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Final ~~Draft~~

Step 7
Risk Characterization
Ecological Risk Assessment

Davis Timber Superfund Site,
Hattiesburg, Mississippi

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LIST OF SELECTED ABBREVIATIONS

ADD	Average daily dose
Ah	Aryl hydrocarbon
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	Alternative toxicity value
BAF	Bioaccumulation factor
BERA	Baseline ecological risk assessment
BP	Beaver Pond
BSAF	Biota-sediment accumulation factor
BW	Body weight
CCME	Canadian Council of Ministers of the Environment
CLP	Contract Laboratory Program
COPC	Chemical of potential concern
CPF	Contaminant concentration in prey item
CS	Threshold abiotic media concentration
DT	Davis Timber
DQO	Data Quality Objective
DW	Dry weight
Eco-SSL	Ecological soil screening level
EMC	East Mineral Creek
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ESAT	Environmental Services Assistance Team
ESV	Ecological screening value
GPS	Global positioning system
HQ	Hazard quotient
ILS	Integrated Laboratory Systems
LC_{50}	Concentration lethal to 50% of test population
LOAEL	Lowest-observed-adverse-effect level
MDEQ	Mississippi Department of Environmental Quality
µg/kg	micrograms/kilogram
µg/l	micrograms/liter
mg/kg	milligrams per kilogram
ND	Not detected
NFIR	Normalized food ingestion rate
NIR	Normalized ingestion rate
NSIR	Normalized soil/sediment ingestion rate
ng/kg	nanograms/kilogram
ng/l	nanograms/liter
NOAEL	No-observed-adverse-effect level
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
OSWER	Office of Solid Waste and Emergency Response
PCDD	Polychlorinated dibenzo-para-dioxin
PCDF	Polychlorinated dibenzo-furan

PCP	Pentachlorophenol
RGO	Remedial goal option
RI	Remedial Investigation
RPM	Remedial Project Manager
SLERA	Screening-level ecological risk assessment
SD	Sediment
SS	Surface soil
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEF	Toxic equivalency factor
TEQ	Toxic equivalent concentration
TOC	Total organic carbon
TRV	Toxicity reference value
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WMC	West Mineral Creek
WP	Work Plan
ww	Wet weight

7.0 RISK CHARACTERIZATION

7.1 INTRODUCTION

This risk characterization (Step 7) and accompanying documents: the screening-level ecological risk assessment (SLERA) (Steps 1 and 2) (Black & Veatch 2003); baseline ecological risk assessment (BERA) problem formulation (Step 3) (Black & Veatch 2003 and USEPA 2003); study design and data quality objectives (DQO) process (Step 4) (USEPA and ILS 2004); and site investigation and analysis phase (Step 6) (USEPA 2005a) complete the ecological risk assessment (ERA) process for the Davis Timber Site in Hattiesburg, Mississippi. The final Step of the 8-Step ERA process is Risk Management which is the sole responsibility of the site risk manager. This final Step is a distinctly differently process from risk assessment (USEPA 1997). The history and operational activities performed at the site have been fully discussed in the SLERA and accompanying documents and will not be repeated in this section.

Risk characterization is the final phase of the ecological risk assessment (ERA) process for the Davis Timber Site, Hattiesburg, Mississippi. It includes two major components: 1) risk estimation, and 2) risk description (USEPA 1998, 1997). Risk estimation consists of integrating the exposure profiles with the exposure-effects information and summarizing the associated uncertainties; and the risk description provides information important for interpreting the risk results. Risk characterization is the culmination of the planning, problem formulation, and analysis of predicted or observed adverse ecological effects related to the assessment endpoints. It is also the starting point for risk management considerations and the foundation for regulatory decision-making (USEPA 1998, 1997). Risk characterization combines data concerning exposure to chemicals with information concerning the ecological effects of the chemicals to estimate risks. It is performed by the weight of evidence and has the goal of clearly communicating the strengths and limitations of the risk assessment for use in decision-making. This is achieved through the values of "transparency in the risk assessment process, clarity, consistency, and reasonableness (USEPA 2001)."

For this risk characterization, several lines of evidence were used to evaluate the risks to wildlife and plant communities which may be present at the site. Data from a field sampling event conducted in July 2004 were used in this risk characterization. All of the available data from chemical analyses, toxicity and bioaccumulation tests, field observations and field measurements were used to estimate the likelihood that significant ecological effects are occurring or will occur at the Davis Timber Site, and to describe the nature, magnitude, and extent of the effects on the designated assessment endpoints (Suter 1996). Analytical data from the July 2004 sampling event used for the preparation of this risk characterization are provided in Step 6 of the risk assessment, and summaries of the data are found in tables in this document. A general map of the state showing the location of the Davis

Timber Site and vicinity is provided in Figure 7-1. The surface soil, sediment, surface water, and fish sampling locations are presented in Figures 7-2 through 7-4.

In addition, personnel from the Mississippi Department of Environmental Quality (MDEQ) collected fish samples in Country Club Lake in February 2004, and requested EPA to process and analyze these fish samples for dioxins/furans. The results of the fish sample analysis are discussed as part of this risk assessment. Two additional sediment samples collected in October 2005 after Hurricane Katrina hit the Gulf Coast will also be evaluated in this risk assessment.

The chemicals of potential concern (COPCs) retained in surface soil, freshwater sediment, and freshwater surface water in the BERA are pentachlorophenol (PCP) and dioxins/furans. The term "dioxin" will be used in this risk assessment to include all of the family of substituted polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs). In this risk characterization, toxic equivalent (TEQ) concentrations were calculated for dioxins/furan congeners based on the procedure of van den Berg *et al.* (1998) as shown in Appendix A. Toxic equivalent concentrations were calculated for birds, fish, and mammals. Toxic equivalent factors (TEF) are applied to the various congener concentrations and summed to obtain a TEQ. The TEFs are based on the relative potency to the most potent congener 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Although the TEF approach is based on toxic response to organisms, this approach is applied to abiotic media to allow comparison between the samples. For this ERA, nondetected (ND) congeners were included in the TEQ as if they were detected so risk will not be underestimated. However, there was some blank contamination, so some of the detection limits for the nondetected congeners may be elevated. The data are all usable except for the soil reference sample. The congener, 1,2,3,4,7,8 hexachlorodibenzofuran, was qualified with an "R" (i.e., rejected), so the TEQ was qualified with an "R." This sample will be discussed in further detail later in the risk characterization. All of the additional data collected in the July 2004 sampling event were reviewed prior to this step (Step 7) of the ERA. No additional chemicals were determined to be of potential ecological concern at the site.

The site investigation (Step 6) was performed by Environmental Protection Agency (EPA) personnel and EPA Region 4 Environmental Services Assistance Team (ESAT) contractors. The EPA Remedial Project Manager (RPM) and personnel from MDEQ assisted in the field work. Field work was conducted during the last week in July 2004.

Minor deviations from the Work Plan (WP) occurred during the site investigation. The deviations

and the reasons are discussed below:

• Soil: The WP specified that on-site soil would be collected at three sampling locations for toxicity and bioaccumulation testing. These stations were found in Grids 2, 4, and 39. Grid Number 4 had overlying water, so this sample was treated as a sediment sample for sediment toxicity and bioaccumulation testing (i.e., Station DT-SS-B/T-04 became DT-SD-B/T-05, and its duplicate DT-SS-504 became DT-SD-504).

• Sediment: The WP specified that four sediment samples would be collected in East Mineral Creek. However, the upper drainage was dry, so the proposed Station DT-EMC-SD6 was not sampled. The other stations identified in the WP were sampled. An additional sample was collected at a Beaver Pond on site (Grid 43).

• Fish: The WP specified that fish would be collected in East Mineral Creek, if conditions permitted. However, no fish were found in East Mineral Creek. Fish samples were collected on-site at a Beaver Pond location (Grid 43), which was not specified in the WP.

Both terrestrial and aquatic receptors are likely to be at risk from exposure to the COPCs at the site. The critical receptors in the terrestrial habitats include invertebrates, plants, mammalian, and avian wildlife species. Aquatic receptors likely to be at risk include fish, benthivorous, piscivorous, and herbivorous wildlife species. The terrestrial habitats at the site include the mixed pine/hardwood forest areas north and east of the site ant terrestrial areas surrounding the site. The three basic types of aquatic habitats of concern were identified at the site include, wetland habitat; the intermittent and perennial riverine habitat (includes Mineral Creek, East Mineral Creek and West Mineral Creek); and Lacustrine habitat (includes a small on-site pond, a pond south of the site, Country Club Estates Lake, and a lake located on the property of Dr. Tom Phillips, hereafter referred to as Phillips' Lake). Several threatened and/or endangered species of concern have distributions that lie within Lamar County, Mississippi.

7.2 RISK ESTIMATION

Risk estimation integrates the exposure profiles with the exposure-effects information and summarizes the associated uncertainties. Documentation of risk estimates describes how inferences are made from the measurement endpoints to the assessment endpoints. All of the chemical analyses data used in this risk estimation are provided in Table 7-1. Data from the Remedial Investigation (RI) were also used to estimate risk when appropriate. Step 6 contains a complete set of the original

data (USEPA 2005a).

7.2.1 Assessment Endpoint No. 1 - Protection of Soil Invertebrates

The risk questions developed for this assessment endpoint include the following:

1. Are the COPC concentrations in the site soils elevated enough in comparison to soil benchmark values and reference station to cause a reduction in the survival, growth, and/or reproduction of soil-dwelling invertebrate species?
2. Do toxicity tests show that PCP concentrations in the site soils are high enough to cause mortality to soil invertebrates?
3.

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of the site soils;
2. Soil benchmark values; and
3. Earthworm, *Eisenia foetida*, acute toxicity tests.

The lines of evidence considered for the evaluation of risks to soil invertebrates include results of *E. foetida* acute toxicity tests and calculation of hazard quotients (HQ) from comparison of surface soil data using mean and maximum contaminant concentrations with benchmark values. The soil sampling locations for July 2004 sampling event are provided in Figure 7-2.

Risk Evaluation Using Soil Benchmark Values

Soil benchmark values were used in conjunction with the average and maximum COPC concentrations in order to calculate HQs as estimates of risk to soil invertebrates. The HQ is defined as the contaminant concentration divided by a toxicological benchmark value. An HQ value of one or greater indicates that there is a potential for unacceptable risks to soil invertebrates, and an HQ value of less than one, indicates that the contaminant alone is unlikely to cause unacceptable risks to soil invertebrates. In the following sections the mean and maximum soil COPC concentrations are used to estimate risks to soil invertebrates. Refer to Table 7-2 for the HQ calculations.

Pentachlorophenol

The EPA developed ecological soil screening levels (Eco-SSLs) for PCP after the WP had been developed for this ERA. Therefore, the Eco-SSLs will take precedence over the alternate toxicity value (ATV) selected in the WP, which was the Canadian Government soil benchmark value of 7.6 milligrams per kilogram (mg/kg) (CCME 1999). It must be noted here that the Eco-SSLs represent initial screening values for soils (USEPA 2005b). The Eco-SSL for the protection of soil

invertebrates is 31 mg/kg (USEPA 2005b). Four studies were used to derive the Eco-SSL for PCP at pH ranges from 5.5 to 6.7. In this risk characterization HQs were calculated for PCP by dividing the concentration from each station by the Eco-SSL benchmark value. An HQ was also calculated for the average concentration (i.e., 7 stations). The HQ calculated based on the mean (HQ = 0.7) is less than unity, which indicates that the site-wide PCP levels may not pose risks to the soil invertebrate population. Two stations (i.e. station DT-SS-07 with an HQ of 3.9 and station DT-SS-08 with an HQ of 1.1) produced HQs greater than unity. One location from the RI (i.e. DT002SLA at a concentration of 68 mg/kg) also generated an HQ greater than unity. This indicates that there may be unacceptable risks to soil invertebrates from exposure to PCP at these two stations. Refer to Table 7-2 for specific details.

The pH at Station DT-SS-07 was 7.0, which is slightly more basic than the highest pH in the experiments to derive the benchmark value (pH = 6.7). Therefore, we would expect that the PCP would be ionized to a greater degree than the PCP used in tests to derive the benchmark value. Station DT-SS-08, however, had a pH of 4.4, and we would expect that the PCP from this sample would be ionized to a lesser degree. Although the PCP at Station DT-SS-07 would be more mobile (i.e., adsorbed to soil to a lesser degree), the PCP that is available at Station DT-SS-08 would be more toxic to invertebrates since the PCP is more protonated (i.e., lipophilic) and can cross cell membranes. This is because adsorption of PCP to soils and bioavailability (hence, toxicity) are based on the degree of ionization (ATSDR 2001; Eisler 1989). It should be noted that the four studies used to derive the Eco-SSL all had a total organic content (TOC) content of 10%. However, both Station DT-SS-07 and Station DT-SS-08 had a TOC content of less than 1%. This indicates that the PCP could be more available to cause toxic effects in the site soils.

Dioxins/Furans

Dioxin TEQs based on mammalian TEFs were compared with a soil invertebrate benchmark value obtained from Reinecke and Nash (1984) to calculate HQs. In the Reinecke and Nash (1984) study, 2 species of earthworms (*Allolobophophora caliginosa* and *Lumbricus rubellus*) were exposed to 5 and 10 mg/kg of TCDD for 85 days. No adverse effects were observed in either species at the TCDD level of 5 mg/kg, but both species died at the 10 mg/kg level. Therefore, 5 mg/kg was used as the no-observed-adverse-effect level (NOAEL) benchmark for the protection of soil invertebrates. The HQs for all stations were well below unity (range HQ = 0.002 to 8.8E-06). This indicates that dioxins alone are unlikely to cause unacceptable risks to the soil invertebrates at the site. Refer to Table 7-2 for specific details.

It should be noted here that there is limited evidence to support the TCDD-like toxicity in invertebrates. Therefore, the use of mammalian TEFs and the TEQ approach in invertebrates, such as earthworms in general, may not be appropriate. Because dioxins are bioaccumulative chemicals and their mechanism of toxic action is initiated by the aryl hydrocarbon (Ah) receptor (which invertebrates are not known to possess), the higher trophic-level organisms may be at greater risk from exposure to dioxins than invertebrates (ATSDR 1998; USEPA 1993).

Risk Evaluation Using Location-Specific Data and Soil Benchmark Values

The use of the mean and maximum contaminant concentrations proved helpful in identifying the potential risks throughout the site, and to detect any hotspots that may exist at the site. However, risks at specific locations of the site may not be detected when only the mean and maximum concentrations are reviewed. It is necessary to review all of the data for specific locations at the site in order to ensure that other locations with potential unacceptable risks to the ecological receptors at the site are not missed.

Pentachlorophenol

The highest concentration of PCP was 120,000 µg/kg and was detected at location DT-SS-07. The next highest concentration was 34,000 µg/kg and was detected at location DT-SS-08, adjacent to and south of the location with the highest concentration (Figure 7-2). Based on the location-specific results, only these 2 locations out of 9 locations exceeded the soil benchmark of 31,000 µg/kg (Table 7-2). If these 2 locations are removed from this evaluation, PCP will not be a COPC in surface soil.

Dioxins/Furans

None of the dioxin TEQs exceeded the benchmark value of 5 mg/kg reported by Reinecke and Nash (1984) for soil invertebrates. This indicates that the dioxins/furans alone are unlikely to cause unacceptable risks to the soil invertebrates at the site. Refer to Table 7-2 for specific details.

Risk Evaluation Using Site-Specific Soil Toxicity Data

Soil toxicity tests were used as a measurement endpoint to assess the risks to soil invertebrates from exposure to PCP in the site soils. The main objective of the earthworm toxicity test was to evaluate the direct toxicity of PCP to earthworms.

Acute toxicity tests were performed using the lumbricid earthworm, *Eisenia foetida*, with surficial soils collected from two site locations (i.e. DT-SS-B/T-01 and DT-SS-B/T-03), one field reference location (i.e. DT-SS-REF-1), and a laboratory control soil (artificial soil). The artificial soil was

prepared using 70% sand, 20% clay, and 10% peat moss. A full scan analysis was conducted on the artificial soil to verify that is was appropriate for use as a control sample in the toxicity tests. No PCP was detected in the artificial soil and the estimated dioxin TEQ was 1.9 ng/kg, based on 1998 World Health Organization (WHO) TEFs. The TOC content of the artificial soil was 2.4%.

The sample from Station DTSSB/T-01 was diluted 50%, and this sample was identified as DT-SS-B/T-02. The soil from Station DT-SS-B/T-01 was diluted because of the expected high PCP concentration at this location as outlined in Step 4 of the ERA (USEPA and ILS 2004). The diluted sample was identified as DT-SS-B/T-02. The rationale for diluting this sample was because the RI data indicated that Grid 2 had a PCP concentration of 68 mg/kg, and the next highest PCP concentration was approximately 9 mg/kg. Therefore, it was necessary to have a mid-range concentration for the toxicity test. Dilutions were performed using the laboratory control or artificial soil as diluent. The diluted soil sample was not analyzed for PCP; however because the dilution was 50% and the soil completely homogenized, it was assumed that Sample DT-SS-B/T-02 had a concentration equal to one-half the original sample. The sampling locations of the surface soil samples used in the toxicity test are presented in Figure 7-2.

The toxicity tests were conducted using a modification of the EPA guideline EPA/600/3-88/029 (Greene *et al.*, 1989). The specific test methods and any modifications used in the tests can be found in Appendix B. The endpoint for the earthworm, *E. foetida,* toxicity test was survival. The tests were initiated within one 96 hours of sample collection. No acute effects were observed in the test samples after 14-days of exposure. Refer to Table 7-3 for a summary of the test results.

Upon receipt of the chemical analyses results (which was approximately 3 months after sample collection), it was determined that the locations with the maximum PCP concentrations were DT-SS-07 and DT-SS-08 (120 mg/kg and 34 mg/kg, respectively) and not DT-SS-01 as identified in the WP. However, samples from these 2 locations were not used in the initial toxicity or bioaccumulation tests because they were only analyzed to further characterize the site. In order to test the soils with the highest PCP concentrations, the leftover soils were retrieved from the Contract Laboratory Program (CLP) laboratories which had performed analyses on the samples (e.g., TOC, dioxins/furans, and grain size) for toxicity testing. Earthworm toxicity screen tests were then performed to determine the acute toxicity of the soils from these 2 locations.

During the initial 24 hours of the test, worms in soil sample DT-SS-07 exhibited complete soil avoidance and 100 percent mortality; therefore, a dilution series was performed using 25%, 12.5%, and 6.25% soil. The soil was diluted with the artificial soil used as laboratory control. Sample DT-

SS-08 also exhibited some avoidance behavior, but with no mortality. The results of the acute toxicity tests with *E. foetida* are presented in Table 7-3. With the exception of sample DT-SS-07 (100%) which had 0 percent survival, there was 100 percent survival of *E. foetida* in test soil DT-SS-08 and all of the dilutions of sample DT-SS-07. Laboratory control soil *E. foetida* survivorship was also 100 percent. Under the conditions of the *E. foetida* acute soil toxicity tests, the survival of *E. foetida* in Davis Timber sample DT-SS-07 was significantly different (P=0.05) from the survival of *E. foetida* in the laboratory control soil. In addition, the diluted soil was analyzed for PCP by EPA chemists, and the results are presented in Table 7-3. Raw data for the toxicity tests and analytical results are provided in Appendix C.

Summary of Risks to Soil Invertebrates

Based on the HQs calculated from the soil concentrations and the soil invertebrate benchmark values, the following locations generated HQs for PCP that were greater than or equal to one:

- PCP - Locations DT-SS-07, DT-SS-08, and DT002SLA

Based on the results of the *E. foetida* toxicity tests, the PCP concentration at location DT-SS-07 was determined to be the most likely area to cause unacceptable adverse effects to the soil invertebrates at the site. The highest concentration of PCP used in the *E. foetida* acute toxicity tests was 120 mg/kg from location DT-SS-07. The next highest concentration of PCP used in the acute *E. foetida* toxicity tests was 34 mg/kg from location DT-SS-08. The results of the toxicity tests indicated that the highest concentration of 120 mg/kg resulted in 100 percent mortality to *E. foetida*. However, there was no toxicity observed in the next highest concentration of 34 mg/kg (Table 7-3). There was not enough soil left to test any other concentrations between the 2 highest levels. Also, Station DT-SS-08 had 34 mg/kg PCP in the soil, and 100% survival rate in the earthworms. Therefore, based on the available results the NOAEL for PCP for *E. foetida* survivorship is estimated at 34 mg/kg. This concentration is comparable with the Eco-SSL of 31 mg/kg for PCP reported by the USEPA (USEPA 2005b).

7.2.2 Assessment Endpoint No. 2 - Protection of Insectivorous, Omnivorous, and Carnivorous Mammals

The risk question developed for this assessment endpoint is:

> "Are dioxin concentrations in the site soils, forage, and prey species elevated enough to cause adverse effects to the long-term health and reproductive capacity in predatory mammals?"

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of the site soils and surface water;
2. Earthworm, *E. foetida*, tissue chemical concentration data from 28-day bioaccumulation tests; and
3. Food-web model.

The line of evidence considered for the evaluation of risks to insectivorous mammals include HQs from the comparison of estimated doses to the short-tailed shrew (*Blarina brevicauda*) to NOAEL and lowest-observed-adverse-effects level (LOAEL) based toxicity reference values (TRV) using a food-web model.

HQs from Food-Web Models Using Mean and Maximum Concentrations

The measurement endpoint used to evaluate risks to insectivorous mammals is an output from a food-web model. The assumptions, methodologies, and equations used for all of the food-web models are described in the Study Design and DQO Process (Work Plan) for the Davis Timber Site (USEPA and ILS 2004). A summary of data is provided in Table 7-1, and calculations for the model are in Table 7-4A. The input parameters for the food-web models are provided in the WP (USEPA and ILS 2004). All calculations used in the food-web models are in dry weight (dw), and the TEQs are based on mammalian TEFs.

Estimation of daily doses was performed using maximum abiotic media concentrations and maximum earthworm tissue concentrations of the dioxins from the 28-day bioaccumulation study. A scenario using the average soil concentration and prey concentration is also presented. A final scenario using the third highest soil concentration (i.e., Station DT-SS-03) with the maximum prey concentration is shown in Table 7-4A. An assumption for the food-web model is that the short-tailed shrew's diet is composed of 100 percent earthworms plus an area use factor of 1. Hazard quotients were calculated using the estimated average daily doses and literature-derived TRVs. The TRVs are based on a TCDD concentration derived for mammals (Murray *et al.*, 1979) and the NOAEL and LOAEL TRVs are 0.001 and 0.01 µg/kg, respectively.

Based on the maximum soil dioxin TEQ, the maximum earthworm tissue dioxin TEQ, and the maximum surface water dioxin TEQ, the HQ for mammals based on the NOAEL and LOAEL were 331.87 and 33.2, respectively. Based on the mean soil dioxin TEQ, the mean earthworm dioxin TEQ, and the maximum surface water dioxin TEQ, the HQ for mammals based on the NOAEL and

LOAEL were 107.9 and 10.8, respectively. The third highest soil concentration scenario also produced NOAEL and LOAEL HQs greater than unity (Table 7-4A).

Summary of Risks Using HQs from Food-Web Models

The results of the HQs calculated using data from the food-web models indicate that there is potential for adverse ecological impacts to insectivorous mammals from exposure to dioxins in the site soils.

7.2.3 Assessment Endpoint No. 3 - Protection of Piscivorous Mammals

This assessment endpoint provides for the protection of piscivorous mammals to ensure that ingestion of contaminants in prey does not adversely impact the growth, reproduction, and survival. The mink (*Mustela vison*) was selected as a representative species. The conceptual model for this endpoint is the ingestion of fish from the site and vicinity, incidental ingestion of sediment, and surface water ingestion.

The risk question developed for this assessment endpoint is:

> "Do the dioxin concentrations in fish tissue exceed NOAEL and LOAEL risk-based dose levels derived from the literature?"

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of sediments and surface water for dioxins/furans;
2. Chemical analysis of fish tissue for dioxins/furans;
3. Comparison of the fish tissue concentrations with literature-derived benchmarks protective for mammals; and
4. Food-web model.

The lines of evidence considered for the evaluation of risks to piscivorous mammals include literature-derived benchmark comparisons, and comparison of estimated doses to the selected receptor (the mink) to NOAEL and LOAEL-based TRVs using a food-web model.

Dioxin Concentrations in Fish Caught at the Davis Timber Site

Fish were caught in West Mineral Creek and Beaver Pond, as well as from the reference location. The various fish species include bluegill (*Lepomis macrochirus*), dollar sunfish (*Lepomis marginatus*), warmouth (*Lepomis gulosus*), redear sunfish (*Lepomis microlophus*), and largemouth bass (*Macropterus salmoides*). The fish tissues were analyzed as composites and therefore represent

true averages. The species of fish with the maximum dioxin concentration was the redear sunfish (with maximum fish TEQ of 170.83 ng/kg dw) caught in West Mineral Creek (Table 7-1b). The locations from which the fish were caught are provided in Figure 7-4. Information regarding fish weights, size, and number of fish in each composite sample is provided in Appendix D. The fish tissue dioxin congener TEQ data are presented in Table 7-1b.

HQs Derived From Fish Tissue Concentrations and TRVs Protective to Aquatic Mammals

The EPA Office of Research and Development produced a comprehensive report on the effects of dioxins to wildlife (USEPA 1993). In this report they calculated toxicological reference values (TRV), or benchmarks, for water, fish, and sediments that relate a low or high likelihood of population failure in aquatic life (i.e., fish), aquatic birds, and wildlife (i.e., mammals). The low risk is associated with "the highest concentration that is unlikely to cause significant effects to sensitive organisms." The high risk is defined as the "lowest exposure concentration that will likely cause severe effects," which is equivalent to a concentration lethal to 50% of test organisms (LC_{50}). The sediment benchmarks were derived based on 3% TOC, and the fish benchmarks were based on 8% lipid content. All benchmarks are in wet weight (ww). Another assumption in the derivation of these benchmarks is that a biota-sediment accumulation factor (BSAF) of 0.1 was incorporated into the wildlife benchmarks, and a BSAF of 0.3 was used for the risk-to-fish benchmark. It should be noted that the benchmark values were derived based on TCDD alone, and not the TEQ approach.

All of the fish tissue dioxin concentrations at the site generated HQs greater than unity when compared with both the low risk (i.e. 0.7 ng/kg) and high risk (i.e. 7 ng/kg) to sensitive mammalian wildlife species TRVs (Table 7-5A). This indicates that there may be unacceptable risks to piscivorous mammals from consumption of the various fish species in the Beaver Pond and West Mineral Creek. Even though there was no fish caught in East Mineral Creek, the dioxin concentrations in the Creek were high and piscivorous mammals consuming fish from East Mineral Creek would also be at risk.

All of the fish samples collected from the reference locations exceeded the low risk to sensitive mammalian wildlife species TRV, but not the high risk to sensitive mammalian species TRV. Refer to Table 7-5A for specific details.

HQs Derived From Sediment Concentrations and TRVs Protective to Aquatic Mammals

The sediment benchmark values used for dioxins were the low risk and high risk TRVs for sensitive mammalian wildlife species reported by EPA (USEPA 1993). The low risk TRVs for sensitive

mammalian species is 2.5 ng/kg (which is the EPA Region 4 screening value), and the high risk value is 25 ng/kg (Table 7-6). Dioxins were detected in all of the eight site sediment stations as well as the reference station used in the risk characterization. The HQs calculated for all of the stations using these TRVs exceeded unity, except for the high risk scenario at Station DT-EMC-SD-12 (Table 7-6). The reference location generated an HQ greater than unity when compared with the low risk to sensitive mammalian species TRV but not the high risk to sensitive mammalian species TRV. Based on these comparisons, sediment at all stations, except DT-EMC-SD-12, may contain dioxin concentrations that may potentially be hazardous to aquatic mammals.

HQs from Food-Web Models Using Mean and Maximum Concentrations

Another measurement endpoint used to evaluate risks to piscivorous mammals is an output from a food-web model. Estimation of daily doses was performed using the maximum abiotic media concentrations and the individual fish species tissue concentrations. A second scenario was conducted using the average fish concentration with the maximum abiotic media concentrations. A third scenario was performed specifically for West Mineral Creek. Hazard quotients were calculated using the estimated average daily doses (ADDs) and literature-derived TRVs. An assumption for the food-web model was that the mink's diet was composed of 100 percent fish and an area use factor of 1. Refer to Table 7-1 for dioxin concentrations and Table 7-4B for model equations.

Based on the maximum sediment and surface water dioxin TEQs, and fish tissue dioxin TEQs for each species, the HQ calculated based on both the NOAEL and LOAEL were all greater than unity. The HQs ranged from 2.8 to 36.3. This indicates that there may be unacceptable risks to piscivorous mammals from consumption of fish at the site. The average of fish dioxin TEQ concentrations also generated HQs greater than unity for both the NOAEL and LOAEL (HQ = 31 and 3.1, respectively). The scenario specifically for West Mineral Creek produced a NOAEL HQ greater than unity, but the LOAEL HQ was less than 1 (i.e., HQ = 0.3). Fish caught from the reference location all generated NOAEL and LOAEL HQs less than unity. Refer to Table 7-4B for specific details.

The food-web model used for the mink assumed an incidental sediment ingestion rate of 9.4 percent. Comments received from the review of this document indicated that using the maximum sediment concentration in the model may tend to skew the results therefore the sediment ingestion was set to zero in the model. Based on the model without incidental sediment ingestion, all of the NOAEL HQs exceeded but not the LOAEL. Refer to Table 7-4B for specific details.

No fish were caught in East Mineral Creek, however, based on the high dioxin concentrations from

the RI data from this Creek tissue concentrations would be elevated if fish were present. Therefore, like Beaver Pond and West Mineral Creek, East Mineral Creek would also provide elevated HQs.

Summary of Risks Using HQs from Food-Web Models

The results of the HQs calculated using data from the food-web models indicate that there may be unacceptable risks to piscivorous mammals from exposure to dioxins/furans in the biotic and abiotic media. The following locations generated HQs greater than unity:

- Dioxins/furans - All locations of Beaver Pond, West Mineral Creek, and East Mineral Creek

7.2.4 Assessment Endpoint No. 4 - Protection of Insectivorous, Omnivorous and Carnivorous Birds

The risk question developed for this assessment endpoint is:

"Are levels of dioxins/furans in soil, surface water, and prey at the site sufficient enough to cause adverse effects to the long-term health and reproductive capacity of insectivorous, omnivorous, and carnivorous birds that may utilize the site?"

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of the site soils and surface water;
2. Chemical analysis of *E. foetida* tissue; and
3. Food-web model.

The lines of evidence considered for the evaluation of risks to insectivorous, omnivorous and carnivorous birds include HQs from the comparison of estimated daily doses to the American woodcock (*Scolopax minor*) to NOAEL- and LOAEL-based TRVs using a food-web model. The NOAEL and LOAEL TRVs for birds were 0.014 and 0.14 µg/kg, respectively (Nosek *et al.*, 1992).

HQs from Food-Web Models Using Mean and Maximum Concentrations

The measurement endpoint used to evaluate risks to insectivorous, omnivorous, and carnivorous birds is an output from a food-web model. Estimation of daily doses was performed using maximum abiotic media concentrations of dioxins and earthworm dioxin tissue concentrations, and the TEQs were based on avian TEFs. A scenario using average soil concentration and average prey concentration was also applied. An assumption for the food-web model was that the American woodcock's diet was composed of 100 percent earthworms plus an area use factor of 1. Hazard

quotients were then calculated using the estimated average daily doses and literature-derived TRVs. Refer to Table 7-1 for the dioxin TEQs and Table 7-4 for the model equations.

Based on the maximum soil dioxin TEQ, the maximum earthworm dioxin TEQ, and the maximum surface water dioxin TEQ, the HQ for birds based on the NOAEL was 7.7, and the LOAEL HQ was less than unity (HQ = 0.8) (Table 7-4B). Based on the average soil dioxin TEQ, the average earthworm dioxin TEQ, and the maximum surface water dioxin TEQ, the HQ based on the NOAEL was 2.3, and the LOAEL HQ was less than unity (HQ = 0.2). If the incidental soil ingestion term is removed from the model and the maximum earthworm tissue concentration is used, the NOAEL HQ exceeded unity (HQ = 2.2) but not the LOAEL HQ (HQ = 0.2). Refer to Table 7-4C for specific details.

Summary of Risks Using HQs from Food-Web Models

The results of the NOAEL HQs calculated using data from the food-web models indicate that there may be unacceptable risks to insectivorous, omnivorous, and carnivorous birds from exposure to dioxins in the soil and prey items at the site. The LOAEL HQs were less than unity for all of the scenarios. Because the NOAEL is a dose that has been shown to not represent risk, it is uncertain if the dioxin concentrations in the prey tissues alone are enough to cause unacceptable risks to the insectivorous, omnivorous, and piscivorous birds at the site.

7.2.5 Assessment Endpoint No. 5 - Protection of Piscivorous Birds

This assessment endpoint provides for the protection of piscivorous birds at the site to ensure that ingestion of prey and ingestion of abiotic media do not negatively impact the growth, reproduction, and survival of predatory birds due to dioxin contamination. The conceptual model for this endpoint is the ingestion of fish, incidental ingestion of sediment, and surface water uptake by piscivorous birds.. The Green heron (*Butorides virescens*) was selected as a representative species of piscivorous birds.

The risk question developed for this assessment endpoint is:

> "Are levels of site contaminants in sediment, soil, forage, and prey animals (fish tissue) sufficient enough to cause adverse effects to the long-term health and reproductive capacity of piscivorous birds that utilize the site?"

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of sediment, surface water, sediment worms, and fish;

2. Comparison of fish tissue concentrations to avian threshold values; and
3. Food-web models using two different prey species.

The lines of evidence considered for the evaluation of risks to piscivorous birds include literature-derived benchmark comparisons, and comparison of estimated doses to the Green heron, to NOAEL and LOAEL-based TRVs using a food-web model.

HQs Derived From Fish Tissue Concentrations and TRVs Protective to Aquatic Birds

Table 7-5C presents HQs for risks to birds using avian reference values based on fish concentrations obtained from EPA (1993). The low risk TRV is 6 ng/kg, and the high risk TRV is 60 ng/kg. All of the site fish tissue dioxin concentrations generated HQs greater than unity when compared with the low risk to sensitive avian wildlife species TRV. Comparison of dioxin concentrations in fish to the high risk TRV generated HQs less than unity. This indicates that there may be unacceptable risks to sensitive piscivorous birds from consumption of the various fish species in Beaver Pond and West Mineral Creek, based on the low risk threshold value. However, because the low risk TRV is the highest concentration that is unlikely to cause adverse effects to sensitive organisms, there is uncertainty regarding the unacceptable risks to piscivorous birds. Refer to Table 7-5C for specific details.

All of the fish samples collected from the reference locations produced HQs less than unity for both low risk and high risk to sensitive avian wildlife species TRV (Table 7-5C).

HQs Derived From Sediment Concentrations and TRVs Protective to Aquatic Birds

The sediment benchmark values used for dioxins were the low risk and high risk TRVs for sensitive avian wildlife species reported by EPA (USEPA 1993). The low risk TRV for sensitive avian species is 21 ng/kg and the high risk value is 210 ng/kg (Table 7-6). Dioxins were detected in all of the eight site sediment stations as well as the reference station used in the risk characterization. The HQs calculated for all of the stations exceeded unity, except for the high risk scenario at Station DT-EMC-SD-12 and the high risk to sensitive avian species for Station DTWMCSD01 (Table 7-6). The reference location generated an HQ less than unity for both TRVs for low risk and high risk to sensitive avian species. Based on these comparisons, sediment from all stations, except DT-EMC-SD-12, may contain dioxin concentrations that may potentially be hazardous to aquatic birds.

HQs from Food-Web Models Using Dioxin Concentrations from Site-related Fish

The measurement endpoint used to evaluate risks to piscivorous birds is an output from a food-web

model. The Green heron was selected as a representative receptor for piscivorous birds. A summary of the chemical data is provided in Table 7-1. Fish sizes, weights, and number of fish in each composite are presented in Appendix D, and the fish sampling locations are provided in Figure 7-4. Refer to Table 7-4D for the model equations.

Estimation of daily doses was performed using the maximum abiotic media dioxin concentrations and concentration of dioxins in each species of fish. An assumption for the model was that the Green heron's diet was composed of 100 percent fish plus an area use factor of 1. The NOAEL and LOAEL TRVs for birds were 0.014 and 0.14 µg/kg, respectively (Nosek *et al.*, 1992). Hazard quotients were then calculated using the estimated ADDs and literature-derived TRVs.

Based on the maximum sediment dioxin TEQs, the average fish tissue dioxin TEQ for each fish species, and the maximum surface water dioxin TEQ, the HQs calculated using the NOAEL were all less than unity. The HQs for the reference fish were also below unity compared with the NOAEL. Because the NOAEL HQ is based on a dose that is known to not represent risk, it is with assurance that aquatic birds are not at risk from dioxin levels found in site-related fish.

HQs from Food-Web Models Using *Lumbriculus variegatus* Tissue Concentrations

This additional line of evidence was included because the diet of many piscivorous birds includes invertebrates (Davis and Kushlan 1994; Kushlan 1978). *Lumbriculus variegatus* were exposed to the site sediments for 28 days in a bioaccumulation study and dioxin concentrations in their tissues were measured. There was not enough tissue to analyze for dioxin in the control sample, so this will be an uncertainty with this model because the concentration of dioxin in the control sample should be subtracted from the dioxin in the site-related tissue samples. The sediment sampling locations for the *L. variegatus* bioaccumulation tests are provided in Figures 7-3 and 7-4. Hazard quotients were calculated using the maximum and mean sediment and *L. variegatus* tissue concentrations, and maximum surface water dioxin concentrations as inputs into a food-web model.

The dioxin TEQs in sediment, *L. variegatus* tissue, and surface water are presented in Table 7-1. Based on the maximum sediment dioxin TEQ, the maximum *L. variegatus* tissue dioxin TEQ for birds, and the maximum surface water dioxin TEQ, the HQ calculated based on the NOAEL was 9.1 (Table 7-4E). The HQ calculated without incidental sediment ingestion was also greater than unity when compared with the NOAEL. The NOAEL HQ was also greater than unity (HQ = 4.1) when the average sediment, the average *L. variegatus* tissue TEQs, and the maximum surface water dioxin TEQs were used. All the scenarios generated HQs less than unity when the LOAEL was used.

These results indicate that there may be unacceptable risks to piscivorous birds from exposure to dioxins at the site. However, because the NOAEL is based on a dose that is known to not represent risk, there is uncertainty regarding the unacceptable risks to piscivorous birds.

Summary of Risks Using HQs from Food-Web Models and Fish Body Burdens

The results of the HQs calculated using data from the food-web models and fish body burdens indicate that there are no unacceptable risks to piscivorous birds from exposure to dioxins in the sediment, water, and prey items at the site. However, using the sediment worm from the laboratory bioaccumulation test, the NOAEL HQ for both all scenarios indicate the possibility of risk.

7.2.6 Assessment Endpoint No. 6 - Protection of Benthic Macroinvertebrate Communities

This assessment endpoint serves to protect benthic macroinvertebrate communities at the site and vicinity to ensure that contact with and incidental ingestion of the site sediments does not negatively impact their growth, survival, and reproduction.

The risk questions developed for this assessment endpoint include the following:

1. Are the COPC concentrations in the site-related sediments elevated enough in comparison to sediment benchmark values to cause a reduction in the survival, growth, and/or reproduction of benthic macroinvertebrate species?
2. Do toxicity tests indicate that COPC concentrations in the site-related sediments are high enough to cause mortality to benthic macroinvertebrates?

The measurement endpoints for this assessment endpoint include:

1. Chemical analysis of the site sediments;
2. Sediment benchmark values; and
3. Aquatic invertebrate solid-phase sediment toxicity tests using the freshwater amphipod, *Hyalella azteca*, and the oligochaete, *Lumbriculus variegatus*.

The lines of evidence considered for the evaluation of risks to benthic macroinvertebrates include calculation of HQs from comparison of site sediment chemical concentrations with sediment benchmark values, and results of aquatic invertebrate toxicity tests.

Risk Evaluation Using Sediment Benchmark Values

Sediment concentrations were screened against sediment benchmark values in order to calculate HQs as a measurement endpoint for Assessment Endpoint No. 6 - Protection of Benthic

Macroinvertebrate Communities.

Risk Evaluation Using Location-Specific Data and Sediment Benchmark Values

In this section, site-specific COPC concentrations from each sampling location were compared with sediment benchmark values in order to determine if specific locations of the site pose greater risks to benthic macroinvertebrates than other locations and to detect any spatial distribution patterns.

HQs Using Mean and Maximum Sediment Concentrations

The HQ method was used to estimate risks to benthic macroinvertebrates using the mean and maximum sediment concentrations. The results of the HQ calculations are presented in Table 7-6 and discussed in the following sections.

Pentachlorophenol

Pentachlorophenol was detected in all of the 8 site sediment stations as well as the reference station used in this risk characterization. All of the PCP concentrations exceeded the benchmark value 12 µg/kg (Barrick *et al.*, 1988). This benchmark value was obtained from the Washington State Puget Sound Sediment Program and is based on fish and bivalve larval apparent effects thresholds. The average concentration of site samples also exceeded the benchmark value (HQ = 49.5), as did the reference station (HQ = 1.2). This indicates that there may be unacceptable risks to the benthic macroinvertebrates from exposure to PCP in the site sediments.

Dioxins/Furans

The Canadian Council of Ministers of the Environment (CCME) published a probable effects level for dioxins that is protective of aquatic organisms that live in or on the sediment that forms on the bottom of lakes and rivers. The value is 21.5 ng/kg dw, based on WHO 1998 TEF values for fish (CCME 1999). All of the site- related samples generated HQs greater than unity. The average of the dioxin concentrations from all of the stations also generated an HQ greater than 1 (HQ = 64.7). The HQ for the reference station was less than 1 (HQ = 0.3). Refer to Table 7-6 for specific details.

Summary of Risks Using Sediment Benchmark Values

Benthic macroinvertebrates were determined to be at risk from exposure to site sediments based on a comparison of the chemical concentrations in sediment with sediment benchmark values. The following COPCs and locations generated HQs that were greater than unity when compared with sediment benchmarks.

- PCP - All locations, including the reference station
- Dioxins/Furans - All locations except the reference station

Risk Evaluation Using Site-Specific Sediment Toxicity Data

Whole sediment toxicity tests were used as a measurement endpoint to assess the risk to benthic macro-invertebrates. The toxicity tests were performed by USEPA Region 4 ESAT toxicologists using the freshwater amphipod, *Hyalella azteca*, and the oligochaete, *Lumbriculus variegatus*. The toxicity tests were conducted following USEPA guidelines described in "*Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*," (USEPA 2000). The toxicity tests were performed with 5 site sediments (i.e. DT-SD-01, DT-SD-02, DT-SD-03, DT-SD-04, and DT-SD-05), one field reference or background sediment (DTSDREF1), and a laboratory control (control). The sediment used as the control for the toxicity tests was obtained from the Ogeechee River, Georgia. A full scan analysis was conducted to verify that the sediment was appropriate for use as a control in the toxicity tests. The control sediment did not contain any PCP but had an estimated dioxin TEQ of 20, based on the 1998 World Health Organization mammalian TEFs. The TOC content of the control sediment was 8.9%.

The sediment toxicity test sampling locations are provided in Figures 7-3 and 7-4, and information relating to these samples is presented in Table 7-1. pH was not measured in the sediments, but was measured in the overlying water during the test. See Appendix B for information about the water quality measurements, test observations, specific test methods, and any modifications used in the tests.

The test endpoint for the *H. azteca* toxicity tests were survival and growth (optional). The results of the *H. azteca* sediment toxicity tests are presented in Table 7-7. No statistically significant differences were noted for the survival or growth in the site-related samples when compared to the reference station or the control sample.

The *L. variegatus* toxicity tests were only screen tests used to determine whether the bioaccumulation tests should proceed. The results of the *L. variegatus* toxicity screen tests were not used in this risk characterization.

Addendum to Sediment Toxicity Tests

Two additional soil samples (i.e. DT-SS-07 and DT-SS-08) were also tested for toxicity as sediment samples because of the high concentrations of PCP detected in them (See discussion in Assessment

Endpoint 1 for rationale). They were overlain with overlying water (well water) and tested as whole sediments without dilution, because it is possible that the sampling locations could become inundated with water during storm events. The *H. azteca* toxicity tests were performed following the same methods used with the sediment samples, but with minor modification. Because of inadequate soil sample volume, only 4 replicates of each sample were set up.

