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303-K Storage Facility: Report on FY98 Closure Activities

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GLOSSARY

DOE/RL	U.S. Department of Energy, Richland Operations Office
EPA	U.S. Environmental Protection Agency
HNF	Hanford Nuclear Facility (document identifier)
RCRA	*Resource Conservation and Recovery Act* (RCRA) *of 1976*
SAP	sampling analysis plan
Tri-Party Agreement	Hanford Federal Facility Agreement and Consent Order
WAC	Washington Administrative Code

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1.0 INTRODUCTION

This report summarizes and evaluates the decontamination activities, sampling activities, and sample analysis performed in support of the closure of the 303-K Storage Facility (Figure 1-1). The evaluation is based on the validated data included in the data validation package (98-EAP-346) for the 303-K Storage Facility. The results of this evaluation will be used in assessing contamination for the purpose of closing the 303-K Storage Facility as described in the 303-K Storage Facility Closure Plan, DOE/RL-90-04.

The closure strategy for the 303-K Storage Facility is to decontaminate the interior of the north half of the 303-K Building to remove known or suspected dangerous waste contamination, to sample the interior concrete and exterior soils for the constituents of concern, and then to perform data analysis, with an evaluation to determine if the closure activities and data meet the closure criteria. The closure criteria for the 303-K Storage Facility is that the concentrations of constituents of concern are not present above the cleanup levels.

Based on the evaluation of the decontamination activities, sampling activities, and sample data, determination has been made that the soils at the 303-K Storage Facility meet the cleanup performance standards (WMH 1997) and can be clean closed. The evaluation determined that the 303-K Building cannot be clean closed without additional closure activities.

An additional evaluation will be needed to determine the specific activities required to clean close the 303-K Storage Facility.

The radiological contamination at the 303-K Storage Facility is not addressed by the closure strategy. The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) allows for the closing of treatment, storage, and/or disposal (TSD) units even when radiological contamination is present. Radiological contamination and uranium are not regulated under RCRA. The information on uranium has been included for information purposes only.

There are two documents that define the decontamination, sampling and analysis requirements for the 303-K Storage Facility: DOE/RL-90-04 and 303-K Storage Facility Sampling and Analysis Plan (HNF-SD-ENV-AP-005). The sampling and analysis plan was developed during the data quality objectives process of November 1996 to May 1997.

The sampling and analysis plan defines the following: constituents of concern, cleanup performance standards, cleanup activities, sampling locations and methods, field screening locations and methods, field quality control requirements, laboratory analytical methods, and data validation methodology. Also, at the time sampling was conducted, the sampling and analysis plan was modified by:

- The errata sheet for the *303-K Storage Facility Sampling and Analysis Plan* (DOE-RL 1997)

- *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste* [Hanford Facility RCRA Permit (HF RCRA Permit)] (Ecology 1994); Part V, Chapter 14, Permit Conditions V.14.B.b, V.14.B.c

- Hanford RCRA Permit, Draft Permit Conditions V.14.B.g.1, V.14.B.g.3, V.14.B.g.4, V.14.B.g.5, and V.14.B.g.7. (Ecology letter 9757627A)

For simplicity and clarity, 'modified sampling and analysis plan (SAP)' will be used to refer to the sampling and analysis plan and these three modifying documents. If there is a conflict in the requirements stated in the closure plan and the modified SAP, the closure plan is superseded by the modified SAP. Use of the modified SAP had been required by Ecology (Ecology letter 9757627A) as part of the approval process.

The specific constituents of concern and their cleanup performance standards to be used for the closure of the 303-K Storage Facility were defined in the modified SAP. The cleanup performance standards for the constituents of concern are summarized in Table 1-1.

Table 1-1. Soil and Concrete Cleanup Performance Standards for the Constituents of Concern.

Constituent of concern	CAS number	Cleanup level (mg/kg)
Arsenic	7440-38-2	9.18
Barium	7440-39-3	5,600
Beryllium	7440-41-7	1.81
Cadmium	7440-43-9	80
Chromium	7440-47-3	400
Lead	7439-92-1	250
Mercury	7439-97-5	24
Nickel (as soluble salts)	7440-02-0	1,600
Silver	7440-22-4	400
Uranium	7440-61-1	n/a
Chloride ion (CL^-)	n/a	541.2
Nitrate ion (NO_3^-)	14797-55-8	128,000
Nitrite ion (NO_2^-)	14797-65-0	8,000
Pentachlorophenol	87-86-5	8.33

n/a not applicable or not available
mg/kg milligrams per kilogram
CAS Chemical Abstract Service.

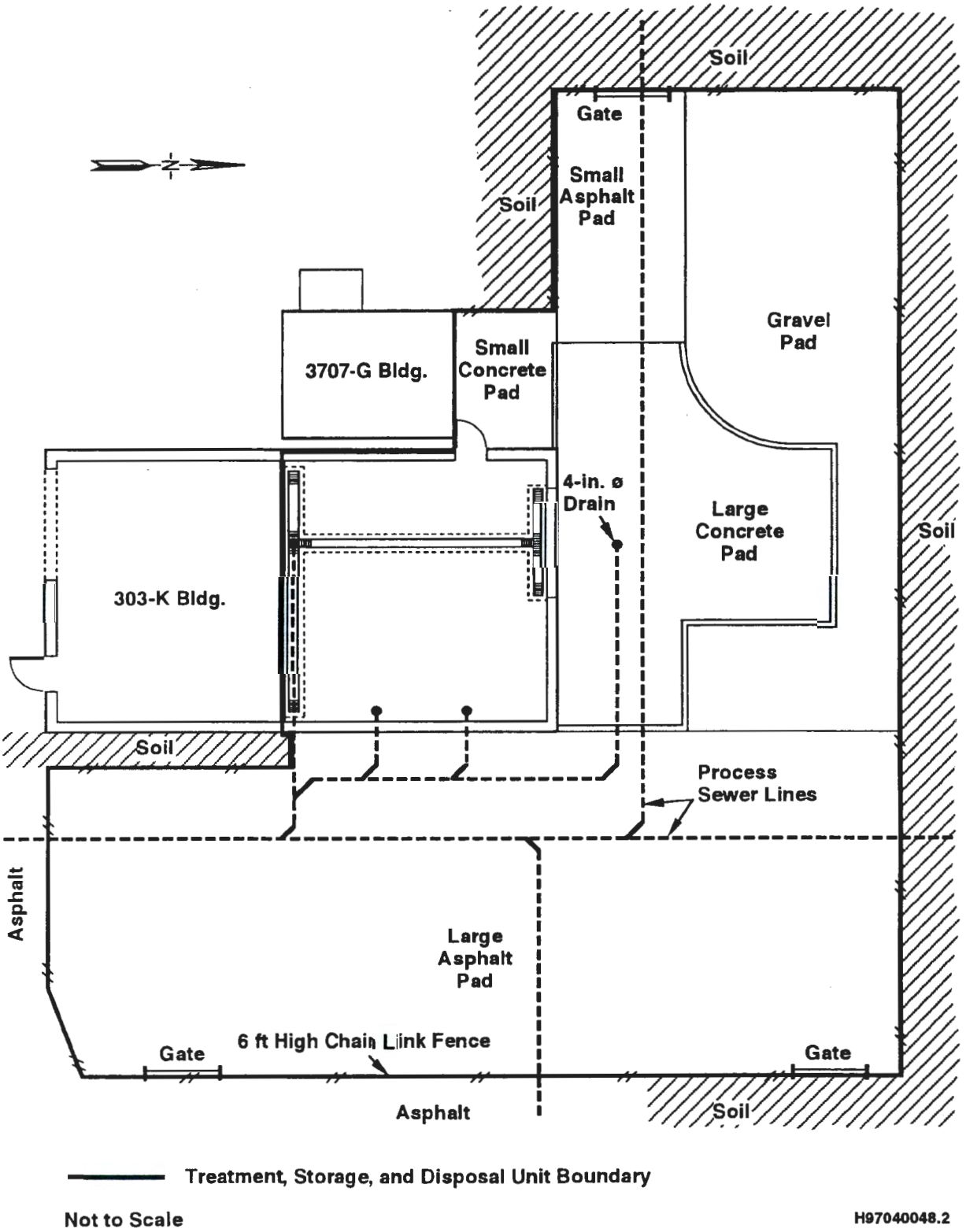

Figure 1-1. 303-K Storage Facility Boundary.

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2.0 DECONTAMINATION

The decontamination effort followed the requirements of the closure plan and the modified SAP. The decontamination effort at the 303-K Storage Facility addressed only the dangerous waste constituents of concern.

Decontamination for dangerous waste constituents was performed on October 23, 1997. In accordance with the modified SAP, the decontamination was limited to damp-wiping the floor and interior trenches. Rags used in the decontamination were sampled; results are included in Table 2-1.

Table 2-1. Rag Sample Data.

Sample Number: BOMHV5					
Analyte	Method		Result (mg/kg)		MDL (mg/kg)
Arsenic	GFAA	LA-505-450	0.00	U	1.00
Barium	ICP	EPA 6010A	22.5		0.40
Beryllium	ICP	EPA 6010A	<0.403	U	0.40
Cadmium	ICP	EPA 6010A	1.51		0.50
Chromium	ICP	EPA 6010A	13.5	J	0.50
Lead	GFAA-CLP	LA-505-405	450	J	0.80
Mercury	Cold vapor	LA-505-404	0.03	J	0.12
Nickel	ICP	EPA 6010A	1.69	J	1.11
Silver	ICP	EPA 6010A	3.12	J	0.40
Uranium	ICP-MS	EPA 200.8	2780		0.30
Chloride ion	IC	LA-533-410	58.5		10.60
Nitrate ion	IC	LA-533-410	1.8	J	0.78
Nitrite ion	IC	LA-533-410	0.2	U	0.20
Pentachlorophenol	GC-MS	EPA 8270B	0.0	U	390.0

EPA = U.S. Environmental Protection Agency method number
GC-MS = gas chromatography – mass spectrometer
GFAA = gas furnace atomic absorption
GFAA-CLP = gas furnace atomic absorption
IC = ion chromatography
ICP = ion coupled plasma
ICP-MS = ion coupled plasma – mass spectrometer
J = Indicates that the compound or analyte was analyzed for and detected, but the value is an estimate.
LA-xxx-xxx = Waste Sampling and Characterization Facility laboratory procedure number
MDL = method detection limit
mg/kg = milligrams per kilograms
U = Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content.

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3.0 SAMPLING

Sampling took place on October 29 and 30, 1997. Sampling was conducted in accordance with the closure plan and the modified SAP. There were 15 sampling locations: 3 in the interior of the 303-K Building and 12 in the exterior areas. At three of the soil sampling locations, samples were collected at two separate intervals. Sampling media were concrete for the interior sample locations and soil for the exterior sample locations. A total of 25 samples were collected: 17 routine samples and 8 quality control samples (5 duplicates and 3 equipment blanks).

3.1 SAMPLE LOCATIONS

The sample locations were established in the modified SAP. Figures 3-1 through 3-3 and Tables 3-1 through 3-3 provide a summary of the sample locations and sample types. Tables 3-4 and 3-5 provides cross-reference lists of sample numbers to sample location.

3.2 SAMPLE COLLECTION

Samples were collected at the locations defined in Section 3.1. Sample collection methodology is defined in the modified SAP. Any deviations or field changes are noted in the following sections. Separate containers were used for the different analysis. Sampler's log book entries are included in Appendix A. Split samples also were collected for Ecology. A copy of Ecology's data is included in Appendix B.

3.2.1 Interior (Concrete) Sample Collection

There are three sample locations in the interior: two in the trench and one on the ceiling (Figures 3-1 and 3-2 and in Table 3-1). Three concrete samples were collected from the interior, and one concrete duplicate sample was collected in the trench at sample location C2, for a total of four concrete samples from the interior. All interior sampling was conducted on October 30, 1997.

The bottles used for the collection of samples were vendor certified to U.S. Environmental Protection Agency (EPA) Level 1. The size, type, lot number, and analysis are identified on Table 3-6. The sample for the radiological analysis used a 20 milliliter poly bottle and did not have or require lot or serial number.

The concrete samples were collected using an electrically operated heavy-duty hammer. Concrete dust and small chips were generated by chiseling and scabbling. With sample location C3 being on the ceiling of the north half of the 303-K Building, a plastic sheet was taped to the ceiling to collect the chips and dust. The dust and chips were collected in sample jars and shipped to LAS, Inc. in Las Vegas, Nevada. All samples were cooled to 4° Celsius for storage and transportation.

3.2.1.1 Deviation During the Interior (Concrete) Sampling

One deviation from the modified SAP occurred during collection of the interior samples. The deviation was use of hardened steel chisels instead of tungsten carbide chisels.

3.2.1.2 Field Changes During the Interior (Concrete) Sampling

There were two field changes to the modified SAP during the interior sampling. Agreement to the field change by Ecology is documented in Appendix C. The field changes were the following:

- At sample location C2, because of the large area of concrete that needed to be scabbled, there was insufficient room to collect a duplicate sample from an adjacent location. Therefore, C2 duplicate sample was collected from the same material as the C2 sample.

- A sample for laboratory analysis of pentachlorophenol was taken from location C1. This was the result of the field screening that yielded inconsistent results. Refer to Section 4.0 for additional information.

3.2.2 Exterior (Soil) Sample Collection

There were 12 exterior sample locations that yielded 18 soil samples (Figure 3-3 and in Table 3-1). Single samples were collected at 10 locations. Separate samples from upper and lower intervals were collected at three locations. Fourteen exterior routine soil samples and four duplicate samples were collected. Soil sampling occurred on October 29 and 30, 1997.

The bottles used for the collection of samples were vendor certified to EPA Level 1. The size, type, lot number, and analysis are identified on Table 3-6. The sample for the radiological analysis used a 20 milliliter poly bottle and did not have or require lot or serial number.

The soil samples were collected using an electrically operated heavy-duty hammer to open a hole in the asphalt or concrete. The top layer of soil material was removed and a hand auger or a spoon was used to transfer the soil material into a stainless steel bowl. Rocks and pebbles were excluded at this time. From the bowl, the soil samples were collected in the sample containers. Poly containers were used for the metals and anion samples and amber glass containers were used for the semivolatile organic soil samples. All soil samples were shipped to LAS, Inc. in Las Vegas, Nevada. All samples were cooled to 4° Celsius for storage and transportation.

There were the following three field changes to the modified SAP during the exterior sampling. Ecology agreement to the field changes is documented in Appendix C.

- Sample location S7 was moved east (about 0.3 meter) from outside the fence to inside the fence. The original sample location was in the dirt strip between the fence and the wall of the south half of the 303-K Building. The move was prompted by concerns about possible radiological contamination in the soil.

- Sample location S10 was relocated about 0.45 meter south and 0.15 meter east of the original location selected. This sample was relocated because rain water collected in the original sample hole.

- Samples for laboratory analysis of pentachlorophenol were taken from all soil sampling locations. This was the result of the field screening that yielded inconsistent results. Refer to Section 4.0 for additional information.

3.3 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The modified SAP required only one type of field quality assurance and quality control sample, equipment blanks, to be collected during the sampling. The modified SAP required one equipment blank be collected for each type of sampling equipment per day of sampling. The equipment blanks were collected using deionized water transported to the sampling site. At the site, the deionized water was poured over or through the sample collection device, collected, and sent to the offsite analytical laboratory for analysis. A total of three equipment blanks were collected and analyzed. There were two soil sampling equipment blanks with one each being collected on October 29 and 30, 1997. There was one concrete chip sampling equipment blank collected on October 30, 1997.

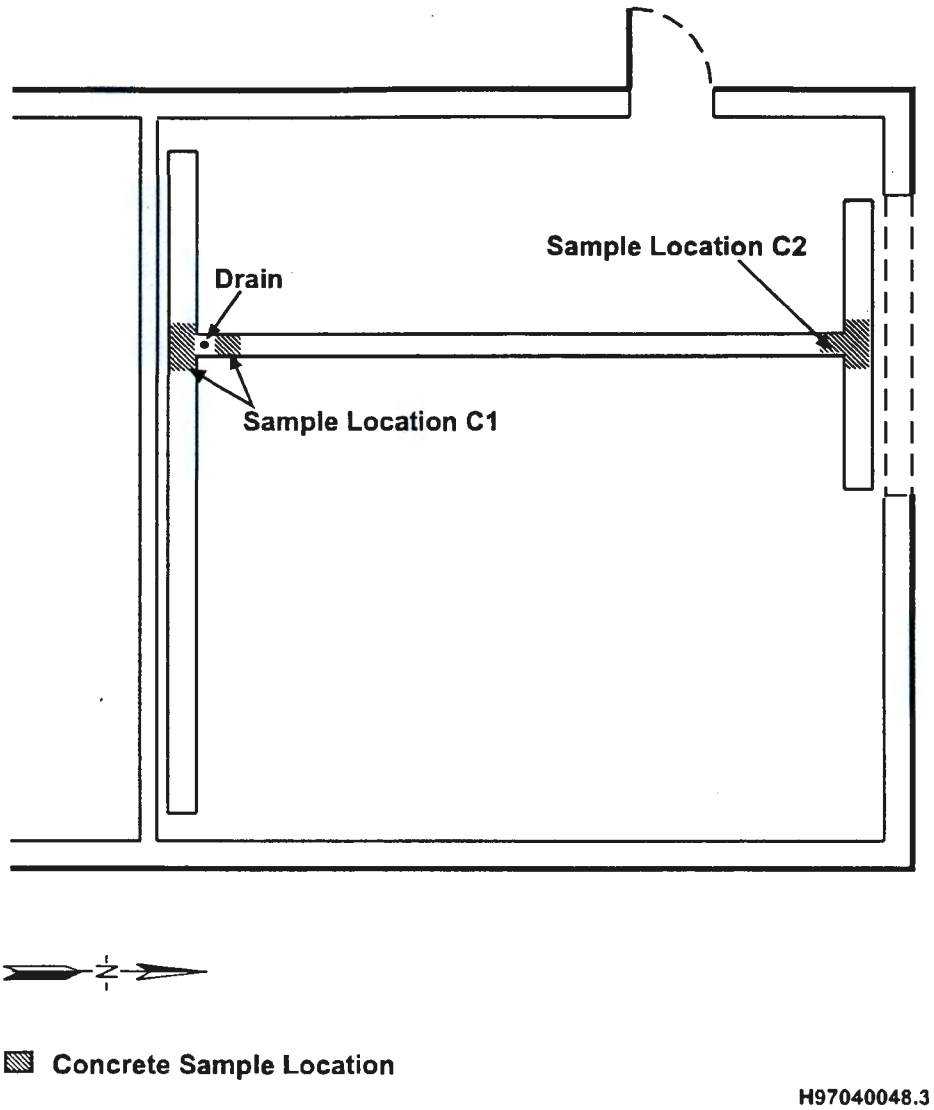

Figure 3-1. 303-K Storage Facility Concrete Sampling Locations (Trench).

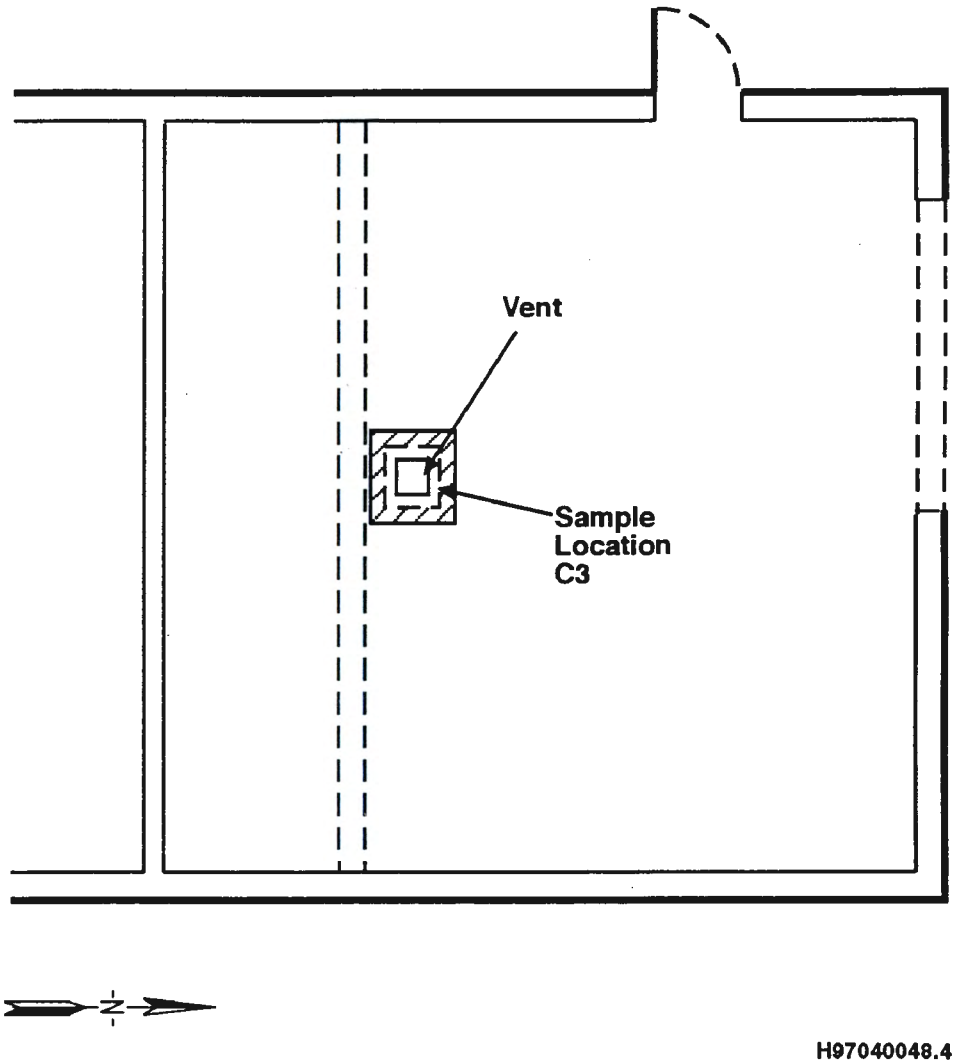

Figure 3-2. 303-K Storage Facility Concrete Sampling Location (Ceiling).

