBON-14
Direct Analysis
LA-348-104

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<2.19E-6	<2.18E-6	N/A	N/A	2.20E-6	1.43E-3	80.8	89.0	85.4	4.54	<2.20E-6	V75	V76	V77

1/12/38

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

10/21/94
146
~~143~~

Se79_4.WK1

SELENIUM-79
Acid Digestion
LA-365-132

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<1.21E-5	<1.18E-5	N/A	N/A	1.21E-5	N/A	N/A	N/A	N/A	N/A	<1.22E-5	N/A	V76	N/A

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

118-139

114
114
114

Tc99_4.WK1

TECHNETIUM-99
Acid Digestion
LA-438-101

LA-438-101															
SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS						QC IDENTIFICATION			
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	3.08E-4	3.07E-4	3.08E-4	0.3	4.24E-5	2.29E+0	97.4	100.9	101.5	0.6	<4.25E-5	V75	V76	V77

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

14-140

148
145

Sr90_4.WK1

STRONTIUM-90
Acid Digestion
LA-220-101

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/ml	Duplicate Result uCi/ml	Average Result uCi/ml	Sample RPD %	Detection Limit uCi/ml	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/ml	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	7.63E-2	7.80E-2	7.72E-2	2.2	6.75E-4	1.16E+0	85.5	99.9	101.9	2.1	<3.25E-4	V75	V76	V77

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

1A-141

10/24/94
126

I129_3.WK1

IODINE-129
Direct Analysis
LA-378-103

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	106-AP-COM	<6.30E-5	<5.80E-5	N/A	N/A	5.90E-5	8.14E-1	103.9	88.2	94.3	6.7	<5.90E-5	V75	V76	V77

47

14-142

WMC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

10/21/94
1150

Np237_4.WK1

NEPTUNIUM -237
Acid Digestion
LA-933-141

SAMPLE INFORMATION		SAMPLE RESULTS					QC RESULTS					QC IDENTIFICATION			
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<1.64E-4	<1.63E-4	N/A	N/A	3.01E-4	2.09E-2	86.3	82.4	83.8	1.5	<2.01E-4	V75	V76	V77

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

1A143

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10/29/04

118

15

Pu2394_4.WK1

PLUTONIUM 239/240
Acid Digestion
LA-503-156

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<4.13E-4	<5.10E-4	N/A	N/A	4.13E-4	1.46E+2	102.8	103.7	102.4	1.4	<1.01E-3	V75	V76	V77

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

//H-1144

149
152
9/27/94

Pu238_4.WK1

PLUTONIUM 238
Acid Digestion
LA-503-156

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS						QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result* uCi/L	Standard* % Rec.	Sample Carrier % Rec.	Duplicate Carrier % Rec.	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<5.65E-4	<6.63E-4	N/A	N/A	6.63E-4	1.46E+2	102.8	41.2	33.9	<1.01E-3	V75	V76	V77

* Based on Pu-239/240 LMCS standard.

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1H-145

120
10/29/04
10/29/04

Am241_5.WK1

AMERICIUM - 241
Acid Digestion
LA-503-158

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<2.87E-4	<7.74E-4	NA	NA	2.87E-4	2.46E+1	102.0	100.3	106.2	5.7	<3.11E-4	V75	V76	V77

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-1A6

154
10/24/04
121

Cm2434_4.WK1

CURIUM 243/244
Acid Digestion
LA-503-156

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Am-241 uCi/L	Standard Am-241 % Rec.	Spike* % Rec.	Spike Duplicate* % Rec.	Spike RPD* %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	<2.87E-4	<7.74E-4	NA	NA	2.87E-4	2.46E+1	102.0	100.3	106.2	5.7	<3.11E-4	V75	V76	N/A

* Spike values are based on Am-241 spike recoveries.

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-1A7

15
10/24/04
222

AT_3.WK1

TOTAL ALPHA
Acid Digestion
LA-508-101

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	2.93E-4	2.70E-4	2.82E-4	8.17	1.09E-4	9.25E-6	89.0	90.0	93.2	3.49	<4.13E-5	V75	V76	V77
V73	108-AP-FB	<6.48E-6	N/A	N/A	N/A	1.49E-5	9.55E-6	98.0	N/A	N/A	N/A	<6.48E-6	V71	V72	N/A

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

/H-148

123 156
10/24/04

TB_3.WK1

TOTAL BETA
Acid Digestion
LA-508-101

SAMPLE INFORMATION		SAMPLE RESULTS				QC RESULTS							QC IDENTIFICATION		
Sample I.D.	Lab I.D.	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Sample RPD %	Detection Limit uCi/mL	Standard Result uCi/L	Standard % Rec.	Spike % Rec.	Spike Duplicate % Rec.	Spike RPD %	Preparation Blank uCi/mL	Standard I.D.	Blank I.D.	Spike I.D.
V77	108-AP-COM	6.18E+0	6.32E+0	6.25E+0	2.24	2.87E-2	2.39E-4	89.1	87.4	87.1	0.34	<1.34E-2	V75	V76	V77
V73	108-AP-FB	1.53E-4	N/A	N/A	N/A	4.17E-5	2.18E-1	89.0	N/A	N/A	N/A	1.00E-4	V71	V72	N/A

WHC-SD-WM-DP-065, REV.0
ADDENDUM 1A,

1A-149

124 157
10/24/04
10/24/04

WHC-SD-WM-DP-065, ADDENDUM 1A, REV. 0

DATA ASSESSMENT FORMS

Volatile Organics - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A-151

172

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION

Westinghouse
Hanford Company

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date 10/28/94

Reviewed By A. Scholtz

DATA ASSESSMENT SUMMARY

Sample # <u>V133, V134, V135, V133^{dup}</u>	Chain of Custody	<u>0</u>
Matrix <u>water</u>	Analysis Completeness	<u>0</u>
Sample Date <u>6/28/94</u>	Holding Times	<u>0</u>
Laboratory <u>222-S</u>	Analytical Blanks	<u>0</u>
	MS or MS/MSD	<u>0</u>
	Duplicate Analysis	<u>0</u>
	Surrogate Recovery	<u>0</u>

0 -data had no problems; X -data qualified due to minor problems
X -data qualified due to major problems/some data may be unusable

Overall Assessment: _____

Comments: All samples were requested to be
analyzed in duplicate. V133 and V135
were not reported as duplicates.

1A-152

RCRA B - Cover

174

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date 10/27/94 Reviewed by A. Scholtz

Sample # V133, V133dup, V134, V135

Analysis Volatiles

ANALYTICAL BLANK ANALYSIS

Blank Sample # VB1K02

Associated Samples _____

Comments: No compounds detected in blanks

Action: none

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked V134

Associated Samples V133 V133dup

Matrix Water

V134 V135 _____

Comments: all recoveries within control limits

Action: none

1A-154

175

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC

Date 10/28/94 Reviewed by A. SchultSample # V133, V133dup, V134, V135Analysis Volatiles

DUPLICATE ANALYSIS

Duplicate Sample V133dup and V134msd Associated Samples V133 V134
Matrix water V135Comments: All RPDs within control limits.
Duplicate analysis requested for V134
and V135 not reportedAction: none

SURROGATE RECOVERY

Comments: All surrogate recoveries within
control limitsAction: none

1A-155

176

Semivolatile Organics - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A-156

177

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION

Westinghouse
Hanford Company

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date 10/28/94 Reviewed By A. Schult

DATA ASSESSMENT SUMMARY

Sample # <u>108 apbFb,</u>	Chain of Custody	<u>0</u>
<u>108 apA, 108 apadu, 108 apb</u>	Analysis Completeness	<u>0</u>
Matrix <u>water</u>	Holding Times	<u>0</u>
Sample Date <u>6/28/94</u>	Analytical Blanks	<u>0</u>
Laboratory <u>222-S</u>	MS or MS/MSD	<u>X</u>
	Duplicate Analysis	<u>0</u>
	Surrogate Recovery	<u>X</u>

0 -data had no problems; X -data qualified due to minor problems
M -data qualified due to major problems/some data may be unusable

Overall Assessment: _____

Comments: All samples were requested to be
analyzed in duplicate. 108 apb and
108 apbFb were not reported as duplicates.

1A157

178

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

RCRA QC - Holding Times

Date 10/28/94 Reviewed by S. Schulz
Sample # 108ApA, 108ApAdA, 108Apb, 108ApbFb

[illegible]

1A-158

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date 10/28/94 Reviewed by J. Schult

Sample # 108APA, 108APADu, 108APb, 108APbFb

Analysis semivolatiles

ANALYTICAL BLANK ANALYSIS

Blank Sample # SeblK05 Associated Samples _____

Comments: No compounds detected in blank

Action: None

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked 108APbms/msd Associated Samples 108APA 108APb

Matrix water 108APADu

Comments: Recovery of pentachlorophenol out of control limits in MS. Recovery of 1,2,4-trichlorobenzene, 4-chloro-3-methylphenol, and 2,4-dinitrotoluene out of control limits in MSD.

Action: all 108APA, 108APADu, 108APb results qualified J, UJ.

1A159

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC

Date 10/24/94 Reviewed by J. Salubetti

Sample # 108ApA, 108Apb, 108Apdu, 108ApbPb
Analysis semivolatiles

DUPLICATE ANALYSIS

Duplicate Sample 108Apdu, 108ApbMSD Associated Samples _____

Matrix water _____

Comments: All RPDs < 20%

Action: none

SURROGATE RECOVERY

Comments: Recovery of 2,4,6-tribromophenol out of control limits in samples 108ApA & 108Apb.

Action: all results in 108ApA & 108Apb qualified J, UJ.

1A-160

181

Total Organic Carbon - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A161

182

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION

Westinghouse
Hanford Company

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date 10/31/94Reviewed By S. Schuldt

----- DATA ASSESSMENT SUMMARY -----

Sample # <u>108APA, 108APB, 108APBFB</u>	Chain of Custody	<u>0</u>
Matrix <u>water</u>	Analysis Completeness	<u>0</u>
Sample Date <u>6/28/94-6/29/94</u>	Holding Times	<u>0</u>
Laboratory <u>222-S</u>	Analytical Blanks	<u>0</u>
	MS or MS/MSD	<u>0</u>
	Duplicate Analysis	<u>0</u>
	Surrogate Recovery	<u>NA</u>

0 -data had no problems; X -data qualified due to minor problems
M -data qualified due to major problems/some data may be unusable

Overall Assessment: Satisfactory. Sample
R3642 will be analyzed at later
date per narrative.

Comments: _____

LEVEL B DOCUMENTATION (cont)

Sample # ~~V133~~ ~~V134~~ ^{20 10/31/11} 108APA, 108APB, 108APBFB

[illegible]

Comments:

1A-163

184

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC

Date 10/31/94 Reviewed by A. Schult
Sample # 108 APA, 108 APB, 108 APB FB
V133, V134, V135 10/31/94
Analysis TOC

DUPLICATE ANALYSIS

Duplicate Sample same as above Associated Samples _____Matrix water _____Comments: all RPDs < 20%Action: None

SURROGATE RECOVERY

Comments: NA

Action:

1A164

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date 10/31/94 Reviewed by J. Schults

Sample # V133(108AP-A), V134(108AP-B), V136(108AP-BFB)

Analysis TOC

ANALYTICAL BLANK ANALYSIS

Blank Sample # Reag. BK Associated Samples _____

Comments: No detect in blank

Action: none

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked V133-5926 Associated Samples _____
Matrix water _____

Comments: 95% recovery

Action: None

1A-165

General Chemistry and Metals - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

/A-166

187

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date: 10/31/94

Reviewed by

----- DATA ASSESSMENT SUMMARY -----

Sample #: V62, V63, V67, V68, V69, V73	Chain of Custody	<u> 0 </u>
Matrix: Water	Analysis Completeness	<u> 0 </u>
Sample Date: See attached	Holding Times	<u> X </u>
Laboratory: 222-S	Analytical Blanks	<u> X </u>
	MS or MS/MSD	<u> M </u>
	Duplicate Analysis	<u> X </u>
	Surrogate Recovery	<u> NA </u>

O - data had no problems; X - data qualified due to minor problems
M - data qualified due to major problems/some data may be unusable
NA - not applicable

Overall Assessment: Overall, most analytical and QA/QC requirements were met the exception being holding times for IC-nitrate, nitrite and phosphate, ammonia, TKN, hydroxide, cyanide, total carbon and mercury; duplicates for nitrate, nitrite, chloride, iron, magnesium, manganese, cadmium, calcium, lead, zinc and silver; spikes for nitrate, arsenic, aluminum, and silver.

Comments: For the ICP runs including samples V67, V68 and V69 and sample V73 (separate run), no spike samples were analyzed.

APPENDIX D

LEVEL B DOCUMENTATION (cont)

Analysis: IC NO3/NO3/P04 Limit: 2

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/13/94	27	J/UJ
V63	03/18/94	04/13/94	26	J/UJ
V67	03/21/94	04/14/94	24	J/UJ
V68	03/21/94	04/14/94	24	J/UJ
V69	03/21/94	04/14/94	24	J/UJ
V73	06/29/94	07/17/94	18	J/UJ

Analysis: IC F/C1/S04 Limit: 28

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/13/94	27	OKAY
V63	03/18/94	04/13/94	26	OKAY
V67	03/21/94	04/14/94	24	OKAY
V68	03/21/94	04/14/94	24	OKAY
V69	03/21/94	04/14/94	24	OKAY
V73	06/29/94	07/17/94	18	OKAY

Analysis: Ammonia (NH3) Limit: 28

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	05/29/94	73	J/UJ
V63	03/18/94	05/29/94	72	J/UJ
V67	03/21/94	05/29/94	69	J/UJ
V68	03/21/94	05/29/94	69	J/UJ
V69	03/21/94	05/29/94	69	J/UJ
V73	06/29/94	09/03/94	66	J/UJ

Analysis: TKN (NH4) Limit: 28

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/16/94	30	J/UJ
V63	03/18/94	04/16/94	29	J/UJ
V67	03/21/94	04/16/94	26	OKAY
V68	03/21/94	04/16/94	26	OKAY
V69	03/21/94	04/16/94	26	OKAY
V73	06/29/94	07/22/94	23	OKAY

Analysis: Hydroxide Limit: 14

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/26/94	40	J/UJ
V63	03/18/94	04/26/94	39	J/UJ
V67	03/21/94	05/04/94	44	J/UJ
V68	03/21/94	05/04/94	44	J/UJ
V69	03/21/94	05/04/94	44	J/UJ
V73	06/29/94	07/03/94	4	OKAY

APPENDIX D

LEVEL B DOCUMENTATION (cont)

Analysis: Cyanide Limit: 14

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	05/10/94	54	J/UJ
V63	03/18/94	05/10/94	53	J/UJ
V67	03/21/94	04/17/94	27	J/UJ
V68	03/21/94	04/17/94	27	J/UJ
V69	03/21/94	04/17/94	27	J/UJ
V73	06/29/94	07/29/94	30	J/UJ

Analysis: TIC Limit: 28

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/12/94	26	OKAY
V63	03/18/94	04/12/94	25	OKAY
V67	03/21/94	07/02/94	103	J/UJ
V68	03/21/94	07/02/94	103	J/UJ
V69	03/21/94	07/02/94	103	J/UJ
V73	06/29/94	07/18/94	19	OKAY

Analysis: Uranium Limit: 180

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/10/94	24	OKAY
V63	03/18/94	04/10/94	23	OKAY
V67	03/21/94	04/15/94	25	OKAY
V68	03/21/94	04/15/94	25	OKAY
V69	03/21/94	04/15/94	25	OKAY
V73	06/29/94	07/04/94	5	OKAY

Analysis: Arsenic Limit: 180

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	06/22/94	97	OKAY
V63	03/18/94	06/22/94	96	OKAY
V67	03/21/94	06/15/94	86	OKAY
V68	03/21/94	06/15/94	86	OKAY
V69	03/21/94	06/15/94	86	OKAY
V73	06/29/94	08/10/94	42	OKAY

Analysis: Selenium Limit: 180

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	05/10/94	54	OKAY
V63	03/18/94	05/10/94	53	OKAY
V67	03/21/94	05/11/94	51	OKAY
V68	03/21/94	05/11/94	51	OKAY
V69	03/21/94	05/11/94	51	OKAY
V73	06/29/94	08/03/94	35	OKAY

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION (cont)

Analysis: Mercury Limit: 28

Sample	Collected	Analyzed	Days	Qualifier
V62	03/17/94	04/15/94	29	J/UJ
V63	03/18/94	04/15/94	28	OKAY
V67	03/21/94	04/22/94	32	J/UJ
V68	03/21/94	04/22/94	32	J/UJ
V69	03/21/94	04/22/94	32	J/UJ
V73	06/29/94	07/07/94	8	OKAY

All remaining metals analyses were completed within 180 days

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date: 10/31/94

Reviewed by: *[Signature]*

Sample #: See below

Analysis: See below

ANALYTICAL BLANK ANALYSIS

Blank Sample # PB

Associated Samples: V62, V63

Comments: Iron detected @ 29.267 (x5 = 146)

Action: Qualify V62 as U

Blank Sample # CCB1

Associated Samples: V62, V63

Comments: Magnesium detected @ 15 (x5 = 75); Silver detected @ 310.4 (x5 = 1552); Zinc detected @ 642.7 (x5 = 3214) *11/3/94*Action: Qualify V62 as U (Mg, Ag, Zn); Qualify V63 as U (Ag and Zn) *11/3/94*

Blank Sample # PB

Associated Samples: V67, V68, V69 *11/3/94*

Comments: Calcium detected @ 14.767 (x5 = 74); chromium detected @ 5.033 (x5 = 25); iron detected @ 8.167 (x5 = 41)

Action: *none*

Blank Sample # CCB1

Associated Samples: V67, V68, V69

Comments: Silver detected @ 20.1 (x5=100); sodium detected @ 29.1 (x5=146); zinc detected @ 28.5 (x5=142).

