WILLAMETTE RIVER CLACKAMAS CO. ,OR;
WILLAMETTE FALLS LOCKS; PRELIMINARY ASSESSMENT -
SEDIMENT QUALITY OF 1996 FLOOD DEPOSITS **10 MAY 96**

Background : Willamette Falls Locks was totally inundated during the FEB '96 flood on the Willamette. Approximately 6 ft of sediment was deposited in the downstream lock entrance, along the west side of the channel. The deposit consists of silty sand and slopewash from the adjacent slope. The sediments sampled are unstratified and include woody debris, unspecified rubbish, bits of plastics, cloth and fibrous material. Sediment to be analyzed was collected from material excavated from three areas with an approximately 6 CY clamshell bucket. The sampled mass had a medium-strength sewage (organic) odor and was medium to dark gray in color. Samples were sent to NPD Laboratory for sediment quality testing, including physical and chemical tests. Chemical analysis was conducted by ARDL, Inc., Mt. Vernon, IL.

Summary of Test Results : Complete results of tests conducted on materials to be dredged are on file at the Corps of Engineers, Portland District.

Physical testing revealed the material to be non-plastic silty sand (USCS/ ASTM D 2487 classifies as SM (ML)). The sample is between 72 and 75 percent sand and the fine fraction is between 25 and 28 percent silts and clays. The fine fraction is composed of 91 percent silt, 9 percent clay. Pollutant adsorption takes place on clay particles, but since the clays make up only about 2.2 percent of the sediment samples, the potential for clay adsorption of pollutants is low.

Chemical analysis was conducted for metals, PAH, pesticides and PCB, total organic carbon, acid volatile sulfides, phenol, and glycol according to EPA protocols. The Chemical Quality Assurance Report (CQAR) was done by NPD Laboratory and is on file at the Corps of Engineers, Portland District. Three chemicals were found to be above screening limits for in-water disposal, but reported values are based on low resolution data displays and represent the operator's estimate of the precise value. Consequently, these three values are estimates of concentration levels of these substances in the sediment column. The reported values and the screening limits for the three substances are as follows :

Benzoic Acid - 628.0 ug/kg - Screening ~~Limit~~ levels (SL) 216.0 ug/kg New 1998 SL = 650 ug/l
Pentachlorophenol - 337.0 ug/kg - SL 100.0 ug/kg " " = 400 ug/l
Silver - 1.6 mg/kg - SL 1.2 ug/kg " " = 6.1 ug/l

→ All levels are below current Screening levels in the Evaluation Frame work = DMEF.

Tim Sherman 3/24/99

Discussion : These sediment quality tests are the first performed at Willamette Falls Locks. Without previous tests with which to compare these results it is unclear whether substances detected and found above screening levels represent a condition peculiar to the sediments derived from flooding or some other, more persistent, condition. Samples were taken at the three locations shown on the attached drawing. The clamshell bucket extracted roughly two cubic

meters of material which was split to expose a central bulk sample approximately 2 meters long. Each of the three composite jar samples was collected to represent full thickness of the material to be removed from within the dredging prism. The three jar samples were composited by the laboratory prior to being tested.

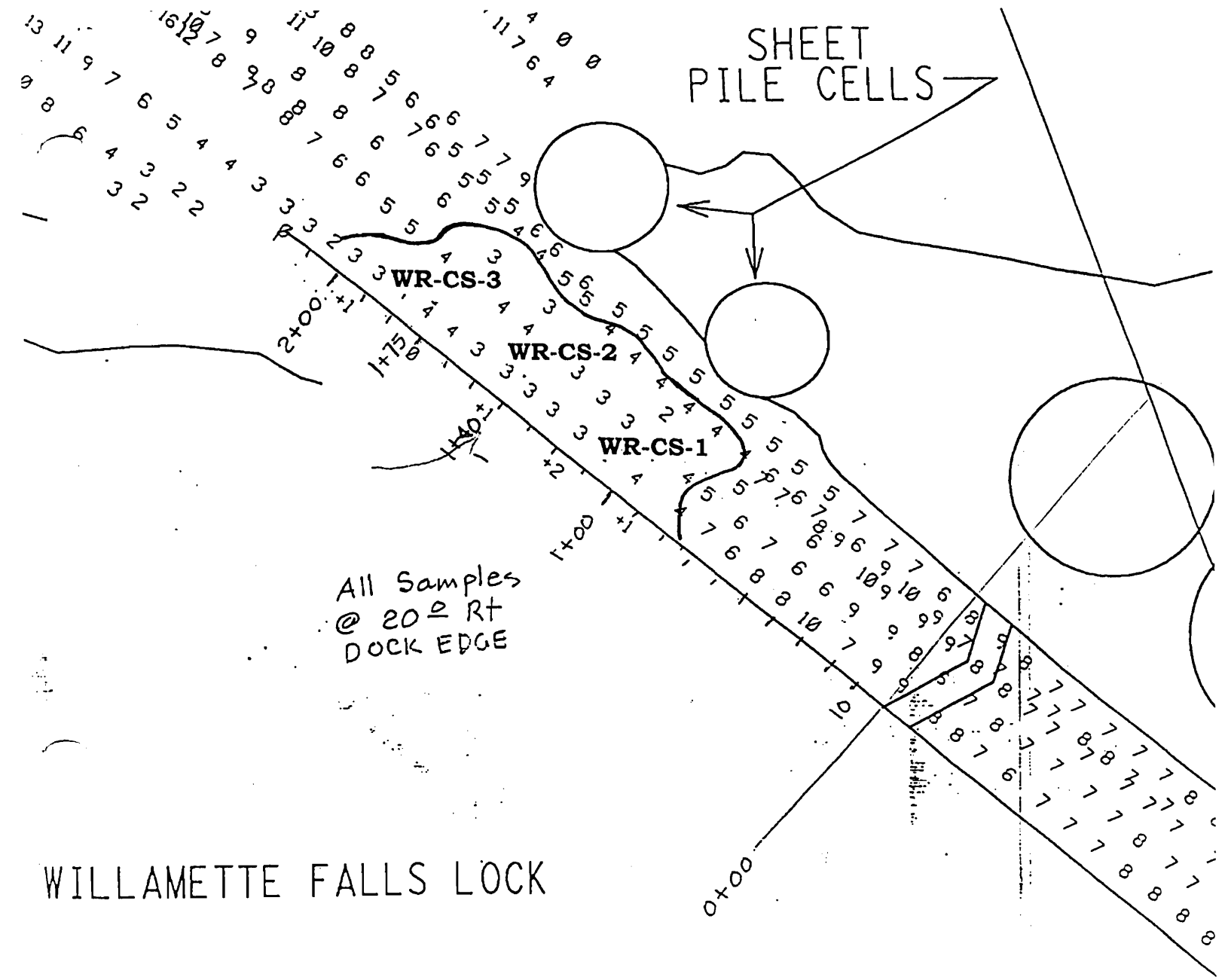
Substances above screening limits were relatively close to the minimum detection levels for the testing methods used, which suggests further testing, at lower detection levels that give clearer and more precise readings are likely to yield values near, or even below screening limits, that is, values that are known rather than estimated.