The acute toxicity tests were terminated after 10 days because of acute toxicity in the test sediments. The survival of *H. azteca* was zero percent in the 2 test sediments. Laboratory control sediment *H. azteca* survivorship was 92.5 percent. Under the conditions of the *H. azteca* acute sediment toxicity tests, the survival of *H. azteca* in Davis Timber sediment/soil samples DT-SS-07 and DT-SS-08 was significantly different (P=0.05) from the survival of *H. azteca* in the laboratory control sediment. Refer to Table 7-7 for specific details.

Discussion of Toxicity Based on the Two Tests

Pentachlorophenol

The chemical analysis results indicated that a true PCP gradient was obtained for the sediments. The PCP concentrations in the sediment samples ranged from 180 µg/kg (Sample DT-SD-B/T-04) to 1,700 µg/kg (Sample DT-SD-B/T-02) (Table 7-7). The soil samples used in the *H. azteca* toxicity tests had PCP concentrations of 34,000 µg/kg (sample DT-SS-08), and 120,000 µg/kg (sample DT-SS-07). Under the conditions of the toxicity tests using site-related sediment, none of the samples was determined to be toxic to *H. azteca*. However, soil samples DT-SS-07 and DT-SS-08 were extremely toxic to *H. azteca*. Both of these samples caused 100 percent mortality to the amphipods. Adequate soil samples were not available to perform definitive dilution series toxicity tests.

Based on the results of the site-specific toxicity tests the NOAEL for PCP was determined to be greater than 1,700 µg/kg which is much higher than the sediment PCP benchmark of 12 µg/kg reported by Barrick *et al.* (1988). The LOAEL for PCP in sediment would be expected to be less than 34,000 µg/kg based on the results of the soil samples with the samples with elevated PCP concentrations that were tested as sediment.

Dioxins/Furans

Dioxins/furans were not analyzed for direct toxicity. However, a review of the sediment data shows that the sample with the highest dioxin mammalian TEQ (i.e., DT-SD-B/T-02 had 5,000 ng/kg) did not cause toxicity to *H. azteca*. Therefore, the dioxins/furans in the site sediments are not expected to cause any direct toxicity to the benthic macroinvertebrate community.

Summary of Risks Using Site-Specific Sediment Toxicity Data

The results of the solid-phase sediment toxicity tests with *H. azteca* indicate the level of PCP in the site sediments is not high enough to cause adverse effects to the benthic macroinvertebrate community. However, if the site soils should become inundated with water, the soil from locations DT-SS-07 and DT-SS-08 may pose unacceptable risks to the invertebrates at the site.

7.2.7 Assessment Endpoint No. 7 - Protection of Fish Populations

This assessment endpoint provides for the protection of fish communities to ensure that fish populations inhabiting the wetlands and creeks are not adversely affected by contaminants found in the surface waters and sediments.

The risk questions for this assessment endpoint include:

1. Are the COPC concentrations in surface water greater than the national recommended water quality criteria (NRWQC) or other freshwater surface water benchmark;
2. Are sediment concentrations greater than benchmarks derived to be protective to fish;
3. Are concentrations of dioxins in the fish tissues at the site elevated enough to cause adverse effects to fish; and
4. Are concentrations of COPCs in the fish tissues at the site elevated enough to cause adverse effects to the fish predators that feed on forage fish?

The measurement endpoints for this assessment endpoint include:

1. Measurement of COPC concentrations in surface water and sediment;
2. Measurement of dioxin concentrations in fish tissues collected from the site; and
3. Comparison of the fish tissue concentrations with literature-derived TRVs.

Risk Evaluation Using National Recommended Water Quality Criteria

The NRWQC for PCP chronic toxicity is 15 µg/l (USEPA 2002). This criterion based on a pH of 7.8. The pH of the surface water samples collected at the site ranged from 5.81 to 6.2 (Table 7-1). No PCP was detected in any of the site-related water samples or at the reference station; however, the detection limits were all 25 µg/l, which is greater than the NRWQC. Therefore, the PCP concentrations do not necessarily exceed the NRWQC but uncertainty exists because of the elevated detection limits.

Although there is no NRWQC for dioxin, the EPA Region 4 screening value for chronic toxicity is

0.01 ng/l (USEPA 2001). This value was based on the marketability of fish. Based on this value and using the mammalian TEQ, all of the surface water samples (including the reference location) generated HQs greater than unity. Uncertainty exists because the conservative screening value is for TCDD alone, and the surface water concentrations were based on TEQs calculated for toxic effects to mammals.

HQs Derived From Fish Tissue Concentrations and TRVs Protective to Piscivorous Fish

Table 7-5B presents HQs for risks to piscivorous fish using reference values based on fish concentrations obtained from EPA (1993). The low risk TRV is 50 ng/kg, and the high risk TRV is 80 ng/kg. All of the fish tissue dioxin concentrations at the site and reference station generated HQs less than unity when compared with the low risk to sensitive piscivorous fish species TRVs (Table 7-5B). This indicates that there are no unacceptable risks to sensitive piscivorous fish populations from consumption of the various forage fish species in Beaver Pond and West Mineral Creek.

HQs Derived From Sediment Concentrations and TRVs Protective to Piscivorous Fish

The sediment benchmark values used for dioxins were the low risk and high risk TRVs for sensitive fish species reported by EPA (USEPA 1993). The low risk TRVs for sensitive fish species is 60 ng/kg, and the high risk value is 100 ng/kg (Table 7-6). Dioxins were detected in all of the 8 site sediment stations as well as the reference station used in the risk characterization. The HQs calculated for all of the stations using these TRVs exceeded unity, except for the low and high risk scenarios at Station DT-EMC-SD-12. The average concentration of all site-related fish also generated an HQ greater than one (HQ = 11.1 and 6.7 for low- and high risk to sensitive fish species TRVs, respectively (Table 7-6).

Fish caught at the reference location contained dioxin concentrations that generated HQs which were less than unity for both the low and high risk to sensitive fish species TRVs (Table 7-6). Based on these comparisons, it is concluded that sediments from all stations, except DT-EMC-SD-12, may contain dioxin concentrations that may potentially be hazardous to predatory fish.

Summary of Risks to Predatory Fish

The following section summarizes risk to predatory fish based on sediment and fish tissue concentrations and TRVs:

- The low risk and high risk benchmark values based on sediment concentrations were not exceeded in any of the fish collected at the Site

- The low risk and high risk to sensitive fish species criteria were exceeded in West Mineral Creek and the Beaver Pond

7.2.8 Assessment Endpoint No. 8 - Protection of Reptiles and Amphibians

This assessment endpoint was not evaluated individually because mammals are more sensitive to dioxins than reptiles and amphibians. There is limited data on the toxicity of dioxins/furans to reptiles and amphibians (USEPA 1993). There was a study in this document in which TCDD was injected into bull frog (*Rana catesbeiana*) tadpoles, and the authors concluded this species of amphibian was more tolerant to TCDD than fish (Beatty *et al.*, 1976 in USEPA 1993). It is uncertain whether amphibians and reptiles have the Ah receptor (like the lack of Ah receptor in invertebrates and primitive fishes), and the absence of the Ah receptor may make amphibians and reptiles less vulnerable to the toxic effects of dioxin (USEPA 1993).

Due to the limited information on the toxic effects to dioxin to reptiles and amphibians and the possible lack of the Ah receptor in these species, it is assumed that if mammals are protected in the BERA, reptiles and amphibians would also be protected.

7.2.9 Assessment Endpoint No. 9 - Protection of Plant Communities

This assessment endpoint provides for the protection of plant communities to ensure that plant communities in the terrestrial and aquatic habitats are not adversely affected by contaminants found in the soils, surface waters, and sediments at the site.

The risk questions for this assessment endpoint include:

1. Are the COPC concentrations in the surface soils, sediment, and surface water greater than those that are known to affect terrestrial and aquatic plant species;
2. Are concentrations of COPCs in the plant tissues at the site elevated enough to cause adverse effects to the plants at the site; and
3. Are concentrations of COPCs in the plant tissues at the site elevated enough to cause adverse effects to the herbivores that feed on the plants?

The measurement endpoints for this assessment endpoint include:

1. Measurement of COPC concentrations in all abiotic media;
2. Comparison of plant tissue concentrations with literature-derived TRVs; and
3. Seedling germination test.

Evaluation of Risks Using Abiotic Media Concentrations

USEPA has recently reported an Eco-SSL of 5 mg PCP/kg for terrestrial plants (USEPA 2005b). The derivation of this Eco-SSL was based on three studies with a soil pH = 6.3, and a TOC of 0.1%. This Eco-SSL was used as the ATV for plants in this risk characterization. The results of the comparison of the ATV with the surface soil PCP concentrations are presented in Table 7-2. Hazard quotients were calculated for PCP, and the HQs were all less than unity except for Stations DT-SS-07 (HQ = 24) and DT-SS-08 (HQ = 6.8). Station DT-SS-07 had a pH of 7.0 and a TOC of 0.97. Therefore, PCP is probably more bioavailable and toxic to plants under these conditions than the protective level of the screening value.

Evaluation of Risks Using Seedling Germination Tests

Terrestrial Plants

Site-specific seedling germination tests were performed with the site soils to determine their ability to support the germination of lettuce seeds, *Lactuca sativa.* The specific test methods and any modifications used in the tests can be found in "*Toxicity and Bioaccumulation Potential of Sediment and Soil Samples from the Davis Timber, Inc. Superfund Site, Hattiesburg, Mississippi,*" prepared by Integrated Laboratory Systems, Inc. (2004). The toxicity report is provided in Appendix B.

Pentachlorophenol

The results of the seedling germination tests with lettuce seeds, *Lactuca sativa*, showed no toxicity in the site soils when compared with reference soils (Table 7-8). This indicates that the site soils tested with the highest PCP concentration (730 µg/kg) are able to support the germination of seeds, and thereby, be protective of plants species. However, the site soils with the highest concentrations of PCP (i.e. locations DT-SS-07 at a concentration of 120,000 µg/kg and location DT-SS-08 at a concentration of 34,000 µg/kg) were not tested for seedling germination potential. Therefore, it is uncertain if these 2 locations will support the germination of seedlings. The PCP concentrations from these two locations are several orders of magnitude greater than the Eco-SSL value of 5 mg/kg for the protection of terrestrial plants (USEPA 2005b). Therefore, these locations may present unacceptable risks to the terrestrial plants at the site.

Dioxins/furans

Dioxins/furans were not analyzed for direct toxicity for seedling germination. Also, the sample with the highest dioxin TEQ (i.e. DT-SS-07 with a mammalian TEQ of 8,100 ng/kg) was not evaluated for seedling germination; therefore, it is uncertain if the dioxin levels at this station would cause adverse effects to the terrestrial plants at this location.

Aquatic Plants

Aquatic plants were not evaluated in this risk characterization.

Summary of Risks to Plant Communities

The results of the site-specific seedling germination tests did not show any toxicity to plants at the highest concentration tested. However, the samples with the highest contaminant concentrations were not tested. Based on a comparison of the soil PCP concentrations with the ATV, the following locations were determined to have the potential to pose unacceptable risks to the terrestrial plants at the site:

- PCP - Locations DT-SS-07, DT-SS-08, and DT002SLA

7.2.10 Assessment Endpoint No. 10 - Protection of Herbivores

This assessment endpoint provides for the protection of herbivorous animals in the aquatic and terrestrial environments to ensure that ingestion of contaminated plants does not adversely affect their survival, growth, and reproduction.

The risk question for this assessment endpoint is:

> "Are the concentrations of COPCs in the various plant species present at the site elevated enough to cause adverse ecological effects to herbivores?"

The seed germination tests did not show any toxicity to plants. Also, it is assumed that mammals, fish, and birds are more sensitive to PCP and dioxin than herbivores; therefore, if these receptors are protected, herbivores would also be protected.

Additional Information Used in the Risk Characterization:

Hurricane Katrina Samples and State Collected Fish Samples

On August 29, 2005, Hurricane Katrina made landfall along the Gulf Coast. Due to this hurricane, personnel from EPA collected two sediment samples from the vicinity of the Davis Timber Site to verify that post-Katrina impacts did not cause a release or re-distribution of contaminants to the site. Two sediment samples were collected on October 13, 2005 at East Mineral Creek at the crossroads. The location and analytical results for these samples are provided in Appendix E. Additional information may be obtained from the EPA report (USEPA 2005c). When the two samples were collected, the creek was dry, so the proposed surface water sampling was not conducted. Samples were collected as grab samples with a stainless steel spoon at a depth of 0- to 0.5-inches. Sample

SD01 was split and the split sample was identified as DT01SDS.

Comparison of the dioxin TEQs with the EPA low risk and high risk to sensitive avian, fish, and mammalian wildlife, indicated that Station SD01 exceeded the high risk to sensitive mammals, fish, and avian wildlife specie. The dioxin TEQ at Station SD02 exceeded only the high risk to sensitive mammalian wildlife species. The dioxin TEQ values were below the low risk to fish and avian species. There was no PCP detected at Station SD02. The PCP concentration at Station SD01 was 880 µg/kg, which exceeded the benchmark value of 12 µg/kg (Barrick *et al.* 1988). However based on the results of the site-specific toxicity tests, the NOAEL for PCP was determined to be greater than 1,700 µg/kg. This value is higher than the PCP concentration detected at Station SD01.

MDEQ Sampling

Personnel from the MDEQ collected fish from Country Club Lake in February 2004. The lake is downstream of the Davis Timber Site and both West Mineral Creek and East Mineral Creek flow into this lake. State personnel collected two composite bluegill samples and one redear sunfish composite. The results of dioxin analysis and calculation of TEQs for these fish are provided in Appendix A. The number of fish per composite is found in Appendix E. Additional information will be included in this report when available (i.e., lengths, weights, total gram weight). The TEQs for these fish ranged from 2.2 to 3.8 ng/kg. Comparison of TEQs from these fish to the TRVs indicates no risk to predatory fish or birds. However, the TEQs for all three fish samples exceed the low risk threshold to sensitive mammals TRV of 0.7 ng/kg, but are below the high risk threshold to sensitive mammals TRV of 7 ng/kg.

7.3 BIOACCUMULATION FACTORS

Soil to earthworm bioaccumulation factors (BAFs), sediment-to-fish BAFs and sediment-to-aquatic worm BAFs were calculated using the available abiotic media and biotic media concentrations. The BAFs were calculated by dividing the biotic media concentrations by the abiotic media concentrations as follows:

$$BAF = C_{tissue} / C_{abiotic\ media}$$

where: C_{tissue} = tissue concentration of chemical (mg/kg dw)

$C_{abiotic\ media}$ = abiotic media concentration of chemical (mg/kg dw)

The abiotic media concentrations were in dry weight; therefore, the biotic concentrations were also

converted to dry weight prior to calculating the BAFs.

The calculated BAFs were then normalized to the TOC fraction of the soil or sediment and the lipid fraction of the earthworm tissue, fish tissue, or aquatic worm tissue in order to calculate BSAFs. The BSAFs were calculated as the less variable alternatives to the BAFs using the following general equation:

$$BSAF = (C_{tissue}/F_{lipid})/(C_{abiotic\ media}/F_{oc})$$

where: F_{lipid} = Lipid fraction in tissue

F_{oc} = Organic carbon fraction in soil or sediment

For the purpose of this risk characterization only the mammalian TEQs were used to calculate the BAFs and BSAFs. The results are presented in Table 7-9A through 7-9C for earthworms (*E. foetida*), fish, and aquatic worm (*L. variegatus*), respectively. The calculated BAFs were used in the equations to derive the remedial goal options (RGOs) for the site.

Soil-to-Earthworm Bioaccumulation Factors

The BAFs for dioxins/furans TEQs ranged from 1.21 for site surface soil sample in grid 2 (toxicity Sample DT-SS-B/T-01) to 1.36 in grid 39 (Sample DT-SS-B/T-03). The BSAFs calculated after lipid and organic carbon normalization ranged from 0.30 (grid 2 – 50% sample) to 2.28 (grid 39). The mean BAF and BSAF values for dioxins TEQs are 1.27 and 0.97, respectively (Table 7-9A).

Sediment-to-Fish Bioaccumulation Factors

The BAFs for dioxins/furans TEQs ranged from 0.07 in a bluegill from the Beaver Pond (DT-BP-BLG) to 0.53 in a redear sunfish from West Mineral Creek (DT-WMC-RSF). The BSAFs calculated after lipid and organic carbon normalization ranged from 0.05 in the bluegill from the Beaver Pond to 0.30 in the bluegill in West Mineral Creek. The mean BAF and BSAF values for dioxins TEQs were 0.265 and 0.19, respectively (Table 7-9B).

Sediment-to-*Lumbriculus variegatus* Bioaccumulation Factors

The BAFs for dioxins/furans TEQs ranged from 0.52 for sediment Sample DT-04-SD-SW to 1.6 for Sample DT-05-SD-SW. The BSAFs calculated after lipid and organic carbon normalization ranged from 0.91 for location DT-05-SD-SW to 1.53 for location DT-03-SD-SW. The mean BAF and BSAF values for dioxins TEQs were 1.071 and 1.225, respectively (Table 7-9C).

7.4 RISK DESCRIPTION

One of the key outputs of the risk characterization step are contaminant concentrations in each environmental medium that bound the threshold for estimated adverse ecological effects, given the uncertainty in the data and the models used (USEPA 1997). These lower- and upper-bound thresholds are the RGOs.

7.4.1 Threshold for Effect on Assessment Endpoints

The lower- and upper-bound thresholds were derived using the NOAEL and LOAEL TRVs used in the food-web models. This was achieved by rearranging the equations used for the food-web models and solving for the soil or sediment concentration as follows:

$$HQ = \frac{ADD}{TRV} = (CPF) \times \frac{NFIR}{TRV} = (CS \times BAF) \times \frac{NFIR}{TRV}$$

Where: HQ = hazard quotient (unitless)
ADD = average daily dose (mg/kg body weight [BW]/day)
CPF = contaminant concentration in prey item (e.g., worm tissue or fish tissue in mg/kg)
NFIR = normalized food ingestion rate (mg/kg BW/day)
CS = threshold abiotic media concentration (mg/kg)
BAF = bioaccumulation factor (mg soil or sediment/mg tissue)
TRV = toxicity reference value (i.e. NOAEL or LOAEL) (mg/kg BW/day)

The RGO is the environmental concentration of a contaminant when the HQ is equal to unity. If the HQ is set to unity in the above equation, the threshold abiotic media concentration can be derived as follows:

$$CS_{threshold} = NOAEL \text{ or } LOAEL / (NIR_{food} * BAF + NIR_{sediment/soil})$$

Where: NOAEL = No observed-adverse-effect-level
NOAEL = Lowest observed-adverse-effect-level
NIR = Normalized ingestion rate (mg/kg BW/day)

For the calculation of the threshold or critical abiotic media concentrations or RGOs, both the mean and maximum BAFs were used with the NOAEL and LOAEL TRVs. However, the preferred RGOs

are those calculated using the maximum BAFs from the laboratory bioaccumulation tests, which are more conservative. These calculations are expected to provide a range of concentrations in different receptors that may be used for remediation. The NOAEL RGO ranges provide estimates of the highest abiotic media concentrations that would not result in unacceptable adverse effects to ecological receptors; but they do not provide concentrations where unacceptable adverse effects might occur. The LOAEL-based RGO ranges on the other hand, provide information on the minimum abiotic media concentrations that may cause harm to the receptors. Therefore, providing data on both the NOAEL- and LOAEL-based RGOs provides a reasonable estimate of the abiotic media concentrations that will result in no unacceptable risks to the ecological receptors at the site. The results of the threshold calculations are presented in Table 7-10 for surface soil and Table 7-11 for sediment. A summary of the risks for the remaining assessment endpoints (soil invertebrates and benthic macroinvertebrates) were based on the toxicity test results and are provided in Table 7-12.

7.4.2 Likelihood of Risk

There is always the possibility of risk from exposure to chemicals at any site. However, the risks may be reduced or completely eliminated based on the remedies selected.

Surface Soil

Dioxins and PCP are persistent in the environment and are not expected to undergo much transformation and/or change with time. However, they may undergo weathering and may be transported, through runoff, to surface water, ground water, and sediment. In the absence of a continuing source of these COPCs in the surface soils, their concentrations are expected to decrease with time. Natural attenuation or natural recovery, reburial, and other physical and chemical processes may, in time, result in an overall reduction in the levels of COPCs in the surface soils. Some of the soil locations were identified as localized hotspot areas.

Sediment

The results of the solid-phase acute toxicity tests with *H. azteca* did not find any significant toxic effects in the site sediments at the concentrations of PCP tested. However, toxicity was observed in the two soil samples (i.e., DT-SS-07 and DT-SS-08) used in the site-specific toxicity tests and the oligochaetes were found to accumulate dioxins/furans in their tissues. If proper actions are taken to mitigate surface soil, the levels of contaminants in the sediments may be expected to decrease with time and eventually diminish through natural attenuation, natural recovery, reburial, and other physical and chemical processes. Some of the sediment locations were also identified as hotspot areas. If these localized contamination areas were not present in the sediments, then COPCs would

not be present in the site sediments.

Surface Water

No COPCs were retained in surface waters. Therefore the surface waters at the site are not expected to pose unacceptable risks to the receptors at the site.

Fish

If the sources of COPCs in the terrestrial and aquatic environments are eliminated, the concentration of COPCs in the fishes and other aquatic organisms are expected to decrease with time. The current levels of COPCs in the fish tissues could be used as a baseline and the fish tissue concentrations could be monitored over time to determine if the levels are abating. The levels of COPCs in the fish at the site are probably at equilibrium at this point in time and are expected to reduce with time.

Plants

Two hotspot locations were identified as potential risk areas in the terrestrial habitats. If these localized contamination areas are removed from the soils, then there would be less potential for risks to the terrestrial plants at the site. If the sources of COPCs in the terrestrial and aquatic environments are removed, the concentration of COPCs in the terrestrial and aquatic plants, if any, will be reduced. At this juncture, it is not known whether there are any COPCs in the plant tissues at the site.

7.5 UNCERTAINTY ANALYSIS

There are several sources of uncertainties associated with an ERA, from sampling through chemical analyses, screening assessment, and estimates of toxicity to ecological receptors. Every step in the ERA process involves assumptions which continue through to the final estimates of risk. This is because of the complex interactions of the environmental conditions with the different matrices, different chemicals, and their concentrations, and the different receptors in the environment. The following sections discuss some of the uncertainties associated with the risk estimates and the general ERA process.

Uncertainties Associated with COPC Refinement

- USEPA Region 4 ESVs and ATVs were not available for all chemicals; therefore, the potential impacts to the ecological receptors at the site could not be evaluated for those chemicals.
- Some chemicals had elevated concentrations and no ATVs, or were detected and had no

TRVs. The impacts of these chemicals to the ecological receptors at the site could not be determined.

Uncertainties Associated with Selection of TRVs

- The selection of TRVs is conservative in nature and the values may not actually reflect real-life effects. For example, some of the TRVs were obtained under controlled laboratory conditions which do not reflect weathered environmental conditions or feral animal behavior patterns. Also, some of the TRVs were extrapolations of toxicity results (e.g., NOAELs to LOAELs, LC_{50} to NOAELs, etc.) where the selected endpoints were not available. These extrapolations may confound the results and lead to further uncertainty.
- Most of the literature-derived toxicity values were reported as the concentration in food. If the body weights were not provided, they were assumed or obtained from the literature when the concentrations were converted to doses (i.e., mg/kg BW/day). This practice introduces uncertainties in the derivation of NOAEL and LOAEL TRVs.
- There are also uncertainties associated with the use of other effects data such as the NRWQC. These criteria are supposed to be protective of 95 percent of the sensitive species most of the time; therefore, the remaining 5 percent are not protected.
- The 1993 EPA TRVs used for calculating HQ estimates to fish, birds, and mammals are based solely on TCDD concentrations, and this risk assessment calculated TEQs based on the 1998 WHO TEFs. Comparisons based on these two approaches may over- or underestimate risk.
- There is substantial inter- and intraspecies differences in sensitivity and toxic responses to TCDD (Eisler 1986); therefore, conclusions drawn from food-web models may over- or underestimate risk.

Uncertainties Associated with Exposure Estimates

- All of the individual locations at the site were not sampled in order to adequately determine the true nature and extent of contamination. Some areas of high contamination may have been missed. For example, the RI data indicated that Grid 2 had the highest PCP concentration of 68 mg/kg but upon sampling in July 2004 for this ERA, this station had only 0.12 mg/kg. This represents an uncertainty with location of maximum chemical concentrations at the site.
- Several assumptions were made in the food-web models used in the risk characterization (e.g., bioavailability was assumed to be 100 percent for dioxins). These models have their own inherent uncertainties which contribute to the overall uncertainties in the risk

characterization.

- The use of the mean and maximum contaminant concentrations in the food-web models and other lines of evidence to estimate risk may overestimate risk because the individual receptors may not be exposed to these concentrations. Also, because the true nature and extent of contamination was not achieved, it is not clear whether the actual site mean and maximum concentrations could be determined.
- The risk characterization assumes that receptors are exposed to one chemical at a time and the additive, synergistic, or antagonistic effects of chemicals are not taken into consideration. This assumption may result in the over- or underestimation of risks at the site.
- Mammalian TEFs were used for calculating TEQs for soil invertebrates. However, there is little evidence to support ligand activation of Ah receptor or for TCDD-like toxicity in invertebrates (van den Berg *et al.*, 1998). This may result in an over- or under-estimation of the risks. Likewise, dioxin concentrations in abiotic media were calculated using the TEF/TEQ approach, which may not be appropriate.
- Di-phenyl ether interferes with furan analysis, causing elevated detection limits for non detected congeners. Because the TEQs were calculated using maximum detection limits, this may have resulted in the overestimation of risk.
- Some blank contamination occurred with dioxin analysis which resulted in the detection limits being elevated. The TEQs calculated using these congeners may be artificially high and be skewed which overestimate risk.
- The reference station had a congener that was rejected (i.e. "R" qualified). This causes uncertainty in the evaluation of risk, since reference stations are incorporated into the risk assessment.
- Uncertainty exists when detection limits are greater than ATVs. Although the chemical may not be detected, the detection limit may be elevated due to interference or the analytical method may not achieve low enough detection limits. For example, the NRWQC for PCP chronic toxicity is 15 µg/l, and although PCP was not detected in surface water, the detection limits were all 25 µg/l. Also, the detection limit for PCP in the control soil was 830 µg/kg. Although PCP was not detected in the soil, the detection limit was elevated because a routine analytical method was used. This increases the uncertainty in the risk assessment with these types of detection limits.

Uncertainties Associated with Selection of Assessment Endpoints

- Different species respond differently to chemical challenge. Because it is impractical to use all of the individual species at the site to evaluate risks, the selection of assessment endpoints

focuses the risk assessment on the ecosystem components that are most likely to be affected by the site contaminants. This may result in risk estimates that are not protective of certain receptors.

Uncertainties Associated with Establishment of Measurement Endpoints

- Different species respond differently to chemical challenge. Because it is impractical to use all of the individual species at the site to evaluate risks, the selection of assessment endpoints focuses the risk assessment on the ecosystem components that are most likely to be affected by the site contaminants. The representative species selected may not be the most sensitive and TRVs may not be derived from the most sensitive species.

Uncertainties Associated with Site-Specific Toxicity Tests

- Site-specific toxicity and bioaccumulation tests were used in the risk estimates; however, toxicity test results were not available for all of the potential receptors at the site.
- The locations with maximum COPC concentrations in surface soil were not used in the seedling germination, earthworm toxicity, and bioaccumulation tests. Therefore, the reported effects level was only an estimate.
- The samples used in the toxicity tests contained a mixture of chemicals including unknown or tentatively identified compounds which may have contributed to some of the observed effects. The synergistic, antagonistic, additive, and other effects of the COPCs were not determined. Therefore, assuming that sample toxicity is due to a single chemical alone may under- or overestimate the risks at the site.
- Earthworms, *E. foetida,* are less sensitive to a wide variety of environmental contaminants, especially metals. The insensitivity of the earthworm to chemical contaminants may result in underestimation of risks to soil invertebrates.
- The toxicity test endpoints were not long enough to determine the long-term effects of the COPCs on the reproduction of the test organisms.
- The *L. variegatus* and *E. foetida* used in the bioaccumulation tests were not analyzed for dioxins prior to the initiation of the tests; therefore, the concentration of dioxins in the worms may be overestimated because the site-related worm concentrations did not have the dioxin concentration in the control worms taken into account.

Uncertainties Associated with Estimation of Risk

- Some of the calculated HQs were greater than unity when compared with the NOAEL but not the LOAEL. Because the NOAEL is based on a concentration that is known to not cause any

adverse effects, it makes the interpretation of the results difficult.

- Some chemicals from the background locations showed similar unacceptable risks as those from the site when comparison to benchmark values. This makes data interpretation difficult.
- Plants at the site were not collected and chemically analyzed; therefore, plant uptake of COPCs at the site is unknown.
- The use of the detection limits in the TEQ calculations may result in overestimating risk.
- Fish were not available in East Mineral Creek; therefore, BAFs were not calculated for this waterway. The risk for this creek has increased uncertainty.
- Different laboratories may use different analytical methods to analyze samples which may lead to slightly different results. For example, the dioxin laboratory calculated percent lipids in sediment worm Sample DT-01-SD-SW to be 1.5%. The EPA laboratory calculated the percent lipid content to be 0.8% in the same sample. This may result in the over- or under-estimation of risk depending on which data are used.

Uncertainties Associated with Preliminary Remedial Goal Options

- In the calculation of the preliminary RGOs, it was assumed that the biota concentrations would change linearly as the abiotic media concentrations. This assumption may not be true in real life situations and may result in additional uncertainties.

7.6 SUMMARY

The results of the risk characterization indicate that there may be unacceptable risks to ecological receptors from exposure to contaminated media (both biotic and abiotic) at the Davis Timber site. The major areas of concern are the aquatic and terrestrial habitats at the site where high levels of PCP and dioxins were detected. The following sections summarize the risks posed to the ecological receptors in surface soils and sediments at the Davis Timber site.

Summary of Risks in Surface Soil

Different lines of evidence have been provided to show that the different areas of the Davis Timber site pose unacceptable risks to the ecological receptors in the surficial soils at the site. The major sources of evidence presented include chemical analyses results which show PCP and dioxin concentrations that are highly elevated and HQs which exceed benchmark values. DTSS07 and DTSS08 have HQs greater than one for PCP in both invertebrates and plants (Table 7-2). Food-web models were also used to provide additional evidence of unacceptable risks to the ecological receptors in the surficial soils at the site. Bioaccumulation of dioxins was demonstrated in the

laboratory bioaccumulation tests with the earthworm, *Eisenia foetida*. Receptors, especially mammals and birds, feeding on these worms are likely to show adverse ecological effects due to their sensitivity to dioxins. The NOAEL and LOAEL HQs for the shrew were all above 1 for dioxins. All NOAEL HQs were above 1 for the woodcock (Table 7-4). The location-specific HQ analysis indicated that there are areas of localized contamination or hotspots at the site. Removal of these areas of localized contamination may eliminate the major sources of contamination from the surficial soils and also reduce further contamination by way of erosion to the aquatic habitats.

For PCP in surface soil, the RGO range was 34 mg/kg to 120 mg/kg based on *E. foetida* toxicity tests. Complete mortality was observed at Station DT-SS-08 where the highest PCP concentration of 120 mg/kg was detected. No mortality was observed at Station DT-SS-08 which had a PCP concentration of 34 mg/kg. Therefore, for this ERA the recommended cleanup number for PCP for the protection of soil invertebrates is 34 mg/kg.

The Eco-SSL of 5 mg/kg is recommended as the cleanup number for the protection of terrestrial plants. This is because the highest PCP concentrations detected in the site soils (34 mg/kg and 120 mg/kg) are higher than the Eco-SSL and were not used in the seedling germination tests. The highest PCP concentration used in the seedling germination tests was 0.73 mg/kg, which did not show any adverse effects on seedling germination. To protect the plant community, the only available value to use for cleanup is the Eco-SSL of 5 mg/kg. The Eco-SSL for PCP for plants is a screening value based on the most conservative assumptions. If the 10 percent acute-to-chronic conversion is applied to the Eco-SSL the higher end of the range would be 50 mg/kg. Therefore, the NOAEL and LOAEL RGOs for PCP for the protection of terrestrial plant communities would be 5 mg/kg and 50 mg/kg, respectively. Refer to Table 7-13A for specific details.

The final recommended RGO ranges for the dioxins/furans for the protection of mammalian and avian insectivores based on the food-web models are presented in Table 7-13A. The RGOs were based on food-web models for the Short-tailed shrew and American woodcock.

Summary of Risks in Sediment

Different lines of evidence were provided to show that West Mineral Creek, East Mineral Creek, and Beaver Pond provide sources of contamination which pose unacceptable risks to the ecological receptors in the sediments. The major sources of evidence presented included chemical analyses results which showed elevated concentrations of PCP and dioxins, and HQs which exceeded literature-derived benchmark values. The results of the bioaccumulation tests with *L. variegatus*

confirmed the uptake of dioxins by the oligochaetes which can be transferred to higher trophic level organisms. The food web model showed NOAEL HQs are greater than 1 for the mink even when incidental ingestion of sediment is excluded in all but one sample (bluegill from West Mineral Creek). All of the LOAEL HQs are greater than one when ingestion of sediment is included in the equation, but less than one when it is not. When *L. variegatus* is used as prey for the green heron the NOAEL HQs are all greater than one. Location-specific HQ analysis indicated that there are areas of localized contamination in the site sediments. (Table 7-4) All sampling locations had HQs of greater than one for PCP (Table 7-6). The HQs for dioxins were above 1 for invertebrates at all sampling locations. The low risk to mammal TEQ HQs were all greater than one. The high risk to mammal TEQ HQs were all greater than one except at locations DTEMCSD12 and DTWMCSD01. Low risk to birds TEQ HQs were greater than one except at DTEMCSD12. High risk to birds TEQ HQs were greater than one except at locations DTEMCSD12 and DTWMCSD01. (Table 7-6) Removal of these areas of localized contamination will eliminate all COPCs from sediment, provided additional COPCs are not leached from the soils to the aquatic habitats.

The solid-phase sediment toxicity tests with *H. azteca* did not detect toxicity in the sediment sample with the highest PCP concentration of 1,700 µg/kg or any of the other samples with lower PCP levels. Some of the PCP concentrations in the East Mineral Creek sediments were higher than the highest concentration tested. Soil Stations DT-SS-08 and DT-SS-07 with PCP concentrations of 34 mg/kg and 120 mg/kg were both toxic to *H. azteca*, and resulted in 100 percent mortality. If the soils with these high PCP concentrations were to erode into the creeks or to become flooded, they would be toxic to benthic invertebrates. Based on this information, the highest sediment PCP concentration of 1,700 µg/kg is recommended as the NOAEL and the lowest soil (sediment) concentration of 34,000 µg/kg is recommended as the LOAEL. Therefore the recommended NOAEL and LOAEL RGO range for PCP in for the protection of benthic invertebrates in sediment is 1,700 µg/kg to 34,000 µg/kg.

The final recommended RGO ranges for the dioxins/furans for the protection of mammalian and avian piscivores and avian insectivores based on the food-web models are presented in Table 7-13A. The RGOs were based on food-web models for the mink and green heron.

7.7 CONCLUSIONS AND RECOMMENDATIONS

General

The burden of selecting the final cleanup goals for any site rests on the site risk manager who must balance risk reductions associated with cleanup of contaminants with potential impacts of the

remedial actions themselves. For this risk characterization, all of the available information was used to calculate NOAEL and LOAEL RGOs for the protection of invertebrates, fish, mammalian, and avian receptors in surficial soils and sediment at the Davis Timber site (Tables 7-13A). The recommended RGO ranges provided in Table 7-13A are expected to aid the risk manager in selecting the appropriate cleanup levels for the site. The recommended RGOs for the terrestrial invertebrates and plants were based on site-specific toxicity tests which are expected to be protective of plants and soil invertebrates. Food-web models were used to develop RGOs for mammalian (shrew) and avian (woodcock) receptors in surface soil. The recommended RGOs for the aquatic invertebrates were based on site-specific solid-phase toxicity tests with the freshwater amphipod, *H. azteca*, and are expected to be protective of benthic invertebrates in the site sediments. Food-web models were used to develop RGOs for mammalian (mink) and avian (shrew) wildlife receptors in sediment. In the site sediments the RGOs based on the laboratory bioaccumulation tests were the more conservative and appeared to be appropriate for the Davis Timber site. The BAFs calculated using the laboratory bioaccumulation studies with the oligochaete, *L. variegatus*, were deemed to be more reliable and controlled than the field-collected fish tissue data. This is because the COPC concentrations in the abiotic and biotic media from the laboratory bioaccumulation tests were measured and known to be accurate, whereas the COPC concentrations from the aquatic areas where the fish were trapped were composites, and only estimated. Refer to Table 7-13A for specific details.

Final Cleanup Numbers for Surface Soil

The final cleanup goal for PCP for the protection of soil invertebrates and terrestrial plants was determined to be 5 mg/kg dry weight (Table 7-13B). This cleanup number is an Eco-SSL TRV based on the protection of terrestrial plants. This number was selected based on studies by TN & Associates, Inc. (2000) with 3 terrestrial plants (alfalfa, turnip, and radish). Only 3 locations exceeded the soil cleanup number of 5 mg/kg for PCP (one from the RI location DT002SLA and its duplicate DT702SLA at concentrations of 28 mg/kg and 68 mg/kg, respectively and 2 from Step 6 locations DTSS07 and DTSS08 at concentrations of 120 mg/kg and 34 mg/kg, respectively). The concentrations and locations of PCP in the surface soils from the RI and Step 6 that exceed the cleanup number are presented in Table 7-13B and Figure 7-5.

The RGOs for dioxins TEQs ranged from 0.0024 to 0.64 µg/kg based on food-web models with the shrew and American woodcock (Table 7-13A). The shrew model was determined to be too conservative and not deemed appropriate for the site. However, based on EPA's Office of Solid Waste and Emergency response (OSWER) Directive 9200.4-26 (USEPA 1998a), the cleanup goal for dioxins is set to 1 µg/kg. The 1 µg/kg TEQ is a conservative cleanup goal estimate for a

residential exposure scenario for the protection of human health and the environment. This number is less than the industrial surface soil exposure scenario TEQs of 5 to 20 µg/kg recommended by the same Directive. Only 2 locations from the Step 6 sampling event exceeded the OSWER Directive TEQ of 1 µg/kg (i.e. DTSS07 with a TEQ of 8.1 µg/kg and DTSS07 with a TEQ of 1.8 µg/kg). None of the IR samples exceeded the soil cleanup TEQ for dioxin of 1 µg/kg. The concentrations and locations of dioxin TEQ in the surface soils from the RI and Step 6 that exceed the cleanup number are presented in Table 7-13B and Figure 7-5.

Final Cleanup Numbers for Surface Sediment

The final cleanup goal for PCP for the protection of aquatic invertebrates was determined to be 7.6 mg/kg dry weight (Table 7-13B). This cleanup number is the geometric mean of the LOAEL and NOAEL RGOs and was selected based on the solid-phase sediment toxicity tests with *Hyalella azteca*. This cleanup number is the same as the Canadian Soil Quality Guideline for the protection of ecological receptors in the environment or for the protection human health in agricultural, residential, commercial, and industrial settings (CCME 2004). Only one location from the RI data exceeded the sediment cleanup number of 7.6 mg/kg for PCP (i.e. 314SD at a concentration of 8.2 mg/kg). The concentrations and locations of PCP in the sediments from the RI and Step 6 that exceed the cleanup number are presented in Table 7-13B and Figure 7-6.

The RGOs for dioxins TEQs ranged from 0.08 to 19 µg/kg based on different scenarios and food-web models with the mink and Green heron (Table 7-13A). Because of the wide variance in the RGOs the decision was made to use the geometric mean of the LOAEL and LOAEL RGOs to determine the final cleanup number for dioxin TEQ in sediment. Based on the geometric mean of the NOAEL and LOAEL RGOs for all the modeled receptors, the cleanup goal for dioxin TEQ in sediment was determined to be 1.9 µg/kg dw. The 1.9 µg/kg TEQ cleanup number is similar to the OSWER Directive of 1.0 µg/kg for the residential surface soil exposure scenario but less than the industrial surface soil exposure scenario of 5 to 20 µg/kg TEQ recommended by the same Directive. Only 2 locations from the Step 6 sampling event exceeded the recommended dioxin cleanup TEQ of 1.9 µg/kg (i.e. DTSDBT/02 at a concentration of 5 µg/kg and DTSDBT/03 at a concentration of 2.2 µg/kg). A total of 6 sediment samples from the RI report exceeded the sediment cleanup number of 1.9 µg/kg (one from West Mineral Creek with a TEQ of 2 µg/kg and 5 from East Mineral Creek with TEQs ranging from 2 µg/kg to 5.9 µg/kg). The concentrations and locations of dioxin TEQ in the sediments from the RI and Step 6 that exceed the cleanup number are presented in Table 7-13B and Figure 7-6.