Action: *Ag, V68, V69 = U Zn, V68 = U*

Blank Sample # PB

Associated Samples: V73

Comments: Zinc detected @ 22.62 (x5=113)

Action: *none*

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date: 10/31/94

Reviewed by: *[Signature]*

Sample #: See below

Analysis: See below

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked: V62

Associated Samples: V62, V63

Matrix: Water

Comments: Fluoride: MS recovery >125, MS/MSD RPD > 20
Nitrate: MSD recovery >125, MS/MSD RPD >20
Nitrite: MS/MSD RPD >20
Arsenic: Spike <75% but >30%
Aluminum: Spike >125%
Silver: Spike <30%

Action: Fluoride, nitrate, nitrite, arsenic, J detects, UJ nondetects;
Aluminum, J detects; silver R all results.

DUPLICATE ANALYSIS

Duplicate Sample V73

Associated Samples: V73

Matrix: Water

Comments: chloride, nitrate RPD >20

Action: Qualify detects J, nondetects UJ.

Duplicate Sample V62

Associated Samples: V62, V63

Matrix: Water

Comments: Iron, magnesium and manganese RPD >20

Action: Qualify detects J, nondetects UJ.

Duplicate Sample V67

Associated Samples: V67

Matrix: Water

Comments: Silver RPD >20

Action: Qualify detects J, nondetects UJ.

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date: 10/31/94

Reviewed by: *[Signature]*

Sample #: See below

Analysis: See below

DUPLICATE ANALYSIS

Duplicate Sample V68

Associated Samples: V68

Matrix: Water

Comments: Cadmium, calcium, iron, lead, magnesium, zinc RPD >20

Action: Qualify detects J, nondetects UJ.

Duplicate Sample V69

Associated Samples: V69

Matrix: Water

Comments: Calcium, iron, ^{magnesium} ~~lead~~, manganese and silver RPD >20

Action: Qualify detects J, nondetects UJ.

Radiochemistry - 222S Laboratory

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

1A174

195

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX B

OSM HIGH LEVEL RADIOCHEMICAL DATA ASSESSMENT

DATE 10/31/94 SAMPLES/MATRIX V77 V73
REVIEWED BY Kent Angulo
LABORATORY 222-S
CASE # —
SDG # V62-222-095

DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	GEA	C14	Se79
1. Chain of Custody		<u>0</u>	<u>0</u>	<u>0</u>
2. Initial Calibrations		<u>0</u>	<u>0</u>	<u>OXO</u> <u>not 10/31/94</u>
3. Efficiency Checks		<u>0</u>	<u>0</u>	<u>XO</u> <u>not 10/31/94</u>
4. Background Checks		<u>0</u>	<u>0</u>	<u>XO</u> <u>not 10/31/94</u>
5. Preparation Blanks		<u>0</u>	<u>0</u>	<u>0</u>
6. MS/Tracers/Carriers		<u>0</u>	<u>0</u>	<u>X</u>
7. Duplicate Analyses		<u>0</u>	<u>0</u>	<u>0</u>
8. LCS		<u>0</u>	<u>0</u>	<u>X</u>
9. Other			<u>X'</u>	<u>X'</u>

0 = data had no problems
X = data qualified due to minor problems
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: _____

NOTES: 'No raw data (inst. printouts provided)
only bench sheets.

* Refer to the corresponding attachments for explanation of any problems.

SAMPLE MANAGEMENT AND ADMINISTRATION

DATA VALIDATION FOR HIGH LEVEL
RCRA/CERCLA RADIOCHEMICAL ANALYSES

Manual

Section

Page

Effective Date February 01, 1991

WHC-CM-5-3

2.4, REV 0

12 of 21

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX B

OSH HIGH LEVEL RADIOCHEMICAL DATA ASSESSMENT

DATE 10/31/94SAMPLES/MATRIX V77 V73REVIEWED BY [Signature]LABORATORY 222-5

CASE # _____

SDG # V62-222-095

DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK

ANALYSIS

TC99 SR90 I-129

1. Chain of Custody

0 0 0

2. Initial Calibrations

0 0 EX not 10/31/94

3. Efficiency Checks

0 0 EX not 10/31/94

4. Background Checks

0 0 EX not 10/31/94

5. Preparation Blanks

0 0 0

6. MS/Tracers/Carriers

0 0 0

7. Duplicate Analyses

0 0 0

8. LCS

0 0 0

9. Other

X

0 = data had no problems

X = data qualified due to minor problems

H = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: _____

NOTES:

'No raw data (inst. printouts) provided, only
bench sheets.

* Refer to the corresponding attachments for explanation of any problems.

1A-176

197

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX B

OSM HIGH LEVEL RADIOCHEMICAL DATA ASSESSMENT

DATE 10/31/94 SAMPLES/MATRIX V77 V93
 REVIEWED BY [Signature]
 LABORATORY 2225
 CASE # _____
 SDG # V62-222-095

DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	<u>NP237</u>	<u>Pu239/40</u>	<u>Am241</u>
1. Chain of Custody		<u>0</u>	<u>0</u>	<u>0</u>
2. Initial Calibrations	<u>10/31/94</u>	<u>EX</u>	<u>0</u>	<u>0</u>
3. Efficiency Checks	<u>10/31/94</u>	<u>EX</u>	<u>0</u>	<u>0</u>
4. Background Checks	<u>10/31/94</u>	<u>EX</u>	<u>0</u>	<u>0</u>
5. Preparation Blanks		<u>0</u>	<u>0</u>	<u>0</u>
6. MS/Tracers/Carriers		<u>X</u>	<u>0</u>	<u>0</u>
7. Duplicate Analyses		<u>0</u>	<u>0</u>	<u>0</u>
8. LCS		<u>0</u>	<u>0</u>	<u>0</u>
9. Other		<u>X</u>		

0 = data had no problems

X = data qualified due to minor problems

H = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: Detector ID was not provided
for NP237 therefore no evaluation could be
performed for calibration eff checks and background.

NOTES: No raw data (inst. printouts) provided, only
bench sheets.

* Refer to the corresponding attachments for explanation of any problems.

1A-177

198

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX B

OSM HIGH LEVEL RADIOCHEMICAL DATA ASSESSMENT

DATE 10/31/94 SAMPLES/MATRIX 1177 1173
REVIEWED BY [Signature]
LABORATORY 2225
CASE # _____
SDG # U62-222-095

DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	<u>Total</u> <u>Alpha</u>	<u>Total</u> <u>Beta</u>	<u>Tritium</u>
1. Chain of Custody		<u>0</u>	<u>0</u>	<u>0</u>
2. Initial Calibrations		<u>0</u>	<u>0</u>	<u>0</u>
3. Efficiency Checks		<u>0</u>	<u>0</u>	<u>0</u>
4. Background Checks		<u>0</u>	<u>0</u>	<u>0</u>
5. Preparation Blanks		<u>0</u>	<u>0</u>	<u>0</u>
6. MS/Tracers/Carriers		<u>0</u>	<u>0</u>	<u>0</u>
7. Duplicate Analyses		<u>0</u>	<u>0</u>	<u>0</u>
8. LCS		<u>0</u>	<u>0</u>	<u>0</u>
9. Other				

0 = data had no problems

X = data qualified due to minor problems

H = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: _____

NOTES: _____

• Refer to the corresponding attachments for explanation of any problems.

1A178

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0APPENDIX C
HIGH LEVEL RADIOCHEMICAL QC- COCName V62-222-095 Date 10/31/94COMMENTS: COC present and acceptableACTION: No action

Sample # Constituent Value/Qual

Sample # Constituent Value/Qual

1A-179

200

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

HIGH LEVEL RADIOCHEMICAL QC - INITIAL CALIBRATION

Name W. M. Sample Date 10/31/94

COMMENTS: No initial calibration data provided for I-129. Detector ID was not provided for Np-237. Data 10/31/94 therefore initial calibration criteria could not be evaluated. 10/31/94

ACTION: Qualify results as UJ for I-129, Np-237. to be evaluated.

Sample # Constituent Value/Qual

Sample # Constituent Value/Qual

V.77: I-129 $6.3e^{-5}$ UJ
U.77 Np-237 $1.64e^{-4}$ UJ

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX D

HIGH LEVEL RADIOCHEMICAL QC - EFFICIENCY CHECKS

Name Walter A. Anderson

Date 10/3/94

COMMENTS:

COMMENTS: No efficiency checks provided for
I-129; Detector ID was not provided
for Np237 therefore efficiency checks could
not be evaluated.

ACTION:

Qualify results as NT

Sample #	Constituent	Value/Qual
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30
31	31	31
32	32	32
33	33	33
34	34	34
35	35	35
36	36	36
37	37	37
38	38	38
39	39	39
40	40	40
41	41	41
42	42	42
43	43	43
44	44	44
45	45	45
46	46	46
47	47	47
48	48	48
49	49	49
50	50	50
51	51	51
52	52	52
53	53	53
54	54	54
55	55	55
56	56	56
57	57	57
58	58	58
59	59	59
60	60	60
61	61	61
62	62	62
63	63	63
64	64	64
65	65	65
66	66	66
67	67	67
68	68	68
69	69	69
70	70	70
71	71	71
72	72	72
73	73	73
74	74	74
75	75	75
76	76	76
77	77	77
78	78	78
79	79	79
80	80	80
81	81	81
82	82	82
83	83	83
84	84	84
85	85	85
86	86	86
87	87	87
88	88	88
89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

Sample #	Constituent	Value/Qual
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30
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33	33	33
34	34	34
35	35	35
36	36	36
37	37	37
38	38	38
39	39	39
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45	45	45
46	46	46
47	47	47
48	48	48
49	49	49
50	50	50
51	51	51
52	52	52
53	53	53
54	54	54
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56	56	56
57	57	57
58	58	58
59	59	59
60	60	60
61	61	61
62	62	62
63	63	63
64	64	64
65	65	65
66	66	66
67	67	67
68	68	68
69	69	69
70	70	70
71	71	71
72	72	72
73	73	73
74	74	74
75	75	75
76	76	76
77	77	77
78	78	78
79	79	79
80	80	80
81	81	81
82	82	82
83	83	83
84	84	84
85	85	85
86	86	86
87	87	87
88	88	88
89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

V77 I-129 $6.3e^{-5}$ UJ
V77 Np 237 $1.64e^{-4}$ UJ

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0APPENDIX E
HIGH LEVEL RADIOCHEMICAL QC - BACKGROUNDName W. M. Dwyer Date 10/31/94COMMENTS: No background checks provided
for I-129; Detector ID was not
reported for Np237 therefore background
could not be evaluated.ACTION: Qualify results as UJ

Sample # Constituent Value/Qual | Sample # Constituent Value/Qual

V77 I-129 6.3×10^{-5} UJ
V97 Np237 1.4×10^{-4} UJ

DATA VALIDATION FOR HIGH LEVEL RCRA/CERCLA RADIOCHEMICAL ANALYSES

Manual	Section	Page
--------	---------	------

Effective Date February 01, 1991

WHC-CM-5-3

2.4, REV 0

• 17 of 21

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

HIGH LEVEL RADIOCHEMICAL QC - PREPARATION BLANKS

Name

Date _____

COMMENTS:

ACTION:

Sample #	Constituent	Value/Qual	Sample #	Constituent	Value/Qual
1	...	...	2	...	...
3	...	...	4	...	...
5	...	...	6	...	...
7	...	...	8	...	...
9	...	...	10	...	...
11	...	...	12	...	...
13	...	...	14	...	...
15	...	...	16	...	...
17	...	...	18	...	...
19	...	...	20	...	...
21	...	...	22	...	...
23	...	...	24	...	...
25	...	...	26	...	...
27	...	...	28	...	...
29	...	...	30	...	...
31	...	...	32	...	...
33	...	...	34	...	...
35	...	...	36	...	...
37	...	...	38	...	...
39	...	...	40	...	...
41	...	...	42	...	...
43	...	...	44	...	...
45	...	...	46	...	...
47	...	...	48	...	...
49	...	...	50	...	...
51	...	...	52	...	...
53	...	...	54	...	...
55	...	...	56	...	...
57	...	...	58	...	...
59	...	...	60	...	...
61	...	...	62	...	...
63	...	...	64	...	...
65	...	...	66	...	...
67	...	...	68	...	...
69	...	...	70	...	...
71	...	...	72	...	...
73	...	...	74	...	...
75	...	...	76	...	...
77	...	...	78	...	...
79	...	...	80	...	...
81	...	...	82	...	...
83	...	...	84	...	...
85	...	...	86	...	...
87	...	...	88	...	...
89	...	...	90	...	...
91	...	...	92	...	...
93	...	...	94	...	...
95	...	...	96	...	...
97	...	...	98	...	...
99	...	...	100	...	...

1A-183

204

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX G

HIGH LEVEL RADIOCHEMICAL QC - MATRIX SPIKES/TRACERS/CARRIERS

Name M. M. M. M. M.Date 10/31/94

COMMENTS: Spike recovery not reported
for Se 79 because suitable standard
is unavailable. Tracer recovery not
reported for Np 237.

ACTION: Qualify Np 237 as UJ

Sample #	Constituent	Value/Qual	Sample #	Constituent	Value/Qual
----------	-------------	------------	----------	-------------	------------

✓77	Np 237	1.64e ⁻⁷ UJ			
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WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0APPENDIX H
HIGH LEVEL RADIOCHEMICAL QC - DUPLICATE ANALYSIS

Name

W. M. Hughes

Date

10/31/94

COMMENTS:

All requirements were met.