With regard to the three substances above the screening limits, the levels of Benzoic Acid and Silver are of minor concern, but the presence of pentachlorophenol indicates that further chemical or biological testing would be needed if unconfined in-water disposal were the only management option.

Also, the material in the dredging prism is not clean sand, but contains fragments of plastics, fiber, fabric and woody debris that includes floatable (?) large fragments, (30cm diam. X 1.25 m long) or possibly larger, the existence of which could adversely affect the placement operation at an in-water disposal site.

Recommendation: Because this material appears, from limited testing, to be only marginally suitable for unconfined in-water disposal and because it contains solid debris that could possibly drift during in- water placement; confined in-water or upland placement of the material is recommended.

Encl - Loc. Dwg



WILLAMETTE RIVER ABOVE PORTLAND
AND YAMHILL RIVER, OREGON

WILLAMETTE RIVER

DOWNSTREAM LOCK APPROACH

2 APRIL 1996

SCALE IN FEET

50 0 50 100 150 200

U.S. ARMY ENGINEER DISTRICT, PORTLAND
OPERATIONS DIVISION

SUBMITTED

CHIEF, HYDROGRAPHIC SURVEYS

RECOMMENDED

CHIEF, WATERWAYS MAINTENANCE SECTION

APPROVED

PROJECT MANAGER,
CHANNELS AND HARBORS

SURVEYED: HGW PLOTTED: HGW CHECKED: FJK

WR-28-12-

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION LABORATORY
CORPS OF ENGINEERS
1491 N.W. GRAHAM ROAD
TROUTDALE, OREGON 97060-9508

REPLY TO
ATTENTION OF:

CENPD-ET-EL (1110-1-8100c) April 25, 1996

MEMORANDUM FOR: Commander, Portland District ATTN: CENPP-PE-G (Sturgill)

SUBJECT: W.O. #96-192, Report of Sediment Analysis

Project: Willamette Falls Lock
Location: Willamette Falls locks downstream approach
Submitted by: CENPP-PE-G (Sturgill)
Date Sampled: 19 Apr 96 Date Received: 19 Apr 96
Method of Test or Specification: EMM1110-2-1906, ASTM
Reference: a) DD Form 448, MIPR no. E86-96-0065 dated 15 Apr 96.
b) NPD Form 303, Transmittal of Sedimentation Samples, outlining required tests.

1. Following is report of dredge test analysis for three sediment samples submitted from the above project. Included are enclosures 1 through 3, Report of Particle Size Analysis and Classification Tests, one for each sample submitted.

2. Results of Dredge Test Analysis:

CENPD Sample No.	Resuspended Density, g/l	Void Ratio	Volatile Solids, %	Specific Gravity	Particle Roundness Grading
WR-CS-15	1603	1.821	4.0	2.702	Subangular-subrounded
WR-CS-25	1591	1.873	3.9	2.697	Subangular-subrounded
WR-CS-35	1558	2.037	4.7	2.696	Subangular-subrounded

3. This completes all physical analysis requested to date for this project.

Enclosures

JAMES K. HINDS, PE
Deputy Director

Copy Furnished: CENPD-ET-EN

* * * CORPS OF ENGINEERS - NORTH PACIFIC DIVISION LABORATORY * * *

WILLAMETTE FALLS LOCKS 96-0192

Boring: **WR-CS** Sample: **15** Depth: --- Lab No.: 19201

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	697.93	0.0
No. 18	0.05	99.9
No. 35	0.54	99.4
No. 60	12.10	87.4
No. 120	56.18	41.7
No. 230	74.04	23.2
Pan	96.35	0.0

Hydrometer Analysis

Sample Weight: 96.35 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	20.2	0.0483	21.3
3	20.0	16.2	0.0286	17.2
10	20.0	14.2	0.0158	15.1
100	20.0	9.3	0.0066	10.1
200	20.0	8.2	0.0047	8.9