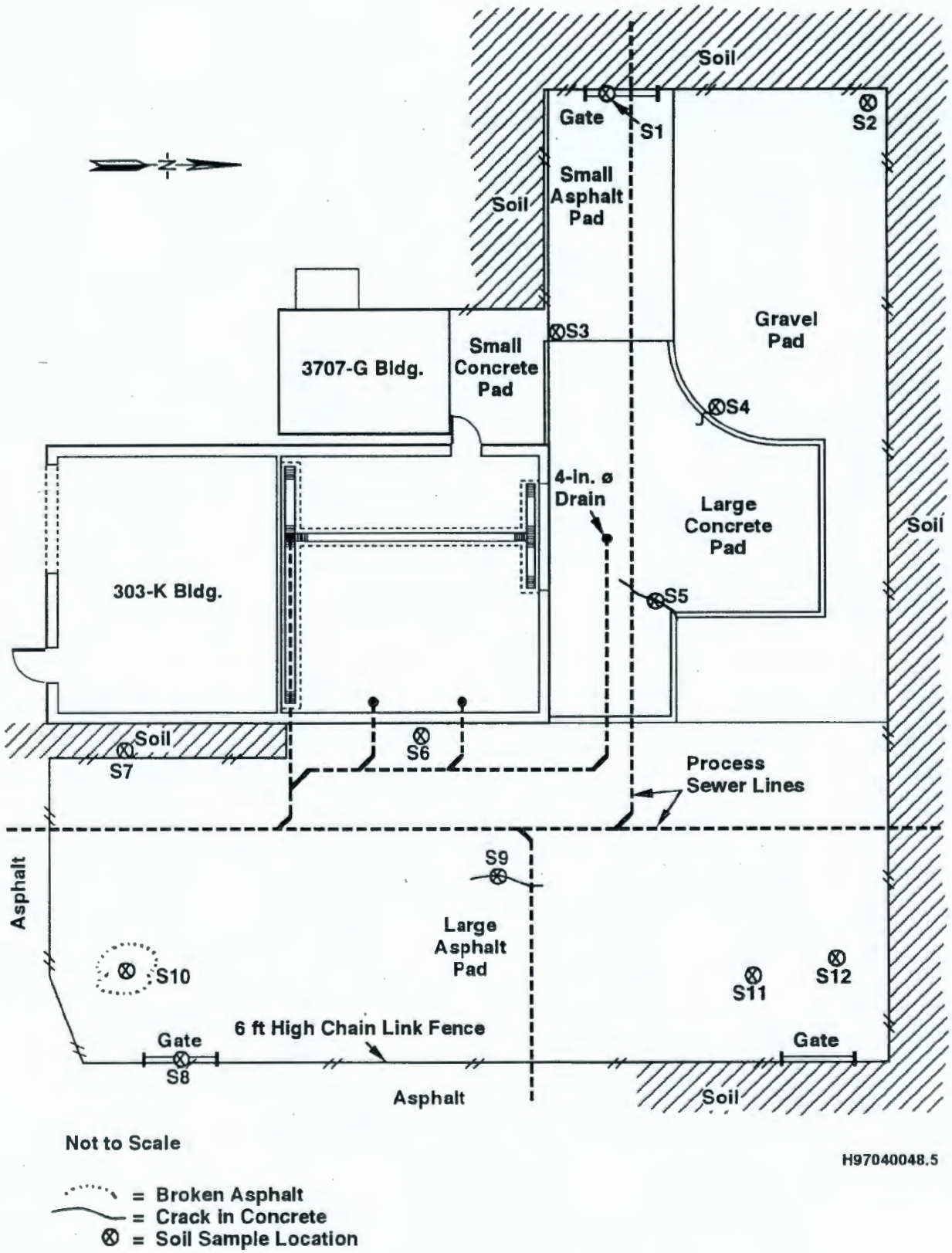

Figure 3-3. 303-K Storage Facility Soil Sample Locations.

Table 3-1. 303-K Storage Facility Sampling Locations.

Sample Types	Sample Location	Description of the Sample Location
CONCRETE SAMPLES	C1	South Trench Junction Near Drain
	C2	North Trench Junction
	C3	Ceiling Near Vent
SOIL SAMPLES	S1	Center of west gate at the end of the Small Asphalt Pad
	S2	North-west corner of the Gravel Pad, about 1 meter from each fence line
	S3	South-east corner of the Small Asphalt Pad, about 0.3 meter from each edge
	S4	On the Gravel Pad, adjacent to the large crack on the north-west curved berm of the Large Concrete Pad. This is the large crack furthest from the building.
	S5	On the crack in the Large Concrete pad, north-east of the drain
	S6	On the Large Asphalt Pad, adjacent to the 303-K Building and between the sink and wash-basin drains
	S7	In the soil between the south-west edge of the Large Asphalt Pad and the south-half of the 303-K Building, with the sample location adjacent to the Large concrete pad and about 2 meters north of the south-west corner of the Large Asphalt Pad.
	S8	On the edge of the Large Asphalt Pad and in the center of the south-east gate.
	S9	On the Large Asphalt Pad, on a crack in the approximate center of the pad
	S10	In the south-east quadrant of the Large Asphalt Pad and one the area of deteriorating asphalt
	S11	In the north east quadrant of the Large Asphalt Pad, about 3 meters in from the north fence and about 5 meters in from the east fence.
	S12	In the north east quadrant of the Large Asphalt Pad, about 1 meter in from the north fence and about 5 meters in from the east fence.

Table 3-2. 303-K Storage Facility: Sampling and Analysis Summary for Interior Samples.

Sample location	Matrix	Metals constituents of concerns		Anion constituent of concern	Semivolatile organic constituent of concern	
		SW-846 methods[a]	LKPA[b]	EPA Methods[c]	Field screening	SW-846 analysis[d]
C1	Concrete	Yes	Yes	Yes	No[e]	Yes
C2	Concrete	Yes	Yes	Yes	No	No
C2 (duplicate)	Concrete	Yes	Yes	Yes	No	No
C3	Concrete	Yes	Yes	Yes	No	No
Concrete sampling equipment blank[f]	Deionized water	Yes	No	Yes	No	No

[a] - SW-846 Methods: 6010, 7421, 7060, and 7471.
[b] - LKPA = Laser Kinetic Phosphorimetric Analysis.
[c] - Inorganic anions analysis includes U.S. Environmental Protection Method 300.0.
[d] - Semivolatile organic analysis (for pentachlorophenol) by SW-846 Method 4010.
[e] - Field screening not performed.
[f] - One equipment blank per day of concrete sampling.

Table 3-3. 303-K Storage Facility: Sampling and Analysis Summary for the Exterior Samples.

Sample Location	Matrix	Sample Interval	Metal Constituents of Concern		Semivolatile Organic Constituents of Concern	
			SW-846 Analysis[a]	LKPA[b]	Field Screening	SW-846 Analysis[c]
S1	Soil	Upper only	Yes	Yes	Yes	Yes
S2	Soil	Upper only	Yes	Yes	Yes	Yes
S3	Soil	Upper only	Yes	Yes	Yes	Yes
S4	Soil	Upper only	Yes	Yes	Yes	Yes
S5	Soil	Upper only	Yes	Yes	No[d]	Yes
S6	Soil	Upper only	Yes	Yes	Yes	Yes
S6 (duplicate)	Soil	Upper only	Yes	Yes	Yes	Yes
S7	Soil	Upper only	Yes	Yes	Yes	Yes
S8	Soil	Upper only	Yes	Yes	No[d]	Yes
S8 (duplicate)	Soil	Upper only	Yes	Yes	No[d]	Yes
S9	Soil	Upper only	Yes	Yes	Yes	Yes
S10	Soil	Upper only	Yes	Yes	No[d]	Yes
S10 (duplicate)	Soil	Upper only	Yes	Yes	No[d]	Yes
S11	Soil	Upper & Lower	Yes	Yes	No[d]	Yes
S11 (duplicate)	Soil	Lower only	Yes	Yes	No[d]	Yes
S12	Soil	Upper & lower	Yes	Yes	No[d]	Yes
Soil Sampling Equipment Blank[e]	Deionized Water	n/a	Yes	No	No	No

[a] - SW-846 Methods: 6010, 7421, 7060, and 7471.
[b] - LKPA = Laser Kinetic Phosphorimetric Analysis.
[c] – Semivolatile organic analysis (for pentachlorophenol) by SW-846 Method 4010.
[d] - Field screening not performed as planned.
[e] - One equipment blank per day of soil sampling. Soil sampling occurred over 2 days; therefore, two samples were collected.

Table 3-4. Summary and Cross-Reference of Sample Numbers to Sample Information.

Sample Number	Date and Time	Sample Type or Location	Sample Media
BOMB44	10/30/97; 1450	C1	Concrete
BOMB45	10/30/97; 1450	C3	"
BOMB46	10/30/97; 1440	C2	"
BOMB47	10/30/97; 1440	C2 Duplicate	"
BOMB48	10/30/97; 1305	Concrete Equipment Blank	Deionized Water
BOMB49	10/30/97; 1120	Soil Equipment Blank	"
BOM8Y6	10/29/97; 1025	Soil Equipment Blank	"
BOM8Y7	10/29/97; 1210	S9	Soil
BOM8Y8	10/29/97; 1125	S6	"
BOM8Y9	10/29/97; 1125	S6 Duplicate	"
BOM900	10/29/97; 1155	S7	"
BOM901	10/29/97; 1216	S3	"
BOM902	10/29/97; 1236	S4	"
BOM903	10/29/97; 1305	S1	"
BOM904	10/29/97; 1234	S10	"
BOM905	10/30/97; 1320	S12 Lower	"
BOM906	10/29/97; 1140	S2	"
BOM907	10/30/97; 1107	S8	"
BOM908	10/30/97; 1022	S10 Duplicate	"
BOM909	10/30/97; 1310	S11 Lower	"
BOM910	10/30/97; 1310	S12 Upper	"
B0M911	10/30/97; 1025	S5	"
BOM912	10/30/97; 1107	S8 Duplicate	"
BOM913	10/30/97; 1340	S11 Lower Duplicate	"
BOM914	10/30/97; 1120	S11 Upper	"

Table 3-5. Summary and Cross-reference of Sample Locations to Sample Numbers.

Sample Type or Location	Date and Time	Sample Number	Sample Media
C1	10/30/97; 1450	BOMB44	Concrete
C2	10/30/97; 1440	BOMB46	"
C2 Duplicate	10/30/97; 1440	BOMB47	"
C3	10/30/97; 1450	BOMB45	"
Concrete Equipment Blank	10/30/97; 1305	BOMB48	Deionized Water
S1	10/29/97; 1305	BOM903	Soil
S2	10/29/97; 1140	BOM906	"
S3	10/29/97; 1216	BOM901	"
S4	10/29/97; 1236	BOM904	"
S5	10/30/97; 1025	BOM911	"
S6	10/29/97; 1125	BOM8Y8	"
S6 Duplicate	10/29/97; 1125	BOM8Y9	"
S7	10/29/97; 1155	BOM900	"
S8	10/30/97; 1107	BOM907	"
S8 Duplicate	10/30/97; 1107	BOM12	"
S9	10/29/97; 1210	BOM8Y7	"
S10	10/29/97; 1324	BOM904	"
S10 Duplicate	10/30/97; 1022	BOM908	"
S11 Upper	10/30/97; 1120	BOM914	"
S11 Lower	10/30/97; 1310	BOM909	"
S11 Lower Duplicate	10/30/97; 1340	BOM913	"
S12 Upper	10/30/97; 1310	BOM910	"
S12 Lower	10/30/97; 1320	BOM905	"
Soil Equipment Blank	10/29/97; 1025	BOM8Y6	Deionized water
Soil Equipment Blank	10/30/97; 1120	BOMB49	"

Table 3-6. Sampling Container Information.

Sample Media	Container Size	Container Type	Lot Number	Analysis
Concrete & Soil	125 ml	Poly wide-mouth	L41230040	Anions
Concrete & Soil	125 ml	Amber glass wide-mouth	65096030	Semivolatile organics
Concrete & Soil	125 ml	Poly wide-mouth	L7009020	Metals
Equipment Blanks (Water)	500 ml	Poly wide-mouth	L7119020	Metals

ml = milliliters.

4.0 FIELD SCREENING FOR PENTACHLOROPHENOL

As allowed in the modified SAP, immunoassay field screening for pentachlorophenol was used during the sampling. Field screening was conducted on October 29 and 30, 1997. The sampler's log book entries (Appendix A) include the field screening activities. The field screening test results are summarized on Table 4-1. Because of inconsistent results, field screening was not used to establish the presence or absence of pentachlorophenol.

4.1 FIELD SCREENING KIT METHODOLOGY

Field screening was done using two Penta Risc® Soil Test System kits, manufactured by Ensys Inc. The kits were purchased from Strategic Diagnostics, Inc. Both Penta Risc® kits were part of Lot Number 7H2227 and both had an expiration date of February 1998. A copy of the kit instructions are provided in Appendix D. As used, the test kit had minimum detection limits of 1 part per million, 10 parts per million, and 100 parts per million.

The modified SAP had the following requirements for field screening.

- One concrete sample (at location C1) would be field screened.
- All soil samples would be field screened.
- If field screening gave a positive response, a sample would be collected for laboratory analysis.

4.2 FIELD SCREENING RESULTS

The field screening results are presented in Table 4-1. The field screening by immunoassay was halted after eight samples as results provided inconsistent data. Test results were inconsistent for single samples and for one sample and its duplicate sample. Examples of the inconsistent results included the following:

- At sample location S3: Negative results at 1 or 100 parts per million, but a positive result at 10 parts per million

- At sample location S7: Negative results at 1 or 10 parts per million, but positive results at 100 parts per million

- At sample location S6 duplicate: Positive results at 1 and 100 parts per million but negative results at 10 parts per million

- Results between S6 and S6 duplicate were not consistent: S6 had a positive result at 1 part per million and negative results at 10 or 100 parts per million while S6 duplicate had positive results at 1 and 100 parts per million but negative results at 10 parts per million.

As a result of the inconsistencies, it was determined that the test was not providing useful information and that the samples for semivolatile organic analysis would have to be sent to an offsite laboratory. With inconsistent field screening results, a field change (Appendix C) was implemented to discontinued field screening and collect samples for laboratory analysis.

The results of the laboratory analysis are discussed in Sections 5.0, 6.0, 7.0, and 8.0. The laboratory analysis of the samples for pentachlorophenol confirmed that the field screening results were giving false positive readings.

4.3 DEVIATIONS DURING FIELD SCREENING

With the field screening being discontinued per the field change, several additional requirements of the modified SAP were not met. Not meeting these requirements does not affect the conclusions of this report as more rigorous and accurate laboratory analysis for pentachlorophenol are being used. Requirements not met as the result of discontinuing the field screening included the following:

- Not conducting field screening on concrete from sample location C1
- Not conducting field screening on soil from sample locations S5, S8, S10, S10 duplicate, S11 Upper, S11 Lower, S12 Upper, and S12 Lower
- Not verifying the method detection limit for the field screening kit.

Table 4-1. Results from the Field Screening for Pentachlorophenol.

Sample Location	Date	Results of field screening at each minimum detection level		
		1 ppm	10 ppm	100 ppm
S1	10/30/97	POSITIVE	POSITIVE	Negative
S2	10/29/97	POSITIVE	POSITIVE	Negative
S3	10/30/97	Negative	POSITIVE	Negative
S4	10/30/97	POSITIVE	Negative	Negative
S6	10/29/97	POSITIVE	Negative	Negative
S6 Duplicate	10/29/97	POSITIVE	Negative	POSITIVE
S7	10/29/97	Negative	Negative	POSITIVE
S9	10/29/97	Negative	Negative	Negative

ppm = parts per million.

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5.0 ANALYSES

Samples were analyzed for metals, inorganic anions, and semivolatile organic constituents. The analytical methods are summarized on Table 5-1. The analysis of all samples occurred at LAS, Inc. in Las Vegas, Nevada. Both the raw and validated data packages were transmitted to Ecology separately (98-EAP-145 and 98-EAP-346).

Both soil and concrete samples included the analysis for metal constituents of concern. The concrete samples also were analyzed for the inorganic anion constituents of concern. The soil samples included the analysis for the semivolatile organic constituents of concern. Only one of the concrete samples (from sample location C1) included the analysis for the semivolatile organic constituents of concern. Although the various analytical methods identified additional constituents, these are not presented or discussed as these are not identified as constituents of concern in the closure plan and in the modified SAP.

5.1 METAL ANALYSIS

The analytical methods required by the modified SAP for the metals analysis are identified on Table 5-1. The data from the sample analysis for the metals constituents of concern is summarized on Tables 5-2 and Table 5-3. The data validation is discussed in Section 6.0 and the data are evaluated in Section 8.0.

The modified SAP required the use of SW-846 Method 7741 "Silver (Atomic Absorption, Furnace Technique)" to determine the concentrations of silver. The two offsite laboratories currently under contract have both discontinued use of Method 7741 because the method had poor results. SW-846, Method 6010A "Inductively Coupled Plasma-Atomic Emission Spectroscopy" was used in its place as this method meets the quality control limits required by the modified SAP. This change had been documented in the 303-K Storage Facility Project Manager Meeting of November 6, 1997 (DOE-RL and Ecology, 1997).

5.2 ANION ANALYSES

The analytical method used for the anion analysis is identified on Table 5-1. The data from the sample analysis for the inorganic anion constituents of concern is summarized on Tables 5-2 and Table 5-3. The data validation is discussed in Section 6.0 and the data are evaluated in Section 8.0.

5.3 SEMIVOLATILE ORGANIC ANALYSES

The analytical method used for the semivolatile organic analysis is identified on Table 5-1. The data from the sample analysis for the semivolatile organic constituent of concern are summarized on Tables 5-2 and Table 5-3. The data validation is discussed in Section 6.0 and the data are evaluated in Section 8.0.

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Table 5-1. Constituents of Concern, Sample Media, and Analytical Methods.

Constituent of Concern	Sample Media	Analytical Method
Arsenic	Soil and Concrete	SW-846 Method 7060
Barium	Soil and Concrete	SW-846 Method 6010A
Beryllium	Soil and Concrete	SW-846 Method 6010A
Cadmium	Soil and Concrete	SW-846 Method 6010A
Chromium	Soil and Concrete	SW-846 Method 6010A
Lead	Soil and Concrete	SW-846 Method 7421
Mercury	Soil and Concrete	SW-846 Method 7421
Nickel	Soil and Concrete	SW-846 Method 6010A
Silver	Soil and Concrete	SW-846 Method 6010A
Uranium	Soil and Concrete	Laser Kinetic Phosphorescence Analysis
Chloride ion	Concrete	EPA Method 300.0
Nitrate ion	Concrete	EPA Method 300.0
Nitrite ion	Concrete	EPA Method 300.0
Pentachlorophenol	Soil and Concrete*	SW-846 Method 8270

* - Per the modified SAP, only one concrete sample (at sample location C1) was analyzed for pentachlorophenol.

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Table 5-2. Interior Sampling Data Summary.

(sheet 1 of 2)

SAMPLE LOCATION	Clean-up Levels	C1	C2	C2 Duplicate	C3	Equipment Blank
SAMPLE NUMBER	n/a	BOMB44	BOMB46	BOMB47	BOMB45	BOMB48
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L
Arsenic	9.18	2.85	2.88	2.98	6.57	< 0.003 U
Barium	5600	252	245	275	97.40	0.0025 B
Beryllium	1.81	0.33 B	0.24 B	0.27 B	0.24 B	< 0.001 U
Cadmium	80	1.94	1.90	3.51	0.31 B	< 0.002 U
Chromium	400	22.1	23.10	28.90	16.20	< 0.003 U
Lead	250	311 J	157 J	289 J	4.91 J	0.0022 U
Mercury	24	0.49 J	< 0.09 UR	< 0.09 UR	< 0.10 UR	< 0.00020 UJ
Nickel	1600	16.00	20.20	26.50	8.12	< 0.009 U
Silver	400	2.99	0.61 B	1.05	< 0.38 U	< 0.004 U
Uranium	n/a	4133±327	567±34	1317±86	5.40±0.68	NR
Chloride ion	541.2	114.	132	116	36	NR
Nitrate ion	128000	2.08	6.11	5.72	4.56	NR
Nitrite ion	8000	10.30	1.20	1.05	0.40	NR
Pentachlorophenol	8.33	3.3 U	NR	NR	NR	NR
UNITS	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm
Uranium-234	n/a	1960±140	232±12	570±35	2.11±.24	NR
Uranium-235	n/a	33±31	3.4±2.1	4.0±6.9	0.161±0.063 J	NR
Uranium-238	n/a	1390±110	190±11	442±28	1.79±0.22	NR

Table 5-2. Interior Sampling Data Summary
(sheet 2 of 2)

n/a = not applicable
mg/kg = milligrams per kilogram (equivalent to parts per million [ppm])
mg/L = milligrams per liter (equivalent to ppm)
pCi/gm = picocuries per gram
NR = Not required by the modified sampling and analysis plan.

Total uranium concentrations were calculated from the isotope concentrations using the following conversion factors:

1.6038 E-4 gram U-234 per pCi U-234
6.62697 E-1 gram U-235 per pCi U-235
2.97493 gram, U-238 per pCi U-238

Data Qualifiers:

U Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ Indicates that the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

UR Indicates that the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency. Ecology is allowing these data to be used (Section 6.3).

J Indicates that the compound or analyte was analyzed for and detected. Because of a quality control deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

B For inorganic data, indicates that the analyte concentration is less than the contract required detection limit, but greater than the instrument detection limits.