ACTION:

None.

Sample #	Constituent	Value/Qual	Sample #	Constituent	Value/Qual
----------	-------------	------------	----------	-------------	------------

/A-185

DATA VALIDATION FOR HIGH LEVEL RCRA/CERCLA RADIOCHEMICAL ANALYSES

Manual
Section
Page :
Effectiv

WHC-CM-5-3
2.4, REV 0
20 of 21
ry 01, 1991

WHC-SD-WM-DP-065
ADDENDUM 1A, REV. 0

APPENDIX I

APPENDIX 1

HIGH LEVEL RADIOCHEMICAL QC - LABORATORY CONTROL SAMPLES

Name Michael R. Rucker Date 10/31/94

COMMENTS: All requirements met with the exception of 5c79 since no suitable CCS is available for 5c79 analysis.

ACTION: None

Sample #	Constituent	Value/Qual	Sample #	Constituent	Value/Qual
1	...	...	2	...	...
3	...	...	4	...	...
5	...	...	6	...	...
7	...	...	8	...	...
9	...	...	10	...	...
11	...	...	12	...	...
13	...	...	14	...	...
15	...	...	16	...	...
17	...	...	18	...	...
19	...	...	20	...	...
21	...	...	22	...	...
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43	...	...	44	...	...
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95	...	...	96	...	...
97	...	...	98	...	...
99	...	...	100	...	...

14-186

WHC-SD-WM-DP-065

APPENDIX J

ADDENDUM 1A, REV. 0

HIGH LEVEL RADIOCHEMICAL QC - OTHER QUALITY CONTROL

Name

David M. Murphy

Date

10/31/94

COMMENTS:

no other QC evaluated
however raw instrument printouts
were not provided for CH, Se 79, Sr 90
Np 237.

ACTION:

Sample #	Constituent	Value/Qual	Sample #	Constituent	Value/Qual

1A187

WHC-SD-WM-DP-065, ADDENDUM 1A, REV. 0

CHAIN OF CUSTODY FORMS

1A188

TANK FAF 1 PLANT OPERATING PROCEDURE

COPY

WHC-SD-WM-DP-065, REV. 0
CHAIN OF CUSTODY ADDENDUM 1A

Company Contact	WHC	Telephone	373-2142
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	Truck		
Shipped to	222-5	Lab	
SAMPLING INFORMATION			
Sample Collected by	R Stahl	Date	3-17-94 Time 10:31 AM
Sample Locations	241-AP-108	Custody Seal #	3666
Remarks			
Ice Chest or Sample Pic No.	Pig TF-7	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW:

R Stahl DATE: 3-21-94
3-18-94
ELN

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R 3632	N/A

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
<i>R Stahl</i>	<i>ML Stanley</i>	3-21-94 844
Relinquished by:	Received by:	Date/Time:
<i>ML Stanley</i>	<i>Erasmus Clark</i>	3-21-94 1425
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

HA-189

161

314

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-2142
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	Truck		
Shipped to	222-S Lab		
SAMPLING INFORMATION			
Sample Collected by	BZ Hall	Date	3-18-94 Time: 10:56 AM
Sample Locations	241-AP-108	Custody Seal #	2629
Remarks			
Ice Chest or Sample Pig No.	Pig B-25	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW:

BZ Hall

DATE:

3-21-94

3-18-94

BCL

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R 3634	N/A

CHAIN OF POSSESSION

Relinquished by: <u>BZ Hall</u>	Received by: <u>Mike Harty</u>	Date/Time: <u>3-21-94</u> <u>3-18-94</u> BCL
Relinquished by: <u>Mike Harty</u>	Received by: <u>Raymond White</u>	Date/Time: <u>3-21-94</u> 1425
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.

TO-080-010

Rev/Mod

B-10

Page

29

1A190

162 315

TANK FAF 1 PLANT OPERATING PROCEDURE

WHC-SD-WM-DP-065, REV. 0

COPY

CHAIN OF CUSTODY			ADDENDUM 1A,	
Company Contact	WHC	Telephone	373-7751	
Bill of Lading No.	NA	Offsite Property No.	NA	
Method of Shipment	TRUCK			
Shipped to	222-S			
SAMPLING INFORMATION				
Sample Collected by	B. Hall	Date	3-21-94	Time 0956 AM
Sample Locations	244-AP-108	Custody Seal #	2259	
Remarks	NA			
Ice Chest or Sample Pig No.	G-10	Field Logbook and Page No.	N/A	

SHIFT MANAGER REVIEW:

[Signature]

DATE: 3-22-94

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R3636	NA

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i>	Received by: <i>[Signature]</i>	Date/Time: 1045 3-22-94
Relinquished by: <i>[Signature]</i>	Received by: <i>[Signature]</i>	Date/Time: 1148 3-22-94
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

1A-191

163

316

TANK FAP-1 PLANT OPERATING PROCEDURE

WHC-SD-WM-DP-065, REV. 0

ADDENDUM 1A,
CHAIN OF CUSTODY

Company Contact	WHC	Telephone	373-7751
Bill of Lading No.	14	Offsite Property No.	14
Method of Shipment	TRUCK		
Shipped to	222-S		
SAMPLING INFORMATION			
Sample Collected by	B. Hall	Date	3-21-94 3-21-94 Time 10:12 AM
Sample Locations	241-AP-108	Custody Seal #	2272
Remarks			
Ice Chest or Sample Pkg. No.	G-2	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW:

[Signature]

DATE: 3-22-94

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R3638	14

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i>	Received by: <i>Mh. Hardy</i>	Date/Time: 1345 3-22-94
Relinquished by: <i>Mh. Hardy</i>	Received by: <i>N. Lopez</i>	Date/Time: 1415 3-22-94
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

1A-192

164

317

TANK FARM PLANT OPERATING PROCEDURE

WHC-SD-WM-DP-065, REV. 0

COPY

ADDENDUM 1A
CHAIN OF CUSTODY

Company Contact	WHC	Telephone	373-7751
Bill of Lading No.	NA	Offsite Property No.	NA
Method of Shipment	Truck		
Shipped to	222-S LAB		
SAMPLING INFORMATION			
Sample Collected by	B. Hall	Date	3-22-94 Time 11:30m
Sample Locations	241-WP-108	Custody Seal #	
Remarks			
Ice Chest or Sample Pig No.	TF-3	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW

DATE: 3-22-94

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R3640	NA

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time: 1345 3-22-94
Relinquished by:	Received by:	Date/Time: 1430 3-22-94
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

1A-193

165

318

WHC-SD-WM-DP-065, REV. 0

COPY

ADDENDUM 1A,
CHAIN OF CUSTODY

Company Contact	WHC	Telephone	373-7751
Bill of Lading No.	MA	Offsite Property No.	MA
Method of Shipment	TRUCK		
Shipped to	222-S		
SAMPLING INFORMATION			
Sample Collected by	B. Hall	Date	3-17-94 Time 11:11 AM
Sample Locations	241-AP-108	Custody Seal #	2271
Remarks	FIELD BLANK		
Ice Chest or Sample Pkg. No.	TF-4	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW: *[Signature]*DATE: 3-22-94

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
R3643 V73 MA	

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i>	Received by: <i>Muh. Harty</i>	Date/Time: 1045 3-22-94
Relinquished by: <i>Muh. Harty</i>	Received by: <i>Raymond White</i>	Date/Time: 1140 3-22-94
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Dumped down Hot Cell drain 03-20-94 *Witnessed!* *George Wilson* 3/30/94
to be resampled - new tag will be generated

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

1A-194

166

319

Westinghouse Hartford
Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page **COPY**
Date Turnaround

Collector D.E. Melville	Company Contact WHC	Telephone No. 3-0257
Project Designation NA	Sampling Location 108 AP, Riser 1W	SAF No. NA
Ice Chest No. NA	Field Logbook No. NA	Method of Shipment Truck
Shipped To 222-S	Offsite Property No. NA	Bill of Lading/Air Bill No. NA
Possible Sample Hazards/Remarks Field blank	Preservative NA	
	Type of Container NA	
	No. of Container(s) NA	
Special Handling and/or Storage NA	Volume NA	

SAMPLE ANALYSIS

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

Sample No.	Matrix*	Date Sampled	Time Sampled																
R3643-A	Liquid	6/29/94	0840	222-S	3782														

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS		Matrix*	
Relinquished By <i>D.E. Melville</i>	Date/Time 6/29/94 10:00 am	Received By <i>Mike Hunt</i>	Date/Time 6-29-94 10:00			S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other	
Relinquished By <i>Mike Hunt</i>	Date/Time 6-29-94 10:30	Received By <i>Shirley Cook</i>	Date/Time 6-29-94 10:30				
Relinquished By	Date/Time	Received By	Date/Time				
Relinquished By	Date/Time	Received By	Date/Time				
LABORATORY SECTION	Received By	Title		Date/Time			
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time			

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

167

REQUEST FOR SPECIAL ANALYSIS (RSA)					RSA No. 1850		
1. Sample Origin 108-AP		2. Date Submitted 3/16/94		4. Requester Name George L Miller		6. Charge Code/Work Package N1A7F	
		3. Submitted By George L Miller		5. Requester Phone/MSIN 373-4739 / T6-06		7. Date Required 3/17/94 4/7/94	
8. Customer ID		Collected Date Time		9. Laboratory ID		12. Number of Samples	
108-AP-A				V 62		2	
108-AP-B				V 63		Approx 100ml	
						13. Volume of Samples	
						14. Protocols ☐ None ☒ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA	
						15. Sample Type ☐ Solid ☐ Soil ☐ Slurry ☐ Gas ☒ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify)	
WHC-SD-WM-DP-065, REV. 0 ADDENDUM 1A,						16. Storage Requirements ☒ None ☐ Specify	
						17. Process Knowledge/Known Listed Wastes ☐ Unknown ☒ Known (Please attach list) Evaporator Feed (DST) ☒ Previously submitted for this Project (Similar to 101-AP)	
10. Determination		11. Expected Range		18. Survey		Dose	
Direct:				S. Loderbauer HPT Signature		46 125 mrad corrected	
• DSC				19. Disposition of Waste ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☒ Other per TPP: WHC-SD-WM-TPP-048			
• Appearance							
• Specific Gravity							
• Uranium - Fluorometric							
• OH ⁻							
• H ₂							
Acid Digest:				20. Additional Information			
• ICP				Sample A requires: { Sample Sample Duplicate Spike Spike Duplicate			
• AS				Sample B requires: { Sample Sample Duplicate			
• Se				Shipping # R3632 is Sample ID# 108-AP-A			
Water (Digest) Dilution:				Shipping # R3634 is Sample ID# 108-AP-B			
• IC				V600, V64			
• NH ₄				Blank, V61			
• CN							
• TIC (Carbonate)							
NH ₃							
21. Chain of Custody				22. Assigned Custodial Group (select one)			
(- ☐ No Seal # 3665 (108-AP-A) ☒ Yes Number: Seal # 2629 (108-AP-B)				☐ PCL ☒ PDSU ☐ ENV ☐ Process			
23. Sample Received By: P. White				24. Laboratory Manager (if required)			
Date: 03-21-94 Time: 1425						170 322	

122 ReRun for acid digest for As & requested by May 2002.

V65 - [REDACTED]
V66 - [REDACTED]
V67 - [REDACTED]
V67 - [REDACTED]
V68 - [REDACTED]
V68 - [REDACTED]
V69 - [REDACTED]
V69 - [REDACTED]

V60 - [REDACTED]
V61 - [REDACTED]
V62 - [REDACTED]
V62 - [REDACTED]
V62 - [REDACTED]
V63 - [REDACTED]
V63 - [REDACTED]

Lauri Spence
5-25-99
RSA 1850

AD for V65-69 for As & Se
2 - V65-8505 LMCS & Ca
V60-63
2 Std

ReRuns

WHC-SD-WM-DP-065, REV. 0
ADDENDUM 1A,

BEST AVAILABLE COPY

REQUEST FOR SPECIAL ANALYSIS (RSA)						RSA No. 1072 1851	
Sample Origin 108-AP		2. Date Submitted 3/16/94		4. Requester Name George L Miller			
		3. Submitted By George L Miller		5. Requester Phone/MSIN 373-4739/TG-06			
8. Customer ID 108-AP-C 108-AP-D 108-AP-E		Collected		9. Laboratory ID V67 V68 V69			
		Date	Time				
<div style="text-align: center;"> WHC-SD-WM-DP-065, REV. 0 ADDENDUM 1A </div>		12. Number of Samples 3		13. Volume of Samples approx 100ml			
		14. Protocols Technology per ☐ None ☒ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA					
		15. Sample Type ☐ Solid ☐ Soil ☐ Slurry ☐ Gas ☒ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify) _____					
		16. Storage Requirements ☒ None ☐ Specify _____					
		17. Process Knowledge/Known Listed Wastes ☐ Unknown ☒ Known (Please attach list) Exporstor Feed ☒ Previously submitted for this Project (Similar to 101-AP)					
		10. Determination Direct: • DSC • Appearance • Specific Gravity • Uranium-Fluorometric • OH ⁻ • Hg • CN		11. Expected Range		18. Survey Sh. Landerbach 9/6 <div style="text-align: right;">Dose 125 mrad/corrected</div> <div style="text-align: right;">HPT Signature</div>	
		Acid Digest: • ICP • AS • Se		19. Disposition of Waste ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☒ Other per TPP: WHC-SD-WM-TPP-048		20. Additional Information Sample C Requires { Sample Duplicate Sample D Requires { Sample Duplicate Sample E Requires { Sample Duplicate Shipping # R3636 is Sample ID# 108-AP-C Shipping # R3638 is Sample ID# 108-AP-D Shipping # R3640 is Sample ID# 108-AP-E STD V65 V70 Blank V66	
		Water (Digest) Dilution: • TC • NH ₄ • AN SKM 4-21-94 • TIC (Carbonate) • NH ₃		22. Assigned Custodial Group (select one) ☐ PCL ☒ PDSU ☐ ENV ☐ Process			
		21. Chain of Custody ☐ No Seal # _____ ☒ Yes Number: _____ <div style="float: right;"> (108-AP-C) (108-AP-D) (108-AP-E) </div>		24. Laboratory Manager (if required) 172 324			
		23. Sample Received By: N. Luperio Date: 3-22-94 Time: 1420					