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Table 7-1. Results of July 2004 Sampling, Davis Timber Site, Hattiesburg, Mississippi

SEDIMENT	DTEMCSD11	DTEMCSD12	DTWMCSD01	DTSDREF1	
PCP (µg/kg) DW	940	150	120	14	
Dioxin TEQ (ng/kg) DW					
mammal	1300 J	22 J	440 J	5.7 J	
avian	640 J	11 J	200 J	4.8 J	
fish	620 J	11 J	210 J	4 J	
% Moisture	41	19	30	53	
pH (standard units)	5.0	4.7	5.3	4.7	
TOC	2.2	0.18	1	1.9	
Grain Size (gravel:sand:silt/clay)	2.58:24.43:31.69	1.2:32.29:47.96	1.86:47.84:23.38	0.12:5.33:39.97	
GPS coordinate	N31.34955 W89.38757	N31.35038 W89.38741	N31.34815 W89.40217	N31.36113 W89.39913	
SURFACE WATER	**DTSW01 (WMC)**	**DTSW02 (BP)**	**DTSW03 (EMC)**	**DTSWREF04**	
PCP (µg/l)	25 U	25 U	25 U	25 U	
Dioxin TEQ (ng/l)					
mammal	0.025 J	0.04 J	0.17 J	0.02 J	
avian	0.027 J	0.034 J	0.083 J	0.025 J	
fish	0.021 J	0.026 J	0.08 J	0.02 J	
pH (standard units)	6.11	6.2	5.81	5.96	
Dissolved Oxygen (mg/l)	2.68	1.78	3.33	1.16	
Conductivity (µmho/cm)	71	70	52	47	
Turbidity (NTU)	30.5	24.6	138.9	13.6	
Temperature (celsius)	23.27	26.65	24.18	24.7	
GPS coordinate	N31.34975 W89.39947 (15.3ft accuracy)	N31.34628 W89.40283 (17.7ft accuracy)	N31.34554 W89.39616	N31.36113 W89.39913 (20.3ft accuracy)	
SOIL	**DTSS01**	**DTSS03**	**DTSS06**	**DTSS07**	**DTSS08**
PCP (µg/kg) DW	28	710	650 J	120000	34000
Dioxin TEQ (ng/kg) DW					
mammal	44 J	710 J	380 J	8100 J	1800 J
avian	24 J	370 J	180 J	4600 J	810 J
fish	25 J	400 J	190 J	5200 J	840 J
% Moisture	13	15	13	9	12
pH (standard units)	5.1	5.8	5.2	7.0	4.4
TOC	1	0.53	0.97	0.97	0.45
Grain Size (gravel:sand:silt/clay)	14.32:49.03:26.51	13.12:42.9:32.38	14.64:41.4:33.39	35.95:39.34:16.89	24.16:39.62:25.4
GPS coordinate	N31.34635 W89.39941	N31.34525 W89.39938	N31.34634 W89.40005	N31.34579 W89.40004	N31.34523 W89.40003

Table 7-1. Results of July 2004 Sampling, Davis Timber Site, Hattiesburg, Mississippi

FISH	DTBPDOS	DTBPBLG	DTBPWAM	DTWMCBLG	DTWMCRSF	DTWMCWAM	DTREF4BLGL	DTREF4BLG	DTREF4LMB
Dioxin TEQ (ng/kg) WW									
mammal	27 J	8.6 J	9.5 J	40 J	60 J	34 J	0.91 J	0.86 J	1.1 J
avian	18 J	7.5 J	7.6 J	23 J	37 J	25 J	1.2 J	1.1 J	1.4 J
fish	19 J	6.8 J	7.7 J	25 J	41 J	26 J	0.9 J	0.83 J	1.2 J
Dioxin TEQ (ng/kg) DW									
mammal	112.50 J	34.4 J	39.58 J	168.78 J	250.00 J	141.67 J	3.53 J	3.48 J	4.58 J
avian	75.00 J	30 J	31.66667 J	5.45 J	154.17 J	104.17 J	4.65 J	4.45 J	5.83 J
fish	79.17 J	27.2 J	32.08 J	5.93 J	170.83 J	108.33 J	3.49 J	3.36 J	5.00 J
% lipid	3.3	3.1	2.3	2.1	3.8	2	3.37	3.7	1.4
% moisture*	76	75	76	76.3	76	76	74.2	75.3	76

SEDIMENT WORMS	DT01SDSW	DT02SDSW	DT03SDSW	DT04SDSW	DT05SDSW	DTREF1SDSW
Dioxin TEQ (ng/kg) WW						
mammal	156 J	560 J	390 J	27 J	70 J	1 J
avian	100 J	350 J	230 J	17 J	51 J	1.3 J
fish	106 J	370 J	250 J	17 J	51 J	1 J
Dioxin TEQ (ng/kg) DW						
mammal	1220.66 J	4179.10 J	3362.07 J	219.69 J	559.11 J	7.66 J
avian	782.47 J	2611.94 J	1982.76 J	138.32 J	407.35 J	9.96 J
fish	829.42 J	2761.19 J	2155.17 J	138.32 J	407.35 J	7.66 J
% lipid	1.5	1.6	1.5	1.3	1.4	1.3
% moisture	87.22	86.6	88.4	87.71	87.48	86.95

EARTHWORM	DT02EW	DT03EW	DT50-2EW	DTControlE	DTREFEW
Dioxin TEQ (ng/kg) WW					
mammal	35 J	54 J	23 J	1.3 J	0.98 J
avian	18 J	33 J	11 J	1.7 J	1.4 J
fish	20 J	34 J	11 J	1.4 J	0.99 J
Dioxin TEQ (ng/kg) DW					
mammal	181.91 J	312.14 J	93.23 J	7.52 J	4.61 J
avian	93.56 J	190.75 J	44.59 J	9.84 J	6.58 J
fish	103.95 J	196.53 J	44.59 J	8.10 J	4.65 J
% lipid	2	2.5	2.7	2.7	2.2
% moisture	80.76	82.7	75.33	82.72	78.72

Table 7-1. Results of July 2004 Sampling, Davis Timber Site, Hattiesburg, Mississippi

TOXICITY TEST SAMPLES

SEDIMENT	DTSDB/T01	DTSDB/T02	DTSDB/T03	DTSDB/T04	DTSDB/T05	DTSD504
						(Duplicate)
PCP (µg/kg)	630	1700	960	180	76	82
Dioxin TEQ (ng/kg)						
mammal	1400 J	5000 J	2200 J	420 J	350 J	280 J
avian	670 J	2400 J	760 J	190 J	170 J	140 J
fish	680 J	2600 J	820 J	220 J	190 J	150 J
% Moisture	41	43	32	66	29	29
pH (standard units	NA	NA	NA	NA	NA	NA
TOC	2.3	1.8	1.5	3.5	0.8	0.85
grain size (gravel:sand:silt/clay)	6.24:23.1:24.53	8.77:10.6:35.36	3.76:32.68:27.27	4.38:8.67:20.54	2.93:16.72:56.55	3.19:14.21:51.47
GPS coordinate	N31.34554 W89.39616	N31.34526 W89.39741	N31.34546 W89.39702	N31.34695 W89.40231	N31.34470 W89.39937	-same as DTSDB/T05

SOIL	DTSSB/T01	DTSSB/T03	DTSSREF1
PCP (µg/kg)	120	82	1.6 J
Dioxin TEQ (ng/kg)			
mammal	150 J	230 J	2.1 R
avian	62 J	110 J	2.4 R
fish	68 J	120 J	2.1 R
% Moisture	12	37	14
pH (standard units	5.3	5.8	5.1
TOC	0.65	4.2	0.69
Grain Size (gravel:sand:silt/clay)	24.83:27.94:34.1	27.82:19.34:19.56	2.62:32.86:46.38
GPS coordinate	N31.34580 W89.39939	N31.34520 W89.40196	N31.36113 W89.39913

Notes:

PCP = Pentachlorophenol
ug/kg = micrograms per kilogram
DW = Dry weight
TEQ = Toxic equivalent
ng/kg = Nanograms per kilogram
TOC = total organic carbon
GPS Coordinates Lat/Lon NAD83

J = Estimated concentration
U = Non-detected analyte
WMC = West Mineral Creek
BP = Beaver Pond
EMC = East Mineral Creek
WW= Wet weight
NA = Not available/analyzed

* = moisture content not available for fish samples DT-PB-DOS, DT-BP-WAM, DT-WMC-RSF, DT-WMC-WAM, or DT-REF4-LMB. Therefore, average of 76% used for these fish

Table 7-2. Location-Specific Hazard Quotients for Pentachlorophenol and Dioxins/Furans in Surface Soil, Davis Timber Site, Hattiesburg, Mississippi

Chemical	ATV	SAMPLE ID									
		DTSS01	HQ	DTSS03	HQ	DTSS06	HQ	DTSS07	HQ	DTSS08	HQ
PCP (invert) (µg/kg)	31000	28	0.001	710	0.02	650	0.02	120000	3.9	34000	1.1
PCP (plant) (µg/kg)	5000	28	0.006	710	0.14	650	0.13	120000	24.0	34000	6.8
Dioxin TEQ* (invert) (ng/kg)	5000000	44	8.8E-06	710	0.000142	380	7.6E-05	8100	0.00162	1800	0.00036

		DTSSB/T01	HQ	DTSSB/T03	HQ
PCP (invert) (µg/kg)	31000	120	0.004	82	0.003
PCP (plant) (µg/kg)	5000	120	0.02	82	0.02
Dioxin TEQ* (invert) (ng/kg)	5000000	150	0.00003	230	0.000046

		AVERAGE	HQ	MINIMUM	HQ	MAXIMUM	HQ
PCP (invert) (µg/kg)	31000	22227.1	0.7	28	0.001	120000	3.9
PCP (plant) (µg/kg)	5000	22227.1	4.4	28	0.006	120000	24.0
Dioxin TEQ* (invert) (ng/kg)	5000000	1630.6	0.000326	44	8.8E-06	8100	0.002

Notes: Highlighted cells are HQ≥1

ATV = Alternate toxicity value

µg/kg = Micrograms per kilogram (all in dry weight)

HQ = Hazard quotient

PCP = Pentachlorophenol

ng/kg = Nanograms per kilogram (all in dry weight)

invert = Invertebrates

* = mammalian toxic equivalent factors used in dioxin toxic equivalent concentrations

ATV Source: PCP (USEPA 2005); dioxin (Reinecke and Nash 1984)

Table 7-3. Survival of Eisenia foetida After 14- and 28-Days of Exposure to Soil Samples From the Davis Timber Site, Hattiesburg, Mississippi

Sample ID	Pentachlorophenol Concentration (µg/kg)	Toxicity			Bioaccumulation			
		Number Exposed	Number Alive	Percent Survival	Initial Weight (g)	Final Weight (g)	Percent Growth	Adequate Tissue?
Control	830U	40	40	100	95.5	98	NM	Yes
DTSSREF-1	1.6	40	39	97.5	96	113.5	NM	Yes
DTSSB/T-01	120	40	40	100	87.5	106	NM	Yes
DTSSB/T-02 (50%)	~60	40	40	100	92	95	NM	Yes
DTSSB/T-03	82	40	40	100	89	99.5	NM	Yes
Soil Dilution Test								
DTSS-07	120000	30	0	0	NA	NA	NM	NA
DTSS-07 (25%)	36000	40	40	100	NA	NA	NM	NA
DTSS-07 (12.5%)	25000	40	40	100	NA	NA	NM	NA
DTSS-07 (6.25%)	8100	40	40	100	NA	NA	NM	NA
DTSS-08	34000	30	30	100	NA	NA	NM	NA

Notes:

µg/kg = Micrograms per kilogram

g = Grams

U = Not detected

NM = Not measured

NA = Not applicable

Table 7-4. Food-Web Models, Davis Timber Site, Hattiesburg, Mississippi

Table 7-4A. Assessment Endpoint 2 - Insectivorous, Omnivorous, and Carnivorous Mammal

Short-tailed shrew (*Blarina brevicauda*) Parameter	Soil Conc (mg/kg)	Soil IR (kg/day)	Soil Dose (mg/day)	Earthworm Conc (mg/kg)	Food IR (kg/day)	Food Dose (mg/day)	Water Conc (mg/L)	Water IR (L/day)	Water Dose (mg/day)	Total Dose (mg/day)	Body Weight (kg)	ADD (mg/kg-day)	NOAEL (mg/kg BW/day)	LOAEL (mg/kg BW/day)	NOAEL HQ	LOAEL HQ
Dioxins/Furans																
Maximum (Mammal)	0.0081	0.00035	2.84E-06	3.10E-04	0.0037	1.1E-06	1.70E-07	0.0027	4.59E-10	4E-06	0.012	0.0003	0.000001	1.00E-05	331.87	33.2
Maximum without soil	0	0.00035	0.00E+00	3.10E-04	0.0037	1.1E-06	1.70E-07	0.0027	4.59E-10	1.1E-06	0.012	0.0001	0.000001	1.00E-05	95.62	9.6
Average (Mammal)	1.63E-03	0.00035	5.71E-07	1.96E-04	0.0037	7.2E-07	1.70E-07	0.0027	4.59E-10	1.3E-06	0.012	0.0001	0.000001	1.00E-05	107.9	10.8
Third highest soil conc	7.10E-04	0.00035	2.49E-07	3.10E-04	0.0037	1.1E-06	1.70E-07	0.0027	4.59E-10	1.4E-06	0.012	0.0001	0.000001	1.00E-05	116.3	11.6

Table 7-4B. Assessment Endpoint 3 - Piscivorous Mammal

Mink (*Mustela vison*) Dioxins/Furans	Sediment Conc (mg/kg)	Sediment IR (kg/day)	Sediment Dose (mg/day)	Fish Conc (mg/kg)	Food IR (kg/day)	Food Dose (mg/day)	Water Conc (mg/L)	Water IR (L/day)	Water Dose (mg/day)	Total Dose (mg/day)	Body Weight (kg)	ADD (mg/kg-day)	NOAEL (mg/kg BW/day)	LOAEL (mg/kg BW/day)	NOAEL HQ	LOAEL HQ
Reference																
Bluegill (large)	5.70E-06	0.003	1.71E-08	3.49E-06	0.029	1E-07	2.00E-08	0.0578	1.16E-09	1.2E-07	0.55	0.0000002	0.000001	1.00E-05	0.2	0.02
Bluegill (small)	5.70E-06	0.003	1.71E-08	3.36E-06	0.029	9.7E-08	2.00E-08	0.0578	1.16E-09	1.2E-07	0.55	0.0000002	0.000001	1.00E-05	0.2	0.02
Largemouth Bass	5.70E-06	0.003	1.71E-08	5.00E-06	0.029	1.5E-07	2.00E-08	0.0578	1.16E-09	1.6E-07	0.55	0.0000003	0.000001	1.00E-05	0.3	0.03
Site																
Bluegill (BP)	0.005	0.003	1.50E-05	2.72E-05	0.029	7.9E-07	1.70E-07	0.0578	9.83E-09	1.6E-05	0.55	0.00003	0.000001	1.00E-05	28.7	2.9
Bluegill (BP-NS)	0	0.003	0.00E+00	2.72E-05	0.029	7.9E-07	1.70E-07	0.0578	9.83E-09	8E-07	0.55	0.000001	0.000001	1.00E-05	1.5	0.1
Dollar Sunfish (BP)	0.005	0.003	1.50E-05	7.92E-05	0.029	2.3E-06	1.70E-07	0.0578	9.83E-09	1.7E-05	0.55	0.00003	0.000001	1.00E-05	31.5	3.1
Dollar Sunfish (BP-NS)	0	0.003	0.00E+00	7.92E-05	0.029	2.3E-06	1.70E-07	0.0578	9.83E-09	2.3E-06	0.55	0.000004	0.000001	1.00E-05	4.2	0.4
Warmouth (BP)	0.005	0.003	1.50E-05	3.21E-05	0.029	9.3E-07	1.70E-07	0.0578	9.83E-09	1.6E-05	0.55	0.00003	0.000001	1.00E-05	29.0	2.9
Warmouth (BP-NS)	0	0.003	0.00E+00	3.21E-05	0.029	9.3E-07	1.70E-07	0.0578	9.83E-09	9.4E-07	0.55	0.000002	0.000001	1.00E-05	1.7	0.2
Bluegill (WMC)	0.005	0.003	1.50E-05	5.93E-06	0.029	1.7E-07	1.70E-07	0.0578	9.83E-09	1.5E-05	0.55	0.000028	0.000001	1.00E-05	27.6	2.8
Bluegill (WMC-NS)	0	0.003	0.00E+00	5.93E-06	0.029	1.7E-07	1.70E-07	0.0578	9.83E-09	1.8E-07	0.55	0.0000003	0.000001	1.00E-05	0.3	0.03
Redear Sunfish (WMC)	0.005	0.003	1.50E-05	1.71E-04	0.029	5E-06	1.70E-07	0.0578	9.83E-09	2E-05	0.55	0.00004	0.000001	1.00E-05	36.3	3.6
Redear Sunfish (WMC-NS	0	0.003	0.00E+00	1.71E-04	0.029	5E-06	1.70E-07	0.0578	9.83E-09	5E-06	0.55	0.00001	0.000001	1.00E-05	9.0	0.9
Warmouth (WMC)	0.005	0.003	1.50E-05	1.08E-04	0.029	3.1E-06	1.70E-07	0.0578	9.83E-09	1.8E-05	0.55	0.00003	0.000001	1.00E-05	33.0	3.3
Warmouth (WMC-NS)	0	0.003	0.00E+00	1.08E-04	0.029	3.1E-06	1.70E-07	0.0578	9.83E-09	3.1E-06	0.55	0.00001	0.000001	1.00E-05	5.7	0.6
Average Fish	0.005	0.003	1.50E-05	7.06E-05	0.029	2E-06	1.70E-07	0.0578	9.83E-09	1.7E-05	0.55	0.00003	0.000001	1.00E-05	31.0	3.1
Average Fish-NS	0	0.003	0.00E+00	7.06E-05	0.029	2E-06	1.70E-07	0.0578	9.83E-09	2.1E-06	0.55	0.000004	0.000001	1.00E-05	3.7	0.4
West Mineral Creek	4.40E-04	0.003	1.32E-06	5.93E-06	0.029	1.7E-07	2.50E-08	0.0578	1.45E-09	1.5E-06	0.55	0.000003	0.000001	1.00E-05	2.7	0.3

Table 7-4. Food-Web Models, Davis Timber Site, Hattiesburg, Mississippi

Conc = Concentration
IR = Ingestion rate
Wt = weight
ADD = Average daily dose
NOAEL =No-observed-adverse-effects level
NS = No incidental sediment ingestion
LOAEL =Lowest-observed-adverse-effects level
HQ = Hazard quotient
mg/kg = milligrams per kilogram (all concentrations in dry weight)
BW = body weight
L = liter
BP = Beaver Pond
WMC = West Mineral Creek

Table 7-5.Hazard Quotients for Dioxin/Furan TEQs in Fish Associated with Low and High Risk to Various Wildlife

Table 7-5A. Risks to Mammalian Wildlife

Fish Species	Sample ID	Location	Dioxin/Furan TEQ (ww) (ng/kg)	Q	Low Risk HQ Toxicity Reference Value* Mammal 0.7	High Risk HQ Toxicity Reference Value* Mammal 7
Bluegill	DTREF4BLGL	Reference	0.9	J	1.3	0.1
Bluegill	DTREF4BLGS	Reference	0.83	J	1.2	0.1
Largemouth Bass	DTREF4LMB	Reference	1.2	J	1.7	0.2
Bluegill	DTBPBLG	Beaver Pond	6.8	J	9.7	0.97
Dollar Sunfish	DTBPDOS	Beaver Pond	19	J	27.1	2.7
Warmouth	DTBPWAM	Beaver Pond	7.7	J	11.0	1.1
Bluegill	DTWMCBLG	West Mineral Creek	25	J	35.7	3.6
Redear Sunfish	DTWMCRSF	West Mineral Creek	41	J	58.6	5.9
Warmouth	DTWMCWAM	West Mineral Creek	26	J	37.1	3.7

Table 7-5B. Risks to Fish Wildlife

					Fish 50	Fish 80
Bluegill	DTREF4BLGL	Reference	0.9	J	0.02	0.01
Bluegill	DTREF4BLGS	Reference	0.83	J	0.02	0.01
Largemouth Bass	DTREF4LMB	Reference	1.2	J	0.02	0.02
Bluegill	DTBPBLG	Beaver Pond	6.8	J	0.1	0.1
Dollar Sunfish	DTBPDOS	Beaver Pond	19	J	0.4	0.2
Warmouth	DTBPWAM	Beaver Pond	7.7	J	0.2	0.1
Bluegill	DTWMCBLG	West Mineral Creek	25	J	0.5	0.3
Redear Sunfish	DTWMCRSF	West Mineral Creek	41	J	0.8	0.5
Warmouth	DTWMCWAM	West Mineral Creek	26	J	0.5	0.3

Table 7-5C. Risks to Avian Wildlife

					Avian 6	Avian 60
Bluegill	DTREF4BLGL	Reference	0.9	J	0.2	0.02
Bluegill	DTREF4BLGS	Reference	0.83	J	0.1	0.01
Largemouth Bass	DTREF4LMB	Reference	1.2	J	0.2	0.02
Bluegill	DTBPBLG	Beaver Pond	6.8	J	1.1	0.1
Dollar Sunfish	DTBPDOS	Beaver Pond	19	J	3.2	0.3
Warmouth	DTBPWAM	Beaver Pond	7.7	J	1.3	0.1
Bluegill	DTWMCBLG	West Mineral Creek	25	J	4.2	0.4
Redear Sunfish	DTWMCRSF	West Mineral Creek	41	J	6.8	0.7
Warmouth	DTWMCWAM	West Mineral Creek	26	J	4.3	0.4

Notes: Highlighted cells are HQ≥1

HQ = Hazard quotient

TEQ = Toxic equivalent quotient

ww = Wet weight

ng/kg = Nanogram per kilogram

Q = Qualifier

J = Estimated concentration

*Toxicity reference values from EPA (1993) and are ng/kg ww

Table 7-6. Location-Specific Hazard Quotients in Sediment, Davis Timber Site, Hattiesburg, MS

Chemical	ATV	DTSDB/T01	HQ	DTSDB/T02	HQ	DTSDB/T03	HQ	DTSDB/T04	HQ	DTSDB/T05	HQ
PCP (µg/kg)	12	630	52.5	1700	141.7	960	80.0	180	15.0	76	6.3
Dioxins/Furans (ng/kg)											
TEQ (invert)	21.5	1400	65.1	5000	232.6	2200	102.3	420	19.5	350	16.3
TEQ (Mammals) LR	2.5	1400	560.0	5000	2000.0	2200	880.0	420	168.0	350	140.0
TEQ (Mammals) HR	25	1400	56.0	5000	200.0	2200	88.0	420	16.8	350	14.0
TEQ (birds) LR	21	670	31.9	2400	114.3	760	36.2	190	9.0	170	8.1
TEQ (birds) HR	210	670	3.2	2400	11.4	760	3.6	190	0.9	170	0.8
TEQ (fish) LR	60	680	11.3	2600	43.3	820	13.7	220	3.7	190	3.2
TEQ (fish) HR	100	680	6.8	2600	26.0	820	8.2	220	2.2	190	1.9
Chemical		**DTEMCSD11**	**HQ**	**DTEMCSD12**	**HQ**	**DTWMCSD01**	**HQ**	**DTSDREF1**	**HQ**		
PCP (µg/kg)	12	940	78.3	150	12.5	120	10.0	14	1.2		
Dioxins/Furans (ng/kg)											
TEQ (invert)	21.5	1300	60.5	22	1.02	440	20.5	5.7	0.3		
TEQ (Mammals) LR	2.5	1300	520.0	22	8.8	440	176.0	5.7	2.3		
TEQ (Mammals) HR	25	1300	52.0	22	0.9	440	17.6	5.7	0.2		
TEQ (birds) LR	21	640	30.5	11	0.5	200	9.5	4.8	0.2		
TEQ (birds) HR	210	640	3.0	11	0.1	200	0.95	4.8	0.02		
TEQ (fish) LR	60	620	10.3	11	0.2	210	3.5	4.0	0.1		
TEQ (fish) HR	100	620	6.2	11	0.1	210	2.1	4.0	0.04		
Chemical		**AVERAGE**	**HQ**	**MINIMUM**	**HQ**	**MAXIMUM**	**HQ**				
PCP (µg/kg)	12	594.5	49.5	76	6.3	1700	141.7				
Dioxins/Furans (ng/kg)											
TEQ (invert)	21.5	1391.5	64.7	22	1.02	5000	232.6				
TEQ (Mammals) LR	2.5	1391.5	556.6	22	8.8	5000	2000				
TEQ (Mammals) HR	25	1391.5	55.7	22	0.9	5000	200.0				
TEQ (birds) LR	21	630.1	30.0	11	0.5	2400	114.3				
TEQ (birds) HR	210	630.1	3.0	11	0.1	2400	11.4				
TEQ (fish) LR	60	668.9	11.1	11	0.2	2600	43.3				
TEQ (fish) HR	100	668.9	6.7	11	0.1	2600	26.0				

Notes: Highlighted cells have HQ≥1

ATV = Alternate toxicity value. Source: PCP (CCME 1999); dioxin invert (CCME 2001); other dioxin values (EPA 1993)

HQ = Hazard quotient

PCP = Pentachlorophenol

invert = Invertebrates

µg/kg = Micrograms per kilogram

TEQ = Toxic equivalent

ng/kg = Nanograms per kilogram

LR = Low risk to sensitive species

HR = High risk to sensitive species

Table 7-7. Survival and Growth of *Hyalella azteca* After 10- and 14-Day Toxicity Tests, Davis Timber Site, Hattiesburg, Mississippi

Sample ID	PCP Concentration (µg/kg)	Number Exposed	Number Alive	Percent Survival	Growth (mg/organism)
Control	3000 U	80	74	92.5	0.12
DTSDREF1	14	80	79	98.75	0.14
DTSDBT01	630	80	79	98.75	0.16
DTSDBT02	1700	80	70	87.5	0.13
DTSDBT03	960	80	78	97.5	0.17
DTSDBT04	180	80	71	88.75	0.19
DTSDBT05	76	80	79	98.75	0.17
10 Day Dilution Tests (Soils were Tested as Sediment*)					
DTSS07[1]	120000	40	0	0[2]	NM[3]
DTSS08[1]	34000	40	0	0[2]	NM[3]
Control	3000 U	40	37	92.5	NM

Notes:

[1] Soil sample tested as sediment

[2] Significantly different (P=0.05) from the laboratory control sediment

[3] NM = Not measured due to 100% mortality

PCP = Pentachlorophenol

ug/kg = Micrograms per kilogram

mg = Milligram

U = Not detected. Number shown is detection limit

* = only 4 replicates tested due to inadequate sample and test run for 10 days

Table 7-8. Results of Seedling Germination Tests with the Lettuce Seed, *Lactuca sativa*, Davis Timber Site, Hattiesburg, Mississippi

Sample ID	PCP Concentration (µg/kg)	Number of Seeds Sown	Number Germinated	Percent Germinated
Control	830 U	120	111	92.5
DT-SS-REF-1	1.6 J	120	99	82.5
DT-SS-02	28	120	87	72.5
DT-SS-02 (50%)	14	120	96	80
DT-SS-03	730	120	83	69.2

Notes:
PCP = Pentachlorophenol
NA = Not analyzed
µg/kg = Micrograms per kilogram
U = Not detected. Number shown is detection limit
J = Estimated value

Table 7-9. Bioaccumulation Factors, Davis Timber Site, Hattiesburg, Mississippi

Table 7-9A. Soil-to-Earthworm Bioaccumulation Factors

Sample ID	Soil TEQ (ng/kg dw)	Earthworm TEQ (ng/kg ww)	Earthworm TEQ (ng/kg dw)	BAF	TOC Fraction	Lipid Fraction	BSAF
DTSS02EW	150	35	181.92	1.21	0.0065	0.024	0.33
DTSS03EW	230	54	312.14	1.36	0.042	0.025	2.28
DT502SSEW*	**75**	23	**93.23**	1.24	**0.0065**	0.027	0.30
DTSSREF1EW	2.1R	0.98	4.61	NA	0.0069	0.022	NA
Average**	151.67	37.33	195.76	1.27	0.02	0.03	0.97

Table 7-9B. Sediment-to-Fish Bioaccumulation Factors

Sample ID	Location	Sediment TEQ (ng/kg dw)	Fish TEQ (ng/kg ww)	Fish TEQ (ng/kg dw)	BAF (Unitless)	TOC Fraction	Lipid Fraction	BSAF (Unitless)
Bluegill	Beaver Pond	420	7.68	30.72	0.07	0.023	0.031	0.05
Dollar Sunfish	Beaver Pond	420	24.528	102.1	0.24	0.023	0.033	0.17
Warmouth	Beaver Pond	420	9.122	36.49	0.09	0.023	0.023	0.09
Bluegill	West Mineral Creek	440	38.77	155.02	0.35	0.018	0.021	0.30
Redear Sunfish	West Mineral Creek	440	58.398	233.59	0.53	0.018	0.038	0.25
Warmouth	West Mineral Creek	440	33.66	134.64	0.31	0.018	0.02	0.28
Average**		430	28.69	115.43	0.265	0.02	0.03	0.19

Table 7-9C. Sediment-to-*Lumbriculus variegatus* Bioaccumulation Factors

Sample ID	Sediment TEQ (ng/kg dw)	Lumbriculus TEQ (ng/kg ww)	Lumbriculus TEQ (ng/kg dw)	BAF (Unitless)	TOC Fraction	Lipid Fraction	BSAF (Unitless)
DT01SDSW	1400	156	1220.66	0.87	0.023	0.015	1.34
DT02SDSW	5000	560	4179.10	0.84	0.018	0.016	0.94
DT03SDSW	2200	390	3362.07	1.53	0.015	0.015	1.53
DT04SDSW	420	27	219.69	0.52	0.035	0.013	1.41
DT05SDSW	350	70	559.11	1.60	0.008	0.014	0.91
DTREF1SDSW	**3.6977**	1	7.66	2.07	0.019	0.022	1.79
Average**	1874	240.6	1908.13	1.071	0.02	0.01	1.225

Notes:

TEQ = Toxic equivalent
ng/kg = Nanogram per kilogram
dw = Dry weight
ww = Wet weight
TOC = Total organic carbon
BAF = Bioaccumulation factor
BSAF = Biota sediment accumulation factor
NA = Not available

* DT502SSEW (50% dilution: Bold number is estimated)

** Average does not include reference location

Table 7-10. Remedial Goal Options for Surface Soil, Davis Timber Site, Hattiesburg, Mississippi

Asssessment Endpoint #2: Mammalian Insectivore

Chemical	Worm IR (kg/day)	Soil IR (kg/day)	BW (kg)	NFIR (mg/kgBW/day)	NSIR	BAFearthworm (mean)	BAFearthworm (max)	DF	NOAEL (mg/kg BW/day)	LOAEL	NOAEL RGO (mg/kg) (mean)	NOAEL RGO (mg/kg) (max)	LOAEL RGO (mg/kg) (mean)	LOAEL RGO (mg/kg) (max)
Dioxins/Furans														
Mammal	0.0037	0.00035	0.012	0.308	0.029	1.27	1.36	1	1E-06	0.00001	0.0000024	0.0000022	0.000024	0.000022

Asssessment Endpoint #4: Avian Insectivore

Chemical	Worm IR (kg/day)	Soil IR (kg/day)	BW (kg)	NFIR (mg/kgBW/day)	NSIR	BAFearthworm (mean)	BAFearthworm (max)	DF	NOAEL (mg/kg BW/day)	LOAEL	NOAEL RGO (mg/kg) (mean)	NOAEL RGO (mg/kg) (max)	LOAEL RGO (mg/kg) (mean)	LOAEL RGO (mg/kg) (max)
Dioxins/Furans														
Bird	0.0256	0.0027	0.16	0.160	0.017	1.27	1.36	1	1.4E-05	0.00014	0.0000636	0.0000597	0.000636	0.000597

Notes:
IR = Ingestion rate
BW = Body weight
NFIR = Normalized food ingestion rate (Food IR/BW)
NSIR = Normalized soil ingestion rate (Soil IR/BW)
BAF = Bioaccumulation factor
DF = Dietary fraction
NOAEL = No observed-adverse-effect level
LOAEL = Lowest observed-adverse-effect level
RGO = Remedial goal option (NOEAL or LOAEL/NFIR*BAF+NSIR)
mg/kg = Milligram per kilogram
max = Maximum

Table 7-11. Remedial Goal Options for Sediment, Davis Timber Site, Hattiesburg, Mississippi

Asssessment Endpoint #4: Mammalian Piscivore

Dioxins/Furans	Fish IR (kg/day)	Sed IR (kg/day)	BW (kg)	NFIR (mg/kgBW/day)	NSIR	BAFfish (mean)	BAFfish (max)	DF	NOAEL (mg/kg BW/day)	LOAEL	NOAEL RGO (mg/kg) (mean)	NOAEL RGO (mg/kg) (max)	LOAEL RGO (mg/kg) (mean)	LOAEL RGO (mg/kg) (max)
Beaver Pond	0.029	0.003	0.55	0.053	0.005	0.133	0.24	1	0.000001	0.00001	0.0000802	0.0000552	0.000802	0.000552
W. Min Creek	0.029	0.003	0.55	0.053	0.005	0.396	0.53	1	0.000001	0.00001	0.0000380	0.0000299	0.000380	0.000299

Asssessment Endpoint #5: Avian Piscivore

Dioxins/Furans	Fish IR (kg/day)	Sed IR (kg/day)	BW (kg)	NFIR (mg/kgBW/day)	NSIR	BAFfish (mean)	BAFfish (max)	DF	NOAEL (mg/kg BW/day)	LOAEL	NOAEL RGO (mg/kg) mean	NOAEL RGO (mg/kg) (max)	LOAEL RGO (mg/kg) (mean)	LOAEL RGO (mg/kg) (max)
Beaver Pond	0.0115	0.00023	0.241	0.048	0.001	0.133	0.24	1	0.000014	0.00014	0.0019176	0.0011284	0.019176	0.011284
W. Min Creek	0.0115	0.00023	0.241	0.048	0.001	0.396	0.53	1	0.000014	0.00014	0.0007053	0.0005334	0.007053	0.005334

Asssessment Endpoint #5: Avian Insectivore

Chemical	Fish IR (kg/day)	Sed IR (kg/day)	BW (kg)	NFIR (mg/kgBW/day)	NSIR	BAFlumbriculus (mean)	BAFlumbriculus (max)	DF	NOAEL (mg/kg BW/day)	LOAEL	NOAEL RGO (mg/kg) (mean)	NOAEL RGO (mg/kg) (max)	LOAEL RGO (mg/kg) (mean)	LOAEL RGO (mg/kg) (max)
Dioxins/Furans	0.0115	0.00023	0.241	0.048	0.001	1.072	1.6	1	0.000014	0.00014	0.0002687	0.0001811	0.002687	0.001811

Notes:
IR = Ingestion rate
DF = Dietary fraction
NFIR = Normalized food ingestion rate (Food IR/BW)
NSIR = Normalized sediment ingestion rate (Sediment IR/BW)
BW = Body weight
RGO = Remedial goal option (NOEAL or LOAEL/NFIR*BAF+NSIR)
NOAEL = No observed-adverse-effect level
LOAEL = Lowest observed-adverse-effect level
BAF = Bioaccumulation factor
NA = Not available
NC = Not calculated

Table 7-12. Summary of Risks in Surface Soil and Sediment, Davis Timber Site, Hattiesburg, Mississippi

Assessment Endpoint	Lines of Evidence	COPCs Involved	Affected Locations
Protection of Soil Invertebrates	HQs greater than unity using mean and maximum chemical concentrations	Pentachlorophenol	All locations
	Location-specific HQs greater than unity	Pentachlorophenol	DTSS07,DTSS08
	Site-specific toxicity toxicity tests with the earthworm, *Eisenia foetida*	Pentachlorophenol	DTSS07,DTSS08
Protection of Insectivorous Mammals	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Dioxins/Furans	All locations including East Mineral Creek West Mineral Creek
Protection of Piscivorous Mammals	HQs greater than unity using mean and maximum chemical concentrations tissues and abiotic media	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
Protection of Omnivorous and Carnivorous Mammals	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
Protection of Insectivorous, Omnivorous, and Carnivorous Birds	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
Protection of Terrestrial Plants	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Pentachlorophenol	DTSS07,DTSS08
	Site-specific toxicity toxicity tests	Pentachlorophenol	DTSS07,DTSS08
Protection of Insectivorous Birds	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
Protection of Piscivorous Birds	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
	HQs greater than unity when compared to Dioxin/Furan TEQs for sensitive avian species	Dioxins/Furans	Beaver Pond West Mineral Creek East Mineral Creek
Protection of Benthic Macroinvertebrates	HQs greater than unity using mean and maximum chemical concentrations	Pentachlorophenol Dioxins/Furans	West Mineral Creek Beaver Pond
	Location-specific HQs greater than unity	Pentachlorophenol Dioxins/Furans	West Mineral Creek East Mineral Creek Beaver Pond
	Site-specific toxicity toxicity tests showing acute toxicity to *Hyalella azteca* and *Chironomus tentans*	Pentachlorophenol	DTSS07,DTSS08
Protection of Fish Populations	HQs greater than unity when compared to Dioxin/Furan TEQs for sensitive fish species	Dioxins/Furans	West Mineral Creek Beaver Pond East Mineral Creek
Protection of Aquatic Plants	HQs from food-web models greater than unity when compared with NOAEL and/or LOAEL TRVs	NA	NA

Notes:

COPC = Chemical of potential concern

HQ = Hazard quotient

NOAEL = No-observed-adverse-effect level

LOAEL = Lowest-observed-adverse-effect level

TRV = Toxicity reference value

NA = Not applicable

Table 7-13A. Remedial Goal Options for Surface Soil and Sediment, Davis Timber Site, Hattiesburg, Mississippi

Chemical	Assessment Endpoint	RGO Range (mg/kg)		Toxicological Endpoint Selected
		NOAEL	LOAEL	
SURFACE SOIL				
Pentachlorophenol	Soil Invertebrates	34	120	Earthworm toxicity test
	Terrestrial Plants	5	50	*Seed germination test*
Dioxin TEQ	Mammalian Insectivore	0.0000024	0.000024	Food-web model with the Short-tailed shrew
	Avian Insectivore	0.000064	0.0006	Food-web model with the American woodcock
SURFACE SEDIMENT				
Pentachlorophenol	Aquatic Invertebrates	1.7	34	*Hyalella azteca* toxicity test
	Aquatic Plants	NA	NA	NA
Dioxin TEQ	Mammalian Piscivore	0.00008	0.0008	Food-web model with the mink
	Mammalian Piscivore	0.000038	0.00038	Food-web model with the mink
	Avian Piscivore	0.0019	0.019	Food-web model with the Green heron
	Avian Piscivore	0.0007	0.007	Food-web model with the Green heron
	Avian Insectivore	0.00027	0.0027	Food-web model with the Green heron

Notes:

RGO = remedial goal option
NOAEL = No observed adverse effect level
LOAEL = Lowest observed adverse effect level
BP = Beaver Pond
WMC = West Mineral Creek
EMC = East Mineral Creek

µg/kg = Microgram per kilogram
mg/kg = Miligram per kilogram
NA = Not applicable
OSWER = Office of Solid Waste and Emergency Response
TEQ = Toxic equivalent

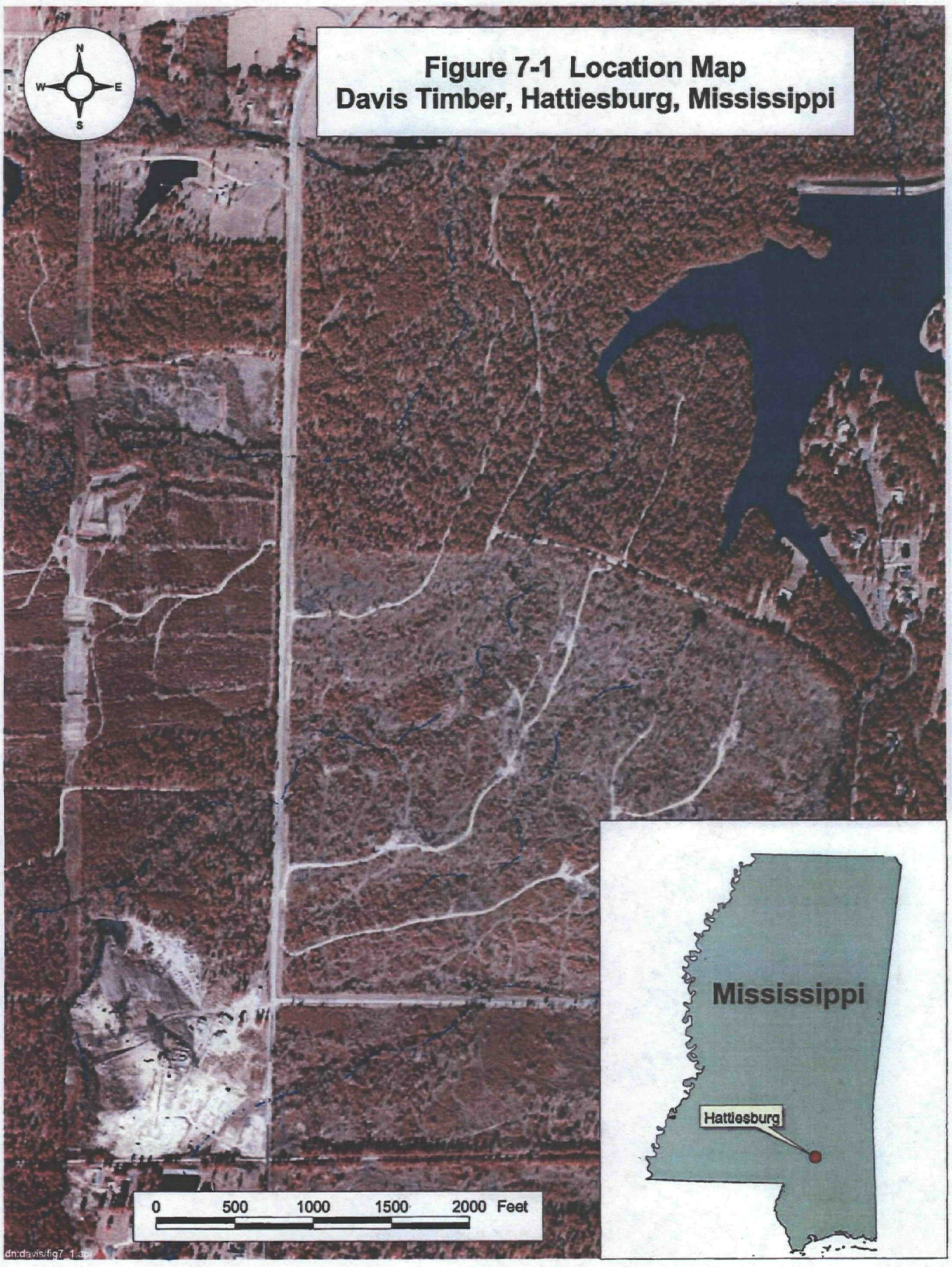
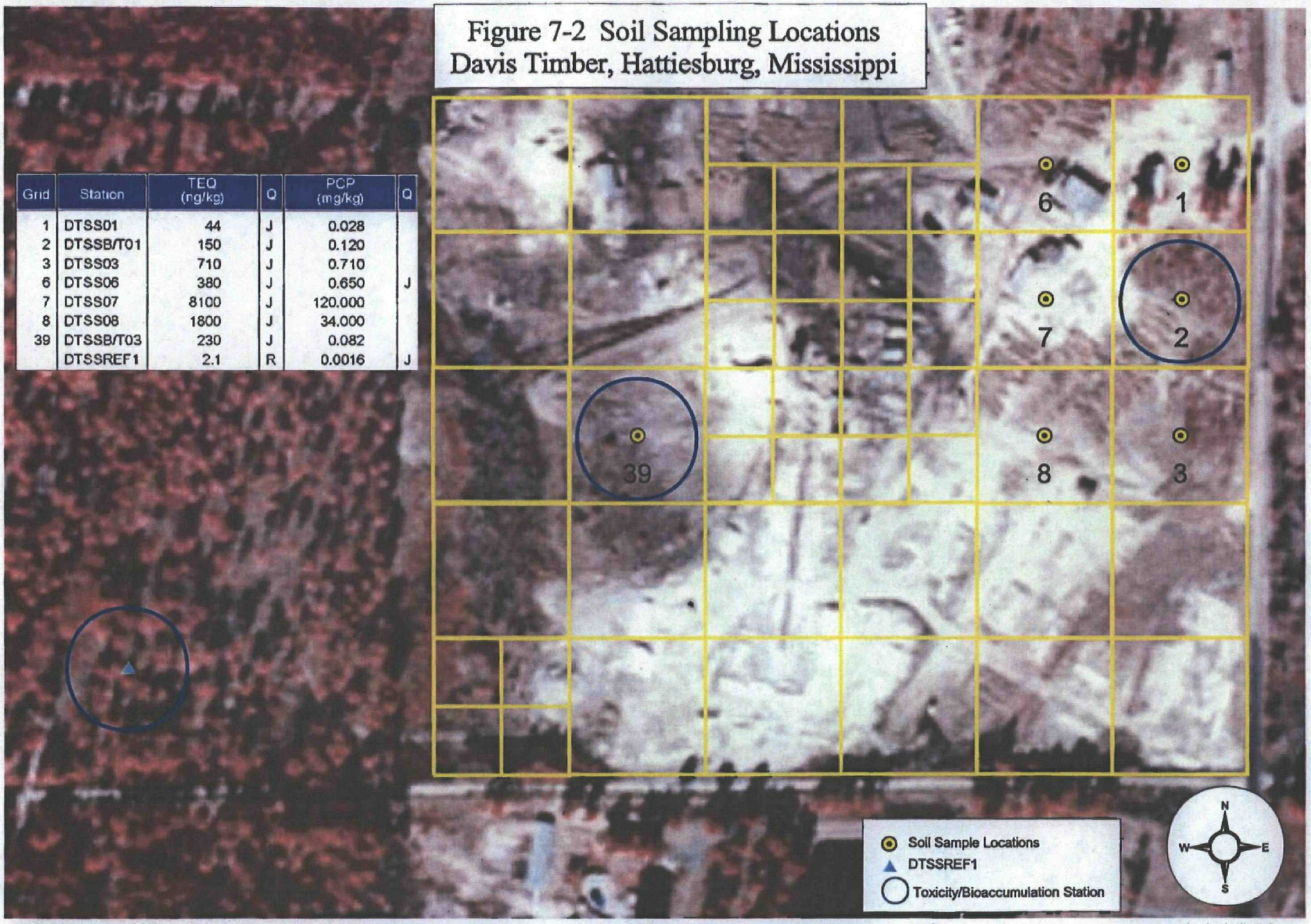

N
W
E
S
Figure 7-1 Location Map
Davis Timber, Hattiesburg, Mississippi
0
500
1000
1500
2000 Feet
Mississippi
Hattiesburg

Figure 7-2 Soil Sampling Locations
Davis Timber, Hattiesburg, Mississippi

Grid	Station	TEQ (ng/kg)	Q	PCP (mg/kg)	Q
1	DTSS01	44	J	0.028	
2	DTSSB/T01	150	J	0.120	
3	DTSS03	710	J	0.710	
6	DTSS06	380	J	0.650	J
7	DTSS07	8100	J	120.000	
8	DTSS08	1800	J	34.000	
39	DTSSB/T03	230	J	0.082	
	DTSSREF1	2.1	R	0.0016	J



TEQ = Toxic Equivalent Concentration of dioxins (mammalian)
PCP = Pentachlorophenol
Q = Qualifier