Table 5-3. Exterior Sampling Data Summary
(sheet 1 of 4)

SAMPLE LOCATION	CLEAN-UP LEVELS	S1	S2	S3	S4	S5	S6	S6 Duplicate
SAMPLE NUMBER	n/a	BOM903	BOM906	BOM901	BOM902	BOM911	BOM8Y8	BOM8Y9
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	9.18	3.02	2.64	1.87	3.41	2.90	1.94	2.16
Barium	5600	74.40	115.00	84.40	122.00	120.00	63.40	58.40
Beryllium	1.81	0.22 B	0.24 B	0.26 B	0.25 B	0.28 B	0.14 B	0.15 B
Cadmium	80	< 0.21 U	0.24 B	0.35 B	0.44 B	0.68	0.36 B	0.3 B
Chromium	400	10.20	12.40	9.37	42.10	15.90	25.20	25.6
Lead	250	5.06	13.80	13.40	20.10	17.10	7.70	10.60
Mercury	24	< 0.09 UJ	< 0.10 UJ	< 0.11 UJ	< 0.10 UJ	< 0.11 UJ	< 0.11 UJ	< 0.10 UJ
Nickel	1600	11.70	16.00	23.50	30.00	150.00	25.60	50.6
Silver	400	0.43 B	< 0.41 U	< 0.45 U	2.05	0.88 B	0.43 B	1.28
Uranium	n/a	2.30±0.17	22.6±1.8	19.4±1.6	741±50	105±2	71.1±4.7	74.6±5.0
Pentachlorophenol	8.33	< 3.5 U	< 3.4 U	< 3.8 U	< 3.4 UJ	< 3.6 U	< 3.5 U	< 3.5 U
UNITS	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm
Uranium-234	n/a	0.88±0.16 J	7.57±0.59	8.84±0.66	257±17	41.1±2.5	24.6±1.6	24.5±1.6
Uranium-235	n/a	0.096±0.056 J	0.59±0.13	0.69±0.14	13.6±2.7	3.14±0.41	1.71±0.28	2.17±0.3
Uranium-238	n/a	0.75±0.15	7.47±0.59	6.37±0.52	246±16	34.7±0.61	23.4±1.5	24.6±1.6

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Table 5-3: Exterior Sampling Data Summary
(sheet 2 of 4)

SAMPLE LOCATION	CLEAN-UP LEVELS	S7	S8	S8 Duplicate	S9	S10	S10 Duplicate
SAMPLE NUMBER	n/a	BOM900	BOM907	BOM912	BOM8Y7	BOM904	BOM908
UNITS	mg/kg	Mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	9.18	2.63	2.36	2.03	1.92	1.99	2.83
Barium	5600	133.00	65.40	68.8	65.50	67.30	84.60
Beryllium	1.81	0.24 B	0.18 B	0.18 B	0.18 B	0.18 B	0.24 B
Cadmium	80	0.44 B	< 0.21 U	0.28 B	< 0.21 U	< 0.21 U	< 0.22 U
Chromium	400	14.70	9.74	9.35	10.40	10.10	11.00
Lead	250	22.50	5.58	5.84	6.88	7.94	4.81
Mercury	24	< 0.096 UJ	< 0.11 UJ	< 0.10 UJ	< 0.11 UJ	< 0.09 UJ	< 0.11 UJ
Nickel	1600	13.40	9.02	9.91	10.10	10.20	11.5
Silver	400	0.86 B	0.58 B	0.48 B	0.47 B	0.53 B	< 0.43 U
Uranium	n/a	552±38	14.2±1.5	23.3±1.9	69.8±5.3	25.2±2.0	17.4±1.7
Pentachlorophenol	8.3	< 3.50 U	< 3.5 U	< 3.5 U	< 3.5 U	< 3.5 U	< 3.5 U
UNITS	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm
Uranium-234	n/a	181±12	4.84±0.48	8.33±0.64	24.3±1.8	8.21±0.65	6.14±0.56
Uranium-235	n/a	11.4±2.1	0.47±0.13	0.336±0.10 J	1.23±0.3	0.63±0.14	0.38±0.12
Uranium-238	n/a	183±12	4.66±0.47	7.78±0.61	23.2±1.7	8.35±0.65	5.75±0.54

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Table 5-3: Exterior Sampling Data Summary
(sheet 3 of 4)

SAMPLE LOCATION	CLEAN-UP LEVEL	S11 Upper	S11 Lower	S11 Lower Duplicate	S12 Upper	S12 Lower	Equipment Blank	Equipment Blank
SAMPLE NUMBER	n/a	BOM914	BOM909	BOM913	BOM910	BOM905	B0M8Y6	BOM49
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/L
Arsenic	9.18	2.39	2.61	2.29	1.99	2.43	< 0.003 U	< 0.003 U
Barium	5600	93.90	88.40	83.20	266.00	111.00	< 0.001 U	< 0.001 U
Beryllium	1.81	0.23 B	0.24 B	0.22 B	0.23 B	0.21 B	< 0.001 U	< 0.001 U
Cadmium	80	< 0.21 U	< 0.21 U	< 0.21 U	< 0.21 U	< 0.20 U	< 0.002 U	< 0.002 U
Chromium	400	9.37	11.30	8.18	9.45	9.14	< 0.003 U	< 0.003 U
Lead	250	13.70	5.01	5.23	12.30	6.70	< 0.0022 U	< 0.0023 U
Mercury	24	< 0.11 UJ	< 0.11 UJ	< 0.11 UJ	< 0.10 UJ	< 0.11 UJ	< 0.0002 UJ	< 0.0002 UJ
Nickel	1600	10.30	12.30	10.30	9.89	9.88	< 0.009 U	< 0.009 U
Silver	400	0.66 B	0.63	0.58 B	0.48 B	0.63 B	< 0.004 U	< 0.004 U
Uranium	n/a	105.8±6.4	46.7±3.4	44.2±3.1	41.6±2.9	26.0±2.1	NR	NR
Pentachlorophenol	8.33	< 3.50 U	< 3.60 U	< 3.70 U	< 3.50 U	< 3.50 U	NR	NR
Units	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm	pCi/gm
Uranium-234	n/a	34.6±2.1	15.1±1	14.7±1	13.55±0.96	9±0.7	NR	NR
Uranium-235	n/a	2.05±0.32	0.89±0.18	0.80±0.16	0.83±0.17	0.46±0.12	NR	NR
Uranium-238	n/a	35.1±2.1	15.5±1.1	14.7±1	13.38±0.95	8.64±0.68	NR	NR

Table 5-3: Exterior Sampling Data Summary
(sheet 4 of 4)

n/a = not applicable
mg/Kg = milligrams per kilogram (equivalent to parts per million [ppm])
mg/L = milligrams per liter (equivalent to ppm)
pCi/gm = picocuries per gram
NR = Not required by the modified sampling and analysis plan.

Total uranium concentrations were calculated from the isotope concentrations using the following conversion factors:

1.6038 E-4 gram U-234 per pCi U-234
6.62697 E-1 gram U-235 per pCi U-235
2.97493 gram U-238 per pCi U-238

Data Qualifiers:

U Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ Indicates that the compound or analyte was analyzed for and not detected in the sample. Because of a quality control deficiency identified during the data validation, the associated quantitation limit is an estimate.

UR Indicates that the compound or analyte was analyzed for and not detected in the sample. Additionally, the data are unusable due to an identified QC deficiency. Ecology is allowing these data to be used (Section 6.3).

J Indicates that the compound or analyte was analyzed for and detected. Because of a quality control deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

B For inorganic data, indicates that the analyte concentration is less than the contract required detection limit, but greater than the instrument detection limits.

6.0 DATA VALIDATION

The data from sampling and analysis were validated by Tech Law, Inc. Validation was performed in accordance with Level D as defined in *Data Validation Procedures for Chemical Analysis* (WHC-SD-EN-SPP-002) and *Data Validation Procedures for Radiochemical Analysis* (WHC-SD-EN-SPP-001). Level D validation includes evaluation and qualification of results based on analytical holding times, method blank results, matrix spikes and duplicates, surrogate recoveries, and analytical method blanks. The results of the data validation are part of the data validation package (98-EAP-346).

6.1 DATA QUALIFIERS

The data validation procedure and the laboratory established the following qualifiers and definitions to describe the data associated with the constituents of concern.

U indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content.

UJ indicates that the compound or analyte was analyzed for and not detected in the sample. Because of a quality control deficiency identified during the data validation, the associated quantitation limit is an estimate.

UR indicates that the compound or analyte was analyzed for and not detected in the sample. Additionally, the data are unusable because of an identified quality control deficiency.

J indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decisionmaking.

B for inorganic data, indicates that the analyte concentration is less than the contract required detection limit, but greater than the instrument detection limits.

6.2 EXPLANATION OF QUALIFIED DATA

Table 6-1 identifies all analytical results qualified by the data validation process. Table 6-1 is limited to the data qualifications for the constituents of concern and the analysis specified in Section 5.0. The significance of the data qualifiers are discussed in Section 6.3. The qualifiers on Table 6-1 are included with the analytical data on Tables 5-2 and 5-3. Additional information is available in the data validation package (98-EAP-346). Any data qualifiers not listed on Table 6-1 were assigned by the laboratory doing the analysis.

6.3 ASSESSMENT OF DATA VALIDATION

The data validation process identified one major deficiency for three interior (concrete) samples. Specifically, the mercury data for BOMB45 from sample location C3, BOMB46 from sample location C2, and BOMB47 from sample location C2 duplicate were rejected for zero percent recovery for mercury in the

matrix spike analysis. The data from these three samples are unusable for determining if the interior of the 303-K Building meets the mercury cleanup performance standard. Note that the mercury data for sample BOMB44 at sample location C1 are still usable. However, Ecology stated that this is not a critical problem and that the otherwise rejected data can be used to support the clean closure of the interior (DOE-RL and Ecology-1998).

The remainder of the interior samples only had minor deficiencies. The qualifier J was applied to lead in four samples, uranium-235 in one sample, and mercury in one sample. The qualifier UJ was applied to mercury in one sample. The qualifier U was applied to lead in one sample.

For the exterior (soil) sample data, no major deficiencies were identified during the data validation process that would have qualified the data as unusable. Minor deficiencies were identified in the validation process. The qualified UJ was applied to mercury in all the exterior samples and to pentachlorophenol in one sample. The qualifier U was applied to lead in two samples. The qualifier J was applied to uranium-235 in one sample and to uranium-234 in two samples.

The data qualifiers are included in Tables 5-2 and 5-3. Information on data validation is provided in more detail in the data validation package (98-EAP-346).

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Table 6-1. Data Qualifications Summary Table.
(sheet 1 of 2)

Constituent of Concern	Type	Qualifier Added to Data	Samples Affected	Data Quality Objective	Reason
Mercury	Major	UR	BOMB45, BOMB46, BOMB47	Accuracy	The recovery for mercury in the matrix spike analysis was 0% for BOMB44, therefore the associated non-detected results were rejected..
Uranium-235	Minor	J	BOMB45, BOM912, BOM903	Laboratory Blanks	Method blank contamination.
Uranium-234	Minor	J	BOM903	Laboratory Blanks	Method blank contamination.
Pentachlorophenol	Minor	UJ	BOM902	Holding Time	Sample was analyzed 21 days beyond the 40 day holding time.
Lead	Minor	J	BOMB44, BOMB45, BOMB46, BOMB47	Precision	The duplicate relative percent difference and serial dilution percent difference for lead in BOMB44 was qualified as an estimate. The associated samples were also qualified as estimates.
Lead	Minor	U	BOMB48, BOMB49, BOM8Y6	Laboratory Blanks	Preparation blank associated with the water matrix samples was contaminated by lead.
Mercury	Minor	J	BOMB44	Accuracy	The recovery for mercury in the matrix spike analysis was 0%.
Mercury	Minor	UJ	BOMB48, BOMB49, BOM8Y6, BOM8Y7, BOM8Y9, BOM900, BOM901, BOM902, BOM903, BOM904, BOM905 BOM906, BOM907, BOM908, BOM909, BOM910, BOM911, BOM912, BOM913, BOM914	Holding Time	All analysis occurred beyond the 28-day holding time.

Table 6-1. Data Qualifications Summary Table
(sheet 2 of 2)

U	Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content.
UJ	Indicates that the compound or analyte was analyzed for and not detected in the sample. Because of a quality control deficiency identified during the data validation, the associated quantitation limit is an estimate.
UR	Indicates that the compound or analyte was analyzed for and not detected in the sample. Additionally, the data are unusable because of an identified quality control deficiency.
J	Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

7.0 STATISTICAL ANALYSIS

All data collected are analyzed and tabulated for evaluation using the methods described in SW-846 and in Appendix F of the closure plan (DOE/RL-90-04).

- Method accuracy
- Method detection limit
- Limit of quantitation
- Total number of samples
- Number of less-than-detection-limit samples
- Mean
- Standard deviation
- Coefficient of variation
- Method precision
- Minimum value
- Maximum value
- Median value.

7.1 DATA SETS FOR STATISTICAL ANALYSIS

To perform a useful statistical analysis, there must be a sufficient number of data points available above the detection limits or the analysis is skewed downward. For this reason, full statistical analysis was not completed on the soil mercury data and soil pentachlorophenol data because all of the values were at the detection limit. The full statistical analysis was not done on the concrete pentachlorophenol data because of only one data point. The detection limit values were used to provide an upper limit to the statistical analysis. The statistical analysis for the soil cadmium data also might be skewed as 10 of the 18 data points were detection limit values. The mathematical equations used in the statistical analysis are included in Appendix E. The statistical analysis for the exterior (soil) data is presented on Table 7-1 and the interior (concrete) data are presented on Table 7-2.

7.2 METHOD ACCURACY

Method accuracy for the data is based on the data analysis of matrix spikes and matrix spike duplicates. The method accuracy calculations are done as part of the data validation package (98-EAP-346) and involve constituents that are not included in the constituents of concern. For this reason, the calculations are not being reported as part of the statistical analysis.

The data validation package reported that the goals for method accuracy on the constituents of concern were met except for mercury in the following interior samples: BOMB44, BOMB45, BOMB46, and BOMB47. On these samples, the matrix spike recovery was outside the acceptance criteria. For three of these four samples, this was identified as a major deficiency by the data validation package. Because only one sample produced useable data, the statistical analysis will exclude the interior mercury data. Refer to Table 6-1 and the data validation package for additional information.

Table 7-1. Exterior (Soil) Data Statistical Analysis.

		Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver	Pentachlorophenol
Method Detection Limit[1] mg/kg		0.33	0.11	0.11	0.22	0.34	0.22	0.11	1.00	0.45	NA
Limit of Quantitation[2] mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	3.7
Total Number of Samples		18	18	18	18	18	18	18	18	18	18
Number of less than detection limit samples		0	0	0	10	0	0	18	0	3	18
Sufficient number of samples for a statistical analysis?		Y	Y	Y	Y	Y	Y	N	Y	Y	N
Mean mg/kg		2.41	98.04	0.22	0.29	14.08	10.24	NA	22.07	0.68	NA
Standard Deviation mg/kg		0.44	47.83	0.04	0.13	8.66	5.53	NA	33.57	0.41	NA
Coefficient of Variation		0.18	0.49	0.18	0.45	0.62	0.54	NA	1.52	0.60	NA
Method Precision as RPD	S6 & S6 Duplicate	10.73	14.55	6.9	18.18	1.57	31.69	9.52	65.62	99.42	0.00
	S10 & S10 Duplicate	34.85	22.78	28.57	4.65	8.53	49.10	20.00	11.98	20.83	0.00
	S11 Lower & S11 Lower Duplicate	13.06	6.06	8.70	0.00	32.03	4.3	0.00	17.70	8.26	2.74
Minimum Value mg/kg		1.87	58.4	0.14	0.20	8.18	4.81	NA	9.02	0.41	NA
Maximum Value mg/kg		3.41	266	0.28	0.68	22.5	22.5	NA	150	2.05	NA
Median mg/kg		2.38	84.5	0.23	0.22	3.97	7.82	NA	11.6	0.56	NA
CLEANUP PERFORMANCE STANDARD mg/kg		9.18	5600	1.81	80	400	250	24	1600	400	8.33

[1] The method detection limit is sample specific. For the analysis indicated, the highest method detection limits are presented.
[2] The limit of quantitation is sample specific. For the analysis indicated, the limit of quantitation is presented.

mg/kg = milligrams per kilogram
NA = not applicable
RPD = relative percent difference
Y = yes
N = no

Table 7-2. Interior (Concrete) Data Statistical Analysis.

	Ar	Ba	Be	Cd	Cr	Pb	Hg	Ni	Ag	Cl	NO3	NO2	PCP
Method Detection Limit[1] mg/kg	0.30	0.10	0.10	0.20	0.30	0.20	0.095	0.90	0.40	0.11	0.034	0.034	NA
Limit of Quantitation[2] mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.3
Total Number of Samples	4	4	4	4	4	4	4	4	4	4	4	4	1
Number of less than detection limit samples	0	0	0	0	0	0	3	0	1	0	0	0	1
Sufficient number of samples for a statistical analysis?	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Mean mg/kg	3.82	217.4	0.27	1.92	22.58	190.5	0.25	17.71	1.27	99.5	4.62	3.24	NA
Standard Deviation mg/kg	1.83	80.99	0.04	1.31	4.82	141.2	NA	7.71	1.18	43.1	1.82	4.72	NA
Coefficient of Variation	0.48	0.37	0.16	0.68	0.21	0.74	NA	0.44	0.93	0.43	0.39	1.46	NA
Method Precision As RPD (C2 & C2 Duplicate)	3.41	11.54	11.76	59.52	22.31	59.19	0.0	26.98	53.01	12.90	6.59	13.33	NA
Minimum Value mg/kg	2.85	97.4	0.24	0.31	16.20	4.91	0.09	8.12	0.38	36	2.08	0.40	NA
Maximum Value mg/kg	6.57	275	0.33	3.51	28.90	311	0.49	23.35	2.99	132	6.11	10.3	NA
Median mg/kg	2.93	263.5	0.24	1.92	22.6	233	0.10	18.10	1.66	36	5.14	1.13	NA
CLEANUP PERFORMANCE STANDARD mg/kg	9.18	5600	1.81	80	400	250	24	1600	400	8000	541.2	128000	8.33

[1] The method detection limit is sample specific. For the analysis indicated, the highest method detection limits are presented.
[2] The limit of quantitation is sample specific. For the analysis indicated, the limit of quantitation is presented.

Ar = arsenic; Ba = barium; Be = beryllium; Cd = cadmium; Cr = chromium; Pb = lead; Hg = mercury; Ni = nickel; Ag = silver
PCP = pentachlorophenol

mg/kg = milligrams per kilogram
NA = not applicable
RPD = relative percent difference
Y = yes
N = no

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8.0 DATA EVALUATION

The closure plan (DOE/RL-90-04) requires an evaluation of the analytical data to determine if the constituents of concern are above the cleanup performance standards. The 303-K Storage Facility is divided into the following two components for the data evaluation:

- The interior consisting of the concrete floor and ceiling
- The exterior consisting of the soil.

These two components are evaluated separately against the requirements for closure.

8.1 EVALUATION OF THE INTERIOR CONCRETE SAMPLE DATA

The analytical data for the interior concrete sampling are presented on Table 5-2. The statistical analysis of the analytical data is presented on Table 7-2.

8.1.1 Metals Analysis and Data

Table 8-1 compares the method detection limits for the metals in the concrete to the permit requirements. All of the metals analysis method detection limits met the requirement to be equal to or less than 1/10 of the value for the cleanup performance standard. Except for the C2, C2 duplicate, and C3 mercury data, all other metals data met the data validation requirements for acceptability. Ecology has determined that the mercury data from locations C2, C2 duplicate, and C3 can be used in the data evaluation (98-EAP-346). Therefore, all of the metals data are useable for the evaluation.

For the concrete, the data in Table 5-2 show that one metal constituent of concern (lead) has values above the cleanup performance standard and all other metals constituents of concern are below the cleanup performance standard. The lead values for locations C1 and C2 duplicate are 311 milligrams per kilogram and 289 milligrams per kilogram. The cleanup performance standard is 250 milligrams per kilogram. Both these locations are from the interior trench. The lead value at sample location C2 is 157 milligrams per kilogram. In contrast, the single sample location from the ceiling, C3, is only 4.91 milligrams per kilogram.

For arsenic, the highest value is less than cleanup performance standard. All arsenic values are the same order of magnitude as the cleanup performance standard. For barium, beryllium, cadmium, and chromium, the maximum concentrations are 1 order of magnitude less than the cleanup performance standard. For mercury, nickel, and silver, the maximum concentrations are 2 orders of magnitude less than the cleanup performance standard. These differences are sufficiently great that there are no statistical concerns related to the data. The uranium data on Table 5-2 are provided for information purposes only.

8.1.2 Inorganic Anion Analysis and Data

Table 8-1 compares the method detection limits for the anions in the concrete to the permit requirements. All method detection limits met the requirement to be equal to or less than 1/10 of the value for the cleanup

performance standard. All anion data met the data validation requirements for acceptability. The data are useable for the evaluation.

For the concrete, the data on Table 5-2 show that all of the anion constituent of concern are below the cleanup performance standards. For the chloride ion, the maximum concentration is 3 orders of magnitude less than the cleanup performance standard. For the nitrate ion, the maximum concentration is 2 orders of magnitude less than the cleanup performance standard. For the nitrite ion, the maximum concentration is 6 orders of magnitude less than the cleanup performance standard. These differences are sufficiently great that there are no statistical concerns related to the data.

8.1.3 Semivolatile Organic Analysis and Data

Table 8-1 compares the method quantitation limit for the semivolatile organic in the concrete to the permit requirement. The method quantitation limit met the requirement to be equal to or less than the value for the cleanup performance standard. All semivolatile organic data met the data validation requirements for acceptability. The data are useable for the evaluation.

For concrete, the data on Table 5-2 show that the concentration of pentachlorophenol is below the cleanup performance standard. The value for pentachlorophenol is of the same magnitude as the cleanup performance standard. This is not a concern because the pentachlorophenol value is also below the method detection limit.

8.1.4 Conclusion: Concrete

Based on the information presented, there is lead contamination above the cleanup performance standard in the interior trench. There is no lead contamination on the interior ceiling. All other interior metals constituents of concern are below the cleanup performance standard. All anion constituents of concern are below the cleanup performance standard. The semivolatile organic constituent of concern is not present in the building interior.

8.2 EVALUATION OF THE SOIL

The inorganic analytical data for the soil are presented on Table 5-3. The statistical analysis of the analytical data is presented on Table 7-1.

8.2.1 Metals Analysis and Data

Table 8-1 compares the method detection limits for the metals in the soil to the permit requirements. All method detection limits met the requirement to be equal to or less than 1/10 of the value for the cleanup performance standard. All soil metals data met the data validation requirements for acceptability. All of the metals data are useable for the evaluation.

For the soil, the data in Table 5-3 show that all metals constituents of concern are below the cleanup performance standard. For beryllium, the maximum concentration is 1 order of magnitude less than the cleanup performance standard. For barium, cadmium, chromium mercury, and nickel, the maximum

concentrations are 2 orders of magnitude less than the cleanup performance standard. For silver, the maximum concentration is 4 orders of magnitude less than the cleanup performance standard. These differences are sufficiently great that there are no statistical concerns related to the data. The uranium data on Table 5-3 are provided for information purposes only.

8.2.2 Semivolatile Organic Analysis and Data

Table 8-1 compares the highest method quantitation limit for semivolatile organic in the concrete to the permit requirement. The method quantitation limit met the requirement to be equal to or less than the value for the cleanup performance standard. All semivolatile organic data met the data validation requirements for acceptability. The data are useable for the evaluation.

For soils, the data on Table 5-3 show that the concentration of pentachlorophenol is below the cleanup performance standard. The values for pentachlorophenol are of the same magnitude as the cleanup performance standard. This is not a concern because the pentachlorophenol values are also below the method detection limit.

8.2.3 Conclusion: Soil

Based on the information presented, there are no metals constituents of concern present in the soil above the cleanup performance standards. The semivolatile organic constituent of concern is not present in the soil.

8.3 EQUIPMENT AND FIELD BLANK ANALYTICAL RESULTS

The analytical data for the concrete and soil sampling equipment blanks are presented on Tables 5-2 and 5-3, respectively.