D85: 0.24 D60: 0.16 D50: 0.14 D30: .090 D15: .016 D10: .0065 mm

Cu: 25.3 Cc: 7.64

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

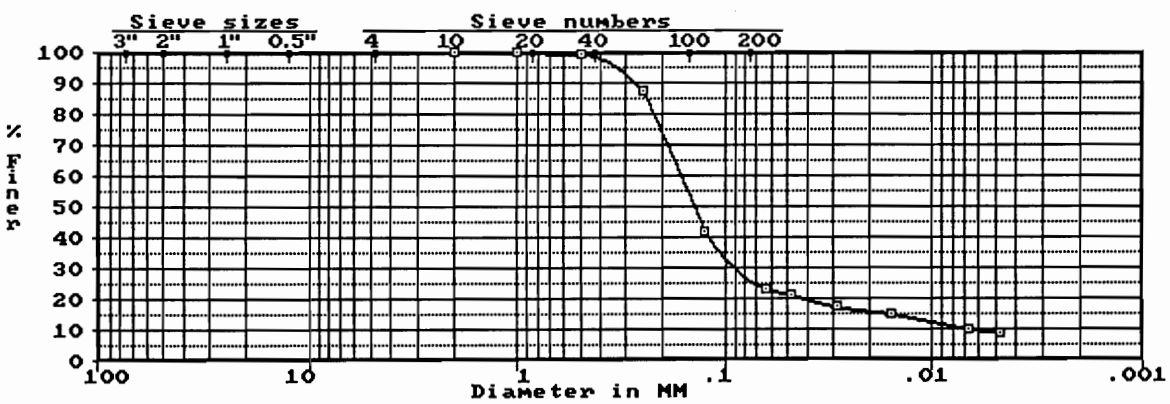
Gravel: 0.0% Sand: 74.3% Fines: 25.7%

ASTM D 2487 Classification

SM Silty SAND

TM 5-818-2 Frost Classification

Percent finer than 0.02 mm: 15.8 Frost Classification: **F4**



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WILLAMETTE FALLS LOCKS 96-0192

Boring: **WR-CS** Sample: **25** Depth: --- Lab No.: 19202

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	775.13	0.0
No. 18	0.06	99.9
No. 35	0.47	99.4
No. 60	11.52	84.6
No. 120	43.39	42.0
No. 230	56.29	24.8
Pan	74.82	0.0

Hydrometer Analysis

Sample Weight: 74.82 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	16.7	0.0493	22.8
3	20.0	12.7	0.0292	17.5
10	20.0	10.2	0.0162	14.2
100	20.0	6.3	0.0068	9.0
200	20.0	5.2	0.0048	7.5

D85: 0.25 D60: 0.17 D50: 0.14 D30: .086 D15: .019 D10: .0081 mm

Cu: 20.7 Cc: 5.47

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

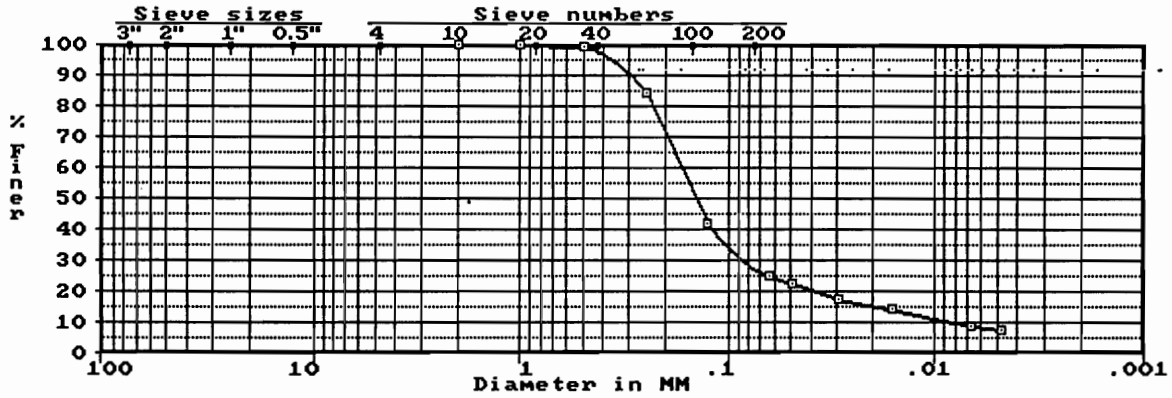
Gravel: 0.0% Sand: 72.8% Fines: 27.2%

ASTM D 2487 Classification

SM Silty SAND

TM 5-818-2 Frost Classification

Percent finer than 0.02 mm: 15.2 Frost Classification: **F4**



* * * CORPS OF ENGINEERS - NORTH PACIFIC DIVISION LABORATORY * * *

WILLAMETTE FALLS LOCKS 96-0192

Boring: **WR-CS** Sample: **35** Depth: --- Lab No.: 19203

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	756.33	0.0
No. 18	0.08	99.9
No. 35	0.60	99.4
No. 60	12.74	86.8
No. 120	55.76	42.4
No. 230	72.27	25.4
Pan	96.85	0.0

---------- Hydrometer Analysis ----------

Sample Weight:96.85 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	22.3	0.0476	23.3
3	20.0	17.3	0.0284	18.2
10	20.0	15.3	0.0157	16.2
100	20.0	9.3	0.0066	10.0
200	20.0	8.3	0.0047	9.0