0 100 200 300 400 500 Feet

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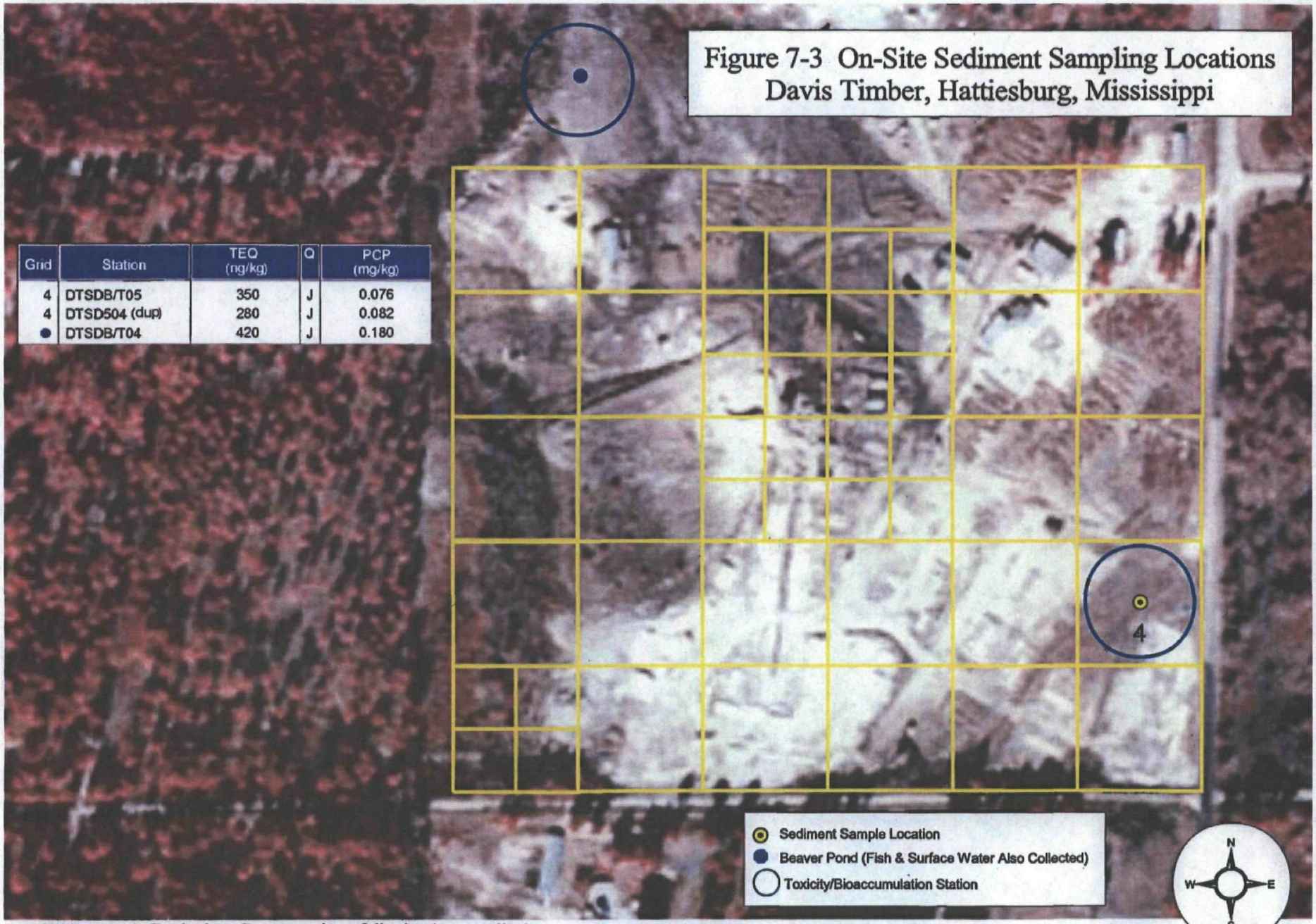
Figure 7-3 On-Site Sediment Sampling Locations
Davis Timber, Hattiesburg, Mississippi



Grid	Station	TEQ (ng/kg)	Q	PCP (mg/kg)
4	DTSDB/T05	350	J	0.076
4	DTSD504 (dup)	280	J	0.082
●	DTSDB/T04	420	J	0.180

TEQ = Toxic Equivalent Concentration of dioxins (mammalian)
PCP = Pentachlorophenol
Q = Qualifier (dup) = Duplicate

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Figure 7-4 Creek Sediment Sampling Locations
Davis Timber, Hattiesburg, Mississippi

Station	TEQ (ng/kg)	Q	PCP (mg/kg)
DT-SD-B/T-01	1400.0	J	0.630
DT-SD-B/T-02	5000.0	J	1.700
DT-SD-B/T-03	2200.0	J	0.960
DT-EMC-SD11	1300.0	J	0.940
DT-EMC-SD12	22.0	J	0.150
DT-WMC-SD01	440.0	J	0.120
DT-SD-REF1	5.7	J	0.014

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0 500 1000 1500 2000 Feet

Fish Collection Zone

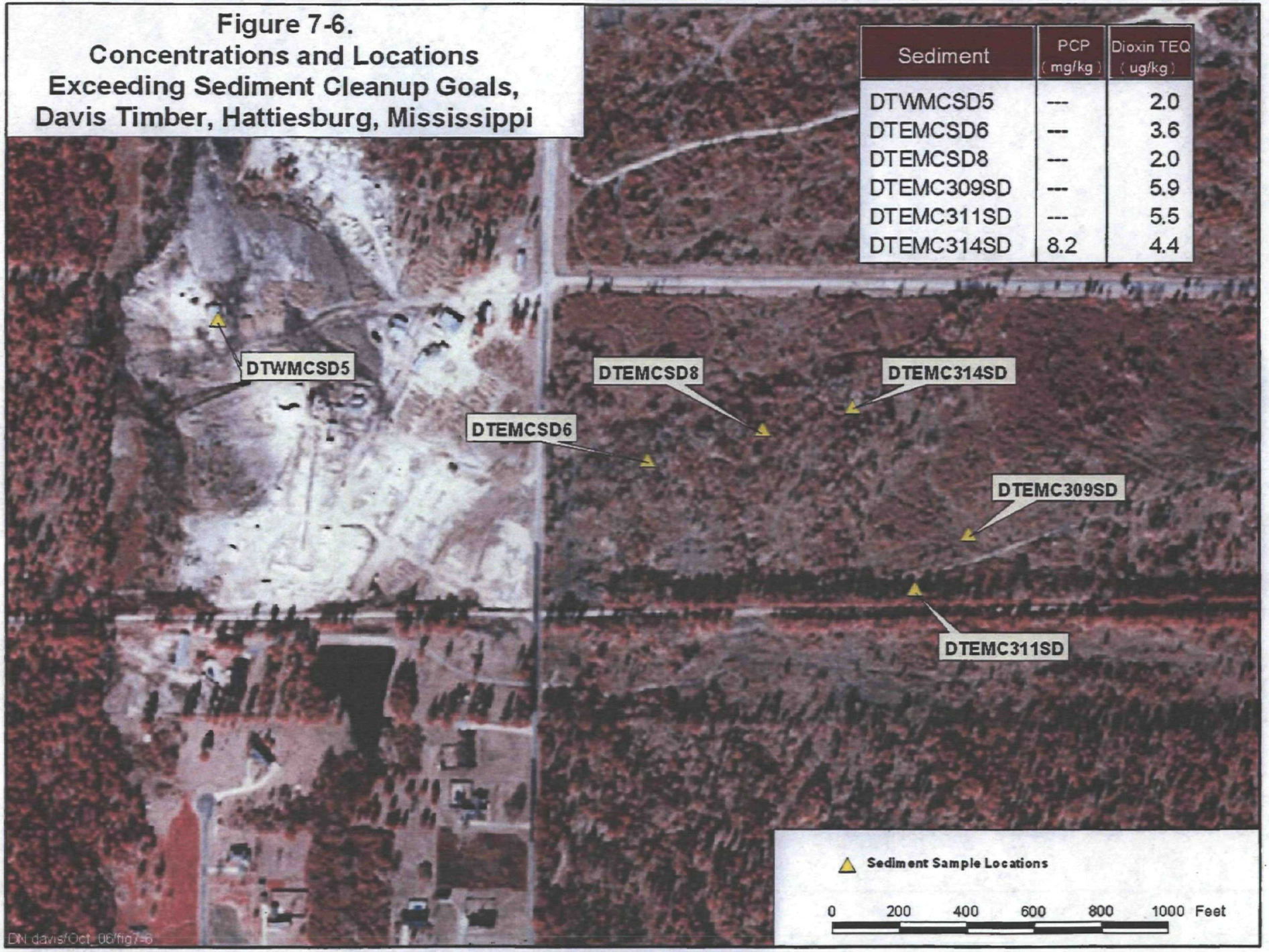
TEQ = Toxic Equivalent Concentration of dioxins (mammalian)
PCP = Pentachlorophenol
Q = Qualifier

Figure 7-5.
Concentrations and Locations Exceeding Surface Soil Cleanup Goals, Davis Timber, Hattiesburg, Mississippi

Soil	PCP (mg/kg)	Dioxin TEQ (ug/kg)
DT702SLA*	28	---
DT002SLA	68	---
DTSS07	120	8.1
DTSS08	34	1.8

*DT702SLA is a duplicate of DT002SLA

Figure 7-6.
Concentrations and Locations Exceeding Sediment Cleanup Goals, Davis Timber, Hattiesburg, Mississippi



Appendix A

Dioxin/Furan Toxic Equivalent Concentration Calculations

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	DL(CS1)	8.76	43.8	87.6	CL (CS5)	3505	17525	35050.18
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 87.63 438.1 876.3 C_1L (CS5) 35050 175251 350501.79

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	6.2	U		2,3,7,8 TCDD	x	1	=	6.20	1	6.20	1	6.20
2	200	J		TCDD Total								
3	77			1,2,3,7,8 PeCDD	x	1	=	77.00	1	77.00	1	77.00
4	1300	J		PeCDD Total								
5	370			1,2,3,4,7,8 HxCDD	x	0.1	=	37.00	0.05	18.50	0.5	185.00
6	2700			1,2,3,6,7,8 HxCDD	x	0.1	=	270.00	0.01	27.00	0.01	27.00
7	1600	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	160.00	0.1	160.00	0.01	16.00
8	16000	J		HxCDD Total								
9	47000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	470.00	0.001	47.00	0.001	47.00
10	69000	J	D	HpCDD Total								
11	290000	J	D,6,9	OCDD	x	0.0001	=	29.00	0.0001	29.00	0.0001	29.00
12	15		C	2,3,7,8 TCDF	x	0.1	=	1.50	1	15.00	0.05	0.75
13	130	J		TCDF Total								
14	60			1,2,3,7,8 PeCDF	x	0.05	=	3.00	0.1	6.00	0.05	3.00
15	44	U	E	2,3,4,7,8 PeCDF	x	0.5	=	22.00	1	44.00	0.5	22.00
16	1000	J		PeCDF Total								
17	320	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	32.00	0.1	32.00	0.1	32.00
18	280			1,2,3,6,7,8 HxCDF	x	0.1	=	28.00	0.1	28.00	0.1	28.00
19	11	U		1,2,3,7,8,9 HxCDF	x	0.1	=	1.10	0.1	1.10	0.1	1.10
20	240			2,3,4,6,7,8 HxCDF	x	0.1	=	24.00	0.1	24.00	0.1	24.00
21	7100	J		HxCDF Total								
22	11000	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	110.00	0.01	110.00	0.01	110.00
23	960			1,2,3,4,7,8,9 HpCDF	x	0.01	=	9.60	0.01	9.60	0.01	9.60
24	30000	J		HpCDF Total								
25	21000	J	7	OCDF	x	0.0001	=	2.10	0.0001	2.10	0.0001	2.10
27	1,300	J		TEQ (mammals from WHO-TEF)								
28	640	J		TEQ (avian from WHO-TEF)								
29	620	J		TEQ (fish from WHO-TEF)								
30	41			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	0.98	4.9	9.8 : CL (CS5):	393	1966	3932.90
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted:

Dilution Factor= ([redacted]) ; D_1L(CS1) 9.83 49.2 98.3 C_1L (CS5) 3933 19665 39328.97

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.66	U		2,3,7,8 TCDD	x	1	=	0.66	1	0.66	1	0.66
2	1.2	J		TCDD Total								
3	2.1	J	1	1,2,3,7,8 PeCDD	x	1	=	2.10	1	2.10	1	2.10
4	21	J		PeCDD Total								
5	6.1			1,2,3,4,7,8 HxCDD	x	0.1	=	0.61	0.05	0.31	0.5	3.05
6	42			1,2,3,6,7,8 HxCDD	x	0.1	=	4.20	0.01	0.42	0.01	0.42
7	19	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	1.90	0.1	1.90	0.01	0.19
8	200	J		HxCDD Total								
9	900			1,2,3,4,6,7,8 HpCDD	x	0.01	=	9.00	0.001	0.90	0.001	0.90
10	1500	J		HpCDD Total								
11	4400	J	D,9	OCDD	x	0.0001	=	0.44	0.0001	0.44	0.0001	0.44
12	0.56	U		2,3,7,8 TCDF	x	0.1	=	0.06	1	0.56	0.05	0.03
13	0.94	UJ		TCDF Total								
14	0.84	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.04	0.1	0.08	0.05	0.04
15	0.87	J	1	2,3,4,7,8 PeCDF	x	0.5	=	0.44	1	0.87	0.5	0.44
16	34	J		PeCDF Total								
17	4.7	J	1,7	1,2,3,4,7,8 HxCDF	x	0.1	=	0.47	0.1	0.47	0.1	0.47
18	4.5	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.45	0.1	0.45	0.1	0.45
19	0.64	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.0
20	4.8	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.48	0.1	0.48	0.1	0.48
21	120	J		HxCDF Total								
22	140	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	1.40	0.01	1.40	0.01	1.40
23	16			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.16	0.01	0.16	0.01	0.16
24	520	J		HpCDF Total								
25	420	J	7	OCDF	x	0.0001	=	0.04	0.0001	0.04	0.0001	0.04
27	22	J		TEQ (mammals from WHO-TEF)								
28	11	J		TEQ (avian from WHO-TEF)								
29	11	J		TEQ (fish from WHO-TEF)								
30	19			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	8.76	43.8	87.6 : CL (CS5):	3505	17525	35050.18
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = (40.91) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (10.0) ; D_1L(CS1 87.63 438.1 876.3 C_1L (CS5) 35050 175251 350501.79

EPA LIMS Sample #: 9073 EPA Sample #: DC-SD-B/T-01 LAB ID #: 48125RE

PROJECT NO.: 04-071 Lab File: B040927A081

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 09/15/04

DATA REVIEWER: Brandie Rivenbark Analysis Date: 09/27/04

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	7.3	U		2,3,7,8 TCDD	x	1	=	7.30	1	7.30	1	7.30
2	10	J		TCDD Total								
3	100			1,2,3,7,8 PeCDD	x	1	=	100.00	1	100.00	1	100.00
4	320	J		PeCDD Total								
5	490	J	5	1,2,3,4,7,8 HxCDD	x	0.1	=	49.00	0.05	24.50	0.5	245.00
6	2400			1,2,3,6,7,8 HxCDD	x	0.1	=	240.00	0.01	24.00	0.01	24.00
7	1900	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	190.00	0.1	190.00	0.01	19.00
8	11000	J		HxCDD Total								
9	55000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	550.00	0.001	55.00	0.001	55.00
10	79000	J	D	HpCDD Total								
11	350000	J	D,9	OCDD	x	0.0001	=	35.00	0.0001	35.00	0.0001	35.00
12	15		C	2,3,7,8 TCDF	x	0.1	=	1.50	1	15.00	0.05	0.75
13	37	J		TCDF Total								
14	58			1,2,3,7,8 PeCDF	x	0.05	=	2.90	0.1	5.80	0.05	2.90
15	40	U	E	2,3,4,7,8 PeCDF	x	0.5	=	20.00	1	40.00	0.5	20.00
16	600	J		PeCDF Total								
17	320	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	32.00	0.1	32.00	0.1	32.00
18	210			1,2,3,6,7,8 HxCDF	x	0.1	=	21.00	0.1	21.00	0.1	21.00
19	24			1,2,3,7,8,9 HxCDF	x	0.1	=	2.40	0.1	2.40	0.1	2.40
20	220			2,3,4,6,7,8 HxCDF	x	0.1	=	22.00	0.1	22.00	0.1	22.00
21	4700	J		HxCDF Total								
22	8400	J	5,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	84.00	0.01	84.00	0.01	84.00
23	730			1,2,3,4,7,8,9 HpCDF	x	0.01	=	7.30	0.01	7.30	0.01	7.30
24	23000	J		HpCDF Total								
25	16000	J	7	OCDF	x	0.0001	=	1.60	0.0001	1.60	0.0001	1.60
27	1,400	J		TEQ (mammals from WHO-TEF)								
28	670	J		TEQ (avian from WHO-TEF)								
29	680	J		TEQ (fish from WHO-TEF)								
30	41			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	8.87	44.4	88.7 : CL (CS5)	3549	17744	35487.61
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 88.72 443.6 887.2 C_1L (CS5) 35488 177438 354876.09

EPA LIMS Sample #: 9074 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis Y. Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	14	J	9	2,3,7,8 TCDD	x	1	=	14.00	1	14.00	1	14.00
2	120	J		TCDD Total								
3	310			1,2,3,7,8 PeCDD	x	1	=	310.00	1	310.00	1	310.00
4	1200	J		PeCDD Total								
5	1800			1,2,3,4,7,8 HxCDD	x	0.1	=	180.00	0.05	90.00	0.5	900.00
6	7600			1,2,3,6,7,8 HxCDD	x	0.1	=	760.00	0.01	76.00	0.01	76.00
7	4800	J	9	1,2,3,7,8,9 HxCDD	x	.0.1	=	480.00	0.1	480.00	0.01	48.00
8	30000	J		HxCDD Total								
9	220000	J	D,2	1,2,3,4,6,7,8 HpCDD	x	0.01	=	2200.00	0.001	220.00	0.001	220.00
10	300000	J	D	HpCDD Total								
11	1400000	J	D,2,C,9	OCDD	x	0.0001	=	140.00	0.0001	140.00	0.0001	140.00
12	42		C	2,3,7,8 TCDF	x	0.1	=	4.20	1	42.00	0.05	2.10
13	130	J		TCDF Total								
14	170			1,2,3,7,8 PeCDF	x	0.05	=	8.50	0.1	17.00	0.05	8.50
15	130			2,3,4,7,8 PeCDF	x	0.5	=	65.00	1	130.00	0.5	65.00
16	2300	J		PeCDF Total								
17	1400	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	140.00	0.1	140.00	0.1	140.00
18	900			1,2,3,6,7,8 HxCDF	x	0.1	=	90.00	0.1	90.00	0.1	90.0[illegible]
19	66			1,2,3,7,8,9 HxCDF	x	0.1	=	6.60	0.1	6.60	0.1	6.6[illegible]
20	720			2,3,4,6,7,8 HxCDF	x	0.1	=	72.00	0.1	72.00	0.1	72.00
21	24000	J		HxCDF Total								
22	48000	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	480.00	0.01	480.00	0.01	480.00
23	4700			1,2,3,4,7,8,9 HpCDF	x	0.01	=	47.00	0.01	47.00	0.01	47.00
24	160000	J	D	HpCDF Total								
25	190000	J	D,7	OCDF	x	0.0001	=	19.00	0.0001	19.00	0.0001	19.00
27	5,000	J		TEQ (mammals from WHO-TEF)								
28	2,400	J		TEQ (avian from WHO-TEF)								
29	2,600	J		TEQ (fish from WHO-TEF)								
30	43			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	DL(CS1)	7.98	39.9	79.8	CL (CS5):	3193	15963	31926.82372
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 7.98 39.9 79.8 C_1L (CS5) 3193 15963 31926.82372

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	13	U		2,3,7,8 TCDD	x	1	=	13	1	13.00	1	13.00
2	48	J		TCDD Total								
3	97			1,2,3,7,8 PeCDD	x	1	=	97	1	97.00	1	97.00
4	590	J		PeCDD Total								
5	460			1,2,3,4,7,8 HxCDD	x	0.1	=	46	0.05	23.00	0.5	230.00
6	2800			1,2,3,6,7,8 HxCDD	x	0.1	=	280	0.01	28.00	0.01	28.00
7	1200	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	120	0.1	120.00	0.01	12.00
8	11000	J		HxCDD Total								
9	130000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	1300	0.001	130.00	0.001	130.00
10	180000	J	D	HpCDD Total								
11	680000	J	D,2,6,9	OCDD	x	0.0001	=	68	0.0001	68.00	0.0001	68.00
12	9.3	U		2,3,7,8 TCDF	x	0.1	=	0.93	1	9.30	0.05	0.47
13	25	J		TCDF Total								
14	53			1,2,3,7,8 PeCDF	x	0.05	=	2.65	0.1	5.30	0.05	2.65
15	45			2,3,4,7,8 PeCDF	x	0.5	=	22.5	1	45.00	0.5	22.50
16	1200	J		PeCDF Total								
17	350	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	35	0.1	35.00	0.1	35.00
18	260			1,2,3,6,7,8 HxCDF	x	0.1	=	26	0.1	26.00	0.1	26.00
19	22	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	2.2	0.1	2.20	0.1	2.20
20	210			2,3,4,6,7,8 HxCDF	x	0.1	=	21	0.1	21.00	0.1	21.00
21	9100	J		HxCDF Total								
22	12000	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	120	0.01	120.00	0.01	120.00
23	1100			1,2,3,4,7,8,9 HpCDF	x	0.01	=	11	0.01	11.00	0.01	11.00
24	45000	J		HpCDF Total								
25	25000	J	7	OCDF	x	0.0001	=	2.5	0.0001	2.50	0.0001	2.50
27	2,200	J		TEQ (mammals from WHO-TEF)								
28	760	J		TEQ (avian from WHO-TEF)								
29	820	J		TEQ (fish from WHO-TEF)								
30	32			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.03	5.1	10.3 : CL (CS5):	412	2059	4118.154803
(CS5)	200	1000	2000						

Sample wt. = (28.9 g) %M or Lipids = (56.6) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (100.0) ; D_1L(CS1 10.30 51.5 103.0 C_1L (CS5) 4118 20591 41181.54803

EPA LIMS Sample #: 9076 EPA Sample #: DT-SD-P/T-04 LAB ID #: 48178

PROJECT NO.: 04-0713 Lab File: B040826A12

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 08/18/04

DATA REVIEWER: Francis C. Huang Analysis Date: 08/28/04

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	2.3	U		2,3,7,8 TCDD	x	1	=	2.3	1	2.30	1	2.30
2	98	J		TCDD Total								
3	32			1,2,3,7,8 PeCDD	x	1	=	32	1	32.00	1	32.00
4	410	J		PeCDD Total								
5	140			1,2,3,4,7,8 HxCDD	x	0.1	=	14	0.05	7.00	0.5	70.00
6	720			1,2,3,6,7,8 HxCDD	x	0.1	=	72	0.01	7.20	0.01	7.20
7	310	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	31	0.1	31.00	0.01	3.10
8	3300	J		HxCDD Total								
9	19000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	190	0.001	19.00	0.001	19.00
10	29000	J	D	HpCDD Total								
11	130000	J	D,2,9	OCDD	x	0.0001	=	13	0.0001	13.00	0.0001	13.00
12	2.4		C	2,3,7,8 TCDF	x	0.1	=	0.24	1	2.40	0.05	0.12
13	64	J		TCDF Total								
14	15			1,2,3,7,8 PeCDF	x	0.05	=	0.75	0.1	1.50	0.05	0.75
15	11			2,3,4,7,8 PeCDF	x	0.5	=	5.5	1	11.00	0.5	5.50
16	580	J		PeCDF Total								
17	93	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	9.3	0.1	9.30	0.1	9.30
18	100			1,2,3,6,7,8 HxCDF	x	0.1	=	10	0.1	10.00	0.1	10.00
19	20			1,2,3,7,8,9 HxCDF	x	0.1	=	2	0.1	2.00	0.1	2.00
20	76			2,3,4,6,7,8 HxCDF	x	0.1	=	7.6	0.1	7.60	0.1	7.60
21	3700	J		HxCDF Total								
22	3000	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	30	0.01	30.00	0.01	30.00
23	340			1,2,3,4,7,8,9 HpCDF	x	0.01	=	3.4	0.01	3.40	0.01	3.40
24	10000	J	D	HpCDF Total								
25	14000	J	D,7	OCDF	x	0.0001	=	1.4	0.0001	1.40	0.0001	1.40
27	420	J		TEQ (mammals from WHO-TEF)								
28	190	J		TEQ (avian from WHO-TEF)								
29	220	J		TEQ (fish from WHO-TEF)								
30	66			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0 : CL (CS5):	399	1993	3986.934417
(CS5)	200	1000	2000						

Sample wt. = (21.3 g) %M or Lipids = (52.9) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ( ) ; D_iL(CS1 0.00 0.0 0.0 C_iL (CS5) 0 0 0

EPA LIMS Sample #: 9077 EPA Sample #: DT-SD-REP1 LAB ID #: 48149

PROJECT NO.: 04-0713 Lab File: R604D828X061.

PROJECT NAME: Davis Timber, Hazlehurst, MS Extraction Date: 08/18/04

DATA REVIEWER: Francis Huang Analysis Date: 08/28/04

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.60	U		2,3,7,8 TCDD	x	1	=	0.6	1	0.60	1	0.60
2	0.60	UJ		TCDD Total								
3	0.83	U		1,2,3,7,8 PeCDD	x	1	=	0.83	1	0.83	1	0.83
4	1.2	UJ		PeCDD Total								
5	1.4	U	E	1,2,3,4,7,8 HxCDD	x	0.1	=	0.14	0.05	0.07	0.5	0.70
6	4.9	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.49	0.01	0.05	0.01	0.05
7	6.0	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	0.6	0.1	0.60	0.01	0.06
8	43	J		HxCDD Total								
9	140			1,2,3,4,6,7,8 HpCDD	x	0.01	=	1.4	0.001	0.14	0.001	0.14
10	290	J		HpCDD Total								
11	3900	J	9	OCDD	x	0.0001	=	0.39	0.0001	0.39	0.0001	0.39
12	0.59	U		2,3,7,8 TCDF	x	0.1	=	0.059	1	0.59	0.05	0.03
13	2.0	UJ		TCDF Total								
14	0.84	U		1,2,3,7,8 PeCDF	x	0.05	=	0.042	0.1	0.08	0.05	0.04
15	0.70	U		2,3,4,7,8 PeCDF	x	0.5	=	0.35	1	0.70	0.5	0.35
16	1.6	J		PeCDF Total								
17	1.3	J	1,7	1,2,3,4,7,8 HxCDF	x	0.1	=	0.13	0.1	0.13	0.1	0.13
18	1.9	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.19	0.1	0.19	0.1	0.19
19	0.42	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.042	0.1	0.04	0.1	0.04
20	1.3	U	E	2,3,4,6,7,8 HxCDF	x	0.1	=	0.13	0.1	0.13	0.1	0.13
21	21	J		HxCDF Total								
22	27	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.27	0.01	0.27	0.01	0.27
23	2.1	U	E	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.021	0.01	0.02	0.01	0.02
24	66	J		HpCDF Total								
25	63	J	7	OCDF	x	0.0001	=	0.0063	0.0001	0.01	0.0001	0.01
27	5.7	J		TEQ (mammals from WHO-TEF)								
28	4.8	J		TEQ (avian from WHO-TEF)								
29	4.0	J		TEQ (fish from WHO-TEF)								
30	53			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0 : CL (CS5):	400	1998	3995
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 0.00 0.0 0.0 C_1L (CS5) 0 0 0

EPA LIMS Sample #: 9078 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.79	U		2,3,7,8 TCDD	x	1	=	0.79	1	0.79	1	0.79
2	0.79	UJ		TCDD Total								
3	4.8	J	1	1,2,3,7,8 PeCDD	x	1	=	4.80	1	4.80	1	4.80
4	28	J		PeCDD Total								
5	16			1,2,3,4,7,8 HxCDD	x	0.1	=	1.60	0.05	0.80	0.5	8.00
6	70			1,2,3,6,7,8 HxCDD	x	0.1	=	7.00	0.01	0.70	0.01	0.70
7	45	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	4.50	0.1	4.50	0.01	0.45
8	380	J		HxCDD Total								
9	1700			1,2,3,4,6,7,8 HpCDD	x	0.01	=	17.0	0.001	1.70	0.001	1.70
10	2900	J		HpCDD Total								
11	9800	J	2,9	OCDD	x	0.0001	=	0.98	0.0001	0.98	0.0001	0.98
12	0.76	U		2,3,7,8 TCDF	x	0.1	=	0.076	1	0.76	0.05	0.04
13	1.5	J		TCDF Total								
14	1.6	U	E	1,2,3,7,8 PeCDF	x	0.05	=	0.080	0.1	0.16	0.05	0.08
15	1.8	J	1	2,3,4,7,8 PeCDF	x	0.5	=	0.90	1	1.80	0.5	0.90
16	47	J		PeCDF Total								
17	11	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	1.10	0.1	1.10	0.1	1.10
18	10			1,2,3,6,7,8 HxCDF	x	0.1	=	1.00	0.1	1.00	0.1	1.00
19	1.0	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.100	0.1	0.10	0.1	0.10
20	11			2,3,4,6,7,8 HxCDF	x	0.1	=	1.10	0.1	1.10	0.1	1.10
21	240	J		HxCDF Total								
22	300	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	3.00	0.01	3.00	0.01	3.00
23	20			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.200	0.01	0.20	0.01	0.20
24	800	J		HpCDF Total								
25	640	J		OCDF	x	0.0001	=	0.064	0.0001	0.06	0.0001	0.06
27	44	J		TEQ (mammals from WHO-TEF)								
28	24	J		TEQ (avian from WHO-TEF)								
29	25	J		TEQ (fish from WHO-TEF)								
30	13			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)	1.00	5.0	10.0	: CL (CS5):	398	1991	3981
(CS5)	200	1000	2000								
Sample wt. = ([redacted] g)	%M or Lipids = ([redacted])				Extract Vol	(20) uL					
Extract Diluted :											
Dilution Factor= ([redacted])				; D_1L(CS1	19.91	99.5	199.1	C_1L (CS5)	7963	39814	79629

EPA LIMS Sample #: 9079[redacted] EPA Sample #: [redacted] LAB ID #: [redacted]
PROJECT NO.: [redacted] Lab File: [redacted]
PROJECT NAME: [redacted] Extraction Date: [redacted]
DATA REVIEWER: [redacted] Analysis Date: [redacted]
SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	3.6	J	9	2,3,7,8 TCDD	x	1	=	3.60	1	3.60	1	3.60
2	19	J		TCDD Total								
3	71			1,2,3,7,8 PeCDD	x	1	=	71.00	1	71.00	1	71.00
4	540	J		PeCDD Total								
5	260			1,2,3,4,7,8 HxCDD	x	0.1	=	26.00	0.05	13.00	0.5	130.00
6	1300			1,2,3,6,7,8 HxCDD	x	0.1	=	130.00	0.01	13.00	0.01	13.00
7	730	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	73.00	0.1	73.00	0.01	7.30
8	6800	J		HxCDD Total								
9	26000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	260.0	0.001	26.00	0.001	26.00
10	42000	J	D	HpCDD Total								
11	160000	J	D,6,9	OCDD	x	0.0001	=	16.00	0.0001	16.00	0.0001	16.00
12	5.9		C	2,3,7,8 TCDF	x	0.1	=	0.590	1	5.90	0.05	0.30
13	55	J		TCDF Total								
14	33			1,2,3,7,8 PeCDF	x	0.05	=	1.650	0.1	3.30	0.05	1.65
15	28			2,3,4,7,8 PeCDF	x	0.5	=	14.00	1	28.00	0.5	14.00
16	1500	J		PeCDF Total								
17	220	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	22.00	0.1	22.00	0.1	22.00
18	160			1,2,3,6,7,8 HxCDF	x	0.1	=	16.00	0.1	16.00	0.1	16.00
19	7.3			1,2,3,7,8,9 HxCDF	x	0.1	=	0.730	0.1	0.73	0.1	0.73
20	160			2,3,4,6,7,8 HxCDF	x	0.1	=	16.00	0.1	16.00	0.1	16.00
21	7400	J		HxCDF Total								
22	5400	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	54.00	0.01	54.00	0.01	54.00
23	700			1,2,3,4,7,8,9 HpCDF	x	0.01	=	7.000	0.01	7.00	0.01	7.00
24	22000	J	D	HpCDF Total								
25	12000	J	D,7	OCDF	x	0.0001	=	1.200	0.0001	1.20	0.0001	1.20
27	710	J		TEQ (mammals from WHO-TEF)								
28	370	J		TEQ (avian from WHO-TEF)								
29	400	J		TEQ (fish from WHO-TEF)								
30	15			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:
1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0	: CL (CS5): 399	1997	3994
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 9.98 49.9 99.8 C_1L (CS5) 3994 19970 39940

EPA LIMS Sample #: 9080 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	4.2	J	9	2,3,7,8 TCDD	x	1	=	4.20	1	4.20	1	4.20
2	14	J		TCDD Total								
3	33			1,2,3,7,8 PeCDD	x	1	=	33.00	1	33.00	1	33.00
4	180	J		PeCDD Total								
5	120			1,2,3,4,7,8 HxCDD	x	0.1	=	12.00	0.05	6.00	0.5	60.00
6	720			1,2,3,6,7,8 HxCDD	x	0.1	=	72.00	0.01	7.20	0.01	7.20
7	360	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	36.00	0.1	36.00	0.01	3.60
8	2800	J		HxCDD Total								
9	16000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	160.0	0.001	16.00	0.001	16.00
10	26000	J	D	HpCDD Total								
11	97000	J	D,2,6,9	OCDD	x	0.0001	=	9.70	0.0001	9.70	0.0001	9.70
12	7.5		C	2,3,7,8 TCDF	x	0.1	=	0.750	1	7.50	0.05	0.38
13	57	J		TCDF Total								
14	25			1,2,3,7,8 PeCDF	x	0.05	=	1.250	0.1	2.50	0.05	1.25
15	23			2,3,4,7,8 PeCDF	x	0.5	=	11.50	1	23.00	0.5	11.50
16	480	J		PeCDF Total								
17	84	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	8.40	0.1	8.40	0.1	8.40
18	63			1,2,3,6,7,8 HxCDF	x	0.1	=	6.30	0.1	6.30	0.1	6.30
19	4.0	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.400	0.1	0.40	0.1	0.40
20	58			2,3,4,6,7,8 HxCDF	x	0.1	=	5.80	0.1	5.80	0.1	5.80
21	1900	J		HxCDF Total								
22	1600	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	16.00	0.01	16.00	0.01	16.00
23	160			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.600	0.01	1.60	0.01	1.60
24	8000	J		HpCDF Total								
25	4800	J	D,7	OCDF	x	0.0001	=	0.480	0.0001	0.48	0.0001	0.48
27	380	J		TEQ (mammals from WHO-TEF)								
28	180	J		TEQ (avian from WHO-TEF)								
29	190	J		TEQ (fish from WHO-TEF)								
30	13			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1) 7.39	36.9	73.9	CL (CS5): 2955	14777	29555
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 147.77 738.9 1477.7 C_1L (CS5) 59110 295550 591099

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	52	J	D,9	2,3,7,8 TCDD	x	1	=	52.00	1	52.00	1	52.00
2	76	J	D	TCDD Total								
3	1000		D	1,2,3,7,8 PeCDD	x	1	=	1000.00	1	1000.00	1	1000.00
4	4800	J	D	PeCDD Total								
5	4300		D	1,2,3,4,7,8 HxCDD	x	0.1	=	430.00	0.05	215.00	0.5	2150.00
6	14000		D	1,2,3,6,7,8 HxCDD	x	0.1	=	1400.00	0.01	140.00	0.01	140.00
7	12000	J	D,9	1,2,3,7,8,9 HxCDD	x	0.1	=	1200.00	0.1	1200.00	0.01	120.00
8	61000	J	D	HxCDD Total								
9	260000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	2600.0	0.001	260.00	0.001	260.00
10	420000	J	D	HpCDD Total								
11	990000	J	D,2,9	OCDD	x	0.0001	=	99.00	0.0001	99.00	0.0001	99.00
12	100		C,D	2,3,7,8 TCDF	x	0.1	=	10.000	1	100.00	0.05	5.00
13	330	J	D	TCDF Total								
14	520		D	1,2,3,7,8 PeCDF	x	0.05	=	26.000	0.1	52.00	0.05	26.00
15	420		D	2,3,4,7,8 PeCDF	x	0.5	=	210.00	1	420.00	0.5	210.00
16	12000	J	D	PeCDF Total								
17	2800	J	D,7	1,2,3,4,7,8 HxCDF	x	0.1	=	280.00	0.1	280.00	0.1	280.00
18	1700		D	1,2,3,6,7,8 HxCDF	x	0.1	=	170.00	0.1	170.00	0.1	170.00
19	96		D	1,2,3,7,8,9 HxCDF	x	0.1	=	9.600	0.1	9.60	0.1	9.60
20	1500		D	2,3,4,6,7,8 HxCDF	x	0.1	=	150.00	0.1	150.00	0.1	150.00
21	96000	J	D	HxCDF Total								
22	39000	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	390.00	0.01	390.00	0.01	390.00
23	8700		D	1,2,3,4,7,8,9 HpCDF	x	0.01	=	87.000	0.01	87.00	0.01	87.00
24	160000	J	D	HpCDF Total								
25	120000	J	D,7	OCDF	x	0.0001	=	12.000	0.0001	12.00	0.0001	12.00
27	**8,100**	J		TEQ (mammals from WHO-TEF)								
28	**4,600**	J		TEQ (avian from WHO-TEF)								
29	**5,200**	J		TEQ (fish from WHO-TEF)								
30	9			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	7.54	37.7	75.4 : CL (CS5):	3017	15083	30166
(CS5)	200	1000	2000						

Sample wt. = (10.5 g) %M or Lipids = (69.9) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (20.0) ; D_1L(CS1 150.83 754.2 1508.3 C_1L (CS5) 60332 301661 603321

EPA LIMS Sample #: 9082 EPA Sample #: DC-SS-04 LAB ID #: 481-14RB

PROJECT NO.: 040313 Lab File: B040922A40

PROJECT NAME: Davis Times Hattiesburg, MS Extraction Date: 09/15/04

DATA REVIEWER: Francis Huang Analysis Date: 09/22/04

SAMPLE TYPE: Soil x Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	7.2	U	E	2,3,7,8 TCDD	x	1	=	7.20	1	7.20	1	7.20
2	3.4	J		TCDD Total								
3	150			1,2,3,7,8 PeCDD	x	1	=	150.00	1	150.00	1	150.00
4	270	J		PeCDD Total								
5	590			1,2,3,4,7,8 HxCDD	x	0.1	=	59.00	0.05	29.50	0.5	295.00
6	3800			1,2,3,6,7,8 HxCDD	x	0.1	=	380.00	0.01	38.00	0.01	38.00
7	1900	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	190.00	0.1	190.00	0.01	19.00
8	13000	J		HxCDD Total								
9	75000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	750.0	0.001	75.00	0.001	75.00
10	110000	J	D	HpCDD Total								
11	440000	J	D,6,9	OCDD	x	0.0001	=	44.00	0.0001	44.00	0.0001	44.00
12	20	U		2,3,7,8 TCDF	x	0.1	=	2.000	1	20.00	0.05	1.00
13	51	J		TCDF Total								
14	110			1,2,3,7,8 PeCDF	x	0.05	=	5.500	0.1	11.00	0.05	5.50
15	86			2,3,4,7,8 PeCDF	x	0.5	=	43.00	1	86.00	0.5	43.00
16	950	J		PeCDF Total								
17	350	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	35.00	0.1	35.00	0.1	35.00
18	220			1,2,3,6,7,8 HxCDF	x	0.1	=	22.00	0.1	22.00	0.1	22.00
19	21	U	E	1,2,3,7,8,9 HxCDF	x	0.1	=	2.100	0.1	2.10	0.1	2.10
20	240			2,3,4,6,7,8 HxCDF	x	0.1	=	24.00	0.1	24.00	0.1	24.00
21	6800	J		HxCDF Total								
22	7100	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	71.00	0.01	71.00	0.01	71.00
23	710			1,2,3,4,7,8,9 HpCDF	x	0.01	=	7.100	0.01	7.10	0.01	7.10
24	24000	J		HpCDF Total								
25	9200	J	7	OCDF	x	0.0001	=	0.920	0.0001	0.92	0.0001	0.92
27	1,800	J		TEQ (mammals from WHO-TEF)								
28	810	J		TEQ (avian from WHO-TEF)								
29	840	J		TEQ (fish from WHO-TEF)								
30	12			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0 : CL (CS5):	400	2000	3999
(CS5)	200	1000	2000						

Sample wt. = (14.0 g) %M or Lipids = (28.5) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (10.0) ; D_1L(CS1 10.00 50.0 100.0 C_1L (CS5) 3999 19996 39991

EPA LIMS Sample #: 9083 EPA Sample #: DM-SS-504-1 LAB ID #: 48145

PROJECT NO.: 04-0719 Lab File: R604083TA07

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 08/18/04

DATA REVIEWER: Francis Y. Huang Analysis Date: 08/31/04

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.1	U	E	2,3,7,8 TCDD	x	1	=	1.10	1	1.10	1	1.10
2	10	J		TCDD Total								
3	31			1,2,3,7,8 PeCDD	x	1	=	31.00	1	31.00	1	31.00
4	160	J		PeCDD Total								
5	96			1,2,3,4,7,8 HxCDD	x	0.1	=	9.60	0.05	4.80	0.5	48.00
6	490			1,2,3,6,7,8 HxCDD	x	0.1	=	49.00	0.01	4.90	0.01	4.90
7	270	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	27.00	0.1	27.00	0.01	2.70
8	2300	J		HxCDD Total								
9	11000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	110.0	0.001	11.00	0.001	11.00
10	17000	J	D	HpCDD Total								
11	72000	J	D,2,9	OCDD	x	0.0001	=	7.20	0.0001	7.20	0.0001	7.20
12	3.2		C	2,3,7,8 TCDF	x	0.1	=	0.320	1	3.20	0.05	0.16
13	21	J		TCDF Total								
14	15			1,2,3,7,8 PeCDF	x	0.05	=	0.750	0.1	1.50	0.05	0.75
15	12			2,3,4,7,8 PeCDF	x	0.5	=	6.00	1	12.00	0.5	6.00
16	410	J		PeCDF Total								
17	66	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	6.60	0.1	6.60	0.1	6.60
18	60			1,2,3,6,7,8 HxCDF	x	0.1	=	6.00	0.1	6.00	0.1	6.00
19	3.7	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.370	0.1	0.37	0.1	0.37
20	57			2,3,4,6,7,8 HxCDF	x	0.1	=	5.70	0.1	5.70	0.1	5.70
21	2200	J		HxCDF Total								
22	1800	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	18.00	0.01	18.00	0.01	18.00
23	140			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.400	0.01	1.40	0.01	1.40
24	6100	J		HpCDF Total								
25	9000	J	D,7	OCDF	x	0.0001	=	0.900	0.0001	0.90	0.0001	0.90
27	280	J		TEQ (mammals from WHO-TEF)								
28	140	J		TEQ (avian from WHO-TEF)								
29	150	J		TEQ (fish from WHO-TEF)								
30	29			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery.
6 High IS recovery.
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0 : CL (CS5):	399	1995	3990
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = (12) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 9.98 49.9 99.8 C_1L (CS5) 3990 19952 39904

EPA LIMS Sample #: 9084 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber Hattiesburg MS Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.63	U		2,3,7,8 TCDD	x	1	=	0.63	1	0.63	1	0.63
2	0.63	UJ		TCDD Total								
3	9.3			1,2,3,7,8 PeCDD	x	1	=	9.30	1	9.30	1	9.30
4	25	J		PeCDD Total								
5	41			1,2,3,4,7,8 HxCDD	x	0.1	=	4.10	0.05	2.05	0.5	20.50
6	220			1,2,3,6,7,8 HxCDD	x	0.1	=	22.00	0.01	2.20	0.01	2.20
7	100	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	10.00	0.1	10.00	0.01	1.00
8	780	J		HxCDD Total								
9	7400		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	74.0	0.001	7.40	0.001	7.40
10	11000	J	D	HpCDD Total								
11	56000	J	D,2,6,9	OCDD	x	0.0001	=	5.60	0.0001	5.60	0.0001	5.60
12	0.81	J	C,1	2,3,7,8 TCDF	x	0.1	=	0.081	1	0.81	0.05	0.04
13	6.1	J		TCDF Total								
14	4.8	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.240	0.1	0.48	0.05	0.24
15	3.4	J	1	2,3,4,7,8 PeCDF	x	0.5	=	1.70	1	3.40	0.5	1.70
16	130	J		PeCDF Total								
17	34	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	3.40	0.1	3.40	0.1	3.40
18	22			1,2,3,6,7,8 HxCDF	x	0.1	=	2.20	0.1	2.20	0.1	2.20
19	1.3	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.130	0.1	0.13	0.1	0.13
20	14			2,3,4,6,7,8 HxCDF	x	0.1	=	1.40	0.1	1.40	0.1	1.40
21	770	J		HxCDF Total								
22	1100	J	8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	11.00	0.01	11.00	0.01	11.00
23	120			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.200	0.01	1.20	0.01	1.20
24	4600	J		HpCDF Total								
25	3200	J	7	OCDF	x	0.0001	=	0.320	0.0001	0.32	0.0001	0.32
27	150	J		TEQ (mammals from WHO-TEF)								
28	62	J		TEQ (avian from WHO-TEF)								
29	68	J		TEQ (fish from WHO-TEF)								
30	12			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)	1.00	5.0	10.0	: CL (CS5):	400	1999	3998
(CS5)	200	1000	2000								
Sample wt. = ([redacted] g)		%M or Lipids = ([redacted])			Extract Vol	(20) uL					
Extract Diluted :											
Dilution Factor= ([redacted])				; D_1L(CS1	9.99	50.0	99.9	C_1L (CS5)	3998	19989	39977

