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August 19, 2002

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

Subject: **Revised Removal Site Evaluation, Offsite Sediment and Soil Sampling**
Sentinel Wood Treaters Site, Ava, Missouri
U.S. EPA Region 7 START 2, Contract No. 68-S7-01-41, Task Order No. 0077
Task Monitor: Eric Nold, On-Scene Coordinator

Dear Mr. Crossland:

The Tetra Tech EM Inc. Superfund Technical Assessment and Response Team (START) is submitting the enclosed removal site evaluation for offsite sediment and soil sampling conducted downgradient of the Sentinel Wood Treaters site. This document was originally submitted to EPA on August 1, 2002 and has been revised based on comments received by the On-Scene Coordinator, Mr. Eric Nold. If you have any questions or comments regarding this submittal, please contact the project manager at (913) 495-3910.

Sincerely,

Ted Faile, PG, CHMM
START Project Manager

for Hieu Q. Vu, PE, CHMM
START Program Manager

Enclosures

REMOVAL SITE EVALUATION FOR
OFFSITE SEDIMENT AND SOIL SAMPLING
SENTINEL WOOD TREATERS SITE – AVA, MISSOURI

Superfund Technical Assessment and Response Team (START) 2

Contract No. 68-S7-01-41, Task Order No. 0077

Prepared For:

U.S. Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101

August 19, 2002

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1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division, under the Superfund Technical Assessment and Response Team (START) 2 Contract No. 68-S7-01-41, Task Order No. 0077, to conduct a Removal Site Evaluation (RSE) at the Sentinel Wood Treaters (Sentinel) Site in Ava, Missouri. The primary objective of the RSE was to assess potential contamination of an unnamed tributary to Prairie Creek, which drains the Sentinel site. Sediment and soil sampling was conducted downgradient of the site to determine whether any contaminants associated with the Sentinel site have impacted the tributary. Low levels of dioxin were previously reported in a sediment sample collected from the tributary, but it is unknown whether this contamination is attributable to historical operations at the site. As part of this task order, Tetra Tech START assisted EPA with conducting a topographic survey of the tributary, collecting sediment samples from the tributary, collecting soil samples from a residential garden near the tributary, and collecting a groundwater sample from a residential well near the site. The following sections will discuss previous investigations at the site, activities performed during the current RSE, and analytical results from environmental samples collected during the RSE.

2.0 SITE DESCRIPTION AND PREVIOUS INVESTIGATIONS

Information regarding the site's location, description, and relevant investigation history is discussed in this section.

2.1 LOCATION AND DESCRIPTION

The Sentinel Site is located in the City of Ava, Missouri, which is approximately 55 miles southeast of Springfield, Missouri (see Figure 1, Appendix A). The site is on the northern side of Northwest 12th Avenue, and was formerly used as a wood treatment facility from 1959 through the mid-1980s. It is currently used as a custom cabinet making facility, with two retail stores, Dollar General and Curtis Department Store, located along the front of the property near Northwest 12th Avenue. Land use surrounding the site is a mixture of residential, commercial and light industrial, and pasture land. The site is bisected by an unnamed tributary which empties into Prairie Creek approximately 2 miles south of the site (USGS 1982).

2.2 PREVIOUS INVESTIGATIONS

Previous investigations have been conducted at this site by the EPA, the Missouri Department of Natural Resources (MDNR), and the potentially responsible party (PRP), Sentinel Industries. The results of these investigations indicate that the site is a source of pentachlorophenol (PCP), dioxin, and other possible contaminants. In 2000-2001, the MDNR conducted an expanded site investigation (ESI) at the Sentinel Site. The scope of the ESI included sediment and surface water sampling from the unnamed tributary to Prairie Creek, downstream of the site. A sediment sample collected approximately 1,400 feet downstream of the site was reported to contain dioxin (2,3,7,8 dioxin total equivalents [TEQ]) at a concentration of 2.3 micrograms per kilogram (µg/kg).

3.0 REMOVAL SITE EVALUATION ACTIVITIES

Site activities for this RSE included a topographic survey; sampling of environmental media, including sediment samples from the unnamed tributary to Prairie Creek; one groundwater sample from a private well near the site; and soil samples from a residential garden located near the tributary. Surveying activities, sediment sampling, domestic well sampling, soil sampling, quality assurance (QA)/ quality control (QC) sampling, and deviations from the site-specific quality assurance project plan (QAPP) will be discussed in this section.

3.1 TOPOGRAPHIC SURVEY

Tetra Tech START team members met with EPA personnel at the site during the week of April 22, 2002, to conduct surveying of the tributary south of the site. The stream was surveyed from Northwest 12th Avenue to a point approximately 1,500 feet downstream (south) of Northwest 12th Avenue (see Figure 2, Appendix A). For sampling purposes, this segment of the tributary was divided into 56 cells, each of which were approximately 28 feet long. The center of every third cell was then designated for sampling by marking with colored tape and a wooden stake (if possible).

3.2 SEDIMENT SAMPLING

Tetra Tech START team members returned to Ava the week of April 29, 2002, to collect sediment samples from the tributary. Samples were collected from every third cell (19 of the 56 cells) which were designated for sampling the previous week. In addition, two background samples were collected from two branches of the tributary located upstream of the Sentinel site. A field duplicate was also collected,

for a total of 22 sediment samples. Samples were collected starting at the most downstream location and progressing upstream. The samples were collected using disposable pie pans and stainless steel spoons. New nitrile gloves were worn for the collection of each sample to avoid cross-contamination. Each sediment sample consisted of nine aliquots (subsamples) which were homogenized in the pie pan and then transferred into three 8-ounce jars. The jars were then labeled and placed in iced coolers. One of the sample jars collected for each sample was retained by Tetra Tech START for screening analysis using High Performance Dioxin/Furan Immunoassay Kits. The dioxin screening was conducted at the Tetra Tech START mobile laboratory facilities in Lenexa, Kansas during the week of May 13, 2002. The two remaining sample jars were delivered to the EPA Region 7 Laboratory in Kansas City, Kansas, for analysis of dioxins/furans and semivolatile organic compounds (SVOC).

Table 1 summarizes the sediment sample identification numbers and the associated stream cell identification numbers.

TABLE 1

SEDIMENT SAMPLE IDENTIFICATION SUMMARY
SENTINEL WOOD TREATERS SITE – AVA, MISSOURI

EPA Sample ID	Stream Cell ID
1506-1	254
1506-2	251
1506-3	248
1506-4	245
1506-5	242
1506-6	239
1506-7	236
1506-8	233
1506-9	230
1506-10	227
1506-11	224

EPA Sample ID	Stream Cell ID
1506-12	221
1506-13	218
1506-14	215
1506-15	212
1506-16	209
1506-16-FD	209
1506-17	206
1506-18	203
1506-19	200
1506-20	NA (Background to NW)
1506-21	NA (Background to NE)

Notes:

EPA	U.S. Environmental Protection Agency
FD	Field duplicate
ID	Identification number
NA	Not applicable
NE	Northeast
NW	Northwest

3.3 GROUNDWATER SAMPLING

On April 30, 2002, one groundwater sample was collected from a private well at the residence of Ms. Julane Williams. The Williams' residence is located approximately 2,000 feet northeast of the Sentinel site (see Figure 3, Appendix A). A sample previously collected from this well by MDNR in December 2000 had a reported dioxin TEQ level of 0.000003 micrograms per liter (µg/L), or 3.0 picograms per liter (pg/L). The sample was collected from a spigot on the southeastern side of the house, between the front door and the garage. The sample (EPA ID 1521-1) was collected directly into two, 1-gallon jugs and submitted to the EPA Region 7 Laboratory for analysis of dioxins/furans and pentachlorophenol (PCP).

3.4 SOIL SAMPLING

Tetra Tech START team members returned to Ava on May 7, 2002, to collect soil samples from two garden plots at the residence of Ms. Kelly Morpeth. The Morpeth residence is located adjacent to the Prairie Creek tributary, about 0.5 mile downstream of the site (see Figure 3, Appendix A). Soil samples were collected from two depths at six locations using a Geoprobe™ slam bar apparatus. The samples were collected from depths of 0 to 6 inches and 18 to 24 inches, using a Geoprobe™ Macro-Core soil sampler with disposable acetate liners. For each sample, soil was packed into two 40-milliliter vials, with as little head space as possible, for analysis of volatile organic compounds (VOC). Additional sample material was placed into two 8-ounce jars, one for laboratory analysis of SVOCs and the other for screening analysis using High Performance Dioxin/Furan Immunoassay Kits. The dioxin screening was conducted at the Tetra Tech START mobile laboratory facilities in Lenexa, Kansas during the week of May 13, 2002. The containers were all labeled and placed into an iced cooler. Samples for VOC and SVOC analysis were submitted to the EPA Region 7 Laboratory. Table 2 summarizes the EPA sample identification numbers and sample locations for all soil samples.

TABLE 2

SOIL SAMPLE IDENTIFICATION SUMMARY
SENTINEL WOOD TREATERS SITE – AVA, MISSOURI

EPA Sample ID	Location
1535-1	SS1, 0 to 6 inches bgs
1535-2	SB1, 18 to 24 inches bgs
1535-3	SS2, 0 to 6 inches bgs
1535-4	SB2, 18 to 24 inches bgs
1535-5	SS3, 0 to 6 inches bgs
1535-6	SB3, 18 to 24 inches bgs
1535-7	SS4, 0 to 6 inches bgs
1535-8	SB4, 18 to 24 inches bgs
1535-9	SS5, 0 to 6 inches bgs
1535-10	SB5, 18 to 24 inches bgs
1535-11	SS6, 0 to 6 inches bgs
1535-12	SB6, 18 to 24 inches bgs
1535-13-FB	NA (soil trip blank)

Notes:

EPA U.S. Environmental Protection Agency
ID Identification number
bgs Below ground surface

3.5 QUALITY ASSURANCE AND QUALITY CONTROL SAMPLING

One field duplicate sediment sample was collected for QA/QC purposes. In addition, one matrix spike and matrix spike duplicate (MS/MSD) soil sample and one soil trip blank were submitted for analysis of VOCs.

3.6 SAMPLE DELIVERY

Tetra Tech START delivered the sediment and groundwater samples to the EPA Region 7 Laboratory on May 1, 2002. The soil samples were delivered to the EPA Region 7 Laboratory on May 8, 2002. The samples, sample collection field sheets, and chain-of-custody (COC) forms were submitted to Ms. Nicole Roblez at the EPA Region 7 Laboratory. Copies of the sample collection field sheets and COC forms are included with the data packages in Attachment 1.

4.0 ANALYTICAL RESULTS

Analytical results for the sediment, soil and groundwater samples are discussed in the following sections.

4.1 SEDIMENT SAMPLE RESULTS

Table 3 summarizes the analytical results of the sediment samples. The sediment sample data indicate that very low levels of dioxins have been released to the tributary and that the Sentinel site source is an apparent source of this dioxin. Dioxin TEQ levels in the two background samples (1506-20 and -21) were 0.011 and 0.008 µg/kg. Dioxin TEQ levels in samples collected downstream of the site ranged from 0.130 µg/kg to 0.595 µg/kg. The average TEQ levels for all downstream sediment samples was 0.316 µg/kg. While the data clearly indicates the site as a source of dioxins to the surface water pathway, the TEQ levels in all samples were below 1.0 µg/kg, a removal action level used consistently by EPA at other dioxin sites in Region 7. The MDNR Cleanup Levels for Missouri (CALM) guidance does not have a standard for dioxin (MDNR 2001).

The Sentinel site also appears to be a source of SVOC contamination within the tributary. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3,cd)pyrene were all reported in downstream samples at levels significantly above background and, at many locations, above the respective CALM level (MDNR 2001). Other SVOCs were also reported in the samples, though at concentrations below their respective CALM levels. In general, the highest levels of SVOCs were found in samples 1506-8 through -19, which were collected within the upper portion (i.e., that portion closest to the site) of the surveyed stream segment. However, several SVOCs were also reported in one of the background samples (1506-21), indicating there may be another source of these compounds in addition to Sentinel. Three of the compounds reported in background sample 1506-21, benzo(a)pyrene, benzo(b)fluoranthene, and di-n-octylphthalate, were reported at levels above the CALM guidance. The extent of SVOC contamination in the tributary is unknown. Levels of benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were reported above the CALM limits in sample 1506-1, the sample collected furthest from the site.

With the exception of di-n-octylphthalate, all of the SVOCs reported in the sediment samples are polycyclic aromatic hydrocarbons (PAHs). PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances. They are also found in diesel fuel, asphalt, coal tar, crude oil, creosote, and roofing tar, and a few are used in medicines or to make dyes, plastics, and pesticides (ATSDR 2002). Therefore, while it is likely that

much of the PAH contamination in the tributary is directly related to former wood treatment operations at Sentinel, other likely sources include the asphalt parking area immediately south of the site, or the asphalt pavement on Northwest 12th Avenue.

PCP, a contaminant linked to this and other wood treater sites, was not reported above the detection limits in any of the sediment samples.

4.2 SOIL SAMPLE RESULTS

Soil samples collected from the Morpeth garden did not contain any reportable levels of VOCs or SVOCs, with one exception. Sample 1535-9, collected from Boring 5 at a depth of 0 to 6 inches bgs, contained 11,000 µg/kg of bis(2-ethylhexyl)phthalate (DEHP). However, this concentration is far below the CALM guidance level of 410,000 µg/kg for this SVOC. DEHP is found in polyvinyl chloride (PVC) plastic products such as toys, vinyl upholstery, shower curtains, adhesives, and coatings. Vinyl plastic may contain up to 40% DEHP. DEHP is also used in inks, pesticides, cosmetics, and vacuum pump oil (ATSDR 2002). Consultation with the laboratory chemist confirmed that this single detection of DEHP was most likely the result of a small piece of plastic in the soil sample.

4.3 GROUNDWATER SAMPLE RESULTS

The groundwater sample collected from the Williams residential well did not contain any reportable levels of dioxins or PCP.

4.4 IMMUNOASSAY SCREENING RESULTS

All 22 sediment samples and six of the garden soil samples were also analyzed using High Performance Dioxin/Furan Immunoassay Kits developed by Cape Technologies of South Portland, Maine. The dioxin screening was conducted at the Tetra Tech START mobile laboratory facilities in Lenexa, Kansas during the week of May 13, 2002. A detailed discussion of the screening results is presented in Appendix B. With one exception, the screening results did not indicate dioxin TEQ levels greater than 1.0 µg/kg in any of the soil or sediment samples. The TEQ screening result for the sediment sample collected from Cell 242 (1506-5) was reported at 1.21 µg/kg (1.14 µg/kg adjusted value), however, this value appears to be a false positive based on the EPA Region 7 laboratory results for this sample (0.13 µg/kg). A performance analysis of the immunoassay kits, based on a comparison with the EPA Region 7 laboratory data, is also included in Appendix B.

TABLE 3

SEDIMENT SAMPLE RESULTS SUMMARY
SENTINEL WOOD TREATERS SITE – AVA, MISSOURI

		EPA Sample ID (1506-) & Cell ID																					
		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-16-FD	-17	-18	-19	-20	-21	MDNR CALM
Compound	Units	254	251	248	245	242	239	236	233	230	227	224	221	218	215	212	209	209	206	203	200	NA	NA	(µg/kg)
2,3,7,8-Dioxin Total Equivalents	µg/kg	0.365	0.207	0.334	0.595	0.130	0.274	0.264L	0.163	0.242	0.196L	0.567	0.429	0.514	0.162	0.427	0.255	0.289	0.242	0.250	0.410	0.011	0.008	NA
Anthracene	µg/kg	ND	ND	ND	ND	ND	ND	160	ND	ND	480	700	ND	ND	910	ND	ND	ND	ND	650	640	ND	ND	8,500,000
Benzo(a)anthracene	µg/kg	910J	ND	590	530J	ND	680J	860J	**1700J**	800J	**2400J**	**2800J**	**1900J**	**1200J**	**3100**	**1800**	**1200**	**2000J**	**1600J**	**4700**	**5600**	ND	820	1,000
Benzo(a)pyrene	µg/kg	**980J**	ND	**700**	**610J**	ND	**690J**	**810J**	**1400J**	**790J**	**2100J**	**2900J**	**1700J**	**1200J**	**2500J**	**2100J**	**1400J**	**2200J**	**1400J**	**4900J**	**6700J**	ND	**890J**	200
Benzo(b)fluoranthene	µg/kg	**1100J**	ND	860	670J	ND	790J	860J	**1400J**	810J	**2100J**	**3100J**	**1900J**	**1200J**	**2500J**	**2600J**	**1800J**	**2000J**	**1300J**	**5800J**	**8900J**	ND	**1200J**	900
Benzo(g,h,i)perylene	µg/kg	1300J	ND	ND	770J	ND	830J	960J	1800J	1100J	2900J	1800J	2000J	1100J	2800J	1300J	660J	2200J	1800J	3500J	4500J	ND	510J	NA
Benzo(k)fluoranthene	µg/kg	890J	ND	650	620J	ND	670J	690J	1400J	800J	1700J	2800J	1500J	1100J	1900J	2300J	1500J	1700J	1200J	5200J	7000J	ND	1100J	8,000
bis(2-Ethylhexyl)phthalate	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	1800J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500	410,000
Carbazole	µg/kg	ND	ND	ND	ND	ND	ND	ND	620	ND	1000	ND	850	600	1800	ND	ND	880	530	730	840	ND	ND	82,000
Chrysene	µg/kg	1400J	ND	870	820J	ND	1000J	1100J	2100J	1100J	3200J	4500	2600J	1700J	3800	2800	2000	2900J	2100J	6400	8900	ND	1500	36,000
Di-n-octylphthalate	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**730J**	300
Dibenz(a,h)anthracene	µg/kg	**490J**	ND	ND	ND	ND	ND	ND	**640J**	ND	**1000J**	**750J**	**740J**	ND	**1200J**	ND	ND	**810J**	**740J**	**1200J**	**1600J**	ND	ND	200
Fluoranthene	µg/kg	1700	ND	1700	1200	670	1700	2000	4600	1700	8200	11000	5500	4300	11000	6100	4300	5700	3000	14000	17000	ND	3100	1,600,000
Fluorene	µg/kg	ND	ND	ND	ND	ND	ND	ND	130	ND	ND	ND	ND	ND	410	ND	ND	ND	ND	ND	ND	ND	ND	1,100,000
Indeno(1,2,3,cd)pyrene	µg/kg	1400J	ND	ND	690J	ND	780J	820J	1700J	950J	2800J	2100J	2200J	1100J	**3000J**	1200J	870J	2100J	1700J	**3500J**	**4600J**	ND	590J	3,000
Phenanthrene	µg/kg	1000	ND	710	540	ND	850	1400	2900	1300	4600	5300	3100	2200	7000	2200	1600	3000	2800	6200	7600	ND	2300	NA
Pyrene	µg/kg	3300	590	2000	2900J	780	2200	2600	5100	2900	9800	11000	6700	4000	8600	6300	4600	7000	5600	14000	19000	ND	3000	2,100,000

Notes:

µg/kg	Micrograms per kilogram
CALM	Cleanup Levels for Missouri
FD	Field duplicate
J	Concentration is estimated
L	Actual concentration is greater than the reported value
MDNR	Missouri Department of Natural Resources
mg/kg	Milligrams per kilogram
NA	No CALM standard available
ND	Not detected

Concentrations in boldface type exceed MDNR CALM standards.

5.0 CONCLUSIONS

This section provides conclusions and recommendations with respect to potential future activities under the Superfund pre-remedial and removal programs.

5.1 PRE-REMEDIAL CONSIDERATIONS

Based on the tributary sediment data collected during this RSE, the Sentinel site appears to be a source of offsite dioxin and PAH contamination. The extent of dioxin and PAH contamination within the tributary is unknown, but reportable levels of these compounds are known to extend at least 1,500 feet downstream of the site (the extent of the sampling area encompassed by this RSE). Dioxin levels in the sediment do not appear to warrant further investigation at this time, because all reported concentrations were below 1.0 µg/kg. However, PAH levels in sediment exceed MDNR CALM levels throughout the 1,500-foot segment of the tributary sampled during the RSE. If EPA determines that the PAH levels identified in the sediment samples pose a potential threat to human health or the environment, additional sediment sampling may be considered to further characterize the extent and other potential sources of this contamination.

5.2 REMOVAL CONSIDERATIONS

Removal activities are currently underway at the Sentinel site. The purpose of these removal activities is to reduce or eliminate any further off-site migration of contaminants. Therefore, it may be assumed that the contamination levels (or at least that portion of the contamination contributed by Sentinel) reported in the off-site sediment samples represent a worst-case scenario. However, existing PAH levels in the sediment do exceed MDNR CALM levels. If EPA determines that these levels pose a potential threat to human health or the environment, off-site removal actions associated with the tributary may be warranted.

6.0 REFERENCES

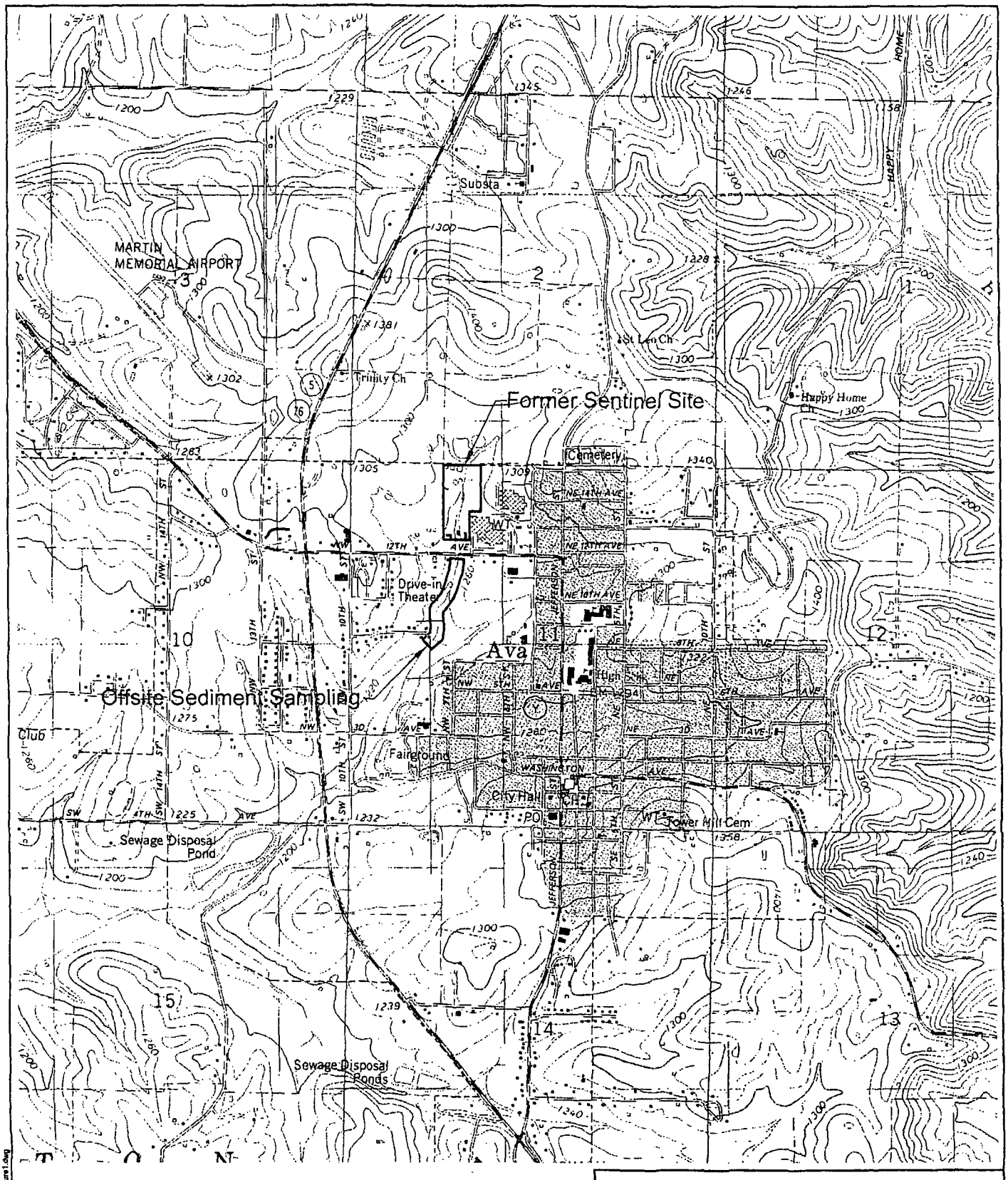
Agency for Toxic Substances and Disease Registry (ATSDR). 2002. The ATSDR ToxFAQs™ http://www.atsdr.cdc.gov/toxfaq.html. U. S. Department of Health and Human Services, Public Health Service. Atlanta, Georgia.

Missouri Department of Natural Resources (MDNR). 2001. *Cleanup Levels for Missouri (CALM).* Division of Environmental Quality, Hazardous Waste Program. Jefferson City, Missouri. July.

U. S. Geological Survey (USGS). 1982. 7.5-Minute Topographic Map. Ava, Missouri, Quadrangle. Washington, DC.

APPENDIX A

Figures



Source: USGS Ava, MO 7.5 Minute Topo Quad, 1982

Sentinel Wood Treaters Site
Ava, Missouri

Figure 1
Site Location Map

Tetra Tech EM Inc.

Date: 7/30/02 Drawn By: Colin Willits Project No: G9011.L.02.0077.00

V:\START 2 (G9011)\Task 0077 - Sentinel\Figures\Figure 1.dwg

Legend

Sediment sampling cell

Stream

N

125 0 125 Feet

Source: Ava, MO DOQ 1995

Sentinel Wood Treaters Site
Ava, Missouri

Figure 2
Sediment Sample Locations

Tetra Tech EM Inc.

Date: 7/30/02 Drawn By: Colin Willits Project No: G9011.L.02.0077.00

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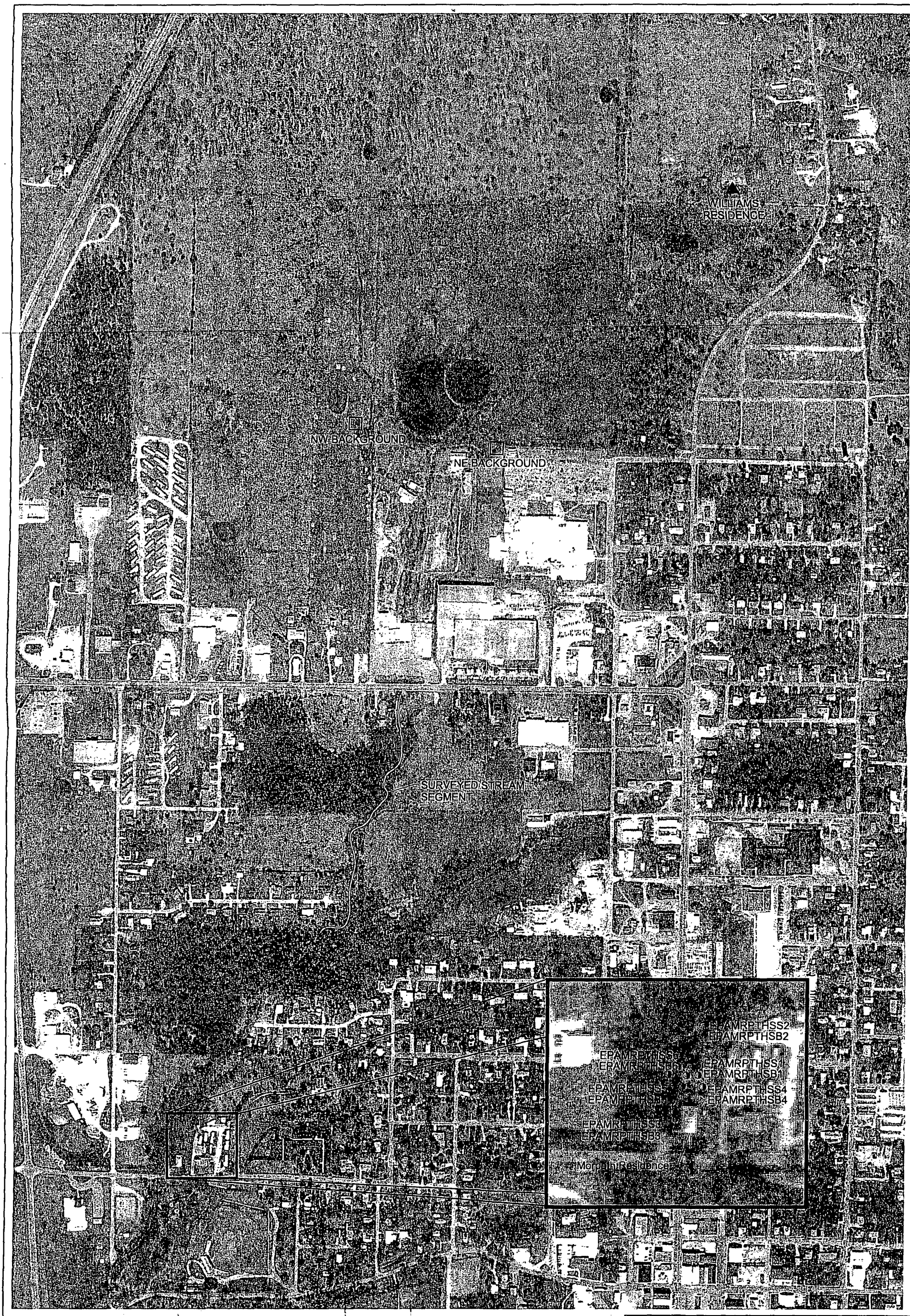

Legend

- ▲ Private well sample
- □ Sediment sample
- ◑ Surface and subsurface soil sample

N

500 0 500 Feet

Source: Ava, MO DOQ 1995

Sentinel Wood Treaters Site
Ava, Missouri

Figure 3
Soil, Groundwater, and Background Sediment Sample Locations

Tetra Tech EM Inc.

Date: 7/30/02 Drawn By: Colin Willits Project No: G9011.L.02.0077.00

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APPENDIX B

Dioxin Immunoassay Screening Results and Technology Evaluation

1.0 INTRODUCTION

A Removal Site Evaluation (RSE) was conducted to assess potential contamination of an unnamed tributary to Prairie Creek, which drains the Sentinel site. As part of the RSE, twenty-two sediment samples, including one field duplicate and two background samples, were collected from the tributary and submitted to the mobile laboratory unit (MLU) operated by Tetra Tech and to the EPA Region 7 Laboratory. The samples were analyzed by both laboratories for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p-furans (PCDD/F).

Samples were prepared and analyzed by the MLU using Cape Technologies' High Performance Dioxin/Furan Immunoassay Kit. For the extraction and cleanup of these samples, Tetra Tech adhered to the procedures outlined in Application Note AN-008 (DRAFT), "Analysis of PCDD/F in Soils and Sediments at Low to Mid Parts per Trillion Using Rapid Extraction and Rapid One-step Cleanup" (see Attachment 1). Once the cleanup procedure was complete, sample extracts were analyzed using an immunoassay kit, following the procedures outlined in the DF1 Kit Insert (IN-DF1) (see Attachment 2). Split (confirmation) samples were prepared and analyzed by the Region 7 Environmental Protection Agency (EPA) Laboratory using a gas chromatography/high resolution mass spectrometry (GC/HRMS). Results for both sets of analyses are presented in the following section. Calculations and laboratory notes for the MLU samples are provided in Attachment 3.