1A199

REQUEST FOR SPECIAL ANALYSIS (RSA)						RSA No. 1852	
1. Sample Origin <i>Evaporator Candidate Feed Tank 108-AP (Field Blank)</i>		2. Date Submitted <i>3/16/94</i>		4. Requester Name <i>George L Miller</i>		6. Charge Code/Work Package <i>NIA7F</i>	
		3. Submitted By <i>George L Miller</i>		5. Requester Phone/MSIN <i>373-4739 / TG-06</i>		7. Date Required <i>3/17/94 4/7/94</i>	
8. Customer ID <i>108-AP-FB</i>		Collected Date <i>3/16/94</i> Time <i>-</i>		9. Laboratory ID <i>V73</i>		12. Number of Samples <i>1</i>	
						13. Volume of Samples <i>800 ml</i>	
						14. Protocols ☐ None ☒ RCRA <i>Technology 1</i> ☐ NOA-1 ☐ Other ☐ CERCLA	
Comment: This sample was misidentified and shipped in error. On 3/22/94 a PNL sample from Riser 1W was received at 222-S labeled as R3643. This sample (received 3/22/94) was dumped in the Hot Cell. A replacement sample, the "real" Field Blank, R3643, was ordered to be recollected and shipped to 222-S with new Chain of Custody. Resampled: <i>06-25-94</i> <i>C. (Indra) Cobb</i> <i>1030</i> <i>Doat #3782</i>				15. Sample Type ☐ Solid ☐ Soil ☐ Slurry ☐ Gas ☒ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify) _____			
				16. Storage Requirements ☒ None WHC-SD-WM-DP-065, REV. 0 ☐ Specify ADDENDUM 1A, _____			
				17. Process Knowledge/Known Listed Wastes ☐ Unknown ☒ Known (Please attach list) <i>Q-Water from 222-SF</i> ☒ Previously submitted for this Project (Same as 101-AP-FB)			
				18. Survey <div style="text-align: right;">Dose Rate <i>125 uR/hr</i></div> <div style="text-align: center;"> <i>[Signature]</i> HPT Signature <i>06-25-94</i> <i>Corrected</i> </div>			
				19. Disposition of Waste ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☒ Other <i>per TPP: WHC-SD-WM-TPP-048</i>			
10. Determination <i>Direct:</i> - Uranium - Fluorometric - OH ⁻ - Hg <i>Acid Digestion:</i> - ICP - AS - Se - GEA - AT - TB <i>Water (Digest) Dilution:</i> - IC - NH ₄ - CN - TIC				20. Additional Information <i>Required Sample Analyses: { Sample Sample Duplicate</i> <i>Shipping # R3643A is Sample ID # 108-AP-FB</i> <i>This is the Field Blank</i>			
21. Chain of Custody ☐ No ☒ Yes Number: <i>See above</i>				22. Assigned Custodial Group (select one) ☐ PCL ☒ PDSU ☐ ENV ☐ Process			
23. Sample Received By: <i>[Signature]</i> Date: <i>3-22-94</i> Time: <i>1140</i>				24. Laboratory Manager (if required) <div style="text-align: right;"><i>1325</i></div> Date: _____			

REQUEST FOR SPECIAL ANALYSIS (RSA)					RSA No. 1853		
1. Sample Origin 108-AP		2. Date Submitted 3/16/94		4. Requester Name George L Miller		6. Charge Code/Work Package NIA7F	
		3. Submitted By George L Miller		5. Requester Phone/MSIN 373-4739/TG-06		7. Date Required 4/7/94	
8. Customer ID SKM 3-18-94		Collected		9. Laboratory ID SKM 3-18-94		12. Number of Samples 1	
		Date	Time			13. Volume of Samples 100 ml	
108-AP-COMP comp		N/A		N 7377		14. Protocols Technology for ☐ None ☒ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA	
WHC-SD-WM-DP-065, REV. 0 ADDENDUM 1A,				15. Sample Type ☐ Solid ☐ Soil ☐ Slurry ☐ Gas ☒ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify) _____			
				16. Storage Requirements ☒ None ☐ Specify _____			
				17. Process Knowledge/Known Listed Wastes ☐ Unknown ☒ Known (Please attach list) Evaporator Feed ☒ Previously submitted for this Project (Similar to 101-AP)			
10. Determination Direct: • Appearance • C-14 • I-129 • H-3 Acid Digest: • GEA • Pu-239/240 • Am-241 • Cm-244 • Np-237 • T-Alpha • T-Beta • Sr-90 • Tc-99 • Se-79		11. Expected Range		18. Survey SNGL HPT Signature			
				19. Disposition of Waste ☐ Return to Client/Location _____ ☐ Dispose per 222-S Procedures ☒ Other Per TPP: WHC-SD-WM-TPP-048			
				20. Additional Information Sample 108-AP-COMP is to be generated as a composite (equal volumes) from Samples 108-AP-A, 108-AP-B, 108-AP-C, 108-AP-D and 108-AP-E 108-AP-COMP requires Sample, Sample Duplicate, Sample Spike and Spike Duplicate for C-14, I-129, H-3, Pu-239/240, Cm-244, Am-241, Np-237, AT, TB, Sr-90 and Tc-99. 108-AP-COMP requires Sample, Sample Duplicate for GEA and Se-79.			
21. Chain of Custody ☐ No ☒ Yes Number: Internal (see Original Samples)				22. Assigned Custodial Group (select one) ☐ PCL ☒ PDSU ☐ ENV ☐ Process			
23. Sample Received By: Shandra Cobb Date: 04-06-94 Time: 0945				24. Laboratory Manager (if required) 1A201 Date: 3/25			

**242-A EVAPORATOR ANALYTICAL SERVICES
PROJECT FY94**

TANK - 108AP

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

DATA PACKAGE/REPORT

PNL Project #21129

Revision 0

September 30, 1994

VALIDATION REPORT

**Battelle, Pacific Northwest Laboratory
Analytical Chemistry Laboratory**

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WHC-SD-WM-DP-065, ADDENDUM 2A, REV. 0

TABLE OF CONTENTS

Introduction	1
Laboratory Form #1's	7
Volatile Organics	8
Semi-Volatile Organics	27
Data Assessment Forms	68
Volatile Organics	69
Semi-Volatile Organics	75
Chain of Custody Forms	82

This document consists of pages 1 through 93.

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

CERTIFICATION STATEMENT

I certify that this data package has met the terms and conditions of TPP 21129. Release of the data contained in this hard copy data package has been authorized by the Project Manager, as verified by the following signature.

K. L. Silvers
Project Manager
Analytical Laboratory Operations

Date

9/30/94

WHC-SD-WM-DP-065, ADDENDUM 2A, REV.0

INTRODUCTION

2A-1

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1.0

INTRODUCTION

This case narrative provides a summary of each of the analyses conducted on Tank 108AP by the Pacific Northwest Laboratory (PNL)¹, Analytical Chemistry Laboratory (ACL) under the Evaporator Characterization Project (PNL Project Number 21129) and the subcontracted work from the Westinghouse Hanford Company (WHC), 222-S Laboratory. This narrative is divided into the following sections:

- 1.0 Introduction
- 2.0 Background
- 3.0 Analytical Summary

2.0

BACKGROUND

Of the following eight samples from Tank 108AP, seven were delivered to the PNL, ACL for Volatile Organic Analysis (VOA), Semi-Volatile Organic Analysis (SVOA) and Total Organic Carbon (TOC). During the sampling and shipment activity, an identification error was made resulting in two samples (R3633 and R3635) being in question. Sample (R3633) was shipped to the ACL and received. While, sample (R3635) was never shipped to the laboratory. The Evaporator Program administratively isolated the samples and later directed their disposal. In addition, the holding time study sample (R3645) and the TOC surface sample (R3642) were not analyzed or reported in this data package due to radiological activities being suspended prior to the analysis be conducted. A follow on sampling event was directed by the Evaporator Program to complete the sample set. The samples were recovered from the same location of the previous sampling event and identified as (R3633A and R3635A) replacing the earlier samples (R3633 and R3635). The later samples (R3633A and R3635A) were subcontracted to the WHC 222-S Laboratory for analysis. The samples were shipped directly from the tank farm to the 222-S Laboratory. The analysis consisted of Volatile Organic Analysis (VOA), Semi-Volatile Organic Analysis (SVOA) and Total Organic Carbon (TOC). This subcontracting was necessary as a result of all radiological activities being temporarily suspended in the ACL.

<u>Customer ID</u>	<u>ACL-ID</u>
R3633	94-04446
R3635	94-04447
R3637	94-04448
R3639	94-04449
R3641	94-04450
R3642	94-04451
R3644	94-04452
R3645	94-04453

¹ Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76 RLO 1830.

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

<u>Customer ID</u>	<u>222S-ID</u>
R3633A	V133
R3635A	V134
R3633B	V135 (Field Blank)
R3635B	V136 (Field Blank)

An ACL number was assigned to each sample upon receipt. The ACL number is used to cross-reference the Customer ID throughout this data package. In concert with this activity, the 222-S number is also used to cross-reference the Customer ID throughout this data package. Each of the requested ACL analyses was successfully accomplished and reported in the data package with the exception of the TOC analysis. The TOC analysis (R3642) and holding time study (R3645) were placed on hold as a result of radiological activities being suspended in the ACL. It is the intent of the ACL, at the direction of the Evaporator Program, to complete the TOC and holding time analyses and amend this data package once radiological activities are resumed in the ACL. Minor problems are documented in the narrative for each respective analysis. In addition, a technical review of the work subcontracted to the 222-S Laboratory was performed by the ACL Organic Analysis Group and is summarized below in section 3.

3.0

ANALYTICAL SUMMARY

ACL Volatile Organic Analysis (VOA)

Each sample listed in Section 2.0 was aliquoted and analyzed by ACL directly for VOA using procedure PNL-ALO-335 (GC/MS Analysis of Volatile Organic Compounds). All analyses were completed within the 14 day holding time (based on sample receipt). No major problems were noted during the analysis/data review. A detailed report is found in the data package.

222-S Volatile Organic Analysis (VOA)

Each sample listed in Section 2.0 was aliquoted and analyzed by the 222-S directly using the test instructions referenced methods and LA-523-401. All analyses were completed in the 14 day holding time (based on sample receipt). No major problems were noted during the analysis/data review. A detailed report is found in the data package.

ACL Semi-Volatile Organic Analysis (SVOA)

A 10 ml sample was extracted for SVOA. The samples were extracted following ACL procedure PNL-ALO-120 (a single pH extraction was used). No major problems were noted during the analysis/data review. A detailed report is found in the data package.

222-S Semi-Volatile Organic Analysis (SVOA)

A 10 ml sample was extracted for SVOA. Samples were analyzed at the 222-S Laboratory according to the test instruction, referenced methods and LA-523-406. Several problems were identified during the ACL technical review. The following is a summary of the problems identified:

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1) Detection of butanol at concentrations near the stated quantitation limit is not supported by the data. There are several contributing factors for low butanol sensitivity:

- The extraction of the samples was performed using methylene chloride which contained cyclohexane as a preservative. A substantial amount of cyclohexane was then co-extracted with any butanol which may have been present. Cyclohexane and butanol were not well resolved on this analytical system with the chromatographic conditions employed. Cyclohexane was present in a relatively large quantity. This made detection of butanol in quantities that were much less than cyclohexane difficult. A requirement to use methylene chloride preserved with aniline rather than cyclohexane will be added to future test instructions by the ACL.
- When the butanol retention times for the continuing calibration on July 26 and subsequent spike and spike duplicate data are compared, variations are observed. In the continuing calibration run, butanol eluted at 1.851 minutes and the nearest internal standard eluted at 6.755 minutes. However, butanol eluted at 2.167 minutes and the internal standard eluted at 6.763 during analysis of the sample spike. The variation of the butanol retention time was 0.316 minute while the internal standard varied by only 0.008 minutes.
- M/z 56 was used as the quantitation ion for butanol. Unfortunately, this is the most abundant ion observed in both the butanol and cyclohexane mass spectra. Since sufficient chromatographic resolution could not be obtained, it is necessary to choose different ions for quantitation. When cyclohexane is present, there are no unique butanol ions observed at sufficient abundance to permit quantitation.

Qualitative results for butanol may be obtained by performing a background correction. There are at least two (M/z 69 and 84) unique cyclohexane ions extending beyond the mass of butanol. By establishing the ion ratio of M/z 56 to 69 or 84, the contribution from cyclohexane at M/z 56 could be subtracted leaving only the butanol response.

The contribution that cyclohexane provided when quantitation of butanol was attempted is demonstrated in the spike recovery data. Recoveries of 120 and 155 percent for butanol were reported. If the ideal case of 100 percent recovery is assumed for butanol, cyclohexane has contributed substantially. Using the qualitative background subtraction would result in butanol recoveries which are comparable to limited historical data obtained for this matrix.

Based on the above observations, it is recommended that the detection limit for butanol be increased to equal the level used for spiked samples, 20000 ug/L. This would be an order of magnitude increase in detection levels currently reported. However, this is reasonable based upon the 20-50 percent suggested bias at the concentration of the spike recovery data.

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

- 2) Accuracy of many of the standards produced is questionable. Accurate delivery of small quantities of liquid requires special equipment and validation of the quantity of material delivered. For example, on page 135 of the log a standard was prepared on July 27 which a volume of 0.4 uL of tetradecane was diluted in solvent. Delivery of 0.4 uL of material is prone to a great deal of inaccuracy. It is not clear how this particular standard was used for this project. See comment 8 regarding standards traceability.
- 3) Updated Form I for 108apa (v133.d) shows a value reported for 2,4-Dinitrotoluene. The quantitation report for this sample shows this result manually deleted. Our review agrees with deletion due to the false contribution of the internal standard. Form I needs to be updated.
- 4) Form 3C matrix spiking concentrations are reported incorrectly.
- 5) Form 5 and DFTPP report values do not match for mass 441.
- 6) Part C of form 8 missing for July 27.
- 7) Extraction bench sheet entitled "108-AP", completed by RJR and Jose Deleon is dated 6/30/94. Notes for same extraction are dated 7/27/94. Analysis for same samples are dated 7/26 and 7/27/94. Need clarification here.
- 8) Surrogate, spike, and internal standard solution preparation can not be tracked. The only reference given to these solutions on bench sheets or in the standard log is the vendor lot number. For example, multiple entries for A002041 from Restek could be found in the log pages for differing dates.

ACL Total Organic Carbon (TOC)

TOC analyses were not conducted by the ACL as a result of the radiological activity suspension.

222-S Total Organic Carbon (TOC)

TOC determinations were conducted on samples subcontracted to the 222-S Laboratory. No major problems were noted during the analysis/data review.

A summary of analytical results generated for Tank 108AP can be found in Table 1.0.

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

Table 1.0 Evaporator Characterization Project Tank 108-AP Summary Results

ANALYTE	R3633A V133	R3635A V135	R3637 94-04448	R3639 94-04449	R3641 94-04450
VOA (ug/L)	222-S	222-S	ACL	ACL	ACL
Acetone	340	530	65	100	110
2-Butanone	36	62	N/D	N/D	N/D
2-Hexanone	3	5	N/D	N/D	N/D
Tetrahydrofuran	16	N/D	N/D	N/D	N/D
ANALYTE	R3633A V133	R3635A V134	R3637 94-04448	R3639 94-04449	R3641 94-04450
SVOA (ug/L)	222-S	222-S	ACL	ACL	ACL
Benzyl Alcohol	N/D	N/D	N/D	N/D	N/D
1-Butanol	N/D	N/D	2700	500	650
2-Butoxyethanol	1800	600	890	270	340
Tetradecane	N/D	N/D	N/D	N/D	N/D
Tributyl phosphate	7000	3500	3900	1600	1700
Tridecane	N/D	N/D	N/D	N/D	N/D
2-Propanol	N/D	N/D	N/D	N/D	N/D
ANALYTE	R3633A V133	R3635A V134			
TOC (ug C/L)	92	62			

WHC-SD-WM-DP-065, ADDENDUM 2A, REV.0

LABORATORY FORM # 1's

2A-7

Volatile Organics - 325 Laboratory

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

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022

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3644

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: DPA104.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec.