D85: 0.24 D60: 0.16 D50: 0.14 D30: .084 D15: .013 D10: .0066 mm

Cu: 24.6 Cc: 6.54

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

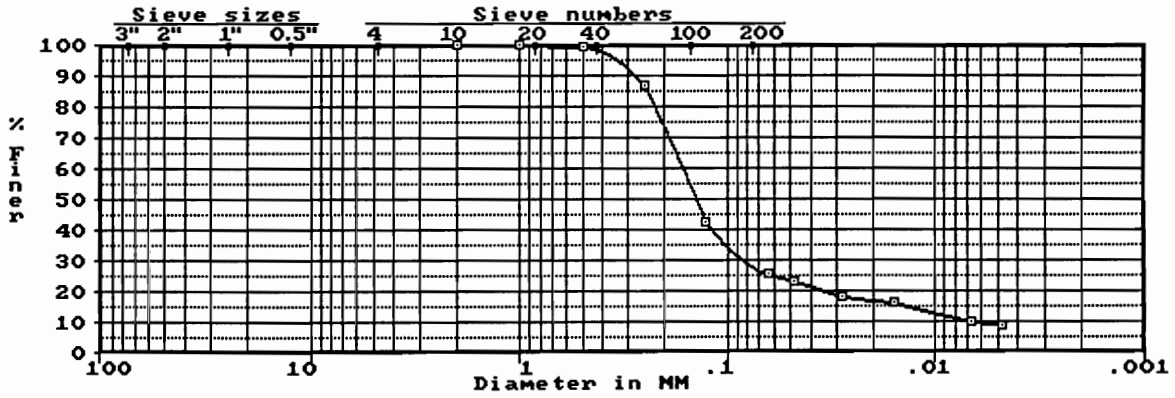
Gravel: 0.0% Sand: 72.3% Fines: 27.7%

---------- ASTM D 2487 Classification ----------

SM Silty SAND

---------- TM 5-818-2 Frost Classification ----------

Percent finer than 0.02 mm: 16.9 Frost Classification: **F4**



Laboratory Report Project Overview

EDF 1.2

Laboratory:	Applied Research and Development Lab, Inc., (ARDL)
Lab Report Number:	009287
Project Name:	WILLAMETTE FALLS LOCKS
NPDL Work Order Number:	96-0192
Control Sheet Number:	96-CS-0486

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

Project Name:	WILLAMETTE FALLS	Analysis:	PAH Specific Ion Monitoring
Project No:	96-0192	Method:	PAHSIM
		Prep Meth:	SW3550

Field ID:	COMPOSITE	Lab Samp ID:	009287-01
Descr/Location:	D/S LOCK E	Rec'd Date:	04/20/96
Sample Date:	04/18/96	Prep Date:	04/23/96
Sample Time:	1508	Analysis Date:	04/24/96
Matrix:	Soil	QC Batch:	B1219
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Acenaphthene	3.1	14.0	PQL		ND	UG/KG	1.00
Acenaphthylene	4.1	14.0	PQL		ND	UG/KG	1.00
Anthracene	1.5	14.0	PQL	J	5.2	UG/KG	1.00
Benzo(a)anthracene	1.1	14.0	PQL	J	11.8	UG/KG	1.00
Benzo(a)pyrene	1.1	14.0	PQL		37.7	UG/KG	1.00
Benzo(b)fluoranthene	1.1	14.0	PQL		19.5	UG/KG	1.00
Benzo(g,h,i)perylene	2.0	14.0	PQL		22.9	UG/KG	1.00
Benzo(k)fluoranthene	2.5	14.0	PQL	J	12.6	UG/KG	1.00
Chrysene	1.2	14.0	PQL	J	9.2	UG/KG	1.00
Dibenzo(a,h)anthracene	1.8	14.0	PQL		ND	UG/KG	1.00
Fluorene	4.6	14.0	PQL		ND	UG/KG	1.00
Fluoranthene	1.7	14.0	PQL		68.2	UG/KG	1.00
Indeno(1,2,3-cd)pyrene	1.8	14.0	PQL	J	8.4	UG/KG	1.00
Naphthalene	4.2	14.0	PQL		ND	UG/KG	1.00
Phenanthrene	1.4	14.0	PQL		15.1	UG/KG	1.00
Pyrene	1.2	14.0	PQL		43.5	UG/KG	1.00

SURROGATE AND INTERNAL STANDARD RECOVERIES:

Nitrobenzene-d5 (surr.)	23-120	SLSA	87%	1.00
2-Fluorobiphenyl (surr.)	30-115	SLSA	83%	1.00
Terphenyl-d14 (surr.)	18-137	SLSA	91%	1.00

J: EPA Flag - Estimated Value

Approved by: _____ Date: _____

Lab Report No.: 009287 Date: 04/26/96

Project Name:	WILLAMETTE FALLS	Analysis:	Semivolatile Organics by GC/MS
Project No:	96-0192	Method:	SW8270
		Prep Meth:	SW3550

Field ID:	COMPOSITE	Lab Samp ID:	009287-01
Descr/Location:	D/S LOCK E	Rec'd Date:	04/20/96
Sample Date:	04/18/96	Prep Date:	04/23/96
Sample Time:	1508	Analysis Date:	04/24/96
Matrix:	Soil	QC Batch:	B1215
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Acenaphthene	61.5	463.0	PQL		ND	UG/KG	1.00
Acenaphthylene	52.9	463.0	PQL		ND	UG/KG	1.00
Anthracene	35.9	463.0	PQL		ND	UG/KG	1.00
Benzoic acid	74.6	2250.0	PQL	J	628.0	UG/KG	1.00
Benzo(a)anthracene	38.3	463.0	PQL		ND	UG/KG	1.00
Benzo(b)fluoranthene	45.7	463.0	PQL		ND	UG/KG	1.00
Benzo(k)fluoranthene	80.8	463.0	PQL		ND	UG/KG	1.00
Benzo(g,h,i)perylene	49.9	463.0	PQL		ND	UG/KG	1.00
Benzo(a)pyrene	51.7	463.0	PQL		ND	UG/KG	1.00
Benzyl alcohol	53.0	463.0	PQL		ND	UG/KG	1.00
Bis(2-chloroethoxy)methane	37.5	463.0	PQL		ND	UG/KG	1.00
Bis(2-chloroethyl) ether	64.4	463.0	PQL		ND	UG/KG	1.00
bis(2-chloroisopropyl) ether	47.6	463.0	PQL		ND	UG/KG	1.00
Bis(2-ethylhexyl) phthalate	54.5	463.0	PQL	J	91.9	UG/KG	1.00
4-Bromophenyl phenyl ether	44.1	463.0	PQL		ND	UG/KG	1.00
Benzyl butyl phthalate	67.7	463.0	PQL		ND	UG/KG	1.00
4-Chloroaniline	169.0	463.0	PQL		ND	UG/KG	1.00
2-Chloronaphthalene	63.7	463.0	PQL		ND	UG/KG	1.00
4-Chloro-3-methyl phenol	50.3	463.0	PQL		ND	UG/KG	1.00
2-Chlorophenol	56.4	463.0	PQL		ND	UG/KG	1.00
4-Chlorophenyl phenyl ether	51.3	463.0	PQL		ND	UG/KG	1.00
Chrysene	47.0	463.0	PQL		ND	UG/KG	1.00
Dibenzo(a,h)anthracene	53.3	463.0	PQL		ND	UG/KG	1.00
Dibenzofuran	35.7	463.0	PQL		ND	UG/KG	1.00
Di-n-butyl phthalate	49.7	463.0	PQL		ND	UG/KG	1.00
1,3-Dichlorobenzene	39.9	463.0	PQL		ND	UG/KG	1.00
1,4-Dichlorobenzene	18.2	463.0	PQL		ND	UG/KG	1.00
1,2-Dichlorobenzene	23.6	463.0	PQL		ND	UG/KG	1.00
3,3'-Dichlorobenzidine	197.0	927.0	PQL		ND	UG/KG	1.00