2.0 RESULTS

Results from the MLU are reported as total dioxin equivalents (TEQs) in parts per trillion (ppt). Results from the EPA Laboratory report individual dioxin concentrations as well as the TEQs in ppt. The TEQs for both sets of analyses are presented in Table 1.

3.0 DISCUSSION

Both quantitative and semi-quantitative data comparisons can be made between the EPA laboratory data and the MLU data. Data can be compared quantitatively by calculating the relative percent difference (RPD) between the two data sets, and semi-quantitatively by determining the number of false positives and false negatives when compared against the removal action level of 1.0 part per billion (ppb). The comparisons are discussed in detail in the following sections.

TABLE 1
PCDD/F RESULTS PRESENTED AS TEQs FOR SEDIMENT SAMPLES
SENTINEL WOOD TREATERS SITE - AVA, MISSOURI

Sample Cell Number	EPA Laboratory Results (ppt)	MLU Results (ppt)
254	365	162
251	207	225
248	334	450
245	595	ND
242	130	1,210
239	274	368
236	264 L	820
233	163	541
230	242	413
227	196 L	360
224	567	600
221	429	244
218	514	244
215	162	183
212	427	145
209	255	265
209 (Field Duplicate)	289	202
206	242	45
203	250	82
200	410	82
Background–Northwest	10.7	ND
Background–Northeast	7.89	ND

Notes:
EPA U. S. Environmental Protection Agency
L Actual Value Greater Than The Value Reported
MLU Mobile Laboratory Unit
ND Not Detected
ppt Parts Per Trillion

3.1 Quantitative Comparison

There are several factors that should be taken into consideration before the MLU results may be compared to the EPA results. One factor is that all calculations for the enzyme immunoassay (EIA) kits are based upon the toxic equivalency factor (TEF) values established in 1997 by the World Health Organization (WHO); the data generated by the EPA laboratory is based on older TEF values. The difference between the older TEF values and the WHO TEF values are presented in Table 2.

TABLE 2
CHANGES IN TEFS MADE BY THE WORLD HEALTH ORGANIZATION IN 1997
SENTINEL WOOD TREATERS SITE - AVA, MISSOURI

Compound	Old TEF Values	WHO TEF Values
1,2,3,7,8-PCDD	0.5	1.0
OCDD	0.001	0.0001
OCDF	0.001	0.0001

Notes: OCDD Octachlorodibenzodioxin
OCDF Octachlorodibenzofuran
PCDD Pentachlorodibenzodioxin
TEFs Toxic Equivalency Factors
WHO World Health Organization

In order to make a the most meaningful comparison between the MLU data and the EPA data, the EPA data first needs to be recalculated using the WHO TEFs. The recalculated EPA data are found in Table 3. (Note that the actual values may differ slightly due to rounding errors.)

Another factor that needs to be considered when comparing the two data sets is the specificity of the EIA kits. According to IN-DF1 (see Attachment 2), the anti-dioxin antibody in the EIA kit binds to different PCDD/F congeners with different affinities. These affinities, expressed as percent crossreactivities relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), are roughly parallel the WHO TEF values. The values for the individual PCDD/F congeners are multiplied by the percent crossreactivity values, instead of the TEF values, to establish a predicted EIA value.

Using the EPA Laboratory data, a correlation can be established between the actual values and the predicted EIA values for each congener, thereby determining what is known as the calibration adjustment factor (CAF). This adjustment factor is incorporated into most of the 4000 series methods, and is a

common practice. The EIA results are multiplied by the CAF to obtain results which are more comparable to the EPA laboratory data because the corrected EIA results now account for the different crossreactivities for the different congeners. The corrected EIA results are presented in Table 3.

RPDs were calculated for all samples with non-qualified, positive values, inputting the recalculated EPA results (based on the WHO TEFs) and the corrected EIA values into the following formula:

$$RPD = \frac{|X - X_1|}{0.5(X + X_1)} \times 100$$

where

X = Recalculated EPA Results

X_1 = Corrected EIA Results

According to EPA data assessment guidelines, good comparability is defined as any RPD less than 67, fair comparability is defined as any RPD between 67 and 167, and poor comparability is defined as any RPD greater than 167. The differences in samples analyzed by the EPA verses the MLU could be attributed to many things including, but not limited to, sample characteristics (homogeneity, moisture content), differences in analytical techniques used, or the amount of sample used for the analysis (dilution factor). The RPDs between the two data sets are presented in Table 3.

Samples collected from Cells 254, 251, 248, 239, 230, 224, 221, 218, 215, 209, and 209 FD exhibited good comparability. Samples collected from Cells 242, 233, 212, 206, 203, and 200 exhibited fair comparability. RPDs for samples collected from Cell 245, background-northwest, and background-northeast could not be calculated because dioxin was not detected in the MLU samples. RPDs for samples collected from Cells 227 and 236 could not be calculated because these results were qualified by EPA. (The actual values were greater than the value reported [L]).

3.2 Semi-quantitative Comparison

A semi-quantitative comparison of the data sets can be made with respect to a particular level of interest, in this case the presumed action level of 1.0 ppb, or 1,000 ppt. Using the recalculated EPA laboratory results (based on the WHO TEFs) and the corrected EIA values, the data are compared

TABLE 3
RPDS FOR MLU AND EPA LABORATORY DATA
SENTINEL WOOD TREATERS SITE - AVA, MISSOURI

Sample Cell Number	Recalculated EPA Laboratory Results (ppt)	Adjusted MLU Results (ppt)	Calculated RPD
254	269	193	32.9
251	171	267	43.8
248	291	534	58.9
245	520	ND	NA
242	137	1,142	157.2
239	220	437	66.1
236	235 L	974	NA
233	163	642	119.0
230	251	474	61.5
227	168 L	414	NA
224	479	690	36.1
221	438	280	44.0
218	426	280	41.4
215	135	210	43.5
212	366	167	74.7
209	218	305	33.3
209 (Field Duplicate)	250	233	7.0
206	198	51	118.1
203	211	97	74.0
200	359	97	114.9
Background–Northwest	10	ND	NA
Background–Northeast	3	ND	NA

Notes:
EPA U. S. Environmental Protection Agency
L Actual Value Greater Than The Value Reported
MLU Mobile Laboratory Unit
NA Not Applicable
ND Not Detected
ppt Parts Per Trillion
RPD Relative Percent Difference

using the following parameters. In "quantifying" the EPA laboratory data, positive (P) results are those values equal to or greater than 1,000 ppt, and negative (N) results are those values less than 1,000 ppt. In comparing the MLU data, correct positive (CP) results are those which are equal to or greater than 1,000 ppt, when the corresponding EPA laboratory results are positive; correct negative (CN) results are those which are less than 1,000 ppt, when the EPA laboratory results are negative; false positive (FP) results are those MLU results which are greater than 1,000 ppt, when the EPA laboratory results are negative; and false negative (FN) results are those MLU results which are less than 1,000 ppt, when the EPA laboratory results are positive. A semi-quantitative analysis based on this system of comparison is presented in Table 4.

As indicated on Table 4, all sample comparisons were correct negatives (CN), with the exception of the sample from Cell 242. For this sample, the MLU result was determined to be a false positive. As stated before, this could be attributed to several factors including, but not limited to, sample characteristics (homogeneity, moisture content), differences in analytical techniques used, or the amount of sample used for the analysis (dilution factor).

3.3 Cost Comparison

The costs of using the EIA kits include the chemist's labor, expendable materials (such as reagents, disposable glassware, etc.) and the cost of the kits themselves. The approximate cost breakdown on a per sample basis for this project is provided below:

Labor (2 hours @ $50/hour)	$100
Expendable Materials	$10
DF1 EIA Kit	$75
SP3 Sample Preparation Kit	$15
Total Cost per Sample	$200

The cost for a full PCDD/PCDF laboratory analysis by GC/HRMS generally ranges from $700 to $900 per sample, so the EIA kits do represent a potentially significant cost savings. The costs of laboratory equipment required for the EIA kits, such as a photometer, micropipettor, repeating pipettors, orbital shaker and centrifuge have not been considered for this cost comparison with fixed laboratory services. However, this equipment can be purchased for approximately $5,000 to $6,000.

TABLE 4
SEMI-QUANTITATIVE ANALYSIS OF MLU AND EPA LABORATORY DATA
SENTINEL WOOD TREATERS SITE - AVA, MISSOURI

Sample Cell Number	Recalculated EPA Results (ppt)	Semi-Quantitative Results	Adjusted MLU Results (ppt)	Semi-Quantitative Results
254	269	N	193	CN
251	171	N	267	CN
248	291	N	534	CN
245	520	N	ND	CN
242	137	N	1,142	**FP**
239	220	N	437	CN
236	235 L	N–biased low	974	CN
233	163	N	642	CN
230	251	N	474	CN
227	168 L	N–biased low	414	CN
224	479	N	690	CN
221	438	N	280	CN
218	426	N	280	CN
215	135	N	210	CN
212	366	N	167	CN
209	218	N	305	CN
209 (Field Duplicate)	250	N	233	CN
206	198	N	51	CN
203	211	N	97	CN
200	359	N	97	CN
Background–Northwest	10	N	ND	CN
Background–Northeast	3	N	ND	CN

Notes: CN Correct Negative; EPA Environmental Protection Agency; FP False Positive; L Actual Value Greater Than The Value Reported; MLU Mobile Laboratory Unit; N Negative; ND Not Detected; ppt Parts Per Trillion

4.0 USES AND LIMITATIONS OF THE EIA KIT

According to the literature available at the Cape Technologies website (www.cape-tech.com), the EIA kits should be used as an initial rapid screening tool with the objective being to reduce the number of samples analyzed by slower, more expensive fixed laboratory methods. Screening results which exhibit positive hits at or near a site-specific action level, along with a certain percentage (typically 5 to 20 percent) of the negative results, should be analyzed by a fixed laboratory for confirmation. The EIA kits are intended to supplement conventional methods, not replace them.

The kits may be used to establish quantitative results; however, proper quality control samples should be incorporated into the method. Because of the level of technology employed by the kits, they should be used only by an analyst who is well trained and has good knowledge of chemistry.

A site-specific CAF should be determined, either through confirmatory analyses, historical data, or site similarity. For this site, the established CAF may be applicable to other wood treater sites based on a presumed similarity of waste characteristics. Confirmatory results from another wood treater site could be used to verify the CAF applied to the MLU sample data for this site.

5.0 CONCLUSIONS

A comparison of EPA Laboratory and MLU data sets for 22 sediment samples showed that approximately 50 percent of the samples exhibited good comparability, 27.3 percent of the samples exhibited fair comparability, and 22.7 percent of the samples exhibited no comparability. Only one (4.5 percent) of the samples exhibited a false positive result with respect to a presumed action level of 1.0 ppb. Based on these results, the EIA kits appear to have performed adequately for their intended use. There were approximately five samples which would have been recommended for confirmatory analysis (those with sample results above 500 ppt), in addition to one or both of the background samples.

In addition to the 22 sediment samples discussed in this report, the RSE also included the collection of soil samples from a residential garden located adjacent to the tributary. The EIA kits were used by the MLU to analyze six of these soil samples. Because none of these samples were sent to the EPA Laboratory for confirmation, the MLU results could not be used for the comparative analysis discussed in this report. However, based on the performance analysis for the sediment samples, the MLU soil sample results should be considered usable data and are presented in Table 5.

TABLE 5
PCDD/F RESULTS PRESENTED AS TEQs FOR SOIL SAMPLES
SENTINEL WOOD TREATERS SITE - AVA, MISSOURI

Sample Number	Sample Depth (inches bgs)	MLU Results (ppt)
G1	0 - 6	ND
G2	18 - 24	ND
G3	0 - 6	ND
G4	18 - 24	308
G5	18 - 24	210
G6	0 - 6	460

Notes:
bgs Below Ground Surface
MLU Mobile Laboratory Unit
ND Not Detected
ppt Parts Per Trillion

It should be noted that all of the soil sample results are below 500 ppt, and the MLU data are therefore reliable without confirmation sample data.

ATTACHMENT 1

APPLICATION NOTE AN-008

CAPE Technologies

High Performance Dioxin/Furan Immunoassay Kit

Application Note AN-008 (DRAFT)

Analysis of PCDD/Fs in soil and sediment at low to mid-ppt using rapid extraction and rapid one-step cleanup

Contents of this Application Note

A. Introduction
B. Summary of Procedure
C. Reagents Required
D. Equipment Required
E. Supplies Required
F. Detailed Sample Preparation Procedure
G. Data Reduction and Interpretation of Immunoassay Results
H. Validation Data Supporting this Method

A. Introduction

This Application Note describes a rapid immunoassay specific extraction and rapid one step cleanup to prepare soil or sediment samples for screening analysis at low to mid ppt (pg/g) using the CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit. The method described here is a slightly modified version of US EPA Method 4025. It includes a much faster and simpler extraction and cleanup than typically required for GC-MS analysis. Using this method, one analyst can screen up to 20 samples per day in a facility as simple as a small mobile laboratory. This Application Note is intended to be used in conjunction with the DF1 Dioxin/Furan Immunoassay Kit and its insert (IN-DF1) and the SP2 and SP2-ST Sample Preparation Kits and their inserts (IN-SP2 and IN-SP2-ST). Please read this Application Note carefully as part of planning your sample preparation and analysis. The documents cited in this Application Note are available by email from CAPE Technologies or at the CAPE Technologies web site (www.cape-tech.com).

B. Summary of Procedure

1. Weigh soil or sediment sample. Add sodium sulfate and mix. Add 4:1 hexane:acetone and extract sample by shaking 2-3 hours. Remove the supernatant hexane:acetone extract.
2. Evaporate an aliquot of the supernatant hexane:acetone extract using a hydrocarbon keeper such as tetradecane, redissolve in hexane, and load onto a coupled acid-silica:activated carbon mini-column.
3. Force hexane through the system until the sample has passed through carbon mini-column.
4. Transfer carbon mini-column to empty reservoir and wash with 1:1 toluene:hexane.
5. Reverse carbon mini-column on reservoir and elute with toluene.
6. Evaporate the toluene to exchange sample into water-miscible keeper solution.
7. Perform the immunoassay procedure as described in the kit insert IN-DF1.
8. Interpret the immunoassay results as described in section G of this Application Note.

C. Reagents Required

1. Anhydrous sodium sulfate, approx. 20 g per sample; reagent grade
2. Hexane, approx. 60 mL per sample; HPLC grade or better of mixed isomer type (CASRN 73513-42-5; this is typically 85% n-hexane with remainder methylcyclopentane and other hexane isomers; n-hexane could also be used, but is more expensive.
3. Acetone, approx. 5 mL per sample; HPLC grade or better (CASRN 67-64-1).
4. Toluene, ultra-pure or residue grade (probably the best grade available, such as Burdick & Jackson), approx. 20 mL per sample. All non-volatile residue in the toluene will end up in the EIA sample, so **maximum purity at this step is critical.**
5. Methanol, approx. 1 mL per sample; reagent grade.
6. Tetradecane or similar high boiling aliphatic hydrocarbon keeper, approx. 0.25 mL per sample.

D. Equipment Required

1. Equipment for performing the DF1 Immunoassay; summarized in section G of the kit insert (IN-DF1) and described in detail in Equipment List (EL-001)
2. Balance for weighing sample (0.1 g or better readability)
3. Orbital platform shaker for mixing during extraction
4. Centrifuge with capacity for holding 40 mL vials (28 mm outside diameter x 98 mm high, flat bottoms)
5. Fume hood and solvent exchange system for samples of approx. 10 mL in glass tubes (refer to IN-DF1, section I3)
6. Computer with Microsoft Excel (for Win97 or later, or for Mac OS9 or later) for data analysis. Solver Add-in must be installed and available (look under **Tools** menu).

E. Supplies Required

1. DF1 Immunoassay Kit and supplies specified in section G of the kit insert (IN-DF1)
2. Pipet bulbs and glass Pasteur pipets for transfer of extracts
3. Pipettors and glass pipets and/or graduated cylinders for measuring approx. 5 to 15 mL
4. Glass vials (2 to 12 mL) with Teflon lined caps for storage of sample extracts
5. Glass tubes (15-20 mL) for evaporation of carbon column eluates
6. SP3 Sample Preparation Kit containing materials for sample extraction, prepacked disposable acid silica columns, and prepacked disposable carbon mini-columns.
7. SP2-ST Starter Sample Preparation Kit containing reusable hardware for manual execution of the column cleanup procedure described in Section F below
8. SP2-RK rack for holding SP3 and SP2-ST reservoirs (glass columns like 25 mL pipets; 16 mm dia. by 30 cm long)
9. Basin or other receptacle to catch waste from carbon mini-column procedure

F. Detailed Sample Preparation Procedure

Before beginning this procedure, please read section F carefully, especially step F12. This section has several references to the DF1 Kit Insert (IN-DF1), which has a detailed description of the EIA procedure in section J. Steps I1 and J1-2 of the EIA procedure should be performed before step F11 below. Steps J3-6 of the EIA procedure should be done at the end of step F11 and before starting step F12 below. Advance preparation of acid silica is required before step F5 below.

1. Weigh sample: Use CAPE Technologies Sample Preparation Kit (SP3-12 or SP3-60). Using wooden spatula from Sample Preparation Kit, mix sample thoroughly and weigh 5 g into 40 mL extraction vial from Sample Preparation Kit. Quality assurance samples to verify method performance (unspiked and spiked method blanks and reference soils) should be included at this point.

2. **Extract sample**: Add 10-20 g anhydrous sodium sulfate to extraction vial and mix with wooden spatula until sample is free flowing. Add 3 steel mixing balls from the SP3 Kit, then 20 mL of 4:1 hexane:acetone. Read and follow precautions and other instructions in SP3 Kit insert (IN-SP3). Cap vials tightly and extract by shaking 2-3 hours at 350 rpm on orbital platform shaker. Extraction vials should lie flat on their sides for maximum agitation.
3. **Spin extract and store**: Centrifuge extraction vial for 10-15 minutes at 1000 x g or less. **Caution:** Exceeding this force during centrifugation can cause breakage of glass vials. Remove a portion of the supernatant hexane:acetone extract to a clean vial with Teflon lined cap for storage. The concentration of soil matrix in the extract will be 0.25 mg soil equivalent per µL.
4. **Evaporate aliquot of extract**: Using glass capillary micropipettor, add 1000 µL of hexane:acetone extract (equivalent to 250 mg of sample) and 100-250 µL of tetradecane or similar hydrocarbon keeper to a glass tube or vial and evaporate (to remove acetone before adding to acid silica). When hexane and acetone are gone, add 1-2 mL of hexane and mix vigorously until all residue is redissolved. **Note on sample load and target sensitivity:** Different target sensitivities can be achieved by using different volumes of extract in this step to set up different sample loads. Consult Table 3 of the DF1 Kit Insert (IN-DF1) for guidance. The procedure described in step F12 below allows recovery of 80% of the prepared sample for introduction to the EIA tube. According to Table 3 of IN-DF1, 200 mg of sample equivalent per EIA tube translates to a nominal sensitivity of 50 pg/g. This means that an aliquot of extract equivalent to 200 mg of a 50 pg/g TEQ sample would contain (under ideal conditions, 100% extraction efficiency, 100% cleanup recovery, etc.) 10 pg TEQ. This corresponds to Standard 2 (IN-DF1, Table 1) and should be consistently detectable. **Note on sample load and quality assurance:** The analyst is responsible for quality assurance and should consider each different sample load level to be a separate method with respect to blanks, spikes, and other quality assurance samples.
5. **Prepare acid silica column**: Remove endcaps from acid silica column of SP3 Kit and place in SP2-RK rack. Place basin underneath to catch waste solvent. Add 10 mL of hexane to acid silica column and let flow through by gravity until the bed is fully wetted and hexane begins dripping from the reservoir tip. No air gaps or bubbles should be visible in the sodium sulfate/silica bed. This procedure should be done one column at a time to avoid drying of columns. **DO NOT ALLOW TOP OF BED TO GO DRY; IT IS CRITICAL TO AVOID AIR BUBBLES IN ACID SILICA COLUMN.**
6. **Attach carbon mini-column to acid silica column:** Remove a carbon mini-column (SP3 Kit) from its pouch and use a Pasteur pipet to fill square cut end with hexane. As hexane is dripping from reservoir tip, place mini-column firmly onto tip with a twisting action. Be sure top of mini-column is full of hexane so that it can be attached without air bubbles. Flow will nearly stop, with solvent front advancing very slowly through carbon mini-column. The reservoir and column assemblies can be left alone at this point until all are assembled and ready for step F7. **DO NOT ALLOW TOP OF BED TO GO DRY.**
7. **Complete prewash:** Several mL of hexane should remain in reservoir above sodium sulfate/silica. Twist stopper/stopcock assembly (SP2-ST Kit) firmly into top of reservoir. Using 20 mL syringe (SP2-ST Kit), pressurize the reservoir, close the stopcock, and remove the syringe. The hexane should flow immediately through the column at 0.5 to 2.0 mL/min. Catch solvent in waste basin. Stop prewash with 2-5 mm of hexane remaining on top of sodium sulfate, then remove stopcock from reservoir. **DO NOT ALLOW TOP OF BED TO GO DRY.**
8. **Load sample onto carbon mini-column**: Using glass capillary micropipettor, add redissolved sample from step F4 to the reservoir. Using a Pasteur pipet, gently rinse the sides of the reservoir with 10 mL of hexane. Twist stopper/stopcock assembly (SP2-ST Kit) firmly into top of reservoir and pressurize as before. Maintain pressure to keep hexane flowing all the way through the acid silica column. Catch solvent in waste basin. When air penetrated the neutral silica layer (bottom 1-2 cm layer at bottom of column, just above tip of column), release pressure to stop flow. **IT IS NECESSARY TO RUN THE SOLVENT ALL THE WAY THROUGH THE ACID SILICA BED, BUT DO NOT ALLOW TOP OF CARBON MINI-COLUMN TO GO DRY.**

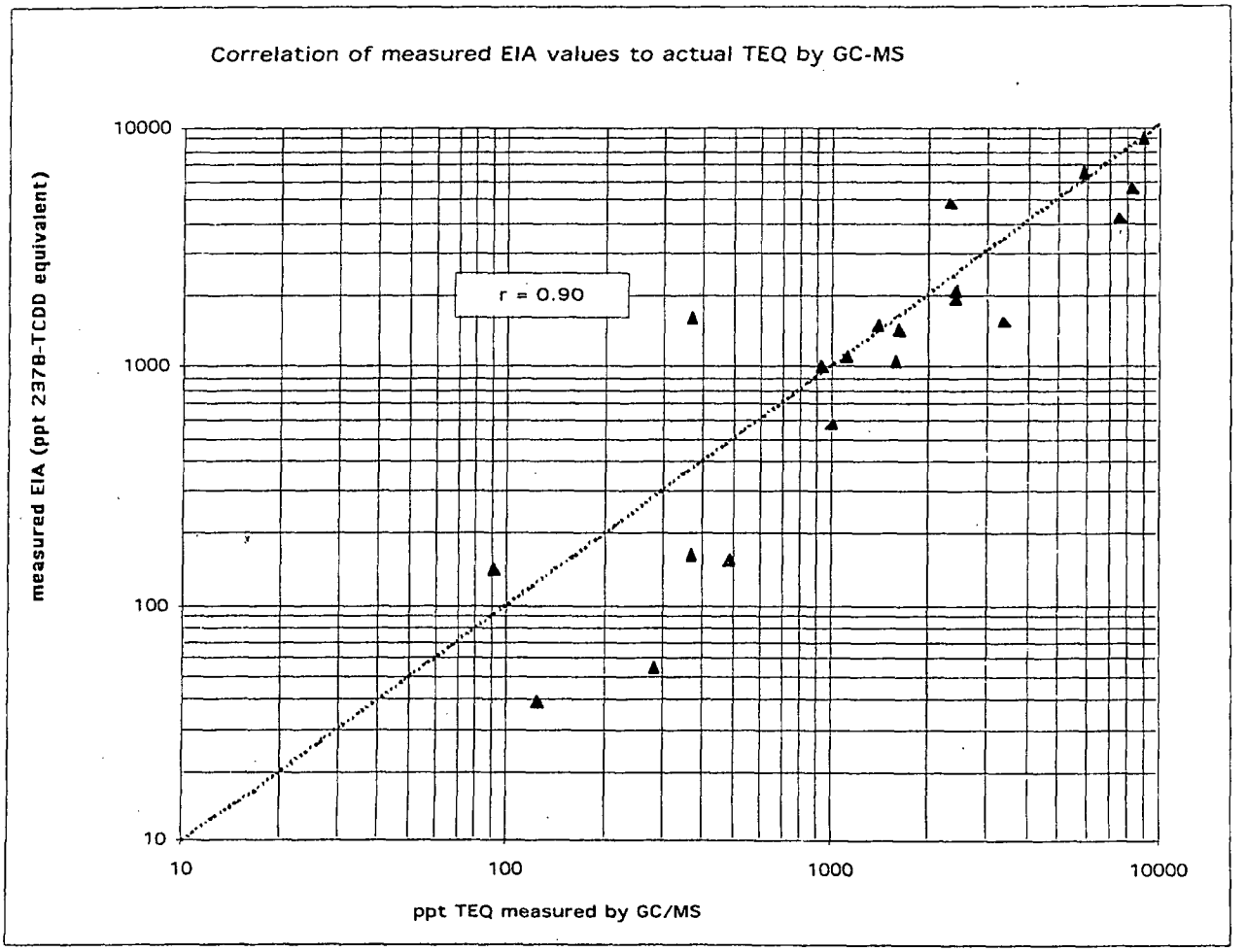
9. **Wash carbon mini-column**: Remove carbon mini-column from the acid silica column, attach square cut end to a clean and empty reservoir (SP2-ST Kit), and place in rack over waste capture basin. Add 7 mL of 1:1 toluene:hexane and pressurize as before. Catch solvent in waste basin. When solvent level reaches tip of reservoir, release pressure to stop flow. **DO NOT ALLOW TOP OF CARBON MINI-COLUMN TO GO DRY.**
10. **Elute sample**: Remove carbon mini-column from tip of reservoir and replace on same reservoir in reverse orientation, slant cut end first. Add 10 mL of toluene and pressurize as before. Capture eluate in clean 16 x 125 mm borosilicate glass tube, allowing air to drive last of toluene through carbon mini-column.
11. **Add keeper and evaporate solvent**: Keeper solution (80:20 methanol:tetraethylene glycol [TEG] + 100 ppm Triton X-100) is made by adding methanol to a stock vial which is part of the DF1 kit (see the DF1 Kit Insert IN-DF1 section I1 for instructions). Add 62.5 µL of TEG-Triton-methanol keeper solution to each evaporation tube containing a toluene eluate. Evaporate the toluene at 60-75°C under a gentle stream of nitrogen as described in the immunoassay kit insert IN-DF1, section I3. When only keeper remains, centrifuge at 1-2000 x g for 2 minutes to concentrate all of the sample at the bottom of the tube.
12. **Dilute sample with methanol**: Before beginning this step you should have completed steps 1 through 6 described in section J of the DF1 Immunoassay Kit Insert (IN-DF1). Once these beginning EIA steps are completed, add 50 µL of methanol (setting 2.5 of Repeater Plus pipettor with 1.0 mL tip) to each evaporation tube and mix vigorously for 15 seconds. Let stand for at least 15 seconds to allow liquid to flow back to bottom of tube, then remove 50 µL for EIA analysis. **Note:** This procedure recovers 80% of the prepared sample for introduction to the EIA tube. Dilution and EIA loading should be done in batches of 4 samples or fewer to minimize concentration changes due to methanol evaporation before pipetting. Add the sample directly to the water in EIA tube, not above the water or onto side of EIA tube. Mix each tube individually as soon as sample is added.
13. **Run EIA**: Perform remainder of EIA as described in section J of DF1 Immunoassay Kit Insert (IN-DF1).

G. Data Reduction and Interpretation of Immunoassay Results

1. Open Calculation Module C (Microsoft Excel workbook downloadable from CAPE Technologies web site [www.cape-tech.com] or available by email from CAPE Technologies). Select "Introduction" worksheet and read the information on background and procedure, then select the "DF1 low-mid ppt quantitative" worksheet. Install Excel "Solver" Add-In if it is not already done.
2. Enter optical density (OD) data for standards and samples into designated spaces.
3. Perform non-linear curve fitting procedure using Excel "Solver" function.
4. Verify sample load (200 mg sample equivalent per EIA tube).
5. Read original sample ppt values for each sample in designated row.
6. Final interpretation of data will be based also on analyst experience, knowledge of individual samples, and especially on results for quality assurance samples.

H. Validation Data Supporting this Method

Correlation between immunoassay screening analysis and TEQ as determined by high resolution gas chromatography-high resolution mass spectrometry (HRGC-HRMS): A set of 21 soil samples from a wood treatment facility were prepared and analyzed as described in Sections F and G above. Each EIA tube received prepared extract equivalent to 200 mg of original sample. Subsamples of each sample were analyzed separately by HRGC-HRMS. The TEQ values were calculated from TEF values and individual congener concentrations as measured by HRGC-HRMS. The line represents x = y.



ATTACHMENT 2

DF1 KIT INSERT

CAPE Technologies

High Performance Dioxin/Furan Immunoassay Kit

DF1 Kit Insert (IN-DF1)

Contents of This Insert

A. Intended Use
B. Background Information
C. Test Principles
D. Performance Characteristics
E. Precautions
F. Materials Provided
G. Materials Supplied by the User
H. Suggestions for Pipettor Use
I. Preparation of PCDD/F Sample Extracts for EIA by Solvent Exchange
J. EIA Analysis of Standards and Prepared Samples
K. Interpretation of the Results
L. Limitations of the Procedure
M. Storage
N. Quality Assurance
O. References
P. General Limited Warranty

A. Intended Use

The CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit is an Enzyme ImmunoAssay (EIA) for analysis of PolyChlorinated DibenzoDioxins and PolyChlorinated DibenzoFurans (PCDD/Fs) in prepared sample extracts. Extracts of fly ash, soil, stack gas, tissue, sediment, food, water, or other samples which have been prepared by conventional extraction methods can be exchanged to a water miscible solvent system for EIA analysis. Samples can also be prepared by immunoassay specific methods for analysis by EIA. Please read this kit insert and other related CAPE Technologies literature carefully to gain maximum understanding of the capabilities and limitations of the test. Refer to Technical Notes and Application Notes available from the CAPE Technologies web site (http://www.cape-tech.com) for discussion of technical issues and for individual applications for different sample matrices. **Note:** Samples analyzed by EIA must contain either no mass-labeled internal standards or immunoassay compatible internal standards. For discussion of issues related to internal standards, consult CAPE Technologies Technical Note TN-001.

B. Background Information

PCDD/Fs are a family of compounds with the same general structure. There are 75 dibenzodioxin congeners and 135 dibenzofuran congeners, containing from 1 to 8 chlorine atoms on the dibenzodioxin or dibenzofuran nucleus. Only 7 of the 75 PCDD congeners and 10 of the 135 PCDF congeners contain the 2,3,7,8 chlorination pattern thought to be required for dioxin-like toxicity. Only these 17 of the 210 total PCDD/F congeners contribute to the Toxic Equivalency (TEQ) of a sample, which is generally the critical analytical target. Based on a variety of toxicity tests, these 17 congeners have been assigned Toxic Equivalency Factors (TEFs) of 1.0 to 0.0001 relative to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin.