For all interior (concrete sampling) equipment blanks, the values for arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, and silver are below detection limit values. However, a very low level of barium (0.0025 milligram per kilogram) was detected. There would not be any adverse affects on the data because the barium concentration in the equipment blank is 6 orders of magnitude less than the lowest barium concentration (97.40 milligram per kilogram) in the concrete.

For all exterior (soil sampling) equipment blanks, the values for the metals (arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, and silver) are below the detection limit values.

The data from the equipment blanks indicate that there is nothing that would affect the 303-K Storage Facility sampling data or any conclusions drawn from that data.

8.4 SUMMARY

Based on the evaluation of the analytical data, the following conclusion for the interior can be made.

- There is lead contamination in the trench inside the 303-K Building.

- No other metal constituents of concern (arsenic, barium, beryllium, cadmium, chromium, mercury, nickel, and silver) are present above the cleanup performance standards.

- None of the anion constituents of concern (chloride ion, nitrate ion, nitrite ion) are present above the cleanup performance standard.

- The semivolatile organic constituent of concern is not present inside the 303-K Building.

Based on the evaluation of the analytical data, the following conclusion for the soils can be made.

- None of the metal constituents of concern (arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, and silver) are present in the soils above the cleanup performance standards.

- None of the anion constituents of concern (chloride ion, nitrate ion, nitrite ion) are present in the soils above the cleanup performance standard.

- The semivolatile organic constituent of concern is not present in the soils.

Table 8-1. Comparison Of Method Detection Limit and Method Quantitation Limit Requirements.

Criteria for acceptable data per Permit Condition V.14.B.g.7:

The MQL must be equal to or less than the cleanup
OR
The MDL must be 10 times below the cleanup level.

For this evaluation, the highest MDL or MQL for any given media and constituent of concern is used.

Sample Media	Constituent of Concern	Met requirement	Cleanup Level (mg/kg)	MQL (mg/kg)	1/10 Cleanup Level (mg/kg)	MDL (mg/kg)
Concrete	Arsenic	YES	9.18	NA	0.918	0.30
	Barium	YES	5600	NA	560	0.10
	Beryllium	YES	1.81	NA	0.181	0.10
	Cadmium	YES	80	NA	8.0	0.20
	Chromium	YES	400	NA	40	0.30
	Lead	YES	250	NA	25	0.20
	Mercury	YES	24	NA	2.4	0.095
	Nickel	YES	1600	NA	160	0.90
	Silver	YES	40	NA	40	0.40
	Chloride ion	YES	54.12	NA	54.12	0.11
	Nitrate ion	YES	128000	NA	12800	0.034
	Nitrite ion	YES	8000	NA	800	0.034
	PCP	YES	8.33	3.7	0.833	NA
Soil	Arsenic	YES	9.18	NA	0.918	0.33
	Barium	YES	5600	NA	560	0.11
	Beryllium	YES	1.81	NA	0.181	0.11
	Cadmium	YES	80	NA	8.0	0.22
	Chromium	YES	400	NA	40	0.34
	Lead	YES	250	NA	25	0.22
	Mercury	YES	24	NA	2.4	0.11
	Nickel	YES	1600	NA	160	1.00
	Silver	YES	40	NA	40	0.45
	PCP	YES	8.33	3.7	0.83	NA

MDL = method detection limit
MQL = method quantitation limit
PCP = pentachlorophenol
mg/kg = milligrams per kilograms
NA = not available

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9.0 CONCLUSIONS

The basic requirement for the clean closure of the 303-K Storage Facility is to have all the constituents of concern below the cleanup performance standards (Table 1-1).

The analytical data show that this requirement has been met for the exterior at the 303-K Storage Facility. The soils can be clean closed per the requirements of WAC 173-303-610. Any metals constituents of concern present in the soil are below the cleanup performance standards. No organic constituents of concern are present in the soil.

The analytical data show that this requirement has not been met for the interior of the 303-K Storage Facility. There is lead contamination in the interior trench. No lead contamination was found on the ceiling. Any other metals and all anion constituents of concern present inside are below the cleanup performance standards.

The entire 303-K Facility cannot be clean closed without additional work. The soil can be clean closed and the 303-K Storage Facility unit boundary can be reduced to the 303-K Building. As a minimum, the additional work required to reach clean closure will include decontaminating the trench until sample results indicate the lead concentration is below the 250 milligrams per kilogram cleanup performance standard.

An additional evaluation beyond this report will be needed to determine how closure of the interior of the 303-K Storage Facility will be achieved.

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10.0 REFERENCES

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98-EAP-145, Letter, J. E. Rasmussen, DOE-RL, to L. J. Cusack, Ecology, TRANSMITTAL OF THE RAW DATA PACKAGE FROM SAMPLING AT THE 303-K STORAGE FACILITY (S-3-1), dated March 10, 1998.

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WHC-SD-EN-SPP-002, *Data Validation Procedures for Chemical Analyses*, Rev. 2, Westinghouse Hanford Company, Richland, Washington, 1993.

APPENDIX A

SAMPLER'S FIELD LOG

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[redacted]

Notebook No. WM-SML-H7
Continued From Page N/A

CT 303-K RCRA Characterization

Project # / Task Order #: 772030 / 22-026-001 Date: 10-29-97 to 10-30-97
SAF #'s R98-001 & R98-002
Customer: Jason Adler, Environmental Enginneer, Waste Management Hanford
Field Contacts: Ken E Schwartz - Electrical Enginneer, B and W Hanford
Patti L Stover - Nuclear Plant Operator, B and W Hanford
Charles E Compestine - Health Physics Techician, B & W Hanford
Richard L Stephenson - Plant Enginneer, B & W Hanford
Ron G Hollenbeck - Contract Worker, FD NW
Mark R Hahn - Civil Enginneer - Dept of Energy
Stephen A Szendre - Plant Engineer - FD Hanford
John A. Remaize - Electrical Engineer - B & W
Joan Bartz - Washington Dept of Ecology
Clint Stuart - Washington Dept of Ecology
Ken J Young - Scientist - WASTE Management Northwest
Daniel L. Edwards - Engineer - Waste Management Northwest
James G Hogan - Sample Technician - Waste Management N.W.

KJY

Purpose: RCRA Closure
Location: 303-K BLDG, 300 Area
Weather Conditions 10-29-97 55° F, Cloudy, No wind
10-30-97 62° F, overcast & raining, wind gust to 45 Mph

PPE: The 303-K BLDG is a Contamination Area. Work Performed under RWP # V-061. Full Set of Anti-C's required.

Work Done To RCRA Protocol

Sample Method: Samples were collected using SML-EP-001, 2.5 cleaned stainless steel, bowls, spoons, & Augers. Samples were collected from locations previously selected. Soil Samples were identified with numbers S1 through S12, Concrete Samples were identified with numbers C1 through C7. Soil Samples were placed into clean bowls using clean spoons, mixed and transferred into sample containers.

KJY

Continued on Page 7

Read and Understood By

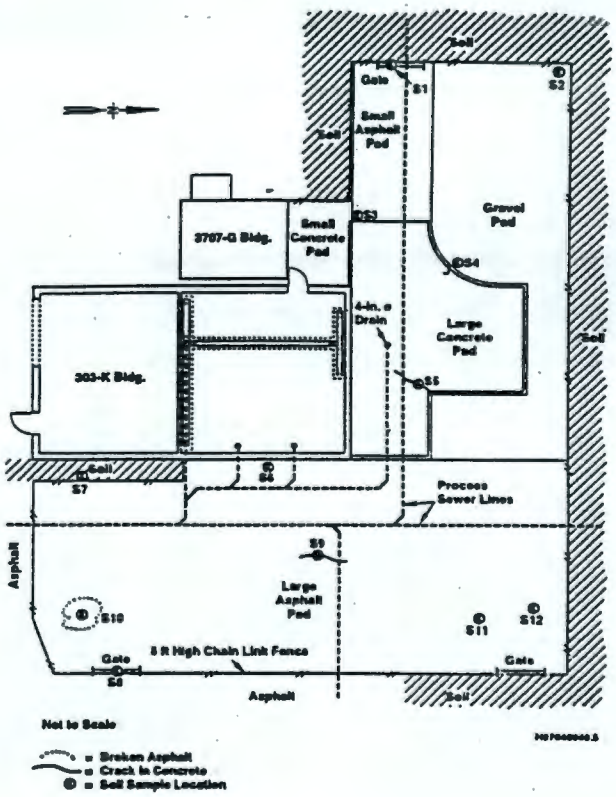
Ken Young K.J. Young 11-17-97
Signed Date

DL Edwards DL Edwards 12-18-97
Signed Date

Soil Sample Locations KJY 11-18-97

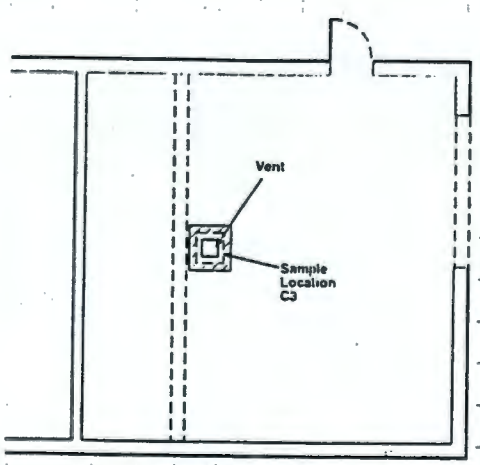
Three Attachments on this page.

KJY 11-18-97



KJY 11-18-97

KJY 11-18-97



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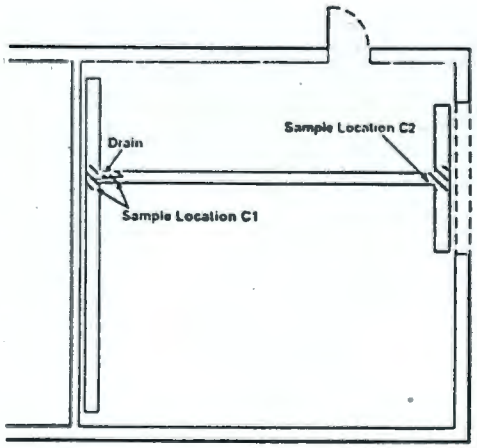

KJY 11-18-97

(ceiling) Concrete Sample Locations

KJY 11-18-97

Continued on Page 8

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K.J. Young	11-18-97	DL Edwards	12-18-97
Signed	Date	Signed	Date

Sample location / Field Screening / Sample #
KJY 11-18-97

Two Attachments on this page.

KJY 11-18-97

TABLE 1			
Sample Number*	Location	Field* Screen	Sample Number
C1	South trench junction near drain	Yes	DOM844
C2	North trench junction	No	DOM846
C2 Duplicate	North trench junction	No	DOM847
C3	Ceiling near vent	No	DOM843
S1	Center of west gate at end of Small Asphalt Pad	Yes	DOM903
S2	Northwest corner of Gravel Pad, ~1M (3'3") from each fence	Yes	DOM906
S3	Southeast corner of Small Asphalt Pad, ~0.3M (1') from each edge	Yes	DOM901
S4	Gravel Pad next to large crack on the NW curved berm of Large Concrete Pad	Yes	DOM902
S5	On the crack in the Large Concrete Pad, northeast of drain	Yes	DOM911
S6	Large Asphalt Pad next to 303K & between sink drains	Yes	DOM878
S6 Duplicate	Large Asphalt Pad next to 303K & between sink drains	No	DOM879
S7	In soil between the SW edge of Large Asphalt Pad & south half of 303K, with sample location adjacent to Large Asphalt Pad & ~2M (6'6") north of SW corner of Large Asphalt Pad	Yes	DOM900
S8	Edge of Large Asphalt Pad & center of SE gate	Yes	DOM907
S8 - Duplicate	Edge of Large Asphalt Pad & center of SE gate	No	DOM912
S9	Large Asphalt Pad on a crack about the center of the pad	Yes	DOM877

KJY 11-18-97

TABLE 1			
Sample Number*	Location	Field* Screen	Sample Number
S10	SE quadrant of Large Asphalt Pad & deteriorating asphalt	Yes	DOM904
S10 Duplicate	SE quadrant of Large Asphalt Pad & deteriorating asphalt	Yes	DOM908
S11 Upper	NE quadrant of Large Asphalt Pad ~1M (3'3") in from north fence & ~5M (16'4") in from east fence	Yes	DOM914
S11 Lower	NE quadrant of Large Asphalt Pad ~1M (3'3") in from north fence & ~5M (16'4") in from east fence	Yes	DOM909
S11 Duplicate Lower	NE quadrant of Large Asphalt Pad ~1M (3'3") in from north fence & ~5M (16'4") in from east fence	No	DOM913
S12 Upper	NE quadrant of Large Asphalt Pad ~3M (9'10") in from north fence & ~5M (16'4") in from east fence	Yes	DOM910
S12 Lower	NE quadrant of Large Asphalt Pad ~3M (9'10") in from north fence & ~5M (16'4") in from east fence	Yes	DOM905
	Concrete Equipment Blank 1 sample		DOM848
	Soil Equipment Blank 2 samples (1 each day) DOM876 / DOM849 (Day 1) / (Day 2)		←

KJY 11-18-97

* C = Concrete Sample
S = Soil Sample
* If a positive result is obtained see Section 8.2 of SAP

Quality Control Samples:

KJY 11-18-97

Two types of quality control samples were collected
1) Duplicate samples: C2, S6, S8, S10, S11 Lower,
2) Equipment blanks (1 each day of sampling) = 2
Equipment blanks were taken first by pouring ASTM type II water over sampling equipment into a sampling bowl to rinse all surfaces. Vendor certified clean bottles were then filled by pouring water into the bottles.

Continued on Page 9

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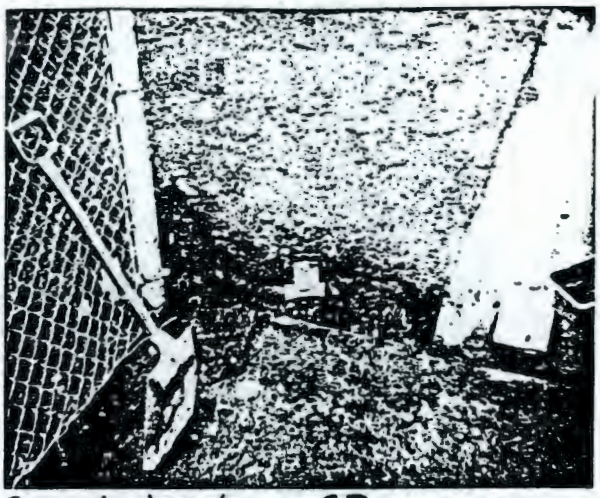
K.J. Lang	11-18-97	DL Edwards	12-18-97
Signed	Date	Signed	Date

KJY 11-18-97



Sample location S3
K. J. Young 10-29-97 1216

S10 - 10/30/97 1010 K.J. Young
Sample locations
Sample + duplicate

S6 - Sample location K.J. Young
10/29/97 1125
DL. Edward removing Asphalt

S2 - Sample location K.J. Young
10/29/97 1145
NW Corner of Gravel Pad

KJY 11-18-97

Four Photos Attached on this page.

10

Ken Young K.J. Young 11-18-97

DL Edwards DL Edwards 12-18-97

KJY 11-18-97

PROJECT 303-K RCRA Characterization

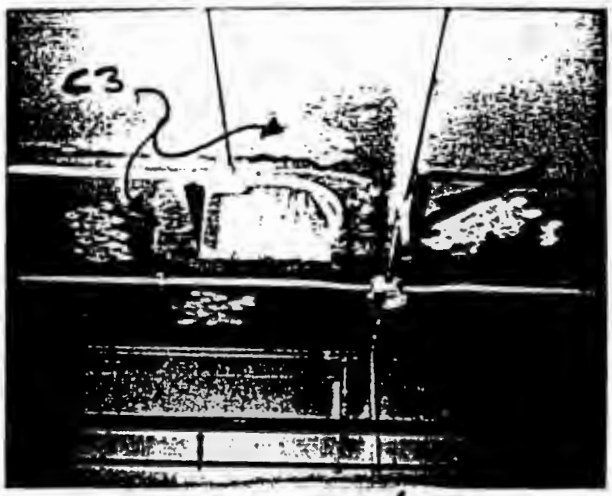
Soil Sample Collection: The first 1 to 2 inches of soil at each location was removed. Samples were then collected for sample locations S1 through S9 6 inches deep (upper). Soil from sample locations S10, S11, & S12 was collected from the upper level and additional from another six inch's deep (lower) level.

Concrete Sample Collection: Concrete was collected from the three locations by chiseling the surface of the collection area up to 1/4 inch ~~deep~~ KJY deep until sufficient volume was collected. Location C3 was collected in the same manner using poly bags to collect the concrete thins as the pieces were removed from the ceiling.

Note: A chisel was also used to remove asphalt which existed over some soil sample locations. In each case a clean bit was used.

KJY 11-18-97

303-K looking South
K.J. Yang 10-30-97 1020
C1, C2 Sample locations



1450 - 10/30/97 K.J. Yang
C-3 Sample location
looking up at removed concrete

KJY 11-18-97

KJY 11-18-97

KJY 11-18-97

Two photos attached this page.

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K.J. Yang Signed 11-18-97

DL Edwards 11-18-97

The bottles used for the collection of samples are EPA Level 1 certified (by the vendor). The sizes of bottles and lot #'s for each sample location are:

125 mL poly wide mouth L41230040
125 mL Amberglass wide mouth G5096030
500 mL poly wide mouth L7009020 (concrete)
500 mL poly wide mouth L7119020 (soil)

For rad analysis at the Waste Sampling & Characterization Facility (WSCF) the lab requested a 20 mL poly bottle and do not have lot or serial numbers.

Washington Department of Ecology requested split samples be taken for analysis at there lab. Ecology provide there own bottles.

All samples collected (including Ecology split samples) were stored in the refrigerated / custody locked storage area at the 6269 building until rad results were completed at WSCF.

Field Screening: Field screening was done for Pentachlorophenol by Immunoassay using SW-846 method 4010.

Two RISc PENTA Soil test Kits (item # 70003) were purchased from: Strategic Diagnostics, Inc
3000 Birch West Tower, Suite 4000
Newport Beach, CA 92660
Att: Sharon Polsky, Client Service Manager.

lot number 7H2227 expiration date 2/98

If PCP was found to be present by field screening then samples for semivolatile organics would be sent into the lab for analysis by SW-846 method 8270

Continued on Page 12

Read and Understood By

K.J. Young — Signed — 11-18-97 — Date
DL Edwards — Signed — 11-18-97 — Date

The field screening kit had detection levels of 1, 10, & 100 ppm on the first day of screening 10-29-97, Sites S7, S6, S6Dup, S2, S9, on the Second day of screening 10-30-97. Sites S1, S3, S4

		1ppm	10 ppm	100ppm	
Sample #'s	S1	-0.66	-0.14	0.39	If reading is nega
	S3	.30	-0.02	0.34	or zero, PCP is pre:
	S4	-0.14	0.23	0.17	
	S7	0.4	0.49	-0.17	A standard was run
	S6	-0.05	0.11	0.10	10-29-97 with 1ppm
	S6D	-0.02	0.18	-0.40	in methanol and the
	S2	-0.25	-0.36	0.28	photometer # was -0
	S9	0.34	0.15	0.46	

Summary of sample shipments:

Deliveries on 10-31-97
WSCF - C.O.C # R98-002-4, R98-001-1
R98-002-5.
Transported by Government Vehicle
Cooler # GWS-24T

Shipment on 11-4-97
Lockheed Analytical - C.O.C # R98-001-2, R98-002-1
R98-002-2, R98-002-3, R98-002-7
Transported by Federal Express Air
Air bill # 423579506067
Cooler # SML-553

Shipment on 11-6-97 (Ecology Lab)
Paragon Analytical - C.O.C # N/A Att Lance Steere
Transported by Federal Express Air
Air-bill # 423579506126
Cooler # IEA
KJY

Continued on Page 13

Read and Understood By

K.J. Yang — Signed — 11-18-97 Date

Signed — 12-18-97 Date

Procedures used in Sampling:

Soil sampling activities = Accordance with WHC-CM-7-7 EII Rev 5, "Soil and Sediment Samp

Chain of Custody = Accordance with SML-EP-001, Section 1.1. "Chain of Custody / Sample Analysis Request" Rev 0, chg. 1.

Equipment was chemically cleaned per SML-EP-001 Section 2.5 "Laboratory Cleaning of Sampling Equipment" Rev 0.

Sample Analysis:

- All samples submitted to WSCF for Analysis consisted of 25 - 20ml poly bottles for Activity Scan.

- All samples submitted to Lockheed Environmental consisted of 25 - 20ml poly bottles for Activity Scan
  ~~24~~ 27 - 20ml poly bottles for Total Uranium

  19 - 125ml amberglass widemouths for Semi-VOA
  4 - 125ml widemouth poly bottles for IC Anions
  22 - 125ml widemouth poly bottles for ICP Metals
  3 - 500ml widemouth poly bottles for ICP Metals

- All samples submitted to Paragon Analytics Inc were done under Joan K Bartz, Dept of Ecology instructions.

ISJY

Continued on Page NONE

Read and Understood By

K.J. Yang — Signed — 11-18-97 Date

Signed — 12-18-97 Date

APPENDIX B

ECOLOGY SPLIT SAMPLE DATA

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Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9711092
Client Name: Washington State Dept. of Ecology
Client Project Name:
Client Project Number: 303-K Closure
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
S1	9711092-1		Soil	10/29/97	13:05
S2	9711092-2		Soil	10/29/97	11:37
S3	9711092-3		Soil	10/29/97	12:15
S5	9711092-4		Soil	10/30/97	10:25
S6	9711092-5		Soil	10/29/97	11:25
S7	9711092-6		Soil	10/29/97	11:55
S8	9711092-7		Soil	10/30/97	11:07
S9	9711092-8		Soil	10/29/97	12:10
S10-1 (upper)	9711092-9		Soil	10/29/97	12:34
S10-2 (lower)	9711092-10		Soil	10/30/97	10:22
S11-1 (upper)	9711092-11		Soil	10/30/97	11:20
S11-2 (lower)	9711092-12		Soil	10/30/97	13:10
S12-1 (upper)	9711092-13		Soil	10/30/97	13:10
S12-2 (lower)	9711092-14		Soil	10/30/97	13:20
C-1 (near drain)	9711092-15		Solid	10/30/97	14:50
C-2 (near door)	9711092-16		Solid	10/30/97	14:40
C-3 (vent)	9711092-17		Solid	10/30/97	14:30
S4	9711092-18		Soil	10/29/97	12:36

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 10/29/97

Client Name: Washington State Dept. of Ecol Date Analyzed : 11/19/97

Client Project ID: Storage Facility

Lab Sample ID Series: 97-11-092 Sample Matrix : Soil

Client Sample ID	Lab Sample ID	Total Uranium (ug/g)	Reporting Limit	Flag
S1	11-092-01	1.29 ± 0.18	0.05	
S2	11-092-02	17.3 ± 2.4	0.10	
S3	11-092-03	13.8 ± 1.9	0.10	
S5	11-092-04	68.3 ± 9.4	0.10	
S6	11-092-05	49.3 ± 6.8	0.10	
S7	11-092-06	143 ± 20	0.10	
S8	11-092-07	10.8 ± 1.5	0.10	
S9	11-092-08	28.7 ± 4.0	0.10	
S10-1 (upper)	11-092-09	23.3 ± 3.2	0.10	
Blank	11-092-B1	0.15 ± 0.02	0.05	
Duplicate	11-092-D1	1.30 ± 0.18	0.05	

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ).
See PAI SOP 743FC for details of TPU determinations.