J: EPA Flag - Estimated Value

Approved by: _____ Date: _____

Lab Report No.: 009287 Date: 04/26/96

Project Name: WILLAMETTE FALLS
Project No: 96-0192

Analysis: Semivolatile Organics by GC/MS
Method: SW8270
Prep Meth: SW3550

Field ID: COMPOSITE
Descr/Location: D/S LOCK E
Sample Date: 04/18/96
Sample Time: 1508
Matrix: Soil
Basis: Dry Weight

Lab Samp ID: 009287-01
Rec'd Date: 04/20/96
Prep Date: 04/23/96
Analysis Date: 04/24/96
QC Batch: B1215
Notes:

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
2,4-Dichlorophenol	46.8	463.0	PQL		ND	UG/KG	1.00
Diethyl phthalate	47.0	463.0	PQL		ND	UG/KG	1.00
2,4-Dimethylphenol	49.7	463.0	PQL		ND	UG/KG	1.00
Dimethyl phthalate	39.9	463.0	PQL		ND	UG/KG	1.00
2-Methyl-4,6-dinitrophenol	55.4	2250.0	PQL		ND	UG/KG	1.00
2,4-Dinitrophenol	45.1	2250.0	PQL		ND	UG/KG	1.00
2,4-Dinitrotoluene	51.1	463.0	PQL		ND	UG/KG	1.00
2,6-Dinitrotoluene	49.2	463.0	PQL		ND	UG/KG	1.00
Di-n-octyl phthalate	36.1	463.0	PQL		ND	UG/KG	1.00
Fluoranthene	33.0	463.0	PQL	J	84.6	UG/KG	1.00
Fluorene	76.1	463.0	PQL		ND	UG/KG	1.00
Hexachlorobenzene	37.8	463.0	PQL		ND	UG/KG	1.00
Hexachlorobutadiene	43.1	463.0	PQL		ND	UG/KG	1.00
Hexachlorocyclopentadiene	55.7	463.0	PQL		ND	UG/KG	1.00
Hexachloroethane	28.5	463.0	PQL		ND	UG/KG	1.00
Indeno(1,2,3-cd)pyrene	46.2	463.0	PQL		ND	UG/KG	1.00
Isophorone	56.5	463.0	PQL		ND	UG/KG	1.00
2-Methylnaphthalene	43.6	463.0	PQL		ND	UG/KG	1.00
2-Methylphenol (o-cresol)	45.8	463.0	PQL		ND	UG/KG	1.00
4-Methylphenol (p-cresol)	57.4	463.0	PQL		ND	UG/KG	1.00
Naphthalene	15.4	463.0	PQL		ND	UG/KG	1.00
2-Nitroaniline	52.1	2250.0	PQL		ND	UG/KG	1.00
3-Nitroaniline	148.0	2250.0	PQL		ND	UG/KG	1.00
4-Nitroaniline	131.0	2250.0	PQL		ND	UG/KG	1.00
Nitrobenzene	71.2	463.0	PQL		ND	UG/KG	1.00
2-Nitrophenol	27.2	463.0	PQL		ND	UG/KG	1.00
4-Nitrophenol	76.1	2250.0	PQL		ND	UG/KG	1.00
N-Nitrosodiphenylamine	50.6	463.0	PQL		ND	UG/KG	1.00
N-Nitrosodi-n-propylamine	55.6	463.0	PQL		ND	UG/KG	1.00

J: EPA Flag - Estimated Value

Approved by: _____ Date: _____

Project Name:	WILLAMETTE FALLS	Analysis:	Semivolatile Organics by GC/MS
Project No:	96-0192	Method:	SW8270
		Prep Meth:	SW3550

Field ID:	COMPOSITE	Lab Samp ID:	009287-01
Descr/Location:	D/S LOCK E	Rec'd Date:	04/20/96
Sample Date:	04/18/96	Prep Date:	04/23/96
Sample Time:	1508	Analysis Date:	04/24/96
Matrix:	Soil	QC Batch:	B1215
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note		Result	Units	Pvc Dil
Pentachlorophenol	52.8	2250.0	PQL	J		337.0	UG/KG	1.00
Phenanthrene	54.8	463.0	PQL			ND	UG/KG	1.00
Phenol	29.7	463.0	PQL			ND	UG/KG	1.00
Pyrene	47.3	463.0	PQL	J		61.9	UG/KG	1.00
1,2,4-Trichlorobenzene	39.0	463.0	PQL			ND	UG/KG	1.00
2,4,5-Trichlorophenol	88.5	2250.0	PQL			ND	UG/KG	1.00
2,4,6-Trichlorophenol	65.1	463.0	PQL			ND	UG/KG	1.00
TENTATIVELY IDENTIFIED COMPOUNDS (TIC'S)		RT						
Unknown#1		7.89		DJ	TI	2700.0	UG/KG	1.00
Unknown#2		21.78		DJ	TI	440.0	UG/KG	1.00
57103 -- no description available		21.99		DJ,N	TI	980.0	UG/KG	1.00
Unknown#4		22.33		DJ	TI	360.0	UG/KG	1.00
Unknown#5		23.92		DJ	TI	340.0	UG/KG	1.00
Unknown#6		26.86		DJ	TI	440.0	UG/KG	1.00
19047859 -- no description available		27.00		DJ,N	TI	560.0	UG/KG	1.00
Unknown#8		28.42		DJ	TI	920.0	UG/KG	1.00
Unknown#9		28.61		DJ	TI	650.0	UG/KG	1.00
Unknown#10		29.24		DJ	TI	370.0	UG/KG	1.00
Unknown#11		29.41		DJ	TI	470.0	UG/KG	1.00
Unknown Alkane#12		29.88		DJ	TI	750.0	UG/KG	1.00
Unknown Alkane#13		31.29		DJ	TI	360.0	UG/KG	1.00
Unknown#14		33.63		DJ	TI	430.0	UG/KG	1.00
Unknown#15		33.81		DJ	TI	1800.0	UG/KG	1.00
Unknown#16		33.89		DJ	TI	1700.0	UG/KG	1.00
Unknown#17		33.97		DJ	TI	550.0	UG/KG	1.00
Unknown#18		34.46		DJ	TI	3700.0	UG/KG	1.00
Unknown#19		34.83		DJ	TI	860.0	UG/KG	1.00
Unknown#20		35.32		DJ	TI	830.0	UG/KG	1.00