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

74-87-3	Chloromethane	10
74-83-9	Bromomethane	10
75-01-4	Vinyl Chloride	10
75-00-3	Chloroethane	10
75-09-2	Methylene Chloride	5
67-64-1	Acetone	10
75-15-0	Carbon Disulfide	5
75-35-4	1,1-Dichloroethene	5
75-34-3	1,1-Dichloroethane	5
540-59-0	trans-1,2-Dichloroethene	5
540-59-0	cis-1,2-Dichloroethene	5
67-66-3	Chloroform	5
107-02-2	1,2-Dichloroethane	5
78-93-3	2-Butanone	10
71-55-6	1,1,1-Trichloroethane	5
56-23-5	Carbon Tetrachloride	5
108-05-4	Vinyl Acetate	10
75-27-4	Bromodichloromethane	5
78-87-5	1,2-Dichloropropane	5
10061-01-5	cis-1,3-Dichloropropene	5
79-01-6	Trichloroethene	5
124-48-1	Dibromochloromethane	5
79-00-5	1,1,2-Trichloroethane	5
71-43-2	Benzene	5
10061-02-6	trans-1,3-Dichloropropene	5
75-25-2	Bromoform	5
108-10-1	4-Methyl-2-Pentanone	10
591-78-6	2-Hexanone	10
127-18-4	Tetrachloroethene	5
79-34-5	1,1,2,2-Tetrachloroethane	5
108-88-3	Toluene	17
108-90-7	Chlorobenzene	5
100-41-4	Ethylbenzene	5

FORM I VOA

2/88

D02-008

2A-3

023

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3644

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: DPA104.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS -
(ug/L or ug/Kg) UG/L

Q

Q

100-42-5-----	Styrene
133-02-7-----	m&p-Xylene
133-02-7-----	o-Xylene
98-82-8-----	Isopropylbenzene
108-67-8-----	1,3,5-Trimethylbenzene
95-63-6-----	1,2,4-Trimethylbenzene
526-73-8-----	1,2,3-Trimethylbenzene
109-99-9-----	Tetrahydrofuran

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11/11/94

FORM I VOA

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WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3644

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452

Sample wt/vol: 5.0

(g/mL) ML

Lab File ID: DPA104.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec.: _____

Data Analyzed: 04/01/94

GC Column: DB-624

ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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2.				
3.				
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30.				

FORM I VOA-TIC

2/88

D02-e10

2A-11

025

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3637

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4448

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA106.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: not dec.

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

74-87-3	Chloromethane	50	Q
74-83-9	Bromomethane	50	Q
75-01-4	Vinyl Chloride	50	Q
75-00-3	Chloroethane	50	Q
75-09-2	Methylene Chloride	25	Q
67-64-1	Acetone	65	Q
75-15-0	Carbon Disulfide	25	Q
75-35-4	1,1-Dichloroethene	25	Q
75-34-3	1,1-Dichloroethane	25	Q
540-59-0	trans-1,2-Dichloroethene	25	Q
540-59-0	cis-1,2-Dichloroethene	25	Q
67-66-3	Chloroform	25	Q
107-02-2	1,2-Dichloroethane	25	Q
78-93-3	2-Butanone	50	Q
71-55-6	1,1,1-Trichloroethane	25	Q
56-23-5	Carbon Tetrachloride	25	Q
108-05-4	Vinyl Acetate	50	Q
75-27-4	Bromodichloromethane	25	Q
78-87-5	1,2-Dichloropropane	25	Q
10061-01-5	cis-1,3-Dichloropropene	25	Q
79-01-6	Trichloroethene	25	Q
124-48-1	Dibromochloromethane	25	Q
79-00-5	1,1,2-Trichloroethane	25	Q
71-43-2	Benzene	25	Q
10061-02-6	trans-1,3-Dichloropropene	25	Q
75-25-2	Bromoform	25	Q
108-10-1	4-Methyl-2-Pentanone	50	Q
591-78-6	2-Hexanone	50	Q
127-18-4	Tetrachloroethene	25	Q
79-34-5	1,1,2,2-Tetrachloroethane	25	Q
108-88-3	Toluene	25	Q
108-90-7	Chlorobenzene	25	Q
100-41-4	Ethylbenzene	25	Q

FORM I VOA

11/1/94

2/88

D02-011

026

2A-12

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3637

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4448

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA106.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS-
(ug/L or ug/Kg) UG/L

100-42-5-----	Styrene	25
133-02-7-----	m&p-Xylene	25
133-02-7-----	o-Xylene	25
98-62-8-----	Isopropylbenzene	25
108-67-8-----	1,3,5-Trimethylbenzene	25
95-63-6-----	1,2,4-Trimethylbenzene	25
526-73-8-----	1,2,3-Trimethylbenzene	25
109-99-9-----	Tetrahydrofuran	50

Q

Q

WS

FORM I VOA

Mr
11/1/94

2/88

027

D02-012
2A-13

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3637

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4448

Sample wt/vol: 1.0

(g/mL) ML

Lab File ID: DPA106.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624

ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
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FORM I VOA-TIC

2/88

~~DO2-013~~
2/14

028

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3639

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4449

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA107.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec.

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

Q

Q

74-87-3	Chloromethane	50	u/s
74-83-9	Bromomethane	50	
75-01-4	Vinyl Chloride	50	
75-00-3	Chloroethane	50	
75-09-2	Methylene Chloride	25	
67-64-1	Acetone	100	
75-15-0	Carbon Disulfide	25	
75-35-4	1,1-Dichloroethene	25	
75-34-3	1,1-Dichloroethane	25	
540-59-0	trans-1,2-Dichloroethene	25	
540-59-0	cis-1,2-Dichloroethene	25	
67-66-3	Chloroform	25	
107-02-2	1,2-Dichloroethane	25	
78-93-3	2-Butanone	50	
71-55-6	1,1,1-Trichloroethane	25	
56-23-5	Carbon Tetrachloride	25	
108-05-4	Vinyl Acetate	50	
75-27-4	Bromodichloromethane	25	
78-87-5	1,2-Dichloropropane	25	
10061-01-5	cis-1,3-Dichloropropene	25	
79-01-6	Trichloroethene	25	
124-48-1	Dibromochloromethane	25	
79-00-5	1,1,2-Trichloroethane	25	
71-43-2	Benzene	25	
10061-02-6	trans-1,3-Dichloropropene	25	
75-25-2	Bromoform	25	
108-10-1	4-Methyl-2-Pentanone	50	
591-78-6	2-Hexanone	50	
127-18-4	Tetrachloroethene	25	
79-34-5	1,1,2,2-Tetrachloroethane	25	
108-88-3	Toluene	4	
108-90-7	Chlorobenzene	25	
100-41-4	Ethylbenzene	25	

FORM I VOA

2/88

D02-014
2A-15

029

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3639

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4449

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA107.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

Q

Q

100-42-5-----	Styrene	25	25 25 25 25 25 25 50	↓
133-02-7-----	m&p-Xylene	25		
133-02-7-----	o-Xylene	25		
98-82-8-----	Isopropylbenzene	25		
108-67-8-----	1,3,5-Trimethylbenzene	25		
95-63-6-----	1,2,4-Trimethylbenzene	25		
526-73-8-----	1,2,3-Trimethylbenzene	25		
109-99-9-----	Tetrahydrofuran	50		

W

FORM I VOA

2/88

D02-015
20-16

030

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3639

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water).WATER

Lab Sample ID: 94-4449

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA107.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec.:

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
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28.				
29.				
30.				

FORM I VOA-TIC

2/88

D02-016

2A-17

031

R3641

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-4450
Sample wt/vol: 1.0 (g/mL) ML Lab File ID: DPA108.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: not dec. Data Analyzed: 04/01/94
GC Column: DB-624 ID: 0.54 (mm) Dilution Factor: 1.0
Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	Q
74-87-3	Chloromethane	50		UT
74-83-9	Bromomethane	50		
75-01-4	Vinyl Chloride	50		
75-00-3	Chloroethane	50		
75-09-2	Methylene Chloride	25		
67-64-1	Acetone	110		
75-15-0	Carbon Disulfide	25		
75-35-4	1,1-Dichloroethene	25		
75-34-3	1,1-Dichloroethane	25		
540-59-0	trans-1,2-Dichloroethene	25		
540-59-0	cis-1,2-Dichloroethene	25		
67-66-3	Chloroform	25		
107-02-2	1,2-Dichloroethane	25		
78-93-3	2-Butanone	50		
71-55-6	1,1,1-Trichloroethane	25		
56-23-5	Carbon Tetrachloride	25		
108-05-4	Vinyl Acetate	50		
75-27-4	Bromodichloromethane	25		
78-87-5	1,2-Dichloropropane	25		
10061-01-5	cis-1,3-Dichloropropene	25		
79-01-6	Trichloroethene	25		
124-48-1	Dibromochloromethane	25		
79-00-5	1,1,2-Trichloroethane	25		
71-43-2	Benzene	25		
10061-02-6	trans-1,3-Dichloropropene	25		
75-25-2	Bromoform	25		
108-10-1	4-Methyl-2-Pentanone	50		
591-78-6	2-Hexanone	50		
127-18-4	Tetrachloroethene	25		
79-34-5	1,1,2,2-Tetrachloroethane	25		
108-88-3	Toluene	7		
108-90-7	Chlorobenzene	25		
100-41-4	Ethylbenzene	25		

FORM I VOA

2/88

D02-017
2018

032

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3641

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4450

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA108.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

100-42-5-----	Styrene	25
133-02-7-----	m&p-Xylene	25
133-02-7-----	o-Xylene	25
98-82-8-----	Isopropylbenzene	25
108-67-8-----	1,3,5-Trimethylbenzene	25
95-63-6-----	1,2,4-Trimethylbenzene	25
526-73-8-----	1,2,3-Trimethylbenzene	25
109-99-9-----	Tetrahydrofuran	50

FORM I VOA

2/88

D02-018
2/19

033

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3641

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-4450
Sample wt/vol: 1.0 (g/mL) ML Lab File ID: DEA108.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: not dec. Data Analyzed: 04/01/94
GC Column: DB-624 ID: 0.54 (mm) Dilution Factor: 1.0
Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs-found: 0

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
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27.				
28.				
29.				
30.				

FORM I VOA-TIC

2/88

2A-20

D02-019

034

R3641D

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4450D

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA109.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

74-87-3	Chloromethane	50	uJ
74-83-9	Bromomethane	50	
75-01-4	Vinyl Chloride	50	
75-00-3	Chloroethane	50	
75-09-2	Methylene Chloride	25	
67-64-1	Acetone	120	
75-15-0	Carbon Disulfide	25	
75-35-4	1,1-Dichloroethene	25	
75-34-3	1,1-Dichloroethane	25	
540-59-0	trans-1,2-Dichloroethene	25	
540-59-0	cis-1,2-Dichloroethene	25	
67-66-3	Chloroform	25	
107-02-2	1,2-Dichloroethane	25	
78-93-3	2-Butanone	50	
71-55-6	1,1,1-Trichloroethane	25	
56-23-5	Carbon Tetrachloride	25	
108-05-4	Vinyl Acetate	50	
75-27-4	Bromodichloromethane	25	
78-87-5	1,2-Dichloropropane	25	
10061-01-5	cis-1,3-Dichloropropene	25	
79-01-6	Trichloroethene	25	
124-48-1	Dibromochloromethane	25	
79-00-5	1,1,2-Trichloroethane	25	
71-43-2	Benzene	25	
10061-02-6	trans-1,3-Dichloropropene	25	
75-25-2	Bromoform	25	
108-10-1	4-Methyl-2-Pentanone	50	
591-78-6	2-Hexanone	50	
127-18-4	Tetrachloroethene	25	
79-34-5	1,1,2,2-Tetrachloroethane	25	
108-88-3	Toluene	6	
108-90-7	Chlorobenzene	25	
100-41-4	Ethylbenzene	25	

FORM I VOA

2/88

2A-21

D02-020

035

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3641D

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4450D

Sample wt/vol: 1.0 (g/mL) ML

Lab File ID: DPA109.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

Q

Q

100-42-5-----Styrene	25	✓
133-02-7-----m&p-Xylene	25	✓
133-02-7-----o-Xylene	25	✓
98-82-8-----Isopropylbenzene	25	✓
108-67-8-----1,3,5-Trimethylbenzene	25	✓
95-63-6-----1,2,4-Trimethylbenzene	25	✓
526-73-8-----1,2,3-Trimethylbenzene	25	✓
109-99-9-----Tetrahydrofuran	50	✓

uJ

FORM I VOA

2A-22

D02-021

11/1/94

2/88

036

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3641D

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-4450D

Sample wt/vol: 1.0

(g/mL) ML

Lab File ID: DPA109.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624

ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
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28.				
29.				
30.				

FORM I VOA-TIC

2/88

2A-23

D02-022

037

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLANK

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: BLANK

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: DPA103.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:-
(ug/L or ug/Kg) UG/L Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	5	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethane	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	trans-1,2-Dichloroethane	5	U
540-59-0	cis-1,2-Dichloroethane	5	U
67-66-3	Chloroform	5	U
107-02-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U

FORM I VOA

2/88

2A-24

D02-005

038

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLANK

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: BLANK

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: DPA103.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624 ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Q

100-42-5-----	Styrene	5	U
133-02-7-----	m&p-Xylene	5	U
133-02-7-----	o-Xylene	5	U
98-82-8-----	Isopropylbenzene	5	U
109-57-8-----	1,3,5-Trimethylbenzene	5	U
95-63-6-----	1,2,4-Trimethylbenzene	5	U
526-73-8-----	1,2,3-Trimethylbenzene	5	U
109-99-9-----	Tetrahydrofuran	10	U

FORM I VOA

2/88

2A-25

~~D02-006~~

039

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

BLANK

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: BLANK

Sample wt/vol: 5.0

(g/mL) ML

Lab File ID: DPA103.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: not dec. _____

Data Analyzed: 04/01/94

GC Column: DB-624

ID: 0.54 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS: _____
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
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Semivolatile Organics - 325 Laboratory

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

2A-27

041

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3633

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04446

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0609.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.6

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorocyclopentadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

DO2-016
2A-28

11/1/94

042

R3633

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04446
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0609.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.6

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	2500
100-02-7	4-Nitrophenol	2500
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	1000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	2500
534-52-1	4,6-Dinitro-2-methylphenol	2500
86-30-6	N-Nitrosodiphenylamine (1)	1000
101-55-3	4-Bromophenyl-phenylether	1000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	2500
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
84-74-2	Di-n-butylphthalate	1000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	1000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	Bis(2-Ethylhexyl)phthalate	1000
117-84-0	Di-n-octylphthalate	1000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenz(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
86-74-8	Carbazole	1000
71-36-3	n-Butyl alcohol	1900
110-86-1	Pryidine	19

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

D03-017
2A 29

11/11/94

043

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3633

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04446
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0609.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.6

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	Q
111-76-2-----	2-Butoxyethanol	730		5
100-51-6-----	Benzyl alcohol	1000		5
629-50-5-----	Tridecane	1000		5
629-59-4-----	Tetradecane	1000		5
126-73-8-----	Tributyl Phosphate	3300		5

FORM I SV-3

3/90

DO2-018
2A-30

044

R3633D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04446D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0610.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.6

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

D03-019
2A-31

11/1/94

045

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3633D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04446D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0610.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.6

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	2500
100-02-7	4-Nitrophenol	2500
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	1000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	2500
534-52-1	4,6-Dinitro-2-methylphenol	2500
86-30-6	N-Nitrosodiphenylamine (1)	1000
101-55-3	4-Bromophenyl-phenylether	1000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	2500
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
84-74-2	Di-n-butylphthalate	1000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	1000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	Bis(2-Ethylhexyl)phthalate	1000
117-84-0	Di-n-octylphthalate	1000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenz(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
86-74-8	Carbazole	1000
71-36-3	n-Butyl alcohol	2000
110-86-1	Pryidine	28

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

B03-020
2A-32

046

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3633D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04446D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0610.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 11.6

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Q

Q

111-76-2-----	2-Butoxyethanol	760	
100-51-6-----	Benzyl alcohol	1000	
629-50-5-----	Tridecane	1000	
629-59-4-----	Tetradecane	1000	
126-73-8-----	Tributyl Phosphate	3400	

FORM I SV-3

3/90

2A-33

D03-021

047

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3637

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04448
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0703.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____, decanted: (Y/N) _____ Date Extracted: 04/07/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/07/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