The PCDD/F congener composition of samples can be highly variable. Because PCDD/Fs are formed unintentionally by a variety of chemical and combustion processes, samples usually contain a mixture of many different congeners. Samples from different sources often have very different mixtures of congeners which are consistent within the source. In most samples, the majority of the PCDD/F mass present does not contribute significantly to the total sample TEQ. Also, in most samples, only a few PCDD/F congeners are responsible for the majority of the TEQ. This immunoassay is designed to measure sample TEQ by responding to the toxic PCDD/F congeners in correlation with their TEFs. Variation in accuracy among samples may occur solely because of the variability of congener composition noted above. Best kit performance will be obtained when all samples are from a single group which shares as many properties as

possible (common source of contamination, similar congener composition, similar sample matrix, etc.). To maximize accuracy, the congener composition of the target sample population should be known.

Both screening and quantitative analysis are possible with this kit. Consult the appropriate CAPE Technologies Application Note for details. Please also consult CAPE Technologies Technical Note TN-004 for further discussion of quantitative use of the kit.

C. Test Principles

PCDD/Fs are typically extracted with organic solvents which are incompatible with the EIA. Before introduction of the sample into the EIA a solvent exchange is required. PCDD/Fs have very low volatility and are retained during this solvent exchange in a small volume of a keeper solution (Triton X-100 detergent in tetraethylene glycol [TEG]) after evaporation of the original solvent. Methanol is added to dilute this solution and the methanol-TEG-Triton mixture is added directly to the EIA tubes. It should be noted that the literature value for solubility of 2,3,7,8-TCDD in methanol is 10 ppm, which is 5000 times higher than the concentration of the highest standard recommended for this kit. Additionally, the solubility of PCDD/Fs in methanol is augmented significantly by the addition of TEG and Triton X-100. These factors assure the solubility of PCDD/Fs in the EIA system.

During the first EIA incubation, PCDD/Fs are specifically bound by the anti-dioxin antibodies, which have been immobilized on the EIA tube surface. After washing away the unbound material, the bound PCDD/Fs remain and a competitor-HorseRadish Peroxidase (HRP) conjugate is added. Bound PCDD/Fs occupy the dioxin binding sites of the antibodies in proportion to the PCDD/F content of the sample and prevent binding of the competitor-HRP conjugate. After a short incubation, unbound conjugate is removed and the test tubes are washed thoroughly. The amount of conjugate bound by the anti-dioxin antibody is inversely related to the amount of PCDD/Fs originally present in the sample.

Finally, a solution of chromogenic HRP substrate and hydrogen peroxide is added to the test tubes. Color development is directly proportional to enzyme concentration and inversely related to the PCDD/F concentration in the original sample. The test tubes are analyzed using a tube reader or spectrophotometer to measure the optical density (OD) at 450 nm. The OD values of unknown samples are compared to the OD values of standards to determine the level of PCDD/Fs in the samples.

D. Performance Characteristics

Sensitivity and Reproducibility

Standard curve data developed by CAPE Technologies for the High Performance Dioxin/Furan Immunoassay Kit are given in Table 1. Response values are expressed as a percentage of the negative control, which is 100 ppm Triton X-100 in 80-20 methanol-TEG. The detection limit of the kit is approximately 4 pg 2,3,7,8-TCDD per EIA tube. Results for samples which are compared to the standards shown in Table 1 must be related to the original sample concentration by back calculation using the proper dilution and volume factors. Matrix detection limits will vary according to matrix, sample size, and dilution factor. Consult the appropriate CAPE Technologies Application Note for further information. The data in Table 1 can be used to determine if kit performance is acceptable. If your results for the standards in Table 1 are not consistently within the percent of negative control ranges given, contact CAPE Technologies for assistance.

Table 1: Sensitivity and Reproducibility of the EIA Standard Curve. Data are accumulated responses for 2,3,7,8-TCDD standards in methanol/Triton over ten months. No sample matrix was present. A total of 41 tests were run in four different labs. The detection limit, which is approximated by the I_{85} or the concentration giving 85% of the negative control OD, was 3.9±1.4 pg/tube (mean±SD). The midpoint of the curve, defined as the I_{50} or the concentration giving 50% of the negative control OD, was 21.9±7.4 pg/tube (mean±SD).

Standard Number	1	2	3	4
ng/mL 2378-TCDD in standard (50 µL per EIA tube)	0.064	0.2	0.64	2
pg 2378-TCDD per EIA tube	3.2	10	32	100
mean percent of negative control (%NC)	87	66	41	29
standard deviation (SD)	6	7	7	6
range of mean±2SD	74-99	51-80	27-55	17-40

Specificity

The anti-dioxin antibody in this kit binds to different PCDD/F congeners with different affinities. The specificity of the test is predominantly for PCDD/Fs which contain 3 to 6 chlorines, with a strong preference for the 2,3,7,8 chlorinated congeners. Test specificity roughly parallels the TEF values of the individual PCDD/F congeners. Crossreactivity data given in the following table are reactivities relative to 2,3,7,8-TCDD.

Table 2: Specificity of the EIA. Response curves were prepared for each congener as noted. The percent crossreactivity = (((congener I_{50}) ÷ (2,3,7,8-TCDD I_{50})) x 100). Values are typically based on 2 to 4 independent curves, each containing at least 4 concentrations.

Compound	Percent Crossreactivity
Toxic Dioxin Congeners	
2,3,7,8-TCDD	100
1,2,3,7,8-PeCDD	105
1,2,3,4,7,8-HxCDD	1.6
1,2,3,6,7,8-HxCDD	7.9
1,2,3,7,8,9-HxCDD	39
1,2,3,4,6,7,8-HpCDD	0.7
OCDD	<0.001
Toxic Furan Congeners	
2,3,7,8-TCDF	20
1,2,3,7,8-PeCDF	4.6
2,3,4,7,8-PeCDF	17
1,2,3,4,7,8-HxCDF	0.4
1,2,3,6,7,8-HxCDF	1.0
1,2,3,7,8,9-HxCDF	3.3
2,3,4,6,7,8-HxCDF	4.9
1,2,3,4,6,7,8-HpCDF	0.02
1,2,3,4,7,8,9-HpCDF	0.9
OCDF	<0.001

Compound	Percent Crossreactivity
Other PCDD/F Congeners	
2,3-dichlorodibenzo-*p*-dioxin	0.13
2,7-dichlorodibenzo-*p*-dioxin	0.003
2,3-dichlorodibenzofuran	0.02
2,7-dichlorodibenzofuran	<0.002
2,3,7-trichlorodibenzo-*p*-dioxin	24
2,3,8-trichlorodibenzofuran	0.26
1,2,3,4-TCDD	<0.001
1,2,3,4-TCDF	<0.001
1,3,6,8-TCDD	0.05
1,3,6,8-TCDF	0.007
PolyChlorinated Biphenyls	
3,3',4,4' (PCB 77)	0.4
3,3',4,4',5 (PCB 126)	0.5
2,2',4,4',5 (PCB 153)	<0.1
3,3',4,4',5,5' (PCB 169)	<0.1
Aroclor 1254	<0.1

E. Precautions

- **Important: Please read the following precautions carefully.**
- **Follow precautions and instructions in this insert to achieve the best results.**

Safety:

- This kit should only be used by properly trained personnel in an appropriate laboratory environment.
- Treat PCDD/Fs, solutions that contain PCDD/Fs, and potentially contaminated samples as hazardous materials.
- Use gloves, proper protective clothing, and means to contain and handle hazardous material where appropriate.
- Obtain (if appropriate) permits pertaining to the handling, analysis and transport of dioxin-containing materials.
- **Stop solution is 1N hydrochloric acid. Handle carefully.**

Storage and Use of Kit:

- **Do not freeze test kit components or expose them to temperatures greater than 37°C (99°F).**
- **If desiccant in tube bag is not blue, do not use kit; contact CAPE Technologies.**
- **Do not expose substrate to direct sunlight.**
- If substrate is blue before adding to EIA tubes, do not use; contact CAPE Technologies.

- Store all test kit components at 2°C to 6°C (36 °F to 43°F) when not in use.
- Storage at ambient temperature (20°C to 27°C or 68°F to 81°F) on the day of use or overnight before the day of use is acceptable. Do not store at ambient temperature for extended periods.
- ***Allow all reagents to reach ambient temperature (20°C to 27°C or 68°F to 81°F) before beginning the test. This typically requires at least 60 minutes at ambient temperature to warm from recommended storage conditions. Warming will occur faster if bottles and tube bags are removed from the kit box.***
- Do not use test kit after the expiration date.
- Do not use components from one test kit with components from a different test kit.

Sample Preparation:

- ***Because this EIA recognizes many of the congeners in mass labeled internal standard mixtures designed for GC-MS methods, EIA samples must contain either immunoassay compatible internal standards or no internal standards.*** For specific recommendations regarding mass labeled internal standards, consult CAPE Technologies Technical Note TN-001.
- ***Water immiscible solvents in sample extracts must be evaporated completely before diluting in methanol for the EIA.*** Residual solvents or excessive oil may cause precipitation when the sample is added to the EIA tubes. If this occurs, the test result may be invalid and the cause should be corrected before repeating the analysis. Quality assurance methods such as comparison of spiked and unspiked sample extracts are essential for determining the validity of such results. Contact CAPE Technologies for assistance with selection of appropriate quality assurance methods.

EIA Protocol:

- ***When adding standards and samples to the EIA tubes, the methanol solutions must be dispensed directly into the liquid and not above the liquid surface or onto the side of the tube. Each EIA tube must be mixed briefly as soon as the sample or standard is added, until the tube contents appear uniform.***

Interpretation of Results:

- Consult the appropriate CAPE Technologies Application Note for proper interpretation of results.
- Proper quality assurance is the responsibility of the analyst and is strongly encouraged. Your quality assurance plan should include GC-MS confirmation of some fraction of both positive and negative results.
- Distribution of PCDD/Fs in samples may vary greatly. The analyst is responsible for adequate frequency, distribution, and homogenization of samples.

F. Materials Provided

The contents of this kit are described in a separate **Materials List** (ML-DF1-12 or ML-DF1-60).

G. Materials Supplied by the User

- Sample preparation supplies and equipment (the SP1 and SP2 Sample Preparation Kits contain vials and other supplies for rapid preparation of soil, food, or other samples). You must consult the relevant Application Note for equipment, reagents, and supplies required for your application. Visit the CAPE Technologies web site (www.cape-tech.com) or contact CAPE Technologies if additional technical assistance is required.
- The remainder of this list gives only those materials needed for a generic solvent exchange and the EIA portion of the analysis..
- HPLC or analytical grade methanol for solvent exchange
- Sample evaporation system for solvent exchange (nitrogen or other gas source)
- Glass tubes or vials for solvent exchange
- Glass vials (1-2 mL) with Teflon lined caps for storage of standards after opening ampoules

- 1 variable volume glass capillary positive displacement pipettor for dispensing 50 to 100 µL of standards, samples, and keeper (Drummond 275 or equivalent)*
- 1 Eppendorf Repeater or Repeater Plus Pipettor and minimum of 6 tips (one 0.5 or 1 mL, four 10 or 12.5 mL, and one 50 mL), for pipetting 50 µL to 1.0 mL volumes (or equivalent repeating pipettor)*
- Artel Differential Photometer or other means for measuring OD of finished immunoassay tubes at 450 nm (alternatives include conventional spectrophotometers, other tube readers, or microplate readers)*
- Marking pen
- Watch or timer
- Reagent grade or bottled distilled water for sample dilution and tube washing
- Basin or other system for capture and disposal of wash water and other waste liquids.

* see Recommended Equipment List (EL-001) for more information

H. Suggestions for Pipettor Use

- ***Please read these suggestions carefully before performing your first EIA.***
- Use empty tubes and extra tips to practice your pipettor technique before analyzing samples. For the glass capillary positive displacement pipettor, use methanol; for the Repeater pipettor, use water.
- Use a different tip for each reagent dispensed with the Eppendorf Repeater Plus Pipettor to avoid reagent cross-contamination, especially between conjugate and substrate. Label four 10 or 12.5 mL tips "water", "Conjugate", "Substrate", and "Stop".
- Draw the desired reagent volume into the Repeater pipettor and dispense at least one portion of reagent back into the container to properly engage the ratchet mechanism. If this is not done, the first volume delivered will be inaccurate.
- When adding reagents to the EIA tubes using the Repeater pipettor, direct the liquid stream down the side of the tube just below the rim to avoid splashback.
- ***When using the glass capillary positive displacement pipettor for adding samples or standards to EIA tubes, the solution must be dispensed directly into the water in the tube, not above the liquid level or onto the side of the tube. The tubes must be individually mixed immediately after the addition of methanol-TEG-Triton solutions to distribute the analyte evenly and to avoid locally high or low concentrations at the antibody coated surface of the tube.***
- When using the glass capillary positive displacement pipettor for standards and samples, the following approach (as for a GC autosampler) has proven effective. After each pipetting operation, repeatedly rinse both inside and outside of the capillary by pipetting several methanol aliquots to a waste container. When changing capillaries, rinse the plunger to minimize carryover. ***If capillaries are not changed after each standard, water on the outside of the capillary must be removed to avoid contamination of the standard with water.***

I. Preparation of PCDD/F Sample Extracts for EIA by Solvent Exchange

1. **Prepare keeper working solution from stock**: Locate the 8 mL vial labeled "TEG-Triton X-100 keeper" and stand upright for several minutes (or centrifuge briefly) to allow TEG-Triton mixture to drain away from lid. Make working solution of keeper by adding 6.0 mL of analytical grade methanol to the vial and mixing thoroughly. This solution of 100 ppm Triton X-100 in 80/20 methanol/TEG will be used for adding keeper to extracts prior to solvent exchange.

2. **Select sample size and keeper volume for solvent exchange**: The following is a generic extract preparation procedure which is appropriate for samples which have gone through the full cleanup procedure prior to GC/MS analysis (using immunoassay compatible internal standards or no internal standards). ***For other samples, consult the appropriate Application Note.*** Use of this EIA for screening analysis depends upon the same amount of each sample being introduced into the EIA. This quantity (the sample load in "mg Sample Equivalent Delivered to EIA Tube") is dictated by your target

level and must be determined in advance. Consult Table 3 below (or your Application Note) to determine the appropriate sample load.

Table 3: Sample Load Selection Guide:

(Correspondence among EIA standards, sample TEQ levels, and amount of sample used in the EIA)

How to use Table 3: Locate your target concentration in the body of the table, then read the "mg Sample Equivalent Delivered to EIA Tube" at the top of that column. This is the amount of sample you must load into each EIA tube. If your decision level occurs in more than one table column, use the one farthest to the left (corresponding to lower standards). This will allow less sample to be used, giving less potential for matrix interferences. This process of estimating the amount of sample needed is illustrated by the examples below. Note that these values are the amount of sample actually delivered to the EIA tube and do not account for replication or the extra volume required to assure that a given volume can be comfortably recovered from the evaporation tube. Read the paragraph immediately below Table 3 and/or consult the appropriate Application Note for selection of keeper volume.

Important Note: Table 3 is for guidance only because it assumes 100% recovery through the sample preparation procedure, including sample extraction efficiency and extract cleanup. Guidance on data interpretation is given in Section K below.

Example 1: When using 10 mg sample equivalent per EIA tube, a nominal sample concentration of 1 ppb would be approximately equivalent to Standard 2 (.2 ppb or 10 pg/EIA tube 2,3,7,8-TCDD).

Example 2: To make a nominal sample concentration of 10 ppt (0.01 ppb) approximately equivalent to Standard 2 (10 pg/EIA tube), use 1000 mg sample equivalent per EIA tube.

Example 3: When using 1000 mg sample equivalent per EIA tube, a nominal sample concentration of 0.1 ppb would be approximately equivalent to Standard 4 (2.0 ppb 2,3,7,8-TCDD).

	2378-TCDD Standards (50 µL per EIA tube)		mg Sample Equivalent Delivered to EIA Tube					
	stock ppb	pg/tube	0.1 mg	1 mg	10 mg	100 mg	1000 mg	10,000 mg
Standard 2	0.2	**10**	100 ppb TEQ	10	1	0.1	0.01	0.001
Standard 3	0.64	**32**	320	32	3.2	0.32	0.032	0.0032
Standard 4	2.0	**100**	1000	100	10	1	0.1	0.01
			Target Concentration in Original Sample (ppb TEQ)					

Selection of keeper volume: It is best to exchange only enough sample for immediate analysis, plus an extra amount to cover waste in pipetting. Leave the rest of the sample in toluene or other low volatility solvent. **For analysis at high pg/g levels**, where only a small fraction of the sample may be used in the EIA, evaporate the sample from 150 µL of keeper. After evaporation, add 120 µL of methanol to reconstitute the sample to 150 µL, allowing recovery of one or two 50 µL aliquots for single or duplicate EIA analysis. In this case, the total amount of sample exchanged is 3x the amount delivered to each EIA tube. **For analysis at low pg/g levels**, where maximum sample recovery is critical, evaporate the sample from 62.5 µL of keeper. After evaporation, add 50 µL of methanol to reconstitute the sample to 62.5 µL, allowing recovery of one 50 µL aliquot, representing 80% of the original sample, for single tube EIA analysis. In this case, the total amount of sample exchanged is 1.25x the amount delivered to the EIA tube. For example, 5 g of sample equivalent would be exchanged so that 4 g of sample equivalent could be added to the EIA tube.

3. **Perform solvent exchange**: Use a clean glass tube or conical vial for evaporating each sample to be analyzed. Add the amount of methanol-TEG-Triton keeper solution (determined in the preceding section) to each evaporation tube or vial. Add sample in volatile solvent such as toluene, hexane, isooctane, or acetone. Solvents with boiling points higher than toluene (111°C) should be avoided if possible. Evaporate solvent completely under dry gas stream such as nitrogen. After removing the original solvent, rinse the sides of the tube once with 2 mL of dichloromethane and evaporate again. Recovery will not be adversely affected if the sample remains under the gas stream for a few minutes after complete evaporation of the solvent. **The original solvent must be completely gone- there should be no solvent odor.** Application of gentle heat (50°C) is acceptable. During solvent exchange the TEG and Triton X-

100 function as a "keeper", similar to the conventional use of dodecane or tetradecane. When the original solvent is completely evaporated, the PCDD/Fs stay in solution in the TEG-Triton and are easily diluted with methanol.

4. **Reconstitute sample**: Centrifuge the evaporation tubes for 2 minutes at 1-2000 x g to collect the residual TEG-Triton in the bottom of the tube. Add a volume of methanol to each tube equal to 80% of the original keeper volume used (replacing the evaporated methanol). Mix vigorously for 15 seconds to dissolve the keeper and sample completely. Sonication or longer mixing times are not necessary. Pipet the redissolved sample into the EIA tube which has been prepared, then mix immediately (as noted in Section J below). **Perform this sample dilution and EIA loading procedure in batches of 4 or fewer samples. This will minimize changes in sample concentration due to evaporation of the methanol.**

J. EIA Analysis of Standards and Prepared Samples

Prepare samples according to the directions above in "Preparation of PCDD/F Sample Extracts by Solvent Exchange" or in the appropriate Application Note. The following steps explain how to analyze your prepared samples using the CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit. For quick reference, a summary of this protocol is provided on a separate sheet (PS-DF1). The number of tubes per run should be limited by the amount of time it takes to add **Competitor-HRP Conjugate** in step 9 below, and is typically 20 or fewer. This is the largest batch size that can be done on one filling of the 10 mL tip of the Eppendorf Repeater Plus pipettor. Follow precautions in Section E above. **Do not expose Substrate to direct sunlight.**

1. **Warm reagents**: Bring all reagents to ambient temperature as described in Section E (Precautions, Storage and Use of Kit).
2. **Prepare wash 1**: Locate the vial labeled "0.5 mL neat Triton X-100". Make a wash solution of 100 ppm (0.01% v/v) Triton in reagent grade or bottled distilled water by adding 10 µL of Triton X-100 to 100 mL of water and mixing thoroughly (this will typically take several minutes on a magnetic stirrer). This amount is sufficient for 20 tubes (20 tubes x 4 washes per tube x 1 mL/wash/tube = 80 mL nominal). This wash can be prepared in larger volumes and stored at room temperature.
3. **Prepare tubes**: Place the anti-Dioxin **antibody coated tubes** in the rack and label them. Put the standard tubes first, from low to high concentration, then the sample tubes.
4. **Prerinse tubes**: **Rinse** tubes once by filling each tube with reagent grade or bottled distilled **water.** Dump water out and tap inverted tubes on absorbent material to remove excess water.
5. **Add water for sample incubation**: Insert the 10 or 12.5 mL pipet tip labeled "water" into the Repeater pipettor and set volume to 500 µL. Dispense one **500 µL** aliquot of reagent grade or bottled distilled **water** into each tube.
6. **Add standards**: Using a glass capillary positive displacement pipettor, pipet **50 µL** of **standard** solution into each EIA standard tube. ***The solutions must be dispensed directly into the liquid and not above the liquid surface or onto the side of the tube.*** **Immediately after addition, mix each tube briefly until appearance is homogeneous**. The mixing should be vigorous enough to visibly swirl the liquid around the bottom of the tubes.
7. **Add samples**: Using a glass capillary positive displacement pipettor, pipet **50 µL** of **prepared sample** into each EIA sample tube. ***The solutions must be dispensed directly into the liquid and not above the liquid surface or onto the side of the tube.*** **Immediately after addition, mix each tube briefly until appearance is homogeneous**. Mix the rack of tubes by shaking for 10 seconds after adding the last sample. The mixing should be vigorous enough to visibly swirl the liquid around the bottom of the tubes. Incubate at room temperature for 2 to 24 hours. For longer incubation times, cover the rack of tubes or place in a closed plastic bag or other airtight container with limited headspace. The amount of time taken for addition of negative control, standard and sample has little effect on the results because of the long sample incubation. (It is preferred to incubate overnight at this point rather than 2 hours because of the slight improvement in sensitivity [up to two-fold] with the longer incubation). Also, results may be affected by proportionally higher variations in incubation time among samples, due to the sample addition process.
8. **Wash 1**: Dump or aspirate the EIA tube contents into a suitable waste container. Tap inverted tubes on absorbent material to remove excess liquid. Insert a 50 mL pipet tip into the Repeater pipettor and

set volume to 1.0 mL. Dispense one **1 mL** aliquot of **100 ppm Triton X-100 in water** (made in step J2 above) into each tube. Dump or aspirate the EIA tube contents into a suitable waste container. **Repeat** this wash step three more times for a **total of 4 washes**. Be certain to shake or tap out as much wash solution as possible on each wash, especially the last one.

9. Add conjugate: Insert the 10 or 12.5 mL pipet tip labeled "conjugate" into the Repeater pipettor and set volume to 500 µL. Dispense one **500 µL** aliquot of "**Competitor-HRP Conjugate**" into each tube. Incubate tubes at room temperature for 15 minutes. Timing for this step is the most important of the EIA steps. Rapid and accurate addition of conjugate and consistent incubation times are necessary to maintain equal treatment within and among runs.

10. Wash 2: **Repeat** the **wash** procedure described in step 6 above *except use reagent grade or bottled distilled water with no detergent added*.

11. Add substrate: Insert the 10 or 12.5 mL pipet tip labeled "substrate" into the Repeater pipettor and set volume to 500 µL. Dispense one **500 µL** aliquot of "**HRP Substrate Solution**" into each tube. Incubate at room temperature for 30 minutes.

WARNING: Stop solution is 1N hydrochloric acid. Handle carefully.

12. Add stop solution: Insert the 10 or 12.5 mL pipet tip labeled "stop" into the Repeater pipettor and set volume to 500 µL. Dispense one **500 µL** aliquot of "**Stop Solution**" into each tube. The Stop Solution converts the developed color to yellow. If Stop Solution is not added, all tubes will eventually turn dark blue. Read the tubes as soon as possible after stopping; the yellow color is stable for only 30 minutes.

13. Read OD values: To use the Artel Differential Photometer, add at least 1 mL of reagent grade or bottled distilled water to a blank test tube and insert the tube into the left well of the photometer. Dry the outside of each EIA tube, insert tube into the right well of the photometer, and record the absorbance (optical density [OD]) of each tube. Alternatively, read the absorbance of each sample at 450 nm using a tube reader, conventional spectrophotometer, or microplate reader. Consult the Recommended Equipment List (EL-001) for information on how to contact Artel.

K. Interpretation of the Results

1. After each EIA run, calculate for each standard and sample the %NC value (OD as a percent of the negative control OD). The %NC values for standards should be compared to Table 1 to determine if the EIA has been performed properly. Refer to Table 3 and/or the appropriate Application Note for instructions on interpretation of sample results. Contact CAPE Technologies if additional assistance is required regarding interpretation of results.

2. The CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit is designed primarily for screening decisions. Quantitative interpretation of data may be possible in certain situations. Consult the appropriate Application Note and Technical Note TN-004 for discussion of this topic. Quantitative interpretation can be performed using **Module C** from the CAPE Technologies web site (**www.cape-tech.com**). This Microsoft Excel workbook file contains background information and operating instructions. The file utilizes a four parameter equation designed specifically for immunoassays and used in most commercial immunoassay software. Module C plots the actual data and the calculated four parameter solution, and determines sample concentrations based on the calculated curve fitting solution. It is necessary to use all the standards listed in Table 1 to produce an acceptable curve fit. Contact CAPE Technologies if additional assistance is required regarding interpretation of results.

L. Limitations of the Procedure

The CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit is designed for screening of samples according to their TEQ by responding to the toxic PCDD/F congeners in approximate correlation with their TEFs. Quantitative interpretation of data may be possible in certain situations. Consult the appropriate Application Note and Technical Note TN-004 for discussion of this topic. Confirmation of positive samples and a portion of the negative samples by GC-MS analysis is strongly recommended. Other quality assurance methods and samples should be used at all stages of sample preparation and analysis.

Samples which appear heterogeneous during the first incubation (step J7 above) may be invalid due to phase separation. Adequate sample cleanup based on the protocol in the chosen Application Note must be assured by the analyst. Contact CAPE Technologies if this is a recurrent problem.

Samples analyzed by EIA must contain either immunoassay compatible internal standards or no internal standards. Consult Technical Note TN-001 and Calculation Module D for discussion and other assistance.

The distribution of PCDD/Fs can be extremely heterogeneous. Adequate sample number, distribution, and homogeneity are the responsibility of the analyst.

To ensure accurate and reliable results, every effort should be made to perform the CAPE Technologies High Performance Dioxin/Furan Immunoassay Kit at temperatures between 20°C (68°F) and 27°C (81°F).

M. Storage

- Store all test kit components at 2°C to 6°C (36 °F to 43°F) when not in use.
- Do not expose test kit components to temperatures greater than 37°C (99°F). Storage at ambient temperature (20°C to 27°C or 68°F to 81°F) on the day of use is acceptable. Prolonged exposure (many days) or repeated exposure to ambient temperatures may cause a loss of reagent (especially conjugate) activity, resulting in decreased OD values for all tubes.
- **Do not freeze test kit components. Kits which have been frozen must not be used.**
- **If desiccant in tube bag is not blue, do not use kit; contact CAPE Technologies.**
- Do not use test kit components after the expiration date printed on the kit box label.

N. Quality Assurance

- Samples which appear milky during the first EIA incubation may contain more oil than can be tolerated by the test. These samples should be diluted or cleaned more, then analyzed again by EIA.
- Response values for 2,3,7,8-TCDD standards typically should be in the ranges given in Table 1.
- If a blue color does not develop in the negative control test tube within 15 minutes after adding the substrate solution, the test is invalid and must be repeated. If the problem persists, contact CAPE Technologies.
- ***The antibody used in this immunoassay recognizes PCDD/F congeners based on structure, not mass. Therefore, conventional stable isotope labeled internal standards are detected as native material. Typical levels of conventional stable isotope labeled internal standards can not be used with this EIA***. Please consult Technical Note TN-001 for recommendations on the use of immunoassay compatible mass labeled internal standards. Contact CAPE Technologies if additional assistance is required regarding these issues. Immunoassay compatible internal standards are available from Wellington Laboratories (Guelph, Ontario, Canada).
- Replication, check samples, standard reference materials, and other QA samples and methods can and should be used with this kit, with the exception of conventional stable isotope labeled internal standards (as noted in the above paragraph). The Starter Kit DF1-ST includes two toluene check samples which should be used to determine if the solvent exchange portion of the sample preparation has been performed properly. Consult Wellington Laboratories to obtain additional QA materials.

O. References

All of the documents cited in this and other CAPE Technologies literature are available from the CAPE Technologies web site at "**www.cape-tech.com**". **Application Notes** describe procedures for analysis of a variety of matrices, TEQ levels, and sample preparation methods. **Technical Notes** provide discussion and recommendations pertaining to important technical issues. **Technical References** are papers from technical journals or other sources which provide extensive background information about selected topics relevant to immunochemical analysis of PCDD/Fs. Additional questions can be directed to CAPE Technologies using the contact information from the web site.

P. General Limited Warranty

CAPE Technologies, LLC ("CAPE Technologies") warrants the products manufactured by it against defects in materials and workmanship when used in accordance with the applicable instructions for a period not to extend beyond the expiration date printed on the product. **CAPE Technologies MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty provided herein and the data, specifications and descriptions of CAPE Technologies products appearing in CAPE Technologies' published catalogues and product literature may not be altered except by express written agreement signed by an officer of CAPE Technologies. Representations, oral or written, which are inconsistent with this warranty or such publications are not authorized and if given, should not be relied upon.