EPA LIMS Sample #: 9085[redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.57	U		2,3,7,8 TCDD	x	1	=	0.57	1	0.57	1	0.57
2	0.57	UJ		TCDD Total								
3	14	U	E	1,2,3,7,8 PeCDD	x	1	=	14.00	1	14.00	1	14.00
4	18	UJ		PeCDD Total								
5	68			1,2,3,4,7,8 HxCDD	x	0.1	=	6.80	0.05	3.40	0.5	34.00
6	410			1,2,3,6,7,8 HxCDD	x	0.1	=	41.00	0.01	4.10	0.01	4.10
7	170	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	17.00	0.1	17.00	0.01	1.70
8	1400	J		HxCDD Total								
9	9700		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	97.0	0.001	9.70	0.001	9.70
10	16000	J	D	HpCDD Total								
11	69000	J	D,2,6,9	OCDD	x	0.0001	=	6.90	0.0001	6.90	0.0001	6.90
12	1.9		C	2,3,7,8 TCDF	x	0.1	=	0.190	1	1.90	0.05	0.10
13	12	J		TCDF Total								
14	11			1,2,3,7,8 PeCDF	x	0.05	=	0.550	0.1	1.10	0.05	0.55
15	8.4			2,3,4,7,8 PeCDF	x	0.5	=	4.20	1	8.40	0.5	4.20
16	200	J		PeCDF Total								
17	68	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	6.80	0.1	6.80	0.1	6.80
18	40	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	4.00	0.1	4.00	0.1	4.00
19	3.1	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.310	0.1	0.31	0.1	0.31
20	45			2,3,4,6,7,8 HxCDF	x	0.1	=	4.50	0.1	4.50	0.1	4.50
21	1600	J		HxCDF Total								
22	2200	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	22.00	0.01	22.00	0.01	22.00
23	190			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.900	0.01	1.90	0.01	1.90
24	8600	J	D	HpCDF Total								
25	9200	J	D,7	OCDF	x	0.0001	=	0.920	0.0001	0.92	0.0001	0.92
27	230	J		TEQ (mammals from WHO-TEF)								
28	110	J		TEQ (avian from WHO-TEF)								
29	120	J		TEQ (fish from WHO-TEF)								
30	37			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	0.99	5.0	9.9 : CL (CS5):	398	1990	3980
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 9.95 49.7 99.5 C_1L (CS5) 3980 19899 39798

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	2.0	U	E	2,3,7,8 TCDD	x	1	=	2.00	1	2.00	1	2.00
2	24	UJ		TCDD Total								
3	36			1,2,3,7,8 PeCDD	x	1	=	36.00	1	36.00	1	36.00
4	170	J		PeCDD Total								
5	130			1,2,3,4,7,8 HxCDD	x	0.1	=	13.00	0.05	6.50	0.5	65.00
6	640			1,2,3,6,7,8 HxCDD	x	0.1	=	64.00	0.01	6.40	0.01	6.40
7	340	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	34.00	0.1	34.00	0.01	3.40
8	2800	J		HxCDD Total								
9	14000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	140.0	0.001	14.00	0.001	14.00
10	22000	J	D	HpCDD Total								
11	75000	J	D,2,6,9	OCDD	x	0.0001	=	7.50	0.0001	7.50	0.0001	7.50
12	3.8		C	2,3,7,8 TCDF	x	0.1	=	0.380	1	3.80	0.05	0.19
13	68	J		TCDF Total								
14	18			1,2,3,7,8 PeCDF	x	0.05	=	0.900	0.1	1.80	0.05	0.90
15	14			2,3,4,7,8 PeCDF	x	0.5	=	7.00	1	14.00	0.5	7.00
16	640	J		PeCDF Total								
17	82	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	8.20	0.1	8.20	0.1	8.20
18	68			1,2,3,6,7,8 HxCDF	x	0.1	=	6.80	0.1	6.80	0.1	6.80
19	3.8	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.380	0.1	0.38	0.1	0.38
20	76			2,3,4,6,7,8 HxCDF	x	0.1	=	7.60	0.1	7.60	0.1	7.60
21	2400	J		HxCDF Total								
22	2300	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	23.00	0.01	23.00	0.01	23.00
23	170			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.700	0.01	1.70	0.01	1.70
24	6900	J	D	HpCDF Total								
25	3900	J	7	OCDF	x	0.0001	=	0.390	0.0001	0.39	0.0001	0.39
27	350	J		TEQ (mammals from WHO-TEF)								
28	170	J		TEQ (avian from WHO-TEF)								
29	190	J		TEQ (fish from WHO-TEF)								
30	29			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	1.00	5.0	10.0 ; CL (CS5)=	400	1999	3998
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 1.00 5.0 10.0 C_1L (CS5): 400 1999 3998

EPA LIMS Sample #: 9087 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.38	U		2,3,7,8 TCDD	x	1	=	0.38	1	0.38	1	0.38
2	0.38	UJ		TCDD Total								
3	0.55	U		1,2,3,7,8 PeCDD	x	1	=	0.55	1	0.55	1	0.55
4	0.55	UJ		PeCDD Total								
5	1.2	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.12	0.05	0.06	0.5	0.60
6	1.3	U		1,2,3,6,7,8 HxCDD	x	0.1	=	0.13	0.01	0.01	0.01	0.01
7	1.2	U		1,2,3,7,8,9 HxCDD	x	0.1	=	0.12	0.1	0.12	0.01	0.01
8	5.1	J		HxCDD Total								
9	20			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.2	0.001	0.02	0.001	0.02
10	38	J		HpCDD Total								
11	350	J	9	OCDD	x	0.0001	=	0.04	0.0001	0.04	0.0001	0.04
12	0.58	U		2,3,7,8 TCDF	x	0.1	=	0.058	1	0.58	0.05	0.03
13	0.94	J		TCDF Total								
14	0.37	U		1,2,3,7,8 PeCDF	x	0.05	=	0.019	0.1	0.04	0.05	0.02
15	0.31	U		2,3,4,7,8 PeCDF	x	0.5	=	0.16	1	0.31	0.5	0.16
16	0.34	UJ		PeCDF Total								
17	0.64	UR	7	1,2,3,4,7,8 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.06
18	0.56	U		1,2,3,6,7,8 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.06
19	0.73	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.073	0.1	0.07	0.1	0.07
20	0.72	U		2,3,4,6,7,8 HxCDF	x	0.1	=	0.07	0.1	0.07	0.1	0.07
21	0.87	UJ		HxCDF Total								
22	2.9	J	1,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.03	0.01	0.03	0.01	0.03
23	1.7	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.017	0.01	0.02	0.01	0.02
24	7.0	J		HpCDF Total								
25	10	U	B	OCDF	x	0.0001	=	0.001	0.0001	0.00	0.0001	0.00
27	2.1	R		TEQ (mammals from WHO-TEF)								
28	2.4	R		TEQ (avian from WHO-TEF)								
29	2.1	R		TEQ (fish from WHO-TEF)								
30	14			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery.
6 High IS recovery.
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)	1.00	5.0	10.0	: CL (CS5):	399	1996	3992
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted])	; D_1L(CS1	9.98	49.9	99.8	C_1L (CS5)	3992	19958	39915

EPA LIMS Sample #: 9092 [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.8	U		2,3,7,8 TCDD	x	1	=	1.80	1	1.80	1	1.80
2	89	J		TCDD Total								
3	28			1,2,3,7,8 PeCDD	x	1	=	28.00	1	28.00	1	28.00
4	510	J		PeCDD Total								
5	130			1,2,3,4,7,8 HxCDD	x	0.1	=	13.00	0.05	6.50	0.5	65.00
6	760			1,2,3,6,7,8 HxCDD	x	0.1	=	76.00	0.01	7.60	0.01	7.60
7	380	J	9	1,2,3,7,8,9 HxCDD	x	0.1	=	38.00	0.1	38.00	0.01	3.80
8	4100	J		HxCDD Total								
9	20000	J	D,2	1,2,3,4,6,7,8 HpCDD	x	0.01	=	200.0	0.001	20.00	0.001	20.00
10	30000	J	D	HpCDD Total								
11	140000	J	D,2,9	OCDD	x	0.0001	=	14.00	0.0001	14.00	0.0001	14.00
12	3.6		C	2,3,7,8 TCDF	x	0.1	=	0.360	1	3.60	0.05	0.18
13	67	J		TCDF Total								
14	17			1,2,3,7,8 PeCDF	x	0.05	=	0.850	0.1	1.70	0.05	0.85
15	12			2,3,4,7,8 PeCDF	x	0.5	=	6.00	1	12.00	0.5	6.00
16	580	J		PeCDF Total								
17	93	J	7	1,2,3,4,7,8 HxCDF	x	0.1	=	9.30	0.1	9.30	0.1	9.30
18	76			1,2,3,6,7,8 HxCDF	x	0.1	=	7.60	0.1	7.60	0.1	7.6
19	9.0	U	E	1,2,3,7,8,9 HxCDF	x	0.1	=	0.900	0.1	0.90	0.1	0.9
20	55		9	2,3,4,6,7,8 HxCDF	x	0.1	=	5.50	0.1	5.50	0.1	5.50
21	3400	J		HxCDF Total								
22	3300	J	D,8	1,2,3,4,6,7,8 HpCDF	x	0.01	=	33.00	0.01	33.00	0.01	33.00
23	320			1,2,3,4,7,8,9 HpCDF	x	0.01	=	3.200	0.01	3.20	0.01	3.20
24	13000	J	D	HpCDF Total								
25	20000	J	D,7	OCDF	x	0.0001	=	2.000	0.0001	2.00	0.0001	2.00
27	440	J		TEQ (mammals from WHO-TEF)								
28	200	J		TEQ (avian from WHO-TEF)								
29	210	J		TEQ (fish from WHO-TEF)								
30	30			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)	6.39	32.0	63.9 : CL (CS5):	2556	12780	25561
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1 0.00 0.0 0.0 C_1L (CS5) 0 0 0

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	18000			2,3,7,8 TCDD	x	1	=	18000.00	1	18000.00	1	18000.00
2	20000	J		TCDD Total								
3	7800			1,2,3,7,8 PeCDD	x	1	=	7800.00	1	7800.00	1	7800.00
4	7800	J		PeCDD Total								
5	31000			1,2,3,4,7,8 HxCDD	x	0.1	=	3100.00	0.05	1550.00	0.5	15500.00
6	240	U		1,2,3,6,7,8 HxCDD	x	0.1	=	24.00	0.01	2.40	0.01	2.40
7	33000			1,2,3,7,8,9 HxCDD	x	0.1	=	3300.00	0.1	3300.00	0.01	330.00
8	56000	J		HxCDD Total								
9	18000			1,2,3,4,6,7,8 HpCDD	x	0.01	=	180.0	0.001	18.00	0.001	18.00
10	19000	J		HpCDD Total								
11	61000			OCDD	x	0.0001	=	6.10	0.0001	6.10	0.0001	6.10
12	6100		C	2,3,7,8 TCDF	x	0.1	=	610.000	1	6100.00	0.05	305.00
13	31000	J		TCDF Total								
14	26000			1,2,3,7,8 PeCDF	x	0.05	=	1300.000	0.1	2600.00	0.05	1300.00
15	110			2,3,4,7,8 PeCDF	x	0.5	=	55.00	1	110.00	0.5	55.00
16	31000	J		PeCDF Total								
17	30000			1,2,3,4,7,8 HxCDF	x	0.1	=	3000.00	0.1	3000.00	0.1	3000.00
18	88	U		1,2,3,6,7,8 HxCDF	x	0.1	=	8.80	0.1	8.80	0.1	8.80
19	33	U		1,2,3,7,8,9 HxCDF	x	0.1	=	3.300	0.1	3.30	0.1	3.30
20	47000			2,3,4,6,7,8 HxCDF	x	0.1	=	4700.00	0.1	4700.00	0.1	4700.00
21	66000	J		HxCDF Total								
22	46000			1,2,3,4,6,7,8 HpCDF	x	0.01	=	460.00	0.01	460.00	0.01	460.00
23	110			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.100	0.01	1.10	0.01	1.10
24	49000	J		HpCDF Total								
25	38000			OCDF	x	0.0001	=	3.800	0.0001	3.80	0.0001	3.80
27	NA			TEQ (mammals from WHO-TEF)								
28	NA			TEQ (avian from WHO-TEF)								
29	NA			TEQ (fish from WHO-TEF)								
30	0			% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)	1.00	5.0	10.0	: CL (CS5):	400	1999	3999
(CS5)	200	1000	2000								

Sample wt. = (10.0 g) %M or Lipids = (0.0) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ( ) ; D_1L(CS1 0.00 0.0 0.0 C_1L (CS5) 0 0 0

EPA LIMS Sample #: 9094 EPA Sample #: 04AG008-PES LAB ID #: 47241

PROJECT NO.: 04-0713 Lab File: B6040830A06

PROJECT NAME: Davis Timber Hattiesburg MS Extraction Date: 08/18/04

DATA REVIEWER: Francis X Huang Analysis Date: 08/30/04

SAMPLE TYPE: Soil X Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE			TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.94	U	2,3,7,8 TCDD	x	1	=	0.94	1	0.94	1	0.94
2	0.94	UJ	TCDD Total								
3	0.59	U	1,2,3,7,8 PeCDD	x	1	=	0.59	1	0.59	1	0.59
4	0.59	UJ	PeCDD Total								
5	1.6	U	1,2,3,4,7,8 HxCDD	x	0.1	=	0.16	0.05	0.08	0.5	0.80
6	1.6	U	1,2,3,6,7,8 HxCDD	x	0.1	=	0.16	0.01	0.02	0.01	0.02
7	1.6	U	1,2,3,7,8,9 HxCDD	x	0.1	=	0.16	0.1	0.16	0.01	0.02
8	1.6	UJ	HxCDD Total								
9	5.6		1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.1	0.001	0.01	0.001	0.01
10	5.6	J	HpCDD Total								
11	43		OCDD	x	0.0001	=	0.00	0.0001	0.00	0.0001	0.00
12	0.26	U	2,3,7,8 TCDF	x	0.1	=	0.026	1	0.26	0.05	0.01
13	0.26	UJ	TCDF Total								
14	0.34	U	1,2,3,7,8 PeCDF	x	0.05	=	0.017	0.1	0.03	0.05	0.02
15	0.29	U	2,3,4,7,8 PeCDF	x	0.5	=	0.15	1	0.29	0.5	0.15
16	0.31	UJ	PeCDF Total								
17	0.52	U	1,2,3,4,7,8 HxCDF	x	0.1	=	0.05	0.1	0.05	0.1	0.05
18	0.39	U	1,2,3,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
19	0.40	U	1,2,3,7,8,9 HxCDF	x	0.1	=	0.040	0.1	0.04	0.1	0.04
20	0.43	U	2,3,4,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
21	0.43	UJ	HxCDF Total								
22	0.99	U	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.01	0.01	0.01	0.01	0.01
23	1.0	U	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.010	0.01	0.01	0.01	0.01
24	1.2	J	HpCDF Total								
25	4.5	J	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	NA		TEQ (mammals from WHO-TEF)								
28	NA		TEQ (avian from WHO-TEF)								
29	NA		TEQ (fish from WHO-TEF)								
30	0		% moisture								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

- I - DL raised due to PCDPE Interference
- B - DL raised due to Blank Contamination
- D - Dilution Value
- C - Confirmation Value
- E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1. Less than quantitation limit.
2. Over instrument calibration range.
3. TCDF result less than CRQL, confirmation not required.
4. Erratic Calibration response.
5. Low IS recovery:
6. High IS recovery:
7. Analyte missed in PE sample.
8. Warning-low recovery in PE sample.
9. Action-high recovery in PE sample.
10. Warning-high recovery in PE sample.
11. IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	0.01	0.0	0.1	: CL (CS5):	4	19	38
(CS5)	200	1000	2000								

Sample wt. = ([redacted] mL) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 0.00 0.0 0.0 C_1L (CS5) 0 0 0

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil ____ Waste ____ Fish ____ Water x Other [redacted]

UNITS: ng/L

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.0035	U		2,3,7,8 TCDD	x	1	=	0.00	1	0.00	1	0.00
2	0.0035	UJ		TCDD Total								
3	0.0060	U		1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.0	1	0.01
4	0.0060	UJ		PeCDD Total								
5	0.0068	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	0.012	U	E	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.000	0.01	0.00
7	0.012	J	1	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	0.039	J		HxCDD Total								
9	0.50			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	0.79	J		HpCDD Total								
11	3.8			OCDD	x	0.0001	=	0.00038	0.0001	0.00	0.0001	0.00
12	0.0038	U		2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	0.0038	UJ		TCDF Total								
14	0.0088	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.001	0.05	0.00
15	0.0071	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.01	0.5	0.0
16	0.0078	UJ		PeCDF Total								
17	0.0035	U		1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	0.0044	U		1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.000	0.1	0.00
19	0.0055	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.001	0.1	0.00
20	0.0058	U		2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	0.054	J		HxCDF Total								
22	0.079			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.001	0.01	0.00
23	0.011	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.0001	0.01	0.00
24	0.25	J		HpCDF Total								
25	0.35			OCDF	x	0.0001	=	0.000	0.0001	0.00004	0.0001	0.00
27	0.025	J		TEQ (mammals from WHO-TEF)								
28	0.027	J		TEQ (avian from WHO-TEF)								
29	0.021	J		TEQ (fish from WHO-TEF)								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)			Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:										
(CS1)	0.50	2.5	5.0	DL(CS1)= 0.01	0.0	0.1	CL (CS5):	4	20	40
(CS5)	200	1000	2000							
Sample wt. = ([redacted] mL)				%M or Lipids = ([redacted])			Extract Vol (20) uL			
Extract Diluted :										
Dilution Factor= ([redacted])				D_1L(CS1)= 0.00	0.0	0.0	C_1L (CS5)	0	0	0

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]
PROJECT NO.: [redacted] Lab File: [redacted]
PROJECT NAME: [redacted] Extraction Date: [redacted]
DATA REVIEWER: [redacted] Analysis Date: [redacted]
SAMPLE TYPE: Soil ____ Waste ____ Fish ____ Water __X__ Other [redacted]

UNITS: ng/L

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.0058	U		2,3,7,8 TCDD	x	1	=	0.01	1	0.01	1	0.01
2	0.0058	UJ		TCDD Total								
3	0.0071	U		1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.01	1	0.01
4	0.0071	UJ		PeCDD Total								
5	0.0060	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	0.023	U	E	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	0.026	U	E	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	0.12	J		HxCDD Total								
9	1.2			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	1.9	J		HpCDD Total								
11	8.8			OCDD	x	0.0001	=	0.00088	0.0001	0.00	0.0001	0.00
12	0.0049	U		2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	0.0049	UJ		TCDF Total								
14	0.0073	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	0.0057	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.01	0.5	0.00
16	0.023	J		PeCDF Total								
17	0.0059	U		1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	0.0052	U		1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	[illegible]
19	0.0065	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	[illegible]
20	0.0068	U		2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	0.13	J		HxCDF Total								
22	0.19			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	0.012	U	E	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.49	J		HpCDF Total								
25	0.72			OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	0.040	J		TEQ (mammals from WHO-TEF)								
28	0.034	J		TEQ (avian from WHO-TEF)								
29	0.026	J		TEQ (fish from WHO-TEF)								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1) =	0.01	0.0	0.1	; CL (CS5):	4	19	39
(CS5)	200	1000	2000								

Sample wt. = ([redacted] mL) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted])	; D_1L(CS1) =	0.00	0.0	0.0	C_1L (CS5)	0	0	0

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil ______ Waste ______ Fish ______ Water X Other [redacted]

UNITS: ng/L

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.0081	U		2,3,7,8 TCDD	x	1	=	0.01	1	0.01	1	0.01
2	0.0081	UJ		TCDD Total								
3	0.0074	U		1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.01	1	0.01
4	0.034	UJ		PeCDD Total								
5	0.041	U	E	1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.02
6	0.30			1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	0.12			1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.01	0.01	0.00
8	1.1	J		HxCDD Total								
9	7.1			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.1	0.001	0.01	0.001	0.01
10	11	J		HpCDD Total								
11	48	J	2	OCDD	x	0.0001	=	0.0048	0.0001	0.00	0.0001	0.00
12	0.0073	U		2,3,7,8 TCDF	x	0.1	=	0.001	1	0.01	0.05	0.00
13	0.013	UJ		TCDF Total								
14	0.0083	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	0.0063	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.01	0.5	0.00
16	0.18	J		PeCDF Total								
17	0.034	J	1	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	0.040	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
19	0.013	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
20	0.030	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	1.0	J		HxCDF Total								
22	1.1			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.01	0.01	0.01
23	0.094			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	3.2	J		HpCDF Total								
25	4.4			OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	**0.17**	J		TEQ (mammals from WHO-TEF)								
28	**0.083**	J		TEQ (avian from WHO-TEF)								
29	**0.080**	J		TEQ (fish from WHO-TEF)								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	0.01	0.0	0.1 : CL (CS5):	4	19	38
(CS5)	200	1000	2000						

Sample wt. = (1040 mL) %M or Lipids = ( ) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ( ) ; D_1L(CS1)= 0.00 0.0 0.0 C_1L (CS5) 0 0 0

EPA LIMS Sample #: 9091 EPA Sample #: DL-SW-REP04 LAB ID #: 48110

PROJECT NO.: 04-013 Lab File: B604081ZA104

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 08/09/04

DATA REVIEWER: Francis Y. Yuang Analysis Date: 08/12/04

SAMPLE TYPE: Soil ____ Waste ____ Fish ____ Water X Other

UNITS: ng/L

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.0071	U		2,3,7,8 TCDD	x	1	=	0.01	1	0.01	1	0.01
2	0.0071	UJ		TCDD Total								
3	0.0052	U		1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.01	1	0.01
4	0.0052	UJ		PeCDD Total								
5	0.0075	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	0.0075	U		1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	0.0074	U		1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	0.0076	UJ		HxCDD Total								
9	0.14			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	0.20	J		HpCDD Total								
11	1.3			OCDD	x	0.0001	=	0.00013	0.0001	0.00	0.0001	0.00
12	0.0059	U		2,3,7,8 TCDF	x	0.1	=	0.001	1	0.01	0.05	0.00
13	0.0059	UJ		TCDF Total								
14	0.0043	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	0.0033	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.00	0.5	0.00
16	0.0037	UJ		PeCDF Total								
17	0.0033	U		1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	0.0031	U		1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
19	0.0038	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
20	0.0037	U		2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	0.0034	UJ		HxCDF Total								
22	0.019	J	1	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	0.0049	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.020	J		HpCDF Total								
25	0.13			OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	0.020	J		TEQ (mammals from WHO-TEF)								
28	0.025	J		TEQ (avian from WHO-TEF)								
29	0.020	J		TEQ (fish from WHO-TEF)								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	3.23	16.1	32.3	: CL (CS5):	1290	6452	12903
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 3.23 16.1 32.3 C_1L (CS5) 1290 6452 12903

EPA LIMS Sample #: 10584 EPA Sample #: EDA-01-SD-BW LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber / Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis G. Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	2.1	J	1	2,3,7,8 TCDD	x	1	=	2.10	1	2.10	1	2.10
2	41	J		TCDD Total								
3	32			1,2,3,7,8 PeCDD	x	1	=	32.0	1	32.00	1	32.00
4	170	J		PeCDD Total								
5	60			1,2,3,4,7,8 HxCDD	x	0.1	=	6.00	0.05	3.00	0.5	30.00
6	330			1,2,3,6,7,8 HxCDD	x	0.1	=	33.0	0.01	3.30	0.01	3.30
7	110			1,2,3,7,8,9 HxCDD	x	0.1	=	11.0	0.1	11.00	0.01	1.10
8	1200	J		HxCDD Total								
9	3800			1,2,3,4,6,7,8 HpCDD	x	0.01	=	38.0	0.001	3.80	0.001	3.80
10	6200	J		HpCDD Total								
11	23000	J	2	OCDD	x	0.0001	=	2.3	0.0001	2.30	0.0001	2.30
12	3.3	U	C	2,3,7,8 TCDF	x	0.1	=	0.330	1	3.30	0.05	0.17
13	56	J		TCDF Total								
14	17			1,2,3,7,8 PeCDF	x	0.05	=	0.850	0.1	1.70	0.05	0.85
15	14	J	1	2,3,4,7,8 PeCDF	x	0.5	=	7.00	1	14.00	0.5	7.00
16	600	J		PeCDF Total								
17	61	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	6.10	0.1	6.10	0.1	6.10
18	39			1,2,3,6,7,8 HxCDF	x	0.1	=	3.90	0.1	3.90	0.1	3.90
19	4.7	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.47	0.1	0.47	0.1	0.47
20	31			2,3,4,6,7,8 HxCDF	x	0.1	=	3.10	0.1	3.10	0.1	3.10
21	1400	J		HxCDF Total								
22	840			1,2,3,4,6,7,8 HpCDF	x	0.01	=	8.4	0.01	8.40	0.01	8.40
23	72			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.72	0.01	0.72	0.01	0.72
24	3300	J		HpCDF Total								
25	3900			OCDF	x	0.0001	=	0.390	0.0001	0.39	0.0001	0.39
27	156	J		TEQ (mammals from WHO-TEF)								
28	100	J		TEQ (avian from WHO-TEF)								
29	106	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	1.96	9.8	19.6 : CL (CS5):	784	3922	7843
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 1.96 9.8 19.6 C_1L (CS5) 784 3922 7843

EPA LIMS Sample #: 10585 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ____ Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.26	U	E	2,3,7,8 TCDD	x	1	=	0.26	1	0.26	1	0.26
2	0.26	UJ		TCDD Total								
3	3.7	U	B	1,2,3,7,8 PeCDD	x	1	=	3.7	1	3.70	1	3.70
4	14	J		PeCDD Total								
5	12			1,2,3,4,7,8 HxCDD	x	0.1	=	1.20	0.05	0.60	0.5	6.00
6	58			1,2,3,6,7,8 HxCDD	x	0.1	=	5.8	0.01	0.58	0.01	0.58
7	19			1,2,3,7,8,9 HxCDD	x	0.1	=	1.9	0.1	1.90	0.01	0.19
8	250	J		HxCDD Total								
9	1400			1,2,3,4,6,7,8 HpCDD	x	0.01	=	14.0	0.001	1.40	0.001	1.40
10	2200	J		HpCDD Total								
11	11000	J	2	OCDD	x	0.0001	=	1.1	0.0001	1.10	0.0001	1.10
12	1.2	U	C	2,3,7,8 TCDF	x	0.1	=	0.120	1	1.20	0.05	0.06
13	1.2	J		TCDF Total								
14	1.9	U	B	1,2,3,7,8 PeCDF	x	0.05	=	0.095	0.1	0.19	0.05	0.10
15	1.2	J	1	2,3,4,7,8 PeCDF	x	0.5	=	0.60	1	1.20	0.5	0.60
16	56	J		PeCDF Total								
17	16	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	1.60	0.1	1.60	0.1	1.60
18	6.9	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.69	0.1	0.69	0.1	0.69
19	0.61	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.06
20	3.5	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.35	0.1	0.35	0.1	0.35
21	550	J		HxCDF Total								
22	310			1,2,3,4,6,7,8 HpCDF	x	0.01	=	3.1	0.01	3.10	0.01	3.10
23	27			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.27	0.01	0.27	0.01	0.27
24	1200	J		HpCDF Total								
25	1700			OCDF	x	0.0001	=	0.170	0.0001	0.17	0.0001	0.17
27	35	J		TEQ (mammals from WHO-TEF)								
28	18	J		TEQ (avian from WHO-TEF)								
29	20	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	3.91	19.6	39.1	: CL (CS5):	1565	7827	15653
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 19.57 97.8 195.7 C_1L (CS5) 7827 39133 78266

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]
PROJECT NO.: [redacted] Lab File: [redacted]
PROJECT NAME: [redacted] Extraction Date: [redacted]
DATA REVIEWER: [redacted] Analysis Date: [redacted]
SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	5.4			2,3,7,8 TCDD	x	1	=	5.40	1	5.40	1	5.40
2	79	J	D	TCDD Total								
3	100			1,2,3,7,8 PeCDD	x	1	=	100.0	1	100.00	1	100.00
4	380	J	D	PeCDD Total								
5	180			1,2,3,4,7,8 HxCDD	x	0.1	=	18.00	0.05	9.00	0.5	90.00
6	1200			1,2,3,6,7,8 HxCDD	x	0.1	=	120.0	0.01	12.00	0.01	12.00
7	390			1,2,3,7,8,9 HxCDD	x	0.1	=	39.0	0.1	39.00	0.01	3.90
8	3400	J		HxCDD Total								
9	14000		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	140.0	0.001	14.00	0.001	14.00
10	22000	J	D	HpCDD Total								
11	87000		D	OCDD	x	0.0001	=	8.7	0.0001	8.70	0.0001	8.70
12	11	U	E	2,3,7,8 TCDF	x	0.1	=	1.100	1	11.00	0.05	0.55
13	130	J	D	TCDF Total								
14	52			1,2,3,7,8 PeCDF	x	0.05	=	2.600	0.1	5.20	0.05	2.60
15	38			2,3,4,7,8 PeCDF	x	0.5	=	19.00	1	38.00	0.5	19.00
16	1300	J	D	PeCDF Total								
17	320	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	32.00	0.1	32.00	0.1	32.00
18	140			1,2,3,6,7,8 HxCDF	x	0.1	=	14.00	0.1	14.00	0.1	14.00
19	13	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	1.30	0.1	1.30	0.1	1.30
20	90			2,3,4,6,7,8 HxCDF	x	0.1	=	9.00	0.1	9.00	0.1	9.00
21	5700	J	D	HxCDF Total								
22	4800			1,2,3,4,6,7,8 HpCDF	x	0.01	=	48.0	0.01	48.00	0.01	48.00
23	440			1,2,3,4,7,8,9 HpCDF	x	0.01	=	4.40	0.01	4.40	0.01	4.40
24	19000	J	D	HpCDF Total								
25	20000		D	OCDF	x	0.0001	=	2.000	0.0001	2.00	0.0001	2.00
27	560	J		TEQ (mammals from WHO-TEF)								
28	350	J		TEQ (avian from WHO-TEF)								
29	370	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED ______

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	1.93	9.6	19.3 : CL (CS5):	770	3851	7702
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 1.93 9.6 19.3 C_1L (CS5) 770 3851 7702

EPA LIMS Sample #: 10587 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.44	J	1	2,3,7,8 TCDD	x	1	=	0.44	1	0.44	1	0.44
2	0.44	J		TCDD Total								
3	8.5	J	1	1,2,3,7,8 PeCDD	x	1	=	8.5	1	8.50	1	8.50
4	13	J		PeCDD Total								
5	18			1,2,3,4,7,8 HxCDD	x	0.1	=	1.80	0.05	0.90	0.5	9.00
6	110			1,2,3,6,7,8 HxCDD	x	0.1	=	11.0	0.01	1.10	0.01	1.10
7	35			1,2,3,7,8,9 HxCDD	x	0.1	=	3.5	0.1	3.50	0.01	0.35
8	320	J		HxCDD Total								
9	1500			1,2,3,4,6,7,8 HpCDD	x	0.01	=	15.0	0.001	1.50	0.001	1.50
10	2400	J		HpCDD Total								
11	10000	J	2	OCDD	x	0.0001	=	1	0.0001	1.00	0.0001	1.00
12	1.5	U	C	2,3,7,8 TCDF	x	0.1	=	0.150	1	1.50	0.05	0.08
13	3.7	J		TCDF Total								
14	5.2	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.260	0.1	0.52	0.05	0.26
15	3.9	J	1	2,3,4,7,8 PeCDF	x	0.5	=	1.95	1	3.90	0.5	1.95
16	88	J		PeCDF Total								
17	25			1,2,3,4,7,8 HxCDF	x	0.1	=	2.50	0.1	2.50	0.1	2.50
18	14			1,2,3,6,7,8 HxCDF	x	0.1	=	1.40	0.1	1.40	0.1	1.40
19	1.2	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.12	0.1	0.12	0.1	0.1
20	10			2,3,4,6,7,8 HxCDF	x	0.1	=	1.00	0.1	1.00	0.1	1.00
21	590	J		HxCDF Total								
22	460			1,2,3,4,6,7,8 HpCDF	x	0.01	=	4.6	0.01	4.60	0.01	4.60
23	42			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.42	0.01	0.42	0.01	0.42
24	1600	J		HpCDF Total								
25	2100			OCDF	x	0.0001	=	0.210	0.0001	0.21	0.0001	0.21
27	54	J		TEQ (mammals from WHO-TEF)								
28	33	J		TEQ (avian from WHO-TEF)								
29	34	J		TEQ (fish from WHO-TEF)								
				%Lipids [redacted]								

INTERNAL QUALIFIERS: DATE DATA ENTERED AND VERIFIED _____

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:
1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	3.18	15.9	31.8	: CL (CS5):	1271	6354	12708
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 3.18 15.9 31.8 C_1L (CS5) 1271 6354 12708

EPA LIMS Sample #: 10588 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: 04-0889 Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	3.3			2,3,7,8 TCDD	x	1	=	3.30	1	3.30	1	3.30
2	86	J	D	TCDD Total								
3	70			1,2,3,7,8 PeCDD	x	1	=	70.0	1	70.00	1	70.00
4	380	J	D	PeCDD Total								
5	130			1,2,3,4,7,8 HxCDD	x	0.1	=	13.00	0.05	6.50	0.5	65.00
6	960			1,2,3,6,7,8 HxCDD	x	0.1	=	96.0	0.01	9.60	0.01	9.60
7	260			1,2,3,7,8,9 HxCDD	x	0.1	=	26.0	0.1	26.00	0.01	2.60
8	2700	J	D	HxCDD Total								
9	9700		D	1,2,3,4,6,7,8 HpCDD	x	0.01	=	97.0	0.001	9.70	0.001	9.70
10	15000	J	D	HpCDD Total								
11	51000		D	OCDD	x	0.0001	=	5.1	0.0001	5.10	0.0001	5.10
12	4.8	U	C	2,3,7,8 TCDF	x	0.1	=	0.480	1	4.80	0.05	0.24
13	84	J	D	TCDF Total								
14	34			1,2,3,7,8 PeCDF	x	0.05	=	1.700	0.1	3.40	0.05	1.70
15	27			2,3,4,7,8 PeCDF	x	0.5	=	13.50	1	27.00	0.5	13.50
16	1200	J	D	PeCDF Total								
17	200	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	20.00	0.1	20.00	0.1	20.00
18	82			1,2,3,6,7,8 HxCDF	x	0.1	=	8.20	0.1	8.20	0.1	8.20
19	5.0	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.50	0.1	0.50	0.1	0.50
20	76			2,3,4,6,7,8 HxCDF	x	0.1	=	7.60	0.1	7.60	0.1	7.60
21	3600	J	D	HxCDF Total								
22	2600			1,2,3,4,6,7,8 HpCDF	x	0.01	=	26.0	0.01	26.00	0.01	26.00
23	180			1,2,3,4,7,8,9 HpCDF	x	0.01	=	1.80	0.01	1.80	0.01	1.80
24	10000	J	D	HpCDF Total								
25	12000			OCDF	x	0.0001	=	1.200	0.0001	1.20	0.0001	1.20
27	390	J		TEQ (mammals from WHO-TEF)								
28	230	J		TEQ (avian from WHO-TEF)								
29	250	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1)= 1.95	9.8	19.5	CL (CS5): 780	3902	7804
(CS5)	200	1000	2000						

Sample wt. = (10.0 g) %M or Lipids = (0.10) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (1.00) ; D_1L(CS1)= 1.95 9.8 19.5 C_1L (CS5) 780 3902 7804

EPA LIMS Sample #: IQ589 EPA Sample #: DT-04-SD-SW LAB ID #: 67338

PROJECT NO.: 04-0889 Lab File: B104I019A121

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 10/07/04

DATA REVIEWER: Francis Y. Huang Analysis Date: 10/20/04

SAMPLE TYPE: Soil Waste Fish X Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.52	J	1	2,3,7,8 TCDD	x	1	=	0.52	1	0.52	1	0.52
2	11	J		TCDD Total								
3	5.0	J	1	1,2,3,7,8 PeCDD	x	1	=	5.0	1	5.00	1	5.00
4	46	J		PeCDD Total								
5	9.2			1,2,3,4,7,8 HxCDD	x	0.1	=	0.92	0.05	0.46	0.5	4.60
6	53			1,2,3,6,7,8 HxCDD	x	0.1	=	5.3	0.01	0.53	0.01	0.53
7	26			1,2,3,7,8,9 HxCDD	x	0.1	=	2.6	0.1	2.60	0.01	0.26
8	230	J		HxCDD Total								
9	740			1,2,3,4,6,7,8 HpCDD	x	0.01	=	7.4	0.001	0.74	0.001	0.74
10	1200	J		HpCDD Total								
11	4300			OCDD	x	0.0001	=	0.43	0.0001	0.43	0.0001	0.43
12	0.98	U	C	2,3,7,8 TCDF	x	0.1	=	0.098	1	0.98	0.05	0.05
13	8.6	J		TCDF Total								
14	2.5	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.125	0.1	0.25	0.05	0.13
15	1.6	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.80	1	1.60	0.5	0.80
16	78	J		PeCDF Total								
17	9.8	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.98	0.1	0.98	0.1	0.98
18	7.6			1,2,3,6,7,8 HxCDF	x	0.1	=	0.76	0.1	0.76	0.1	0.7
19	1.9	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.19	0.1	0.19	0.1	0.1
20	4.2	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.42	0.1	0.42	0.1	0.42
21	220	J		HxCDF Total								
22	140			1,2,3,4,6,7,8 HpCDF	x	0.01	=	1.4	0.01	1.40	0.01	1.40
23	12			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.12	0.01	0.12	0.01	0.12
24	530	J		HpCDF Total								
25	660			OCDF	x	0.0001	=	0.066	0.0001	0.07	0.0001	0.07
27	27	J		TEQ (mammals from WHO-TEF)								
28	17	J		TEQ (avian from WHO-TEF)								
29	17	J		TEQ (fish from WHO-TEF)								

% Lipids 0.10

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	2.79	13.9	27.9	: CL (CS5):	1115	5573	11147
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 2.79 13.9 27.9 C_1L (CS5) 1115 5573 11147

EPA LIMS Sample #: 10590[redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.3	U	E	2,3,7,8 TCDD	x	1	=	1.30	1	1.30	1	1.30
2	10	J		TCDD Total								
3	19			1,2,3,7,8 PeCDD	x	1	=	19.0	1	19.00	1	19.00
4	69	J		PeCDD Total								
5	25			1,2,3,4,7,8 HxCDD	x	0.1	=	2.50	0.05	1.25	0.5	12.50
6	150			1,2,3,6,7,8 HxCDD	x	0.1	=	15.0	0.01	1.50	0.01	1.50
7	50			1,2,3,7,8,9 HxCDD	x	0.1	=	5.0	0.1	5.00	0.01	0.50
8	450	J		HxCDD Total								
9	1200			1,2,3,4,6,7,8 HpCDD	x	0.01	=	12.0	0.001	1.20	0.001	1.20
10	1900	J		HpCDD Total								
11	6000			OCDD	x	0.0001	=	0.6	0.0001	0.60	0.0001	0.60
12	2.7	J	1,C	2,3,7,8 TCDF	x	0.1	=	0.270	1	2.70	0.05	0.14
13	25	J		TCDF Total								
14	8.2	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.410	0.1	0.82	0.05	0.41
15	8.1	J	1	2,3,4,7,8 PeCDF	x	0.5	=	4.05	1	8.10	0.5	4.05
16	250	J		PeCDF Total								
17	29	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	2.90	0.1	2.90	0.1	2.90
18	14			1,2,3,6,7,8 HxCDF	x	0.1	=	1.40	0.1	1.40	0.1	1.40
19	1.3	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.13	0.1	0.13	0.1	0.13
20	17			2,3,4,6,7,8 HxCDF	x	0.1	=	1.70	0.1	1.70	0.1	1.70
21	540	J		HxCDF Total								
22	320			1,2,3,4,6,7,8 HpCDF	x	0.01	=	3.2	0.01	3.20	0.01	3.20
23	15			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.15	0.01	0.15	0.01	0.15
24	970	J		HpCDF Total								
25	920			OCDF	x	0.0001	=	0.092	0.0001	0.09	0.0001	0.09
27	70	J		TEQ (mammals from WHO-TEF)								
28	51	J		TEQ (avian from WHO-TEF)								
29	51	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warnfng-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1)= 2.45	12.2	24.5	CL (CS5): 979	4893	9785
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 2.45 12.2 24.5 C_1L (CS5) 979 4893 9785

EPA LIMS Sample #: 10591 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Rattlesnake, MS Extraction Date: [redacted]

DATA REVIEWER: Francis C. Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.23	U	E	2,3,7,8 TCDD	x	1	=	0.23	1	0.23	1	0.23
2	0.23	UJ		TCDD Total								
3	2.3	J	1	1,2,3,7,8 PeCDD	x	1	=	2.3	1	2.30	1	2.30
4	4.1	J		PeCDD Total								
5	6.9	J	1	1,2,3,4,7,8 HxCDD	x	0.1	=	0.69	0.05	0.35	0.5	3.45
6	28			1,2,3,6,7,8 HxCDD	x	0.1	=	2.8	0.01	0.28	0.01	0.28
7	9.5			1,2,3,7,8,9 HxCDD	x	0.1	=	1.0	0.1	0.95	0.01	0.10
8	99	J		HxCDD Total								
9	630			1,2,3,4,6,7,8 HpCDD	x	0.01	=	6.3	0.001	0.63	0.001	0.63
10	950	J		HpCDD Total								
11	4600			OCDD	x	0.0001	=	0.46	0.0001	0.46	0.0001	0.46
12	1.1	U	C	2,3,7,8 TCDF	x	0.1	=	0.110	1	1.10	0.05	0.06
13	1.2	J		TCDF Total								
14	1.2	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.060	0.1	0.12	0.05	0.06
15	1.0	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.50	1	1.00	0.5	0.50
16	24	J		PeCDF Total								
17	8.0	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.80	0.1	0.80	0.1	0.80
18	4.1	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.41	0.1	0.41	0.1	0.4
19	0.74	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.07	0.1	0.07	0.1	0.
20	2.6	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.26	0.1	0.26	0.1	0.26
21	160	J		HxCDF Total								
22	140			1,2,3,4,6,7,8 HpCDF	x	0.01	=	1.4	0.01	1.40	0.01	1.40
23	12			1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.12	0.01	0.12	0.01	0.12
24	500	J		HpCDF Total								
25	700			OCDF	x	0.0001	=	0.070	0.0001	0.07	0.0001	0.07
27	23	J		TEQ (mammals from WHO-TEF)								
28	11	J		TEQ (avian from WHO-TEF)								
29	11	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	10.00	50.0	100.0	: CL (CS5):	4000	20000	40000
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 10.00 50.0 100.0 C_1L (CS5) 4000 20000 40000

EPA LIMS Sample #: 10592 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	3.3E-06	U		2,3,7,8 TCDD	x	1	=	0.00	1	0.00	1	0.00
2	1.9E-05	J		TCDD Total								
3	1.7E-06	U	E	1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.00	1	0.00
4	7.9E-06	J		PeCDD Total								
5	2.5E-06	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	6.1E-06	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	4.0E-06	J	1	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	9.8E-06	J		HxCDD Total								
9	4.3E-05	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	7.5E-05	J		HpCDD Total								
11	3.0E-04			OCDD	x	0.0001	=	3.03E-08	0.0001	0.00	0.0001	0.00
12	5.1E-06	U	C	2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	2.4E-06	J		TCDF Total								
14	2.6E-06	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	2.6E-06	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.00	0.5	0.00
16	2.6E-06	UJ		PeCDF Total								
17	3.7E-06	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	1.8E-06	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
19	2.6E-06	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
20	3.9E-06	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	7.7E-06	J		HxCDF Total								
22	1.3E-06	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	2.2E-06	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	2.7E-05	J		HpCDF Total								
25	5.3E-05	J	1	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	NA			TEQ (mammals from WHO-TEF)								
28	NA			TEQ (avian from WHO-TEF)								
29	NA			TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	4.06	20.3	40.6	: CL (CS5):	1622	8111	16221
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 4.06 20.3 40.6 C_1L (CS5) 1622 8111 16221