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

Remarks:

Sample 97-11-092-D1 is a duplicate of 97-11-092-01.

BP

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 10/30/97

Client Name: Washington State Dept. of Ecol Date Analyzed : 11/19/97

Client Project ID: Storage Facility

Lab Sample ID Series: 97-11-092 Sample Matrix : Soil

Client Sample ID	Lab Sample ID	Total Uranium (ug/g)	Reporting Limit	Flag
S10-2 (lower)	11-092-10	7.8 ± 1.1	0.09	
S11-1 (upper)	11-092-11	66.2 ± 9.1	0.23	
S11-2 (lower)	11-092-12	29.9 ± 4.2	0.10	
S12-1 (upper)	11-092-13	29.7 ± 4.1	0.09	
S12-2 (lower)	11-092-14	16.6 ± 2.3	0.10	
C-1 (near drain)	11-092-15	3071 ± 420	0.97	
C-2 (near door)	11-092-16	915 ± 130	0.50	
C-3 (vent)	11-092-17	3.67 ± 0.50	0.10	
S4	11-092-18	517 ± 71	0.10	
Duplicate	11-092-D2	7.9 ± 1.1	0.10	

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ).
See PAI SOP 743FC for details of TPU determinations.

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

Remarks:

Sample 97-11-092-D2 is a duplicate of 97-11-092-10.

BJ

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S3

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-3

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _90.9

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	7530			P
7440-36-0	Antimony_	2.2	U	N	P
7440-38-2	Arsenic__	1.9			P
7440-39-3	Barium___	81.7			P
7440-41-7	Beryllium	0.57			P
7440-43-9	Cadmium__	1.1	U		P
7440-70-2	Calcium__	13100		N*	P
7440-47-3	Chromium_	7.2		E	P
7440-48-4	Cobalt___	15.3			P
7440-50-8	Copper___	43.3		N	P
7439-89-6	Iron_____	31100			P
7439-92-1	Lead_____	16.3		*	P
7439-95-4	Magnesium	7570			P
7439-96-5	Manganese	618			P
7439-97-6	Mercury__	0.04	U		AV
7440-02-0	Nickel___	27.9		N	P
7440-09-7	Potassium	867			P
7782-49-2	Selenium_	1.3			P
7440-22-4	Silver___	1.1	U		P
7440-23-5	Sodium___	485			P
7440-28-0	Thallium_	2.2	U		P
7440-62-2	Vanadium_	46.6			P
7440-66-6	Zinc_____	175			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S5

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-4

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _91.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	6060			P
7440-36-0	Antimony_	2.2	U	N	P
7440-38-2	Arsenic__	2.4			P
7440-39-3	Barium___	109			P
7440-41-7	Beryllium	0.55	U		P
7440-43-9	Cadmium__	1.1	U		P
7440-70-2	Calcium__	11900		N*	P
7440-47-3	Chromium_	11.2		E	P
7440-48-4	Cobalt___	9.4			P
7440-50-8	Copper___	58.8		N	P
7439-89-6	Iron_____	21300			P
7439-92-1	Lead_____	18.0		*	P
7439-95-4	Magnesium	3630			P
7439-96-5	Manganese	300			P
7439-97-6	Mercury__	0.04	U		AV
7440-02-0	Nickel___	149		N	P
7440-09-7	Potassium	1100			P
7782-49-2	Selenium_	1.1	U		P
7440-22-4	Silver___	1.1	U		P
7440-23-5	Sodium___	135			P
7440-28-0	Thallium_	2.2	U		P
7440-62-2	Vanadium_	49.1			P
7440-66-6	Zinc_____	83.4			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S9

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-8

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _94.8

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	4870			P
7440-36-0	Antimony_	2.1	U	N	P
7440-38-2	Arsenic__	1.7			P
7440-39-3	Barium___	63.8			P
7440-41-7	Beryllium	0.53	U		P
7440-43-9	Cadmium__	0.53	U		P
7440-70-2	Calcium__	4050		N*	P
7440-47-3	Chromium_	8.6		E	P
7440-48-4	Cobalt___	8.4			P
7440-50-8	Copper___	19.6		N	P
7439-89-6	Iron_____	17100			P
7439-92-1	Lead_____	6.7		*	P
7439-95-4	Magnesium	3520			P
7439-96-5	Manganese	249			P
7439-97-6	Mercury__	0.04	U		AV
7440-02-0	Nickel___	9.5		N	P
7440-09-7	Potassium	702			P
7782-49-2	Selenium_	0.67			P
7440-22-4	Silver___	1.1	U		P
7440-23-5	Sodium___	144			P
7440-28-0	Thallium_	1.1	U		P
7440-62-2	Vanadium_	37.0			P
7440-66-6	Zinc_____	55.8			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S10-1

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-9

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _95.1

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4750			P
7440-36-0	Antimony	2.1	U	N	P
7440-38-2	Arsenic	2.0			P
7440-39-3	Barium	60.8			P
7440-41-7	Beryllium	0.53	U		P
7440-43-9	Cadmium	0.53	U		P
7440-70-2	Calcium	4120		N*	P
7440-47-3	Chromium	8.2		E	P
7440-48-4	Cobalt	8.5			P
7440-50-8	Copper	18.0		N	P
7439-89-6	Iron	17400			P
7439-92-1	Lead	8.0		*	P
7439-95-4	Magnesium	3450			P
7439-96-5	Manganese	241			P
7439-97-6	Mercury	0.04	U		AV
7440-02-0	Nickel	10.0			P
7440-09-7	Potassium	657			P
7782-49-2	Selenium	0.67			P
7440-22-4	Silver	1.1	U		P
7440-23-5	Sodium	122		F	P
7440-28-0	Thallium	1.1	U		P
7440-62-2	Vanadium	36.9			P
7440-66-6	Zinc	95.3			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:
FULL_CLIENT_SAMPLE_ID_IS_S10-1_(UPPER).

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S10-2

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-10

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _92.2

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	6970			P
7440-36-0	Antimony_	2.2	U	N	P
7440-38-2	Arsenic__	2.5			P
7440-39-3	Barium___	76.8			P
7440-41-7	Beryllium	0.54	U		P
7440-43-9	Cadmium__	1.1	U		P
7440-70-2	Calcium__	6030		N*	P
7440-47-3	Chromium_	9.1		E	P
7440-48-4	Cobalt___	10.5			P
7440-50-8	Copper___	12.9		N	P
7439-89-6	Iron_____	23100			P
7439-92-1	Lead_____	6.0		*	P
7439-95-4	Magnesium	4190			P
7439-96-5	Manganese	325			P
7439-97-6	Mercury__	0.04	U		AV
7440-02-0	Nickel___	10.6		N	P
7440-09-7	Potassium	1160			P
7782-49-2	Selenium_	1.1	U		P
7440-22-4	Silver___	1.1	U		P
7440-23-5	Sodium___	109			P
7440-28-0	Thallium_	2.2	U		P
7440-62-2	Vanadium_	49.5			P
7440-66-6	Zinc_____	46.2			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:

FULL_CLIENT_SAMPLE_ID_IS_S10-2_(LOWER).

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

C-1

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-15

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _85.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	7890			P
7440-36-0	Antimony_	2.4	U	N	P
7440-38-2	Arsenic__	3.6			P
7440-39-3	Barium___	277			P
7440-41-7	Beryllium	0.77			P
7440-43-9	Cadmium__	2.8			P
7440-70-2	Calcium__	107000		N*	P
7440-47-3	Chromium_	38.4		E	P
7440-48-4	Cobalt___	8.7			P
7440-50-8	Copper___	55.6		N	P
7439-89-6	Iron_____	21300			P
7439-92-1	Lead_____	426		*	P
7439-95-4	Magnesium	3870			P
7439-96-5	Manganese	259			P
7439-97-6	Mercury__	0.77			AV
7440-02-0	Nickel___	19.8			P
7440-09-7	Potassium	1160			P
7782-49-2	Selenium_	0.86			P
7440-22-4	Silver___	1.7			P
7440-23-5	Sodium___	1690		F	P
7440-28-0	Thallium_	1.2	U		P
7440-62-2	Vanadium_	84.2			P
7440-66-6	Zinc_____	253			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:
FULL_CLIENT_SAMPLE_ID_IS_C-1_(NEAR_DRAIN).

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S4

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: RCRA__

Matrix (soil/water): SOIL_ Lab Sample ID: S9711092-18

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: _96.1

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	5670			P
7440-36-0	Antimony_	2.1	U	N	P
7440-38-2	Arsenic__	3.5			P
7440-39-3	Barium___	99.3			P
7440-41-7	Beryllium	0.52	U		P
7440-43-9	Cadmium__	1.0	U		P
7440-70-2	Calcium__	6500		N*	P
7440-47-3	Chromium_	12.7		E	P
7440-48-4	Cobalt___	10.1			P
7440-50-8	Copper___	52.4		N	P
7439-89-6	Iron_____	22600			P
7439-92-1	Lead_____	27.5		*	P
7439-95-4	Magnesium	3640			P
7439-96-5	Manganese	304			P
7439-97-6	Mercury__	0.04			AV
7440-02-0	Nickel___	15.0		N	P
7440-09-7	Potassium	955			P
7782-49-2	Selenium_	1.0	U		P
7440-22-4	Silver___	1.0	U		P
7440-23-5	Sodium___	127			P
7440-28-0	Thallium_	2.1	U		P
7440-62-2	Vanadium_	43.8			P
7440-66-6	Zinc_____	75.5			P

Color Before: BROWN____ Clarity Before: N/A___ Texture: MEDIUM

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

AROCLORS

Method 8081

Sample ID

S1

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Lab Sample ID: 9711092-1

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.2 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	71
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	ND	36
Aroclor 1260	ND	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	86	47 - 137
Decachlorobiphenyl	94	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S2

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Lab Sample ID: 9711092-2

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 4.3 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 5

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	170
Aroclor 1221	ND	350
Aroclor 1232	ND	170
Aroclor 1242	ND	170
Aroclor 1248	ND	170
Aroclor 1254	570	170
Aroclor 1260	ND	170

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	79	47 - 137
Decachlorobiphenyl	81	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S3

Lab Name: Paragon Analytics. Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Lab Sample ID: 9711092-3

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 9.1 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 2

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	73
Aroclor 1221	ND	150
Aroclor 1232	ND	73
Aroclor 1242	ND	73
Aroclor 1248	ND	73
Aroclor 1254	250	73
Aroclor 1260	ND	73

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	88	47 - 137
Decachlorobiphenyl	88	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S5

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-4

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 9 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	37
Aroclor 1221	ND	73
Aroclor 1232	ND	37
Aroclor 1242	ND	37
Aroclor 1248	ND	37
Aroclor 1254	160	37
Aroclor 1260	85	37

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	75	47 - 137
Decachlorobiphenyl	93	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S6

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Lab Sample ID: 9711092-5

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.9 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	72
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	ND	36
Aroclor 1260	ND	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	96	47 - 137
Decachlorobiphenyl	102	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S7

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-6

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.4 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	71
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	100	36
Aroclor 1260	76	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	92	47 - 137
Decachlorobiphenyl	97	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S8

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Lab Sample ID: 9711092-7

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 5.3 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	35
Aroclor 1221	ND	70
Aroclor 1232	ND	35
Aroclor 1242	ND	35
Aroclor 1248	ND	35
Aroclor 1254	ND	35
Aroclor 1260	ND	35

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	96	47 - 137
Decachlorobiphenyl	96	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S9

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Lab Sample ID: 9711092-8

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 5.2 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	35
Aroclor 1221	ND	70
Aroclor 1232	ND	35
Aroclor 1242	ND	35
Aroclor 1248	ND	35
Aroclor 1254	81	35
Aroclor 1260	ND	35

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	91	47 - 137
Decachlorobiphenyl	89	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S10-1 (upper)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-9

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 4.9 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	35
Aroclor 1221	ND	70
Aroclor 1232	ND	35
Aroclor 1242	ND	35
Aroclor 1248	ND	35
Aroclor 1254	79	35
Aroclor 1260	ND	35

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	89	47 - 137
Decachlorobiphenyl	87	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S10-2 (lower)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Lab Sample ID: 9711092-10

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 7.8 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	72
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	ND	36
Aroclor 1260	ND	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	93	47 - 137
Decachlorobiphenyl	93	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S11-1 (upper)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-11

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.7 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 5

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	180
Aroclor 1221	ND	360
Aroclor 1232	ND	180
Aroclor 1242	ND	180
Aroclor 1248	ND	180
Aroclor 1254	670	180
Aroclor 1260	ND	180

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	86	47 - 137
Decachlorobiphenyl	91	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S11-2 (lower)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-12

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 9.9 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	37
Aroclor 1221	ND	74
Aroclor 1232	ND	37
Aroclor 1242	ND	37
Aroclor 1248	ND	37
Aroclor 1254	69	37
Aroclor 1260	ND	37

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	93	47 - 137
Decachlorobiphenyl	89	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S12-1 (upper)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-13

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.8 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	72
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	190	36
Aroclor 1260	39	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	91	47 - 137
Decachlorobiphenyl	91	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S12-2 (lower)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-14

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.4 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	36
Aroclor 1221	ND	71
Aroclor 1232	ND	36
Aroclor 1242	ND	36
Aroclor 1248	ND	36
Aroclor 1254	ND	36
Aroclor 1260	ND	36

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	97	47 - 137
Decachlorobiphenyl	101	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

C-1 (near drain)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-15

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 15 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 10

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	390
Aroclor 1221	ND	780
Aroclor 1232	ND	390
Aroclor 1242	ND	390
Aroclor 1248	ND	390
Aroclor 1254	1,200	390
Aroclor 1260	ND	390

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	76	47 - 137
Decachlorobiphenyl	66	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

C-2 (near door)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-16

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 6.8 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 50

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	1,800
Aroclor 1221	ND	3,600
Aroclor 1232	ND	1,800
Aroclor 1242	ND	1,800
Aroclor 1248	ND	1,800
Aroclor 1254	4,700	1,800
Aroclor 1260	ND	1,800

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	I	47 - 137
Decachlorobiphenyl	I	34 - 129

ND = Not Detected at or above client requested reporting limit.
I = Surrogate recovery not reported due to sample dilution.

AROCLORS

Method 8081

Sample ID

C-3 (vent)

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Date Collected: 10/30/97
Date Extracted: 11/12/97
Date Analyzed: 11/14/97

Lab Sample ID: 9711092-17

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 1.5 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 10

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	340
Aroclor 1221	ND	680
Aroclor 1232	ND	340
Aroclor 1242	ND	340
Aroclor 1248	ND	340
Aroclor 1254	650	340
Aroclor 1260	ND	340

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	61	47 - 137
Decachlorobiphenyl	42	34 - 129

ND = Not Detected at or above client requested reporting limit.

AROCLORS

Method 8081

Sample ID

S4

Lab Name: Paragon Analytics, Inc.
Client Name: Washington State Department of Ecology
Client Project ID: RCRA Closue of 303-K Storage Facility

Lab Sample ID: 9711092-18

Date Collected: 10/29/97
Date Extracted: 11/12/97
Date Analyzed: 11/13/97

Sample Matrix: Soil
Cleanup: Sulfuric Acid
% Moisture: 3.9 %
Results based on dry weight

Sample Weight: 30 g
Final Volume: 10 mL
Dilution Factor: 1

Analyte	Conc (ug/kg)	Reporting Limit (ug/kg)
Aroclor 1016	ND	35
Aroclor 1221	ND	69
Aroclor 1232	ND	35
Aroclor 1242	ND	35
Aroclor 1248	ND	35
Aroclor 1254	160	35
Aroclor 1260	120	35

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
2,4,5,6-Tetrachloro-m-xylene	95	47 - 137
Decachlorobiphenyl	101	34 - 129

ND = Not Detected at or above client requested reporting limit.

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S3
Lab ID: 9711092-3

Sample Matrix: solid
% Moisture: 9.1
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	730	ug/kg	730	U	
62-75-9	N-NITROSODIMETHYLAMINE	730	ug/kg	730	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	730	ug/kg	730	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	730	ug/kg	730	U	
95-57-8	2-CHLOROPHENOL	730	ug/kg	730	U	
541-73-1	1,3-DICHLOROBENZENE	730	ug/kg	730	U	
106-46-7	1,4-DICHLOROBENZENE	730	ug/kg	730	U	
95-50-1	1,2-DICHLOROBENZENE	730	ug/kg	730	U	
100-51-6	BENZYL ALCOHOL	730	ug/kg	730	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	730	ug/kg	730	U	
95-48-7	2-METHYLPHENOL	730	ug/kg	730	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	730	ug/kg	730	U	
106-44-5	4-METHYLPHENOL	730	ug/kg	730	U	
67-72-1	HEXACHLOROETHANE	730	ug/kg	730	U	
98-95-3	NITROBENZENE	730	ug/kg	730	U	
78-59-1	ISOPHORONE	730	ug/kg	730	U	
88-75-5	2-NITROPHENOL	730	ug/kg	730	U	
105-67-9	2,4-DIMETHYLPHENOL	730	ug/kg	730	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	730	ug/kg	730	U	
120-83-2	2,4-DICHLOROPHENOL	730	ug/kg	730	U	
65-85-0	BENZOIC ACID	3700	ug/kg	3700	U	
120-82-1	1,2,4-TRICHLOROBENZENE	730	ug/kg	730	U	
91-20-3	NAPHTHALENE	730	ug/kg	730	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	730	ug/kg	730	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	730	ug/kg	730	U	
91-57-6	2-METHYLNAPHTHALENE	730	ug/kg	730	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	730	ug/kg	730	U	
88-06-2	2,4,6-TRICHLOROPHENOL	730	ug/kg	730	U	
95-95-4	2,4,5-TRICHLOROPHENOL	730	ug/kg	730	U	
91-58-7	2-CHLORONAPHTHALENE	730	ug/kg	730	U	
88-74-4	2-NITROANILINE	3700	ug/kg	3700	U	
131-11-3	DIMETHYL PHTHALATE	730	ug/kg	730	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S3
Lab ID: 9711092-3

Sample Matrix: solid
% Moisture: 9.1
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	730	ug/kg	730	U
208-96-8	ACENAPHTHYLENE	730	ug/kg	730	U
99-09-2	3-NITROANILINE	3700	ug/kg	3700	U
83-32-9	ACENAPHTHENE	730	ug/kg	730	U
51-28-5	2,4-DINITROPHENOL	3700	ug/kg	3700	U
100-02-7	4-NITROPHENOL	3700	ug/kg	3700	U
132-64-9	DIBENZOFURAN	730	ug/kg	730	U
121-14-2	2,4-DINITROTOLUENE	730	ug/kg	730	U
84-66-2	DIETHYL PHTHALATE	730	ug/kg	730	U
86-73-7	FLUORENE	730	ug/kg	730	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	730	ug/kg	730	U
100-01-6	4-NITROANILINE	3700	ug/kg	3700	U
103-33-3	AZOBENZENE	730	ug/kg	730	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3700	ug/kg	3700	U
86-30-6	N-NITROSODIPHENYLAMINE	730	ug/kg	730	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	730	ug/kg	730	U
118-74-1	HEXACHLOROBENZENE	730	ug/kg	730	U
87-86-5	PENTACHLOROPHENOL	3700	ug/kg	3700	U
85-01-8	PHENANTHRENE	730	ug/kg	730	U
120-12-7	ANTHRACENE	730	ug/kg	730	U
86-74-8	CARBAZOLE	730	ug/kg	730	U
84-74-2	DI-N-BUTYL PHTHALATE	82	ug/kg	730	J,B
206-44-0	FLUORANTHENE	730	ug/kg	730	U
129-00-0	PYRENE	730	ug/kg	730	U
85-68-7	BUTYL BENZYL PHTHALATE	730	ug/kg	730	U
56-55-3	BENZO(A)ANTHRACENE	730	ug/kg	730	U
91-94-1	3,3'-DICHLOROBENZIDINE	3700	ug/kg	3700	U
218-01-9	CHRYSENE	730	ug/kg	730	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	80	ug/kg	730	J
117-84-0	DI-N-OCTYL PHTHALATE	730	ug/kg	730	U
205-99-2	BENZO(B,K)FLUORANTHENE	730	ug/kg	730	U
50-32-8	BENZO(A)PYRENE	730	ug/kg	730	U
193-39-5	INDENO(1,2,3-CD)PYRENE	730	ug/kg	730	U
53-70-3	DIBENZO(A,H)ANTHRACENE	730	ug/kg	730	U
191-24-2	BENZO(G,H,I)PERYLENE	730	ug/kg	730	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S3	**Sample Matrix:** solid	**Date Collected:** 29-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-3	**% Moisture:** 9.1	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1720	ug/kg	2500	69	19 - 113
321-60-8	2-FLUOROBIPHENYL	1030	ug/kg	1670	62	30 - 105
367-12-4	2-FLUOROPHENOL	1450	ug/kg	2500	58	25 - 100
4165-60-0	NITROBENZENE-D5	941	ug/kg	1670	56	31 - 106
13127-88-3	PHENOL-D5	1630	ug/kg	2500	65	24 - 104
1718-51-0	TERPHENYL-D14	1550	ug/kg	1670	93	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S5
Lab ID: 9711092-4