D03-028
2A-34

048

R3637

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04448
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0703.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/07/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/07/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5-----	2,4-Dinitrophenol	2500	Q	Q
100-02-7-----	4-Nitrophenol	2500		
132-64-9-----	Dibenzofuran	1000		
121-14-2-----	2,4-Dinitrotoluene	1000		
84-66-2-----	Diethylphthalate	1000		
7005-72-3-----	4-Chlorophenyl-phenylether	1000		
86-73-7-----	Fluorene	1000		
100-01-6-----	4-Nitroaniline	2500		
534-52-1-----	4,6-Dinitro-2-methylphenol	2500		
86-30-6-----	N-Nitrosodiphenylamine (1)	1000		
101-55-3-----	4-Bromophenyl-phenylether	1000		
118-74-1-----	Hexachlorobenzene	1000		
87-86-5-----	Pentachlorophenol	2500		
85-01-8-----	Phenanthrene	1000		
120-12-7-----	Anthracene	1000		
84-74-2-----	Di-n-butylphthalate	1000		
206-44-0-----	Fluoranthene	1000		
129-00-0-----	Pyrene	1000		
85-68-7-----	Butylbenzylphthalate	1000		
91-94-1-----	3,3'-Dichlorobenzidine	1000		
56-55-3-----	Benzo(a)anthracene	1000		
213-01-9-----	Chrysene	1000		
117-81-7-----	Bis(2-Ethylhexyl)phthalate	1000		
117-84-0-----	Di-n-octylphthalate	1000		
205-99-2-----	Benzo(b)fluoranthene	1000		
207-08-9-----	Benzo(k)fluoranthene	1000		
50-32-8-----	Benzo(a)pyrene	1000		
193-39-5-----	Indeno(1,2,3-cd)pyrene	1000		
53-70-3-----	Dibenz(a,h)anthracene	1000		
191-24-2-----	Benzo(g,h,i)perylene	1000		
86-74-8-----	Carbazole	1000		
71-36-3-----	n-Butyl alcohol	2700		
110-86-1-----	Pryidine	39		

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

D03-029
2A-35

12/1/94

049

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3637

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04448

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0703.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/07/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/07/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)*N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

111-76-2-----	2-Butoxyethanol	890	Q
100-51-6-----	Benzyl alcohol	1000	Q
629-50-5-----	Tridecane	1000	Q
629-59-4-----	Tetradecane	1000	Q
126-73-8-----	Tributyl Phosphate	3900	Q

FORM I SV-3

3/90

DO2-030
2A-36

050

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3637D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04448D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0704.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/07/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/07/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

D03-031
JA37

11/1/94

051

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3637D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04448D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0704.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/07/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/07/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5-----	2,4-Dinitrophenol	2500
100-02-7-----	4-Nitrophenol	2500
132-64-9-----	Dibenzofuran	1000
121-14-2-----	2,4-Dinitrotoluene	1000
84-66-2-----	Diethylphthalate	1000
7005-72-3-----	4-Chlorophenyl-phenylether	1000
86-73-7-----	Fluorene	1000
100-01-6-----	4-Nitroaniline	2500
534-52-1-----	4,6-Dinitro-2-methylphenol	2500
86-30-6-----	N-Nitrosodiphenylamine (1)	1000
101-55-3-----	4-Bromophenyl-phenylether	1000
118-74-1-----	Hexachlorobenzene	1000
87-86-5-----	Pentachlorophenol	2500
85-01-8-----	Phenanthrene	1000
120-12-7-----	Anthracene	1000
84-74-2-----	Di-n-butylphthalate	1000
206-44-0-----	Fluoranthene	1000
129-00-0-----	Pyrene	1000
85-68-7-----	Butylbenzylphthalate	1000
91-94-1-----	3,3'-Dichlorobenzidine	1000
56-55-3-----	Benzo(a)anthracene	1000
218-01-9-----	Chrysene	1000
117-81-7-----	Bis(2-Ethylhexyl)phthalate	1000
117-84-0-----	Di-n-octylphthalate	1000
205-99-2-----	Benzo(b)fluoranthene	1000
207-08-9-----	Benzo(k)fluoranthene	1000
50-32-8-----	Benzo(a)pyrene	1000
193-39-5-----	Indeno(1,2,3-cd)pyrene	1000
53-70-3-----	Dibenz(a,h)anthracene	1000
191-24-2-----	Benzo(g,h,i)perylene	1000
86-74-8-----	Carbazole	1000
71-36-3-----	n-Butyl alcohol	2200
110-86-1-----	Pryidine	54

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

DO2-032
2A38

11/11/94

052

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3637D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04448D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0704.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/07/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/07/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.5

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

111-76-2-----	2-Butoxyethanol	890	Q	Q
100-51-6-----	Benzyl alcohol	1000		
629-50-5-----	Tridecane	1000		
629-59-4-----	Tetradecane	1000		
126-73-8-----	Tributyl Phosphate	3800		

FORM I SV-3

3/90

~~D03-033~~
2A-39

053

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1B
SEMITVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3639

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04449
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0603.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	1000	U
111-44-4	Bis(2-Chloroethyl) ether	1000	U
95-57-8	2-Chlorophenol	1000	U
541-73-1	1,3-Dichlorobenzene	1000	U
106-46-7	1,4-Dichlorobenzene	1000	U
95-50-1	1,2-Dichlorobenzene	1000	U
95-48-7	2-Methylphenol	1000	U
108-60-1	Bis(2-Chloroisopropyl) ether	1000	U
106-44-5	4-Methylphenol	1000	U
621-64-7	N-Nitroso-di-n-propylamine	1000	U
67-72-1	Hexachloroethane	1000	U
98-95-3	Nitrobenzene	1000	U
78-59-1	Isophorone	1000	U
88-75-5	2-Nitrophenol	1000	U
105-67-9	2,4-Dimethylphenol	1000	U
111-91-1	Bis(2-Chloroethoxy)methane	1000	U
120-83-2	2,4-Dichlorophenol	1000	U
120-82-1	1,2,4-Trichlorobenzene	1000	U
91-20-3	Naphthalene	1000	U
106-47-8	4-Chloroaniline	1000	U
87-68-3	Hexachlorobutadiene	1000	U
59-50-7	4-Chloro-3-methylphenol	1000	U
91-57-6	2-Methylnaphthalene	1000	U
77-47-4	Hexachlorocyclopentadiene	1000	U
88-06-2	2,4,6-Trichlorophenol	1000	U
95-95-4	2,4,5-Trichlorophenol	2500	U
91-58-7	2-Chloronaphthalene	1000	U
88-74-4	2-Nitroaniline	2500	U
131-11-3	Dimethylphthalate	1000	U
208-96-8	Acenaphthylene	1000	U
606-20-2	2,6-Dinitrotoluene	1000	U
99-09-2	3-Nitroaniline	2500	U
83-32-9	Acenaphthene	1000	U

FORM I SV-1

3/90

D03-034
2A-40

11/1/94

054

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3639

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04449
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0603.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	2500
100-02-7	4-Nitrophenol	2500
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	1000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	2500
534-52-1	4,6-Dinitro-2-methylphenol	2500
86-30-6	N-Nitrosodiphenylamine (1)	1000
101-55-3	4-Bromophenyl-phenylether	1000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	2500
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
84-74-2	Di-n-butylphthalate	1000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	1000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	Bis(2-Ethylhexyl)phthalate	1000
117-84-0	Di-n-octylphthalate	1000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenz(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
86-74-8	Carbazole	1000
71-36-3	n-Butyl alcohol	500
110-86-1	Pryidine	43

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

D03-035
2A-41

11/1/94

055

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3639

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04449

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0603.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

111-76-2-----	2-Butoxyethanol	270	
100-51-6-----	Benzyl alcohol	1000	
629-50-5-----	Tridecane	1000	
629-59-4-----	Tetradecane	1000	
126-73-8-----	Tributyl Phosphate	1600	

FORM I SV-3

3/90

~~DO2-026~~
2A.42

m-j
u/1/94

056

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3639D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04449D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0604.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

~~DO3-032~~
2A-43

mt
11/1/94

057

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3639D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04449D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0604.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 11.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	-----2,4-Dinitrophenol	2500
100-02-7	-----4-Nitrophenol	2500
132-64-9	-----Dibenzofuran	1000
121-14-2	-----2,4-Dinitrotoluene	1000
84-66-2	-----Diethylphthalate	1000
7005-72-3	-----4-Chlorophenyl-phenylether	1000
86-73-7	-----Fluorene	1000
100-01-6	-----4-Nitroaniline	2500
534-52-1	-----4,6-Dinitro-2-methylphenol	2500
86-30-6	-----N-Nitrosodiphenylamine (1)	1000
101-55-3	-----4-Bromophenyl-phenylether	1000
118-74-1	-----Hexachlorobenzene	1000
87-86-5	-----Pentachlorophenol	2500
85-01-8	-----Phenanthrene	1000
120-12-7	-----Anthracene	1000
84-74-2	-----Di-n-butylphthalate	1000
206-44-0	-----Fluoranthene	1000
129-00-0	-----Pyrene	1000
85-68-7	-----Butylbenzylphthalate	1000
91-94-1	-----3,3'-Dichlorobenzidine	1000
56-55-3	-----Benzo(a)anthracene	1000
218-01-9	-----Chrysene	1000
117-81-7	-----Bis(2-Ethylhexyl)phthalate	1000
117-84-0	-----Di-n-octylphthalate	1000
205-99-2	-----Benzo(b)fluoranthene	1000
207-08-9	-----Benzo(k)fluoranthene	1000
50-32-8	-----Benzo(a)pyrene	1000
193-39-5	-----Indeno(1,2,3-cd)pyrene	1000
53-70-3	-----Dibenz(a,h)anthracene	1000
191-24-2	-----Benzo(g,h,i)perylene	1000
86-74-8	-----Carbazole	1000
71-36-3	-----n-Butyl alcohol	590
110-86-1	-----Pryidine	80

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

DO3-038
27-44

058

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3639D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04449D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0604.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.0

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	UG/L
111-76-2-----	2-Butoxyethanol	350	
100-51-6-----	Benzyl alcohol	1000	
629-50-5-----	Tridecane	1000	
629-59-4-----	Tetradecane	1000	
126-73-8-----	Tributyl Phosphate	1700	

Q J 5 1 5

FORM I SV-3

3/90

~~D03-039~~

2A-45

059

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3641

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04450

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0605.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) * N pH: 10.9

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy) methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

D02-640

2A-46

060

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3641

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04450
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0605.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000(UL) Date Analyzed: 04/06/94
Injection Volume: 1.0(uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 10.9

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5-----	2,4-Dinitrophenol	2500
100-02-7-----	4-Nitrophenol	2500
132-64-9-----	Dibenzofuran	1000
121-14-2-----	2,4-Dinitrotoluene	1000
84-66-2-----	Diethylphthalate	1000
7005-72-3-----	4-Chlorophenyl-phenylether	1000
86-73-7-----	Fluorene	1000
100-01-6-----	4-Nitroaniline	2500
534-52-1-----	4,6-Dinitro-2-methylphenol	2500
86-30-6-----	N-Nitrosodiphenylamine (1)	1000
101-55-3-----	4-Bromophenyl-phenylether	1000
118-74-1-----	Hexachlorobenzene	1000
87-86-5-----	Pentachlorophenol	2500
85-01-8-----	Phenanthrene	1000
120-12-7-----	Anthracene	1000
84-74-2-----	Di-n-butylphthalate	1000
206-44-0-----	Fluoranthene	1000
129-00-0-----	Pyrene	1000
85-68-7-----	Butylbenzylphthalate	1000
91-94-1-----	3,3'-Dichlorobenzidine	1000
56-55-3-----	Benzo(a)anthracene	1000
218-01-9-----	Chrysene	1000
117-81-7-----	Bis(2-Ethylhexyl)phthalate	1000
117-84-0-----	Di-n-octylphthalate	1000
205-99-2-----	Benzo(b)fluoranthene	1000
207-08-9-----	Benzo(k)fluoranthene	1000
50-32-8-----	Benzo(a)pyrene	1000
193-39-5-----	Indeno(1,2,3-cd)pyrene	1000
53-70-3-----	Dibenz(a,h)anthracene	1000
191-24-2-----	Benzo(g,h,i)perylene	1000
86-74-8-----	Carbazole	1000
71-36-3-----	n-Butyl alcohol	650
110-86-1-----	Pryidine	51

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

DO2-041

2A-47

061

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3641

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04450

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0605.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 10.9

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

111-76-2-----	2-Butoxyethanol	340	5
100-51-6-----	Benzyl alcohol	1000	5
629-50-5-----	Tridecane	1000	1
629-59-4-----	Tetradecane	1000	1
126-73-8-----	Tributyl Phosphate	1700	5

FORM I SV-3

3/90

~~DO2-042~~

2A-48

062

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3641D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04450D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0606.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 10.9

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000	U
111-44-4	bis(2-Chloroethyl) ether	1000	U
95-57-8	2-Chlorophenol	1000	U
541-73-1	1,3-Dichlorobenzene	1000	U
106-46-7	1,4-Dichlorobenzene	1000	U
95-50-1	1,2-Dichlorobenzene	1000	U
95-48-7	2-Methylphenol	1000	U
108-60-1	bis(2-Chloroisopropyl) ether	1000	U
106-44-5	4-Methylphenol	1000	U
621-64-7	N-Nitroso-di-n-propylamine	1000	U
67-72-1	Hexachloroethane	1000	U
98-95-3	Nitrobenzene	1000	U
78-59-1	Isophorone	1000	U
88-75-5	2-Nitrophenol	1000	U
105-67-9	2,4-Dimethylphenol	1000	U
111-91-1	bis(2-Chloroethoxy) methane	1000	U
120-83-2	2,4-Dichlorophenol	1000	U
120-82-1	1,2,4-Trichlorobenzene	1000	U
91-20-3	Naphthalene	1000	U
106-47-8	4-Chloroaniline	1000	U
87-68-3	Hexachlorobutadiene	1000	U
59-50-7	4-Chloro-3-methylphenol	1000	U
91-57-6	2-Methylnaphthalene	1000	U
77-47-4	Hexachlorocyclopentadiene	1000	U
88-06-2	2,4,6-Trichlorophenol	1000	U
95-95-4	2,4,5-Trichlorophenol	2500	U
91-58-7	2-Chloronaphthalene	1000	U
88-74-4	2-Nitroaniline	2500	U
131-11-3	Dimethylphthalate	1000	U
208-96-8	Acenaphthylene	1000	U
606-20-2	2,6-Dinitrotoluene	1000	U
99-09-2	3-Nitroaniline	2500	U
83-32-9	Acenaphthene	1000	U

FORM I SV-1

3/90

2A-49

D03-043

11/1/94

063

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3641D

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04450D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0606.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 10.9