J: EPA Flag - Estimated Value
DJ: TIC identification based on mass fragmentation pattern only.
N: EPA Flag - Presumptive evidence of a compound

Approved by: _____ Date: _____

Lab Report No.: 009287 Date: 04/26/96

Project Name:	WILLAMETTE FALLS	Analysis:	Semivolatile Organics by GC/MS
Project No:	96-0192	Method:	SW8270
		Prep Meth:	SW3550

Field ID:	COMPOSITE	Lab Samp ID:	009287-01
Descr/Location:	D/S LOCK E	Rec'd Date:	04/20/96
Sample Date:	04/18/96	Prep Date:	04/23/96
Sample Time:	1508	Analysis Date:	04/24/96
Matrix:	Soil	QC Batch:	B1215
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit	Note	Result	Units	Pvc Dil
SURROGATE AND INTERNAL STANDARD RECOVERIES:						
Nitrobenzene-d5 (surr.)		23-120	SLSA	71%		1.00
2-Fluorobiphenyl (surr.)		30-115	SLSA	90%		1.00
Terphenyl-d14 (surr.)		18-137	SLSA	95%		1.00

Approved by: _____ Date: _____

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

Project Name: WILLAMETTE FALLS LOCKS

Project No: 96-0192

Field ID: COMPOSITE
Descr/Location: D/S LOCK E
Matrix: Soil

Sample Date: 04/18/96
Sample Time: 1508
Lab Samp ID: 009287-01

Analyte	Detection Limit	Reporting Limit		Note	Result	Units	Dil	Prep Method	Analysis Method	Analysis Date	QC Batch
Arsenic	3.5	7.0	PQL	J	3.9	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Cadmium	0.7	1.4	PQL	J	0.8	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Chromium	0.7	1.4	PQL		22.3	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Copper	0.7	1.4	PQL		24.8	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Lead	3.5	7.0	PQL		9.5	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Mercury	0.11	0.28	PQL		ND	MG/KG dw	1.00	SW7470	SW7470	04/24/96	C0591
Nickel	2.8	5.6	PQL		23.2	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Silver	0.7	1.4	PQL		1.6	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331
Zinc	0.7	1.4	PQL		77.0	MG/KG dw	1.00	SW3050	SW6010	04/24/96	P1331

J: EPA Flag - Estimated Value

Approved by: _____ Date: _____

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

Project Name: WILLAMETTE FALLS LOCKS

Project No: 96-0192

Field ID: COMPOSITE
Descr/Location: D/S LOCK E
Matrix: Soil

Sample Date: 04/18/96
Sample Time: 1508
Lab Samp ID: 009287-01

Analyte	Detection Limit	Reporting Limit		Note	Result	Units		Dil	Prep Method	Analysis Method	Analysis Date	QC Batch
Phenolics, Total Recoverable	0.7	0.7	PQL		ND	MG/KG	dw	1.00	METHOD	SW9066	04/22/96	04242213
Sulfide	3.5	7.0	PQL		ND	MG/KG	dw	1.00	METHOD	D91AVSM	04/23/96	04242212
Total Organic Carbon	0.0108	0.0108	PQL		10.4	MG/G	dw	1.00	NONE	SW9060	04/24/96	04252214
Total Solids	NA	NA			71.2	PERCE	dw	1.00	NONE	E160.3	04/22/96	04232208