In the event of a breach of the foregoing warranty, CAPE Technologies' sole obligation shall be to repair or replace, at its option, any product or part thereof that proves defective in materials or workmanship within the warranty period, provided the customer notifies CAPE Technologies promptly of any such defect. The exclusive remedy provided herein shall not be deemed to have failed of its essential purpose so long as CAPE Technologies is willing and able to repair or replace any nonconforming CAPE Technologies product or part. **CAPE Technologies shall not be liable for consequential, incidental, special or any other indirect damages resulting from economic loss or property damage sustained by any customer from the use of its products.**

ATTACHMENT 3

MLU CALCULATIONS AND LABORATORY NOTES

Coupled Column Cleanup of Sentinal hexane:acetone extracts

Table 1: Standards data

Standard pg/tube -->	Neg. Cntl.	3.2	10	32	100
OD rep. 1	1.20	1.05	0.76	0.45	0.33
OD rep. 2					
mean OD	1.20	1.05	0.76	0.45	0.33
% of NC OD	100.0	87.5	63.3	37.5	27.5

Table 2: Starting / final values for A-D

A	B	C	D
100.1	1.37	10.4	24.2

Table 3: Squares of diffs. actual vs. calc. curves

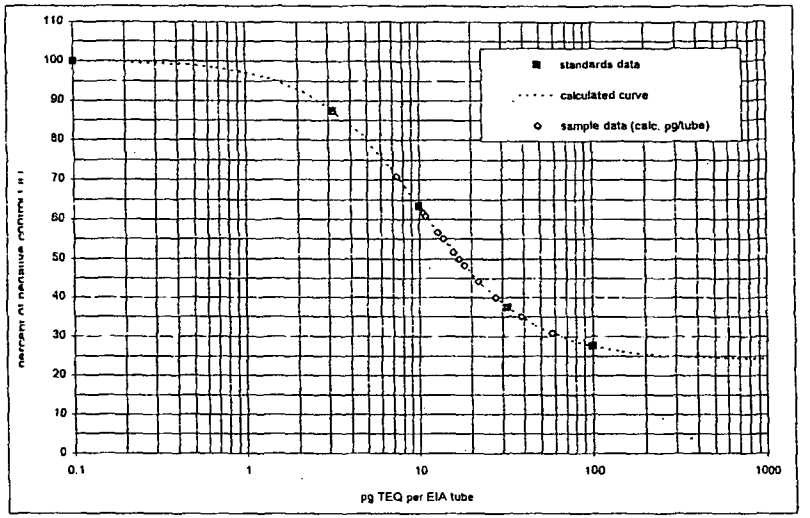
x	0.1	3.2	10	32	100
y pred.	99.97	87.58	63.24	37.60	27.45
(y-y pred)^2	0.00	0.01	0.01	0.01	0.00

Table 4: Sum of squares of diffs. from Table 3

Σ(y-y pred)^2	0.03

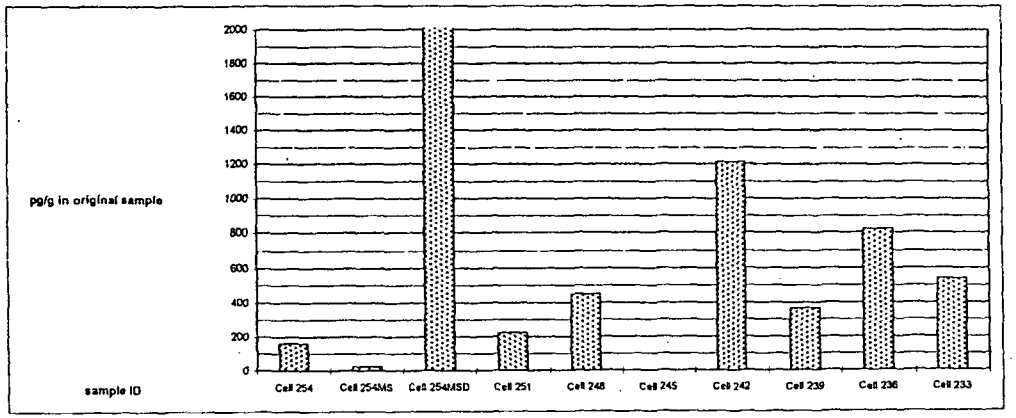
Table 5: Calc. I85 and I50 values (pg/tube)

I85 =	3.8	I50 =	18.9



SAMPLE DATA

sample ID						MB-	MB+	Cell 254	Cell 254MS	Cell 254MSD	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233
sample info	keeper control after std 4	keeper evap control unspiked	keeper evap control + 20 pg	keeper evap control + 50 pg	keeper added after ev 50	hexane control unspiked, put thru column cleanup	hexane control +50 pg, put thru column cleanup	Cell 254	Cell 254MS	Cell 254MSD	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233
OD rep. 1						0.74	0.42	0.68	0.73	0.37	0.66	0.60	0.85	0.48	0.62	0.53	0.58
OD rep. 2																	
calc. mean OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.74	0.42	0.68	0.73	0.37	0.66	0.60	0.85	0.48	0.62	0.53	0.58
calc. % of NC OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	62	35	57	61	31	55	50	71	40	52	44	48
calc. pg/tube		#DIV/0!	#DIV/0!	#DIV/0!		10.6	38.6	12.8	11.0	57.5	13.8	16.9	7.4	27.8	15.8	22.1	18.2
blank subtracted pg/tube		=0	#DIV/0!	#DIV/0!		=0	27.9	2.3	0.3	46.9	3	6	-3	17	5	11	7.6
g SE per tube (enter data)								0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
uncorrected EIA pg/g TEQ in orig. sample								516	439	2300	551	676	297	1103	630	883	727
blank corrected EIA pg/g TEQ in orig. sample								91	14	1875	126	251	-128	679	206	458	302
recovery corrected EIA pg/g TEQ in orig. sample								162	25	3356	225	450	-229	1214	368	820	541
Calibration Adjustment Factor (CAF)								1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
CAF Corrected EIA pg/g TEQ in orig. sample								193	29	3986	267	534	-272	1442	437	974	642



coupled column cleanup of Leeder hexane:acetone extracts

Table 1: Standards data

Standard pg/tube -->	Neg. Cntl.	3.2	10	32	100
OD rep. 1	1.21	1.03	0.74	0.45	0.30
OD rep. 2					
mean OD	1.21	1.03	0.74	0.45	0.30
% of NC OD	100.0	85.1	61.2	37.2	24.8

Table 2: Starting / final values for A-D

A	B	C	D
100.4	1.19	10.6	19.8

Table 3: Squares of diffs. actual vs. calc. curves

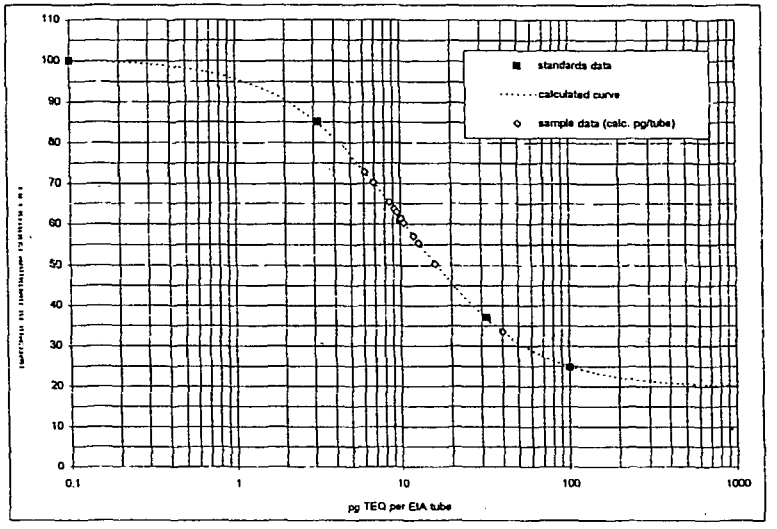
x	0.1	3.2	10	32	100
y pred.	100.10	84.85	61.53	36.82	24.97
(y-y pred)^2	0.01	0.08	0.14	0.14	0.03

Table 4: Sum of squares of diffs. from Table 3

Σ(y-y pred)^2	0.39

Table 5: Calc. I85 and I50 values (pg/tube)

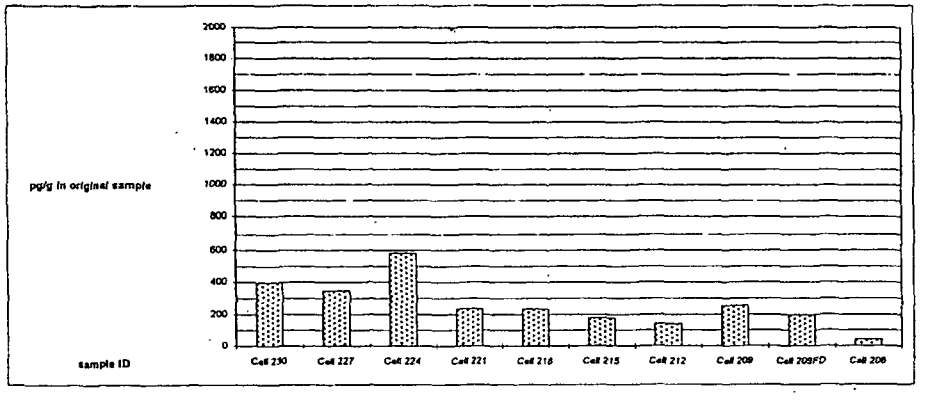
I85 =	3.2	I50 =	16.3



SAMPLE DATA

sample ID						MB-	MB+	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FD	Cell 206
sample info	keeper control after std 4	keeper evap control unspiked	keeper evap control + 20 pg	keeper evap control + 50 pg	keeper added after ev 50	hexane control unspiked, put thru column cleanup	hexane control +50 pg, put thru column cleanup	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FD	Cell 206
OD rep. 1						0.68	-*	0.67	0.69	0.61	0.74	0.74	0.77	0.79	0.73	0.76	0.85
OD rep. 2																	
calc. mean OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.68	-*	0.67	0.69	0.61	0.74	0.74	0.77	0.79	0.73	0.76	0.85
calc. % of NC OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	73	34	55	57	50	61	61	64	65	60	63	70
calc. pg/tube		#DIV/0!	#DIV/0!	#DIV/0!		6.2	40.0	12.9	12.1	16.0	10.2	10.2	9.2	8.5	10.5	9.5	6.9
blank subtracted pg/tube		=0	#DIV/0!	#DIV/0!		=0	33.9	6.6	5.9	9.8	4	4	3	2	4	3	0.7
g SE per tube (enter data)								0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
uncorrected EIA pg/g TEQ in orig. sample								517	483	640	406	406	366	342	420	379	276
blank corrected EIA pg/g TEQ in orig. sample								271	236	394	160	160	120	95	174	133	29
recovery corrected EIA pg/g TEQ in orig. sample								399	348	581	236	236	177	140	257	196	43
Calibration Adjustment Factor (CAF)								1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
CAF Corrected EIA pg/g TEQ in orig. sample								474	414	690	280	280	210	167	305	233	51

* NOTE: MB+ sample was contaminated and therefore no usable data was generated from this sample. The average calc. % of NC OD was used from the 051402 and the 052102 sample batches to determine the recovery corrected EIA pg/g TEQ in orig. sample.



coupled column cleanup of Leeder hexane:acetone extracts

Table 1: Standards data

Standard pg/tube -->	Neg. Cntl	3.2	10	32	100
OD rep. 1	1.25	1.05	0.80	0.46	0.33
OD rep. 2					
mean OD	1.25	1.05	0.80	0.46	0.33
% of NC OD	100.0	84.0	64.0	36.8	26.4

Table 2: Starting / final values for A-D

A	B	C	D
100.0	1.18	11.2	20.2

Table 3: Squares of diffs. actual vs. calc. curves

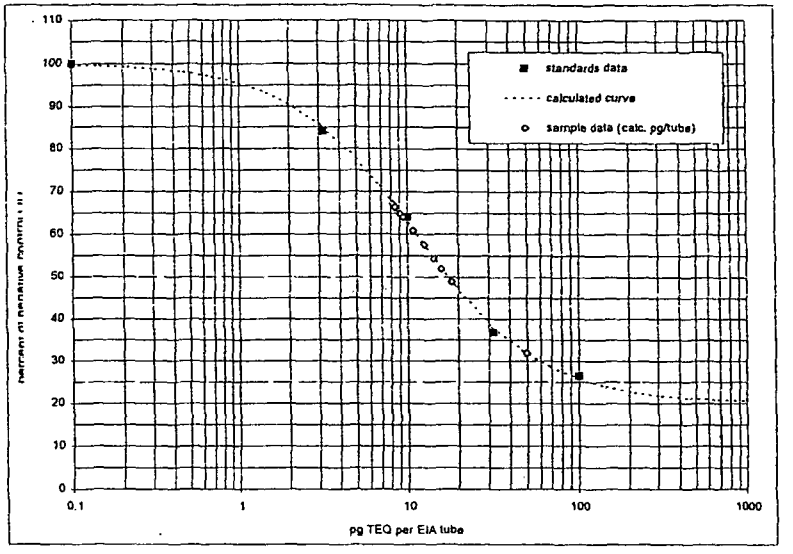
x	0.1	3.2	10	32	100
y pred.	99.64	85.03	62.63	38.09	25.81
(y-y pred)^2	0.13	1.06	1.66	1.67	0.35

Table 4: Sum of squares of diffs. from Table 3

Σ(y-y pred)^2	5.09

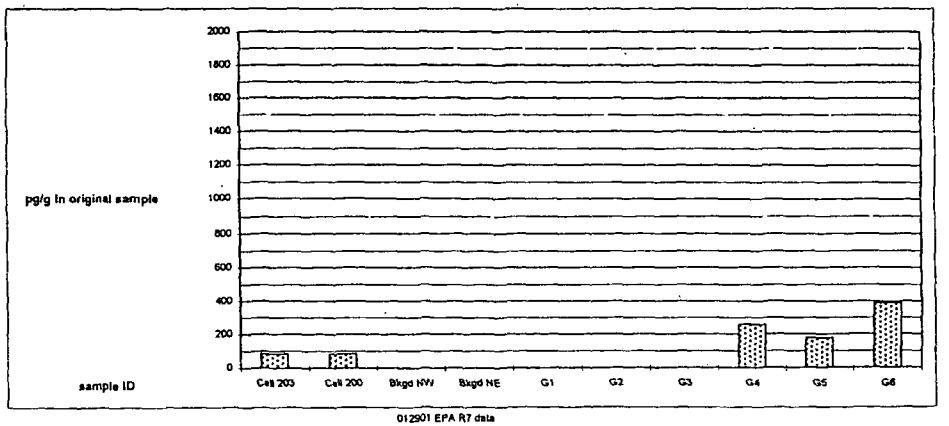
Table 5: Calc. I85 and I50 values (pg/tube)

I85 =	3.2	I50 =	17.3



SAMPLE DATA

sample ID						MB-	MB+	Cell 203	Cell 200	Bkgd NW	Bkgd NE	G1	G2	G3	G4	G5	G6
sample info	keeper control after std 4	keeper evap control unspiked	keeper evap control + 20 pg	keeper evap control + 50 pg	keeper added after ev 50	hexane control unspiked, put thru column cleanup	hexane control +50 pg, put thru column cleanup	Cell 203	Cell 200	Bkgd NW	Bkgd NE	G1	G2	G3	G4	G5	G6
OD rep. 1						0.76	0.40	0.72	0.72	0.81	0.84	0.84	0.83	0.80	0.65	0.68	0.61
OD rep. 2																	
calc. mean OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.76	0.40	0.72	0.72	0.81	0.84	0.84	0.83	0.80	0.65	0.68	0.61
calc. % of NC OD	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	61	32	58	58	65	67	67	66	64	52	54	49
calc. pg/tube		#DIV/0!	#DIV/0!	#DIV/0!		10.8	49.4	12.4	12.4	9.1	8.2	8.2	8.5	9.4	15.8	14.2	18.3
blank subtracted pg/tube		=0	#DIV/0!	#DIV/0!		=0	38.5	1.6	1.6	-1.7	-3	-3	-2	-1	5	3	7.5
g SE per tube (enter data)								0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
uncorrected EIA pg/g TEQ in orig. sample								496	496	364	328	328	340	377	632	569	731
blank corrected EIA pg/g TEQ in orig. sample								63	63	-68	-104	-104	-93	-55	200	137	299
recovery corrected EIA pg/g TEQ in orig. sample								82	82	-88	-135	-135	-120	-72	259	177	387
Calibration Adjustment Factor								1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
CAF Corrected EIA pg/g TEQ in orig. sample								97	97	-105	-161	-161	-143	-85	308	210	460



Dioxin worksheet for calculation and correlation of TEQ and predicted EIA response

25-Jul-02 data from Angela Suarez 070802

ppt concentration by congener for each sample (by GC-MS)

#	congener	(note- new WHO values) TEF	%CR	Cell 254	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FD	Cell 206	Cell 203	Cell 200	Bkgd NW	Bkgd NE
D1	2378 D	1	100	0	3	5	7	1	2	5	2	2	2	6	3	4	2	4	3	3	4	4	7	0	0
D2	12378 D	1	105	0	19	30	62	12	22	34	17	28	21	60	36	38	17	44	32	36	22	29	57	0	0
D3	123478 D	0.1	1.8	154	72	98	204	38	81	174	61	110	76	187	133	95	46	145	103	87	73	88	157	6	0
D4	123678 D	0.1	7.9	421	226	322	627	139	264	265	172	258	195	572	460	515	151	399	257	292	215	245	386	14	0
D5	123789 D	0.1	39	307	139	194	435	81	138	168	112	198	129	363	237	245	99	287	169	194	135	160	291	13	7
D6	1234678 D	0.01	0.72	13700	6370	8880	17800	4040	7760	7670	5100	7710	5420	16300	13300	14300	4400	12400	7270	8670	6630	6870	11600	391	131
D7	OCDD	0.0001	0.0001	110000	50200	67900	125000	32300	72400	62100	40200	56600	38900	124000	109000	113000	37300	96500	60200	65500	59900	54400	90500	2800	5640
F1	2378 F	0.1	20	0	1	2	2	0	0	2	0	0	0	4	2	3	2	4	1	2	3	0	3	0	0
F2	12378 F	0.05	4.6	0	66	20	8	31	262	53	10	8	9	11	21	27	8	5	0	0	0	5	10	0	0
F3	23478 F	0.5	17	0	18	28	69	7	57	19	12	15	14	56	34	57	17	40	23	26	19	18	37	0	0
F4	123478 F	0.1	0.4	0	0	359	213	330	22	120	310	480	219	373	1000	435	120	278	93	100	234	228	218	17	0
F5	123678 F	0.1	1	98	28	110	170	16	21	32	20	18	19	39	52	83	15	100	61	72	24	23	91	0	0
F6	123789 F	0.1	3.3	0	18	47	89	11	16	23	15	23	16	77	57	98	27	60	28	34	30	16	43	0	0
F7	234678 F	0.1	4.9	0	56	93	157	35	7	59	43	64	51	146	124	170	40	98	68	80	61	65	109	0	0
F8	1234678 F	0.01	0.022	2010	1180	1970	3210	921	1260	1470	884	1270	914	2920	2760	3320	847	2310	1370	1570	1070	1200	1900	64	21
F9	1234789 F	0.01	0.94	165	111	198	317	75	124	141	81	136	93	307	268	327	90	249	132	147	114	110	193	0	0
F10	OCDF	0.0001	0.0001	8990	5080	9250	10900	4920	6260	5360	3780	5050	3630	12000	12600	13600	3970	7880	5200	5530	4840	4410	7350	123	0
	ppt TEQ by group 7 dioxins			236	134	192	386	82	157	182	108	170	120	353	266	281	96	266	166	191	141	157	272	7	3
	10 furans			32	36	99	134	55	63	52	55	81	48	126	173	144	39	100	52	59	57	55	87	2	0
	5 total heptas & octas			171	82	116	227	54	99	100	65	97	69	209	175	192	58	160	94	111	85	88	147	5	2
	ppt TEQ HpCDD			137	64	89	178	40	78	77	51	77	54	163	133	143	44	124	73	87	66	69	116	4	1
	% TEQ by group 7 dioxins			68	79	66	74	60	71	78	66	68	71	74	81	68	71	73	76	76	71	74	76	76	92
	10 furans			12	21	34	26	40	29	22	34	32	29	26	39	34	29	27	24	24	29	26	24	24	8
	5 total heptas & octas			64	48	41	44	39	45	42	40	39	41	44	40	45	43	44	43	44	43	41	41	49	75
	% TEQ HpCDD			51	37	31	34	30	35	33	31	31	32	34	30	34	33	34	33	35	34	32	32	40	47
	% pred. EIA by group 7 dioxins			99	93	92	94	92	87	94	94	95	94	94	92	91	93	94	94	94	93	95	94	99	100
	10 furans			1	7	8	6	8	13	6	6	5	6	6	8	9	7	6	6	6	7	5	6	1	0
	avg. TEF = TEQ/conc. =			0.002	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.000
	overall ppt conc.			135815	63587	89506	159269	42657	88697	77694	50827	71970	49606	157421	140086	146296	47151	120901	75009	82353	73373	67869	112951	3428	5799
x	overall ppt TEQ			269	171	291	520	137	220	235	163	251	168	479	438	426	135	368	216	250	198	211	359	10	3
y1	Σ(pred. EIA)			257	153	220	452	93	182	197	122	197	137	402	290	313	111	308	187	217	156	176	315	9	4
	pred. EIA as % of actual TEQ			96	90	76	87	68	83	84	76	79	81	84	66	74	82	84	86	87	79	83	88	92	131
y2	measured EIA			182	225	450	0	1210	388	820	541	413	360	600	244	244	183	145	265	202	45	82	82	0	0

mean	SD
73	8
27	8
45	8
35	5
94	3
6	3
0.003	0.001

	<CAF=	Target Value
84 13	1.19	100

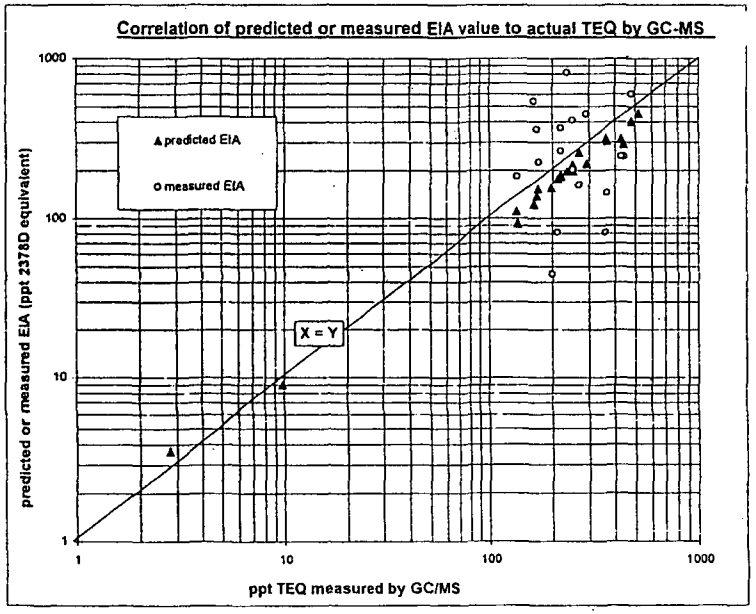


Table 1: TEQ by congener for each sample

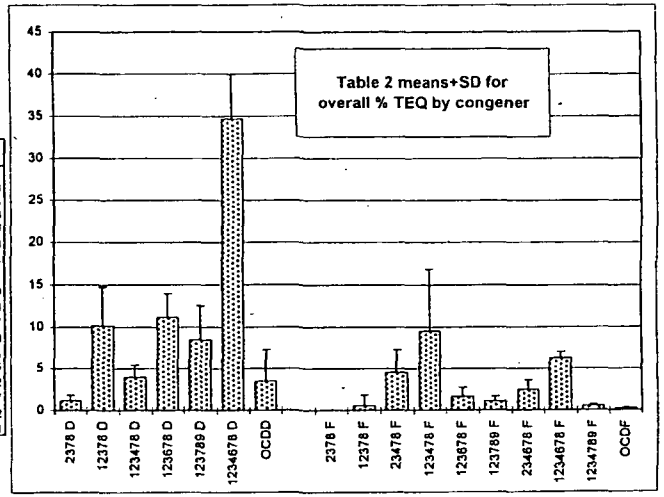
	sample number Cell 254	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FC	Cell 206	Cell 203	Cell 200	Bkgd NW	Bkgd NE
D1 2378 D	0	3	5	7	1	2	5	2	2	2	6	3	4	2	4	3	3	4	4	7	0	0
D2 12378 D	0	19	30	62	12	22	34	17	28	21	60	36	38	17	44	32	38	22	29	57	0	0
D3 123478 D	15	7	10	20	4	8	17	6	11	8	19	13	10	5	15	10	10	7	9	16	1	0
D4 123678 D	42	23	32	63	14	26	27	17	26	20	57	46	52	15	40	26	29	22	25	39	1	0
D5 123789 D	31	14	19	44	8	14	17	11	20	13	36	24	25	10	29	17	19	14	16	29	1	1
D6 1234678 D	137	64	89	178	40	78	77	51	77	54	163	133	143	44	124	73	87	66	69	116	4	1
D7 OCDD	11	5	7	13	3	7	6	4	6	4	12	11	11	4	10	6	7	6	5	9	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F1 2378 F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F2 12378 F	0	3	1	0	2	13	3	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
F3 23478 F	0	9	14	34	4	29	9	6	7	7	28	17	28	9	20	11	13	10	8	18	0	0
F4 123478 F	0	0	36	21	33	2	12	31	48	22	37	100	44	12	28	9	10	23	23	22	2	0
F5 123678 F	10	3	11	17	2	2	3	2	2	2	4	5	6	2	10	6	7	2	2	9	0	0
F6 123789 F	0	2	5	9	1	2	2	2	2	2	8	6	10	3	6	3	3	3	2	4	0	0
F7 234678 F	0	6	9	16	4	1	6	4	6	5	15	12	17	4	10	7	8	6	6	11	0	0
F8 1234678 F	20	12	20	32	9	13	15	9	13	9	29	28	33	8	23	14	16	11	12	19	1	0
F9 1234789 F	2	1	2	3	1	1	1	1	1	1	3	3	3	1	2	1	1	1	1	2	0	0
F10 OCDF	1	1	1	1	0	1	1	0	1	0	1	1	1	0	1	1	1	0	0	1	0	0
total TEQ	269	171	291	520	137	220	235	163	251	168	479	438	426	135	366	218	250	198	211	359	10	3

Table 2: % of total TEQ by congener for each sample

	sample number Cell 254	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FC	Cell 206	Cell 203	Cell 200	Bkgd NW	Bkgd NE	mean	SD
D1 2378 D	0.0	1.7	1.8	1.3	0.8	1.0	2.2	1.0	0.9	1.0	1.2	0.6	0.9	1.4	1.2	1.4	1.4	2.1	2.0	2.1	0.0	0.0	1.2	0.7
D2 12378 D	0.0	11.2	10.3	12.0	8.5	10.0	14.3	10.2	11.2	12.2	12.6	8.2	8.9	12.5	12.1	14.5	14.3	11.1	13.6	15.7	0.0	0.0	10.2	4.6
D3 123478 D	5.7	4.2	3.4	3.9	2.8	3.7	7.4	3.7	4.4	4.5	3.9	3.0	2.2	3.4	4.0	4.7	3.9	3.7	4.2	4.4	6.2	0.0	4.0	1.4
D4 123678 D	15.7	13.3	11.1	12.1	10.2	12.0	11.3	10.6	10.3	11.6	11.9	10.5	12.1	11.2	10.9	11.8	11.7	10.9	11.6	10.7	14.2	0.0	11.2	2.8
D5 123789 D	11.4	8.2	6.7	8.4	5.9	6.3	7.2	6.9	7.9	7.7	7.6	5.4	5.8	7.3	7.6	7.7	7.6	6.8	7.6	8.1	12.9	24.9	8.5	4.0
D6 1234678 D	51.0	37.4	30.5	34.2	29.5	35.2	32.7	31.3	30.8	32.2	34.0	30.3	33.6	32.5	33.9	33.3	34.6	33.5	32.5	32.3	39.8	47.3	34.7	5.3
D7 OCDD	4.1	2.9	2.3	2.4	2.4	3.3	2.6	2.5	2.3	2.3	2.6	2.5	2.7	2.8	2.6	2.8	2.6	3.0	2.6	2.5	2.9	20.4	3.5	3.8
F1 2378 F	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
F2 12378 F	0.0	1.9	0.3	0.1	1.1	5.9	1.1	0.3	0.2	0.3	0.1	0.2	0.3	0.3	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.6	1.3
F3 23478 F	0.0	5.4	4.9	6.6	2.7	13.0	4.0	3.6	3.0	4.1	5.8	3.6	6.7	6.4	5.5	5.2	5.1	4.8	3.7	5.1	0.0	0.0	4.5	2.7
F4 123478 F	0.0	0.0	12.3	4.1	24.1	1.0	5.1	19.0	19.2	13.0	7.6	22.6	10.2	8.9	7.6	4.3	4.0	11.8	10.8	6.1	17.3	0.0	9.5	7.3
F5 123678 F	3.6	1.7	3.6	3.3	1.2	1.0	1.4	1.2	0.7	1.1	0.8	1.2	1.5	1.1	2.7	2.8	2.9	1.2	1.1	2.5	0.0	0.0	1.7	1.1
F6 123789 F	0.0	1.0	1.6	1.7	0.8	0.7	1.0	0.9	0.9	0.9	1.6	1.3	2.3	2.0	1.6	1.3	1.4	1.5	0.7	1.2	0.0	0.0	1.1	0.6
F7 234678 F	0.0	3.3	3.2	3.0	2.8	0.3	2.5	2.6	2.5	3.1	3.0	2.8	4.0	2.9	2.6	3.1	3.2	3.1	3.1	3.0	0.0	0.0	2.5	1.2
F8 1234678 F	7.5	6.9	6.6	6.2	6.7	5.7	6.3	5.4	5.1	5.4	6.1	6.3	7.8	6.3	6.3	6.3	6.3	5.4	5.7	5.3	6.6	7.5	6.3	0.7
F9 1234789 F	0.6	0.7	0.7	0.6	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.0	0.0	0.5	0.2
F10 OCDF	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.2	0.1

Table 3: rank % TEQ by congener for each sample

	sample number Cell 254	Cell 251	Cell 248	Cell 245	Cell 242	Cell 239	Cell 236	Cell 233	Cell 230	Cell 227	Cell 224	Cell 221	Cell 218	Cell 215	Cell 212	Cell 209	Cell 209FC	Cell 206	Cell 203	Cell 200	Bkgd NW	Bkgd NE	overall rank
D1 2378 D	10	12	12	13	13	11	11	12	12	12	12	14	13	12	13	12	12	11	11	12	9	5	12
D2 12378 D	10	3	4	3	4	4	2	4	3	3	2	4	4	2	2	2	2	3	2	2	9	5	3
D3 123478 D	5	7	9	8	7	8	4	7	7	7	8	8	11	8	8	7	8	8	7	8	6	5	8
D4 123678 D	2	2	3	2	3	3	3	3	4	4	3	3	2	3	3	3	3	4	3	3	3	5	2
D5 123789 D	3	4	6	4	6	5	5	5	5	5	5	6	7	5	4	4	4	5	5	4	4	2	5
D6 1234678 D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
D7 OCDD	6	9	11	11	10	9	9	10	10	10	10	10	9	10	10	11	11	10	10	11	7	3	9
F1 2378 F	10	16	17	17	17	17	17	17	17	17	17	17	17	17	16	16	16	16	17	17	9	5	17
F2 12378 F	10	10	15	16	12	6	13	15	16	15	16	16	16	15	17	17	17	17	16	16	9	5	14
F3 23478 F	10	6	7	5	6	2	8	8	8	8	7	7	6	6	7	6	6	7	8	7	9	5	7
F4 123478 F	10	17	2	7	2	10	7	2	2	2	4	2	3	4	5	8	7	2	4	5	2	5	4
F5 123678 F	7	11	8	9	11	12	12	11	13	11	13	12	12	13	9	10	10	13	12	10	9	5	11
F6 123789 F	10	13	13	12	14	13	14	13	11	13	11	11	10	11	12	13	13	12	13	13	9	5	13
F7 234678 F	10	8	10	10	9	15	10	9	9	9	9	9	8	9	11	9	9	9	9	9	9	5	10
F8 1234678 F	4	5	5	6	5	7	6	6	6	6	6	5	5	7	6	5	5	6	6	6	5	4	6
F9 1234789 F	8	14	14	14	15	14	15	14	14	14	14	13	14	14	14	14	14	14	14	14	9	5	15
F10 OCDF	9	15	16	15	16	16	16	16	15	16	15	15	15	16	15	15	15	15	15	15	8	5	16



Client: Environmental Protection Agency (EPA) Page: 1 of 11

Project No: GA01L.02.0077.00 Date: 5/13/02 Made by: Angela Suarez

Ava Mo. Dioxin Field Screening Checked by:

Preliminary: Final

May 13, 2002

Extraction:

- Began at 10:00 AM (10:00 hours)
- Weighed out approx 5.0 g sample into 40 mL extraction vial.
- Added approx. 20 g Na_2SO_4 (sodium sulfate), ~~5g sand~~ (a3) and mixed with wooden spatula (steel)
- Added approx. 5 g of sand and 3 metal BBs - Add 20 mL 4:1 Hexane:Acetone
- Mixed on orbital shaker 15 minutes at 170 rpm. Checked.
- Checked samples after additional 15 min to make sure they mixed ~~at 30 min~~.
- Mixed on orbital shaker additional ~~2h 45 min~~. 4h 30 min.