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5-----	2,4-Dinitrophenol	2500
100-02-7-----	4-Nitrophenol	2500
132-64-9-----	Dibenzofuran	1000
121-14-2-----	2,4-Dinitrotoluene	1000
84-66-2-----	Diethylphthalate	1000
7005-72-3-----	4-Chlorophenyl-phenylether	1000
86-73-7-----	Fluorene	1000
100-01-6-----	4-Nitroaniline	2500
534-52-1-----	4,6-Dinitro-2-methylphenol	2500
86-30-6-----	N-Nitrosodiphenylamine (1)	1000
101-55-3-----	4-Bromophenyl-phenylether	1000
118-74-1-----	Hexachlorobenzene	1000
87-86-5-----	Pentachlorophenol	2500
85-01-8-----	Phenanthrene	1000
120-12-7-----	Anthracene	1000
84-74-2-----	Di-n-butylphthalate	1000
206-44-0-----	Fluoranthene	1000
129-00-0-----	Pyrene	1000
85-68-7-----	Butylbenzylphthalate	1000
91-94-1-----	3,3'-Dichlorobenzidine	1000
56-55-3-----	Benzo(a)anthracene	1000
218-01-9-----	Chrysene	1000
117-81-7-----	Bis(2-Ethylhexyl)phthalate	1000
117-84-0-----	Di-n-octylphthalate	1000
205-99-2-----	Benzo(b)fluoranthene	1000
207-08-9-----	Benzo(k)fluoranthene	1000
50-32-8-----	Benzo(a)pyrene	1000
193-39-5-----	Indeno(1,2,3-cd)pyrene	1000
53-70-3-----	Dibenz(a,h)anthracene	1000
191-24-2-----	Benzo(g,h,i)perylene	1000
86-74-8-----	Carbazole	1000
71-36-3-----	n-Butyl alcohol	630
110-86-1-----	Pryidine	63

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

2A-50

D03-044

12/1/94

064

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3641D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04450D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0606.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 10.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	Q
111-76-2-----	2-Butoxyethanol	370		J
100-51-6-----	Benzyl alcohol	1000		us
629-50-5-----	Tridecane	1000		1
629-59-4-----	Tetradecane	1000		J
126-73-8-----	Tributyl Phosphate	1700		

FORM I SV-3

3/90

2A-51

D03-045

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12/1/94

065

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: BATTELLE PNL

Contract:

R3643
R3644

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0607.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)*N

pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy)methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

2A-52

D03-046

11/1/94

066

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R3643-
R3644

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04452
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0607.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	2500
100-02-7	4-Nitrophenol	2500
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	1000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	2500
534-52-1	4,6-Dinitro-2-methylphenol	2500
86-30-6	N-Nitrosodiphenylamine (1)	1000
101-55-3	4-Bromophenyl-phenylether	1000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	2500
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
84-74-2	Di-n-butylphthalate	1000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	1000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	Bis(2-Ethylhexyl)phthalate	1000
117-84-0	Di-n-octylphthalate	1000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenz(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
86-74-8	Carbazole	1000
71-36-3	n-Butyl alcohol	1000
110-86-1	Pryidine	1000

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

D03-047
27-53

11/1/94

067

WHC-SD-WM-DP-065
ADDENDUM 2A, REV.0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

~~R3643~~
R3644

Lab Name: BATTELLE PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0607.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Q Q

111-76-2-----	2-Butoxyethanol	1000	ug/L
100-51-6-----	Benzyl alcohol	1000	
629-50-5-----	Tridecane	1000	
629-59-4-----	Tetradecane	1000	
126-73-8-----	Tributyl Phosphate	1000	

FORM I SV-3

3/90

~~D03-048~~

2A-54

068

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

R2643D
R3644D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04452D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0608.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

108-95-2	Phenol	1000
111-44-4	bis(2-Chloroethyl) ether	1000
95-57-8	2-Chlorophenol	1000
541-73-1	1,3-Dichlorobenzene	1000
106-46-7	1,4-Dichlorobenzene	1000
95-50-1	1,2-Dichlorobenzene	1000
95-48-7	2-Methylphenol	1000
108-60-1	bis(2-Chloroisopropyl) ether	1000
106-44-5	4-Methylphenol	1000
621-64-7	N-Nitroso-di-n-propylamine	1000
67-72-1	Hexachloroethane	1000
98-95-3	Nitrobenzene	1000
78-59-1	Isophorone	1000
88-75-5	2-Nitrophenol	1000
105-67-9	2,4-Dimethylphenol	1000
111-91-1	bis(2-Chloroethoxy) methane	1000
120-83-2	2,4-Dichlorophenol	1000
120-82-1	1,2,4-Trichlorobenzene	1000
91-20-3	Naphthalene	1000
106-47-8	4-Chloroaniline	1000
87-68-3	Hexachlorobutadiene	1000
59-50-7	4-Chloro-3-methylphenol	1000
91-57-6	2-Methylnaphthalene	1000
77-47-4	Hexachlorocyclopentadiene	1000
88-06-2	2,4,6-Trichlorophenol	1000
95-95-4	2,4,5-Trichlorophenol	2500
91-58-7	2-Chloronaphthalene	1000
88-74-4	2-Nitroaniline	2500
131-11-3	Dimethylphthalate	1000
208-96-8	Acenaphthylene	1000
606-20-2	2,6-Dinitrotoluene	1000
99-09-2	3-Nitroaniline	2500
83-32-9	Acenaphthene	1000

FORM I SV-1

3/90

D03-049

2A-55

069

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

R3643D
R3644D

Lab Name: BATTELLE PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04452D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0608.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (UL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

51-28-5	2,4-Dinitrophenol	2500
100-02-7	4-Nitrophenol	2500
132-64-9	Dibenzofuran	1000
121-14-2	2,4-Dinitrotoluene	1000
84-66-2	Diethylphthalate	1000
7005-72-3	4-Chlorophenyl-phenylether	1000
86-73-7	Fluorene	1000
100-01-6	4-Nitroaniline	2500
534-52-1	4,6-Dinitro-2-methylphenol	2500
86-30-6	N-Nitrosodiphenylamine (1)	1000
101-55-3	4-Bromophenyl-phenylether	1000
118-74-1	Hexachlorobenzene	1000
87-86-5	Pentachlorophenol	2500
85-01-8	Phenanthrene	1000
120-12-7	Anthracene	1000
84-74-2	Di-n-butylphthalate	1000
206-44-0	Fluoranthene	1000
129-00-0	Pyrene	1000
85-68-7	Butylbenzylphthalate	1000
91-94-1	3,3'-Dichlorobenzidine	1000
56-55-3	Benzo(a)anthracene	1000
218-01-9	Chrysene	1000
117-81-7	Bis(2-Ethylhexyl)phthalate	1000
117-84-0	Di-n-octylphthalate	1000
205-99-2	Benzo(b)fluoranthene	1000
207-08-9	Benzo(k)fluoranthene	1000
50-32-8	Benzo(a)pyrene	1000
193-39-5	Indeno(1,2,3-cd)pyrene	1000
53-70-3	Dibenz(a,h)anthracene	1000
191-24-2	Benzo(g,h,i)perylene	1000
86-74-8	Carbazole	1000
71-36-3	n-Butyl alcohol	1000
110-86-1	Pryidine	1000

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/90

D03-050

2A-56

11/1/94

070

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE

Lab Name: BATTELLE PNL

Contract:

R3643D
R3644D

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452D

Sample wt/vol: 10 (g/mL) ML

Lab File ID: DP0608.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (UL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

111-76-2-----	2-Butoxyethanol	1000	Q 45 1 4 4 4 4
100-51-6-----	Benzyl alcohol	1000	
629-50-5-----	Tridecane	1000	
629-59-4-----	Tetradecane	1000	
126-73-8-----	Tributyl Phosphate	1000	

24.57

D03-051

071

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3633

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04446

Sample wt/vol: 10

(g/mL) ML

Lab File ID: DP0609.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____, decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 11.6

Number TICs found: 5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.840	120	NJ
2. 1569-50-2	3-Penten-2-ol	4.069	90	NJ
3. 67-71-0	Dimethyl sulfone	9.870	150	NJ
4. 10471-14-4	Ethane, 1-ethoxy-1-methoxy-	11.919	100	NJ
5. 122-99-6	Ethanol, 2-phenoxy-	16.391	140	NJ
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FORM I SV-TIC

3/90

2A-58

D03-054

11/1/94

072

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3633D

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04446D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0610.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (uL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.6

Number TICs found: 5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.865	150	NJ
2. 1569-50-2	3-Penten-2-ol	4.094	120	NJ
3. 67-71-0	Dimethyl sulfone	9.875	160	NJ
4. 20324-32-7	2-Propanol, 1-(2-methoxy-1-m	11.924	75	NJ
5. 122-99-6	Ethanol, 2-phenoxy-	16.396	160	NJ
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FORM I SV-TIC

3/90

D03-055

2059

11/1/94

073

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3637

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04448

Sample wt/vol: 10

(g/mL) ML

Lab File ID: DP0703.D

Level: (low/med) LOW

Date Received: 03/28/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/07/94

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/07/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)*N

pH: 11.5

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.861	170	NJB
2. 1569-50-2	3-Penten-2-ol	4.090	85	NJ
3. 67-71-0	Dimethyl sulfone	9.870	210	NJ
4. 20324-32-7	2-Propanol, 1-(2-methoxy-1-m	11.847	80	NJ
5. 10471-14-4	Ethane, 1-ethoxy-1-methoxy-	11.920	150	NJ
6. 122-99-6	Ethanol, 2-phenoxy-	16.391	190	NJ
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FORM I SV-TIC

3/90

D03-C56
2A-60

MMA
4/11/94

074

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3637D

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04448D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0704.D
Level: (low/med) LOW Date Received: 03/28/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/07/94
Concentrated Extract Volume: 1000 (uL) Date Analyzed: 04/07/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.5

Number TICs found: 7

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexane	3.893	130	NJ
2. 1569-50-2	3-Penten-2-ol	4.112	55	NJ
3. 67-71-0	Dimethyl sulfone	9.871	180	NJ
4. 20324-32-7	2-Propanol, 1-(2-methoxy-1-m	11.848	81	NJ
5. 10471-14-4	Ethane, 1-ethoxy-1-methoxy-	11.921	150	NJ
6. 122-99-6	Ethanol, 2-phenoxy-	16.392	210	NJ
7. 20324-34-9	2,5,8,11-Tetraoxatetradecan-	17.619	47	
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FORM I SV-TIC

3/90

D03-057
2A-61

11/1/94

075

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3639

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04449

Sample wt/vol: 10

(g/mL) ML

Lab File ID: DP0603.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 11.0

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.851	110	NJB
2. 1569-50-2	3-Penten-2-ol	4.069	65	NJ
3. 67-71-0	Dimethyl sulfone	9.860	180	NJ
4. 78-40-0	Triethyl phosphate	14.400	55	NJ
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FORM I SV-TIC

3/90

~~D03-058~~
~~2A-62~~

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11/1/94

076

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3639D

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04449D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0604.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (uL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 11.0

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.871	110	NJB
2. 115-18-4	3-Buten-2-ol, 2-methyl-	4.089	68	NJ
3. 67-71-0	Dimethyl sulfone	9.870	170	NJ
4. 78-40-0	Triethyl phosphate	14.405	57	NJ
5. 122-99-6	Ethanol, 2-phenoxy-	16.401	44	NJ
6. 3555-47-3	Trisiloxane, 1,1,1,5,5,5-hex	20.518	46	NJ
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FORM I SV-TIC

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11/1/94

077

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

R3641

Lab Name: Battelle PNL

Contract:

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04450

Sample wt/vol: 10

(g/mL) ML

Lab File ID: DP0605.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 10.9

Number TICs found: 5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.683	130	NJ
2. 1569-50-2	3-Penten-2-ol	4.112	63	NJ
3. 67-71-0	Dimethyl sulfone	9.882	190	NJ
4. 78-40-0	Triethyl phosphate	14.408	57	NJ
5. 122-99-6	Ethanol, 2-phenoxy-	16.404	55	NJ
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FORM I SV-TIC

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1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

R3641D

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04450D
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0606.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (uL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 10.9

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.872	110	NJ
2. 19354-27-9	Furan, tetrahydro-2-(methoxy	4.101	60	NJ
3. 111-76-2	Ethanol, 2-butoxy-	9.653	160	NJ
4. 67-71-0	Dimethyl sulfone	9.882	160	NJ
5. 78-40-0	Triethyl phosphate	14.417	53	NJ
6. 122-99-6	Ethanol, 2-phenoxy-	16.403	50	NJ
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FORM I SV-TIC

3/90

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WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

~~R3643~~
R3644

Lab Name: Battelle PNL Contract:
Lab Code: PNL Case No.: 21129 SAS No.: SDG No.: T108A
Matrix: (soil/water) WATER Lab Sample ID: 94-04452
Sample wt/vol: 10 (g/mL) ML Lab File ID: DP0607.D
Level: (low/med) LOW Date Received: 03/29/94
% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 04/04/94
Concentrated Extract Volume: 1000 (uL) Date Analyzed: 04/06/94
Injection Volume: 1.0 (uL) Dilution Factor: 1.0
GPC Cleanup: (Y/N) N pH: 7.8

Number TICs found: 3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 107-87-9	2-Pentanone	3.705	69	NJ
2. 110-83-8	Cyclohexene	3.862	110	NJ
3. 1569-50-2	3-Penten-2-ol	4.090	61	NJ
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FORM I SV-TIC

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WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE

Lab Name: Battelle PNL

Contract:

~~R3643D~~
R3644D

Lab Code: PNL

Case No.: 21129

SAS No.:

SDG No.: T108A

Matrix: (soil/water) WATER

Lab Sample ID: 94-04452D

Sample wt/vol: 10

(g/mL) ML

Lab File ID: DP0608.D

Level: (low/med) LOW

Date Received: 03/29/94

% Moisture: _____ decanted: (Y/N) _____

Date Extracted: 04/04/94

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/06/94

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH: 7.8

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 110-83-8	Cyclohexene	3.819	100	NJD
2. 1569-50-2	3-Penten-2-ol	4.047	81	NJ
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FORM I SV-TIC

3/90

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WHC-SD-WM-DP-065, ADDENDUM 2A, REV.0

DATA ASSESSMENT FORMS

Volatile Organics - 325 Laboratory

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

2A-69

SAMPLE MANAGEMENT AND ADMINISTRATION
DATA VALIDATION FOR RCRA ANALYSES

Manual
Section
Page
Effective Date

WHC-CM-5-3
2.0, REV 0
17 of 24
08/27/90

APPENDIX D
LEVEL B DOCUMENTATION

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

Westinghouse
Hanford Company

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date 10/28/94 Reviewed By S. Schult

DATA ASSESSMENT SUMMARY

Sample # <u>R3641, R3641D</u>	Chain of Custody	<u>0</u>
<u>R3644, R3637, R3639</u>	Analysis Completeness	<u>0</u>
Matrix <u>water</u>	Holding Times	<u>X</u>
Sample Date <u>3/17/94-3/21/94</u>	Analytical Blanks	<u>0</u>
Laboratory <u>PNL</u>	MS or MS/MSD	<u>0</u>
	Duplicate Analysis	<u>X</u>
	Surrogate Recovery	<u>0</u>

0 -data had no problems; X -data qualified due to minor problems
M -data qualified due to major problems/some data may be unusable

Overall Assessment: _____

Comments: Sample analysis requests were not
included on the COCs.

2A-70

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

RCRA QC - Holding Times

[illegible]

2A-71

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

RCRA QC - Holding Times

[illegible]

2A-72

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC

Date 10/28/94 Reviewed by A. SchultsSample # R3637, R3639, R3641, R3641D, R3644Analysis Volatiles

DUPLICATE ANALYSIS

Duplicate Sample 3641 MS/MSD Associated Samples same as aboveMatrix water

Comments: RPD for benzene, toluene outside control limits. Benzene 18%, Toluene 15%.

Action: All sample results qualified J/US.

SURROGATE RECOVERY

Comments: All recoveries within control limits.

Action: none

28-73

163

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date 10/28/94 Reviewed by S. Schults

Sample # R3637, R3639, R3641, R3641D, R3644

Analysis Volatiles

ANALYTICAL BLANK ANALYSIS

Blank Sample # Blank Associated Samples _____

Comments: No compounds detected in blank,

Action: none.