Approved by: _____ Date: _____

QA/QC Report
Method Blank Summary

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

QC Batch:	B1214	Analysis:	Organochlorine Pesticides and PCBs
Matrix:	Soil/Solid Quality Control Matrix	Method:	SW8080
Lab Samp ID:	009287-01B1	Prep Meth:	SW3550
Analysis Date:	04/25/96	Prep Date:	04/23/96
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Aldrin	0.53	1.7	PQL		ND	UG/KG	1.00
alpha-BHC	0.546	1.7	PQL		ND	UG/KG	1.00
beta-BHC	0.515	1.7	PQL		ND	UG/KG	1.00
delta-BHC	0.542	1.7	PQL		ND	UG/KG	1.00
gamma-BHC (Lindane)	0.519	1.7	PQL		ND	UG/KG	1.00
Chlordane	1.1	10.0	PQL		ND	UG/KG	1.00
4,4'-DDD	0.554	3.3	PQL		ND	UG/KG	1.00
4,4'-DDE	0.553	3.3	PQL		ND	UG/KG	1.00
4,4'-DDT	0.518	3.3	PQL		ND	UG/KG	1.00
Dieldrin	0.536	3.3	PQL		ND	UG/KG	1.00
Endosulfan I	0.553	1.7	PQL		ND	UG/KG	1.00
Endosulfan II	0.546	3.3	PQL		ND	UG/KG	1.00
Endosulfan sulfate	0.534	3.3	PQL		ND	UG/KG	1.00
Endrin	0.54	3.3	PQL		ND	UG/KG	1.00
Endrin aldehyde	0.56	3.3	PQL		ND	UG/KG	1.00
Heptachlor	0.549	1.7	PQL		ND	UG/KG	1.00
Heptachlor epoxide	0.555	1.7	PQL		ND	UG/KG	1.00
Methoxychlor	0.552	3.3	PQL		ND	UG/KG	1.00
Toxaphene	11.0	110.0	PQL		ND	UG/KG	1.00
PCB-1016 (Aroclor 1016)	5.55	33.0	PQL		ND	UG/KG	1.00
PCB-1221 (Aroclor 1221)	9.08	67.0	PQL		ND	UG/KG	1.00
PCB-1232 (Aroclor 1232)	5.28	33.0	PQL		ND	UG/KG	1.00
PCB-1242 (Aroclor 1242)	5.55	33.0	PQL		ND	UG/KG	1.00
PCB-1248 (Aroclor 1248)	5.5	33.0	PQL		ND	UG/KG	1.00
PCB-1254 (Aroclor 1254)	5.4	33.3	PQL		ND	UG/KG	1.00
PCB-1260 (Aroclor 1260)	5.48	33.0	PQL		ND	UG/KG	1.00
Endrin ketone	0.558	3.3	PQL		ND	UG/KG	1.00
SURROGATE AND INTERNAL STANDARD RECOVERIES:							
Decachlorobiphenyl (surr.)		28-103	SLSA		65%		1.00
2,4,5,6-Tetrachloro-meta-xylene (surr.)		18-105	SLSA		58%		1.00

Approved by: _____ Date: _____

QA/QC Report
Method Blank Summary

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

QC Batch:	B1215	Analysis:	Semivolatile Organics by GC/MS
Matrix:	Soil/Solid Quality Control Matrix	Method:	SW8270
Lab Samp ID:	009287-01B1	Prep Meth:	SW3550
Analysis Date:	04/24/96	Prep Date:	04/23/96
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Acenaphthene	43.8	330.0	PQL		ND	UG/KG	1.00
Acenaphthylene	37.7	330.0	PQL		ND	UG/KG	1.00
Anthracene	25.6	330.0	PQL		ND	UG/KG	1.00
Benzoic acid	53.1	1600.0	PQL		ND	UG/KG	1.00
Benzo(a)anthracene	27.2	330.0	PQL		ND	UG/KG	1.00
Benzo(b)fluoranthene	32.6	330.0	PQL		ND	UG/KG	1.00
Benzo(g,h,i)perylene	35.5	330.0	PQL		ND	UG/KG	1.00
Benzo(k)fluoranthene	57.6	330.0	PQL		ND	UG/KG	1.00
Benzo(a)pyrene	36.8	330.0	PQL		ND	UG/KG	1.00
Benzyl alcohol	37.8	330.0	PQL		ND	UG/KG	1.00
Bis(2-chloroethoxy)methane	26.7	330.0	PQL		ND	UG/KG	1.00
Bis(2-chloroethyl) ether	45.9	330.0	PQL		ND	UG/KG	1.00
bis(2-chloroisopropyl) ether	33.9	330.0	PQL		ND	UG/KG	1.00
Bis(2-ethylhexyl) phthalate	38.8	330.0	PQL		ND	UG/KG	1.00
4-Bromophenyl phenyl ether	31.4	330.0	PQL		ND	UG/KG	1.00
Benzyl butyl phthalate	48.2	330.0	PQL		ND	UG/KG	1.00
4-Chloroaniline	120.0	330.0	PQL		ND	UG/KG	1.00
2-Chloronaphthalene	45.4	330.0	PQL		ND	UG/KG	1.00
4-Chloro-3-methyl phenol	35.8	330.0	PQL		ND	UG/KG	1.00
2-Chlorophenol	40.2	330.0	PQL		ND	UG/KG	1.00
4-Chlorophenyl phenyl ether	36.5	330.0	PQL		ND	UG/KG	1.00
Chrysene	33.5	330.0	PQL		ND	UG/KG	1.00
Dibenzo(a,h)anthracene	37.9	330.0	PQL		ND	UG/KG	1.00
Dibenzofuran	25.4	330.0	PQL		ND	UG/KG	1.00
Di-n-butyl phthalate	35.4	330.0	PQL		ND	UG/KG	1.00
1,3-Dichlorobenzene	28.4	330.0	PQL		ND	UG/KG	1.00
1,4-Dichlorobenzene	13.0	330.0	PQL		ND	UG/KG	1.00
1,2-Dichlorobenzene	16.8	330.0	PQL		ND	UG/KG	1.00
3,3'-Dichlorobenzidine	141.0	660.0	PQL		ND	UG/KG	1.00
2,4-Dichlorophenol	33.3	330.0	PQL		ND	UG/KG	1.00