NOTE: Samples were left on orbital shaker (stopped after ~~4h 30~~ min) overnight. They were NOT mixing (a2)

~~Sample ID~~ (a1)	~~Amt. Sample (g)~~ (a3)	Amt. Sand (g) (a2)	Amt Extract (mL) (a4)
~~1506-1~~ (a8)	~~5.23 g~~ (a2)	(a2)	(a8)

Sample #	Cell I.D. #	Collection Date / Time	Amt. of Sample (g)	5/16/02 OD Reading	5/16/02 Calculated Conc. (ppb)	Date
1	254	4/29/02 14:20	5.17	0.68	0.162	5/16/02
2	251	4/29/02 14:35	5.20	0.66	0.225	
3	248	4/29/02 14:45	5.13	0.60	0.450	
4	245	4/29/02 14:55	5.16	0.85	n.d.	
5	242	4/29/02 15:10	5.03	0.48	1.21	
6	239	4/29/02 15:25	5.15	0.62	0.368	
7	236	4/29/02 15:35	5.28	0.53	0.820	
8	233	4/29/02 15:45	5.08	0.58	0.541	5/16/02
9	230	4/29/02 15:55	5.20	0.67	0.413	5/17/02
10	227	4/29/02 16:05	5.00	0.69	~~0.8~~ 0.360	
11	224	4/29/02 16:25	5.11	0.61	0.600	
12	221	4/29/02 16:50	5.14	0.74	0.244	
13	218	4/29/02 17:05	5.12	0.74	0.244	
14	215	4/29/02 17:15	5.26	0.77	0.183	
15	212	4/29/02 17:25	5.25	0.79	0.145	
16	209	4/29/02 17:50	5.08	0.73	0.265	
16 FD	209	4/29/02 17:50	5.10	0.76	0.202	5/17/02

Client: EPA Page: 2 of 11

Project No: G9011.L.02.0077.00 Date: 5/13/02 - 5/16/02 Made by: A. Suárez

Ava. MO Dioxin Field Screening Checked by:

Preliminary: Final

Sample #	Cell ID #	Collection Date / Time	Amt. of Sample (g)	OD Reading	Calculated conc. (ppb)	Date
17	206	4/29/02 18:05	5.36	0.85	0.045	5/17/02
18	203	4/29/02 18:20	5.14	~~0.82~~ 0.72	0.087	5/21/02
19	200	4/29/02 18:35	5.25	0.72	0.082	↕
20	Bkgd-NW	4/30/02 8:45	5.03	0.81	n.d	↕
21	Bkgd-NE	4/30/02 9:05	5.08	0.84	n.d	5/21/02
1 MS	254	4/29/02 14:20	4.91	0.73	0.025	5/16/02
1 MSD	254	4/29/02 14:20	5.34	0.37	3.356	5/16/02

May 14, 2002:

- Samples were mixed an additional 1 hr, checked after 30 minutes.
- Samples were centrifuged at 800 rpm for 15 min.

Note: END OF EXTRACTION PROCESS

- At end of extraction sample concentration was 250 mg/mL
- ~~Fireteface®~~ The target level, or action level for project, is 1.0 ppb, or 1000 pg/g.
- To reach center of calibration curve, 25 mg soil equivalent (seq) needs to be applied to clean-up column (acid silica column). This is equivalent to applying 100 µl of extract to the column.
- In order to have enough sample so sample volume is not an issue, 200 µl of extract will be added to the column. This will give 50 mg soil equivalent in sample evaporation tube. Half of this will be introduced to ~~EIA®~~ EIA tube to achieve 25 mg seq.

CONTINUED . . . on next page

Clean-Up:

- Preparation of acid silica column:
  - Remove end caps from column and place in holder
  - Add 10 mL of hexane to column and let flow by gravity until it drips from end. Don't allow top to go dry.
  - ~~Using~~ Place carbon column, square end, on acid silica column. Fill tip of carbon column with hexane using pasteur pipet before placing it onto ~~the~~ acid silica column so no air bubbles develop. Do not let go dry.
  - Several mL of hexane should remain in acid silica column.
  - Pressurize columns using 20 mL syringe and stopper/stopcock assembly.
  - Allow all but 2-5 mL of hexane to flow through column. Open stopcock when ~~for~~ flow is ~~to~~ to stop. Don't allow to go dry.

- Sample preparation:
  - Remove 200 µl of extract and place in evaporation test tube
  - Add 200 µl of tetradecane keeper to tube
  - Allow acetone: hexane to evaporate
  - Re-constitute sample with approx. 200-250 µl of hexane and vortex ~~and~~ tube to make sure all sample goes back into solution.
  - ~~Transfer all contents~~
  - At this point there are 50 seq in sample evaporation tube

- Cleanup procedure:
  - Transfer all contents of evaporation tube to acid silica column, rinsing the evaporation tube with several mL of hexane and transferring this to column also.
  - Flush acid silica column with 25 mL of hexane, making sure to rinse sides of silica column with hexane.
  - Flush using stopper/stopcock assembly (Pressurized).
  - After all 25 mL has been placed on column, let hexane run through acid silica column until it reaches neutral [illegible] Don't let

- Clean Up Procedure (con't):
  - Do not let carbon colum go dry. Dioxins are trapped here and to ~~do so~~ let column go ~~dry~~ dry would lose the sample
  - Transfer carbon colum. to empty reservoir, attach square end to column
  - Add 7 mL of 1:1 toluene: hexane and pressurize as before. DO NOT Let carbon column go dry
  - Remove carbon column, ~~then~~ invert it, and replace slant end onto empty reservoir
  - Add 10 mL of toluene and pressurize as before, catching elute into clean borosilicate glass tube. Allow carbon column to go dry at this point. ↳ evaporation tube

- Evaporation Procedure
  - Add 100 µl of Keeper Sol'n (80:20 methanol: tetraethyleneglycol CT6 + 100 ppm Triton X-100) to evaporation tube
  - Place tubes in waterbath set at 75°C ~~with~~ under a gentle stream of nitrogen gas.
  - When only Keeper remains, centrifuge at 2000 rpm for 2 min to concentrate all of sample at bottom of tube; there should be 20 µl of non-volatile residue

NOTE: END OF CLEANUP PROCEDURE

EIA: Bring all reagents to room temperature prior to use.

- Preparation of ~~tubes~~ wash sol'n:
  - Place 10 µl of Triton X-100 in 100 mL of distilled water and mix thoroughly Larger Volume can be made to store at room temperature.
- Place antibody coated tubes (ac-tubes) in rack and label them. Place standard tubes first, from low to high.
- Rinse tubes by filling them up completely with distilled water.
- Dump water and tap on absorbent paper to remove excess water.

Client: EPA
Project No: 69011.L.02.0077.00 Date: 5/14/02 to 5/15/02
Ava MO Dioxin Field Screening

Made by: A. Suárez
Checked by:
Preliminary: Final

EIA (cont):

- Dispense 500 µl of distilled water in each tube
- Add 50 µl of standards and samples to each tube (appropriate) directly UNDER (into) liquid. Mix immediately.
- Incubate minimum of 2 hours, preferrably overnight.

Reconstitute samples 2 at a time with 80 µl hexane

Day's Activities:
- Samples were centrifuged at 800 rpm for 15 minutes.
- Vials were left set upright overnight
- 6 acid silica/carbon columns were prepared with hexane and left set overnight

May 15, 2002

Day's Activities: Follow procedures for cleanup and EIA as written on May 14, 2002

- Water bath was turned on at approx 7:30 am. and allowed to come to 75°C
- Samples were taken through the cleanup procedure 6 at a time

Run Log:

		Sample #	Cleanup Began	Time of Evaporation	5/15/02 Begin Incubation	5/16/02 End Incubation
		3 - Carbon dry	10:25	~~16:00~~ 16:04	19:06	10:32
Note: Tops of acid silica columns were brown in color for Set #1	Set #1	4 - Carbon dry	10:30			
		5	10:35			
		6 - Carbon dry	10:40			
		7 - Carbon dry	10:43			
		8	10:50			
	Set #2	1	~~2:42~~ 14:14			
		1 MS	~~2:34~~ 14:34			
		1 MSD	~~2:38~~ 14:38			
		2	~~2:44~~ 14:44			
		MB	~~2:48~~ 14:48			
		MB+	~~2:54~~ 14:54		19:01	10:22

Client: EPA

Project No: EA011.L02.0077.000 Date: 5/15/12

Ava MO Dioxin Field Screening

Page: 6 of 11

Made by: A. Suárez

Checked by:

Preliminary: Final

Daily Activities (Con't):

- Contents of extraction vials, the extract, were transferred to a 8mL storage vial using Pasteur pipette.
- 200µl of extract were transferred to evaporation test tubes and 200µl of n-tetradecane (n-TD) were added. Tubes were mixed. @ Tubes sat for approx 20-30 min to evaporate aceton
- Samples 1-MS, and 1-MSD and MB+ were spiked with 10µl of 10 ppb stock sol'n.
- Samples were transferred to columns using pasteur pipette. Tubes were rinsed with hexane after contents had been transferred, and this was also added to the column.
- Approx 10-12 mL of hexane was pushed through columns
- An additional 10-12 mL of hexane was pushed through column a second time and Silica column was allowed to "go dry" up to 1-2 cm above tip into neutral silica layer.
- Carbon columns were transferred to clean reservoir
- 7mL of 1:1 hexane: toluene were added to column and pressurized as before. DO NOT LET CARBON COLUMN GO DRY!
- Flip carbon column and add 10mL toluene + pressurize. Catch liquid in test tube. Push air all the way through the column.
- Add 100µl of Keeper and evaporated
- Centrifuge tubes for 2 minutes to concentrate sample in bottom
- Prepare EIA Tubes
  - Fill with water and dump
  - Fill with 500µl H_2O
- Reconstitute samples by adding 80µl MeOH, 2 tubes at a time. Vortex for 15 seconds
- Place 50µl of reconstituted sample directally into water in EIA tube.
- Place 50µl of standards in EIA tube ~~as well~~
- Incubate overnight, covered with alluminum foyle

Client: EPA
Project No: 69911.L.02077.00 Date: 5/16/02
Ava MO Dioxin Field Screening

Page: 7 of 11
Made by: A. Suarez
Checked by:
Preliminary: Final

May 16, 2002

Daily Activities: Followed procedures for cleanup & EIA as written on May 14, 2002

- Water Bath turned on at 8:00 am. and allowed to reach 75°C
- Samples were prepped for introduction to column.
- 200 µl sample and 200 µl n-TD were added to glass test tube. Acetone was allowed to evaporate for at least 30 minutes.

Sample Prep and Run Log		Sample #	Cleanup Began	Time of Evaporation	5/16/02 Begin Incubate	5/17/02 End Incubate
		9	~~15:16~~ 15:16	18:34	~~18:43~~ 21:07	~~20:15~~ 12:30
		10	15:19			
		11	15:22			
	Set #1	12	15:38			
		13	15:30			
		14	15:38			
		15	17:09			
		14	17:11			
	Set #2	16FD	17:14			
		17	17:17			
		MB	17:21			
		MB+	17:25			

really got too hot in bath?
White flecks
White flecks
Cardboard from evap. bath

18:34 21:07 ~~18:43~~ 12:30 ~~20:15~~

- EIA wash solution was prepared using 20 µl of Triton-X sol'n and 200 mL distilled H_2O.
- EIA tubes were dumped and rinsed with 1 mL of EIA wash, 4 times, tapping between each wash
- 0.5 mL conjugate added and incubated 15 minutes
- Washed with water 4x
- 0.5 mL substrate added and incubated 30 minutes
- 0.5 mL stop sol'n added and OD readings taken

Client: EPA

Project No: G9011.L02.0077.00 Date: 5/16/02

Ava MO Dioxin Field Screening

Made by: A. Suárez

Checked by:

Preliminary: Final

EIA Results:

	Sample #	OD Reading	Corrected Calculated Sample Conc. (pg/g)	Blank Corrected Calculated pg/tube	
Standards	0_s	1.20	—	—	
	1_s	1.05	—	—	
	2_s	0.76	—	—	
	3_s	0.485	—	—	
	4_s	0.33	—	—	50 pg/ spiked
	5_s	0.27	—	—	
Samples	1	0.68	162	2.3	
	1MS	0.73	25	0.3	% Reco
	1MSD	0.387	3356	46.9 ←	89.2
	2	0.66	225	3	
	3	0.60	450	6	
	4	0.85	-229	-3	
	5	0.48	1214	17	
	6	0.62	368	5	
	7	0.53	820	11	
	8	0.58	541	7.6	
Blanks	MB	0.74	—	10.6*	% Reco
	MBS	0.42	—	27.9 ←	55.8

* Add this to all values to achieve calculated pg/tube

- EIA tubes prepared for next batch of samples
- EIA tubes left to incubate overnight

Angela M. Suarez 5/16/02

Client: EPA

Project No: G9011.L.02.00077.00 Date: 5/17/02

Ava Mo. Dioxin Field Screening

Page: 9 of 11

Made by: A. Suarez

Checked by:

Preliminary: Final

May 17, 2002

- Six garden samples were taken through the extraction procedure.
- They were checked after 30 minutes, and all was well
- They were left shaking for 5h 30min more.

Sample #	Depth	Collection Date/Time	Amt of Sample (g)	OD Reading	Calculated Concentration (ppb)	Date
G1	0-6		5.06	0.84	n.d	5/21/02
G2	18-24		5.05	0.83	n.d	
G3	0-6		5.12	0.80	n.d	
G4	18-24		5.06	0.65	0.259	
G5	18-24		5.00	0.68	0.177	
G6	0-6		5.02	0.61	0.387	5/21/02

- Samples from May 16, 2002, were taken through rest of EIA

EIA Results:

	Sample #	OD Reading	Corrected Calculated Sample Conc (pg/g) (Using Average of MBS from other 2 runs)	Blank Corrected Calculated pg/tube
Standards	0_S	1.21	—	—
	1_S	1.03	—	—
	2_S	0.74	—	—
	3_S	0.45	—	—
	4_S	0.30	—	—
	5_S	0.26	—	—
Samples	9	0.67	413	6.8
	10	0.69	360	5.9
	11	0.61	600	9.8
	12	0.74	244	4
	13	0.74	244	4
	14	0.77	183	3

2@

Client: EPA
Project No: G4811.L.02.00077.00 Date: 5/17/02
Area M6. Dioxin Field Screening

Page: 10 of 11
Made by: A. Suarez
Checked by:
Preliminary: Final

May 17, 2002

EIA Results (Con't):

	Sample #	OD Reading	Corrected Calculated Concentration (pg/g)	RPD	Blank corrected Calculated pg/tube	RPD
Samples	15	0.79	145		2	
	16	0.73	265	27.0	4	28.6
	16FD	0.76	202		3	
	17	0.85	45		0.7	
Blanks	MS	0.88	—		6.2	% Recovery
	MSB	0.83	—		32.8 →	65.6%

May 20, 2002

Daily Activities:

- Extraction vials were centrifuged 4 at a time for 15 min at 800 rpm.
- Supernate was removed and placed in storage vial
- These six samples, plus MB and 4 samples from previous extraction, were taken through cleanup, placed in EIA tubes and left to incubate overnight

Continued

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Client: EPA
Project No: G9011.L.02.007200 Date: 5/20/02
Ava MO. Dioxin Field Screening

Made by: A. Suárez
Checked by:
Preliminary: Final

May 20 2002 - Continued

Run/Sample Prep: Log

	Sample #	Begin Cleanup	Begin Time of Evaporation	End Time Evaporation	5/20/02 Begin Incub.	5/21/02 End Incub.
	18	12:18	16:05	19:55	21:06	12:41
	19	12:21	↑	↕		
	20	12:25				
Set#1	21	12:28		19:55		
white sediment	G1	12:32		20:25		
	G2	12:36		19:55		
	G3	15:27		↑		
	G4	15:24				
	G5	15:28				
Set#2	G6	15:32				
	MB	15:36	↓	↓		
	MBS	15:39	16:05	19:15		

May 21, 2002

Sample #	O.D. Reading	Corrected Calc. Sample Conc (pg/g)	Blank Corrected Calculated pg/tube
0_s	1.25	—	—
1_s	1.05	—	—
2_s	0.80	—	—
3_s	0.46	—	—
4_s	0.33	—	—
18	0.72	~~0.00~~ 82	1.6
19	0.72	82	1.6
20	0.81	-88	-1.7
21	0.84	-135	-3
G1	0.84	-135	-3
G2	0.83	-120	-2
G3	0.80	-72	-1
G4	0.65	259	5
G5	0.68	177	3
G6	0.61	387	7.5
MB	0.76	—	10.8

Rerun for Samples run on 5/17/02
OD / 0.67
MBS

% Rec

APPENDIX C

Superfund Removal Site Evaluation Form

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

I. SITE NAME AND LOCATION:

NAME: Sentinel Wood Treaters Site (Off-site Sediment Sampling)

ADDRESS OR OTHER LOCATION IDENTIFIER: 412 NW 12th Avenue

CITY: Ava	**STATE:** Missouri	**ZIP:** 65608

DIRECTIONS TO SITE: From Springfield, east on Highway 60 to Highway 5 (Mansfield exit). South on Highway 5 approximately 14 miles to Highway 14 (aka NW 12th Avenue) in Ava, Missouri. East approximately ½ mile on NW 12th Avenue. Site is located on north side of the road.
MAP ATTACHED: X (In attached report).

II. PROGRAM CONTACTS:

REQUESTED BY: Eric Nold	**DATE OF REQUEST:** May 15, 2001

AGENCY/OFFICE: US EPA Region 7 Superfund Division

MAILING ADDRESS: 901 N. 5th Street

CITY: Kansas City	**STATE:** Kansas	**ZIP:** 66101
TELEPHONE: (913) 551-7488	**FAX:** (913) 551-7948	

EVALUATOR: T. Elliott

AGENCY/OFFICE: Tetra Tech EM Inc.

MAILING ADDRESS: 8030 Flint Street

CITY: Lenexa	**STATE:** Kansas	**ZIP:** 66214
TELEPHONE: (913) 495-3957	**FAX:** (913) 894-6295	

III. REMOVAL SITE EVALUATION CRITERIA [40 CFR 300.410(e)]

IS THERE A RELEASE AS DEFINED BY THE NCP: YES ■ or NO ☐

EXPLAIN: Detectable levels of dioxin and elevated levels of polynuclear aromatic hydrocarbons (PAHs) were reported in sediment samples collected from a tributary to Prairie Creek which drains the Sentinel site. Contaminant levels in sediment downstream of the site are significantly higher than those in background sediment from the same tributary.

*(A **RELEASE** is defined as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment of barrels, containers, and other closed receptacles containing any hazardous substances or pollutant or contaminant), but excludes: workplace exposures; engine exhaust emissions; nuclear releases otherwise regulated; and the normal application of fertilizer. For purposes of the NCP, release also means threat of release.)*

IS THE SOURCE A FACILITY OR VESSEL AS DEFINED BY THE NCP: YES ■ or NO ☐

EXPLAIN: The source area includes former lagoons and operations areas where hazardous substances were deposited.

*(A **FACILITY** is defined as any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or POTW), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft or any site or area, where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel. A **VESSEL** is defined as any description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel.)*

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

III. REMOVAL SITE EVALUATION CRITERIA [40 CFR 300.410(e)] (continued):

DOES THE RELEASE INVOLVE A HAZARDOUS SUBSTANCE, OR POLLUTANT OR CONTAMINANT AS DEFINED BY THE NCP: YES ■ or NO ☐

EXPLAIN: Dioxin and PAHs are considered hazardous substances pursuant to CERCLA.

*(A **HAZARDOUS SUBSTANCE** means any substance, element, compound, mixture, solution, hazardous waste, toxic pollutant, hazardous air pollutant, or imminently hazardous chemical substance or mixture designated pursuant to the CWA, CERCLA, SDWA, CAA or TSCA. The term does not include petroleum products, natural gas, natural gas liquids, liquefied natural gas, synthetic gas or mixtures of natural and synthetic gas. The definition of **POLLUTANT or CONTAMINANT** includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions or physical deformations, in such organisms or their offspring. The term does not include petroleum products, natural gas, natural gas liquids, liquefied natural gas, synthetic gas or mixtures of natural and synthetic gas).*

IS THE RELEASE SUBJECT TO THE LIMITATIONS ON RESPONSE: YES ☐ or NO ■
EXPLAIN:

(The LIMITATIONS ON RESPONSE provisions of the NCP (40 CFR 300.400(B) states that removals shall not be undertaken in response to a release: of a naturally occurring substance in its unaltered or natural form; from products that are a part of the structure of, and result in exposure within, residential buildings or business or community structures; or into public or private drinking water supplies due to deterioration of the system through ordinary use.)

DOES THE QUANTITY OR CONCENTRATION WARRANT RESPONSE: YES ☐ or NO ■

EXPLAIN: Dioxin levels in the sediment samples were below 1.0 micrograms per kilogram (µg/kg) in all samples. Levels of certain PAHs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3,cd)pyrene, exceeded Missouri Department of Natural Resources (MDNR) risk-based criteria. However, the quantity of contaminated sediment may be relatively low (due to predominance of bedrock streambed) and the concentrations of these compounds may not be high enough to warrant further response.

HAS A PRP BEEN IDENTIFIED: YES ■ or NO ☐

EXPLAIN: The probable primary PRP is Sentinel Wood Treaters.

IV. CONDITIONS TO WARRANT REMOVAL [40 CFR 300.415(b)(2)]:

ACTUAL OR POTENTIAL EXPOSURE TO HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS: YES ■ or NO ☐

EXPLAIN: Children or adults walking in the stream may be exposed to sediment contamination.

ACTUAL OR POTENTIAL CONTAMINATION OF DRINKING WATER SUPPLIES: YES ☐ or NO ■

EXPLAIN:

HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS IN DRUMS, BARRELS, OR BULK STORAGE CONTAINERS: YES ☐ or NO ■

EXPLAIN:

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

IV. CONDITIONS TO WARRANT REMOVAL [40 CFR 300.415(b)(2)] (continued):

HIGH LEVELS OF HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS IN NEAR-SURFACE SOILS: YES ☐ or NO ■

EXPLAIN:

CONDITIONS SUSCEPTIBLE TO IMPACT FROM ADVERSE WEATHER CONDITIONS: YES ☐ or NO ■

EXPLAIN:

THREAT OF FIRE OR EXPLOSION: YES ☐ or NO ■

EXPLAIN:.

POTENTIAL FOR OTHER FEDERAL OR STATE RESPONSE MECHANISMS: YES ☐ or NO ■

EXPLAIN:

OTHER SITUATIONS OR FACTORS WHICH POSE A THREAT: YES ☐ or NO ■

EXPLAIN:

V. POTENTIAL REMOVAL ACTIONS [40 CFR 300.415(d)]:

(NOTE: The following identifies potential removal actions which may be determined to be appropriate pending further review and study. The proposed actions should be considered preliminary proposals and are subject to change.)

SITE SECURITY: YES ☐ or NO ■

EXPLAIN:

STABILIZATION OR REMOVAL OF SURFACE IMPOUNDMENTS: YES ■ or NO ☐

EXPLAIN: Former lagoons onsite may be contributing to off-site migration of contaminants into the tributary.

CAPPING OF CONTAMINATED SOIL: YES ☐ or NO ■

EXPLAIN:

USE OF CHEMICALS TO CONTROL/RETARD SPREAD OF CONTAMINATION: YES ☐ or NO ■

EXPLAIN:

CONTAMINATED SOIL EXCAVATION: YES ☐ or NO ■

EXPLAIN:

REMOVAL OF DRUMS, TANKS, OR BULK STORAGE CONTAINERS: YES ☐ or NO ■

EXPLAIN:

CONTAINMENT, TREATMENT, OR DISPOSAL OF HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS: YES ■ or NO ☐

EXPLAIN: Contaminated soil and groundwater onsite may be contributing to off-site migration of contaminants into the tributary.

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

PROVIDE ALTERNATIVE WATER SUPPLIES: YES ☐ or NO ■

EXPLAIN:

VI. REMOVAL SITE EVALUATION DETERMINATION AND REMOVAL PRELIMINARY ASSESSMENT FINDINGS AND RECOMMENDATIONS:

X | REMOVAL NOT WARRANTED—REMOVAL SITE EVALUATION TERMINATED

(Cite one or more of the criteria from SECTION III. REMOVAL SITE EVALUATION CRITERIA, as the basis for the above determination.)

	NOT A RELEASE			NOT A FACILITY OR VESSEL
	NOT A HAZARDOUS SUBSTANCE OR POLLUTANT OR CONTAMINANT			SUBJECT TO RESPONSE LIMITATIONS
X	INSUFFICIENT QUANTITY OR CONCENTRATION		X	WILLING/CAPABLE PRP IDENTIFIED

COMMENT: While PAH levels exceed MDNR risk-based criteria, the quantity of contaminated sediment and the contaminant concentrations may not be significant enough to warrant a response by EPA. In addition, the PRP is already conducting removal actions onsite which should eliminate off-site migration of contaminants in the future. Any future off-site removal activities within the tributary, as dictated by EPA, would likely be a PRP-lead response.

REMOVAL RECOMMENDED [__ EMERGENCY __ TIME-CRITICAL __ NON-TIME-CRITICAL]

(Cite one or more of the conditions or factors from Section IV. CONDITIONS TO WARRANT A REMOVAL ACTION, as a basis for recommending that a removal action be conducted.)

	EXPOSURE TO HAZARDOUS SUBSTANCES OR POLLUTANTS OR CONTAMINANTS			ADVERSE WEATHER IMPACTS
	CONTAMINATED DRINKING WATER		FIRE/EXPLOSION THREAT	CONTAMINATED SOIL
	DRUMS, BARRELS OR CONTAINERS		NO OTHER RESPONSE MECHANISM	OTHER FACTORS

(Identify one or more of the removal actions listed in Section V. REMOVAL ACTIONS WHICH MAY BE APPROPRIATE, as examples of the types of response actions which are recommended.)

	SITE SECURITY		DRAINAGE CONTROL	IMPOUNDMENT STABILIZATION
	REMOVAL OF DRUMS, BARRELS, ETC.		SOIL CAPPING	SOIL EXCAVATION
	CONTAIN/TREAT/DISPOSE OF WASTES		CHEMICAL CONTROLS	ALT. DRINKING WATER SUPPLIES

COMMENT:

ADDITIONAL REMOVAL SITE EVALUATION RECOMMENDED

(Cite one or more of the conditions or factors from Section IV. CONDITIONS TO WARRANT A REMOVAL ACTION, as a basis for recommending that additional site evaluation be performed.)

	EXPOSURE TO HAZARDOUS SUBSTANCES OR POLLUTANTS OR CONTAMINANTS			ADVERSE WEATHER IMPACTS
	CONTAMINATED DRINKING WATER		FIRE/EXPLOSION THREAT	CONTAMINATED SOIL
	DRUMS, BARRELS OR CONTAINERS		NO OTHER RESPONSE MECHANISM	OTHER FACTORS

(Identify one or more of the removal actions listed in Section V. REMOVAL ACTIONS WHICH MAY BE APPROPRIATE, as examples of the types of response actions which may be appropriate pending the results of further site evaluation.)

	SITE SECURITY		DRAINAGE CONTROL	IMPOUNDMENT STABILIZATION
	REMOVAL OF DRUMS, BARRELS, ETC.		SOIL CAPPING	SOIL EXCAVATION
	CONTAIN/TREAT/DISPOSE OF WASTE		CHEMICAL CONTROLS	ALTERNATIVE DRINKING WATER SUPPLIES

COMMENT:

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

VII. ADDITIONAL INFORMATION OR COMMENTS:

EPA USE ONLY

VIII. CERTIFICATION

SIGNATURE: [signature] **DATE:** 8/21/02

POSITION/TITLE:

OFFICE/AGENCY:

SUPERFUND REMOVAL SITE EVALUATION
and
REMOVAL PRELIMINARY ASSESSMENT

(Supplemental Waste Inventory Sheet)

IX. HAZARDOUS SUBSTANCES, POLLUTANTS OR CONTAMINANT INFORMATION:

MATERIAL DESCRIPTION	CONTAINER INFORMATION					
TRADE NAME/ACTIVE INGREDIENTS	*NUMBER of CONTAINERS*	SIZE	TYPE	*SOLID or LIQUID*	% FULL	CONDITION

ATTACHMENT 1

Laboratory Data Packages

SEDIMENT

United States Environmental Protection Agency

Region 7 Laboratory
25 Funston Road
Kansas City, KS 66115

Date: 5/30/2002

Subject: Transmittal of Sample Analysis Results for ASR #: 1506
Activity Number: ERN15
Activity Description: Sentinel Wood Treating Co. sediment sampling

From: Michael Thomas, Associate Laboratory Director
Regional Laboratory, Environmental Services Division

To: Eric Nold
SUPR/EFLR

This is the sample analysis results transmittal for the above-referenced Analytical Services Request (ASR). The data contained in this transmittal have been approved by the Regional Laboratory. This transmittal contains all of the sample analysis results for this ASR. The Regional Laboratory should be notified within 14 days if any changes are needed to the contents of this report. If you have any questions, comments or data changes, please contact the Laboratory Customer Service Department at 913-551-5295.

cc: Analytical Data File

ASR Number: 1506

Summary of Activity Information
5/29/2002

Activity Leader: Nold, Eric Org: SUPR/EFLR Phone: (913) 551-7488
Activity Number: ERN15
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund/Oil
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:
Purpose: Site characterization

Explanation of Codes, Units and Qualifiers used on this report.

Sample QC Codes: QC Codes identify the type of sample for quality control purposes.

__ = Field Sample
FD = Field Duplicate

Units: Specific units in which results are reported.

ng/kg = Nanograms per Kilogram
ug/kg = Micrograms per Kilogram

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank) = Values have been reviewed and found acceptable for use.
J = The associated numerical value is an estimated quantity.
K = Actual value of the sample is less than the value reported.
L = Actual value of the sample is greater than the value reported.
U = Not detected at or above the reportable level shown.