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked 3641MS/MSD Associated Samples _____

Matrix water _____

Comments: Recoveries within control limits

Action: None

27-74

Semivolatile Organics - 325 Laboratory

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

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165

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION

OFFICE OF SAMPLE MANAGEMENT RCRA DATA VALIDATION - LEVEL B

Date 10/28/94 Reviewed By A. Schuldt

----- DATA ASSESSMENT SUMMARY -----	
<u>R3641, R3644</u>	Chain of Custody <u>0</u>
Sample # <u>R3633, R3637, R3639,</u>	Analysis Completeness <u>0</u>
Matrix <u>water</u>	Holding Times <u>X</u>
Sample Date <u>3/17/94 - 3/21/94</u>	Analytical Blanks <u>0</u>
Laboratory <u>PNL</u>	MS or MS/MSD <u>0</u>
	Duplicate Analysis <u>X</u>
	Surrogate Recovery <u>X</u>

0 -data had no problems; X -data qualified due to minor problems
M -data qualified due to major problems/some data may be unusable

Overall Assessment: _____

Comments: Sample R3643 should be R3644.
See page 2 sample analysis requests
were not included on the COCs.

core narrative Appendix 3 mt 11/1/94
RCRA B - Cover
276

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA QC - Holding Times

Date 10/31/94Reviewed by S. SchultsSample # R3637, R3637D.

Analysis Requested

Completion Date

Holding Time

Q

semivolatile4/7/94, 4/7/9417/175/05

Comments:

2A-77

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

RCRA QC - Holding Times

[illegible]

2A-78

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

APPENDIX D

LEVEL B DOCUMENTATION (cont)

RCRA QC - Holding Times

Date 10/28/94 Reviewed by S. Schuldt
Sample # R3644, R3644D, 3633, 3633D

[illegible]

Comments:

2A-79

169

RCRA QC - of

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC

Date 10/28/94 Reviewed by S. Scholtz

Sample # R3637, R3637D, R3633, R3639

Analysis semivolatiles

DUPLICATE ANALYSIS

Duplicate Sample R3639D R3633D, R3637D, Associated Samples _____

Matrix water _____

Comments: RPD for pyridine >20% for samples R3633, R3637, R3639. RPD for 2-butoxyethanol in sample R3639.

Action: All results for R3633, R3633D, R3637, R3637D, R3639, and R3639D qualified J/UJ.

SURROGATE RECOVERY

Comments: Recovery of phenol-d5 & 1,2-dichlorobenzene d4 out of limits for R3637. Recovery of 1,2-dichlorobenzene d4 out for R3637D.

Action: all results for R3637 and R3637D qualified J/UJ.

2A 80

APPENDIX D

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

LEVEL B DOCUMENTATION (cont)

RCRA Level B QC (cont)

Date 10/28/94Reviewed by S. SchultSample # R3633, R3637, R3639, R3641, R3644Analysis semivolatiles

ANALYTICAL BLANK ANALYSIS

Blank Sample # Method blank

Associated Samples _____

Comments: No compounds detected in blanks.Action: None

MATRIX SPIKE or MS/MSD (circle one)

Sample Spiked R3637, R3633

Associated Samples _____

Matrix waterComments: % recoveries and RPDs within control limit.Action: None

27-81

WHC-SD-WM-DP-065, ADDENDUM 2A, REV.0

CHAIN OF CUSTODY FORMS

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-0257
Bill of Lading No.	NA	Offsite Property No.	NA
Method of Shipment	Truck		
Shipped to	222-S		
SAMPLING INFORMATION			
Sample Collected by	D.E. Melville	Date	6/28/94
Sample Location	108-AP, River 1W	Time	1300
Remarks	NA	Custody Seal #	3777
Ice Chest or Sample Pig No.	NA	Field Logbook and Page No.	N/A

SUPERVISION REVIEW: Dave Melville DATE: _____

SAMPLE IDENTIFICATION	
Sample Number	Sample Schedule Number
R3633-A	NA
<div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> V133 </div>	

CHAIN OF POSSESSION		
Relinquished by: <u>Dave Melville</u>	Received by: <u>Mike Harty</u>	Date/Time: 6/28/94 1350
Relinquished by: <u>Mike Harty</u>	Received by: <u>James C. Cope</u>	Date/Time: 6/28/94 1417
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-030	C-4	21

B03-001

2A-83

TANK FAF PLANT OPERATING PROCEDURE

COP

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-0257
Bill of Lading No.	NA	Offsite Property No.	NA
Method of Shipment	Truck		
Shipped to:	222-5		
SAMPLING INFORMATION			
Sample Collected By	D.E. Melville	Date	6/28/94 Time 1300
Sample Locations	108 AP, River 1W	Custody Seal #	3781
Remarks	Liquid		
Ice Chest or Sample Pkg No.	NA	Field Logbook and Page No.	N/A

SUPERVISION REVIEW: D.E. Melville DATE: 6/28/94

SAMPLE IDENTIFICATION	
Sample Number	Sample Schedule Number
<u>R 3035-A</u>	<u>NA</u>
(V134)	

CHAIN OF POSSESSION		
Relinquished by: <u>D.E. Melville</u>	Received by: <u>Mike Smith</u>	Date/Time: <u>6/28/94</u> 1350
Relinquished by: <u>Mike Smith</u>	Received by: <u>Wanda Webb</u>	Date/Time: <u>6/29/94</u> 1417
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-030	C-4	21

B03-002
9A-84

303

Westinghouse Hanford Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST										Page <u>1</u> of <u>1</u>	
Collector <u>D.E. Melville</u>		Company Contact <u>WHC</u>		Telephone No. <u>3-0257</u>		SAF No. <u>NA</u>		Method of Shipment <u>TRUCK</u>		Priority ☒ Normal			
Project Designation <u>NA</u>		Sampling Location <u>108-AP, Riser 1W</u>		Field Logbook No. <u>NA</u>		Bill of Lading/Bill No. <u>NA</u>							
Ice Chest No. <u>NA</u>		Offsite Property No. <u>NA</u>		Preservative <u>NA</u>		Type of Container <u>NA</u>		No. of Containers <u>NA</u>		Volume <u>NA</u>			
Shipped To <u>322-5</u>		Possible Sample Hazard/Remarks		Field Blank		20 ml		Special Handling and/or Storage <u>NA</u>					
SAMPLE ANALYSIS													
Sample No.	Matrix*	Date Sampled	Time Sampled	<div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> V135 </div>									
R3633-B	Liquid	6/29/91	0840										
CHAIN OF POSSESSION				Significant Findings				SPECIAL INSTRUCTIONS					
Relinquished By	Date/Time	Received By	Date/Time					Matrix* ☐ Soil ☐ Sediment ☐ Solid ☐ Sludge ☐ Water ☐ Oil ☐ Air ☐ Drums Solids ☐ Drums Liquids ☐ Tissue ☐ Wipes ☐ Liquid ☐ Vegetation ☐ Other					
<u>Dave Melville</u>	6/29/91 10:00	<u>Mark Hardy</u>	6-29-91 10:00										
<u>Mark Hardy</u>	6/29/91 10:24	<u>Spalding</u>	6-29-91 10:30										
Relinquished By	Date/Time	Received By	Date/Time	Title				Date/Time					
LABORATORY SECTION		Received By		Disposal Method				Disposed By					
FINAL SAMPLE DISPOSITION													

305

WHC-SD-WM-DP-065
ADDENDUM 2A, REV. 0

REQUEST FOR SPECIAL ANALYSIS (RSA)						RSA No. 1998	
1. Sample Origin 108-AP		2. Date Submitted 6/28/94		4. Requester Name George L Miller		6. Charge Code/Work Package NIA7F	
		3. Submitted By George L Miller		5. Requester Phone/MSIN 373-4739		7. Date Required 7/20/94	
8. Customer ID		Collected Date Time		9. Laboratory ID		12. Number of Samples 3	
108-AP-A				V133		13. Volume of Samples approx 100ml	
108-AP-B				V134		14. Protocols ☐ None ☐ RCRA ☐ NQA-1 ☒ Other ☐ CERCLA <i>per Test Plan</i>	
108-AP-A FB				V135		15. Sample Type ☐ Solid ☐ Soil ☐ Slurry ☐ Gas ☒ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify) _____	
108-AP-B FB				V136		16. Storage Requirements ☐ None ☒ Specify Refrigerator (4°C)	
						17. Process Knowledge/Known Listed Wastes ☐ Unknown ☒ Known (Please attach list) <i>See PNL's data for 108-AP</i> ☐ Previously submitted for this Project	
10. Determination		11. Expected Range		18. Survey Dose Rate			
Direct:				HPT Signature _____			
VOA <i>(on 108-AP-A, 108-AP-B, 108-AP-A-FB)</i>				19. Disposition of Waste ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☒ Other <i>per TPP: WHC-SD-WM-TPP-048</i>			
Semi-VOA <i>(on 108-AP-A, 108-AP-B, 108-AP-B-FB)</i>				STD V131 Blank V132			
TOC <i>(on 108-AP-A, 108-AP-B, 108-AP-B-FB)</i>				20. Additional Information Shipping # R 3633-A is Customer ID # 108-AP-A Shipping # R 3635-A is Customer ID # 108-AP-B Shipping # R 3635-B is Customer ID # 108-AP-B FB Shipping # R 3633-B is Customer ID # 108-AP-A FB Perform analyses on Field Blanks (108-AP-A-FB & 108-AP-B-FB) in duplicate. Perform analyses on 108-AP-B in duplicate. Perform analyses on 108-AP-A in duplicate, plus spike and spike duplicate.			
21. Chain of Custody		Seal #: 3777 Seal #: 3792		22. Assigned Custodial Group (select one)			
☐ No ☒ Yes Number: 3759				☐ PCL ☒ PSDU ☐ ENV ☐ Process			
23. Sample Received By: M. Lopez		Date: 6-29-94 Time: 1555		24. Laboratory Manager (if required) Date: _____			

BC-6700-181 (11/93)

~~E03-229~~

2487

306

TANK FAF 1 PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact:	WHC	Telephone:	373-7751
Bill of Lading No.:	MA	Offsite Property No.:	MA
Method of Shipment:	TRUCK		
Shipped to:	PNL		
SAMPLING INFORMATION			
Sample Collected by:	B. Hall	Date:	3-17-94
Sample Location:	241-AP-1188	Custody Seal #:	2263
Remarks:			
Ice Chest or Sample Pkg No.:	TF-9	Field Logbook and Page No.:	N/A

SHIFT MANAGER REVIEW: Deery

DATE: 3-28-94

SAMPLE IDENTIFICATION	
Sample Number	Sample Schedule Number
R# 3633	NA

CHAIN OF POSSESSION		
Relinquished by: <u>Deery</u>	Received by: <u>John Smith</u>	Date/Time: <u>3-28-94</u>
Relinquished by: <u>John Smith</u>	Received by: <u>John Smith</u>	Date/Time: <u>3-28-94</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

B01-002
2A-88

307

TANK FARM 1 PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-7751
Bill of Lading No.	NA	Offsite Property No.	NA
Method of Shipment	TRUCK		
Shipped to	DNL		
SAMPLING INFORMATION			
Sample Collected by	B. HALL	Date	3-21-94 Time 10:06 AM
Sample Location	241-AP-108	Custody Seal #	2275
Remarks			
Ice Chest or Sample Pkg No.	TF-8	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW: [Signature] DATE: 3-26-94

SAMPLE IDENTIFICATION	
Sample Number	Sample Schedule Number
R# 3637	NA

CHAIN OF POSSESSION		
Relinquished by: <u>[Signature]</u> 3-21-94	Received by: <u>[Signature]</u>	Date/Time: 1851 3-29-94
Relinquished by: <u>[Signature]</u>	Received by: <u>[Signature]</u>	Date/Time: 2010 3-28-94
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

TANK FAF 1 PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-2142
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	TRUCK		
Shipped to	PNL		
SAMPLING INFORMATION			
Sample Collected by	B. Hall	Date	3-21-94 Time 1018
Sample Locations	241-AP-108	Custody Seal #	2776
Remarks			
Ice Chest or Sample Pkg. No.	B10	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW:

[Signature]

DATE:

3/29/94

SAMPLE IDENTIFICATION	
Sample Number	R3639
Sample Schedule Number	N/A
Shipment # 13727	

CHAIN OF POSSESSION		
Relinquished by:	Received by:	Date/Time:
<i>[Signature]</i>	<i>[Signature]</i>	3-29-94 1755
Relinquished by:	Received by:	Date/Time:
<i>[Signature]</i>	<i>[Signature]</i>	3-29-94 8:30 PM
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

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2A90

309

TANK FAF 1 PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact	WHC	Telephone	373-2142
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	Truck		
Shipped to	PNL		
SAMPLING INFORMATION			
Sample Collected by	B. Hall	Date	3-21-94 Time 1137
Sample Location	241 AP-108	Custody Seal #	2277
Remarks			
Ice Chest or Sample Pkg No.	B8A	Field Logbook and Page No.	N/A

SHIFT MANAGER REVIEW: *[Signature]*

DATE: 3/29/94

SAMPLE IDENTIFICATION	
Sample Number <u>23641</u>	Sample Schedule Number <u>13127</u> <u>shipment</u>

CHAIN OF POSSESSION		
Relinquished by: <u><i>[Signature]</i></u>	Received by: <u><i>[Signature]</i></u>	Date/Time: <u>3-24-94 1755</u>
Relinquished by: <u><i>[Signature]</i></u>	Received by: <u><i>[Signature]</i></u>	Date/Time: <u>3-29-94 8:30 PM</u>
Relinquished by: <u> </u>	Received by: <u> </u>	Date/Time: <u> </u>
Relinquished by: <u> </u>	Received by: <u> </u>	Date/Time: <u> </u>

Document No. TO-080-010	Rev/Mod B-10	Page 29
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B01-011

2A-91

310

TANK FAF 1 PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY			
Company Contact:	WHC	Telephone:	373-2142
Bill of Lading No.:	N/A	Offsite Property No.:	N/A
Method of Shipment:	TRUCK		
Shipped to:	PNL		
SAMPLING INFORMATION			
Sample Collected by:	B. Hall	Date:	3-29-94
Sample Location:	241-AP-108	Custody Seal #	2279
Remarks:			
Ice Chest or Sample Pkg No.:	G-9	Field Logbook and Page No.:	N/A

SHIFT MANAGER REVIEW: ORIN HALL DATE: 3-29-94

SAMPLE IDENTIFICATION	
Sample Number	SHIPMENT
<u>R3645</u>	<u>#13728</u>
<u>R3644</u>	

CHAIN OF POSSESSION		
Relinquished by:	Received by:	Date/Time:
<u>ORIN HALL</u>	<u>AL IMMEDIATE</u>	<u>3-29-94 22:00</u>
Relinquished by:	Received by:	Date/Time:
<u>AL IMMEDIATE</u>	<u>JOHN K. BO</u>	<u>3-29-94 24:00</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-010	B-10	29

B01-015
27492

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2793

312

* note - Evaporator sample ID's to be provided by WHC upon sample receipt.
 ** note - All samples are to be analyzed in duplicate for each required analysis.

ALD Number	Evap. Number	Tank ID**	Comment
94-04446	R3633	108AP	Sample
94-04447	R3635	108AP	Sample
94-04448	R3637	108AP	Sample
94-04449	R3639	108AP	Sample
94-04450	R3641	108AP	Sample
94-04451	R3642	108AP	Surface/Analyze for TOC** and Appearance ONLY.
94-04452	R3644	108AP	Field Blank
94-04453	R3645	108AP	Holding time study sample

Table 3.0

WHC-SD-WM-DP-065
 ADDENDUM 2A, REV.0