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.31	U		2,3,7,8 TCDD	x	1	=	0.31	1	0.31	1	0.31
2	0.31	UJ		TCDD Total								
3	0.38	U		1,2,3,7,8 PeCDD	x	1	=	0.4	1	0.38	1	0.38
4	0.38	UJ		PeCDD Total								
5	0.47	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.05	0.05	0.02	0.5	0.24
6	0.68	U	B	1,2,3,6,7,8 HxCDD	x	0.1	=	0.1	0.01	0.01	0.01	0.01
7	0.49	U		1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.05	0.01	0.00
8	0.65	J		HxCDD Total								
9	2.7	U	B	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	4.1	J		HpCDD Total								
11	20	J	1	OCDD	x	0.0001	=	0.002	0.0001	0.00	0.0001	0.00
12	0.34	U		2,3,7,8 TCDF	x	0.1	=	0.034	1	0.34	0.05	0.02
13	0.34	UJ		TCDF Total								
14	0.40	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.020	0.1	0.04	0.05	0.02
15	0.37	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.19	1	0.37	0.5	0.19
16	0.40	J		PeCDF Total								
17	0.53	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.05	0.1	0.05	0.1	0.05
18	0.44	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
19	0.39	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
20	0.34	U		2,3,4,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
21	1.1	J		HxCDF Total								
22	0.74	U		1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.01	0.01	0.01
23	0.96	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.01	0.01	0.01	0.01	0.01
24	0.95	J		HpCDF Total								
25	3.2	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	1.3	J		TEQ (mammals from WHO-TEF)								
28	1.7	J		TEQ (avian from WHO-TEF)								
29	1.4	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED ______________

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0 ;	DL(CS1) =	2.26	11.3	22.6	: CL (CS5):	902	4510	9020
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1) = 2.26 11.3 22.6 C_1L (CS5) 902 4510 9020

EPA LIMS Sample #: 10594[redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.17	U		2,3,7,8 TCDD	x	1	=	0.17	1	0.17	1	0.17
2	0.17	U		TCDD Total								
3	0.30	U	B	1,2,3,7,8 PeCDD	x	1	=	0.3	1	0.30	1	0.30
4	0.30	J		PeCDD Total								
5	0.26	U	E	1,2,3,4,7,8 HxCDD	x	0.1	=	0.03	0.05	0.01	0.5	0.13
6	0.68	U	B	1,2,3,6,7,8 HxCDD	x	0.1	=	0.1	0.01	0.01	0.01	0.01
7	0.47	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.05	0.01	0.00
8	2.3	J		HxCDD Total								
9	6.3	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.1	0.001	0.01	0.001	0.01
10	12	J		HpCDD Total								
11	140			OCDD	x	0.0001	=	0.014	0.0001	0.01	0.0001	0.01
12	0.27	U		2,3,7,8 TCDF	x	0.1	=	0.027	1	0.27	0.05	0.01
13	0.58	J		TCDF Total								
14	0.21	U		1,2,3,7,8 PeCDF	x	0.05	=	0.011	0.1	0.02	0.05	0.01
15	0.31	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.16	1	0.31	0.5	0.16
16	0.80	J		PeCDF Total								
17	0.39	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
18	0.35	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
19	0.21	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.02
20	0.37	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
21	2.6	J		HxCDF Total								
22	1.6	J	1	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.02	0.01	0.02
23	0.26	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	4.1	J		HpCDF Total								
25	5	U	B	OCDF	x	0.0001	=	0.001	0.0001	0.00	0.0001	0.00
27	1.0	J		TEQ (mammals from WHO-TEF)								
28	1.3	J		TEQ (avian from WHO-TEF)								
29	1.0	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED __________

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	0.81	4.0	8.1 : CL (CS5)=	323	1616	3232
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted] %) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 0.81 4.0 8.1 C_1L (CS5) 323 1616 3232

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.19	U		2,3,7,8 TCDD	x	1	=	0.19	1	0.19	1	0.19
2	0.19	UJ		TCDD Total								
3	0.32	U	B	1,2,3,7,8 PeCDD	x	1	=	0.3	1	0.32	1	0.32
4	0.32	UJ	B	PeCDD Total								
5	0.32	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.03	0.05	0.02	0.5	0.16
6	0.47	U	B	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	0.38	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.04	0.01	0.00
8	1.0	J		HxCDD Total								
9	3.0	U	B	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	3.7	J		HpCDD Total								
11	44			OCDD	x	0.0001	=	0.0044	0.0001	0.00	0.0001	0.00
12	0.35	U	B	2,3,7,8 TCDF	x	0.1	=	0.035	1	0.35	0.05	0.02
13	0.56	J		TCDF Total								
14	0.26	U		1,2,3,7,8 PeCDF	x	0.05	=	0.013	0.1	0.03	0.05	0.01
15	0.32	U		2,3,4,7,8 PeCDF	x	0.5	=	0.16	1	0.32	0.5	0.16
16	0.32	UJ	B	PeCDF Total								
17	0.34	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
18	0.27	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.0
19	0.18	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.0
20	0.23	U	BE	2,3,4,6,7,8 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.02
21	1.4	J		HxCDF Total								
22	0.84	U	B	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.01	0.01	0.01
23	0.32	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.44	J		HpCDF Total								
25	8.1	U	B	OCDF	x	0.0001	=	0.001	0.0001	0.00	0.0001	0.00
27	0.98	J		TEQ (mammals from WHO-TEF)								
28	1.4	J		TEQ (avian from WHO-TEF)								
29	0.99	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1)= 1.85	9.2	18.5	CL (CS5): 740	3698	7395
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 1.85 9.2 18.5 C_1L (CS5) 740 3698 7395

EPA LIMS Sample #: 10293 EPA Sample #: DT-BP-DC LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis Y. Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.86	J	1	2,3,7,8 TCDD	x	1	=	0.86	1	0.86	1	0.86
2	0.88	J		TCDD Total								
3	2.8	J	1	1,2,3,7,8 PeCDD	x	1	=	2.8	1	2.80	1	2.80
4	2.8	J		PeCDD Total								
5	2.5	J	1	1,2,3,4,7,8 HxCDD	x	0.1	=	0.25	0.05	0.13	0.5	1.25
6	20			1,2,3,6,7,8 HxCDD	x	0.1	=	2.0	0.01	0.20	0.01	0.20
7	4.3	J	1	1,2,3,7,8,9 HxCDD	x	0.1	=	0.4	0.1	0.43	0.01	0.04
8	31	J		HxCDD Total								
9	65			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.7	0.001	0.07	0.001	0.07
10	79	J		HpCDD Total								
11	200			OCDD	x	0.0001	=	0.02	0.0001	0.02	0.0001	0.02
12	1.2	U	C	2,3,7,8 TCDF	x	0.1	=	0.120	1	1.20	0.05	0.06
13	9.6	UJ		TCDF Total								
14	1.1	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.055	0.1	0.11	0.05	0.06
15	0.54	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.27	1	0.54	0.5	0.27
16	8.6	J		PeCDF Total								
17	6.4	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.64	0.1	0.64	0.1	0.64
18	2.1	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.21	0.1	0.21	0.1	0.21
19	0.42	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
20	1.1	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.11	0.1	0.11	0.1	0.11
21	24	J		HxCDF Total								
22	11			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.1	0.01	0.11	0.01	0.11
23	1.6	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.02	0.01	0.02	0.01	0.02
24	15	J		HpCDF Total								
25	17	J	1	OCDF	x	0.0001	=	0.002	0.0001	0.00	0.0001	0.00
27	8.6	J		TEQ (mammals from WHO-TEF)								
28	7.5	J		TEQ (avian from WHO-TEF)								
29	6.8	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	2.23	11.1	22.3	: CL (CS5):	891	4455	8911
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 2.23 11.1 22.3 C_1L (CS5) 891 4455 8911

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.2	U	E	2,3,7,8 TCDD	x	1	=	1.20	1	1.20	1	1.20
2	0.31	J		TCDD Total								
3	7.7	J	1	1,2,3,7,8 PeCDD	x	1	=	7.7	1	7.70	1	7.70
4	9.2	J		PeCDD Total								
5	11			1,2,3,4,7,8 HxCDD	x	0.1	=	1.10	0.05	0.55	0.5	5.50
6	81			1,2,3,6,7,8 HxCDD	x	0.1	=	8.1	0.01	0.81	0.01	0.81
7	19			1,2,3,7,8,9 HxCDD	x	0.1	=	1.9	0.1	1.90	0.01	0.19
8	120	J		HxCDD Total								
9	350			1,2,3,4,6,7,8 HpCDD	x	0.01	=	3.5	0.001	0.35	0.001	0.35
10	370	J		HpCDD Total								
11	510			OCDD	x	0.0001	=	0.051	0.0001	0.05	0.0001	0.05
12	1.2	U	C	2,3,7,8 TCDF	x	0.1	=	0.120	1	1.20	0.05	0.06
13	0.65	J		TCDF Total								
14	3.5	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.175	0.1	0.35	0.05	0.18
15	1.5	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.75	1	1.50	0.5	0.75
16	23	J		PeCDF Total								
17	9.2	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.92	0.1	0.92	0.1	0.92
18	9.2	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.92	0.1	0.92	0.1	0.92
19	1.4	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.14	0.1	0.14	0.1	0.1
20	2.8	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.28	0.1	0.28	0.1	0.28
21	73	J		HxCDF Total								
22	38			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.4	0.01	0.38	0.01	0.38
23	3.2	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.03	0.01	0.03	0.01	0.03
24	48	J		HpCDF Total								
25	20	J	1	OCDF	x	0.0001	=	0.002	0.0001	0.00	0.0001	0.00
27	27	J		TEQ (mammals from WHO-TEF)								
28	18	J		TEQ (avian from WHO-TEF)								
29	19	J		TEQ (fish from WHO-TEF)								

%Lipids [redacted]

INTERNAL QUALIFIERS: DATE DATA ENTERED AND VERIFIED

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	1.82	9.1	18.2	: CL (CS5): 730	3650	7299
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted] %) Extract Vol (20) uL

extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 1.82 9.1 18.2 C_1L (CS5) 730 3650 7299

EPA LIMS Sample #: T0295 [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.73	J	1	2,3,7,8 TCDD	x	1	=	0.73	1	0.73	1	0.73
2	0.73	J		TCDD Total								
3	3.4	J	1	1,2,3,7,8 PeCDD	x	1	=	3.4	1	3.40	1	3.40
4	3.7	J		PeCDD Total								
5	3.5	J	1	1,2,3,4,7,8 HxCDD	x	0.1	=	0.35	0.05	0.18	0.5	1.75
6	23			1,2,3,6,7,8 HxCDD	x	0.1	=	2.3	0.01	0.23	0.01	0.23
7	4.6	J	1	1,2,3,7,8,9 HxCDD	x	0.1	=	0.5	0.1	0.46	0.01	0.05
8	34	J		HxCDD Total								
9	74			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.7	0.001	0.07	0.001	0.07
10	83	J		HpCDD Total								
11	170			OCDD	x	0.0001	=	0.017	0.0001	0.02	0.0001	0.02
12	0.67	U	C	2,3,7,8 TCDF	x	0.1	=	0.067	1	0.67	0.05	0.03
13	0.37	J		TCDF Total								
14	1.2	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.060	0.1	0.12	0.05	0.06
15	0.79	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.40	1	0.79	0.5	0.40
16	8.9	J		PeCDF Total								
17	4.1	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.41	0.1	0.41	0.1	0.41
18	2.6	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.26	0.1	0.26	0.1	0.26
19	0.44	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
20	1.2	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.12	0.1	0.12	0.1	0.12
21	24	J		HxCDF Total								
22	11			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.1	0.01	0.11	0.01	0.11
23	1.5	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.02	0.01	0.02	0.01	0.02
24	14	J		HpCDF Total								
25	13	J	1	OCDF	x	0.0001	=	0.001	0.0001	0.00	0.0001	0.00
27	9.5	J		TEQ (mammals from WHO-TEF)								
28	7.6	J		TEQ (avian from WHO-TEF)								
29	7.7	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	2.42	12.1	24.2 : CL (CS5):	966	4832	9663
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_iL(CS1)= 2.42 12.1 24.2 C_iL (CS5) 966 4832 9663

EPA LIMS Sample #: 10296 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.1	J	1	2,3,7,8 TCDD	x	1	=	1.10	1	1.10	1	1.10
2	1.3	J		TCDD Total								
3	0.88	U	B	1,2,3,7,8 PeCDD	x	1	=	0.9	1	0.88	1	0.88
4	2.4	J		PeCDD Total								
5	1.5	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.15	0.05	0.08	0.5	0.75
6	11	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	1.1	0.01	0.11	0.01	0.11
7	2.3	U	E	1,2,3,7,8,9 HxCDD	x	0.1	=	0.2	0.1	0.23	0.01	0.02
8	24	J		HxCDD Total								
9	69			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.7	0.001	0.07	0.001	0.07
10	110	J		HpCDD Total								
11	370			OCDD	x	0.0001	=	0.037	0.0001	0.04	0.0001	0.04
12	0.75	U	C	2,3,7,8 TCDF	x	0.1	=	0.075	1	0.75	0.05	0.04
13	1.8	UJ		TCDF Total								
14	0.61	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.031	0.1	0.06	0.05	0.03
15	0.49	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.25	1	0.49	0.5	0.25
16	6.8	J		PeCDF Total								
17	1.3	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.13	0.1	0.13	0.1	0.13
18	1.3	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.13	0.1	0.13	0.1	0.1
19	0.34	U	E	1,2,3,7,8,9 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.0
20	0.95	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.10	0.1	0.10	0.1	0.10
21	18	J		HxCDF Total								
22	12	J	1	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.1	0.01	0.12	0.01	0.12
23	1.2	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.01	0.01	0.01	0.01	0.01
24	33	J		HpCDF Total								
25	32	J		OCDF	x	0.0001	=	0.003	0.0001	0.00	0.0001	0.00
27	5.1	J		TEQ (mammals from WHO-TEF)								
28	4.3	J		TEQ (avian from WHO-TEF)								
29	3.8	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1)= 2.35	11.8	23.5	CL (CS5): 940	4700	9400
(CS5)	200	1000	2000						

Sample wt. = (10.3 g) %M or Lipids = (80.0) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (1.0) ; D_1L(CS1)= 2.35 11.8 23.5 C_1L (CS5) 940 4700 9400

EPA LIMS Sample #: 10297 F EPA Sample #: MB-DTCCDBEG02 LAB ID #: 566922RB

PROJECT NO.: 04-0729 Lab File: B104I029A11

PROJECT NAME: Davis Timber, Hattiesburg,MS Extraction Date: 10/27/04

DATA REVIEWER: Francis Huang Analysis Date: 10/30/04

SAMPLE TYPE: Soil Waste Fish Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.52	U	E	2,3,7,8 TCDD	x	1	=	0.52	1	0.52	1	0.52
2	0.52	J		TCDD Total								
3	0.73	U	B	1,2,3,7,8 PeCDD	x	1	=	0.7	1	0.73	1	0.73
4	2.7	J		PeCDD Total								
5	1.6	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.16	0.05	0.08	0.5	0.80
6	7.1			1,2,3,6,7,8 HxCDD	x	0.1	=	0.7	0.01	0.07	0.01	0.07
7	2.6	J	1	1,2,3,7,8,9 HxCDD	x	0.1	=	0.3	0.1	0.26	0.01	0.03
8	27	J		HxCDD Total								
9	84			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.8	0.001	0.08	0.001	0.08
10	140	J		HpCDD Total								
11	470			OCDD	x	0.0001	=	0.047	0.0001	0.05	0.0001	0.05
12	0.16	U		2,3,7,8 TCDF	x	0.1	=	0.016	1	0.16	0.05	0.01
13	2.3	UJ		TCDF Total								
14	0.42	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.021	0.1	0.04	0.05	0.02
15	0.47	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.24	1	0.47	0.5	0.24
16	8.1	J		PeCDF Total								
17	1.6	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.16	0.1	0.16	0.1	0.16
18	1.4	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.14	0.1	0.14	0.1	0.14
19	0.29	U	E	1,2,3,7,8,9 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
20	0.87	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.09	0.1	0.09	0.1	0.09
21	21	J		HxCDF Total								
22	14			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.1	0.01	0.14	0.01	0.14
23	1.7	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.02	0.01	0.02	0.01	0.02
24	42	J		HpCDF Total								
25	34	J	1	OCDF	x	0.0001	=	0.003	0.0001	0.00	0.0001	0.00
27	4.1	J		TEQ (mammals from WHO-TEF)								
28	3.0	J		TEQ (avian from WHO-TEF)								
29	3.1	J		TEQ (fish from WHO-TEF)								

% Lipids 80.8

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	2.07	10.3	20.7 : CL (CS5):	826	4131	8261
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 2.07 10.3 20.7 C_1L (CS5) 826 4131 8261

EPA LIMS Sample #: 10298 EPA Sample #: SDTGCRSE01 LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis C. Hulan Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.36	U	E	2,3,7,8 TCDD	x	1	=	0.36	1	0.36	1	0.36
2	0.19	J		TCDD Total								
3	0.63	U	E	1,2,3,7,8 PeCDD	x	1	=	0.6	1	0.63	1	0.63
4	0.92	J		PeCDD Total								
5	1.0	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.10	0.05	0.05	0.5	0.50
6	3.0	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.3	0.01	0.03	0.01	0.03
7	1.3	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.1	0.1	0.13	0.01	0.01
8	12	J		HxCDD Total								
9	37			1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.4	0.001	0.04	0.001	0.04
10	58	J		HpCDD Total								
11	200			OCDD	x	0.0001	=	0.02	0.0001	0.02	0.0001	0.02
12	0.45	U	C	2,3,7,8 TCDF	x	0.1	=	0.045	1	0.45	0.05	0.02
13	0.18	J		TCDF Total								
14	0.31	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.016	0.1	0.03	0.05	0.02
15	0.33	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.17	1	0.33	0.5	0.17
16	4.3	J		PeCDF Total								
17	1.5	U	I	1,2,3,4,7,8 HxCDF	x	0.1	=	0.15	0.1	0.15	0.1	0.15
18	0.51	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.05	0.1	0.05	0.1	0.0
19	0.17	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.0
20	0.57	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.06
21	10	J		HxCDF Total								
22	7.2	J	1	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.1	0.01	0.07	0.01	0.07
23	0.89	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.01	0.01	0.01	0.01	0.01
24	9.7	J		HpCDF Total								
25	15	J	1	OCDF	x	0.0001	=	0.002	0.0001	0.00	0.0001	0.00
27	2.5	J		TEQ (mammals from WHO-TEF)								
28	2.4	J		TEQ (avian from WHO-TEF)								
29	2.2	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	1.85	9.2	18.5 ; CL (CS5)=	739	3693	7387
(CS5)	200	1000	2000						

Sample wt. = (5 g) %M or Lipids = (30) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (1) ; D_1L(CS1)= 1.85 9.2 18.5 C_1L (CS5) 739 3693 7387

EPA LIMS Sample #: 10299 EPA Sample #: PT-REF-6-BLGU LAB ID #: 56924RE

PROJECT NO.: 04-0729 Lab File: HT041003X05

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 10/22/04

DATA REVIEWER: Francis Y. Huang Analysis Date: 10/30/04

SAMPLE TYPE: Soil Waste Fish X Water Other

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.10	U	E	2,3,7,8 TCDD	x	1	=	0.10	1	0.10	1	0.10
2	0.10	UJ		TCDD Total								
3	0.36	U	B	1,2,3,7,8 PeCDD	x	1	=	0.4	1	0.36	1	0.36
4	0.36	J		PeCDD Total								
5	0.29	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.03	0.05	0.01	0.5	0.15
6	0.75	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.1	0.01	0.01	0.01	0.01
7	0.33	U	E	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.03	0.01	0.00
8	1.2	J		HxCDD Total								
9	1.7	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	1.7	J		HpCDD Total								
11	24			OCDD	x	0.0001	=	0.0024	0.0001	0.00	0.0001	0.00
12	0.29	U	C	2,3,7,8 TCDF	x	0.1	=	0.029	1	0.29	0.05	0.01
13	0.17	J		TCDF Total								
14	0.24	U	E	1,2,3,7,8 PeCDF	x	0.05	=	0.012	0.1	0.02	0.05	0.01
15	0.26	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.13	1	0.26	0.5	0.13
16	0.38	J		PeCDF Total								
17	0.31	U	E	1,2,3,4,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
18	0.35	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
19	0.17	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.02
20	0.33	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
21	0.76	J		HxCDF Total								
22	0.42	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	0.28	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.62	J		HpCDF Total								
25	0.54	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	0.91	J		TEQ (mammals from WHO-TEF)								
28	1.2	J		TEQ (avian from WHO-TEF)								
29	0.90	J		TEQ (fish from WHO-TEF)								

% Lipids 30%

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	1.94	9.7	19.4 ; CL (CS5):	774	3870	7740
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 1.94 9.7 19.4 C_1L (CS5) 774 3870 7740

EPA LIMS Sample #: 10300 [redacted] EPA Sample #: DT-REF4-BIGSS LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.12	U	E	2,3,7,8 TCDD	x	1	=	0.12	1	0.12	1	0.12
2	0.12	UJ		TCDD Total								
3	0.29	U	B	1,2,3,7,8 PeCDD	x	1	=	0.3	1	0.29	1	0.29
4	0.29	J		PeCDD Total								
5	0.22	U	E	1,2,3,4,7,8 HxCDD	x	0.1	=	0.02	0.05	0.01	0.5	0.11
6	0.73	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.1	0.01	0.01	0.01	0.01
7	0.35	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.04	0.01	0.00
8	1.1	J		HxCDD Total								
9	1.4	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	1.9	J		HpCDD Total								
11	18	J	1	OCDD	x	0.0001	=	0.0018	0.0001	0.00	0.0001	0.00
12	0.13	U		2,3,7,8 TCDF	x	0.1	=	0.013	1	0.13	0.05	0.01
13	0.19	UJ		TCDF Total								
14	0.25	U	E	1,2,3,7,8 PeCDF	x	0.05	=	0.013	0.1	0.03	0.05	0.01
15	0.31	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.16	1	0.31	0.5	0.16
16	0.21	J		PeCDF Total								
17	0.37	U	E	1,2,3,4,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
18	0.27	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
19	0.16	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.02
20	0.32	U	E	2,3,4,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
21	0.22	J		HxCDF Total								
22	0.51	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.01	0.01	0.01
23	0.23	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.19	J		HpCDF Total								
25	0.79	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	0.86	J		TEQ (mammals from WHO-TEF)								
28	1.1	J		TEQ (avian from WHO-TEF)								
29	0.83	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	2.66	13.3	26.6	: CL (CS5)=	1064	5319	10638
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_iL(CS1)= 2.66 13.3 26.6 C_iL (CS5) 1064 5319 10638

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis Y. Huang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] X Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.18	U		2,3,7,8 TCDD	x	1	=	0.18	1	0.18	1	0.18
2	0.18	UJ		TCDD Total								
3	0.39	U	E	1,2,3,7,8 PeCDD	x	1	=	0.4	1	0.39	1	0.39
4	0.33	UJ		PeCDD Total								
5	0.44	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.04	0.05	0.02	0.5	0.22
6	0.68	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.1	0.01	0.01	0.01	0.01
7	0.30	U	E	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.03	0.01	0.00
8	1.1	J		HxCDD Total								
9	1.4	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	1.4	J		HpCDD Total								
11	26	J	1	OCDD	x	0.0001	=	0.0026	0.0001	0.00	0.0001	0.00
12	0.18	U		2,3,7,8 TCDF	x	0.1	=	0.018	1	0.18	0.05	0.01
13	0.26	UJ		TCDF Total								
14	0.34	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.017	0.1	0.03	0.05	0.02
15	0.41	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.21	1	0.41	0.5	0.21
16	0.74	J		PeCDF Total								
17	0.55	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.06	0.1	0.06	0.1	0.06
18	0.25	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.03	0.1	0.03	0.1	0.03
19	0.22	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.02	0.1	0.02	0.1	0.02
20	0.40	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.04	0.1	0.04	0.1	0.04
21	0.95	J		HxCDF Total								
22	0.52	U	B	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.01	0.01	0.01
23	0.40	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	0.93	J		HpCDF Total								
25	0.79	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	1.1	J		TEQ (mammals from WHO-TEF)								
28	1.4	J		TEQ (avian from WHO-TEF)								
29	1.2	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

pcdd/pcdf form 1

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	2.25	11.3	22.5	: CL (CS5):	901	4506	9011
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 2.25 11.3 22.5 C_1L (CS5) 901 4506 9011

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	0.86	U	E	2,3,7,8 TCDD	x	1	=	0.86	1	0.86	1	0.86
2	0.39	J		TCDD Total								
3	9.8	J	1	1,2,3,7,8 PeCDD	x	1	=	9.8	1	9.80	1	9.80
4	15	J		PeCDD Total								
5	15			1,2,3,4,7,8 HxCDD	x	0.1	=	1.50	0.05	0.75	0.5	7.50
6	130			1,2,3,6,7,8 HxCDD	x	0.1	=	13.0	0.01	1.30	0.01	1.30
7	27			1,2,3,7,8,9 HxCDD	x	0.1	=	2.7	0.1	2.70	0.01	0.27
8	210	J		HxCDD Total								
9	720			1,2,3,4,6,7,8 HpCDD	x	0.01	=	7.2	0.001	0.72	0.001	0.72
10	830	J		HpCDD Total								
11	2100			OCDD	x	0.0001	=	0.21	0.0001	0.21	0.0001	0.21
12	0.47	U	C	2,3,7,8 TCDF	x	0.1	=	0.047	1	0.47	0.05	0.02
13	0.57	J		TCDF Total								
14	1.8	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.090	0.1	0.18	0.05	0.09
15	2.0	U	B	2,3,4,7,8 PeCDF	x	0.5	=	1.00	1	2.00	0.5	1.00
16	23	J		PeCDF Total								
17	13			1,2,3,4,7,8 HxCDF	x	0.1	=	1.30	0.1	1.30	0.1	1.30
18	8.7	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	0.87	0.1	0.87	0.1	0.87
19	0.82	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.08	0.1	0.08	0.1	0.0
20	3.5	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.35	0.1	0.35	0.1	0.35
21	120	J		HxCDF Total								
22	90			1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.9	0.01	0.90	0.01	0.90
23	8.6	J	1	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.09	0.01	0.09	0.01	0.09
24	240	J		HpCDF Total								
25	140			OCDF	x	0.0001	=	0.014	0.0001	0.01	0.0001	0.01
27	40	J		TEQ (mammals from WHO-TEF)								
28	23	J		TEQ (avian from WHO-TEF)								
29	25	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED ______

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:
1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	4.86	24.3	48.6	: CL (CS5):	1945	9723	19447
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 4.86 24.3 48.6 C_1L (CS5) 1945 9723 19447

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.5	U	E	2,3,7,8 TCDD	x	1	=	1.50	1	1.50	1	1.50
2	2.2	J		TCDD Total								
3	16	J	1	1,2,3,7,8 PeCDD	x	1	=	16.0	1	16.00	1	16.00
4	32	J		PeCDD Total								
5	24			1,2,3,4,7,8 HxCDD	x	0.1	=	2.40	0.05	1.20	0.5	12.00
6	170			1,2,3,6,7,8 HxCDD	x	0.1	=	17.0	0.01	1.70	0.01	1.70
7	33			1,2,3,7,8,9 HxCDD	x	0.1	=	3.3	0.1	3.30	0.01	0.33
8	320	J		HxCDD Total								
9	1100			1,2,3,4,6,7,8 HpCDD	x	0.01	=	11.0	0.001	1.10	0.001	1.10
10	1400	J		HpCDD Total								
11	4700			OCDD	x	0.0001	=	0.47	0.0001	0.47	0.0001	0.47
12	1.1	U	C	2,3,7,8 TCDF	x	0.1	=	0.110	1	1.10	0.05	0.06
13	2.3	J		TCDF Total								
14	3.9	J	1	1,2,3,7,8 PeCDF	x	0.05	=	0.195	0.1	0.39	0.05	0.20
15	4.2	J	1	2,3,4,7,8 PeCDF	x	0.5	=	2.10	1	4.20	0.5	2.10
16	52	J		PeCDF Total								
17	19	J	1	1,2,3,4,7,8 HxCDF	x	0.1	=	1.90	0.1	1.90	0.1	1.90
18	12	J	1	1,2,3,6,7,8 HxCDF	x	0.1	=	1.20	0.1	1.20	0.1	1.20
19	1.1	J	1	1,2,3,7,8,9 HxCDF	x	0.1	=	0.11	0.1	0.11	0.1	0.11
20	5.9	J	1	2,3,4,6,7,8 HxCDF	x	0.1	=	0.59	0.1	0.59	0.1	0.59
21	220	J		HxCDF Total								
22	180			1,2,3,4,6,7,8 HpCDF	x	0.01	=	1.8	0.01	1.80	0.01	1.80
23	13	J	1	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.13	0.01	0.13	0.01	0.13
24	530	J		HpCDF Total								
25	420			OCDF	x	0.0001	=	0.042	0.0001	0.04	0.0001	0.04
27	60	J		TEQ (mammals from WHO-TEF)								
28	37	J		TEQ (avian from WHO-TEF)								
29	41	J		TEQ (fish from WHO-TEF)								
				% Lipids [redacted]								

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	3.13	15.6	31.3	: CL (CS5)=	1250	6250	12500
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 3.13 15.6 31.3 C_1L (CS5) 1250 6250 12500

EPA LIMS Sample #: 10304 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: [redacted]

DATA REVIEWER: Francis Zhuang Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] X Water _____ Other [redacted]

UNITS: ng/kg

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	2.2	J	1,5	2,3,7,8 TCDD	x	1	=	2.20	1	2.20	1	2.20
2	2.2	J		TCDD Total								
3	11	J	1,5	1,2,3,7,8 PeCDD	x	1	=	11.0	1	11.00	1	11.00
4	15	J		PeCDD Total								
5	13	J	1,5	1,2,3,4,7,8 HxCDD	x	0.1	=	1.30	0.05	0.65	0.5	6.50
6	89	J	5	1,2,3,6,7,8 HxCDD	x	0.1	=	8.9	0.01	0.89	0.01	0.89
7	23	J	5	1,2,3,7,8,9 HxCDD	x	0.1	=	2.3	0.1	2.30	0.01	0.23
8	130	J		HxCDD Total								
9	350	J	5	1,2,3,4,6,7,8 HpCDD	x	0.01	=	3.5	0.001	0.35	0.001	0.35
10	390	J		HpCDD Total								
11	1000	J	5	OCDD	x	0.0001	=	0.1	0.0001	0.10	0.0001	0.10
12	1.8	U	C	2,3,7,8 TCDF	x	0.1	=	0.180	1	1.80	0.05	0.09
13	2.5	J		TCDF Total								
14	1.2	UJ	5	1,2,3,7,8 PeCDF	x	0.05	=	0.060	0.1	0.12	0.05	0.06
15	3.0	J	1,5	2,3,4,7,8 PeCDF	x	0.5	=	1.50	1	3.00	0.5	1.50
16	15	J		PeCDF Total								
17	12	J	1,5	1,2,3,4,7,8 HxCDF	x	0.1	=	1.20	0.1	1.20	0.1	1.20
18	6.7	J	1,5	1,2,3,6,7,8 HxCDF	x	0.1	=	0.67	0.1	0.67	0.1	0.67
19	0.69	UJ	5	1,2,3,7,8,9 HxCDF	x	0.1	=	0.07	0.1	0.07	0.1	0.07
20	4.3	J	1,5	2,3,4,6,7,8 HxCDF	x	0.1	=	0.43	0.1	0.43	0.1	0.43
21	72	J		HxCDF Total								
22	46	J	5	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.5	0.01	0.46	0.01	0.46
23	6.3	J	1,5	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.06	0.01	0.06	0.01	0.06
24	120	J		HpCDF Total								
25	80	J	5	OCDF	x	0.0001	=	0.008	0.0001	0.01	0.0001	0.01
27	34	J		TEQ (mammals from WHO-TEF)								
28	25	J		TEQ (avian from WHO-TEF)								
29	26	J		TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF		Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF		Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	10.00	50.0	100.0	; CL (CS5):	4000	20000	40000
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 10.00 50.0 100.0 C_1L (CS5) 4000 20000 40000

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ____ Other [redacted]

UNITS: ug

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	8.1E-07	U		2,3,7,8 TCDD	x	1	=	0.00	1	0.00	1	0.00
2	8.1E-07	UJ		TCDD Total								
3	2.0E-06	U	B	1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.00	1	0.00
4	2.0E-06	J		PeCDD Total								
5	2.3E-06	J	1	1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	3.1E-06	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	2.2E-06	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	7.6E-06	J		HxCDD Total								
9	7.8E-06	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	7.8E-06	J		HpCDD Total								
11	2.7E-05	J	1	OCDD	x	0.0001	=	2.7E-09	0.0001	0.00	0.0001	0.00
12	9.8E-07	U		2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	9.8E-07	UJ		TCDF Total								
14	1.8E-06	U	E	1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	2.4E-06	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.00	0.5	0.00
16	2.4E-06	UJ		PeCDF Total								
17	2.6E-06	J	1	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	1.8E-06	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
19	1.5E-06	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
20	2.1E-06	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	4.9E-06	J		HxCDF Total								
22	3.4E-06	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	1.9E-06	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	4.2E-06	UJ		HpCDF Total								
25	6.5E-06	J	1	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	NA			TEQ (mammals from WHO-TEF)								
28	NA			TEQ (avian from WHO-TEF)								
29	NA			TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED ________

INTERNAL QUALIFIERS:

- I - DL raised due to PCDPE Interference
- B - DL raised due to Blank Contamination
- D - Dilution Value
- C - Confirmation Value
- E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1. Less than quantitation limit.
2. Over instrument calibration range.
3. TCDF result less than CRQL, confirmation not required.
4. Erratic Calibration response.
5. Low IS recovery:
6. High IS recovery:
7. Analyte missed in PE sample.
8. Warning-low recovery in PE sample.
9. Action-high recovery in PE sample.
10. Warning-high recovery in PE sample.
11. IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0	DL(CS1)= 10.00	50.0	100.0	CL (CS5): 4000	20000	40000
(CS5)	200	1000	2000						

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_iL(CS1)= 10.00 50.0 100.0 C_iL (CS5) 4000 20000 40000

EPA LIMS Sample #: 10306 EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water [redacted] Other [redacted]

UNITS: ug

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.5E-06	U		2,3,7,8 TCDD	x	1	=	0.00	1	0.00	1	0.00
2	1.5E-06	UJ		TCDD Total								
3	2.6E-06	U	B	1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.00	1	0.00
4	2.7E-06	J		PeCDD Total								
5	2.8E-06	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	3.1E-06	U	B	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	1.8E-06	U	B	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	7.7E-06	J		HxCDD Total								
9	5.2E-06	U	B	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	5.2E-06	J		HpCDD Total								
11	7.4E-06	U	E	OCDD	x	0.0001	=	7.38E-10	0.0001	0.00	0.0001	0.00
12	1.7E-06	U		2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	1.7E-06	UJ		TCDF Total								
14	1.8E-06	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	2.1E-06	U	E	2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.00	0.5	0.00
16	2.1E-06	UJ		PeCDF Total								
17	3.4E-06	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	2.6E-06	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.0
19	3.1E-06	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.
20	2.6E-06	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	1.2E-05	J		HxCDF Total								
22	3.1E-06	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	2.9E-06	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	3.8E-06	UJ		HpCDF Total								
25	4.8E-06	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	NA			TEQ (mammals from WHO-TEF)								
28	NA			TEQ (avian from WHO-TEF)								
29	NA			TEQ (fish from WHO-TEF)								

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	10.00	50.0	100.0	: CL (CS5):	4000	20000	40000
(CS5)	200	1000	2000						

Sample wt. = (10.0 g) %M or Lipids = (0.0) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (0.0) ; D_1L(CS1)= 10.00 50.0 100.0 C_1L (CS5) 4000 20000 40000

EPA LIMS Sample #: T0307 EPA Sample #: 10A-BBSS7 LAB ID #: 56312RE

PROJECT NO.: 04-0729 Lab File: B104100A07

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 10/21/04

DATA REVIEWER: Francis X. Huang Analysis Date: 10/31/04

SAMPLE TYPE: Soil Waste Fish Water Other Drywarce/Blank

UNITS: ug

	RESULT	CODE				TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	3.6E-06	U		2,3,7,8 TCDD	x	1	=	0.00	1	0.00	1	0.00
2	3.6E-06	UJ		TCDD Total								
3	2.2E-06	U	B	1,2,3,7,8 PeCDD	x	1	=	0.0	1	0.00	1	0.00
4	2.2E-06	J		PeCDD Total								
5	2.2E-06	U		1,2,3,4,7,8 HxCDD	x	0.1	=	0.00	0.05	0.00	0.5	0.00
6	2.3E-06	U		1,2,3,6,7,8 HxCDD	x	0.1	=	0.0	0.01	0.00	0.01	0.00
7	2.2E-06	U		1,2,3,7,8,9 HxCDD	x	0.1	=	0.0	0.1	0.00	0.01	0.00
8	2.2E-06	UJ		HxCDD Total								
9	4.0E-06	U	B	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0	0.001	0.00	0.001	0.00
10	4.0E-06	J		HpCDD Total								
11	8.2E-06	U	B	OCDD	x	0.0001	=	8.2E-10	0.0001	0.00	0.0001	0.00
12	2.1E-06	U		2,3,7,8 TCDF	x	0.1	=	0.000	1	0.00	0.05	0.00
13	2.1E-06	UJ		TCDF Total								
14	2.0E-06	U		1,2,3,7,8 PeCDF	x	0.05	=	0.000	0.1	0.00	0.05	0.00
15	1.9E-06	U		2,3,4,7,8 PeCDF	x	0.5	=	0.00	1	0.00	0.5	0.00
16	2.0E-06	UJ		PeCDF Total								
17	2.9E-06	U	B	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
18	2.3E-06	U	B	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
19	3.6E-06	U		1,2,3,7,8,9 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
20	3.6E-06	U	B	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00	0.1	0.00	0.1	0.00
21	9.6E-06	J		HxCDF Total								
22	4.2E-06	U	E	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0	0.01	0.00	0.01	0.00
23	3.2E-06	U		1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00	0.01	0.00	0.01	0.00
24	5.1E-06	UJ		HpCDF Total								
25	5.6E-06	U	B	OCDF	x	0.0001	=	0.000	0.0001	0.00	0.0001	0.00
27	NA			TEQ (mammals from WHO-TEF)								
28	NA			TEQ (avian from WHO-TEF)								
29	NA			TEQ (fish from WHO-TEF)								

% Lipids 0.0

DATE DATA ENTERED AND VERIFIED _____

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL)				Equivalent DL in Samples (ng/kg)				Equivalent CL in Samples (ng/kg)		
	TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF		TCDD/TCDF	Others	OCDD/OCDF
No dilution:											
(CS1)	0.50	2.5	5.0	; DL(CS1)=	10.00	50.0	100.0	CL (CS5):	4000	20000	40000
(CS5)	200	1000	2000								

Sample wt. = ([redacted] g) %M or Lipids = ([redacted]) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= ([redacted]) ; D_1L(CS1)= 10.00 50.0 100.0 C_1L (CS5) 4000 20000 40000

EPA LIMS Sample #: [redacted] EPA Sample #: [redacted] LAB ID #: [redacted]

PROJECT NO.: [redacted] Lab File: [redacted]

PROJECT NAME: [redacted] Extraction Date: [redacted]

DATA REVIEWER: [redacted] Analysis Date: [redacted]

SAMPLE TYPE: Soil [redacted] Waste [redacted] Fish [redacted] Water ______ Other [redacted]

UNITS: ug

	RESULT	CODE				TEF mammals		TEQ mammals
1	2.0E-06	U		2,3,7,8 TCDD	x	1	=	0.00
2	2.0E-06	UJ		TCDD Total				
3	2.5E-06	U	B	1,2,3,7,8 PeCDD	x	1	=	0.0
4	2.5E-06	J		PeCDD Total				
5	2.5E-06	U	B	1,2,3,4,7,8 HxCDD	x	0.1	=	0.00
6	2.8E-06	J	1	1,2,3,6,7,8 HxCDD	x	0.1	=	0.0
7	1.8E-06	U	E	1,2,3,7,8,9 HxCDD	x	0.1	=	0.0
8	5.4E-06	J		HxCDD Total				
9	3.1E-06	J	1	1,2,3,4,6,7,8 HpCDD	x	0.01	=	0.0
10	3.1E-06	J		HpCDD Total				
11	7.8E-06	U	B	OCDD	x	0.0001	=	7.8E-10
12	1.5E-06	U		2,3,7,8 TCDF	x	0.1	=	0.000
13	1.5E-06	UJ		TCDF Total				
14	2.1E-06	U	B	1,2,3,7,8 PeCDF	x	0.05	=	0.000
15	2.9E-06	U	B	2,3,4,7,8 PeCDF	x	0.5	=	0.00
16	5.0E-06	J		PeCDF Total				
17	2.1E-06	U	E	1,2,3,4,7,8 HxCDF	x	0.1	=	0.00
18	1.6E-06	U	E	1,2,3,6,7,8 HxCDF	x	0.1	=	0.00
19	2.1E-06	U	B	1,2,3,7,8,9 HxCDF	x	0.1	=	0.00
20	2.3E-06	U	E	2,3,4,6,7,8 HxCDF	x	0.1	=	0.00
21	1.5E-06	J		HxCDF Total				
22	2.7E-06	U	B	1,2,3,4,6,7,8 HpCDF	x	0.01	=	0.0
23	2.5E-06	U	B	1,2,3,4,7,8,9 HpCDF	x	0.01	=	0.00
24	5.3E-06	J		HpCDF Total				
25	4.2E-06	U	B	OCDF	x	0.0001	=	0.000
27	NA			TEQ (mammals from WHO-TEF)				
28	NA			TEQ (avian from WHO-TEF)				
29	NA			TEQ (fish from WHO-TEF)				

% Lipids [redacted]

DATE DATA ENTERED AND VERIFIED ______

INTERNAL QUALIFIERS:

- I - DL raised due to PCDPE Interference
- B - DL raised due to Blank Contamination
- D - Dilution Value
- C - Confirmation Value
- E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1. Less than quantitation limit.
2. Over instrument calibration range.
3. TCDF result less than CRQL, confirmation not required.
4. Erratic Calibration response.
5. Low IS recovery:
6. High IS recovery:
7. Analyte missed in PE sample.
8. Warning-low recovery in PE sample.
9. Action-high recovery in PE sample.
10. Warning-high recovery in PE sample.
11. IS ION RATIO OUTSIDE LIMITS

SOLID	Calibration Stds (ug/uL) TCDD/TCDF	Others	OCDD/OCDF	Equivalent DL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF	Equivalent CL in Samples (ng/kg) TCDD/TCDF	Others	OCDD/OCDF
No dilution:									
(CS1)	0.50	2.5	5.0 ; DL(CS1)=	10.00	50.0	100.0	: CL (CS5):	4000	20000	40000
(CS5)	200	1000	2000						

Sample wt. = (10.0 g) %M or Lipids = (0.0) Extract Vol (20) uL

Extract Diluted :

Dilution Factor= (1.0) ; D_1L(CS1)= 10.00 50.0 100.0 C_1L (CS5) 4000 20000 40000

EPA LIMS Sample #: 10309 EPA Sample #: WQA-DIB6 LAB ID #: 56934AB

PROJECT NO.: 04-0729 Lab File: B104030A09F

PROJECT NAME: Davis Timber, Hattiesburg, MS Extraction Date: 10/21/04

DATA REVIEWER: Francis Y. Hiang Analysis Date: 10/31/04

SAMPLE TYPE: Soil Waste Fish Water Other Dry Ice Blank

UNITS: ug

	RESULT	CODE			TEF mammals		TEQ mammals	TEF birds	TEQ birds	TEF fish	TEQ fish
1	1.0E-06	U		2,3,7,8 TCDD	x	1 =	0.00	1	0.00	1	0.00
2	1.0E-06	UJ		TCDD Total							
3	2.1E-06	U	B	1,2,3,7,8 PeCDD	x	1 =	0.0	1	0.00	1	0.00
4	2.1E-06	J		PeCDD Total							
5	1.9E-06	U		1,2,3,4,7,8 HxCDD	x	0.1 =	0.00	0.05	0.00	0.5	0.00
6	1.6E-06	U		1,2,3,6,7,8 HxCDD	x	0.1 =	0.0	0.01	0.00	0.01	0.00
7	1.2E-06	U		1,2,3,7,8,9 HxCDD	x	0.1 =	0.0	0.1	0.00	0.01	0.00
8	1.9E-06	UJ		HxCDD Total							
9	2.7E-06	U		1,2,3,4,6,7,8 HpCDD	x	0.01 =	0.0	0.001	0.00	0.001	0.00
10	2.7E-06	UJ		HpCDD Total							
11	7.4E-06	U	B	OCDD	x	0.0001 =	7.4E-10	0.0001	0.00	0.0001	0.00
12	1.1E-06	U		2,3,7,8 TCDF	x	0.1 =	0.000	1	0.00	0.05	0.00
13	1.1E-06	UJ		TCDF Total							
14	1.9E-06	U		1,2,3,7,8 PeCDF	x	0.05 =	0.000	0.1	0.00	0.05	0.00
15	2.2E-06	U	B	2,3,4,7,8 PeCDF	x	0.5 =	0.00	1	0.00	0.5	0.00
16	2.3E-06	J		PeCDF Total							
17	2.0E-06	U	B	1,2,3,4,7,8 HxCDF	x	0.1 =	0.00	0.1	0.00	0.1	0.00
18	2.1E-06	U	B	1,2,3,6,7,8 HxCDF	x	0.1 =	0.00	0.1	0.00	0.1	0.00
19	1.8E-06	U		1,2,3,7,8,9 HxCDF	x	0.1 =	0.00	0.1	0.00	0.1	0.00
20	1.9E-06	U		2,3,4,6,7,8 HxCDF	x	0.1 =	0.00	0.1	0.00	0.1	0.00
21	5.0E-06	J		HxCDF Total							
22	2.4E-06	U		1,2,3,4,6,7,8 HpCDF	x	0.01 =	0.0	0.01	0.00	0.01	0.00
23	2.0E-06	U		1,2,3,4,7,8,9 HpCDF	x	0.01 =	0.00	0.01	0.00	0.01	0.00
24	2.9E-06	UJ		HpCDF Total							
25	4.5E-06	U	B	OCDF	x	0.0001 =	0.000	0.0001	0.00	0.0001	0.00
27	NA			TEQ (mammals from WHO-TEF)							
28	NA			TEQ (avian from WHO-TEF)							
29	NA			TEQ (fish from WHO-TEF)							

% Lipids 0.0

DATE DATA ENTERED AND VERIFIED

INTERNAL QUALIFIERS:

I - DL raised due to PCDPE Interference
B - DL raised due to Blank Contamination
D - Dilution Value
C - Confirmation Value
E - 'Estimated Most Probable Concentration', due to Interference, ion ratio out.