Approved by: _____ Date: _____

QA/QC Report
Method Blank Summary

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

QC Batch:	B1215	Analysis:	Semivolatile Organics by GC/MS
Matrix:	Soil/Solid Quality Control Matrix	Method:	SW8270
Lab Samp ID:	009287-01B1	Prep Meth:	SW3550
Analysis Date:	04/24/96	Prep Date:	04/23/96
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Diethyl phthalate	33.5	330.0	PQL		ND	UG/KG	1.00
2,4-Dimethylphenol	35.4	330.0	PQL		ND	UG/KG	1.00
Dimethyl phthalate	28.4	330.0	PQL		ND	UG/KG	1.00
2-Methyl-4,6-dinitrophenol	39.5	1600.0	PQL		ND	UG/KG	1.00
2,4-Dinitrophenol	32.1	1600.0	PQL		ND	UG/KG	1.00
2,4-Dinitrotoluene	36.4	330.0	PQL		ND	UG/KG	1.00
2,6-Dinitrotoluene	35.0	330.0	PQL		ND	UG/KG	1.00
Di-n-octyl phthalate	25.7	330.0	PQL		ND	UG/KG	1.00
Fluoranthene	23.5	330.0	PQL		ND	UG/KG	1.00
Fluorene	54.2	330.0	PQL		ND	UG/KG	1.00
Hexachlorobenzene	26.9	330.0	PQL		ND	UG/KG	1.00
Hexachlorobutadiene	30.7	330.0	PQL		ND	UG/KG	1.00
Hexachlorocyclopentadiene	39.6	330.0	PQL		ND	UG/KG	1.00
Hexachloroethane	20.3	330.0	PQL		ND	UG/KG	1.00
Indeno(1,2,3-cd)pyrene	32.9	330.0	PQL		ND	UG/KG	1.00
Isophorone	40.3	330.0	PQL		ND	UG/KG	1.00
2-Methylnaphthalene	31.0	330.0	PQL		ND	UG/KG	1.00
2-Methylphenol (o-cresol)	32.6	330.0	PQL		ND	UG/KG	1.00
4-Methylphenol (p-cresol)	40.9	330.0	PQL		ND	UG/KG	1.00
Naphthalene	10.9	330.0	PQL		ND	UG/KG	1.00
2-Nitroaniline	37.1	1600.0	PQL		ND	UG/KG	1.00
3-Nitroaniline	105.0	1600.0	PQL		ND	UG/KG	1.00
4-Nitroaniline	93.5	1600.0	PQL		ND	UG/KG	1.00
Nitrobenzene	50.7	330.0	PQL		ND	UG/KG	1.00
2-Nitrophenol	19.4	330.0	PQL		ND	UG/KG	1.00
4-Nitrophenol	54.2	1600.0	PQL		ND	UG/KG	1.00
N-Nitrosodiphenylamine	36.0	330.0	PQL		ND	UG/KG	1.00
N-Nitrosodi-n-propylamine	39.6	330.0	PQL		ND	UG/KG	1.00
Pentachlorophenol	37.6	1600.0	PQL		ND	UG/KG	1.00
Phenanthrene	39.0	330.0	PQL		ND	UG/KG	1.00

Approved by: _____ Date: _____

QA/QC Report
Method Blank Summary

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

QC Batch:	B1215	Analysis:	Semivolatile Organics by GC/MS
Matrix:	Soil/Solid Quality Control Matrix	Method:	SW8270
Lab Samp ID:	009287-01B1	Prep Meth:	SW3550
Analysis Date:	04/24/96	Prep Date:	04/23/96
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note		Result	Units	Pvc Dil
Phenol	21.2	330.0	PQL			ND	UG/KG	1.00
Pyrene	33.7	330.0	PQL			ND	UG/KG	1.00
1,2,4-Trichlorobenzene	27.7	330.0	PQL			ND	UG/KG	1.00
2,4,5-Trichlorophenol	63.0	1600.0	PQL			ND	UG/KG	1.00
2,4,6-Trichlorophenol	46.3	330.0	PQL			ND	UG/KG	1.00
TENTATIVELY IDENTIFIED COMPOUNDS (TIC'S)								
Unknown#1		7.11		DJ	TI	140.0	UG/KG	1.00
Unknown#2		29.21		DJ	TI	170.0	UG/KG	1.00
SURROGATE AND INTERNAL STANDARD RECOVERIES:								
Nitrobenzene-d5 (surr.)		23-120	SLSA			49%		1.00
2-Fluorobiphenyl (surr.)		30-115	SLSA			60%		1.00
Terphenyl-d14 (surr.)		18-137	SLSA			64%		1.00

DJ: TIC identification based on mass fragmentation pattern only.

Approved by: _____ Date: _____

QA/QC Report
Method Blank Summary

Applied Research and Development Lab, Inc., (ARDL) Mt. Vernon, IL

Lab Report No.: 009287 Date: 04/26/96

QC Batch:	B1219	Analysis:	PAH Specific Ion Monitoring
Matrix:	Soil/Solid Quality Control Matrix	Method:	PAHSIM
Lab Samp ID:	009287-01B1	Prep Meth:	SW3550
Analysis Date:	04/24/96	Prep Date:	04/23/96
Basis:	Dry Weight	Notes:	

Analyte	Det Limit	Rep Limit		Note	Result	Units	Pvc Dil
Acenaphthene	2.2	10.0	PQL		ND	UG/KG	1.00
Acenaphthylene	2.9	10.0	PQL		ND	UG/KG	1.00
Anthracene	1.1	10.0	PQL		ND	UG/KG	1.00
Benzo(a)anthracene	0.81	10.0	PQL		ND	UG/KG	1.00
Benzo(a)pyrene	0.78	10.0	PQL		ND	UG/KG	1.00
Benzo(b)fluoranthene	0.76	10.0	PQL		ND	UG/KG	1.00
Benzo(g,h,i)perylene	1.4	10.0	PQL		ND	UG/KG	1.00
Benzo(k)fluoranthene	1.8	10.0	PQL		ND	UG/KG	1.00
Chrysene	0.85	10.0	PQL		ND	UG/KG	1.00
Dibenzo(a,h)anthracene	1.3	10.0	PQL		ND	UG/KG	1.00
Fluorene	3.3	10.0	PQL		ND	UG/KG	1.00
Fluoranthene	1.2	10.0	PQL		ND	UG/KG	1.00
Indeno(1,2,3-cd)pyrene	1.3	10.0	PQL		ND	UG/KG	1.00
Naphthalene	3.0	10.0	PQL		ND	UG/KG	1.00
Phenanthrene	1.0	10.0	PQL		ND	UG/KG	1.00
Pyrene	0.84	10.0	PQL		ND	UG/KG	1.00
SURROGATE AND INTERNAL STANDARD RECOVERIES:							
Nitrobenzene-d5 (surr.)		23-120	SLSA		57%		1.00
2-Fluorobiphenyl (surr.)		30-115	SLSA		54%		1.00
Terphenyl-d14 (surr.)		18-137	SLSA		62%		1.00

Approved by: _____ Date: _____