Sample Matrix: solid
% Moisture: 9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	730	ug/kg	730	U	
62-75-9	N-NITROSODIMETHYLAMINE	730	ug/kg	730	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	730	ug/kg	730	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	730	ug/kg	730	U	
95-57-8	2-CHLOROPHENOL	730	ug/kg	730	U	
541-73-1	1,3-DICHLOROBENZENE	730	ug/kg	730	U	
106-46-7	1,4-DICHLOROBENZENE	730	ug/kg	730	U	
95-50-1	1,2-DICHLOROBENZENE	730	ug/kg	730	U	
100-51-6	BENZYL ALCOHOL	730	ug/kg	730	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	730	ug/kg	730	U	
95-48-7	2-METHYLPHENOL	730	ug/kg	730	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	730	ug/kg	730	U	
106-44-5	4-METHYLPHENOL	730	ug/kg	730	U	
67-72-1	HEXACHLOROETHANE	730	ug/kg	730	U	
98-95-3	NITROBENZENE	730	ug/kg	730	U	
78-59-1	ISOPHORONE	730	ug/kg	730	U	
88-75-5	2-NITROPHENOL	730	ug/kg	730	U	
105-67-9	2,4-DIMETHYLPHENOL	730	ug/kg	730	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	730	ug/kg	730	U	
120-83-2	2,4-DICHLOROPHENOL	730	ug/kg	730	U	
65-85-0	BENZOIC ACID	3700	ug/kg	3700	U	
120-82-1	1,2,4-TRICHLOROBENZENE	730	ug/kg	730	U	
91-20-3	NAPHTHALENE	730	ug/kg	730	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	730	ug/kg	730	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	730	ug/kg	730	U	
91-57-6	2-METHYLNAPHTHALENE	730	ug/kg	730	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	730	ug/kg	730	U	
88-06-2	2,4,6-TRICHLOROPHENOL	730	ug/kg	730	U	
95-95-4	2,4,5-TRICHLOROPHENOL	730	ug/kg	730	U	
91-58-7	2-CHLORONAPHTHALENE	730	ug/kg	730	U	
88-74-4	2-NITROANILINE	3700	ug/kg	3700	U	
131-11-3	DIMETHYL PHTHALATE	730	ug/kg	730	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S5
Lab ID: 9711092-4

Sample Matrix: solid
% Moisture: 9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	730	ug/kg	730	U
208-96-8	ACENAPHTHYLENE	730	ug/kg	730	U
99-09-2	3-NITROANILINE	3700	ug/kg	3700	U
83-32-9	ACENAPHTHENE	730	ug/kg	730	U
51-28-5	2,4-DINITROPHENOL	3700	ug/kg	3700	U
100-02-7	4-NITROPHENOL	3700	ug/kg	3700	U
132-64-9	DIBENZOFURAN	730	ug/kg	730	U
121-14-2	2,4-DINITROTOLUENE	730	ug/kg	730	U
84-66-2	DIETHYL PHTHALATE	730	ug/kg	730	U
86-73-7	FLUORENE	730	ug/kg	730	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	730	ug/kg	730	U
100-01-6	4-NITROANILINE	3700	ug/kg	3700	U
103-33-3	AZOBENZENE	730	ug/kg	730	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3700	ug/kg	3700	U
86-30-6	N-NITROSODIPHENYLAMINE	730	ug/kg	730	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	730	ug/kg	730	U
118-74-1	HEXACHLOROBENZENE	730	ug/kg	730	U
87-86-5	PENTACHLOROPHENOL	3700	ug/kg	3700	U
85-01-8	PHENANTHRENE	730	ug/kg	730	U
120-12-7	ANTHRACENE	730	ug/kg	730	U
86-74-8	CARBAZOLE	730	ug/kg	730	U
84-74-2	DI-N-BUTYL PHTHALATE	730	ug/kg	730	U
206-44-0	FLUORANTHENE	730	ug/kg	730	U
129-00-0	PYRENE	730	ug/kg	730	U
85-68-7	BUTYL BENZYL PHTHALATE	730	ug/kg	730	U
56-55-3	BENZO(A)ANTHRACENE	730	ug/kg	730	U
91-94-1	3,3'-DICHLOROBENZIDINE	3700	ug/kg	3700	U
218-01-9	CHRYSENE	730	ug/kg	730	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	130	ug/kg	730	J
117-84-0	DI-N-OCTYL PHTHALATE	730	ug/kg	730	U
205-99-2	BENZO(B,K)FLUORANTHENE	730	ug/kg	730	U
50-32-8	BENZO(A)PYRENE	730	ug/kg	730	U
193-39-5	INDENO(1,2,3-CD)PYRENE	730	ug/kg	730	U
53-70-3	DIBENZO(A,H)ANTHRACENE	730	ug/kg	730	U
191-24-2	BENZO(G,H,I)PERYLENE	730	ug/kg	730	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S5	**Sample Matrix:** solid	**Date Collected:** 30-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-4	**% Moisture:** 9	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1330	ug/kg	2500	53	19 - 113
321-60-8	2-FLUOROBIPHENYL	823	ug/kg	1670	49	30 - 105
367-12-4	2-FLUOROPHENOL	1070	ug/kg	2500	43	25 - 100
4165-60-0	NITROBENZENE-D5	737	ug/kg	1670	44	31 - 106
13127-88-3	PHENOL-D5	1300	ug/kg	2500	52	24 - 104
1718-51-0	TERPHENYL-D14	1190	ug/kg	1670	72	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S6
Lab ID: 9711092-5

Sample Matrix: solid
% Moisture: 6.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	720	ug/kg	720	U	
62-75-9	N-NITROSODIMETHYLAMINE	720	ug/kg	720	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	720	ug/kg	720	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	720	ug/kg	720	U	
95-57-8	2-CHLOROPHENOL	720	ug/kg	720	U	
541-73-1	1,3-DICHLOROBENZENE	720	ug/kg	720	U	
106-46-7	1,4-DICHLOROBENZENE	720	ug/kg	720	U	
95-50-1	1,2-DICHLOROBENZENE	720	ug/kg	720	U	
100-51-6	BENZYL ALCOHOL	720	ug/kg	720	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	720	ug/kg	720	U	
95-48-7	2-METHYLPHENOL	720	ug/kg	720	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	720	ug/kg	720	U	
106-44-5	4-METHYLPHENOL	720	ug/kg	720	U	
67-72-1	HEXACHLOROETHANE	720	ug/kg	720	U	
98-95-3	NITROBENZENE	720	ug/kg	720	U	
78-59-1	ISOPHORONE	720	ug/kg	720	U	
88-75-5	2-NITROPHENOL	720	ug/kg	720	U	
105-67-9	2,4-DIMETHYLPHENOL	720	ug/kg	720	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	720	ug/kg	720	U	
120-83-2	2,4-DICHLOROPHENOL	720	ug/kg	720	U	
65-85-0	BENZOIC ACID	3600	ug/kg	3600	U	
120-82-1	1,2,4-TRICHLOROBENZENE	720	ug/kg	720	U	
91-20-3	NAPHTHALENE	720	ug/kg	720	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	720	ug/kg	720	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	720	ug/kg	720	U	
91-57-6	2-METHYLNAPHTHALENE	720	ug/kg	720	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	720	ug/kg	720	U	
88-06-2	2,4,6-TRICHLOROPHENOL	720	ug/kg	720	U	
95-95-4	2,4,5-TRICHLOROPHENOL	720	ug/kg	720	U	
91-58-7	2-CHLORONAPHTHALENE	720	ug/kg	720	U	
88-74-4	2-NITROANILINE	3600	ug/kg	3600	U	
131-11-3	DIMETHYL PHTHALATE	720	ug/kg	720	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S6
Lab ID: 9711092-5

Sample Matrix: solid
% Moisture: 6.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	720	ug/kg	720	U
208-96-8	ACENAPHTHYLENE	720	ug/kg	720	U
99-09-2	3-NITROANILINE	3600	ug/kg	3600	U
83-32-9	ACENAPHTHENE	720	ug/kg	720	U
51-28-5	2,4-DINITROPHENOL	3600	ug/kg	3600	U
100-02-7	4-NITROPHENOL	3600	ug/kg	3600	U
132-64-9	DIBENZOFURAN	720	ug/kg	720	U
121-14-2	2,4-DINITROTOLUENE	720	ug/kg	720	U
84-66-2	DIETHYL PHTHALATE	720	ug/kg	720	U
86-73-7	FLUORENE	720	ug/kg	720	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	720	ug/kg	720	U
100-01-6	4-NITROANILINE	3600	ug/kg	3600	U
103-33-3	AZOBENZENE	720	ug/kg	720	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3600	ug/kg	3600	U
86-30-6	N-NITROSODIPHENYLAMINE	720	ug/kg	720	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	720	ug/kg	720	U
118-74-1	HEXACHLOROBENZENE	720	ug/kg	720	U
87-86-5	PENTACHLOROPHENOL	3600	ug/kg	3600	U
85-01-8	PHENANTHRENE	720	ug/kg	720	U
120-12-7	ANTHRACENE	720	ug/kg	720	U
86-74-8	CARBAZOLE	720	ug/kg	720	U
84-74-2	DI-N-BUTYL PHTHALATE	91	ug/kg	720	J,B
206-44-0	FLUORANTHENE	720	ug/kg	720	U
129-00-0	PYRENE	720	ug/kg	720	U
85-68-7	BUTYL BENZYL PHTHALATE	720	ug/kg	720	U
56-55-3	BENZO(A)ANTHRACENE	720	ug/kg	720	U
91-94-1	3,3'-DICHLOROBENZIDINE	3600	ug/kg	3600	U
218-01-9	CHRYSENE	720	ug/kg	720	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	720	ug/kg	720	U
117-84-0	DI-N-OCTYL PHTHALATE	720	ug/kg	720	U
205-99-2	BENZO(B,K)FLUORANTHENE	720	ug/kg	720	U
50-32-8	BENZO(A)PYRENE	720	ug/kg	720	U
193-39-5	INDENO(1,2,3-CD)PYRENE	720	ug/kg	720	U
53-70-3	DIBENZO(A,H)ANTHRACENE	720	ug/kg	720	U
191-24-2	BENZO(G,H,I)PERYLENE	720	ug/kg	720	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S6	**Sample Matrix:** solid	**Date Collected:** 29-Oct-97	**Sample Aliquot:**	30
Lab ID: 9711092-5	**% Moisture:** 6.9	**Date Extracted:** 11-Nov-97	**Final Volume:**	1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:**	2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092		

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1610	ug/kg	2500	64	19 - 113
321-60-8	2-FLUOROBIPHENYL	1010	ug/kg	1670	60	30 - 105
367-12-4	2-FLUOROPHENOL	1240	ug/kg	2500	49	25 - 100
4165-60-0	NITROBENZENE-D5	960	ug/kg	1670	58	31 - 106
13127-88-3	PHENOL-D5	1600	ug/kg	2500	64	24 - 104
1718-51-0	TERPHENYL-D14	1330	ug/kg	1670	80	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S7
Lab ID: 9711092-6

Sample Matrix: solid
% Moisture: 8.7
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	730	ug/kg	730	U	
62-75-9	N-NITROSODIMETHYLAMINE	730	ug/kg	730	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	730	ug/kg	730	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	730	ug/kg	730	U	
95-57-8	2-CHLOROPHENOL	730	ug/kg	730	U	
541-73-1	1,3-DICHLOROBENZENE	730	ug/kg	730	U	
106-46-7	1,4-DICHLOROBENZENE	730	ug/kg	730	U	
95-50-1	1,2-DICHLOROBENZENE	730	ug/kg	730	U	
100-51-6	BENZYL ALCOHOL	730	ug/kg	730	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	730	ug/kg	730	U	
95-48-7	2-METHYLPHENOL	730	ug/kg	730	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	730	ug/kg	730	U	
106-44-5	4-METHYLPHENOL	730	ug/kg	730	U	
67-72-1	HEXACHLOROETHANE	730	ug/kg	730	U	
98-95-3	NITROBENZENE	730	ug/kg	730	U	
78-59-1	ISOPHORONE	730	ug/kg	730	U	
88-75-5	2-NITROPHENOL	730	ug/kg	730	U	
105-67-9	2,4-DIMETHYLPHENOL	730	ug/kg	730	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	730	ug/kg	730	U	
120-83-2	2,4-DICHLOROPHENOL	730	ug/kg	730	U	
65-85-0	BENZOIC ACID	3700	ug/kg	3700	U	
120-82-1	1,2,4-TRICHLOROBENZENE	730	ug/kg	730	U	
91-20-3	NAPHTHALENE	730	ug/kg	730	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	730	ug/kg	730	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	730	ug/kg	730	U	
91-57-6	2-METHYLNAPHTHALENE	730	ug/kg	730	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	730	ug/kg	730	U	
88-06-2	2,4,6-TRICHLOROPHENOL	730	ug/kg	730	U	
95-95-4	2,4,5-TRICHLOROPHENOL	730	ug/kg	730	U	
91-58-7	2-CHLORONAPHTHALENE	730	ug/kg	730	U	
88-74-4	2-NITROANILINE	3700	ug/kg	3700	U	
131-11-3	DIMETHYL PHTHALATE	730	ug/kg	730	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S7
Lab ID: 9711092-6

Sample Matrix: solid
% Moisture: 8.7
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	730	ug/kg	730	U
208-96-8	ACENAPHTHYLENE	730	ug/kg	730	U
99-09-2	3-NITROANILINE	3700	ug/kg	3700	U
83-32-9	ACENAPHTHENE	730	ug/kg	730	U
51-28-5	2,4-DINITROPHENOL	3700	ug/kg	3700	U
100-02-7	4-NITROPHENOL	3700	ug/kg	3700	U
132-64-9	DIBENZOFURAN	730	ug/kg	730	U
121-14-2	2,4-DINITROTOLUENE	730	ug/kg	730	U
84-66-2	DIETHYL PHTHALATE	730	ug/kg	730	U
86-73-7	FLUORENE	730	ug/kg	730	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	730	ug/kg	730	U
100-01-6	4-NITROANILINE	3700	ug/kg	3700	U
103-33-3	AZOBENZENE	730	ug/kg	730	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3700	ug/kg	3700	U
86-30-6	N-NITROSODIPHENYLAMINE	730	ug/kg	730	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	730	ug/kg	730	U
118-74-1	HEXACHLOROBENZENE	730	ug/kg	730	U
87-86-5	PENTACHLOROPHENOL	3700	ug/kg	3700	U
85-01-8	PHENANTHRENE	730	ug/kg	730	U
120-12-7	ANTHRACENE	730	ug/kg	730	U
86-74-8	CARBAZOLE	730	ug/kg	730	U
84-74-2	DI-N-BUTYL PHTHALATE	140	ug/kg	730	J,B
206-44-0	FLUORANTHENE	730	ug/kg	730	U
129-00-0	PYRENE	730	ug/kg	730	U
85-68-7	BUTYL BENZYL PHTHALATE	730	ug/kg	730	U
56-55-3	BENZO(A)ANTHRACENE	730	ug/kg	730	U
91-94-1	3,3'-DICHLOROBENZIDINE	3700	ug/kg	3700	U
218-01-9	CHRYSENE	730	ug/kg	730	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	730	ug/kg	730	U
117-84-0	DI-N-OCTYL PHTHALATE	730	ug/kg	730	U
205-99-2	BENZO(B,K)FLUORANTHENE	730	ug/kg	730	U
50-32-8	BENZO(A)PYRENE	730	ug/kg	730	U
193-39-5	INDENO(1,2,3-CD)PYRENE	730	ug/kg	730	U
53-70-3	DIBENZO(A,H)ANTHRACENE	730	ug/kg	730	U
191-24-2	BENZO(G,H,I)PERYLENE	730	ug/kg	730	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S7	**Sample Matrix:** solid	**Date Collected:** 29-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-6	**% Moisture:** 8.7	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1700	ug/kg	2500	68	19 - 113
321-60-8	2-FLUOROBIPHENYL	1110	ug/kg	1670	67	30 - 105
367-12-4	2-FLUOROPHENOL	1460	ug/kg	2500	58	25 - 100
4165-60-0	NITROBENZENE-D5	972	ug/kg	1670	58	31 - 106
13127-88-3	PHENOL-D5	1750	ug/kg	2500	70	24 - 104
1718-51-0	TERPHENYL-D14	1610	ug/kg	1670	97	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-1 (upper)
Lab ID: 9711092-9

Sample Matrix: solid
% Moisture: 4.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	700	ug/kg	700	U	
62-75-9	N-NITROSODIMETHYLAMINE	700	ug/kg	700	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	700	ug/kg	700	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	700	ug/kg	700	U	
95-57-8	2-CHLOROPHENOL	700	ug/kg	700	U	
541-73-1	1,3-DICHLOROBENZENE	700	ug/kg	700	U	
106-46-7	1,4-DICHLOROBENZENE	700	ug/kg	700	U	
95-50-1	1,2-DICHLOROBENZENE	700	ug/kg	700	U	
100-51-6	BENZYL ALCOHOL	700	ug/kg	700	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	700	ug/kg	700	U	
95-48-7	2-METHYLPHENOL	700	ug/kg	700	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	700	ug/kg	700	U	
106-44-5	4-METHYLPHENOL	700	ug/kg	700	U	
67-72-1	HEXACHLOROETHANE	700	ug/kg	700	U	
98-95-3	NITROBENZENE	700	ug/kg	700	U	
78-59-1	ISOPHORONE	700	ug/kg	700	U	
88-75-5	2-NITROPHENOL	700	ug/kg	700	U	
105-67-9	2,4-DIMETHYLPHENOL	700	ug/kg	700	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	700	ug/kg	700	U	
120-83-2	2,4-DICHLOROPHENOL	700	ug/kg	700	U	
65-85-0	BENZOIC ACID	3500	ug/kg	3500	U	
120-82-1	1,2,4-TRICHLOROBENZENE	700	ug/kg	700	U	
91-20-3	NAPHTHALENE	700	ug/kg	700	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	700	ug/kg	700	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	700	ug/kg	700	U	
91-57-6	2-METHYLNAPHTHALENE	700	ug/kg	700	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	700	ug/kg	700	U	
88-06-2	2,4,6-TRICHLOROPHENOL	700	ug/kg	700	U	
95-95-4	2,4,5-TRICHLOROPHENOL	700	ug/kg	700	U	
91-58-7	2-CHLORONAPHTHALENE	700	ug/kg	700	U	
88-74-4	2-NITROANILINE	3500	ug/kg	3500	U	
131-11-3	DIMETHYL PHTHALATE	700	ug/kg	700	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-1 (upper)
Lab ID: 9711092-9

Sample Matrix: solid
% Moisture: 4.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	700	ug/kg	700	U
208-96-8	ACENAPHTHYLENE	700	ug/kg	700	U
99-09-2	3-NITROANILINE	3500	ug/kg	3500	U
83-32-9	ACENAPHTHENE	700	ug/kg	700	U
51-28-5	2,4-DINITROPHENOL	3500	ug/kg	3500	U
100-02-7	4-NITROPHENOL	3500	ug/kg	3500	U
132-64-9	DIBENZOFURAN	700	ug/kg	700	U
121-14-2	2,4-DINITROTOLUENE	700	ug/kg	700	U
84-66-2	DIETHYL PHTHALATE	700	ug/kg	700	U
86-73-7	FLUORENE	700	ug/kg	700	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	700	ug/kg	700	U
100-01-6	4-NITROANILINE	3500	ug/kg	3500	U
103-33-3	AZOBENZENE	700	ug/kg	700	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3500	ug/kg	3500	U
86-30-6	N-NITROSODIPHENYLAMINE	700	ug/kg	700	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	700	ug/kg	700	U
118-74-1	HEXACHLOROBENZENE	700	ug/kg	700	U
87-86-5	PENTACHLOROPHENOL	3500	ug/kg	3500	U
85-01-8	PHENANTHRENE	700	ug/kg	700	U
120-12-7	ANTHRACENE	700	ug/kg	700	U
86-74-8	CARBAZOLE	700	ug/kg	700	U
84-74-2	DI-N-BUTYL PHTHALATE	87	ug/kg	700	J,B
206-44-0	FLUORANTHENE	700	ug/kg	700	U
129-00-0	PYRENE	700	ug/kg	700	U
85-68-7	BUTYL BENZYL PHTHALATE	700	ug/kg	700	U
56-55-3	BENZO(A)ANTHRACENE	700	ug/kg	700	U
91-94-1	3,3'-DICHLOROBENZIDINE	3500	ug/kg	3500	U
218-01-9	CHRYSENE	700	ug/kg	700	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	700	ug/kg	700	U
117-84-0	DI-N-OCTYL PHTHALATE	700	ug/kg	700	U
205-99-2	BENZO(B,K)FLUORANTHENE	700	ug/kg	700	U
50-32-8	BENZO(A)PYRENE	700	ug/kg	700	U
193-39-5	INDENO(1,2,3-CD)PYRENE	700	ug/kg	700	U
53-70-3	DIBENZO(A,H)ANTHRACENE	700	ug/kg	700	U
191-24-2	BENZO(G,H,I)PERYLENE	700	ug/kg	700	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-1 (upper)	**Sample Matrix:** solid	**Date Collected:** 29-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-9	**% Moisture:** 4.9	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1910	ug/kg	2500	76	19 - 113
321-60-8	2-FLUOROBIPHENYL	1160	ug/kg	1670	70	30 - 105
367-12-4	2-FLUOROPHENOL	1470	ug/kg	2500	59	25 - 100
4165-60-0	NITROBENZENE-D5	1090	ug/kg	1670	66	31 - 106
13127-88-3	PHENOL-D5	1790	ug/kg	2500	72	24 - 104
1718-51-0	TERPHENYL-D14	1830	ug/kg	1670	110	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-2 (lower)
Lab ID: 9711092-10

Sample Matrix: solid
% Moisture: 7.8
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	720	ug/kg	720	U	
62-75-9	N-NITROSODIMETHYLAMINE	720	ug/kg	720	U	
62-53-3	ANILINE	1800	ug/kg	1800	U	
108-95-2	PHENOL	720	ug/kg	720	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	720	ug/kg	720	U	
95-57-8	2-CHLOROPHENOL	720	ug/kg	720	U	
541-73-1	1,3-DICHLOROBENZENE	720	ug/kg	720	U	
106-46-7	1,4-DICHLOROBENZENE	720	ug/kg	720	U	
95-50-1	1,2-DICHLOROBENZENE	720	ug/kg	720	U	
100-51-6	BENZYL ALCOHOL	720	ug/kg	720	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	720	ug/kg	720	U	
95-48-7	2-METHYLPHENOL	720	ug/kg	720	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	720	ug/kg	720	U	
106-44-5	4-METHYLPHENOL	720	ug/kg	720	U	
67-72-1	HEXACHLOROETHANE	720	ug/kg	720	U	
98-95-3	NITROBENZENE	720	ug/kg	720	U	
78-59-1	ISOPHORONE	720	ug/kg	720	U	
88-75-5	2-NITROPHENOL	720	ug/kg	720	U	
105-67-9	2,4-DIMETHYLPHENOL	720	ug/kg	720	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	720	ug/kg	720	U	
120-83-2	2,4-DICHLOROPHENOL	720	ug/kg	720	U	
65-85-0	BENZOIC ACID	3600	ug/kg	3600	U	
120-82-1	1,2,4-TRICHLOROBENZENE	720	ug/kg	720	U	
91-20-3	NAPHTHALENE	720	ug/kg	720	U	
106-47-8	4-CHLOROANILINE	1800	ug/kg	1800	U	
87-68-3	HEXACHLOROBUTADIENE	720	ug/kg	720	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	720	ug/kg	720	U	
91-57-6	2-METHYLNAPHTHALENE	720	ug/kg	720	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	720	ug/kg	720	U	
88-06-2	2,4,6-TRICHLOROPHENOL	720	ug/kg	720	U	
95-95-4	2,4,5-TRICHLOROPHENOL	720	ug/kg	720	U	
91-58-7	2-CHLORONAPHTHALENE	720	ug/kg	720	U	
88-74-4	2-NITROANILINE	3600	ug/kg	3600	U	
131-11-3	DIMETHYL PHTHALATE	720	ug/kg	720	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-2 (lower)
Lab ID: 9711092-10