Activity Number: ERN15 ASR Number: 1506 Sample Information Summary

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/29/2002

Sample Number	QC Code	Matrix	Location	External Sample No.	Start Date	Start Time	End Date	End Time	Receipt Date
1	__	Soil	Cell 254/Creek sediment sample		04/29/2002	14:20			05/01/2002
2	__	Soil	Cell 251/Creek sediment sample		04/29/2002	14:35			05/01/2002
3	__	Soil	Cell 248/Creek sediment sample		04/29/2002	14:45			05/01/2002
4	__	Soil	Cell 245/Creek sediment sample		04/29/2002	14:55			05/01/2002
5	__	Soil	Cell 242/Creek sediment sample		04/29/2002	15:10			05/01/2002
6	__	Soil	Cell 239/Creek sediment sample		04/29/2002	15:25			05/01/2002
7	__	Soil	Cell 236/Creek sediment sample		04/29/2002	15:35			05/01/2002
8	__	Soil	Cell 233/Creek sediment sample		04/29/2002	15:45			05/01/2002
9	__	Soil	Cell 230/Creek sediment sample		04/29/2002	15:55			05/01/2002
10	__	Soil	Cell 227/Creek sediment sample		04/29/2002	16:05			05/01/2002
11	__	Soil	Cell 224/Creek sediment sample		04/29/2002	16:25			05/01/2002
12	__	Soil	Cell 221/Creek sediment sample		04/29/2002	16:50			05/01/2002
13	__	Soil	Cell 218/Creek sediment sample		04/29/2002	17:05			05/01/2002
14	__	Soil	Cell 215/Creek sediment sample		04/29/2002	17:15			05/01/2002
15	__	Soil	Cell 212/Creek sediment sample		04/29/2002	17:25			05/01/2002
16	__	Soil	Cell 209/Creek sediment sample		04/29/2002	17:50			05/01/2002
16	FD	Soil	Cell 209/Creek sediment sample - Field Duplicate of sample 16		04/29/2002	17:50			05/01/2002
17	__	Soil	Cell 206/Creek sediment sample		04/29/2002	18:05			05/01/2002
18	__	Soil	Cell 203/Creek sediment sample		04/29/2002	18:20			05/01/2002
19	__	Soil	Cell 200/Creek sediment sample		04/29/2002	18:35			05/01/2002
20	__	Soil	Background - Northwest on creek of former lagoon/Creek sediment sample		04/30/2002	8:45			05/01/2002
21	__	Soil	Background - Northeast on creek of former lagoon/Creek sediment sample		04/30/2002	9:05			05/01/2002

Analysis	Comments About Results For This Analysis

PCDD/PCDF in Soil by GC/HRMS

The samples contained polychlorinated diphenyl ethers, compounds that may form PCDFs during the analysis process. Any affected isomers (1,2,3,6,7,8-HxCDF in samples 1-4, 6, 9, 11, 13-16, 16FD, 17, and 19; 1,2,3,7,8-PeCDF in samples 2, 5, and 7; 1,2,3,4,7,8-HxCDF in samples 5, 7, 8, 9, 12, 14, and 20; and 2,3,7,8-TCDF in samples 12, 13, 14, 15, and 16FD) should be regarded as estimated maximum possible concentrations. These isomers were "K-coded" in all of the samples indicated. The impact on the results is that the detection limits for these isomers are somewhat elevated. Since they are not included in the equivalence calculation the values reported for 2,3,7,8-TCDD equivalence may be lower than the actual values.

Low levels of 1,2,3,4,6,7,8-HpCDD, OCDD, and OCDF contamination were found in one of the laboratory method blanks. Only samples containing this compound at a level greater than five times the contamination level of the blank are reported without being qualified. All samples that contained this compound but at a level less than five times the contamination in the blank have the result "U-coded" indicating the method reporting limit has been raised to the level found in the sample. Only OCDF was qualified in sample 1506-21.

Semi-Volatile Organic Compounds in Soil

Indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene were J-coded in samples -18 and -19 due to their exceeding the calibration range of the instrument. The reported values may be somewhat lower than the actual values.

Bis(2-ethylhexyl)phthalate in sample -10 and benzo(g,h,i)perylene in samples -1, -4, -6, -7, -8, -9, -10, -12, -13, -14, -16FD, and -17 were J-coded due to the continuing calibrations not meeting accuracy specifications. The reported values may be as much as100% and 30% higher, respectively, than the actual values.

Benzo(a)anthracene and chrysene in samples -1, -4, -6, -7, -8, -9, -10, -12, -13,-16FD, and -17; pyrene in sample -4; bis(2-ethylhexyl)phthalate in sample -10; benzo(a)pyrene, benzo(b)fluoranthene, benzo (g,h,i)perylene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene in samples -1, -4, -6, -7, -8, -9, -10, -11, -12, -13, -14, -15, -16, -16FD, -17, -18, -19, and -21; dibenzo(a,h)anthracene in samples -1, -8,-10, -11, -12, -14, -16FD, -17, -18, and -19, and di-n-octylphthalate in sample -21 were J-coded. Although the analytes in question have been positively identified in the samples, the quantitations are estimates (J-coded) due to the internal standards not meeting accuracy specifications. The actual concentrations for these analytes may be higher than the reported values.

Analysis / Analyte	Units	1-__	2-__	3-__	4-__
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	19.5 U	2.82	5.12	6.51
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	97.6 U	19.1	30	62.4
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	154	71.5	98	204
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	421	226	322	627
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	307	139	194	435
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	13700	6370	8880	17800
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	110000	50200	67900	125000
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	19.5 U	1.18	2.19	2.01
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	97.6 U	66 K	20.3	7.78
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	97.6 U	18.4	28.3	68.5
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	160 U	100 U	359	213
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	97.6 K	28.2 K	110 K	140 K
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	97.6 U	17.6	46.8	88.6
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	97.6 U	56	92.6	157
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	2010	1180	1970	3210
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	165	111	198	317
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	8960	5080	9250	10900
2,3,7,8-Dioxin Total Equivalents	ng/kg	365	207	334	595
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	400 U	390 U	420 U	420 U
Acenaphthylene	ug/kg	400 U	390 U	420 U	420 U
Acetophenone	ug/kg	400 U	390 U	420 U	420 U
Anthracene	ug/kg	400 U	390 U	420 U	420 U
Atrazine	ug/kg	400 U	390 U	420 U	420 U
Benzaldehyde	ug/kg	400 U	390 U	420 U	420 U
Benzo(a)anthracene	ug/kg	910 J	390 U	590	530 J
Benzo(a)pyrene	ug/kg	980 J	390 U	700	610 J
Benzo(b)fluoranthene	ug/kg	1100 J	390 U	860	670 J
Benzo(g,h,i)perylene	ug/kg	1300 J	390 U	420 U	770 J
Benzo(k)fluoranthene	ug/kg	890 J	390 U	650	620 J
Biphenyl	ug/kg	400 U	390 U	420 U	420 U
bis(2-Chloroethoxy)methane	ug/kg	400 U	390 U	420 U	420 U
bis(2-Chloroethyl)ether	ug/kg	400 U	390 U	420 U	420 U
bis(2-Chloroisopropyl)ether	ug/kg	400 U	390 U	420 U	420 U
bis(2-Ethylhexyl)phthalate	ug/kg	400 U	390 U	420 U	420 U
4-Bromophenyl-phenylether	ug/kg	400 U	390 U	420 U	420 U
Butylbenzylphthalate	ug/kg	400 U	390 U	420 U	420 U
Caprolactam	ug/kg	400 U	390 U	420 U	420 U
Carbazole	ug/kg	400 U	390 U	420 U	420 U
4-Chloro-3-methylphenol	ug/kg	400 U	390 U	420 U	420 U
4-Chloroaniline	ug/kg	400 U	390 U	420 U	420 U
2-Chloronaphthalene	ug/kg	400 U	390 U	420 U	420 U
2-Chlorophenol	ug/kg	400 U	390 U	420 U	420 U
4-Chlorophenyl-phenylether	ug/kg	400 U	390 U	420 U	420 U
Chrysene	ug/kg	1400 J	390 U	870	820 J
Di-n-butylphthalate	ug/kg	400 U	390 U	420 U	420 U
Di-n-octylphthalate	ug/kg	400 U	390 U	420 U	420 U
Dibenz(a,h)anthracene	ug/kg	490 J	390 U	420 U	420 U

Activity Number: ERN15 ASR Number: 1506 RLAB Approved Sample Analysis Results

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/29/2002

Analysis / Analyte	Units	1-__	2-__	3-__	4-__
Dibenzofuran	ug/kg	400 U	390 U	420 U	420 U
3,3'-Dichlorobenzidine	ug/kg	400 U	390 U	420 U	420 U
2,4-Dichlorophenol	ug/kg	400 U	390 U	420 U	420 U
Diethylphthalate	ug/kg	400 U	390 U	420 U	420 U
2,4-Dimethylphenol	ug/kg	400 U	390 U	420 U	420 U
Dimethylphthalate	ug/kg	400 U	390 U	420 U	420 U
4,6-Dinitro-2-methylphenol	ug/kg	1000 U	990 U	1100 U	1100 U
2,4-Dinitrophenol	ug/kg	1000 U	990 U	1100 U	1100 U
2,4-Dinitrotoluene	ug/kg	400 U	390 U	420 U	420 U
2,6-Dinitrotoluene	ug/kg	400 U	390 U	420 U	420 U
Fluoranthene	ug/kg	1700	390 U	1700	1200
Fluorene	ug/kg	400 U	390 U	420 U	420 U
Hexachlorobenzene	ug/kg	400 U	390 U	420 U	420 U
Hexachlorobutadiene	ug/kg	400 U	390 U	420 U	420 U
Hexachlorocyclopentadiene	ug/kg	400 U	390 U	420 U	420 U
Hexachloroethane	ug/kg	400 U	390 U	420 U	420 U
Indeno(1,2,3-cd)pyrene	ug/kg	1400 J	390 U	420 U	690 J
Isophorone	ug/kg	400 U	390 U	420 U	420 U
2-Methylnaphthalene	ug/kg	400 U	390 U	420 U	420 U
2-Methylphenol	ug/kg	400 U	390 U	420 U	420 U
4-Methylphenol	ug/kg	400 U	390 U	420 U	420 U
Naphthalene	ug/kg	400 U	390 U	420 U	420 U
2-Nitroaniline	ug/kg	1000 U	990 U	1100 U	1100 U
3-Nitroaniline	ug/kg	1000 U	990 U	1100 U	1100 U
4-Nitroaniline	ug/kg	1000 U	990 U	1100 U	1100 U
Nitrobenzene	ug/kg	400 U	390 U	420 U	420 U
2-Nitrophenol	ug/kg	400 U	390 U	420 U	420 U
4-Nitrophenol	ug/kg	1000 U	990 U	1100 U	1100 U
N-nitroso-di-n-propylamine	ug/kg	400 U	390 U	420 U	420 U
N-nitrosodiphenylamine	ug/kg	400 U	390 U	420 U	420 U
Pentachlorophenol	ug/kg	1000 U	990 U	1100 U	1100 U
Phenanthrene	ug/kg	1000	390 U	710	540
Phenol	ug/kg	400 U	390 U	420 U	420 U
Pyrene	ug/kg	3300	590	2000	2900 J
2,4,5-Trichlorophenol	ug/kg	1000 U	990 U	1100 U	1100 U
2,4,6-Trichlorophenol	ug/kg	400 U	390 U	420 U	420 U

Analysis / Analyte	Units	5-__	6-__	7-__	8-__
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	1.06	2.19	5.2	1.67
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	11.6	22.1	33.6	16.7
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	38.3	80.6	174	61
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	139	264	265	172
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	81.2	138	168	112
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	4040	7760	7670	5100
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	32300	72400	62100	40200
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	0.987 U	0.997 U	1.6	0.988 U
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	31 K	7.07	53 K	9.69
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	7.3	16.4	18.7	11.6
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	330 K	262	120 K	310 K
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	15.9	21 K	32.3	20.1
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	10.5	22.2	22.8	15.1
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	35.1	57.3	58.6	43
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	921	1260	1470	884
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	74.8	124	141	80.5
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	4620	6260	5360	3790
2,3,7,8-Dioxin Total Equivalents	ng/kg	130	274	264 L	163
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	420 U	400 U	400 U	420 U
Acenaphthylene	ug/kg	420 U	400 U	400 U	420 U
Acetophenone	ug/kg	420 U	400 U	400 U	420 U
Anthracene	ug/kg	420 U	400 U	160	420 U
Atrazine	ug/kg	420 U	400 U	400 U	420 U
Benzaldehyde	ug/kg	420 U	400 U	400 U	420 U
Benzo(a)anthracene	ug/kg	420 U	680 J	860 J	1700 J
Benzo(a)pyrene	ug/kg	420 U	690 J	810 J	1400 J
Benzo(b)fluoranthene	ug/kg	420 U	790 J	860 J	1400 J
Benzo(g,h,i)perylene	ug/kg	420 U	830 J	960 J	1800 J
Benzo(k)fluoranthene	ug/kg	420 U	670 J	690 J	1400 J
Biphenyl	ug/kg	420 U	400 U	400 U	420 U
bis(2-Chloroethoxy)methane	ug/kg	420 U	400 U	400 U	420 U
bis(2-Chloroethyl)ether	ug/kg	420 U	400 U	400 U	420 U
bis(2-Chloroisopropyl)ether	ug/kg	420 U	400 U	400 U	420 U
bis(2-Ethylhexyl)phthalate	ug/kg	420 U	400 U	400 U	420 U
4-Bromophenyl-phenylether	ug/kg	420 U	400 U	400 U	420 U
Butylbenzylphthalate	ug/kg	420 U	400 U	400 U	420 U
Caprolactam	ug/kg	420 U	400 U	400 U	420 U
Carbazole	ug/kg	420 U	400 U	400 U	620
4-Chloro-3-methylphenol	ug/kg	420 U	400 U	400 U	420 U
4-Chloroaniline	ug/kg	420 U	400 U	400 U	420 U
2-Chloronaphthalene	ug/kg	420 U	400 U	400 U	420 U
2-Chlorophenol	ug/kg	420 U	400 U	400 U	420 U
4-Chlorophenyl-phenylether	ug/kg	420 U	400 U	400 U	420 U
Chrysene	ug/kg	420 U	1000 J	1100 J	2100 J
Di-n-butylphthalate	ug/kg	420 U	400 U	400 U	420 U
Di-n-octylphthalate	ug/kg	420 U	400 U	400 U	420 U
Dibenz(a,h)anthracene	ug/kg	420 U	400 U	400 U	640 J

Analysis / Analyte	Units	5-__	6-__	7-__	8-__
Dibenzofuran	ug/kg	420 U	400 U	400 U	420 U
3,3'-Dichlorobenzidine	ug/kg	420 U	400 U	400 U	420 U
2,4-Dichlorophenol	ug/kg	420 U	400 U	400 U	420 U
Diethylphthalate	ug/kg	420 U	400 U	400 U	420 U
2,4-Dimethylphenol	ug/kg	420 U	400 U	400 U	420 U
Dimethylphthalate	ug/kg	420 U	400 U	400 U	420 U
4,6-Dinitro-2-methylphenol	ug/kg	1100 U	1000 U	1000 U	1100 U
2,4-Dinitrophenol	ug/kg	1100 U	1000 U	1000 U	1100 U
2,4-Dinitrotoluene	ug/kg	420 U	400 U	400 U	420 U
2,6-Dinitrotoluene	ug/kg	420 U	400 U	400 U	420 U
Fluoranthene	ug/kg	670	1700	2000	4600
Fluorene	ug/kg	420 U	400 U	400 U	130
Hexachlorobenzene	ug/kg	420 U	400 U	400 U	420 U
Hexachlorobutadiene	ug/kg	420 U	400 U	400 U	420 U
Hexachlorocyclopentadiene	ug/kg	420 U	400 U	400 U	420 U
Hexachloroethane	ug/kg	420 U	400 U	400 U	420 U
Indeno(1,2,3-cd)pyrene	ug/kg	420 U	780 J	820 J	1700 J
Isophorone	ug/kg	420 U	400 U	400 U	420 U
2-Methylnaphthalene	ug/kg	420 U	400 U	400 U	420 U
2-Methylphenol	ug/kg	420 U	400 U	400 U	420 U
4-Methylphenol	ug/kg	420 U	400 U	400 U	420 U
Naphthalene	ug/kg	420 U	400 U	400 U	420 U
2-Nitroaniline	ug/kg	1100 U	1000 U	1000 U	1100 U
3-Nitroaniline	ug/kg	1100 U	1000 U	1000 U	1100 U
4-Nitroaniline	ug/kg	1100 U	1000 U	1000 U	1100 U
Nitrobenzene	ug/kg	420 U	400 U	400 U	420 U
2-Nitrophenol	ug/kg	420 U	400 U	400 U	420 U
4-Nitrophenol	ug/kg	1100 U	1000 U	1000 U	1100 U
N-nitroso-di-n-propylamine	ug/kg	420 U	400 U	400 U	420 U
N-nitrosodiphenylamine	ug/kg	420 U	400 U	400 U	420 U
Pentachlorophenol	ug/kg	1100 U	1000 U	1000 U	1100 U
Phenanthrene	ug/kg	420 U	850	1400	2900
Phenol	ug/kg	420 U	400 U	400 U	420 U
Pyrene	ug/kg	780	2200	2600	5100
2,4,5-Trichlorophenol	ug/kg	1100 U	1000 U	1000 U	1100 U
2,4,6-Trichlorophenol	ug/kg	420 U	400 U	400 U	420 U

Analysis / Analyte	Units	9-__	10-__	11-__	12-__
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	2.26	1.69	5.57	2.52
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	28.1	20.5	60.2	36.1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	110	75.6	187	133
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	258	195	572	460
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	198	129	363	237
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	7710	5420	16300	13300
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	56600	38800	124000	109000
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	0.992 U	0.99 U	3.5	2 K
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	8.2	8.53	11.3	21
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	14.8	13.8	56	33.6
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	480 K	219	373	1000 K
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	18 K	18.5	39 K	52.1
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	22.8	15.7	77.4	56.9
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	63.8	51.4	146	124
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	1270	914	2920	2760
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	136	93.3	307	268
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	5050	3630	12000	12600
2,3,7,8-Dioxin Total Equivalents	ng/kg	242	196 L	567	429
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	420 U	420 U	440 U	430 U
Acenaphthylene	ug/kg	420 U	420 U	440 U	430 U
Acetophenone	ug/kg	420 U	420 U	440 U	430 U
Anthracene	ug/kg	420 U	480	700	430 U
Atrazine	ug/kg	420 U	420 U	440 U	430 U
Benzaldehyde	ug/kg	420 U	420 U	440 U	430 U
Benzo(a)anthracene	ug/kg	800 J	2400 J	2800 J	1900 J
Benzo(a)pyrene	ug/kg	790 J	2100 J	2900 J	1700 J
Benzo(b)fluoranthene	ug/kg	810 J	2100 J	3100 J	1900 J
Benzo(g,h,i)perylene	ug/kg	1100 J	2900 J	1800 J	2000 J
Benzo(k)fluoranthene	ug/kg	800 J	1700 J	2800 J	1500 J
Biphenyl	ug/kg	420 U	420 U	440 U	430 U
bis(2-Chloroethoxy)methane	ug/kg	420 U	420 U	440 U	430 U
bis(2-Chloroethyl)ether	ug/kg	420 U	420 U	440 U	430 U
bis(2-Chloroisopropyl)ether	ug/kg	420 U	420 U	440 U	430 U
bis(2-Ethylhexyl)phthalate	ug/kg	420 U	1800 J	440 U	430 U
4-Bromophenyl-phenylether	ug/kg	420 U	420 U	440 U	430 U
Butylbenzylphthalate	ug/kg	420 U	420 U	440 U	430 U
Caprolactam	ug/kg	420 U	420 U	440 U	430 U
Carbazole	ug/kg	420 U	1000	440 U	850
4-Chloro-3-methylphenol	ug/kg	420 U	420 U	440 U	430 U
4-Chloroaniline	ug/kg	420 U	420 U	440 U	430 U
2-Chloronaphthalene	ug/kg	420 U	420 U	440 U	430 U
2-Chlorophenol	ug/kg	420 U	420 U	440 U	430 U
4-Chlorophenyl-phenylether	ug/kg	420 U	420 U	440 U	430 U
Chrysene	ug/kg	1100 J	3200 J	4500	2600 J
Di-n-butylphthalate	ug/kg	420 U	420 U	440 U	430 U
Di-n-octylphthalate	ug/kg	420 U	420 U	440 U	430 U
Dibenz(a,h)anthracene	ug/kg	420 U	1000 J	750 J	740 J

Analysis / Analyte	Units	9-__	10-__	11-__	12-__
Dibenzofuran	ug/kg	420 U	420 U	440 U	430 U
3,3'-Dichlorobenzidine	ug/kg	420 U	420 U	440 U	430 U
2,4-Dichlorophenol	ug/kg	420 U	420 U	440 U	430 U
Diethylphthalate	ug/kg	420 U	420 U	440 U	430 U
2,4-Dimethylphenol	ug/kg	420 U	420 U	440 U	430 U
Dimethylphthalate	ug/kg	420 U	420 U	440 U	430 U
4,6-Dinitro-2-methylphenol	ug/kg	1100 U	1100 U	1100 U	1100 U
2,4-Dinitrophenol	ug/kg	1100 U	1100 U	1100 U	1100 U
2,4-Dinitrotoluene	ug/kg	420 U	420 U	440 U	430 U
2,6-Dinitrotoluene	ug/kg	420 U	420 U	440 U	430 U
Fluoranthene	ug/kg	1700	8200	11000	5500
Fluorene	ug/kg	420 U	420 U	440 U	430 U
Hexachlorobenzene	ug/kg	420 U	420 U	440 U	430 U
Hexachlorobutadiene	ug/kg	420 U	420 U	440 U	430 U
Hexachlorocyclopentadiene	ug/kg	420 U	420 U	440 U	430 U
Hexachloroethane	ug/kg	420 U	420 U	440 U	430 U
Indeno(1,2,3-cd)pyrene	ug/kg	950 J	2800 J	2100 J	2200 J
Isophorone	ug/kg	420 U	420 U	440 U	430 U
2-Methylnaphthalene	ug/kg	420 U	420 U	440 U	430 U
2-Methylphenol	ug/kg	420 U	420 U	440 U	430 U
4-Methylphenol	ug/kg	420 U	420 U	440 U	430 U
Naphthalene	ug/kg	420 U	420 U	440 U	430 U
2-Nitroaniline	ug/kg	1100 U	1100 U	1100 U	1100 U
3-Nitroaniline	ug/kg	1100 U	1100 U	1100 U	1100 U
4-Nitroaniline	ug/kg	1100 U	1100 U	1100 U	1100 U
Nitrobenzene	ug/kg	420 U	420 U	440 U	430 U
2-Nitrophenol	ug/kg	420 U	420 U	440 U	430 U
4-Nitrophenol	ug/kg	1100 U	1100 U	1100 U	1100 U
N-nitroso-di-n-propylamine	ug/kg	420 U	420 U	440 U	430 U
N-nitrosodiphenylamine	ug/kg	420 U	420 U	440 U	430 U
Pentachlorophenol	ug/kg	1100 U	1100 U	1100 U	1100 U
Phenanthrene	ug/kg	1300	4600	5300	3100
Phenol	ug/kg	420 U	420 U	440 U	430 U
Pyrene	ug/kg	2900	9800	11000	6700
2,4,5-Trichlorophenol	ug/kg	1100 U	1100 U	1100 U	1100 U
2,4,6-Trichlorophenol	ug/kg	420 U	420 U	440 U	430 U

Activity Number: ERN15 ASR Number: 1506 RLAB Approved Sample Analysis Results

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/29/2002

Analysis / Analyte	Units	13-__	14-__	15-__	16-__
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	3.85	1.89	4.41	3.05
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	37.7	16.9	44.4	31.6
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	95.2	46.1	145	103
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	515	151	399	257
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	245	99	287	169
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	14300	4400	12400	7270
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	113000	37300	96500	60200
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	2.7 K	1.7 K	3.5 K	1.45
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	27	8.3	5.46	4.84 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	56.8	17.2	40	22.6
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	435	120 K	278	93
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	63 K	15 K	100 K	61 K
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	98.2	26.5	59.5	27.7
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	170	39.8	96	67.6
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	3320	847	2310	1370
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	327	90.4	249	132
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	13600	3970	7980	5200
2,3,7,8-Dioxin Total Equivalents	ng/kg	514	162	427	255
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	410 U	400 U	430 U	400 U
Acenaphthylene	ug/kg	410 U	400 U	430 U	400 U
Acetophenone	ug/kg	410 U	400 U	430 U	400 U
Anthracene	ug/kg	410 U	910	430 U	400 U
Atrazine	ug/kg	410 U	400 U	430 U	400 U
Benzaldehyde	ug/kg	410 U	400 U	430 U	400 U
Benzo(a)anthracene	ug/kg	1200 J	3100	1800	1200
Benzo(a)pyrene	ug/kg	1200 J	2500 J	2100 J	1400 J
Benzo(b)fluoranthene	ug/kg	1200 J	2500 J	2600 J	1800 J
Benzo(g,h,i)perylene	ug/kg	1100 J	2800 J	1300 J	660 J
Benzo(k)fluoranthene	ug/kg	1100 J	1900 J	2300 J	1500 J
Biphenyl	ug/kg	410 U	400 U	430 U	400 U
bis(2-Chloroethoxy)methane	ug/kg	410 U	400 U	430 U	400 U
bis(2-Chloroethyl)ether	ug/kg	410 U	400 U	430 U	400 U
bis(2-Chloroisopropyl)ether	ug/kg	410 U	400 U	430 U	400 U
bis(2-Ethylhexyl)phthalate	ug/kg	410 U	400 U	430 U	400 U
4-Bromophenyl-phenylether	ug/kg	410 U	400 U	430 U	400 U
Butylbenzylphthalate	ug/kg	410 U	400 U	430 U	400 U
Caprolactam	ug/kg	410 U	400 U	430 U	400 U
Carbazole	ug/kg	600	1800	430 U	400 U
4-Chloro-3-methylphenol	ug/kg	410 U	400 U	430 U	400 U
4-Chloroaniline	ug/kg	410 U	400 U	430 U	400 U
2-Chloronaphthalene	ug/kg	410 U	400 U	430 U	400 U
2-Chlorophenol	ug/kg	410 U	400 U	430 U	400 U
4-Chlorophenyl-phenylether	ug/kg	410 U	400 U	430 U	400 U
Chrysene	ug/kg	1700 J	3800	2800	2000
Di-n-butylphthalate	ug/kg	410 U	400 U	430 U	400 U
Di-n-octylphthalate	ug/kg	410 U	400 U	430 U	400 U
Dibenz(a,h)anthracene	ug/kg	410 U	1200 J	430 U	400 U

Analysis / Analyte	Units	13-__	14-__	15-__	16-__
Dibenzofuran	ug/kg	410 U	400 U	430 U	400 U
3,3'-Dichlorobenzidine	ug/kg	410 U	400 U	430 U	400 U
2,4-Dichlorophenol	ug/kg	410 U	400 U	430 U	400 U
Diethylphthalate	ug/kg	410 U	400 U	430 U	400 U
2,4-Dimethylphenol	ug/kg	410 U	400 U	430 U	400 U
Dimethylphthalate	ug/kg	410 U	400 U	430 U	400 U
4,6-Dinitro-2-methylphenol	ug/kg	1000 U	1000 U	1100 U	1000 U
2,4-Dinitrophenol	ug/kg	1000 U	1000 U	1100 U	1000 U
2,4-Dinitrotoluene	ug/kg	410 U	400 U	430 U	400 U
2,6-Dinitrotoluene	ug/kg	410 U	400 U	430 U	400 U
Fluoranthene	ug/kg	4300	11000	6100	4300
Fluorene	ug/kg	410 U	410	430 U	400 U
Hexachlorobenzene	ug/kg	410 U	400 U	430 U	400 U
Hexachlorobutadiene	ug/kg	410 U	400 U	430 U	400 U
Hexachlorocyclopentadiene	ug/kg	410 U	400 U	430 U	400 U
Hexachloroethane	ug/kg	410 U	400 U	430 U	400 U
Indeno(1,2,3-cd)pyrene	ug/kg	1100 J	3000 J	1200 J	870 J
Isophorone	ug/kg	410 U	400 U	430 U	400 U
2-Methylnaphthalene	ug/kg	410 U	400 U	430 U	400 U
2-Methylphenol	ug/kg	410 U	400 U	430 U	400 U
4-Methylphenol	ug/kg	410 U	400 U	430 U	400 U
Naphthalene	ug/kg	410 U	400 U	430 U	400 U
2-Nitroaniline	ug/kg	1000 U	1000 U	1100 U	1000 U
3-Nitroaniline	ug/kg	1000 U	1000 U	1100 U	1000 U
4-Nitroaniline	ug/kg	1000 U	1000 U	1100 U	1000 U
Nitrobenzene	ug/kg	410 U	400 U	430 U	400 U
2-Nitrophenol	ug/kg	410 U	400 U	430 U	400 U
4-Nitrophenol	ug/kg	1000 U	1000 U	1100 U	1000 U
N-nitroso-di-n-propylamine	ug/kg	410 U	400 U	430 U	400 U
N-nitrosodiphenylamine	ug/kg	410 U	400 U	430 U	400 U
Pentachlorophenol	ug/kg	1000 U	1000 U	1100 U	1000 U
Phenanthrene	ug/kg	2200	7000	2200	1600
Phenol	ug/kg	410 U	400 U	430 U	400 U
Pyrene	ug/kg	4000	8600	6300	4600
2,4,5-Trichlorophenol	ug/kg	1000 U	1000 U	1100 U	1000 U
2,4,6-Trichlorophenol	ug/kg	410 U	400 U	430 U	400 U

Analysis / Analyte	Units	16-FD	17-__	18-__	19-__
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	3.45	4.08	4.32	7.47
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	35.9	22	28.8	56.5
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	97.2	73.2	87.8	157
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	292	215	245	386
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	194	135	160	291
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	8670	6630	6870	11600
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	65500	59900	54400	90500
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	1.8 K	2.82	0.967 U	2.86
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.98 U	4.85 U	5.37	9.7
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	25.7	19.1	15.8	36.5
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	99.6	234	228	218
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	72 K	24 K	23.3	91 K
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	34.4	29.5	15.8	43.2
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	79.8	60.5	64.8	109
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	1570	1070	1200	1900
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	147	114	110	193
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	5530	4840	4410	7350
2,3,7,8-Dioxin Total Equivalents	ng/kg	289	242	250	410
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	410 U	390 U	390 U	450 U
Acenaphthylene	ug/kg	410 U	390 U	390 U	450 U
Acetophenone	ug/kg	410 U	390 U	390 U	450 U
Anthracene	ug/kg	410 U	390 U	650	640
Atrazine	ug/kg	410 U	390 U	390 U	450 U
Benzaldehyde	ug/kg	410 U	390 U	390 U	450 U
Benzo(a)anthracene	ug/kg	2000 J	1600 J	4700	5600
Benzo(a)pyrene	ug/kg	2200 J	1400 J	4900 J	6700 J
Benzo(b)fluoranthene	ug/kg	2000 J	1300 J	5800 J	8900 J
Benzo(g,h,i)perylene	ug/kg	2200 J	1800 J	3500 J	4500 J
Benzo(k)fluoranthene	ug/kg	1700 J	1200 J	5200 J	7000 J
Biphenyl	ug/kg	410 U	390 U	390 U	450 U
bis(2-Chloroethoxy)methane	ug/kg	410 U	390 U	390 U	450 U
bis(2-Chloroethyl)ether	ug/kg	410 U	390 U	390 U	450 U
bis(2-Chloroisopropyl)ether	ug/kg	410 U	390 U	390 U	450 U
bis(2-Ethylhexyl)phthalate	ug/kg	410 U	390 U	390 U	450 U
4-Bromophenyl-phenylether	ug/kg	410 U	390 U	390 U	450 U
Butylbenzylphthalate	ug/kg	410 U	390 U	390 U	450 U
Caprolactam	ug/kg	410 U	390 U	390 U	450 U
Carbazole	ug/kg	880	530	730	840
4-Chloro-3-methylphenol	ug/kg	410 U	390 U	390 U	450 U
4-Chloroaniline	ug/kg	410 U	390 U	390 U	450 U
2-Chloronaphthalene	ug/kg	410 U	390 U	390 U	450 U
2-Chlorophenol	ug/kg	410 U	390 U	390 U	450 U
4-Chlorophenyl-phenylether	ug/kg	410 U	390 U	390 U	450 U
Chrysene	ug/kg	2900 J	2100 J	6400	8900
Di-n-butylphthalate	ug/kg	410 U	390 U	390 U	450 U
Di-n-octylphthalate	ug/kg	410 U	390 U	390 U	450 U
Dibenz(a,h)anthracene	ug/kg	810 J	740 J	1200 J	1600 J