REMARKS:

1 Less than quantitation limit.
2 Over instrument calibration range.
3 TCDF result less than CRQL, confirmation not required.
4 Erratic Calibration response.
5 Low IS recovery:
6 High IS recovery:
7 Analyte missed in PE sample.
8 Warning-low recovery in PE sample.
9 Action-high recovery in PE sample.
10 Warning-high recovery in PE sample.
11 IS ION RATIO OUTSIDE LIMITS

Appendix B

Toxicity and Bioaccumulation Potential of Sediment and Soil Samples from the Davis Timber Superfund Site, Hattiesburg, Mississippi

FINAL REPORT

TOXICITY AND BIOACCUMULATION POTENTIAL OF SEDIMENT AND SOIL SAMPLES FROM THE DAVIS TIMBER SUPERFUND SITE, HATTIESBURG, MISSISSIPPI

PREPARED FOR:

U.S. Environmental Protection Agency Region 4
Science and Ecosystems Support Division
980 College Station Road
Athens, Georgia 30605-2720

PREPARED BY:

Integrated Laboratory Systems, Inc.
Environmental Services Assistance Team Contractor
Science and Ecosystems Support Division
980 College Station Road
Athens, Georgia 30605-2720

October 25, 2004

EXECUTIVE SUMMARY

Whole sediment and soil bioassays were conducted at the EPA Region 4 Science and Ecosystems Support Division/Environmental Services Assistance Team Toxicology Laboratory in Athens, Georgia, to determine the toxicity of samples from the Davis Timber Superfund site, Hattiesburg, Mississippi. The test species used were the amphipod, *Hyalella azteca,* the oligochaete, *Lumbriculus variegatus*, the earthworm, *Eisenia foetida* and the lettuce seed, *Lactuca sativa.* The bioaccumulation potential of the soil and sediment samples was also determined with *Eisenia foetida* and *Lumbriculus variegatus*, respectively. After 14 days of exposure to the site sediments there were no significant differences (P=0.05) in the survival and growth of *Hyalella azteca* between the laboratory control or field reference sediments and any of the site sediments. In the 96-hour sediment toxicity screen tests, there were no significant differences (P=0.05) in the survival of *Lumbriculus variegatus* between the laboratory control or field reference sediment and any of the site sediments. Adequate amounts of *Lumbriculus variegatus* tissue was obtained for chemical analyses in all of the sediment samples after the 28-day bioaccumulation tests. In the soil toxicity tests, there were no significant differences (P=0.05) in the survival of *Eisenia foetida* between the laboratory control or field reference soil and any of the site soils. The growth of *Eisenia foetida* in the earthworms was not measured. Adequate amounts of *Eisenia foetida* tissue were obtained for chemical analyses for all of the soil samples after the bioaccumulation tests. Finally, there were no significant differences (P=0.05) in the seedling germination rates between the laboratory control or field reference soil and any of the site soils.

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LIST OF ACRONYMS

ANOVA	Analysis of variance
ASB	Analytical Services Branch
ASTM	American Society for Testing and Materials
cm	Centimeter
CLP	Contract laboratory program
$CaCO_3$	Calcium carbonate
COPCs	Chemicals of potential concern
D.O.	Dissolved oxygen
EPA	Environmental Protection Agency
ESAT	Environmental Services Assistance Team
g	Gram
KCl	Potassium chloride
L	Liter
mg	Milligram
mL	Milliliter
µmhos	Micromhos
SESD	Science and Ecosystems Support Division
TOC	Total organic carbon
YCTM	Yeast-Cereal leaves-Tetramin

1.0 INTRODUCTION

Surface soil and whole sediment bioassays were conducted at the EPA Region 4 Science and Ecosystems Support Division (SESD)/Environmental Services Assistance Team (ESAT) Toxicology Laboratory in Athens, Georgia, to determine the toxicity and bioaccumulation potential of sediment and soil samples collected from the Davis Timber Superfund Site, Hattiesburg, Mississippi. The freshwater test organisms used for the whole sediment toxicity tests were the amphipod, *Hyalella azteca* (acute toxicity) and the oligochaete, *Lumbriculus variegatus* (acute toxicity and bioaccumulation potential). The test species used for the soil bioassays were the lettuce seed, *Lactuca sativa* (acute toxicity) and the lumbricid earthworm, *Eisenia foetida* (acute toxicity and bioaccumulation potential). The effect criteria for the acute toxicity tests were survival and growth (*H. azteca* and *E. foetida*) and seedling germination (*L. sativa*). The criteria for effect the bioaccumulation tests with *L. variegatus* and *E. foetida* were survival and bioaccumulation potential. The endpoint for the bioaccumulation tests was to obtain adequate mass of test organism tissue for use in the analyses of the chemicals of potential concern (COPCs).

The original copies of the relevant raw data pertaining to the toxicity and bioaccumulation tests are maintained at the EPA Region 4 SESD/ESAT Toxicology Laboratory, 980 College Station Road, Athens, Georgia 30605-2720.

2.0 MATERIALS AND METHODS

2.1 TEST SAMPLES

The five sediment and five soil samples used in the bioassays were collected by U.S. EPA Region 4 SESD personnel on July 27 and 28, 2004 and transported on ice to the EPA Region 4 Laboratory in Athens, Georgia. The sediment samples were identified as DT-SD-B/T-01, DT-SD-B/T-02, DT-SD-B/T-03, DT-SD-B/T-04, and DT-SD-REF1 (reference). The soil samples were identified as DT-SS-B/T-01, DT-SS-B/T-02, DT-SS-B/T-03, DT-SS-B/T-04, and DT-SS-REF1. All of the samples were stored in a refrigerator at 4 $\pm$ 2 °C until used for testing. Prior to use in testing, the samples were thoroughly homogenized in their original containers and hand sorted to remove large debris, grass, stones, sticks, and any indigenous organisms present.

The control sediment used to assess the health of the test organisms was collected from the Ogechee River in northern Georgia, and was treated the same way as the test sediments. The control soil used for

the earthworm tests was artificial soil prepared in the laboratory and comprised 20% kaolinite clay, 10% sphagnum peat, and 70% fine silica sand and the control soil for the seedling germination tests comprised of 100% fine silica sand (Greene *et al.*, 1989). The laboratory control sediment and soil have been chemically characterized and are within acceptable limits (i.e. free of elevated COPCs). Chain-of-custody records and other traffic information pertaining to the test samples are provided in Appendix A.

2.2 TEST ORGANISMS

Juvenile *H. azteca,* 7- to 14-days old at test initiation and adult *L. variegatus* were used in the sediment bioassays. Adult, fully clitellate *E. foetida* (more than 60 days old at test initiation) and *L sativa* seeds (Buttercrunch variety) were used in the soil bioassays. The test organisms used for the bioassays were obtained from EPA Region 4 SESD/ESAT in-house laboratory cultures and the lettuce seeds were obtained from an outside vendor. The organisms appeared to be normal and healthy at test initiation. No mortalities or abnormalities in the test populations were observed within 24 to 48 hours of test initiation.

2.3 CONTROL (OVERLYING) WATER

The control or overlying water used for the sediment toxicity and bioaccumulation tests was well water with hardness, alkalinity and conductivity values of approximately 64 mg/L as $CaCO_3$, 55 mg/L as $CaCO_3$, and 176 µmhos/cm, respectively. The well water was obtained from a deep well located at the EPA Region 4 SESD facility. The water used to hydrate the earthworm and lettuce seed bioassay soils was Milli-Q water (i.e. deionized water that had been further purified by passing through a Milli-Q deionizing system).

2.4 TEST METHODS

The *H. azteca* toxicity tests and the *L. variegatus* toxicity and bioaccumulation tests were performed according to a modification of the guidelines provided in EPA/600/R-99/064 entitled: "*Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*" (USEPA, 2000). The *H. azteca* tests were performed for 14 days instead of the 10 days recommended by the method. In order to obtain adequate amount of tissue for chemical analyses (i.e. approximately 60 grams tissue per sample), the guidelines for the *L. variegatus* bioaccumulation tests were modified by using larger test vessels and varying the amounts of sediment, *L. variegatus*, and overlying water.

The bioassays with *E. foetida* and *L. sativa* were performed using a modification of EPA guideline EPA/600/3-88/029 entitled: "*Protocols for Short Term Toxicity Screening of Hazardous Waste Sites*" (Greene *et al.*, 1989). The modifications for the earthworm bioaccumulation tests were performed in order to obtain adequate mass of earthworm tissue for use in chemical analyses (i.e. approximately 60-70 grams per sample).

2.4.1 *Hyalella azteca* Whole Sediment Toxicity Tests

The 14-day solid phase toxicity tests with *H. azteca* were conducted in 300 mL glass beakers containing approximately 100 mL of test or control sediment and 175 mL of overlying water. One day prior to the addition of the test organisms, the test vessels were labeled and the required volumes of sediment and overlying water were added. Four site sediments (i.e. DT-SD-B/T-01, DT-SD-B/T-02, DT-SD-B/T-03, and DT-SD-B/T-04), one reference sediment (i.e. DT-SD-REF1), one site soil (i.e. DT-SS-B/T-04), and one laboratory control sediment (control) were used in the toxicity tests. Soil sample DT-SS-B/T-04 was used as a sediment (i.e. DT-SD-B/T-05) because it was inundated with water and could not be used in the soil bioassays.

On the day of the tests, the overlying water was renewed in each replicate test vessel and the water quality parameters (hardness, alkalinity, conductivity, dissolved oxygen, pH, etc.) were measured. Eighty *H. azteca* were exposed per sample in individual test vessels, equally divided among 8 replicates (i.e. 10 organisms per replicate). The test vessels were labeled replicate A through H. The test organisms were indiscriminately added to the test chambers, one replicate at a time until loading was completed. The duration of the toxicity tests was 14 days during which the overlying water in each replicate was renewed twice daily.

A summary of the *H. azteca* sediment toxicity test conditions is provided in Table 2-1. Each *H. azteca* replicate was fed 1 mL of a Yeast-Cereal leaves-Tetramin (YCTM) mixture daily after the second overlying water renewal. The tests were conducted in a room maintained at a temperature of 22 $\pm$ 2 °C with a daily photoperiod of 16 hours of light and 8 hours of darkness under ambient laboratory illumination (100-1,000 Lux). The test vessels were observed daily for organism mortality, sediment avoidance, and other behavioral changes. At the end of the 14-day exposure period, organisms were sieved from the sediment, counted, and oven-dried at 60 $\pm$ 2 °C for 24 hours. The dried organism were then weighed in order to determine growth (i.e. dry weight).

2.4.2 *Lumbriculus variegatus* Whole Sediment Toxicity and Bioaccumulation Tests

2.4.2.1 Toxicity Screen Tests

A 96-hour whole sediment toxicity screen test was performed concurrently with the *L. variegatus* bioaccumulation tests. The screen test was performed to determine if the sediments were acutely toxic, and whether the bioaccumulation tests should continue. The test containers and conditions were the same as those described for the *H. azteca* toxicity tests except that only 40 adult *L. variegatus* were used with 4 replicates per sample (i.e. 10 organisms per replicate). Also, the *L. variegatus* were not fed during the 96-hour exposure. A summary of the *L. variegatus* whole sediment toxicity screen test conditions is provided in Table 2-1. At the end of the 96-hour exposure period, the organisms were sieved from the sediment and counted to determine whether the bioaccumulation tests should proceed.

2.4.2.2 Bioaccumulation Tests

The *L. variegatus* bioaccumulation tests were conducted in 19 L (5 gallon) glass aquaria (26.5 cm height x 41 cm length x 20.5 cm width) containing approximately 2.5 to 3.5 L of test or control sediment and 4 L of overlying water. The volume of sediment used provided a sediment total organic carbon (TOC) content to oligochaete tissue dry weight ratio of approximately 50:1 or greater. One day prior to the addition of the test organisms, the test vessels were labeled (as replicate A through D) and the required volumes of sediment and overlying water were added. Four site sediments (i.e. DT-SD-B/T-01, DT-SD-B/T-02, DT-SD-B/T-03, and DT-SD-B/T-04), one reference sediment (i.e. DT-SD-REF1), one site soil (i.e. DT-SS-B/T-04), and one laboratory control sediment (control) were used in the bioaccumulation tests. Soil sample DT-SS-B/T-04 was used as a sediment (i.e. DT-SD-B/T-05) because it was inundated with water and could not be used in the soil bioassays. On the day of the test, the overlying water was renewed in each replicate test vessel and the water quality parameters (hardness, alkalinity, conductivity, dissolved oxygen, pH, etc.) were measured. The exposures were began by weighing approximately 25 grams (wet weight) of the oligochaetes and adding them to each of the 4 replicate test chambers. The duration of the bioaccumulation tests was 28 days during which the overlying water in each replicate was renewed daily. The *L. variegatus* were not fed during the 28-day exposure period. Aeration was provided to all of the test chambers after 48 hours because of low dissolved oxygen (D.O.) levels.

A summary of the *L. variegatus* sediment bioaccumulation test conditions is provided in Table 2-2. The tests were conducted in a room maintained at a temperature of 22 $\pm$ 2 °C with a daily photoperiod of 16 hours of light and 8 hours of darkness under ambient laboratory illumination (100-1,000 Lux). The test

organisms were observed daily for mortality and other behavioral changes. At the end of the 28-day exposure period, the organisms were sieved from the sediment and weighed. All of the organisms in the replicates of each sample were pooled and then frozen prior to homogenization and shipment to the analytical laboratory for chemical analyses.

2.4.3 *Eisenia foetida* Soil Toxicity and Bioaccumulation Tests

2.4.3.1 *Eisenia foetida* Soil Toxicity Tests

The earthworm, *E. foetida*, whole soil toxicity tests were conducted in 500 mL Mason jars using 200 grams of soil and 10 adult earthworms per replicate. Two site soils (i.e. DT-SS-B/T-01 and DT-SS-B/T-03), one reference soil (i.e. DT-SS-REF1) and one laboratory control or artificial soil (control) were used in the toxicity tests. A 50% dilution of sample DT-SS-B/T-01 was performed using the laboratory control soil as diluent. This diluted sample was designated as DT-SS-B/T-02. Four replicates were set up for each soil sample and 200 grams of soil (hydrated to 75% of the water holding capacity) were added to each replicate. Samples with excess moisture in them were allowed to air-dry at room temperature prior to use. The exposures were began by counting and weighing 10 adult (>60 days old, each weighing 300 to 500 mg), fully clitellate worms into each of the 4 replicate test chambers. The earthworms were placed on top of the soil and allowed to burrow into the soil. The soils were checked 2 hours after loading to ensure that all of the worms had burrowed. The test vessels were covered with plastic sheets with air holes punched in the middle to allow for gaseous exchange. The duration of the toxicity tests was 14 days during which the worms were not fed.

2.4.3.2 *Eisenia foetida* Soil Bioaccumulation Tests

The earthworm bioaccumulation tests were conducted in 3.75 L (1 gallon) glass jars containing approximately 2 kilograms of test or control soil. The same soils used in the toxicity tests (i.e. DT-SS-B/T-01, DT-SS-B/T-02, DT-SS-B/T-03, field reference, and laboratory control) were also used in the bioaccumulation tests. Four replicates (labeled A through D) were set up for each sample. The exposures were began by weighing approximately 25 grams (wet weight) of adult (>60 days old, each weighing 300 to 500 mg), fully clitellate worms into each replicate jar. The earthworms were placed on top of the soil and allowed to burrow into the soil. The soils were checked 2 hours after loading to ensure that all of the worms had burrowed. The test vessels were covered with plastic sheets with airholes punched in the middle to allow for gaseous exchange. The duration of the bioaccumulation tests was 28 days and the earthworms were not fed during the 28-day exposure period.

A summary of the soil toxicity and bioaccumulation test conditions for the earthworms is provided in Table 2-3. The tests were conducted in a room maintained at a temperature of 22 ± 2 °C with a daily photoperiod of 24 hours of light and 0 hours of darkness under ambient laboratory illumination (540-1,080 Lux). The test temperature was continuously monitored and recorded daily with a thermometer inserted into a separate temperature control vessel containing artificial soil. At weekly intervals, the contents of each replicate test container were emptied into a glass bowl and the number of live worms was counted. Any dead worms were also counted and removed during the weekly inspections. Soils which appeared to be dry were hydrated by sprinkling deionized water from a wash bottle onto the soil and thoroughly mixing it with the soil. The worms were then placed on top of the soil and allowed to burrow into the soil. The pH of the soils was measured at the beginning and end of the tests. At the end of the exposure period, worms were collected from the soil, cleaned, and weighed. The worms in each replicate were pooled and then frozen prior to homogenization and shipment to the analytical laboratory for chemical analyses.

2.4.4 *Lactuca sativa* Seedling Germination Tests

The *Lactuca sativa* seedling germination tests were performed in 14 cm x 2.5 cm Petri dishes containing 100 grams of soil hydrated to approximately 85% of its water holding capacity. Three replicates of each sample was set up and 40 lettuce seeds (Buttercrunch variety) were evenly placed on top of each replicate. The seeds were overlain with 90 grams of fine sand, placed in Ziploc® bags, and incubated at 24 ± 2 °C. The first 48 hours of the seedling germination tests were performed in complete darkness and the final 72 hours were conducted with a photoperiod of 16 hours light and 8 hours dark. The light intensity was 4300 ± 430 Lux. The pH of the soils was measured at the beginning and end of the tests. At the end of the 120-hour exposure period, the number of germinated seeds in each replicate was determined by counting each seedling that protruded above the soil surface. A summary of the test conditions for the lettuce seed germination tests is provided in Table 2-4.

2.5 REFERENCE TOXICANT TESTS

Routine reference toxicant tests are performed for all of the test organisms cultured at the EPA Region 4 SESD/ESAT Toxicology laboratory. For those organisms for which reference toxicant data were not available, a reference toxicant test using potassium chloride (KCl) or 2-chloroacetamide (*E. foetida* only) as the toxicant, was conducted concurrently with the toxicity tests. The nominal concentrations of reference toxicant used were 0 (control), 62.5, 125, 250, 500, and 1,000 mg KCl/L for *H. azteca* tests and

0 (control), 125, 250, 500, 1,000, and 2,000 mg KCl/L for *L. variegatus*. The reference toxicant used for the *E. foetida* tests was 2-chloroacetamide at concentrations of 0 (control), 12.5, 25, 50, 100, and 200 µg 2-chloroacetamide/g of soil. The reference toxicant tests are conducted under similar conditions as the toxicity tests. However, the number of replicates used is usually less and the duration of the reference toxicant tests is either 48 hours or 96 hours.

3.0 STATISTICAL ANALYSES

Statistical analyses were performed following procedures published by USEPA (USEPA, 2000) using computer programs to determine statistically significant differences between test sample and laboratory control or field reference sample exposures. Survival and growth data were transformed when necessary, and tested for normality and homogeneity of variance and analyzed by analysis of variance (ANOVA) followed by Dunnett's test or other comparison procedure (Gulley and WEST, Inc. 1994; Hamilton *et. al*, 1977; Snedecor and Cochran, 1980).

4.0 RESULTS AND DISCUSSION

All of the whole sediment and soil test conditions including temperature, dissolved oxygen, pH, hardness, alkalinity, and conductivity remained within acceptable limits for the duration of the toxicity, seedling germination, and bioaccumulation tests. No situations were recorded and/or noted during the tests which were considered severe enough to jeopardize the quality of the sediment and soil toxicity data.

4.1 SEDIMENT TESTS

4.1.1 *Hyalella azteca* Toxicity Tests

After 14 days of exposure to the Davis Timber Superfund site sediments, *H. azteca* were sieved from the sediment and counted. Amphipods which were not found after repeated sieving and thorough examination of the sediments were considered to be dead. The survival and growth data for the *H. azteca* sediment toxicity tests are presented in Table 4-1. The survival of *H. azteca* in the test sediments ranged from 87.5 percent in sample DT-SD-B/T-02 to 98.75 percent in samples DT-SD-B/T-01 and DT-SD-B/T-05. The survival of *H. azteca* was 92.5 percent and 98.75 percent, respectively, in the laboratory control sediment and field reference sediment (i.e. DT-SD-REF1) (Table 4-1). Under the conditions of the14-day sediment toxicity tests there were no significant differences (P=0.05) in the survival of *H. azteca* between the laboratory control or field reference sediment and any of the site sediments. Refer to Table 4-1 for specific details.

The growth of *H. azteca* in the test sediments ranged from 0.13 mg/organism in sample DT-SD-B/T-02 to 0.19 mg/organism in sample DT-SD-B/T-04. The growth of *H. azteca* was 0.12 mg/organism and 0.14 mg/organism, respectively, in the laboratory control sediment and field reference sediment (i.e. DT-SD-REF1) (Table 4-1). Under the conditions of the14-day sediment toxicity tests there were no significant differences (P=0.05) in the growth of *H. azteca* between the laboratory control or field reference sediment and any of the site sediments. Refer to Table 4-1 for specific details.

Copies of the relevant raw data pertaining to the *H. azteca* sediment toxicity tests and the statistical summaries are provided in Appendix B.

4.1.2 *Lumbriculus variegatus* Bioaccumulation Tests

The results of the 96-hour acute toxicity screen tests with *L. variegatus* indicated no toxicity to the test organisms from exposure to the site, field reference, or laboratory control sediments (Table 4-2). There were no significant differences (P=0.05) in the survival of *L. variegatus* between the laboratory control or field reference sediment and any of the site sediments. Therefore, the bioaccumulation tests were continued for the full 28 days.

At the end of the 28-day exposure period, all of the oligochaetes in the site, laboratory control, and field reference sediments appeared to be normal and healthy. A considerable amount of time and effort were expended in sieving and collecting the oligochaetes from the sediments. Adequate amounts of tissue (approximately 60 - 70 grams per sample) were collected for all of the test samples. The tissues from each replicate sample were pooled, homogenized, and sent to the EPA Region 4 SESD Analytical Services Branch (ASB) and a contract laboratory program (CLP) laboratory for chemical analysis. Refer to Table 4-2 for specific details.

Copies of the relevant raw data pertaining to the *L. variegatus* sediment toxicity screen and bioaccumulation tests and the statistical summaries are provided in Appendix C.

4.2 SOIL TESTS

4.2.1 *Eisenia foetida* Toxicity Tests

The results of the 14-day *E. foetida* soil toxicity tests with the two site soils, one field reference soil, and one artificial soil (control) are provided in Table 4-3. The survival of *E. foetida* in all of the site and

control soils was 100 percent. The survival of *E. foetida* in the field reference soil was 97.5 percent (Table 4-3). Under the conditions of the 14-day soil toxicity tests, there were no significant differences (P=0.05) in the survival of *E. foetida* between the laboratory control or field reference soil and any of the site soils (Table 4-3).

The growth of *E. foetida* was not determined because the worms were added to the bioaccumulation vessels in order to meet the weight requirements. Copies of the relevant raw data pertaining to the *E. foetida* soil toxicity tests and the statistical summaries are provided in Appendix D.

4.2.2 *Eisenia foetida* Bioaccumulation Tests

The results of the 28-day *E. foetida* soil bioaccumulation tests are presented in Table 4-3. At the end of the 28-day exposure period, the soils were emptied onto glass containers and the worms were collected. The soils were thoroughly examined and earthworms not found at the end of the examination period were considered to be dead. The survival of *E. foetida* in all of soils was determined to be approximately 100 percent. Adequate amounts of earthworm tissue were available for chemical analyses for all of the samples. Refer to Table 4-3 for specific details.

Copies of the relevant raw data pertaining to the *E. foetida* bioaccumulation tests and the statistical summaries are provided in Appendix D.

4.2.3 *Lactuca sativa* Germination Tests

The results of the 120-hour *L. sativa* seedling germination tests are presented in Table 4-4. At the end of exposure period, the seedlings protruding out of the oils were counted and recorded. The percentage germination of the lettuce seeds in the site soils ranged from 69.2 percent in sample DT-SS-B/T-03 to 80 percent in DT-SS-B/T-02. The laboratory control and field reference germination percentages were 92.5 percent and 82.5%, respectively (Table 4-4). Under the conditions of the seedling germination tests, there were no significant differences (P=0.05) in the germination of *L. sativa* between the laboratory control or field reference soil and any of the site soils. Refer to Table 4-4 for specific details.

Copies of the relevant raw data pertaining to the *L. sativa* germination tests and the statistical summaries are provided in Appendix E.

5.0 CONCLUSION

Under the conditions of the 14-day toxicity tests, there were no significant differences (P=0.05) in the survival and growth of *Hyalella azteca* between the laboratory control or field reference sediments and any of the site sediments. In the 96-hour sediment toxicity screen tests, there were no significant differences (P=0.05) in the survival of *Lumbriculus variegatus* between the laboratory control or field reference sediment and any of the site sediments. Adequate amounts of *Lumbriculus variegatus* tissue was obtained for chemical analyses in all of the sediment samples after the 28-day bioaccumulation tests. In the soil toxicity tests, there were no significant differences (P=0.05) in the survival of *Eisenia foetida* between the laboratory control or field reference soil and any of the site soils. Adequate amounts of *Eisenia foetida* tissue were obtained for chemical analyses for all of the soil samples following the bioaccumulation tests. Finally, there were no significant differences (P=0.05) in the seedling germination rates between the laboratory control or field reference soil and any of the site soils.

6.0 REFERENCES

Greene, J.C., C.L. Bartels, W.J. Warren-Hicks, B.R. Parkhurst, G.L. Linder, S.A. Peterson, and W.E. Miller. "*Protocols for Short Term Toxicity Screening of Hazardous Waste Sites.*" EPA 600/3-88/029. USEPA. February 1989.

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Snedecor, G.W. and W.G. Cochran. 1980. Statistical Methods. 7th Edition. The Iowa State University Press, Ames, Iowa.

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Table 2-1. Summary of Test Conditions for the *Hyalella azteca* and *Lumbriculus variegatus* Sediment Toxicity Tests

PARAMETER		CONDITIONS
1.	Test type:	Whole sediment toxicity test with overlying water renewal
2.	Temperature:	22 ± 2 °C
3.	Light quality:	Fluorescent (Ambient Laboratory Levels)
4.	Illuminance:	100-1000 Lux
5.	Photoperiod:	16-Hour Light: 8-Hour Dark
6.	Test chamber size:	300 mL beaker
7.	Sediment volume:	100 mL
8.	Overlying water volume:	175 mL
9.	Renewal of overlying water:	2 volume additions/day
10.	Age of organisms:	7-to 14-days *H. azteca* (1- to 2-day range in age); adult *L. variegatus*
11.	Number of organisms/chamber:	10
12.	Number of replicates/treatment:	8 *H. azteca*; 4 for *L. variegatus* screen
13.	Feeding:	1 mL YCTM/replicate daily *H. azteca*; none for *L. variegatus*
14.	Aeration:	None, unless D.O. falls below 2.5 mg/L
15.	Overlying water:	Well water
16.	Test chamber cleaning:	None
17.	Overlying water quality:	Hardness, alkalinity, conductivity, pH and ammonia at the beginning and end of test. Temperature and DO daily
18.	Test duration:	14 days (4 days for *L. variegatus* screen)
19.	Endpoints:	Survival and growth
20.	Test acceptability:	Minimum control survival (90% for *H. azteca*, 90% for *L. variegatus*)

Source:
EPA/600/R-99/064 entitled: "*Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*" (U.S. EPA, 2000).

Table 2-2. Summary of Test Conditions for the *Lumbriculus variegatus* 28-Day Sediment Bioaccumulation Test

PARAMETER		CONDITIONS
1.	Test type:	Whole sediment toxicity test with overlying water renewal
2.	Temperature:	23 ± 1 °C
3.	Light quality:	Fluorescent (Ambient Laboratory Levels)
4.	Illuminance:	100-1000 Lux
5.	Photoperiod:	16-Hour Light: 8-Hour Dark
6.	Test chamber size:	4-6 L aquaria (may be modified)
7.	Sediment volume:	1 L or more depending on TOC
8.	Overlying water volume:	1 L or more depending on TOC
9.	Renewal of overlying water:	2 volume additions/day
10.	Age of organisms:	Adult
11.	Number of organisms/chamber:	Variable (minimum 1 g/replicate) (50:1 TOC:dry weight)
12.	Number of replicates/treatment:	Depends on test objective (5 recommended)
13.	Feeding:	None
14.	Aeration:	None, unless D.O. falls below 2.5 mg/L
15.	Overlying water:	Well water, reconstituted water
16.	Test chamber cleaning:	None
17.	Overlying water quality:	Hardness, alkalinity, conductivity, pH and ammonia at the beginning and end of test. Temperature and D.O. daily
18.	Test duration:	28 days
19.	Endpoints:	Bioaccumulation
20.	Test acceptability:	Adequate tissue for chemical analyses

Source:
EPA/600/R-99/064 entitled: "*Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*" (USEPA, 2000).

Table 2-3. Summary of Test Conditions for the *Eisenia foetida* Soil Toxicity and Bioaccumulation Tests

PARAMETER		CONDITIONS
1.	Test type:	Whole soil toxicity and bioaccumulation tests
2.	Temperature:	22 ± 2 °C
3.	Light quality:	Fluorescent (Ambient Laboratory Levels)
4.	Illuminance:	540-1000 Lux
5.	Photoperiod:	24-Hours light/0 hours darkness (continuous illumination)
6.	Test chamber size:	500 mL glass (toxicity); 3.75 L glass (bioaccumulation)
7.	Soil volume:	200 g/replicate for toxicity; 2 kg/replicate for bioaccumulation
8.	Age of organisms:	Fully clitellate adult (>60 days old), 300-500 mg each
9.	Number of organisms/chamber:	10/replicate (toxicity); 50 to 60/replicate (bioaccumulation)
10.	Number of replicated/treatment:	4
11.	Feeding:	None
12.	Test chamber cleaning:	None
13.	Soil conditions:	pH at the beginning and end of test. Temperature daily
14.	Test duration:	14 days (toxicity); 28 days (bioaccumulation)
15.	Endpoints:	Survival, growth, and bioaccumulation potential
16.	Test acceptability:	≥ 90% control survival (toxicity) Adequate tissue for chemical analyses (bioaccumulation)

Source:
ASTM E1676-97. *Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm, Eisenia foetida.*" ASTM 1997.

Greene *et al.* 1989. "*Protocols for Short Term Toxicity Screening of Hazardous Waste Sites.*" EPA/600/3-88/029. USEPA. February 1989.

Table 2-4. Summary of Test Conditions for the lettuce seed, *Lactuca sativa,* Germination Tests

PARAMETER		CONDITIONS
1.	Test type:	Static seedling germination tests
2.	Temperature:	24 ± 2 °C
3.	Light quality:	Fluorescent (Ambient Laboratory Levels)
4.	Illuminance:	4300 ± 430 Lux
5.	Photoperiod:	Initial 48 hours dark, followed by 16 hours light and 8 hours dark until test termination at 120 hours
6.	Test chamber size:	Plastic petri dishes (14 cm x 2.5 cm) placed in re-sealable polyethylene bags
7.	Soil volume:	100 g/replicate
8.	Soil moisture:	85 percent of water holding capacity
9.	Age of organisms:	Seeds
10.	Number of organisms/chamber:	40
11.	Number of replicated/treatment:	3
12.	Test chamber cleaning:	None
13.	Soil conditions:	pH and light intensity at the beginning and end of test. Temperature daily
14.	Test duration:	120 hours (7 days)
15.	Test endpoint:	Germination
16.	Test acceptability:	≥ 90% germination in the control

Source:
Greene *et al.* 1989. *"Protocols for Short Term Toxicity Screening of Hazardous Waste Sites."* EPA/600/3-88/029. USEPA. February 1989.

Table 4-2. Results of the *Lumbriculus variegatus* Sediment Toxicity and Bioaccumulation Tests with Samples from the Davis Timber Superfund Site, Hattiesburg, Mississippi

Sample ID	Toxicity			Bioaccumulation		
	Number Exposed	Number Alive[a]	Percent Survival	Initial Weight (grams)	Final Weight (grams)	Adequate Tissue Amount for Analysis?
Control[b]	40	40	100	108	77.5	Yes
DTSDREF1	40	40	100	102.5	73.5	Yes

APPENDIX A: CHAIN-OF-CUSTODY AND TRAFFIC INFORMATION

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case: 33146
Client No:

R

Region:	4	Date Shipped:	7/28/2004	**Chain of Custody Record**	Sampler Signature:
Project Code:	04-0790	Carrier Name:	SESD Personnel	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:		1	Joe Ownan-Yan 7/30/04 930
CERCLIS ID:		Shipped to:	US EPA Region 4 SESD 980 College Station Rd. Athens GA 30605 (706) 355-8804	2	
Spill ID:				3	
Site Name/State:	Davis Timber/MS			4	
Project Leader:	Linda George				
Action:	Ecological Risk Assessment				
Sampling Co:	US EPA Region 4 SESD				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
DT-SD-B/T-01	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-01	S: 7/28/2004	9:35	--
DT-SD-B/T-02	Sediment/ Bobby Lewis	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-02	S: 7/28/2004	8:45	--
DT-SD-B/T-03	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-03	S: 7/28/2004	8:40	--
DT-SD-B/T-04	Sediment/ Bobby Lewis	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-04	S: 7/27/2004	15:50	--
DT-SD-REF1	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-REF1	S: 7/28/2004	10:20	--
DT-SS-B/T-01	surface soil/ Dan Thoman	L/C	BIO (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-01	S: 7/27/2004	8:35	--
DT-SS-B/T-02	surface soil/ Dan Thoman	L/C	BIO (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-02	S: 7/27/2004	8:35	--
DT-SS-B/T-03	surface soil/ Dan Thoman	L/C	BIO/TOX (21)	(Ice Only) (1)	DT-SS-B/T-03	S: 7/27/2004	11:00	--
DT-SS-B/T-04	surface soil/ Dan Thoman	L/C	BIO/TOX (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-04	S: 7/27/2004	10:10	--
DT-SS-REF1	surface soil/ Dan Thoman	L/C	BIO/TOX (21)	(Ice Only) (1)	DT-SS-REF1	S: 7/27/2004	13:35	--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

BIO = Bioaccumulation, BIO/TOX = Bioaccumulation/Toxicity, TOX = Toxicity

R Number: 4-255188868-072804-0002

REGION COPY

R provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case: 33146 R
Client No:

Region:	4	Date Shipped:	7/28/2004	**Chain of Custody Record**	Sampler Signature:
Project Code:	04-0790	Carrier Name:	SESD Personnel	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:		1	Joe Ormach-Yan 7/30/04 930
CERCLIS ID:		Shipped to:	US EPA Region 4 SESD 980 College Station Rd. Athens GA 30605 (706) 355-8804	2	
Spill ID:				3	
Site Name/State:	Davis Timber/MS			4	
Project Leader:	Linda George				
Action:	Ecological Risk Assessment				
Sampling Co:	US EPA Region 4 SESD				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
DT-SD-B/T-01	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-01	S: 7/28/2004	9:35	--
DT-SD-B/T-02	Sediment/ Bobby Lewis	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-02	S: 7/28/2004	8:45	--
DT-SD-B/T-03	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-03	S: 7/28/2004	8:40	--
DT-SD-B/T-04	Sediment/ Bobby Lewis	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-B/T-04	S: 7/27/2004	15:50	--
DT-SD-REF1	Sediment/ Dan Thoman	L/G	BIO/TOX (21)	(Ice Only) (1)	DT-SD-REF1	S: 7/28/2004	10:20	--
DT-SS-B/T-01	surface soil/ Dan Thoman	L/C	BIO (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-01	S: 7/27/2004	8:35	--
DT-SS-B/T-02	surface soil/ Dan Thoman	L/C	BIO (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-02	S: 7/27/2004	8:35	--
DT-SS-B/T-03	surface soil/ Dan Thoman	L/C	BIO/TOX (21)	(Ice Only) (1)	DT-SS-B/T-03	S: 7/27/2004	11:00	--
DT-SS-B/T-04	surface soil/ Dan Thoman	L/C	BIO/TOX (21), TOX (21)	(Ice Only) (2)	DT-SS-B/T-04	S: 7/27/2004	10:10	--
DT-SS-REF1	surface soil/ Dan Thoman	L/C	BIO/TOX (21)	(Ice Only) (1)	DT-SS-REF1	S: 7/27/2004	13:35	--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

BIO = Bioaccumulation, BIO/TOX = Bioaccumulation/Toxicity, TOX = Toxicity

R Number: 4-255188868-072804-0002

REGION COPY

R provides preliminary results. Requests for preliminary results will increase analytical costs.

end Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

APPENDIX B: *Hyalella azteca* TEST RAW DATA

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Sediment Toxicity Tests Test Species: *Hyalella azteca*

8/5/04 Set up Hyalella azteca test. Added approximately 100g sediment to test vessels (300 ml beakers); 8 replicates for each sample. Added well water, covered and allowed to equilibrate (~ 175 mL well water).

8/6/04 Measured temp DO collected overlying water for analysis. Renewed all overlying water in each replicate. Added Hyalella organisms to each replicate.

8/7/04 Monitored/observed tests. Measured water quality and renewed overlying water. Fed each replicate 1 mL YCTM — Jay

8/8/04 Jay — Monitored/observed tests. Checked temperature and DO and renewed overlying water in each replicate. Fed each replicate 1mL YCTM.

8/9/04 RH Measured temp/D.O + pH. Renewed overlying water in each replicate A.M and P.M. Fed each replicate after PM RH 8/9/04 feeding renewal

8/10/04 RH Measured temp/D.O. Renewed overlying water in each replicate A.M + P.M. Fed each replicate 1 ml YCTM after PM renewal.

8/11/04 RH Measured temp, DO, pH. Renewed overlying water in each replicate A.M. + P.M. Fed each replicate 1 ml YCTM after PM renewal.

8/12/04 RH Measured temp + D.O. Renewed overlying water in each replicate. Fed each replicate 1 ml YCTM.

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Sediment Toxicity Tests Test Species: *Hyalella azteca*

8/13/04 RH Measured temp / D.O. Collected overlying water for analysis from each sample. Renewed overlying water in each replicate A.M. + P.M. Fed each replicate after P.M. renewal.

8/14/04 JY Measured DO & temperature and renewed overlying water in each replicate. Fed each replicate 1 mL YCTM

8/15/04 JY Measured D.O. and Temperature. Renewed overlying water and fed each replicate 1mL YCTM

8/16/04 RH Measured temp, D.O + ~~pH~~ 8/16/04. Renewed overlying water A.M. + P.M. Fed each replicate 1 mL YCTM after P.M. renewal.

8/17/04 RH Measured temp / D.O and pH. Renewed overlying water in each replicate A.M. + PM Fed each replicate 0.5 YCTM after PM renewal.

8/18/04 RH Measured temp / D.O. Renewed overlying water A.M. + P.M. Fed each replicate 1 mL YCTM after PM renewal.

8/19/04 RH Measured temp + D.O, Renewed overlying water in each replicate A.M. + P.M. Fed each replicate 1 mL YCTM after PM. renewal.

8/20/04 RH Measured temp / D.O. Collected overlying waters from each sample for analysis. Terminated test.