Sample Matrix: solid
% Moisture: 7.8
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	720	ug/kg	720	U
208-96-8	ACENAPHTHYLENE	720	ug/kg	720	U
99-09-2	3-NITROANILINE	3600	ug/kg	3600	U
83-32-9	ACENAPHTHENE	720	ug/kg	720	U
51-28-5	2,4-DINITROPHENOL	3600	ug/kg	3600	U
100-02-7	4-NITROPHENOL	3600	ug/kg	3600	U
132-64-9	DIBENZOFURAN	720	ug/kg	720	U
121-14-2	2,4-DINITROTOLUENE	720	ug/kg	720	U
84-66-2	DIETHYL PHTHALATE	720	ug/kg	720	U
86-73-7	FLUORENE	720	ug/kg	720	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	720	ug/kg	720	U
100-01-6	4-NITROANILINE	3600	ug/kg	3600	U
103-33-3	AZOBENZENE	720	ug/kg	720	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3600	ug/kg	3600	U
86-30-6	N-NITROSODIPHENYLAMINE	720	ug/kg	720	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	720	ug/kg	720	U
118-74-1	HEXACHLOROBENZENE	720	ug/kg	720	U
87-86-5	PENTACHLOROPHENOL	3600	ug/kg	3600	U
85-01-8	PHENANTHRENE	720	ug/kg	720	U
120-12-7	ANTHRACENE	720	ug/kg	720	U
86-74-8	CARBAZOLE	720	ug/kg	720	U
84-74-2	DI-N-BUTYL PHTHALATE	87	ug/kg	720	J,B
206-44-0	FLUORANTHENE	720	ug/kg	720	U
129-00-0	PYRENE	720	ug/kg	720	U
85-68-7	BUTYL BENZYL PHTHALATE	720	ug/kg	720	U
56-55-3	BENZO(A)ANTHRACENE	720	ug/kg	720	U
91-94-1	3,3'-DICHLOROBENZIDINE	3600	ug/kg	3600	U
218-01-9	CHRYSENE	720	ug/kg	720	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	720	ug/kg	720	U
117-84-0	DI-N-OCTYL PHTHALATE	720	ug/kg	720	U
205-99-2	BENZO(B,K)FLUORANTHENE	720	ug/kg	720	U
50-32-8	BENZO(A)PYRENE	720	ug/kg	720	U
193-39-5	INDENO(1,2,3-CD)PYRENE	720	ug/kg	720	U
53-70-3	DIBENZO(A,H)ANTHRACENE	720	ug/kg	720	U
191-24-2	BENZO(G,H,I)PERYLENE	720	ug/kg	720	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S10-2 (lower)	**Sample Matrix:** solid	**Date Collected:** 30-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-10	**% Moisture:** 7.8	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	1860	ug/kg	2500	74	19 - 113
321-60-8	2-FLUOROBIPHENYL	1160	ug/kg	1670	70	30 - 105
367-12-4	2-FLUOROPHENOL	1590	ug/kg	2500	64	25 - 100
4165-60-0	NITROBENZENE-D5	1080	ug/kg	1670	65	31 - 106
13127-88-3	PHENOL-D5	1850	ug/kg	2500	74	24 - 104
1718-51-0	TERPHENYL-D14	1970	ug/kg	1670	118	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: C-1 (near drain)
Lab ID: 9711092-15

Sample Matrix: solid
% Moisture: 15
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 10
Dilution: 10

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	39000	ug/kg	39000	U	
62-75-9	N-NITROSODIMETHYLAMINE	39000	ug/kg	39000	U	
62-53-3	ANILINE	98000	ug/kg	98000	U	
108-95-2	PHENOL	49000	ug/kg	39000		
111-44-4	BIS(2-CHLOROETHYL)ETHER	39000	ug/kg	39000	U	
95-57-8	2-CHLOROPHENOL	39000	ug/kg	39000	U	
541-73-1	1,3-DICHLOROBENZENE	39000	ug/kg	39000	U	
106-46-7	1,4-DICHLOROBENZENE	39000	ug/kg	39000	U	
95-50-1	1,2-DICHLOROBENZENE	39000	ug/kg	39000	U	
100-51-6	BENZYL ALCOHOL	39000	ug/kg	39000	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	39000	ug/kg	39000	U	
95-48-7	2-METHYLPHENOL	39000	ug/kg	39000	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	39000	ug/kg	39000	U	
106-44-5	4-METHYLPHENOL	39000	ug/kg	39000	U	
67-72-1	HEXACHLOROETHANE	39000	ug/kg	39000	U	
98-95-3	NITROBENZENE	39000	ug/kg	39000	U	
78-59-1	ISOPHORONE	39000	ug/kg	39000	U	
88-75-5	2-NITROPHENOL	39000	ug/kg	39000	U	
105-67-9	2,4-DIMETHYLPHENOL	39000	ug/kg	39000	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	39000	ug/kg	39000	U	
120-83-2	2,4-DICHLOROPHENOL	39000	ug/kg	39000	U	
65-85-0	BENZOIC ACID	200000	ug/kg	200000	U	
120-82-1	1,2,4-TRICHLOROBENZENE	39000	ug/kg	39000	U	
91-20-3	NAPHTHALENE	39000	ug/kg	39000	U	
106-47-8	4-CHLOROANILINE	98000	ug/kg	98000	U	
87-68-3	HEXACHLOROBUTADIENE	39000	ug/kg	39000	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	39000	ug/kg	39000	U	
91-57-6	2-METHYLNAPHTHALENE	39000	ug/kg	39000	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	39000	ug/kg	39000	U	
88-06-2	2,4,6-TRICHLOROPHENOL	39000	ug/kg	39000	U	
95-95-4	2,4,5-TRICHLOROPHENOL	39000	ug/kg	39000	U	
91-58-7	2-CHLORONAPHTHALENE	39000	ug/kg	39000	U	
88-74-4	2-NITROANILINE	200000	ug/kg	200000	U	
131-11-3	DIMETHYL PHTHALATE	39000	ug/kg	39000	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: C-1 (near drain)
Lab ID: 9711092-15

Sample Matrix: solid
% Moisture: 15
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 10
Dilution: 10

606-20-2	2,6-DINITROTOLUENE	39000	ug/kg	39000	U
208-96-8	ACENAPHTHYLENE	39000	ug/kg	39000	U
99-09-2	3-NITROANILINE	200000	ug/kg	200000	U
83-32-9	ACENAPHTHENE	39000	ug/kg	39000	U
51-28-5	2,4-DINITROPHENOL	200000	ug/kg	200000	U
100-02-7	4-NITROPHENOL	200000	ug/kg	200000	U
132-64-9	DIBENZOFURAN	39000	ug/kg	39000	U
121-14-2	2,4-DINITROTOLUENE	39000	ug/kg	39000	U
84-66-2	DIETHYL PHTHALATE	39000	ug/kg	39000	U
86-73-7	FLUORENE	39000	ug/kg	39000	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	39000	ug/kg	39000	U
100-01-6	4-NITROANILINE	200000	ug/kg	200000	U
103-33-3	AZOBENZENE	39000	ug/kg	39000	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	200000	ug/kg	200000	U
86-30-6	N-NITROSODIPHENYLAMINE	39000	ug/kg	39000	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	39000	ug/kg	39000	U
118-74-1	HEXACHLOROBENZENE	39000	ug/kg	39000	U
87-86-5	PENTACHLOROPHENOL	200000	ug/kg	200000	U
85-01-8	PHENANTHRENE	4600	ug/kg	39000	J
120-12-7	ANTHRACENE	39000	ug/kg	39000	U
86-74-8	CARBAZOLE	39000	ug/kg	39000	U
84-74-2	DI-N-BUTYL PHTHALATE	39000	ug/kg	39000	U
206-44-0	FLUORANTHENE	39000	ug/kg	39000	U
129-00-0	PYRENE	39000	ug/kg	39000	U
85-68-7	BUTYL BENZYL PHTHALATE	39000	ug/kg	39000	U
56-55-3	BENZO(A)ANTHRACENE	39000	ug/kg	39000	U
91-94-1	3,3'-DICHLOROBENZIDINE	200000	ug/kg	200000	U
218-01-9	CHRYSENE	39000	ug/kg	39000	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	13000	ug/kg	39000	J
117-84-0	DI-N-OCTYL PHTHALATE	39000	ug/kg	39000	U
205-99-2	BENZO(B,K)FLUORANTHENE	39000	ug/kg	39000	U
50-32-8	BENZO(A)PYRENE	39000	ug/kg	39000	U
193-39-5	INDENO(1,2,3-CD)PYRENE	39000	ug/kg	39000	U
53-70-3	DIBENZO(A,H)ANTHRACENE	39000	ug/kg	39000	U
191-24-2	BENZO(G,H,I)PERYLENE	39000	ug/kg	39000	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: C-1 (near drain)
Lab ID: 9711092-15

Sample Matrix: solid
% Moisture: 15
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 30-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 10
Dilution: 10

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	10400	ug/kg	25000	42	19 - 113
321-60-8	2-FLUOROBIPHENYL	12300	ug/kg	16700	74	30 - 105
367-12-4	2-FLUOROPHENOL	17800	ug/kg	25000	71	25 - 100
4165-60-0	NITROBENZENE-D5	13500	ug/kg	16700	81	31 - 106
13127-88-3	PHENOL-D5	21200	ug/kg	25000	85	24 - 104
1718-51-0	TERPHENYL-D14	18300	ug/kg	16700	110	18 - 112

U = Less than the Reporting Limit

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S4
Lab ID: 9711092-18

Sample Matrix: solid
% Moisture: 3.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

CASNO	Target Analyte	Result	Units	Reporting Limit	Result Qualifier	Result Footnote
110-86-1	PYRIDINE	690	ug/kg	690	U	
62-75-9	N-NITROSODIMETHYLAMINE	690	ug/kg	690	U	
62-53-3	ANILINE	1700	ug/kg	1700	U	
108-95-2	PHENOL	690	ug/kg	690	U	
111-44-4	BIS(2-CHLOROETHYL)ETHER	690	ug/kg	690	U	
95-57-8	2-CHLOROPHENOL	690	ug/kg	690	U	
541-73-1	1,3-DICHLOROBENZENE	690	ug/kg	690	U	
106-46-7	1,4-DICHLOROBENZENE	690	ug/kg	690	U	
95-50-1	1,2-DICHLOROBENZENE	690	ug/kg	690	U	
100-51-6	BENZYL ALCOHOL	690	ug/kg	690	U	
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	690	ug/kg	690	U	
95-48-7	2-METHYLPHENOL	690	ug/kg	690	U	
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	690	ug/kg	690	U	
106-44-5	4-METHYLPHENOL	690	ug/kg	690	U	
67-72-1	HEXACHLOROETHANE	690	ug/kg	690	U	
98-95-3	NITROBENZENE	690	ug/kg	690	U	
78-59-1	ISOPHORONE	690	ug/kg	690	U	
88-75-5	2-NITROPHENOL	690	ug/kg	690	U	
105-67-9	2,4-DIMETHYLPHENOL	690	ug/kg	690	U	
111-91-1	BIS(2-CHLOROETHOXY)METHANE	690	ug/kg	690	U	
120-83-2	2,4-DICHLOROPHENOL	690	ug/kg	690	U	
65-85-0	BENZOIC ACID	3500	ug/kg	3500	U	
120-82-1	1,2,4-TRICHLOROBENZENE	690	ug/kg	690	U	
91-20-3	NAPHTHALENE	690	ug/kg	690	U	
106-47-8	4-CHLOROANILINE	1700	ug/kg	1700	U	
87-68-3	HEXACHLOROBUTADIENE	690	ug/kg	690	U	
59-50-7	4-CHLORO-3-METHYLPHENOL	690	ug/kg	690	U	
91-57-6	2-METHYLNAPHTHALENE	690	ug/kg	690	U	
77-47-4	HEXACHLOROCYCLOPENTADIENE	690	ug/kg	690	U	
88-06-2	2,4,6-TRICHLOROPHENOL	690	ug/kg	690	U	
95-95-4	2,4,5-TRICHLOROPHENOL	690	ug/kg	690	U	
91-58-7	2-CHLORONAPHTHALENE	690	ug/kg	690	U	
88-74-4	2-NITROANILINE	3500	ug/kg	3500	U	
131-11-3	DIMETHYL PHTHALATE	690	ug/kg	690	U	

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S4
Lab ID: 9711092-18

Sample Matrix: solid
% Moisture: 3.9
Cleanup Method: NONE
Report Basis: DRY WEIGHT

Date Collected: 29-Oct-97
Date Extracted: 11-Nov-97
Date Analyzed: 14-Nov-97
Prep Batch: sv11092

Sample Aliquot: 30
Final Volume: 1
Dilution: 2

606-20-2	2,6-DINITROTOLUENE	690	ug/kg	690	U
208-96-8	ACENAPHTHYLENE	690	ug/kg	690	U
99-09-2	3-NITROANILINE	3500	ug/kg	3500	U
83-32-9	ACENAPHTHENE	690	ug/kg	690	U
51-28-5	2,4-DINITROPHENOL	3500	ug/kg	3500	U
100-02-7	4-NITROPHENOL	3500	ug/kg	3500	U
132-64-9	DIBENZOFURAN	690	ug/kg	690	U
121-14-2	2,4-DINITROTOLUENE	690	ug/kg	690	U
84-66-2	DIETHYL PHTHALATE	690	ug/kg	690	U
86-73-7	FLUORENE	690	ug/kg	690	U
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	690	ug/kg	690	U
100-01-6	4-NITROANILINE	3500	ug/kg	3500	U
103-33-3	AZOBENZENE	690	ug/kg	690	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	3500	ug/kg	3500	U
86-30-6	N-NITROSODIPHENYLAMINE	690	ug/kg	690	U
101-55-3	4-BROMOPHENYL PHENYL ETHER	690	ug/kg	690	U
118-74-1	HEXACHLOROBENZENE	690	ug/kg	690	U
87-86-5	PENTACHLOROPHENOL	3500	ug/kg	3500	U
85-01-8	PHENANTHRENE	690	ug/kg	690	U
120-12-7	ANTHRACENE	690	ug/kg	690	U
86-74-8	CARBAZOLE	690	ug/kg	690	U
84-74-2	DI-N-BUTYL PHTHALATE	110	ug/kg	690	J,B
206-44-0	FLUORANTHENE	690	ug/kg	690	U
129-00-0	PYRENE	690	ug/kg	690	U
85-68-7	BUTYL BENZYL PHTHALATE	690	ug/kg	690	U
56-55-3	BENZO(A)ANTHRACENE	690	ug/kg	690	U
91-94-1	3,3'-DICHLOROBENZIDINE	3500	ug/kg	3500	U
218-01-9	CHRYSENE	690	ug/kg	690	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	690	ug/kg	690	U
117-84-0	DI-N-OCTYL PHTHALATE	690	ug/kg	690	U
205-99-2	BENZO(B,K)FLUORANTHENE	690	ug/kg	690	U
50-32-8	BENZO(A)PYRENE	690	ug/kg	690	U
193-39-5	INDENO(1,2,3-CD)PYRENE	690	ug/kg	690	U
53-70-3	DIBENZO(A,H)ANTHRACENE	690	ug/kg	690	U
191-24-2	BENZO(G,H,I)PERYLENE	690	ug/kg	690	U

Semi-volatile Organics by GC/MS

Method SW8270

Lab Name: Paragon Analytics, Inc.
Work Order Number: 9711092
Client Name: Washington State Dept. of Ecol
ClientProject ID: RCRA Closure of 303-K >

Reported on: Tuesday, November 18, 1997

Field ID: S4	**Sample Matrix:** solid	**Date Collected:** 29-Oct-97	**Sample Aliquot:** 30
Lab ID: 9711092-18	**% Moisture:** 3.9	**Date Extracted:** 11-Nov-97	**Final Volume:** 1
	Cleanup Method: NONE	**Date Analyzed:** 14-Nov-97	**Dilution:** 2
	Report Basis: DRY WEIGHT	**Prep Batch:** sv11092	

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Units	Spike Amount	Percent Recovery	Control Limits
118-79-6	2,4,6-TRIBROMOPHENOL	2160	ug/kg	2500	86	19 - 113
321-60-8	2-FLUOROBIPHENYL	1270	ug/kg	1670	76	30 - 105
367-12-4	2-FLUOROPHENOL	1660	ug/kg	2500	66	25 - 100
4165-60-0	NITROBENZENE-D5	1230	ug/kg	1670	74	31 - 106
13127-88-3	PHENOL-D5	1910	ug/kg	2500	76	24 - 104
1718-51-0	TERPHENYL-D14	1810	ug/kg	1670	109	18 - 112

U = Less than the Reporting Limit

APPENDIX C

FIELD CHANGE AGREEMENT

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FIELD CHANGES TO 303-K STORAGE FACILITY SAMPLING AND ANALYSIS PLAN
FOR THE SAMPLING EVENT OF OCTOBER 29 AND 30, 1997

Field changes made to the *303-K Storage Facility Sampling and Analysis Plan* (HNF-SD-ENV-AP-005, Revision 0) during the sampling event of October 29 and 30, 1997:

1. Sample location S7 was moved east (about 0.3 meters) from outside the 303-K Storage Facility fence to inside the fence. The original sample location was in the dirt strip between the 303-K fence and the wall of the south half of the 303-K Building. The move was prompted by concerns about possible radiological contamination under the asphalt. This sample location was located outside the fence to access the soil at the edge of the Large Asphalt Pad. No radiological contamination above background was found at this sample location.

2. Sample location S10 was relocated about 0.45 meters south and 0.15 meters east of the original location selected. This sample was relocated due to rain water collecting in the sample hole.

3. The field screening by immunoassay for pentachlorophenol (PCP) was halted after 8 samples. The results were providing inconsistent data. The test kit had minimum detect limits of 1 ppm, 10 ppm, and 100 ppm. Examples of the inconsistent results include:

   S7: No hits at 1 ppm or 10 ppm, but positive results at 100 ppm.

   S6 Duplicate: Hits at 1 ppm and 100 ppm but not hits at 10 ppm.

   As a result of the inconsistencies, BWHC (J. A. Remaize) and WMH (J. G. Adler) determined that the test was not providing useful information and that the samples for semi-volatile organic analysis would have to be sent in to the off-site laboratory. At this point field screening was stopped.

4. At sample location C2, due to the large area of concrete that needed to be scabbled, there was insufficient room to collect a duplicate sample from an adjacent location. Therefore, C2 duplicate sample was collected from the same material as the C2 sample.

FIELD CHANGES TO 303-K STORAGE FACILITY SAMPLING AND ANALYSIS PLAN
FOR THE SAMPLING EVENT OF OCTOBER 29 AND 30, 1997

The undersigned indicate by their signatures that these are the field changes made during the above dated sampling event.

Ellen Mattlin Date: 11/25/97
Ellen M. Mattlin, Project Manager, RL

Joan K. Bartz Date: 1-20-98
Joan K. Bartz, Ecology Chemist, Washington State Department of Ecology

Contractor/Sub-Contractor Representatives

Fred A. Ruck III Date: 11/25/97
Fred A. Ruck III, FDH

Ivan L. Metcalf Date: 12/3/97
Ivan L. Metcalf, BWHC

Jason G. Adler Date: 11/25/97
Jason G. Adler, WMH

APPENDIX D

IMMUNOASSAY KIT INSTRUCTIONS

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ENSYS INC.
ENVIRONMENTAL PRODUCTS

PENTA RISC® SOIL TEST SYSTEM

RAPID IMMUNOASSAY SCREEN

User's Guide

Multiple Level Test

This method correctly identifies 95% of samples containing 0.5 ppm pentachlorophenol (PCP). A sample that develops less color than the standard is interpreted as positive. It contains PCP. A sample that develops more color than the standard is interpreted as negative. It contains less than 0.5 ppm PCP.

IMPORTANT NOTICE

This test system should be used only under the supervision of a technically qualified individual who is capable of understanding any potential health and environmental risks of this product as identified in the product literature. The components must only be used for the analysis of soil samples for the presence of pentachlorophenol. After use, the kits must be disposed of in accordance with applicable federal and local regulations.

PENTA RISC SOIL TEST TROUBLESHOOTER GUIDE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

Wash Step - Lack of vigorous washing may result in false positives or negatives depending on whether the wash error was committed on standard or sample tubes.
Solution: make sure that the operator washes four times vigorously.

Pipet Calibration - An out-of-calibration pipet may result in false positives or negatives depending on whether the amount is greater or less than the specified transfer volume.
Solution: Check the calibration at least daily and after any extreme mechanical shock (such as dropping). An indication that the pipet is out of calibration is if the gold barrel is loose and will turn. (When set on 30µl there should be about 1/4 of an inch between the white plunger and the end of the clear pipet tip.)

Air bubbles in the pipet - The presence of air bubbles in the pipet tip when transferring extracts may result in false positives or negatives depending on whether the error was committed on standard or sample tubes.
Solution: Quickly examine the pipet tip each time an aliquot is withdrawn and go back to the source and take another aliquot to displace the air bubble if necessary.

Mixing - Lack of thorough mixing, when instructed, can cause inconsistent results.
Solution: Observe the mixing times in the instructions and mix with sufficient force to ensure homogeneity.

Timing - It is important to follow the timing steps in the instructions carefully. The incubation ste in the antibody tubes can vary a bit without harm to the test. The color development step timing is critical and should be no less than 2 minutes and no greater than 3 minutes.

Wiping the Tubes - Wiping of the tubes should be done before they are read in the spectrophotometer because smudges and fingerprints on the tubes can give potentially false negative readings.

Mixing Lot #'s - Never mix lots! Each kit's components are matched together for optimal performance and may give inaccurate results with the components from other kits. Also, the user must NEVER mix components from different types of kits (ex: Petro kit buffer can't be used with a PCP kit.)

Storage and Operating Temperatures. - Temperature requirements are very important and should be strictly adhered to. This test kit should be stored at less than 80°F/27°C, and operated between 55°F/13°C and 90°F/32°C.