Activity Number: ERN15 ASR Number: 1506 RLAB Approved Sample Analysis Results

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/29/2002

Analysis / Analyte	Units	16-FD	17-__	18-__	19-__
Dibenzofuran	ug/kg	410 U	390 U	390 U	450 U
3,3'-Dichlorobenzidine	ug/kg	410 U	390 U	390 U	450 U
2,4-Dichlorophenol	ug/kg	410 U	390 U	390 U	450 U
Diethylphthalate	ug/kg	410 U	390 U	390 U	450 U
2,4-Dimethylphenol	ug/kg	410 U	390 U	390 U	450 U
Dimethylphthalate	ug/kg	410 U	390 U	390 U	450 U
4,6-Dinitro-2-methylphenol	ug/kg	1000 U	990 U	980 U	1100 U
2,4-Dinitrophenol	ug/kg	1000 U	990 U	980 U	1100 U
2,4-Dinitrotoluene	ug/kg	410 U	390 U	390 U	450 U
2,6-Dinitrotoluene	ug/kg	410 U	390 U	390 U	450 U
Fluoranthene	ug/kg	5700	3000	14000	17000
Fluorene	ug/kg	410 U	390 U	390 U	450 U
Hexachlorobenzene	ug/kg	410 U	390 U	390 U	450 U
Hexachlorobutadiene	ug/kg	410 U	390 U	390 U	450 U
Hexachlorocyclopentadiene	ug/kg	410 U	390 U	390 U	450 U
Hexachloroethane	ug/kg	410 U	390 U	390 U	450 U
Indeno(1,2,3-cd)pyrene	ug/kg	2100 J	1700 J	3500 J	4600 J
Isophorone	ug/kg	410 U	390 U	390 U	450 U
2-Methylnaphthalene	ug/kg	410 U	390 U	390 U	450 U
2-Methylphenol	ug/kg	410 U	390 U	390 U	450 U
4-Methylphenol	ug/kg	410 U	390 U	390 U	450 U
Naphthalene	ug/kg	410 U	390 U	390 U	450 U
2-Nitroaniline	ug/kg	1000 U	990 U	980 U	1100 U
3-Nitroaniline	ug/kg	1000 U	990 U	980 U	1100 U
4-Nitroaniline	ug/kg	1000 U	990 U	980 U	1100 U
Nitrobenzene	ug/kg	410 U	390 U	390 U	450 U
2-Nitrophenol	ug/kg	410 U	390 U	390 U	450 U
4-Nitrophenol	ug/kg	1000 U	990 U	980 U	1100 U
N-nitroso-di-n-propylamine	ug/kg	410 U	390 U	390 U	450 U
N-nitrosodiphenylamine	ug/kg	410 U	390 U	390 U	450 U
Pentachlorophenol	ug/kg	1000 U	990 U	980 U	1100 U
Phenanthrene	ug/kg	3000	2800	6200	7600
Phenol	ug/kg	410 U	390 U	390 U	450 U
Pyrene	ug/kg	7000	5600	14000	19000
2,4,5-Trichlorophenol	ug/kg	1000 U	990 U	980 U	1100 U
2,4,6-Trichlorophenol	ug/kg	410 U	390 U	390 U	450 U

Analysis / Analyte	Units	20-__	21-__
PCDD/PCDF in Soil by GC/HRMS			
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	0.984 U	0.978 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	4.92 U	4.89 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	6.07	4.89 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	13.9	4.89 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	12.7	6.89
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	391	131
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	ng/kg	2800	5640
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	0.984 U	0.978 U
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	17 K	4.89 U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	64.3	20.8
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	4.92 U	4.89 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	123	43.9 U
2,3,7,8-Dioxin Total Equivalents	ng/kg	10.7	7.89
Semi-Volatile Organic Compounds in Soil			
Acenaphthene	ug/kg	460 U	430 U
Acenaphthylene	ug/kg	460 U	430 U
Acetophenone	ug/kg	460 U	430 U
Anthracene	ug/kg	460 U	430 U
Atrazine	ug/kg	460 U	430 U
Benzaldehyde	ug/kg	460 U	430 U
Benzo(a)anthracene	ug/kg	460 U	820
Benzo(a)pyrene	ug/kg	460 U	890 J
Benzo(b)fluoranthene	ug/kg	460 U	1200 J
Benzo(g,h,i)perylene	ug/kg	460 U	510 J
Benzo(k)fluoranthene	ug/kg	460 U	1100 J
Biphenyl	ug/kg	460 U	430 U
bis(2-Chloroethoxy)methane	ug/kg	460 U	430 U
bis(2-Chloroethyl)ether	ug/kg	460 U	430 U
bis(2-Chloroisopropyl)ether	ug/kg	460 U	430 U
bis(2-Ethylhexyl)phthalate	ug/kg	460 U	500
4-Bromophenyl-phenylether	ug/kg	460 U	430 U
Butylbenzylphthalate	ug/kg	460 U	430 U
Caprolactam	ug/kg	460 U	430 U
Carbazole	ug/kg	460 U	430 U
4-Chloro-3-methylphenol	ug/kg	460 U	430 U
4-Chloroaniline	ug/kg	460 U	430 U
2-Chloronaphthalene	ug/kg	460 U	430 U
2-Chlorophenol	ug/kg	460 U	430 U
4-Chlorophenyl-phenylether	ug/kg	460 U	430 U
Chrysene	ug/kg	460 U	1500
Di-n-butylphthalate	ug/kg	460 U	430 U
Di-n-octylphthalate	ug/kg	460 U	730 J
Dibenz(a,h)anthracene	ug/kg	460 U	430 U

Analysis / Analyte	Units	20-__	21-__
Dibenzofuran	ug/kg	460 U	430 U
3,3'-Dichlorobenzidine	ug/kg	460 U	430 U
2,4-Dichlorophenol	ug/kg	460 U	430 U
Diethylphthalate	ug/kg	460 U	430 U
2,4-Dimethylphenol	ug/kg	460 U	430 U
Dimethylphthalate	ug/kg	460 U	430 U
4,6-Dinitro-2-methylphenol	ug/kg	1200 U	1100 U
2,4-Dinitrophenol	ug/kg	1200 U	1100 U
2,4-Dinitrotoluene	ug/kg	460 U	430 U
2,6-Dinitrotoluene	ug/kg	460 U	430 U
Fluoranthene	ug/kg	460 U	3100
Fluorene	ug/kg	460 U	430 U
Hexachlorobenzene	ug/kg	460 U	430 U
Hexachlorobutadiene	ug/kg	460 U	430 U
Hexachlorocyclopentadiene	ug/kg	460 U	430 U
Hexachloroethane	ug/kg	460 U	430 U
Indeno(1,2,3-cd)pyrene	ug/kg	460 U	590 J
Isophorone	ug/kg	460 U	430 U
2-Methylnaphthalene	ug/kg	460 U	430 U
2-Methylphenol	ug/kg	460 U	430 U
4-Methylphenol	ug/kg	460 U	430 U
Naphthalene	ug/kg	460 U	430 U
2-Nitroaniline	ug/kg	1200 U	1100 U
3-Nitroaniline	ug/kg	1200 U	1100 U
4-Nitroaniline	ug/kg	1200 U	1100 U
Nitrobenzene	ug/kg	460 U	430 U
2-Nitrophenol	ug/kg	460 U	430 U
4-Nitrophenol	ug/kg	1200 U	1100 U
N-nitroso-di-n-propylamine	ug/kg	460 U	430 U
N-nitrosodiphenylamine	ug/kg	460 U	430 U
Pentachlorophenol	ug/kg	1200 U	1100 U
Phenanthrene	ug/kg	460 U	2300
Phenol	ug/kg	460 U	430 U
Pyrene	ug/kg	460 U	3000
2,4,5-Trichlorophenol	ug/kg	1200 U	1100 U
2,4,6-Trichlorophenol	ug/kg	460 U	430 U

ctivity # ERN15
rSR# 1506

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Eric Nold / Ted Faile	Sampling Sentinel Wood Treating, Co. Sediment	29-3 / 04 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	8oz BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
1506-1		2						X			PCDD/PCDF in Soil
1506-2		2									& SVOCs in Soil
1506-3		2									" " "
1506-4		2									" " "
1506-5		2									" " "
1506-6		2									" " "
1506-7		2									" " "
1506-8		2									" " "
1506-9		2									" " "
1506-10		2									" " "
1506-11		2									" " "
1506-12		2									" " "
1506-13		2									" " "
1506-14		2									" " "
1506-15		2									" " "
1506-16		2									" " "
1506-16D		2									" " "
1506-17		2									" " "
1506-18		2									" " "
1506-19		2									" " "
1506-20		2									" " "
1506-21		2						V			" " "
						4-30-02					Fldr. Temp. Recd Det. 3-5° C

DESCRIPTION OF SHIPMENT

44 PIECE(S) CONSISTING OF _____ BOX(ES)

1 ICE CHEST(S): OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER: _____

_____ COURIER

X SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED UNSEALED X	5/1/02	9:15	Micah Robley SEALED UNSEALED X	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED UNSEALED			SEALED UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 1 QC Code: __ Matrix: Soil Tag ID: 1506-1-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 254

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Start 4/29/02 14:20
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9-aliquot,

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 2 QC Code: __ Matrix: Soil Tag ID: 1506-2-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 251

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 14:35
End __/__/__ ____:____

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9-aliquot,

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 3 QC Code: __ Matrix: Soil Tag ID: 1506-3-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 248

External Sample Number: _____

Expected Conc: Circle One (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 14:45
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot,

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 4 QC Code: __ Matrix: Soil Tag ID: 1506-4-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 245

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 14:55
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9-aliquot,

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 5 QC Code: __ Matrix: Soil Tag ID: 1506-5-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 242

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 15:10
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9-aliquot,

Creek sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 6 QC Code: __ Matrix: Soil Tag ID: 1506-6-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 239

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Start 4/29/02 15:25
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot,

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 7 QC Code: __ Matrix: Soil Tag ID: 1506-7-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 236

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 15:35
End __/__/__ ____:____

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 **Sample Number:** 8 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1506-8-__

Activity Number: ERN15 **Activity Leader:** Nold, Eric

Activity Desc: Sentinel Wood Treating Co. sediment sampling

Location: Ava **State:** Missouri **Type:** Superfund

Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Cell 233

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)

Start 4/29/02 15:45

End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 9 QC Code: __ Matrix: Soil Tag ID: 1506-9-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 230

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 15:55
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot,

Creek Sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 10 QC Code: __ Matrix: Soil Tag ID: 1506-10-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 227

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 16:05
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot,

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 11 QC Code: __ Matrix: Soil Tag ID: 1506-11-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 224

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 16:25
End __/__/__ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 12 QC Code: __ Matrix: Soil Tag ID: 1506-12-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 221

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 16:50
End __/__/__ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 13 QC Code: __ Matrix: Soil Tag ID: 1506-13-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 218

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 17:05
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot,

creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 14 QC Code: __ Matrix: Soil Tag ID: 1506-14-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 215

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 12:15
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 15 QC Code: __ Matrix: Soil Tag ID: 1506-15-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 212

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 17:25
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9-aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 16 QC Code: __ Matrix: Soil Tag ID: 1506-16-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 209

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 17:50
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: ~~20~~ 16 SP QC Code: FD Matrix: Soil Tag ID: 1506-~~28~~ 16 SP-4-29-0 FD

Activity Number: ERN15 Activity Leader: Nold, Eric

Activity Desc: Sentinel Wood Treating Co. sediment sampling

Location: Ava State: Missouri Type: Superfund

Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Field Duplicate of sample ~~20~~ 16 SP

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)

Start 4/29/02 17:50

End ___/___/___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

Cell 209 Field Duplicate

9-aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 17 QC Code: _ Matrix: Soil Tag ID: 1506-17-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 206

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 18:05
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek Sediment Sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 18 QC Code: __ Matrix: Soil Tag ID: 1506-18-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 203

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 18:20
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9- aliquot

Creek sediment sample

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 19 QC Code: __ Matrix: Soil Tag ID: 1506-19-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Cell 200

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/29/02 18:35
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment sample.

Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 20 QC Code: __ Matrix: Soil Tag ID: 1506-20-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Background Northwest on creek of former Lagoons

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Start 4/30/02 8:45
End __/__/__ __:__

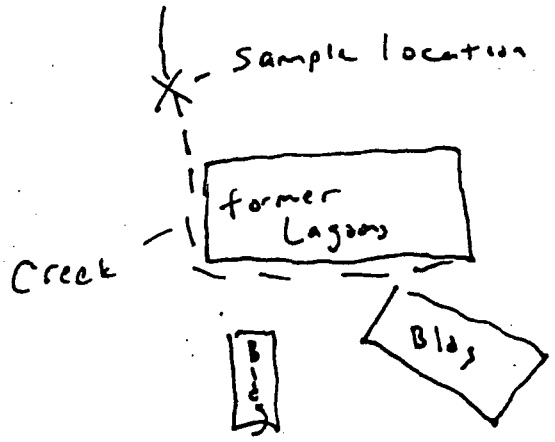
Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments:

9 aliquot

Creek sediment sample



Sample collected by: Pritchard / Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1506 Sample Number: 21 QC Code: __ Matrix: Soil Tag ID: 1506-21-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Background - Northeast on creek of former Lagoon
External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 4/30/02 9:05
End __/__/__ __:__

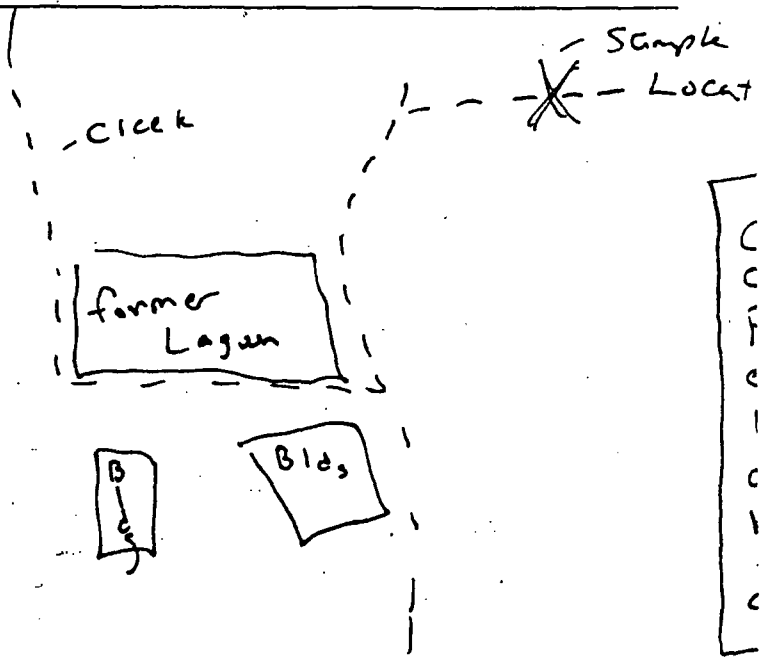
Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

9-aliquot

Creek sediment sample



Sample collected by: Pritchard / Dealy

SOIL

United States Environmental Protection Agency

Region 7 Laboratory
25 Funston Road
Kansas City, KS 66115

Date: 5/21/2002

Subject: Transmittal of Sample Analysis Results for ASR #: 1535
Activity Number: ERN16
Activity Description: Sentinel Wood Treating Co.-Res. Garden sampling

From: Michael Thomas, Associate Laboratory Director M. Thomas
Regional Laboratory, Environmental Services Division

To: Eric Nold
SUPR/EFLR

This is the sample analysis results transmittal for the above-referenced Analytical Services Request (ASR). The data contained in this transmittal have been approved by the Regional Laboratory. This transmittal contains all of the sample analysis results for this ASR. The Regional Laboratory should be notified within 14 days if any changes are needed to the contents of this report. If you have any questions, comments or data changes, please contact the Laboratory Customer Service Department at 913-551-5295.

cc: Analytical Data File

ASR Number: 1535

Summary of Activity Information
5/21/2002

Activity Leader: Nold, Eric Org: SUPR/EFLR Phone: (913) 551-7488

Activity Number: ERN16

Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling

Location: Ava State: Missouri Type: Superfund/Oil

Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Purpose: Site characterization

Explanation of Codes, Units and Qualifiers used on this report.

Sample QC Codes: QC Codes identify the type of sample for quality control purposes.

— = Field Sample

FB = Field Blank

Units: Specific units in which results are reported.

ug/kg = Micrograms per Kilogram

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank) = Values have been reviewed and found acceptable for use.

U = Not detected at or above the reportable level shown.

Activity Number: ERN16 ASR Number: 1535 Sample Information Summary

Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling 5/21/2002

Sample Number	QC Code	Matrix	Location	External Sample No.	Start Date	Start Time	End Date	End Time	Receipt Date
1	__	Soil	Morpeth property/ (0-6")		05/07/2002	14:00			05/08/2002
2	__	Soil	Morpeth garden/#1 (18-24")		05/07/2002	14:20			05/08/2002
3	__	Soil	Morpeth garden/#2 (0-6")		05/07/2002	13:20			05/08/2002
4	__	Soil	Morpeth garden/#2 (18-24")		05/07/2002	13:40			05/08/2002
5	__	Soil	Morpeth garden/#3 (0-6")		05/07/2002	14:40			05/08/2002
6	__	Soil	Morpeth garden/#3 (18-24")		05/07/2002	15:30			05/08/2002
7	__	Soil	Morpeth garden/#4 (0-6")		05/07/2002	15:20			05/08/2002
8	__	Soil	Morpeth garden/#4 (18-24")		05/07/2002	15:15			05/08/2002
9	__	Soil	Morpeth garden/#5 (0-6")		05/07/2002	16:10			05/08/2002
10	__	Soil	Morpeth garden/#5 (18-24")		05/07/2002	15:50			05/08/2002
11	__	Soil	Morpeth garden/#6 (0-6")		05/07/2002	16:35			05/08/2002
12	__	Soil	Morpeth garden/#6 (18-24")		05/07/2002	16:25			05/08/2002
13	FB	Soil	Routine soil VOA Trip Blank sample		05/07/2002	13:20			05/08/2002

Analysis	Comments About Results For This Analysis
Semi-Volatile Organic Compounds in Soil	Dilutions were necessary because of high levels of analyte compounds in sample -9. This resulted in elevated (6 times) reporting limits in sample -9.

Analysis / Analyte	Units	1-__	2-__	3-__	4-__
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	420 U	400 U	420 U	370 U
Acenaphthylene	ug/kg	420 U	400 U	420 U	370 U
Acetophenone	ug/kg	420 U	400 U	420 U	370 U
Anthracene	ug/kg	420 U	400 U	420 U	370 U
Atrazine	ug/kg	420 U	400 U	420 U	370 U
Benzaldehyde	ug/kg	420 U	400 U	420 U	370 U
Benzo(a)anthracene	ug/kg	420 U	400 U	420 U	370 U
Benzo(a)pyrene	ug/kg	420 U	400 U	420 U	370 U
Benzo(b)fluoranthene	ug/kg	420 U	400 U	420 U	370 U
Benzo(g,h,i)perylene	ug/kg	420 U	400 U	420 U	370 U
Benzo(k)fluoranthene	ug/kg	420 U	400 U	420 U	370 U
Biphenyl	ug/kg	420 U	400 U	420 U	370 U
bis(2-Chloroethoxy)methane	ug/kg	420 U	400 U	420 U	370 U
bis(2-Chloroethyl)ether	ug/kg	420 U	400 U	420 U	370 U
bis(2-Chloroisopropyl)ether	ug/kg	420 U	400 U	420 U	370 U
bis(2-Ethylhexyl)phthalate	ug/kg	420 U	400 U	420 U	370 U
4-Bromophenyl-phenylether	ug/kg	420 U	400 U	420 U	370 U
Butylbenzylphthalate	ug/kg	420 U	400 U	420 U	370 U
Caprolactam	ug/kg	420 U	400 U	420 U	370 U
Carbazole	ug/kg	420 U	400 U	420 U	370 U
4-Chloro-3-methylphenol	ug/kg	420 U	400 U	420 U	370 U
4-Chloroaniline	ug/kg	420 U	400 U	420 U	370 U
2-Chloronaphthalene	ug/kg	420 U	400 U	420 U	370 U
2-Chlorophenol	ug/kg	420 U	400 U	420 U	370 U
4-Chlorophenyl-phenylether	ug/kg	420 U	400 U	420 U	370 U
Chrysene	ug/kg	420 U	400 U	420 U	370 U
Di-n-butylphthalate	ug/kg	420 U	400 U	420 U	370 U
Di-n-octylphthalate	ug/kg	420 U	400 U	420 U	370 U
Dibenz(a,h)anthracene	ug/kg	420 U	400 U	420 U	370 U
Dibenzofuran	ug/kg	420 U	400 U	420 U	370 U
3,3'-Dichlorobenzidine	ug/kg	420 U	400 U	420 U	370 U
2,4-Dichlorophenol	ug/kg	420 U	400 U	420 U	370 U
Diethylphthalate	ug/kg	420 U	400 U	420 U	370 U
2,4-Dimethylphenol	ug/kg	420 U	400 U	420 U	370 U
Dimethylphthalate	ug/kg	420 U	400 U	420 U	370 U
4,6-Dinitro-2-methylphenol	ug/kg	1100 U	1000 U	1100 U	940 U
2,4-Dinitrophenol	ug/kg	1100 U	1000 U	1100 U	940 U
2,4-Dinitrotoluene	ug/kg	420 U	400 U	420 U	370 U
2,6-Dinitrotoluene	ug/kg	420 U	400 U	420 U	370 U
Fluoranthene	ug/kg	420 U	400 U	420 U	370 U
Fluorene	ug/kg	420 U	400 U	420 U	370 U
Hexachlorobenzene	ug/kg	420 U	400 U	420 U	370 U
Hexachlorobutadiene	ug/kg	420 U	400 U	420 U	370 U
Hexachlorocyclopentadiene	ug/kg	420 U	400 U	420 U	370 U
Hexachloroethane	ug/kg	420 U	400 U	420 U	370 U
Indeno(1,2,3-cd)pyrene	ug/kg	420 U	400 U	420 U	370 U
Isophorone	ug/kg	420 U	400 U	420 U	370 U
2-Methylnaphthalene	ug/kg	420 U	400 U	420 U	370 U
2-Methylphenol	ug/kg	420 U	400 U	420 U	370 U

Analysis / Analyte	Units	1-__	2-__	3-__	4-__
4-Methylphenol	ug/kg	420 U	400 U	420 U	370 U
Naphthalene	ug/kg	420 U	400 U	420 U	370 U
2-Nitroaniline	ug/kg	1100 U	1000 U	1100 U	940 U
3-Nitroaniline	ug/kg	1100 U	1000 U	1100 U	940 U
4-Nitroaniline	ug/kg	1100 U	1000 U	1100 U	940 U
Nitrobenzene	ug/kg	420 U	400 U	420 U	370 U
2-Nitrophenol	ug/kg	420 U	400 U	420 U	370 U
4-Nitrophenol	ug/kg	1100 U	1000 U	1100 U	940 U
N-nitroso-di-n-propylamine	ug/kg	420 U	400 U	420 U	370 U
N-nitrosodiphenylamine	ug/kg	420 U	400 U	420 U	370 U
Pentachlorophenol	ug/kg	1100 U	1000 U	1100 U	940 U
Phenanthrene	ug/kg	420 U	400 U	420 U	370 U
Phenol	ug/kg	420 U	400 U	420 U	370 U
Pyrene	ug/kg	420 U	400 U	420 U	370 U
2,4,5-Trichlorophenol	ug/kg	1100 U	1000 U	1100 U	940 U
2,4,6-Trichlorophenol	ug/kg	420 U	400 U	420 U	370 U
VOCs in Solid Matrices by GC/MS					
Acetone	ug/kg	13 U	12 U	13 U	11 U
Benzene	ug/kg	13 U	12 U	13 U	11 U
Bromodichloromethane	ug/kg	13 U	12 U	13 U	11 U
Bromoform	ug/kg	13 U	12 U	13 U	11 U
Bromomethane	ug/kg	13 U	12 U	13 U	11 U
2-Butanone	ug/kg	13 U	12 U	13 U	11 U
Carbon Disulfide	ug/kg	13 U	12 U	13 U	11 U
Carbon Tetrachloride	ug/kg	13 U	12 U	13 U	11 U
Chlorobenzene	ug/kg	13 U	12 U	13 U	11 U
Chloroethane	ug/kg	13 U	12 U	13 U	11 U
Chloroform	ug/kg	13 U	12 U	13 U	11 U
Chloromethane	ug/kg	13 U	12 U	13 U	11 U
Cyclohexane	ug/kg	13 U	12 U	13 U	11 U
1,2-Dibromo-3-Chloropropane	ug/kg	13 U	12 U	13 U	11 U
Dibromochloromethane	ug/kg	13 U	12 U	13 U	11 U
1,2-Dibromoethane	ug/kg	13 U	12 U	13 U	11 U
1,2-Dichlorobenzene	ug/kg	13 U	12 U	13 U	11 U
1,3-Dichlorobenzene	ug/kg	13 U	12 U	13 U	11 U
1,4-Dichlorobenzene	ug/kg	13 U	12 U	13 U	11 U
Dichlorodifluoromethane	ug/kg	13 U	12 U	13 U	11 U
1,1-Dichloroethane	ug/kg	13 U	12 U	13 U	11 U
1,2-Dichloroethane	ug/kg	13 U	12 U	13 U	11 U
1,1-Dichloroethene	ug/kg	13 U	12 U	13 U	11 U
cis-1,2-Dichloroethene	ug/kg	13 U	12 U	13 U	11 U
trans-1,2-Dichloroethene	ug/kg	13 U	12 U	13 U	11 U
1,2-Dichloropropane	ug/kg	13 U	12 U	13 U	11 U
cis-1,3-Dichloropropene	ug/kg	13 U	12 U	13 U	11 U
trans-1,3-Dichloropropene	ug/kg	13 U	12 U	13 U	11 U
Ethyl Benzene	ug/kg	13 U	12 U	13 U	11 U
2-Hexanone	ug/kg	13 U	12 U	13 U	11 U
Isopropylbenzene	ug/kg	13 U	12 U	13 U	11 U
Methyl Acetate	ug/kg	13 U	12 U	13 U	11 U
Methyl tert-butyl ether	ug/kg	13 U	12 U	13 U	11 U

Analysis / Analyte	Units	1-__	2-__	3-__	4-__
Methylcyclohexane	ug/kg	13 U	12 U	13 U	11 U
Methylene Chloride	ug/kg	13 U	12 U	13 U	11 U
4-Methyl-2-Pentanone	ug/kg	13 U	12 U	13 U	11 U
Styrene	ug/kg	13 U	12 U	13 U	11 U
1,1,2,2-Tetrachloroethane	ug/kg	13 U	12 U	13 U	11 U
Tetrachloroethene	ug/kg	13 U	12 U	13 U	11 U
Toluene	ug/kg	13 U	12 U	13 U	11 U
1,2,4-Trichlorobenzene	ug/kg	13 U	12 U	13 U	11 U
1,1,1-Trichloroethane	ug/kg	13 U	12 U	13 U	11 U
1,1,2-Trichloroethane	ug/kg	13 U	12 U	13 U	11 U
Trichloroethene	ug/kg	13 U	12 U	13 U	11 U
Trichlorofluoromethane	ug/kg	13 U	12 U	13 U	11 U
1,1,2-Trichlorotrifluoroethane	ug/kg	13 U	12 U	13 U	11 U
Vinyl Chloride	ug/kg	13 U	12 U	13 U	11 U
total Xylene	ug/kg	13 U	12 U	13 U	11 U

Analysis / Analyte	Units	5-__	6-__	7-__	8-__
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	400 U	370 U	420 U	390 U
Acenaphthylene	ug/kg	400 U	370 U	420 U	390 U
Acetophenone	ug/kg	400 U	370 U	420 U	390 U
Anthracene	ug/kg	400 U	370 U	420 U	390 U
Atrazine	ug/kg	400 U	370 U	420 U	390 U
Benzaldehyde	ug/kg	400 U	370 U	420 U	390 U
Benzo(a)anthracene	ug/kg	400 U	370 U	420 U	390 U
Benzo(a)pyrene	ug/kg	400 U	370 U	420 U	390 U
Benzo(b)fluoranthene	ug/kg	400 U	370 U	420 U	390 U
Benzo(g,h,i)perylene	ug/kg	400 U	370 U	420 U	390 U
Benzo(k)fluoranthene	ug/kg	400 U	370 U	420 U	390 U
Biphenyl	ug/kg	400 U	370 U	420 U	390 U
bis(2-Chloroethoxy)methane	ug/kg	400 U	370 U	420 U	390 U
bis(2-Chloroethyl)ether	ug/kg	400 U	370 U	420 U	390 U
bis(2-Chloroisopropyl)ether	ug/kg	400 U	370 U	420 U	390 U
bis(2-Ethylhexyl)phthalate	ug/kg	400 U	370 U	420 U	390 U
4-Bromophenyl-phenylether	ug/kg	400 U	370 U	420 U	390 U
Butylbenzylphthalate	ug/kg	400 U	370 U	420 U	390 U
Caprolactam	ug/kg	400 U	370 U	420 U	390 U
Carbazole	ug/kg	400 U	370 U	420 U	390 U
4-Chloro-3-methylphenol	ug/kg	400 U	370 U	420 U	390 U
4-Chloroaniline	ug/kg	400 U	370 U	420 U	390 U
2-Chloronaphthalene	ug/kg	400 U	370 U	420 U	390 U
2-Chlorophenol	ug/kg	400 U	370 U	420 U	390 U
4-Chlorophenyl-phenylether	ug/kg	400 U	370 U	420 U	390 U
Chrysene	ug/kg	400 U	370 U	420 U	390 U
Di-n-butylphthalate	ug/kg	400 U	370 U	420 U	390 U
Di-n-octylphthalate	ug/kg	400 U	370 U	420 U	390 U
Dibenz(a,h)anthracene	ug/kg	400 U	370 U	420 U	390 U
Dibenzofuran	ug/kg	400 U	370 U	420 U	390 U
3,3'-Dichlorobenzidine	ug/kg	400 U	370 U	420 U	390 U
2,4-Dichlorophenol	ug/kg	400 U	370 U	420 U	390 U
Diethylphthalate	ug/kg	400 U	370 U	420 U	390 U
2,4-Dimethylphenol	ug/kg	400 U	370 U	420 U	390 U
Dimethylphthalate	ug/kg	400 U	370 U	420 U	390 U
4,6-Dinitro-2-methylphenol	ug/kg	1000 U	930 U	1100 U	990 U
2,4-Dinitrophenol	ug/kg	1000 U	930 U	1100 U	990 U
2,4-Dinitrotoluene	ug/kg	400 U	370 U	420 U	390 U
2,6-Dinitrotoluene	ug/kg	400 U	370 U	420 U	390 U
Fluoranthene	ug/kg	400 U	370 U	420 U	390 U
Fluorene	ug/kg	400 U	370 U	420 U	390 U
Hexachlorobenzene	ug/kg	400 U	370 U	420 U	390 U
Hexachlorobutadiene	ug/kg	400 U	370 U	420 U	390 U
Hexachlorocyclopentadiene	ug/kg	400 U	370 U	420 U	390 U
Hexachloroethane	ug/kg	400 U	370 U	420 U	390 U
Indeno(1,2,3-cd)pyrene	ug/kg	400 U	370 U	420 U	390 U
Isophorone	ug/kg	400 U	370 U	420 U	390 U
2-Methylnaphthalene	ug/kg	400 U	370 U	420 U	390 U
2-Methylphenol	ug/kg	400 U	370 U	420 U	390 U

Analysis / Analyte	Units	5-__	6-__	7-__	8-__
4-Methylphenol	ug/kg	400 U	370 U	420 U	390 U
Naphthalene	ug/kg	400 U	370 U	420 U	390 U
2-Nitroaniline	ug/kg	1000 U	930 U	1100 U	990 U
3-Nitroaniline	ug/kg	1000 U	930 U	1100 U	990 U
4-Nitroaniline	ug/kg	1000 U	930 U	1100 U	990 U
Nitrobenzene	ug/kg	400 U	370 U	420 U	390 U
2-Nitrophenol	ug/kg	400 U	370 U	420 U	390 U
4-Nitrophenol	ug/kg	1000 U	930 U	1100 U	990 U
N-nitroso-di-n-propylamine	ug/kg	400 U	370 U	420 U	390 U
N-nitrosodiphenylamine	ug/kg	400 U	370 U	420 U	390 U
Pentachlorophenol	ug/kg	1000 U	930 U	1100 U	990 U
Phenanthrene	ug/kg	400 U	370 U	420 U	390 U
Phenol	ug/kg	400 U	370 U	420 U	390 U
Pyrene	ug/kg	400 U	370 U	420 U	390 U
2,4,5-Trichlorophenol	ug/kg	1000 U	930 U	1100 U	990 U
2,4,6-Trichlorophenol	ug/kg	400 U	370 U	420 U	390 U
VOCs in Solid Matrices by GC/MS					
Acetone	ug/kg	12 U	11 U	13 U	12 U
Benzene	ug/kg	12 U	11 U	13 U	12 U
Bromodichloromethane	ug/kg	12 U	11 U	13 U	12 U
Bromoform	ug/kg	12 U	11 U	13 U	12 U
Bromomethane	ug/kg	12 U	11 U	13 U	12 U
2-Butanone	ug/kg	12 U	11 U	13 U	12 U
Carbon Disulfide	ug/kg	12 U	11 U	13 U	12 U
Carbon Tetrachloride	ug/kg	12 U	11 U	13 U	12 U
Chlorobenzene	ug/kg	12 U	11 U	13 U	12 U
Chloroethane	ug/kg	12 U	11 U	13 U	12 U
Chloroform	ug/kg	12 U	11 U	13 U	12 U
Chloromethane	ug/kg	12 U	11 U	13 U	12 U
Cyclohexane	ug/kg	12 U	11 U	13 U	12 U
1,2-Dibromo-3-Chloropropane	ug/kg	12 U	11 U	13 U	12 U
Dibromochloromethane	ug/kg	12 U	11 U	13 U	12 U
1,2-Dibromoethane	ug/kg	12 U	11 U	13 U	12 U
1,2-Dichlorobenzene	ug/kg	12 U	11 U	13 U	12 U
1,3-Dichlorobenzene	ug/kg	12 U	11 U	13 U	12 U
1,4-Dichlorobenzene	ug/kg	12 U	11 U	13 U	12 U
Dichlorodifluoromethane	ug/kg	12 U	11 U	13 U	12 U
1,1-Dichloroethane	ug/kg	12 U	11 U	13 U	12 U
1,2-Dichloroethane	ug/kg	12 U	11 U	13 U	12 U
1,1-Dichloroethene	ug/kg	12 U	11 U	13 U	12 U
cis-1,2-Dichloroethene	ug/kg	12 U	11 U	13 U	12 U
trans-1,2-Dichloroethene	ug/kg	12 U	11 U	13 U	12 U
1,2-Dichloropropane	ug/kg	12 U	11 U	13 U	12 U
cis-1,3-Dichloropropene	ug/kg	12 U	11 U	13 U	12 U
trans-1,3-Dichloropropene	ug/kg	12 U	11 U	13 U	12 U
Ethyl Benzene	ug/kg	12 U	11 U	13 U	12 U
2-Hexanone	ug/kg	12 U	11 U	13 U	12 U
Isopropylbenzene	ug/kg	12 U	11 U	13 U	12 U
Methyl Acetate	ug/kg	12 U	11 U	13 U	12 U
Methyl tert-butyl ether	ug/kg	12 U	11 U	13 U	12 U

Analysis / Analyte	Units	5-__	6-__	7-__	8-__
Methylcyclohexane	ug/kg	12 U	11 U	13 U	12 U
Methylene Chloride	ug/kg	12 U	11 U	13 U	12 U
4-Methyl-2-Pentanone	ug/kg	12 U	11 U	13 U	12 U
Styrene	ug/kg	12 U	11 U	13 U	12 U
1,1,2,2-Tetrachloroethane	ug/kg	12 U	11 U	13 U	12 U
Tetrachloroethene	ug/kg	12 U	11 U	13 U	12 U
Toluene	ug/kg	12 U	11 U	13 U	12 U
1,2,4-Trichlorobenzene	ug/kg	12 U	11 U	13 U	12 U
1,1,1-Trichloroethane	ug/kg	12 U	11 U	13 U	12 U
1,1,2-Trichloroethane	ug/kg	12 U	11 U	13 U	12 U
Trichloroethene	ug/kg	12 U	11 U	13 U	12 U
Trichlorofluoromethane	ug/kg	12 U	11 U	13 U	12 U
1,1,2-Trichlorotrifluoroethane	ug/kg	12 U	11 U	13 U	12 U
Vinyl Chloride	ug/kg	12 U	11 U	13 U	12 U
total Xylene	ug/kg	12 U	11 U	13 U	12 U

Analysis / Analyte	Units	9-__	10-__	11-__	12-__
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	2700 U	420 U	420 U	380 U
Acenaphthylene	ug/kg	2700 U	420 U	420 U	380 U
Acetophenone	ug/kg	2700 U	420 U	420 U	380 U
Anthracene	ug/kg	2700 U	420 U	420 U	380 U
Atrazine	ug/kg	2700 U	420 U	420 U	380 U
Benzaldehyde	ug/kg	2700 U	420 U	420 U	380 U
Benzo(a)anthracene	ug/kg	2700 U	420 U	420 U	380 U
Benzo(a)pyrene	ug/kg	2700 U	420 U	420 U	380 U
Benzo(b)fluoranthene	ug/kg	2700 U	420 U	420 U	380 U
Benzo(g,h,i)perylene	ug/kg	2700 U	420 U	420 U	380 U
Benzo(k)fluoranthene	ug/kg	2700 U	420 U	420 U	380 U
Biphenyl	ug/kg	2700 U	420 U	420 U	380 U
bis(2-Chloroethoxy)methane	ug/kg	2700 U	420 U	420 U	380 U
bis(2-Chloroethyl)ether	ug/kg	2700 U	420 U	420 U	380 U
bis(2-Chloroisopropyl)ether	ug/kg	2700 U	420 U	420 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	11000	420 U	420 U	380 U
4-Bromophenyl-phenylether	ug/kg	2700 U	420 U	420 U	380 U
Butylbenzylphthalate	ug/kg	2700 U	420 U	420 U	380 U
Caprolactam	ug/kg	2700 U	420 U	420 U	380 U
Carbazole	ug/kg	2700 U	420 U	420 U	380 U
4-Chloro-3-methylphenol	ug/kg	2700 U	420 U	420 U	380 U
4-Chloroaniline	ug/kg	2700 U	420 U	420 U	380 U
2-Chloronaphthalene	ug/kg	2700 U	420 U	420 U	380 U
2-Chlorophenol	ug/kg	2700 U	420 U	420 U	380 U
4-Chlorophenyl-phenylether	ug/kg	2700 U	420 U	420 U	380 U
Chrysene	ug/kg	2700 U	420 U	420 U	380 U
Di-n-butylphthalate	ug/kg	2700 U	420 U	420 U	380 U
Di-n-octylphthalate	ug/kg	2700 U	420 U	420 U	380 U
Dibenz(a,h)anthracene	ug/kg	2700 U	420 U	420 U	380 U
Dibenzofuran	ug/kg	2700 U	420 U	420 U	380 U
3,3'-Dichlorobenzidine	ug/kg	2700 U	420 U	420 U	380 U
2,4-Dichlorophenol	ug/kg	2700 U	420 U	420 U	380 U
Diethylphthalate	ug/kg	2700 U	420 U	420 U	380 U
2,4-Dimethylphenol	ug/kg	2700 U	420 U	420 U	380 U
Dimethylphthalate	ug/kg	2700 U	420 U	420 U	380 U
4,6-Dinitro-2-methylphenol	ug/kg	6700 U	1100 U	1100 U	970 U
2,4-Dinitrophenol	ug/kg	6700 U	1100 U	1100 U	970 U
2,4-Dinitrotoluene	ug/kg	2700 U	420 U	420 U	380 U
2,6-Dinitrotoluene	ug/kg	2700 U	420 U	420 U	380 U
Fluoranthene	ug/kg	2700 U	420 U	420 U	380 U
Fluorene	ug/kg	2700 U	420 U	420 U	380 U
Hexachlorobenzene	ug/kg	2700 U	420 U	420 U	380 U
Hexachlorobutadiene	ug/kg	2700 U	420 U	420 U	380 U
Hexachlorocyclopentadiene	ug/kg	2700 U	420 U	420 U	380 U
Hexachloroethane	ug/kg	2700 U	420 U	420 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	2700 U	420 U	420 U	380 U
Isophorone	ug/kg	2700 U	420 U	420 U	380 U
2-Methylnaphthalene	ug/kg	2700 U	420 U	420 U	380 U
2-Methylphenol	ug/kg	2700 U	420 U	420 U	380 U

Analysis / Analyte	Units	9-__	10-__	11-__	12-__
4-Methylphenol	ug/kg	2700 U	420 U	420 U	380 U
Naphthalene	ug/kg	2700 U	420 U	420 U	380 U
2-Nitroaniline	ug/kg	6700 U	1100 U	1100 U	970 U
3-Nitroaniline	ug/kg	6700 U	1100 U	1100 U	970 U
4-Nitroaniline	ug/kg	6700 U	1100 U	1100 U	970 U
Nitrobenzene	ug/kg	2700 U	420 U	420 U	380 U
2-Nitrophenol	ug/kg	2700 U	420 U	420 U	380 U
4-Nitrophenol	ug/kg	6700 U	1100 U	1100 U	970 U
N-nitroso-di-n-propylamine	ug/kg	2700 U	420 U	420 U	380 U
N-nitrosodiphenylamine	ug/kg	2700 U	420 U	420 U	380 U
Pentachlorophenol	ug/kg	6700 U	1100 U	1100 U	970 U
Phenanthrene	ug/kg	2700 U	420 U	420 U	380 U
Phenol	ug/kg	2700 U	420 U	420 U	380 U
Pyrene	ug/kg	2700 U	420 U	420 U	380 U
2,4,5-Trichlorophenol	ug/kg	6700 U	1100 U	1100 U	970 U
2,4,6-Trichlorophenol	ug/kg	2700 U	420 U	420 U	380 U
VOCs in Solid Matrices by GC/MS					
Acetone	ug/kg	14 U	13 U	13 U	12 U
Benzene	ug/kg	14 U	13 U	13 U	12 U
Bromodichloromethane	ug/kg	14 U	13 U	13 U	12 U
Bromoform	ug/kg	14 U	13 U	13 U	12 U
Bromomethane	ug/kg	14 U	13 U	13 U	12 U
2-Butanone	ug/kg	14 U	13 U	13 U	12 U
Carbon Disulfide	ug/kg	14 U	13 U	13 U	12 U
Carbon Tetrachloride	ug/kg	14 U	13 U	13 U	12 U
Chlorobenzene	ug/kg	14 U	13 U	13 U	12 U
Chloroethane	ug/kg	14 U	13 U	13 U	12 U
Chloroform	ug/kg	14 U	13 U	13 U	12 U
Chloromethane	ug/kg	14 U	13 U	13 U	12 U
Cyclohexane	ug/kg	14 U	13 U	13 U	12 U
1,2-Dibromo-3-Chloropropane	ug/kg	14 U	13 U	13 U	12 U
Dibromochloromethane	ug/kg	14 U	13 U	13 U	12 U
1,2-Dibromoethane	ug/kg	14 U	13 U	13 U	12 U
1,2-Dichlorobenzene	ug/kg	14 U	13 U	13 U	12 U
1,3-Dichlorobenzene	ug/kg	14 U	13 U	13 U	12 U
1,4-Dichlorobenzene	ug/kg	14 U	13 U	13 U	12 U
Dichlorodifluoromethane	ug/kg	14 U	13 U	13 U	12 U
1,1-Dichloroethane	ug/kg	14 U	13 U	13 U	12 U
1,2-Dichloroethane	ug/kg	14 U	13 U	13 U	12 U
1,1-Dichloroethene	ug/kg	14 U	13 U	13 U	12 U
cis-1,2-Dichloroethene	ug/kg	14 U	13 U	13 U	12 U
trans-1,2-Dichloroethene	ug/kg	14 U	13 U	13 U	12 U
1,2-Dichloropropane	ug/kg	14 U	13 U	13 U	12 U
cis-1,3-Dichloropropene	ug/kg	14 U	13 U	13 U	12 U
trans-1,3-Dichloropropene	ug/kg	14 U	13 U	13 U	12 U
Ethyl Benzene	ug/kg	14 U	13 U	13 U	12 U
2-Hexanone	ug/kg	14 U	13 U	13 U	12 U
Isopropylbenzene	ug/kg	14 U	13 U	13 U	12 U
Methyl Acetate	ug/kg	14 U	13 U	13 U	12 U
Methyl tert-butyl ether	ug/kg	14 U	13 U	13 U	12 U

Analysis / Analyte	Units	9-__	10-__	11-__	12-__
Methylcyclohexane	ug/kg	14 U	13 U	13 U	12 U
Methylene Chloride	ug/kg	14 U	13 U	13 U	12 U
4-Methyl-2-Pentanone	ug/kg	14 U	13 U	13 U	12 U
Styrene	ug/kg	14 U	13 U	13 U	12 U
1,1,2,2-Tetrachloroethane	ug/kg	14 U	13 U	13 U	12 U
Tetrachloroethene	ug/kg	14 U	13 U	13 U	12 U
Toluene	ug/kg	14 U	13 U	13 U	12 U
1,2,4-Trichlorobenzene	ug/kg	14 U	13 U	13 U	12 U
1,1,1-Trichloroethane	ug/kg	14 U	13 U	13 U	12 U
1,1,2-Trichloroethane	ug/kg	14 U	13 U	13 U	12 U
Trichloroethene	ug/kg	14 U	13 U	13 U	12 U
Trichlorofluoromethane	ug/kg	14 U	13 U	13 U	12 U
1,1,2-Trichlorotrifluoroethane	ug/kg	14 U	13 U	13 U	12 U
Vinyl Chloride	ug/kg	14 U	13 U	13 U	12 U
total Xylene	ug/kg	14 U	13 U	13 U	12 U

Analysis / Analyte	Units	13-FB
VOCs in Solid Matrices by GC/MS		
Acetone	ug/kg	11 U
Benzene	ug/kg	11 U
Bromodichloromethane	ug/kg	11 U
Bromoform	ug/kg	11 U
Bromomethane	ug/kg	11 U
2-Butanone	ug/kg	11 U
Carbon Disulfide	ug/kg	11 U
Carbon Tetrachloride	ug/kg	11 U
Chlorobenzene	ug/kg	11 U
Chloroethane	ug/kg	11 U
Chloroform	ug/kg	11 U
Chloromethane	ug/kg	11 U
Cyclohexane	ug/kg	11 U
1,2-Dibromo-3-Chloropropane	ug/kg	11 U
Dibromochloromethane	ug/kg	11 U
1,2-Dibromoethane	ug/kg	11 U
1,2-Dichlorobenzene	ug/kg	11 U
1,3-Dichlorobenzene	ug/kg	11 U
1,4-Dichlorobenzene	ug/kg	11 U
Dichlorodifluoromethane	ug/kg	11 U
1,1-Dichloroethane	ug/kg	11 U
1,2-Dichloroethane	ug/kg	11 U
1,1-Dichloroethene	ug/kg	11 U
cis-1,2-Dichloroethene	ug/kg	11 U
trans-1,2-Dichloroethene	ug/kg	11 U
1,2-Dichloropropane	ug/kg	11 U
cis-1,3-Dichloropropene	ug/kg	11 U
trans-1,3-Dichloropropene	ug/kg	11 U
Ethyl Benzene	ug/kg	11 U
2-Hexanone	ug/kg	11 U
Isopropylbenzene	ug/kg	11 U
Methyl Acetate	ug/kg	11 U
Methyl tert-butyl ether	ug/kg	11 U
Methylcyclohexane	ug/kg	11 U
Methylene Chloride	ug/kg	11 U
4-Methyl-2-Pentanone	ug/kg	11 U
Styrene	ug/kg	11 U
1,1,2,2-Tetrachloroethane	ug/kg	11 U
Tetrachloroethene	ug/kg	11 U
Toluene	ug/kg	11 U
1,2,4-Trichlorobenzene	ug/kg	11 U
1,1,1-Trichloroethane	ug/kg	11 U
1,1,2-Trichloroethane	ug/kg	11 U
Trichloroethene	ug/kg	11 U
Trichlorofluoromethane	ug/kg	11 U
1,1,2-Trichlorotrifluoroethane	ug/kg	11 U
Vinyl Chloride	ug/kg	11 U
total Xylene	ug/kg	11 U

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Eric Nold	Sentinel Wood Treating	01 / 05 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE	BOTTLE	8-oz jar BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS-PER SAMPLE NUMBER										
N16-1535-1				✓ 1	✓ 1		✓				
-2				✓ 1	✓ 1		✓				
-3				✓ 1	✓ 1		✓				
-4				✓ 1	✓ 1		✓				
-5				✓ 1	✓ 1		✓				
-6				✓ 1	✓ 1 (6 vials)		✓				VOA's 5/7/02 → *Note: Triple volume for MS/MSD
-7				✓ 1	✓ 1		✓				
-8				✓ 1	✓ 1		✓				
-9				✓ 1	✓ 1		✓				
-10				✓ 1	✓ 1		✓				
-11				✓ 1	✓ 1		✓				
-12				✓ 1	✓ 1		✓				
-13-FB					✓ 1		✓				

Complete
Susan R. Dealy
5/7/02

Chr. Imp. Acid
bot. 3-5 c.

DESCRIPTION OF SHIPMENT

____ PIECE(S) CONSISTING OF ____ BOX(ES)

X ICE CHEST(S): OTHER ____

MODE OF SHIPMENT

____ COMMERCIAL CARRIER: ____

____ COURIER

X SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Susan R. Dealy ☐ SEALED ☒ UNSEALED	5/8/02	1315	Micah Rebla ☐ SEALED ☒ UNSEALED	Analysis
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 Sample Number: 1 QC Code: __ Matrix: Soil Tag ID: 1535-1-__

Activity Number: ERN16 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: The Morpeth's, j #1, 0-6"
External Sample Number: _____

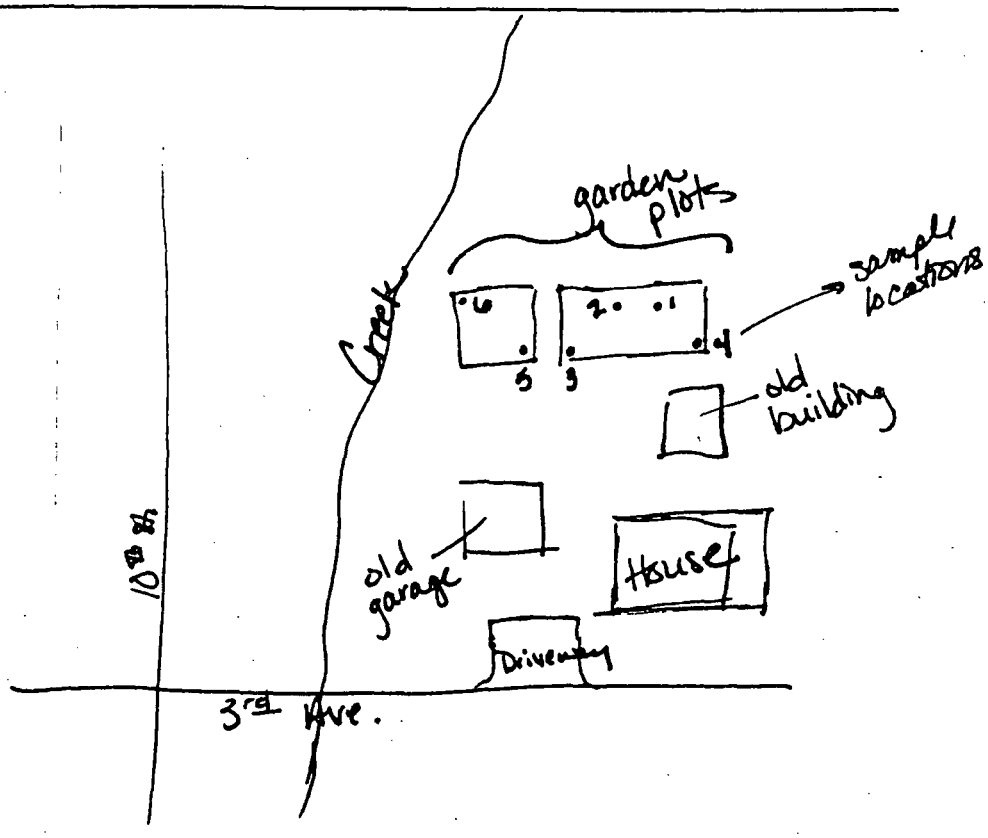
Expected Conc: Circle One: Low Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 5/7/02 14:00
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:
Kelly Morpeth



Sample collected by: ~~T. Faile~~ Dealy & Hodge

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 2 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-2-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #1, 18-24"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 5/7/02 14:20
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: T. Faile

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 3 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-3-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric

Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling

Location: Ava **State:** Missouri **Type:** Superfund

Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #2, 0-6"

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)

Start 5/7/02 13:20

End ___/___/___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 Sample Number: 4 QC Code: __ Matrix: Soil Tag ID: 1535-4-__

Activity Number: ERN16 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Morpeth garden, #2, 18-24"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High

		Date	Time (24 Hr)
Latitude: ___ ___ ___	Sample Collection: Start	5/7/02	13:40
Longitude: ___ ___ ___	End	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 5 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-5-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #3, 0-6"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 5/7/02 14:40
End __/__/__ __:__

Laboratory Analyses:

Container	*Preservative*	*Holding Time*	*Analysis*
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 Sample Number: 6 QC Code: __ Matrix: Soil Tag ID: 1535-6-__

Activity Number: ERN16 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Morpeth garden, #3, 18-24"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 5/7/02 15:30
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Triple volume for VOAs (for MS/MSD)

Sample collected by: ~~T. Fatte~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 7 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-7-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #4, 0-6"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High

		Date	Time (24 Hr)
Latitude: ___ ___ ___	**Sample Collection:** Start	5/7/02	15:20
Longitude: ___ ___ ___	End	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 8 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-8-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #4, 18-24"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 5/7/02 15:15
End __/__/__ ____:____

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 9 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-9-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric

Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling

Location: Ava **State:** Missouri **Type:** Superfund

Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #5, 0-6"

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)

Start 5/7/02 16:10

End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Deely

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 10 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1535-10-__

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Morpeth garden, #5, 18-24"

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 5/7/02 15:50
End __/__/__ ____:____

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 Sample Number: 11 QC Code: __ Matrix: Soil Tag ID: 1535-11-__

Activity Number: ERN16 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Morpeth garden, #16, 0-6"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Date Time (24 Hr)
Start 5/7/02 16:35
End ___/___/___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 Sample Number: 12 QC Code: __ Matrix: Soil Tag ID: 1535-12-__

Activity Number: ERN16 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Morpeth garden, #6, 18-24"
External Sample Number: _____

Expected Conc: Circle One: Low Medium High

		Date	Time (24 Hr)
Latitude: ___ ___ ___	Sample Collection: Start	5/7/02	16:25
Longitude: ___ ___ ___	End	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil

Sample Comments:

Sample collected by: ~~T. Feile~~ Hodge & Dealy

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1535 **Sample Number:** 13 **QC Code:** FB **Matrix:** Soil **Tag ID:** 1535-13-FB

Activity Number: ERN16 **Activity Leader:** Nold, Eric
Activity Desc: Sentinel Wood Treating Co.-Res. Garden sampling
Location: Ava **State:** Missouri **Type:** Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. **Site ID:** 07YD **Site OU:**

Location Desc: Routine soil VOA Trip Blank sample

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ____ ____ ____

Longitude: ____ ____ ____

Sample Collection: **Date** **Time** (24 Hr)
Start 5/7/02 13:20
End __/__/__ ____:____

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	14 Days	VOCs in Solid Matrices by GC/MS

Sample Comments:

Sample collected by: ~~T. Faile~~ Hodge & Dealy

GROUNDWATER

United States Environmental Protection Agency

Region 7 Laboratory
25 Funston Road
Kansas City, KS 66115

Date: 5/24/2002

Subject: Transmittal of Sample Analysis Results for ASR #: 1521
Activity Number: ERN15
Activity Description: Sentinel Wood Treating Co. sediment sampling

From: Michael Thomas, Associate Laboratory Director
Regional Laboratory, Environmental Services Division

To: Eric Nold
SUPR/EFLR

This is the sample analysis results transmittal for the above-referenced Analytical Services Request (ASR). The data contained in this transmittal have been approved by the Regional Laboratory. This transmittal contains all of the sample analysis results for this ASR. The Regional Laboratory should be notified within 14 days if any changes are needed to the contents of this report. If you have any questions, comments or data changes, please contact the Laboratory Customer Service Department at 913-551-5295.

cc: Analytical Data File

ASR Number: 1521

Summary of Activity Information
5/24/2002

Activity Leader: Nold, Eric Org: SUPR/EFLR Phone: (913) 551-7488
Activity Number: ERN15
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund/Oil
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:
Purpose: Site characterization

Explanation of Codes, Units and Qualifiers used on this report.

Sample QC Codes: QC Codes identify the type of sample for quality control

__ = Field Sample

Units: Specific units in which results are reported.

pg/L = Picograms per Liter
ug/L = Micrograms per Liter

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank) = Values have been reviewed and found acceptable for use.
U = Not detected at or above the reportable level shown.

Activity Number: ERN15 ASR Number: 1521 Sample Information Summary

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/24/2002

Sample Numbe	QC Code	Matrix	Location	External Sample No.	Start Date	Start Time	End Date	End Time	Receipt Date
1	-	Water	Williams house/Sample collected from spicket next to front door		04/30/2002	9:30			05/01/2002

Analysis	Comments About Results For This Analysis
Herbicides in Drinking Water by GC/EC	The contract laboratory extracted the sample outside the holding time (< 24 hours). All extracts were analyzed well within their applicable holding time. Since the sample was non-detect and all applicable QC data were acceptable, no data were qualified.

Activity Number: ERN15 ASR Number: 1521 RLAB Approved Sample Analysis Results

Activity Desc: Sentinel Wood Treating Co. sediment sampling 5/24/2002

Analysis / Analyte	Units	1-__	
Herbicides in Drinking Water by GC/EC			
Pentachlorophenol	ug/L	0.04	U
PCDD/PCDF in Water by GC/HRMS			
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/L	9.84	U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/L	49.2	U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/L	49.2	U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/L	49.2	U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/L	49.2	U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/L	49.2	U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	pg/L	98.4	U
2,3,7,8-Tetrachlorodibenzo-p-furan	pg/L	9.84	U
1,2,3,7,8-Pentachlorodibenzo-p-furan	pg/L	49.2	U
2,3,4,7,8-Pentachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	pg/L	49.2	U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	pg/L	49.2	U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	pg/L	98.4	U
2,3,7,8-Dioxin Total Equivalents	pg/L	0	U

Activity# ERNIS
ISR # 1521

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Eric Nold / Ted Faile	Sentinel Wood Treating Co. Sediment Sampling	30 / 04 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE (VOA-2)	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
1521-1		2				X					PCDF/PCDD in Water
											SVOCs in Water

Complete
4-3-02

Ch. Temp. Rec'd
bet. 3-5°C

DESCRIPTION OF SHIPMENT

2 PIECE(S) CONSISTING OF _____ BOX(ES)

1 ICE CHEST(S); OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER: _____

_____ COURIER

X SAMPLER CONVEYED

_____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED UNSEALED X	5/1/02	9:15A	Nicole Cobb SEALED UNSEALED X	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED UNSEALED			SEALED UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED UNSEALED			SEALED UNSEALED	

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1521 Sample Number: 1 QC Code: __ Matrix: Water Tag ID: 1521-1-__

Activity Number: ERN15 Activity Leader: Nold, Eric
Activity Desc: Sentinel Wood Treating Co. sediment sampling
Location: Ava State: Missouri Type: Superfund
Superfund Name: Sentinel Wood Treating Co. Inc. Site ID: 07YD Site OU:

Location Desc: Williams House - Spicket next to front door
External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High
Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: Start 4/30/02 9:30 End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - ~~1 Liter~~ 250 amber glass	4 Deg C	365 Days	PCDD/PCDF in Water by GC/HRMS
1 - 128oz amber glass	4 Deg C, HCL to pH<2, sodium sulfite	14 Days	~~Semi Volatiles in~~ Herbicides in Drinking Water by GC/MS (PCP only)

Sample Comments:

- Well on behind Northside house

- Purged for 5 minutes

pH: 6.5

temp: } Could not be determined
Cond:
turb:

Sample collected by: Pritchard / Dealy