Shelf Life - Each kit label contains the kit expiration date. To achieve accurate results, kits must be used prior to expiration.

READ TO AVOID COSTLY MISTAKES

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SAMPLE DILUTION PROGRAM

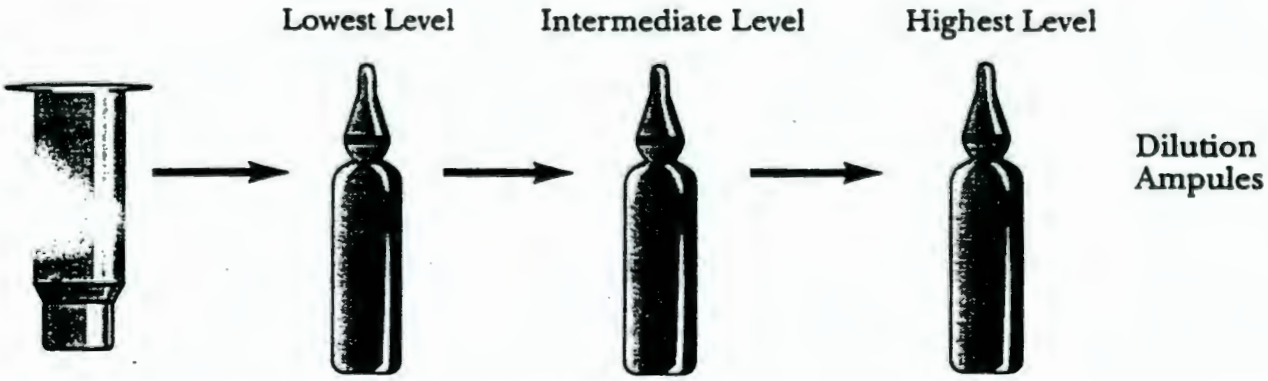
1. The sample dilution procedure on page 6 of the instructions is for 0.5, 5, and 50 ppm detection levels. The following diagram represents the sample dilution procedure for all **other detection levels.**

2. EVERY DILUTION AMPULE PROVIDED MUST BE USED!

If there are any questions concerning the dilution procedure please call Technical Services before running the samples to help avoid costly mistakes.

1-800-242-7472 or 919-941-5509.

EXAMPLE:



Note: Always transfer filtered sample to the dilution labeled with the lowest ppm level and then transfer from it to the next higher level dilution.

10- NEHA

100 ml

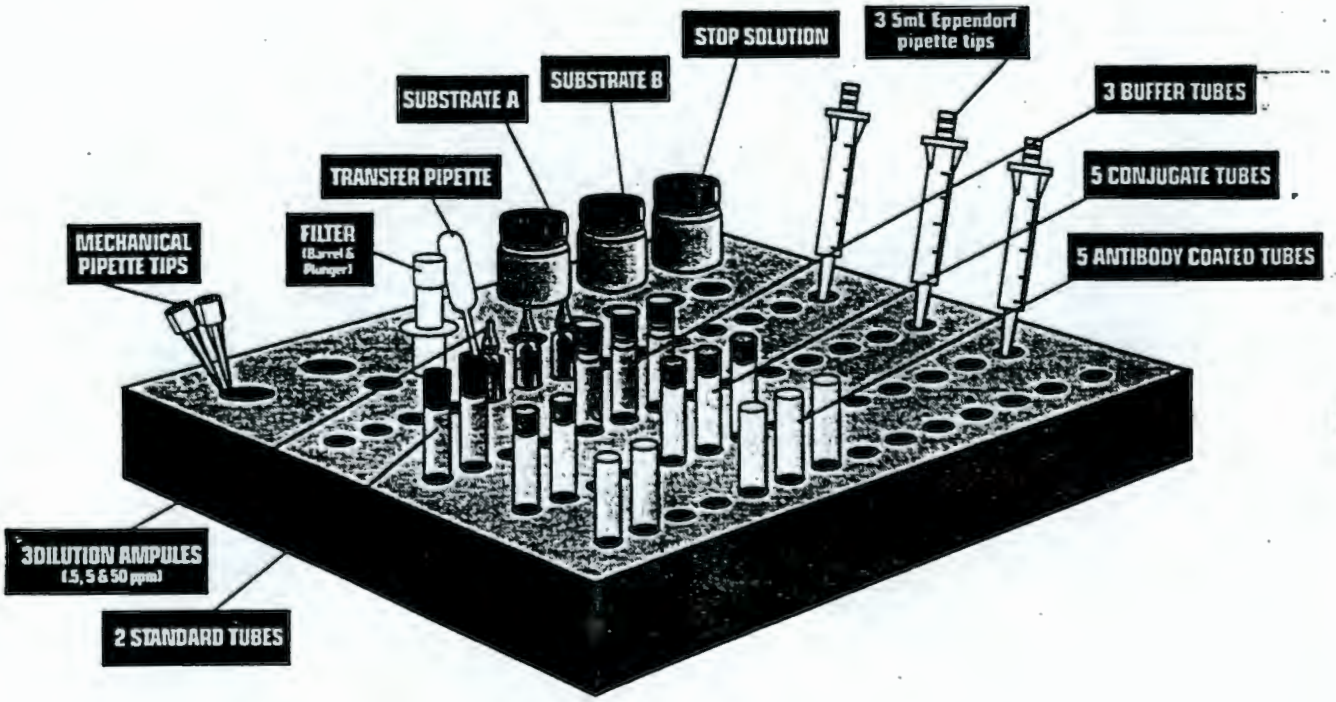
20 ml → 10 GRAMS

WORKSTATION SET-UP

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WORKSTATION SET-UP FOR 1 SAMPLE AT 3 LEVELS

- 2 Mechanical pipet tips
- Stop solution
- 2 PENTA standard Tubes
- 5 Conjugate tubes
- Substrate A
- Filtration barrel & plunger
- 3 blue buffer tubes
- 5 antibody coated tubes
- Substrate B
- Bulb pipet
- 0.5, 5 and 50 ppm dilution ampules
- Eppendorf Tips



READ BEFORE PROCEEDING

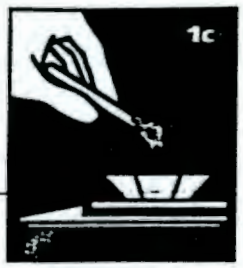
- Follow diagram above to setup workstation.
- Items that you will need that are not provided in the test kit include:
  a permanent marking pen, laboratory tissue (or paper towels), a liquid waste container, and disposable gloves.
- This User's Guide was written for analyzing soil samples for PCP at 0.5, 5 and 50 ppm.
- Label all Eppendorf tips. Tips can be reused for future analyses. Label the first 5mL tip "A", the second tip "B" & the third tip "Stop".

PHASE ONE

EXTRACTION & PREPARATION OF THE SAMPLE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WEIGH SAMPLE

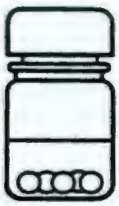


1a Place unused weigh boat on pan balance.

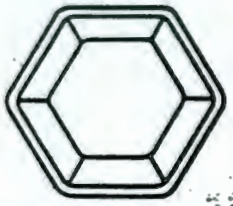
1b Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.

1c Weigh out 10 +/- 0.1 grams of soil.

1d If balance turns off prior to completing weighing, use empty weigh boat to retare, then continue.



Methanol Extraction Jar



Weigh Boat

Pan balance

Wooden spatula

EXTRACT PCP

2a Using wooden spatula, transfer 10 grams of soil from weigh boat into extraction jar containing Methanol.

2b Recap extraction jar tightly and shake vigorously for one minute.

2c Allow to settle for one minute.

Repeat steps **1a - 2c** for each sample to be tested.

Sample extraction jar

FILTER SAMPLE

3a Disassemble filtration plunger from filtration barrel.

3b Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer **at least ½** bulb capacity into filtration barrel. **Do not use more than one full bulb.**

3c Press plunger firmly into barrel until adequate filtered sample is available (place on table and press if necessary).

Repeat steps **3a - 3c** for each sample to be tested.

Filtration plunger

Bulb pipet

Filtration barrel

PHASE TWO

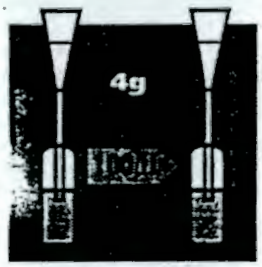
SAMPLE AND STANDARD PREPARATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING

- "Shake tubes" means to thoroughly mix the contents with special care not to spill or splash.

DILUTE AND BUFFER SAMPLE
FOR 0.5, 5 & 50 PPM DETECTION LEVELS
See page 3 for other detection levels



4a Flick or tap to get buffer into the bottom of the ampule. Open dilution ampules.

4b Uncap enough conjugate and buffer tubes for **Samples** and **Standards**.

4c Empty two Penta standard tubes into two conjugate tubes.

4d Empty a blue buffer tube into each remaining conjugate tube for samples.

4e Assemble tip onto mechanical pipet.

4f Withdraw 100 µL of sample from filter unit using mechanical pipet and dispense below the liquid level in **0.5 ppm** dilution ampule. Shake for 5 seconds. Wipe mechanical pipet tip.

4g Withdraw 100 µL of diluted sample from **0.5 ppm** dilution ampule and dispense below the liquid level in the **5 ppm** dilution ampule. Shake 5 seconds. Wipe mechanical pipet tip.

4h Withdraw 100 µL of diluted sample from **5 ppm** dilution ampule and dispense below the liquid level in **50 ppm** dilution ampule. Shake for 5 seconds. Wipe mechanical pipet tip.

4i Withdraw 100 µL of diluted sample from **50 ppm** dilution ampule and dispense below the liquid level in **50 ppm** conjugate tube. Repeat with 5 and .5 ppm test levels.

4j Discard mechanical pipet tip.

Repeat steps **4e - 4i** for each sample to be tested.

4k Mix all conjugate tubes for 5 sec.

Dilution ampule (0.5, 5 & 50 ppm)

Plastic Safety Sleeve

Blue buffer tubes

Conjugate tubes

Mechanical pipet

Mechanical pipet tip

PHASE THREE

THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

TRANSFER FROM CONJUGATE TUBE TO ANTIBODY COATED TUBE

5a. Label the antibody coated tubes with sample identification and test level.

5b. Set timer for 10 minutes.

5c. Working left to right in the workstation:

1. Fit all antibody coated tubes firmly on top of all corresponding conjugate tubes.
2. **Start timer and immediately invert all** connected tube pairs so that the liquid is poured into the antibody coated tubes. Return the tube pairs to the appropriate workstation row making sure the (larger) antibody coated tube is on the bottom.

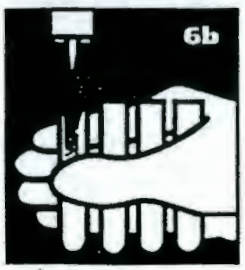
5d. Disconnect and discard the smaller glass conjugate tubes. [It is not important to worry about drops of liquid adhering to lips of tubes].

Antibody coated tubes (contained in resealable "zip-seal" aluminized pouch)

WASH PROCEDURE

- Washing must be done vigorously and with force.
- Place nozzle just above antibody coated tube, squeeze bottle to fill each tube with a vigorous stream and empty into liquid waste container.
- The wash solution is a harmless, dilute solution of detergent. Do not hesitate to wash vigorously even if the solution contacts gloved hands.

WASHING



6a. After the 10 minute incubation period, empty antibody coated tubes into liquid waste container.

6b. Wash antibody coated tubes with wash solution by vigorously filling and emptying a total of 4 times.

6c. Tap antibody coated tubes upside down on paper towels to remove excess liquid. Residual foam in the tubes will not interfere with test results.

Wash Bottle

PHASE THREE

THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

COLOR DEVELOPMENT

7a Set the Eppendorf Repeater on 2, assemble the "A" tip and fill with Substrate A (TMB, yellow label).

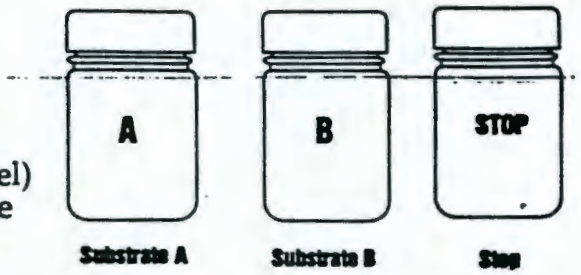
7b Dispense once (200µl) into each antibody coated tube.

7c Set timer for exactly 2 1/2 minutes

7d Assemble "B" tip, fill with Substrate B, (H_2O_2, green label) start timer, and dispense once (200µl) into each antibody coated tube.

7e Shake all tubes for 5 seconds. Solution will turn blue in some or all antibody coated tubes.

7f Assemble "Stop" tip, fill with Stop Solution (red label), and stop reaction at end of 2 1/2 minutes by dispensing once (200µl) into each antibody coated tube.



PHASE FOUR

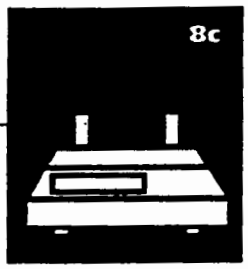
INTERPRETATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SELECT CONSERVATIVE STANDARD

8a Wipe outside of all antibody coated tubes.

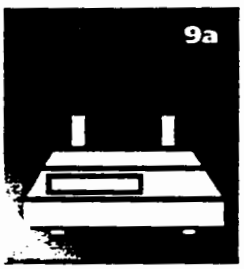
8b Place both **Standard** tubes in photometer.



8c Switch tubes until the photometer reading is negative or zero. Record reading. If reading is greater than - 0.3 in magnitude, results are outside of QC limits. Retest the sample(s).

8d Remove and discard tube in right well. The tube in the left well is the conservative standard.

INTERPRET RESULTS



9a Place **0.5 ppm** sample tubes in right well of photometer and record reading.

If photometer reading is **negative** or zero, PCP is present.

If photometer reading is **positive**, concentration of PCP is less than **0.5 ppm**.

9b Place **5 ppm** tube in right well of photometer and record reading shown on display.

If photometer reading is **negative** or zero, PCP is present.

If photometer reading is **positive**, concentration of PCP is less than **5 ppm**.

9c Same as above for 50ppm.

QUALITY CONTROL

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

How It Works

Standards, Samples, and color-change reagents are added to test tubes coated with a chemical specific to pentachlorophenol. The concentration of pentachlorophenol in an unknown **Sample** is determined by comparing its color intensity with that of a **Standard**.

Note: Pentachlorophenol concentration is inversely proportional to color intensity; the lighter the color development of the sample, the higher the concentration of pentachlorophenol.

Quality Control

Standard precautions for maintaining quality control:

- Do not use reagents or test tubes from one Test System with reagents or test tubes from another Test System.
- Do not use the Test System after its expiration date.
- Each analysis must include 2 **Standards**, with no more than a total of 12 antibody coated tubes.
- Do not exceed incubation periods prescribed by the specific steps.
- Results may not be valid if photometer reading for **Standards** exceeds 0.3 in magnitude.

Storage and Handling Precautions

- Wear protective gloves and eyewear.
- Store kit at room temperature and out of direct sunlight (less than 80°F).
- Keep aluminized pouch (containing unused antibody coated tubes) sealed when not in use.
- If liquid from the extraction jar, or PCP Standard comes into contact with eyes, wash thoroughly with cold water and seek immediate medical attention.
- Operate test at temperatures greater than 13° C/55° F and less than 32° C/90° F.
- After use, dispose of kit components in accordance with applicable federal and local regulations.

System Description

Each Penta RISC® Soil Test System contains enough material to perform twelve complete tests, at two different test levels.

The Penta RISC® Soil Test is divided into four phases. The instructions and notes should be reviewed before proceeding with each phase.

Hotline Assistance

If you need assistance or are missing necessary Test System materials, call toll free: 1-800-242-RISC (7472).

Validation and Warranty Information

Product claims are based on validation studies carried out under controlled conditions. Data has been collected in accordance with valid statistical methods and the product has undergone quality control tests of each manufactured lot.

Pentachlorophenol -free soil and soil containing 0.5 ppm of pentachlorophenol were tested with the EnSys Penta RISC® analytical method. The method correctly identified 95% of these samples.

The company does not guarantee that the results with the Penta RISC® Soil Test System will always agree with instrument-based analytical laboratory methods. All analytical methods, both field and laboratory, need to be subject to the appropriate quality control procedures.

EnSys, Inc. warrants that this product conforms to the descriptions contained herein. No other warranties, whether expressed or implied, including warranties of merchantability and of fitness for a particular purpose shall apply to this product.

EnSys, Inc. neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than such as is expressly set forth herein.

Under no circumstances shall EnSys, Inc. be liable for incidental or consequential damages resulting from the use or handling of this product.

REPEATER PIPET & MECHANICAL PIPET

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

HOW TO OPERATE THE REPEATER PIPET

To Set Or Adjust Volume

To determine the pipetting volume, the dial setting (1-5) is multiplied by the minimum pipetting volume of the tip.

To Assemble Pipet Tip

Slide filling lever down until it stops. Then raise the locking clamp and insert the tip until it clicks into position. Be sure the tip plunger is fully inserted into the barrel before lowering the locking clamp to affix the tip in place.

To Fill Tip

With tip mounted in position on pipet, immerse end of tip into solution. Slide filling lever upward slowly.

To Dispense Sample

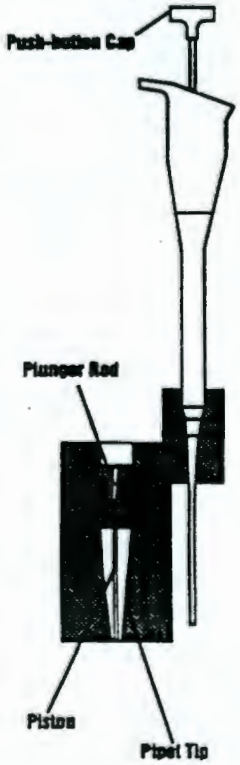
Check the volume selection dial to ensure pipetting volume. Place tip inside test tube so that tip touches the inner wall of tube. Completely depress the pipetting lever.

To Eject Tip

Empty tip of any remaining solution into appropriate container. Raise locking clamp upward, and remove the tip.

For additional information regarding operation and use of repeater, please refer to your Repeater pipet manual.

Mechanical Pipet



Repeater Pipet

HOW TO OPERATE THE MECHANICAL PIPET

To Set Or Adjust Volume

Remove push-button cap and use it to loosen volume lock screw. Turn lower part of push-button to adjust volume up or down. Meter should read "100". Tighten volume lock screw and replace push-button cap.

To Assemble Pipet Tip

Slide larger mounting end of pipet tip onto end of pipet. Holding tip in place, press push-button until plunger rod enters pipet tip. **Ensure no gap exists between piston and plunger rod.**

To Withdraw Sample

With tip mounted in position on pipet, press push-button to first stop and hold it.

Place tip at bottom of liquid sample and slowly release push-button to withdraw measured sample. Ensure that no bubbles exist in liquid portion of sample. If bubbles exist, dispense sample and re-withdraw sample.

To Dispense Sample

Place tip into dispensing vessel (immersing end of the tip if vessel contains liquid) and slowly press push-button to first stop. (Do not push to second stop or tip will eject).

Remove tip from vessel and release push-button.

To Eject Tip

Press push-button to second stop. Tip is ejected.

For additional information regarding operation and use of pipet, please refer to your pipet manual.

ON-SITE QUALITY CONTROL/QUALITY ASSURANCE RECOMMENDATIONS
EnSys RISC® TEST SYSTEM

Please read the following before proceeding with field testing.

SAMPLING

The result of your screening test is only as valid as the sample that was analyzed. Samples should be homogenized thoroughly to ensure that the 10 grams you remove for field testing is representative of the sample as a whole. All other applicable sample handling procedures should be followed as well.

PRIOR TO TESTING SAMPLES

Carefully follow the instructions in the User's Guide included with every test kit. This is the key element in obtaining accurate results. In addition, store your unused test kits at room temperature and do not use them past their expiration date (see label on each test kit).

INTERNAL TEST QC

Two standards are analyzed with each sample to provide internal test system quality control. With both standards inserted in the photometer, a valid test is indicated when the magnitude of the displayed number (irrespective of the sign, + or -) is less than the value given in the User's Guide. Test runs resulting in a greater number should be repeated to ensure valid conclusions.

QA/QC

The validity of field test results can be substantially enhanced by employing a modest, but effective QA/QC plan. EnSys recommends that you structure your QA/QC plan with the elements detailed below. These have been developed based on the data quality principles established by the U.S. Environmental Protection Agency.

A. **Sample Documentation**
   1. Location, depth
   2. Time and date of collection and field analysis

B. **Field analysis documentation** - provide raw data, calibration, any calculations, and final results of field analysis for all samples screened (including QC samples)

C. **Method calibration** - this is an integral part of EnSys RISC® immunoassay tests; a duplicate calibration is performed for each set of samples tested (see the instructions in the User's Guide)

D. **Method blank** - field analyze the contents of an unused extraction jar X

E. **Site-specific matrix background field analysis** - collect and field analyze uncontaminated sample from site matrix to document matrix effect

F. **Duplicate sample field analysis** - field analyze duplicate sample to document method repeatability; at least one of every 20 samples should be analyzed in duplicate

G. **Confirmation of field analysis** - provide confirmation of the quantitation of the analyte via an EPA-approved method different from the field method on at least 10% of the samples; choose at least two representative samples testing above the action level; provide chain of custody and documentation such as gas chromatograms, mass spectra, etc.

H. **Performance evaluation sample field analysis (optional, but strongly recommended)** - field analyze performance evaluation sample daily to document method/operator performance

I. **Matrix spike field analysis (optional)** - field analyze matrix spike to document matrix effect on analyte measurement

FURTHER QUESTIONS?

EnSys technical support personnel are always prepared to discuss your quality needs to help you meet your data quality objectives.

APPENDIX E

EQUATIONS USED IN THE STATISTICAL ANALYSIS

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APPENDIX E

EQUATIONS USED IN THE STATISTICAL ANALYSIS

Calculations of the Mean:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$\bar{x}$ = mean
x_i = constituent concentration
n = number of samples

Calculation of the Standard Deviation:

$$s = \frac{\sqrt{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{2}}}{n-1}$$

s = standard deviation
x_i = constituent concentration
n = number of samples

Calculation of the Coefficient of Variation:

$$CV = \frac{s}{\bar{x}}$$

s = standard deviation
$\bar{x}$ = mean

Calculation of the Relative Percent Difference:

$$RPD = \left| 100 \frac{x_{orig} - x_{dup}}{\left(\frac{x_{orig} + x_{dup}}{2} \right)} \right|$$

RPD = Relative Percent Difference
x_{orig} = concentration of original sample
x_{dup} = concentration of duplicate sample

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