COMMENTS:

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: CONTROL Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JAY/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 – 8/6/04 JAY	A	23.1	5.4	6.8	35	48	171	<1
1 – 8/7/04 JAY	B	22.6	3.2					
2 – 8/8/04 JAY	C	22.4	2.8					
3 – 8/9/04 RH	D	22.5	5.6	6.9				
4 – 8/10/04 RH	E	22.5	5.4					
5 – 8/11/04 RH	F	21.5	6.6	7.0				
6 – 8/12/04 RH	G	22.5	4.0					
7 – 8/13/04 RH	H	21.9	4.5	7.0	52	60	187	<1
8 – 8/14/04 JAY	A	22.9	4.2					
9 – 8/15/04 JAY	B	22.7	4.0					
10 – 8/16/04 RH	C	23.1	3.9					
11 – 8/17/04 RH	D	22.5	3.3	7.3				
12 – 8/18/04 RH	E	23.1	4.7					
13 – 8/19/04 RH	F	22.7	3.7					
14 – 8/20/04 RH	G	23.2	3.9	7.0	39	62	173	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 – 8/6/04	10 L	10 L	10 L	10 L	10 L	10 L	10 L	10 L
1 – 8/7/04	N	N	N	N	N	N	N	N
2 – 8/8/04	N	N	N	N	N	N	N	N
3 – 8/9/04	N	N	N	N	N	N	N	N
4 – 8/10/04	N	N	N	N	N	N	N	N
5 – 8/11/04	N	N	N	N	N	N	N	N
6 – 8/12/04	N	N	N	N	N	N	N	N
7 – 8/13/04	N	N	N	N	N	N	N	N
8 – 8/14/04	N	N	N	N	N	N	N	N
9 – 8/15/04	N	N	N	N	N	N	N	N
10 – 8/16/04	N	N	N	N	N	N	N	N
11 – 8/17/04	N	N	N	N	N	N	N	N
12 – 8/18/04	N	N	N	N	N	N	N	N
13 – 8/19/04	N	N	N	N	N	N	N	N
14 – 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	9	7	10	10	10	9	9

COMMENTS: L = Loaded, N = none

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-ref-1 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JJ/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 – 8/6/04 JM	A	22.7	5.7	6.4	24	36	108	<1
1 – 8/7/04 JM	B	22.6	2.8					
2 – 8/8/04 JM	C	22.4	5.1					
3 – 8/9/04 RH	D	21.6	3.6	6.8				
4 – 8/10/04 RH	E	22.3	5.0					
5 – 8/11/04 RH	F	21.5	5.5	6.9				
6 – 8/12/04 RH	G	21.0	4.0					
7 – 8/13/04 RH	H	22.0	3.7	6.9	52	56	168	<1
8 – 8/14/04 JM	A	3 22.3 JM	3.5					
9 – 8/15/04 JM	B	22.0	2.7					
10 – 8/16/04 RH	C	23.1	2.8					
11 – 8/17/04 RH	D	22.9	1.9	7.4				
12 – 8/18/04 RH	E	22.4	3.6					
13 – 8/19/04 RH	F	22.0	2.8					
14 – 8/20/04 RH	G	21.9	2.9	7.0	50	58	169	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 – 8/6/04	10L	10L	10L	10L	10L	10L	10L	10L
1 – 8/7/04	N	N	N	N	N	N	N	N
2 – 8/8/04	N	N	N	N	N	N	N	N
3 – 8/9/04	N	N	N	N	N	N	N	N
4 – 8/10/04	N	N	N	N	N	N	N	N
5 – 8/11/04	N	N	N	N	N	N	N	N
6 – 8/12/04	N	N	N	N	N	N	N	N
7 – 8/13/04	N	N	N	N	N	N	N	N
8 – 8/14/04	N	N	N	N	N	N	N	N
9 – 8/15/04	N	N	N	N	N	N	N	N
10 – 8/16/04	N	N	N	N	N	N	N	N
11 – 8/17/04	N	N	N	N	N	N	N	N
12 – 8/18/04	N	N	N	N	N	N	N	N
13 – 8/19/04	N	N	N	N	N	N	N	N
14 – 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	10	10	9	10	10	10	10

COMMENTS: N = None, L = Loaded

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-B/T-01 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JA/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 -- 8/6/04 JA	A	22.7	5.8	6.3	22	36	105	<1
1 -- 8/7/04 JA	B	22.4	4.5					
2 -- 8/8/04 JA	C	22.2	4.6					
3 -- 8/9/04 RH	D	22.4	3.9	6.5				
4 -- 8/10/04 RH	E	22.2	7.7					
5 -- 8/11/04 RH	F	21.4	6.1	6.7				
6 -- 8/12/04 RH	G	22.1	4.3					
7 -- 8/13/04 RH	H	21.0	4.0	6.8	49	58	163	<1
8 -- 8/14/04 JA	A	21.9	5.4					
9 -- 8/15/04 JA	B	23.0	4.1					
10 -- 8/16/04 RH	C	23.5	2.5					
11 -- 8/17/04 RH	D	22.6	3.9	7.5				
12 -- 8/18/04 RH	E	21.5	5.2					
13 -- 8/19/04 RH	F	21.3	4.9					
14 -- 8/20/04 RH	G	22.5	4.1	7.0	52	54	170	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 -- 8/6/04	10L	10L	10L	10L	10L	10L	10L	10L
1 -- 8/7/04	N	N	N	N	N	N	N	N
2 -- 8/8/04	N	N	N	N	N	N	N	N
3 -- 8/9/04	N	N	N	N	N	N	N	N
4 -- 8/10/04	N	N	N	N	N	N	N	N
5 -- 8/11/04	*	*	*	N	N	N	*	N
6 -- 8/12/04	*	*	*	N	N	N	*	N
7 -- 8/13/04	N	N	N	N	N	N	N	N
8 -- 8/14/04	N	N	N	N	N	N	N	N
9 -- 8/15/04	N	N	N	N	N	N	N	N
10 -- 8/16/04	N	N	N	N	N	N	N	N
11 -- 8/17/04	N	N	N	N	N	N	N	N
12 -- 8/18/04	N	N	N	N	N	N	N	N
13 -- 8/19/04	N	N	N	N	N	N	N	N
14 -- 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	9	10	10	10	10	10	10	10

COMMENTS:
L = Loaded, N = None
* - Luminculus sp. live in sample native species

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-B/T-02 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JM/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 -- 8/6/04 JM	A	22.6	6.4	6.3	22	38	103	<1
1 -- 8/7/04 JM	B	22.4	5.1					
2 -- 8/8/04 JM	C	22.2	3.8					
3 -- 8/9/04 RH	D	21.9	4.0	6.7				
4 -- 8/10/04 RH	E	22.3	6.5					
5 -- 8/11/04 RH	F	21.3	9.5	6.9				
6 -- 8/12/04 RH	G	21.6	4.7					
7 -- 8/13/04 RH	H	20.3	5.4	6.9	55	66	174	<1
8 -- 8/14/04 JM	A	21.9	5.5					
9 -- 8/15/04 JM	B	23.0	5.1					
10 -- 8/16/04 RH	C	22.8	5.5					
11 -- 8/17/04 RH	D	22.4	4.0	7.5				
12 -- 8/18/04 RH	E	20.8	4.9					
13 -- 8/19/04 RH	F	22.0	5.0					
14 -- 8/20/04 RH	G	22.2	5.1	7.1	54	52	171	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 -- 8/6/04	10 L	10 L	10 L	10 L	10 L	10 L	10 L	10 L
1 -- 8/7/04	N	N	N	N	N	N	N	N
2 -- 8/8/04	N	N	N	N	N	N	N	N
3 -- 8/9/04	N	N	N	N	N	N	N	N
4 -- 8/10/04	N	N	N	N	N	N	N	N
5 -- 8/11/04	N	N	N	N	N	N	N	N
6 -- 8/12/04	N	N	N	N	N	N	N	N
7 -- 8/13/04	N	N	N	N	N	N	N	N
8 -- 8/14/04	N	N	N	N	N	N	N	N
9 -- 8/15/04	N	N	N	N	N	N	N	N
10 -- 8/16/04	N	N	N	N	N	N	N	N
11 -- 8/17/04	N	N	N	N	N	N	N	N
12 -- 8/18/04	N	N	N	N	N	N	N	N
13 -- 8/19/04	N	N	N	N	N	N	N	N
14 -- 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	10	10	10	9	8	6,2	9

COMMENTS: L = Loaded, N = none

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-B/T-03 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JM/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 – 8/6/04 JM	A	22.6	6.3	6.4	24	36	117	<1
1 – 8/7/04 JM	B	22.2	4.5					
2 – 8/8/04 JM	C	22.1	4.8					
3 – 8/9/04 RH	D	22.0	4.5	6.7				
4 – 8/10/04 RH	E	21.9	7.4					
5 – 8/11/04 RH	F	21.0	7.0	6.8				
6 – 8/12/04 RH	G	21.5	4.1					
7 – 8/13/04 RH	H	21.3	4.0	7.0	53	64	175	<1
8 – 8/14/04 JM	A	22.1	4.5					
9 – 8/15/04 JM	B	23.0	4.1					
10 – 8/16/04 RH	C	23.0	3.8					
11 – 8/17/04 RH	D	22.5	4.3	7.6				
12 – 8/18/04 RH	E	20.9	4.7					
13 – 8/19/04 RH	F	21.2	5.3					
14 – 8/20/04 RH	G	22.0	5.3	7.3	61	50	181	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 – 8/6/04	10L	10L	10L	10L	10L	10L	10L	10L
1 – 8/7/04	N	N	N	N	N	N	N	N
2 – 8/8/04	N	N	N	N	N	N	N	N
3 – 8/9/04	N	N	N	N	N	N	N	N
4 – 8/10/04	N	N	N	N	N	N	N	N
5 – 8/11/04	N	N	N	N	N	N	N	N
6 – 8/12/04	N	N	N	N	N	N	N	N
7 – 8/13/04	N	N	N	N	N	N	N	N
8 – 8/14/04	N	N	N	N	N	N	N	N
9 – 8/15/04	N	N	N	N	N	N	N	N
10 – 8/16/04	N	N	N	N	N	N	N	N
11 – 8/17/04	N	N	N	N	N	N	N	N
12 – 8/18/04	N	N	N	N	N	N	N	N
13 – 8/19/04	N	N	N	N	N	N	N	N
14 – 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	9	9	10	10	10	10	10

COMMENTS: L = loaded, N = None

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-B/T-04 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JV/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 – 8/6/04 JV	A	22.6	7.1	6.5	32	46	127	<1
1 – 8/7/04 JV	B	22.7	2.7					
2 – 8/8/04 JV	C	22.1	4.5					
3 – 8/9/04 RH	D	22.3	3.1	6.9				
4 – 8/10/04 RH	E	22.3	7.4					
5 – 8/11/04 RH	F	20.8	6.7	7.0				
6 – 8/12/04 RH	G	20.6	3.4					
7 – 8/13/04 RH	H	21.7	3.7	7.0	55	64	170	<1
8 – 8/14/04 JV	A	22.8	4.2					
9 – 8/15/04 JV	B	22.7	3.8					
10 – 8/16/04 RH	C	22.3	2.7					
11 – 8/17/04 RH	D	22.3	3.4	7.5				
12 – 8/18/04 RH	E	21.6	4.4					
13 – 8/19/04 RH	F	20.6	4.2					
14 – 8/20/04 RH	G	21.6	4.1	7.2	53	48	165	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 – 8/6/04	10 L	10 L	10 L	10 L	10 L	10 L	10 L	10 L
1 – 8/7/04	N	N	N	N	N	N	N	N
2 – 8/8/04	N	N	N	N	N	N	N	N
3 – 8/9/04	N	N	N	N	N	N	N	N
4 – 8/10/04	N	N	N	N	N	N	N	N
5 – 8/11/04	N	N	N	N	N	N	N	N
6 – 8/12/04	N	N	N	N	N	N	N	N
7 – 8/13/04	N	N	N	N	N	N	N	N
8 – 8/14/04	N	N	N	N	N	N	N	N
9 – 8/15/04	N	N	N	N	N	N	N	N
10 – 8/16/04	N	N	N	N	N	N	N	N
11 – 8/17/04	N	N	N	N	N	N	N	N
12 – 8/18/04	N	N	N	N	N	N	N	N
13 – 8/19/04	N	N	N	N	N	N	N	N
14 – 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	10	7	10	10	7	8	9

COMMENTS: L = Loaded, N = None

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-B/T-05 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: JM/RH

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 – 8/6/04 JM	A	22.4	5.4	6.5	30	46	123	<1
1 – 8/7/04 JM	B	22.6	3.9					
2 – 8/8/04 JM	C	22.4	4.5					
3 – 8/9/04 RH	D	22.5	4.9	6.9				
4 – 8/10/04 RH	E	21.9	7.7					
5 – 8/11/04 RH	F	20.9	7.2	7.0				
6 – 8/12/04 RH	G	20.6	4.7					
7 – 8/13/04 RH	H	21.5	4.3	7.0	65	72	195	<1
8 – 8/14/04 JM	A	22.4	4.6					
9 – 8/15/04 JM	B	22.7	2.8					
10 – 8/16/04 RH	C	22.1	3.6					
11 – 8/17/04 RH	D	22.3	4.5	7.6				
12 – 8/18/04 RH	E	21.1	4.8					
13 – 8/19/04 RH	F	21.1	4.0					
14 – 8/20/04 RH	G	21.1	4.8	7.1	6.1	80	185	<1

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D	E	F	G	H
0 – 8/6/04	10L	10L	10L	10L	10L	10L	10L	10L
1 – 8/7/04	N	N	N	N	N	N	N	N
2 – 8/8/04	N	N	N	N	N	N	N	N
3 – 8/9/04	N	N	N	N	N	N	N	N
4 – 8/10/04	N	N	N	N	N	N	N	N
5 – 8/11/04	N	N	N	N	N	N	N	N
6 – 8/12/04	N	N	N	N	N	N	N	N
7 – 8/13/04	N	N	N	N	N	N	N	N
8 – 8/14/04	N	N	N	N	N	N	N	N
9 – 8/15/04	N	N	N	N	N	N	N	N
10 – 8/16/04	N	N	N	N	N	N	N	N
11 – 8/17/04 →	N	N	N	N	N	N	N	N → *
12 – 8/18/04	N	N	N	N	N	N	N	N
13 – 8/19/04	N	N	N	N	N	N	N	N
14 – 8/20/04	N	N	N	N	N	N	N	N
# ALIVE	10	10	10	10	9, 10	10	10	10

COMMENTS: N = None, L = Loaded
* Collected Ciliates in sample

DT1
DT2

SHORT-TERM CHRONIC TOXICITY TEST-WEIGHT DATA

INDUSTRY:Davis Timber
LOCATION: Room F118
INVESTIGATOR:

SPECIES:*Hyalella azteca*
DATE:8/25/04
DURATION OF DRYING (HOURS):24

OVEN MODEL: FISHER 565G
OVEN TEMP (C): 60+/- 2 ºC

Sample ID	Rep	Boat #	Initial Wt	Final Wt.	Hyalella Wt.	# of Hyalella	Mean Dry Wt.	Mean: mg/organism
Control	A	1	0.0518	0.0532	0.0014	10	0.00014	0.11944
	B	2	0.0521	0.0534	0.0013	9	0.00014	
	C	3	0.0528	0.0535	0.0007	7	0.00010	
	D	4	0.0420	0.0433	0.0013	10	0.00013	
	E	5	0.0373	0.0384	0.0011	10	0.00011	
	F	6	0.0517	0.0529	0.0012	10	0.00012	
	G	7	0.0463	0.0473	0.0010	9	0.00011	
	H	8	0.0462	0.0471	0.0009	9	0.00010	
DT-SD-REF-1	A	9	0.0464	0.0475	0.0011	10	0.00011	0.13653
	B	10	0.0486	0.0497	0.0011	10	0.00011	
	C	11	0.0551	0.0566	0.0015	10	0.00015	
	D	12	0.0515	0.0526	0.0011	9	0.00012	
	E	13	0.0509	0.0526	0.0017	10	0.00017	
	F	14	0.0494	0.0507	0.0013	10	0.00013	
	G	15	0.0562	0.0578	0.0016	10	0.00016	
	H	16	0.0485	0.0499	0.0014	10	0.00014	
DT-SD-B/T-01	A	17	0.0523	0.0537	0.0014	9	0.00016	0.15819
	B	18	0.0667	0.0679	0.0012	10	0.00012	
	C	19	0.0514	0.0528	0.0014	10	0.00014	
	D	20	0.0568	0.0579	0.0011	10	0.00011	
	E	21	0.0501	0.0521	0.0020	10	0.00020	
	F	22	0.0449	0.0464	0.0015	10	0.00015	
	G	23	0.0417	0.0435	0.0018	10	0.00018	
	H	24	0.0493	0.0514	0.0021	10	0.00021	
DT-SD-B/T-02	A	25	0.0578	0.0593	0.0015	10	0.00015	
	B	26	0.0570	0.0581	0.0011	10	0.00011	0.12833
	C	27	0.0369	0.0380	0.0011	10	0.00011	
	D	28	0.0436	0.0447	0.0011	10	0.00011	
	E	29	0.0528	0.0535	0.0007	9	0.00008	

	F	30	0.0459	0.0467	0.0008	8	0.00010	
	G	31	0.0451	0.0460	0.0009	6	0.00015	
	H	32	0.0521	0.0538	0.0017	9	0.00019	
DT-SD-B/T-03	A	33	0.0482	0.0500	0.0018	10	0.00018	0.16556
	B	34	0.0568	0.0586	0.0018	9	0.00020	
	C	35	0.0424	0.0437	0.0013	9	0.00014	
	D	36	0.0436	0.0456	0.0020	10	0.00020	
	E	37	0.0353	0.0364	0.0011	10	0.00011	
	F	38	0.0478	0.0493	0.0015	10	0.00015	
	G	39	0.0396	0.0414	0.0018	10	0.00018	
	H	40	0.0519	0.0535	0.0016	10	0.00016	
DT-SD-B/T-04	A	41	0.0479	0.0494	0.0015	10	0.00015	0.18843
	B	42	0.0576	0.0593	0.0017	10	0.00017	
	C	43	0.0370	0.0385	0.0015	7	0.00021	
	D	44	0.0439	0.0461	0.0022	10	0.00022	
	E	45	0.0415	0.0430	0.0015	10	0.00015	
	F	46	0.0467	0.0482	0.0015	7	0.00021	
	G	47	0.0514	0.0530	0.0016	8	0.00020	
	H	48	0.0384	0.0401	0.0017	9	0.00019	
DT-SD-B/T-05	A	49	0.0396	0.0414	0.0018	10	0.00018	0.17083
	B	50	0.0443	0.0461	0.0018	10	0.00018	
	C	51	0.0417	0.0429	0.0012	10	0.00012	
	D	52	0.0368	0.0382	0.0014	10	0.00014	
	E	53	0.0395	0.0410	0.0015	9	0.00017	
	F	54	0.0441	0.0463	0.0022	10	0.00022	
	G	55	0.0464	0.0485	0.0021	10	0.00021	
	H	56	0.0342	0.0357	0.0015	10	0.00015	

Davis Timber Hyalella 14-Day Survival
File: dt1 Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	1.298				
2	DTSDREF1	1.392	80.50	46.00	8.00	
3	DTSDBT01	1.392	80.50	46.00	8.00	
4	DTSDBT02	1.267	66.00	46.00	8.00	
5	DTSDBT03	1.371	77.00	46.00	8.00	
6	DTSDBT04	1.248	64.50	46.00	8.00	
7	DTSDBT05	1.392	80.50	46.00	8.00	

Critical values use k = 6, are 1 tailed, and alpha = 0.05

Davis Timber Hyalella 14-Day Growth
File: dt2 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 5.48

Table Chi-square value = 16.81 (alpha = 0.01, df = 6)
Table Chi-square value = 12.59 (alpha = 0.05, df = 6)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Davis Timber Hyalella 14-Day Growth
File: dt2 Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates
s greater than 50.

Total number of replicates = 56

avis Timber Hyalella 14-Day Growth
ile: dt2 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
etween	6	0.031	0.005	5.886
ithin (Error)	49	0.044	0.001	
otal	55	0.075		

Critical F value = 2.34 (0.05,6,40)
Since F > Critical F REJECT Ho: All equal

Davis Timber Hyalella 14-Day Growth
File: dt2 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.119	0.119		
2	DTSDREF1	0.136	0.136	-1.173	
3	DTSDBT01	0.159	0.159	-2.682	
4	DTSDBT02	0.125	0.125	-0.419	
5	DTSDBT03	0.165	0.165	-3.101	
6	DTSDBT04	0.188	0.188	-4.610	
7	DTSDBT05	0.171	0.171	-3.520	

Dunnett table value = 2.37 (1 Tailed Value, P=0.05, df=40,6)

Davis Timber Hyalella 14-Day Growth
File: dt2 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
	DTSDREF1	8	0.035	29.8	-0.018
3	DTSDBT01	8	0.035	29.8	-0.040
4	DTSDBT02	8	0.035	29.8	-0.006
5	DTSDBT03	8	0.035	29.8	-0.046
6	DTSDBT04	8	0.035	29.8	-0.069
7	DTSDBT05	8	0.035	29.8	-0.053

Davis Timber Hyalella 14-Day Growth
File: dt2 Transform: NO TRANSFORMATION

STEEL'S MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	0.119				
2	DTSDREF1	0.136	83.00	46.00	8.00	
3	DTSDBT01	0.159	90.50	46.00	8.00	
4	DTSDBT02	0.125	70.00	46.00	8.00	
5	DTSDBT03	0.165	94.00	46.00	8.00	
6	DTSDBT04	0.188	100.00	46.00	8.00	
7	DTSDBT05	0.171	95.50	46.00	8.00	

Critical values use k = 6, are 1 tailed, and alpha = 0.05

APPENDIX C: *Lumbriculus variegatus* TEST RAW DATA

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Sediment Bioaccumulation Tests Test Species: *Lumbriculus variegatus*

8/3/04 - Loaded sediment samples ~~with~~ RH 8/4/04 (about 1.5 L) to each of 4 replicate test vessels (5 gallon aquaria) Added ~5 L of overlying water (well water) Allowed samples to equilibrate at 23° ± 1° C.

8/4/04 - Renewed overlying water in each replicate. added about 25 grams of Lumbriculus variegatus to each replicate tank. Aerated each tank to have dissolved oxygen levels.
Set up an additional sample, 4 replicate vessels each (DT SD 1-5) Allowed to equilibrate.

8/5/04 - Measured temp/DO & collected water for water quality analysis. Renewed overlying water in each replicate. Aerated DT SD-5, added ~25 gr. L. variegatus to each.

8/6/04 RH Measured temp/DO, renewed overlying water in each replicate.

8/7/04 — JM Monitored/observed tests and renewed overlying water in each replicate with fresh well water

8/8/04 — JM — Monitored/observed all replicates and renewed overlying water with fresh well water

8/9/04 RH Measured temp/DO, renewed overlying water in each replicate.

8/10/04 RH Measured temp DO, collected overlying water samples for analysis. Renewed overlying water in each replicate

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Sediment Bioaccumulation Tests Test Species: *Lumbriculus variegatus*

8/11/04 RH Monitored/maintained test. Renewed overlying water in each replicate.

8/12/04 RH Measured temp/D.O. Renewed overlying water in each replicate.

8/13/04 RH Measured temp/D.O. Renewed overlying water in each replicate.

8/14/04 JBY Measured temperature and DO and renewed the overlying water in each replicate

8/15/04 JY Measured temperature and DO. and renewed overlying water in each replicate

8/16/04 RH Measured temp/D.O. Renewed overlying water in each replicate.

8/17/04 RH Measured temp/D.O Collected overlying water from each sample for analysis. Renewed overlying water in each replicate

8/18/04 Measured temp/D.O. Renewed overlying water in each replicate

8/19/04 Measured temp/D.O. Renewed overlying water in each replicate.

8/20/04 RH measured temperature and D.O. and renewed overlying water in each replicate

8/21/04 JY Measured temperature and DO.. checked airlines and renewed overlying water in each replicate

8/22/04 JY Measured temperature and D.O. Checked all airlines and renewed overlying water in each replicate with fresh well water

8/23/04 RH Measured temps/D.O. Renewed overlying water in each replicate

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Sediment Bioaccumulation Tests Test Species: *Lumbriculus variegatus*

8/24/04 RH Measured temp. / D.O. Collected overlying water for analysis from each Sample. Renewed overlying water in each replicate.

8/25/04 RH/LT Measured temp/DO ~~Collected overlying water~~ RH 8/25/04 Renewed overlying water in each replicate.

9/26/04 RH/LT Measured temp/DO Renew overlying water in each replicate. collected H_2O from Sample #5

8/27/04 RH Measured temp / D.O. Renewed overlying water in each replicate

8/28/04 JY Monitored tests and checked airlines Renewed overlying H_2O after checking temperature and D.O.

8/29/04 JY Monitored tests and checked airlines. Renewed overlying water after checking D.O. and temperature

8/30/04 RH Measured temp / DO & collected overlying water*. Terminated Reference sample. *from Reference sample.

8/31/04 LT measured temp/DO & collected overlying water from sample 1, 2, 3, & 4

9/1/04 RH Measured temp / DO sample 5. Renewed

9/2/04 RH Measured temp / D.O collected overlying water from sample 5. Renewed overlying water in each replicate - sample 5.

9/3/04 RH Measured temp / D.O sample 5. Renewed overlying water.

9/4/04 LT measured temp/DO sample 5 Renewed water

9/5/04 LT measured temp/DO sample 5 Renewed water

COMMENTS: 9/6/04 LT measured temp/DO Sample 5 Renewed water collected water sample from 5D.

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-REF-1 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JY/RH

WATER QUALITY MEASUREMENTS									
Day-Date-Initial	Rep	Daily Observations	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 – 8/03/04	A	Day 0	23.0	7.4					
1 – 8/04/04 JY	B	N	22.4	6.4					
2 – 8/05/04 RH	C	N	22.5	7.0					
3 – 8/06/04 RH	D	N	23.0	7.4					
4 – 8/07/04 JY	A	N	22.6	5.2					
5 – 8/08/04 JY	B	N	22.9	7.7					
6 – 8/09/04 RH	C	N	23.5	7.6					
7 – 8/10/04 RH	D	N	22.3	8.1	6.7	15	12	95	<1
8 – 8/11/04 RH	A	N	22.1	7.2					
9 – 8/12/04 RH	B	N	22.1	5.9					
10 – 8/13/04 RH	C	N	22.8	6.6					
11 – 8/14/04 JY	D	N	23.4	7.0					
12 – 8/15/04 JY	A	N	23.3	6.0					
13 - 8/16/04 RH	B	N	23.4	6.6					
14 - 8/17/04 —	C	—	—	—	7.1	22	28	124	<1
15 - 8/18/04 RH	D	N	22.1	7.7					
16 - 8/19/04 RH	A	N	21.8	8.2					
17 - 8/20/04 RH	B	N	23.2	6.8					
18 - 8/21/04 JY	C	N	23.4	7.4					
19 - 8/22/04 JY	D	N	24.0	7.2					
20 - 8/23/04 RH	A	N	23.2	7.5					
21 - 8/24/04 RH	B	N	23.2	6.0	6.3	12	30	105	<1
22 - 8/25/04 LT	C	N	22.7	6.8					
23 - 8/26/04 LT	D	N	23.2	5.8					
24 - 8/27/04 RH	A	N	23.4	6.8					
25 - 8/28/04 JM	B	N	23.3	6.4					
26 - 8/29/04 JM	C	N	22.5	7.9					
27 - 8/30/04 RH	D	N	23.4	7.5					
28 – 8/31/04 JM	A	N	23.1	7.1	6.7	12	34	113	<1
Initial Weight (grams)		23.0g		24.5g		27.0g		28.0g	
Final Weight (grams)		36.5 + 32.5		+4.5					

COMMENTS: N = None, NP = No Problems Observed, AV =Avoidance, FOS = Film on surface

taken 8/30/04

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-B/T01 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JM / RH

WATER QUALITY MEASUREMENTS									
Day-Date-Initial	Rep	Daily Observations	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 – 8/03/04	A	Day 0	23.0	7.6					
1 – 8/04/04 JM	B	N	22.6	7.1					
2 – 8/05/04 RH	C	N	22.3	7.9					
3 – 8/06/04 RH	D	N	22.6	7.2					
4 – 8/07/04 JM	A	N	22.6	5.8					
5 – 8/08/04 JM	B	N	22.5	6.3					
6 – 8/09/04 RH	C	N	22.6	5.3					
7 – 8/10/04 RH	D	N	22.5	8.0	6.2	12	14	91	<1
8 – 8/11/04 RH	A	N	22.6	6.5					
9 – 8/12/04 RH	B	N	22.3	7.1					
10 – 8/13/04 RH	C	N	22.3	7.8					
11 – 8/14/04 JM	D	N	23.4	7.4					
12 – 8/15/04 JM	A	N	23.6	6.1					
13 - 8/16/04 RH	B	N	23.4	7.5					
14 - 8/17/04 RH	C	N	—	—	6.9	14	26	111	<1
15 - 8/18/04 RH	D	N	23.3	6.8					
16 - 8/19/04 RH	A	N	23.2	3.9					
17 - 8/20/04 RH	B	N	23.4	7.5					
18 - 8/21/04 JM	C	N	23.4	7.7					
19 - 8/22/04 JM	D	N	23.2	7.1					
20 - 8/23/04 RH	A	N	23.6	6.5					
21 - 8/24/04 RH	B	N	23.2	6.3	6.5	14	32	107	<1
22 - 8/25/04 LT	C	N	23.2	6.8					
23 - 8/26/04 LT	D	N	23.1	5.9					
24 - 8/27/04 RH	A	N	23.1	7.8					
25 - 8/28/04 JM	B	N	23.0	7.7					
26 - 8/29/04 JM	C	N	22.8	7.8					
27 - 8/30/04 RH	D	N	23.2	7.8					
28 – 8/31/04 LT	AB	N	23.2	6.9	6.77	18	34	112	<1
Initial Weight (grams)		25.5 g		24.5g		26.5g		24.5g	
Final Weight (grams)		10g + 26.5 g		28 + 10 + 3.5 ~~+12.5~~ JM					

COMMENTS: N = None, NP = No Problems Observed, AV = Avoidance, FOS = Film on surface

Lumbriculidae - genus Eclipidrilus found in this sample.

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-B/T02 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JY/RH

WATER QUALITY MEASUREMENTS

Day-Date-Initial	Rep	Daily Observations	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 -- 8/03/04	A	Day 0	23.9	7.4					
1 -- 8/04/04 JY	B	N	22.1	7.4			8/16/04		
2 -- 8/05/04 RH	C	N	21.9	7.3					
3 -- 8/06/04 RH	D	N	22.6	7.0					
4 -- 8/07/04 JY	A	N	22.3	6.8					
5 -- 8/08/04 JY	B	N	22.4	7.5					
6 -- 8/09/04 RH	C	N	22.8	5.7					
7 -- 8/10/04 RH	D	N	22.3	7.9	6.6	18	20	106	<1
8 -- 8/11/04 RH	A	N	22.4	6.2					
9 -- 8/12/04 RH	B	N	22.4	6.0					
10 -- 8/13/04 RH	C	N	22.4	6.8					
11 -- 8/14/04 JY	D	N	23.3	6.9					
12 -- 8/15/04 JY	A	N	23.4	6.8					
13 - 8/16/04 RH	B	N	23.5	6.2					
14 - 8/17/04 RH	C	N	—	—	7.0	17	24	115	<1
15 - 8/18/04 RH	D	N	23.1	5.9					
16 - 8/19/04 RH	A	N	23.1	6.9					
17 - 8/20/04 RH	B	N	23.3	6.5					
18 - 8/21/04 JY	C	N	23.3	6.8					
19 - 8/22/04 JY	D	N	23.3	6.8					
20 - 8/23/04 RH	A	N	22.9	7.1					
21 - 8/24/04 RH	B	N	23.3	6.5	6.4	10	30	103	<1
22 - 8/25/04 LT	C	N	23.3	5.9					
23 - 8/26/04 LT	D	N	23.0	5.9					
24 - 8/27/04 RH	A	N	23.3	7.0					
25 - 8/28/04 JY	B	N	23.4	7.1					
26 - 8/29/04 JY	C	N	22.8	7.3					
27 - 8/30/04 RH	D	N	23.1	6.9					
28 -- 8/31/04 LT	A	N	23.0	6.1	6.6	21	36	118	<1
Initial Weight (grams)		~~24.5g~~		26.5g		25.0g	24.5g		23.5g
Final Weight (grams)		~~H~~ 8.5+41.5		+16 + 7.5					

COMMENTS: N = None, NP = No Problems Observed, AV =Avoidance, FOS = Film on surface

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-B/T03 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JM/RH

WATER QUALITY MEASUREMENTS

Day-Date-Initial	Rep	Daily Observations	Temp. (°C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 – 8/03/04	A	Day 0	23.0	7.4					
1 – 8/04/04 JM	B	N	22.1	7.0					
2 – 8/05/04 RH	C	N	21.9	6.2					
3 – 8/06/04 RH	D	N	22.3	6.2					
4 – 8/07/04 JM	A	N	22.3	4.8					
5 – 8/08/04 JM	B	N	22.5	6.6					
6 – 8/09/04 RH	C	N	22.4	6.0					
7 – 8/10/04 RH	D	AV	22.1	6.8	6.7	30	32	127	<1
8 – 8/11/04 RH	A	N	22.3	6.8					
9 – 8/12/04 RH	B	N	21.9	7.1					
10 – 8/13/04 RH	C	N	22.1	4.9					
11 – 8/14/04 JM	D	N	22.8	6.2					
12 – 8/15/04 JM	A	N	23.2	6.8					
13 - 8/16/04 RH	B	N	23.1	6.5					
14 - 8/17/04 RH	C	N	–	–	7.5	48	50	16.2	<1
15 - 8/18/04 RH	D	N	22.9	6.8					
16 - 8/19/04 RH	A	N	23.9	7.2					
17 - 8/20/04 RH	B	N	23.0	7.3					
18 - 8/21/04 JM	C	N	23.1	7.1					
19 - 8/22/04 JM	D	N	22.7	7.3					
20 - 8/23/04 RH	A	N	23.1	7.4					
21 - 8/24/04 RH	B	N	23.0	7.3	7.1	28	44	131	<1
22 - 8/25/04 LT	C	N	22.9	6.1					
23 - 8/26/04 LT	D	N	22.8	6.4					
24 - 8/27/04 RH	A	N	23.0	7.3					
25 - 8/28/04 JM	B	N	23.1	7.4					
26 - 8/29/04 JM	C	N	23.1	8.1					
27 - 8/30/04 RH	D	N	22.8	7.8					
28 – 8/31/04 LT	A	N	23.1	6.2	7.1	37	46	142	<1
Initial Weight (grams)		28.5g		26.5g		24.5g		26.0g	
Final Weight (grams)		2.5+33.5+ RH		10.5+9.5+6					

COMMENTS: N = None, NP = No Problems Observed, AV = Avoidance, FOS = Film on surface

1 Ep Eclipidrilus found in this sample.

1 Einfeldia found in this sample (midge)

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-B/T04 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JV/RH

WATER QUALITY MEASUREMENTS

Day-Date-Initial	Rep	Daily Observations	Temp. (°C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 -- 8/03/04	A	Day 0	23.1	7.6					
1 – 8/04/04 JV	B	N	22.8	7.3					
2 – 8/05/04 RH	C	N	22.0	7.1	6.8	26	20	110	<1
3 -- 8/06/04 RH	D	N	22.5	6.9					
4 -- 8/07/04 JV	A	N	22.1	7.0					
5 – 8/08/04 JV	B	N	22.1	7.3					
6 – 8/09/04 RH	C	N	22.1	8.2					
7 -- 8/10/04 RH	D	N	22.4	7.8	6.2	8	12	91	<1
8 – 8/11/04 RH	A	N	22.2	7.7					
9 – 8/12/04 RH	B	N	21.8	7.2					
10 -- 8/13/04 RH	C	N	21.5	7.2					
11 – 8/14/04 JV	D	N	22.5	6.2					
12 – 8/15/04 JV	A	N	22.9	6.8					
13 - 8/16/04 RH	B	N	22.4	7.3					
14 - 8/17/04 RH	C	N	—	—	6.8	12	38	114	<1
15 - 8/18/04 RH	D	N	23.0	6.8					
16 - 8/19/04 RH	A	N	22.4	7.2					
17 - 8/20/04 RH	B	N	22.6	6.5					
18 - 8/21/04 JV	C	N	22.9	6.3					
19 - 8/22/04 JV	D	N	23.0	6.6					
20 - 8/23/04 RH	A	N	22.6	7.7					
21 - 8/24/04 RH	B	N	22.3	7.0	6.4	6	30	99	<1
22 - 8/25/04 LT	C	N	22.6	6.7					
23 - 8/26/04 LT	D	N	22.9	6.1					
24 - 8/27/04 RH	A	N	23.0	7.6					
25 - 8/28/04 JV	B	N	23.1	7.1					
26 - 8/29/04 JV	C	N	22.4	8.0					
27 - 8/30/04 RH	D	N	23.0	7.5					
28 -- 8/31/04 LT	A	N	22.9	6.7	6.9	20	24	116	<1
Initial Weight (grams)		22.5g		25.5g		28.5g		28.0g	
Final Weight (grams)		13.5 +6.0+2.5		+14 + 3.5 +5.5 +4.5					
				RH RH					

COMMENTS: N = None, NP = No Problems Observed, AV =Avoidance, FOS = Film on surface

Lumbriculus variegatus Sediment Bioaccumulation Test Data Sheet

Industry/Study: Davis Timber Bioaccumulation Tests Test Species: *Lumbriculus variegatus* Room # F112
Sample ID: DT-SD-B/T-05 Vessel Location: Bench-Top Photoperiod: 16 hr L:8 hr D Analyst: JDY/RH

WATER QUALITY MEASUREMENTS

Day-Date-Initial	Rep	Daily Observations	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (µmhos/cm)	NH_3 (mg/L)
0 -- 8/05/04 JDY	A	N	22.4	6.8					
1 -- 8/06/04 RH	B	N	22.7	7.4	6.6	38	46	132	<1
2 -- 8/07/04 JDY	C	N	27.6	5.5					
3 -- 8/08/04 JDY	D	N	22.6	7.7					
4 -- 8/9/04 RH	A	N	22.8	5.5					
5 -- 8/10/04 RH	B	N	22.5	8.2					
6 -- 8/11/04 RH	C	N	22.3	5.7					
7 -- 8/12/04 RH	D	N	22.5	6.3					
8 -- 8/13/04 RH	A	N	22.8	5.0	6.6	32	42	121	<1
9 -- 8/14/04 JDY	B	N	23.1	7.5					
10 -- 8/15/04 JDY	C	N	23.5	5.9					
11 -- 8/16/04 RH	D	N	23.7	7.3					
12 -- 8/17/04 RH	A	N	–	–					
13 - 8/18/04 RH	B	N	22.6	7.7					
14 - 8/19/04 RH	C	N	22.2	7.1	7.4	40	50	149	<1
15 - 8/20/04 RH	D	N	23.4	7.4					
16 - 8/21/04 JDY	A	N	23.3	6.3					
17 - 8/22/04 JDY	B	N	23.7	7.2					
18 - 8/23/04 RH	C	N	23.1	6.7					
19 - 8/24/04 RH	D	N	23.1	7.4					
20 - 8/25/04 LT	A	N	21.9/20.5	7.6					
21 - 8/26/04 LT	B	N	23.6	6.0	6.8	24	30	119	<1
22 - 8/27/04 RH	C	N	23.3	6.7					
23 - 8/28/04 JDY	D	N	23.4	6.8					
24 - 8/29/04 JDY	A	N	23.0	7.4					
25 - 8/30/04 RH	B	N	23.6	7.2					
26 - 8/31/04 LT	C	N	23.8	5.7					
27 - 9/01/04 RH	D	N	21.9	7.3					
28 -- 9/02/04 RH	A	N	23.9	6.0	6.9	42	54	149	<1
Initial Weight (grams)		25.5 g		22.5 g		25.5 g		27.5 g	
Final Weight (grams)		~~35.27~~ JDY/JDY		26.5 + 17 + 6 + 13.5					

COMMENTS: N = None, NP = No Problems Observed, AV =Avoidance, FOS = Film on surface

9/3 RH DO = 6.9
~~pH~~ Temp = 23.3

9/7/04 -

APPENDIX D: *Eisenia foetida* TEST RAW DATA

14-DAY EARTHWORM TOXICITY TEST LOGSHEET

Industry/Study: Davis Timber Soils Location: Mississippi Species/Age: *Eisenia foetida*/Adult
Temperature (°C): 22 +/- 2 Date/Start Time: 8/2/04 1330 Date/Stop Time: 8/16/04 1400

Sample ID	REP	pH (s.u)		Weight (grams)		DAILY SURVIVAL					
		Initial	Final	Initial	Final	Day 0	Observ	Day 7	Observ	Day 14	Observ
Control	A	7.1	7.5	4.0	5.0	10	N	10	N	5/10 N	10 N
	B	—	—	4.5	5.0	10	N	10	N	5/10 N	10
	C	—	—	5.0	5.5	10	N	10	N	N	10
	D	—	—	4.5	5.0	10	N	10	N	N	10
DT-SS-02	A	5.3	5.7	4.0	~~6.5~~ 5.5	10	N	10	N	N	10
	B	—	—	3.5	6.5	10	N	10	N	N	10
	C	—	—	4.0	6.0	10	N	10	N	N	10
	D	—	—	4.0	6.5	10	N	10	N	N	10
DT-SS-02 (50%)	A	5.8	6.1	4.5	4.5	10	N	10	N	A	10
	B	—	—	4.5	5.0	10	N	10	N	N	10
	C	—	—	4.5	5.0	10	N	10	N	N	10
	D	—	—	3.5	5.0	10	N	9	1NF 1 small	N	10
DT-SS-03	A	5.8	6.1	4.5	5.0	10	N	10	N	N	10
	B	—	—	4.5	4.5	10	N	10	N	egg case	10
	C	—	—	4.0	4.5	10	N	10	N	N	10
	D	—	—	4.0	4.5	10	N	10	N	N	10
~~DT-SS-04~~	A	5.6					N				
	B										
	C										
	D										
Reference	A	5.1	5.4	4.5	5.5	10	N	10	N	N	10
	B	—	—	4.0	5.5	10	N	10	N	N	10
	C	—	—	5.0	5.5	10	N	10	N	N	10
	D	—	—	4.5	4.5	10	N	10	N	N	9
ANALYST		JY	JY	LH	LH	JY	8/18/04	[illegible]	[illegible]	LH	LH

Key: HERR = Hemorrhaging; N = None; LE = Lethargic; AV = Soil Avoidance; NF = Not found; EL = Elongated
COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Toxicity Tests Test Species: *Eisenia foetida*

8-2-04 JN Added 200 grams of soil to each of 4 replicate test vessels (300mL Mason jars). Added 10 worms each weighing 0.3–0.5 grams to each replicate. Three site soils, one reference soil and 1 lab control were set up. Temperature = 22.4°C Lighting = 700 Lux

8-3-04 JN – Temperature 22°C, 780 Lux

8-4-04 JN – Temperature 22°C, 760 Lux

8-5-04 JN – Temperature 22°C, 700 Lux

8-6-04 JN – Temperature 22°C 780 Lux

8-7-04 JN – Temperature 22°C, 706 Lux

8-8-04 JN – Temperature 23°C

8-9-04 JN – Temperature = 22°C, Monitored observed test. Removed/checked and counted worms, Hydrated soils as necessary and added worms back to soil

8-10-04 JN Temperature reads 22°C

8-11-04 JN Temperature reads 22°C

8-12-04 JN Temperature = 22°C

8-13-04 JN Temperature = 22°C

8-14-04 JN Temperature = 22°C

8-15-04 JN Temperature = 22°C

8-16-04 JN Temperature = 22°C. Removed and counted worms, weighed worms and added worms to their respective bioaccumulation jars

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Bioaccumulation Tests Test Species: *Eisenia foetida*

8-2-04 JAY – Added ~2kg of soil to each of 4 replicate test vessels. Added between 20–25 grams of earthworms to each replicate. Three site soils, 1 reference and 1 lab control were set up. Temperature = 22°C. Light intensity = 700Lux

8-3-04 JAY Temperature reads 22°C

8-4-04 JAY Temperature reads 22°C

8-5-04 JAY Temperature reads 22°C

8-6-04 JAY Temperature reads 22°C. Light bulb is out in incubator. Send email message to Betty Kinney for replacement. Worms in soil

8-7-04 JAY – Temperature reads 22°C. Light still out but worms inside soil

8-8-04 JAY – Temperature = 22°C. Light is back on.

8-9-04 JAY Temperature reads 22°C. Rewired/check worms and hydrated soils as necessary

8-10-04 JAY Temperature reads 22°C. Light still off but worms inside jars

8-11-04 JAY Temperature reads 22°C; Light fixed by Jesse

8-12-04 JAY Temperature = 22°C

8-13-04 JAY Temperature = 22°C

8-14-04 JAY Temperature = 22°C

8-15-04 JAY Temperature = 22°C

8-16-04 JAY Temperature = 22°C. Removed and observed all worms. Hydrated soils and placed worms on top of soil.

8-17-04 JAY Temperature reads 22°C

8-18-04 JAY Temperature reads 22°C

8-19-04 JAY Temperature reads 22°C

8-20-04 JAY Temperature = 22°C

8-21-04 JAY Temperature = 22°C

8-22-04 JAY Temperature = 22°C

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Bioaccumulation Tests Test Species: *Eisenia foetida*

8-23-04	JV	Temperature = 22°C. Removed and examined worms, hydrated soils as necessary and placed worms on top of soil.
8-24-04	JV	Temperature reads 22°C. Light = 850 Lux
8-25-04	JV	Temperature reads 22°C
8-26-04	JV	Temperature reads 22°C
8-27-04	JV	Temperature reads 22°C
8-28-04	JV	Temperature reads 22°C
8-29-04	JV	Temperature reads 22°C
8-30-04	JV	Temperature reads 22°C, Removed worms from soils, cleaned and froze worms

COMMENTS:

28-DAY EARTHWORM BIOACCUMULATION TEST LOG SHEET

Industry/Study: Davis Timber Site Location: Mississippi Species: *Eisenia foetida* Temperature (°C) 22+2 Light Intensity 540-1080 Lux

Sample ID	REP	pH (s.u)		Weight (grams)		DAILY SURVIVAL									
		Initial	Final	Initial	Final	Day 0	Observ	Day 7	Observ	Day 14*	Observ	Day 21	Observ	Day 28	Observ
Control	A	7.1	7.3	24.0	25.0	All Burrowed	N	OK	N	All OK	N	All ok	N	All ok	N
	B			21.5	24.0	"	N	"	N	"	N	"	N	"	N
	C			23.5	26.5	"	N	"	N	"	N	"	N	"	N
	D			26.5	22.5	"	N	"	N	"	N	"	N	"	N
DT-SS-02	A	5.3	4.8	22.0	26.5	"	N	"	N	"	N	"	N	"	N
	B			22.5	26.0	"	N	"	N	"	N	"	N	"	N
	C			21.5	26.0	"	N	"	N	"	N	"	N	"	N
	D			21.5	27.0	"	N	"	N	"	N	"	N	"	N
DT-SS-03	A	5.8	5.2	23.0	27.0	"	N	"	N	"	N	"	N	"	N
	B			21.5	27.0	"	N	"	N	"	N	"	N	"	N
	C			22.5	25.5	"	N	"	N	"	N	"	N	"	N
	D			22.0	20.0	"	N	"	N	"	N	"	N	"	N
DT-SS-02 (50%)	A	5.8	6.4	22.5	24.5	"	N	"	N	"	N	"	N	"	N
	B			22.5	23.5	"	N	"	N	"	N	"	N	"	N
	C			23.0	21.5	"	N	"	N	"	N	"	N	"	N
	D			24.0	25.5	"	N	"	N	"	N	"	N	"	N
Reference	A	5.1	5.2	25.0	30.0	"	N	"	N	"	N	"	N	"	N
	B			23.0	29.0	"	N	"	N	"	N	"	N	"	N
	C			23.5	29.0	"	N	"	N	"	N	"	N	"	N
	D			24.5	25.5	"	N	"	N	"	N	"	N	"	N
INITIALS/DATE		JY 8/2	JY 8/2	JY	DS	JY 8/2		JY 8/9/04		JY 8/16/04		JY 8/23/04		JY 8/30/04	

KEY: A = ALIVE; D = DEAD; LE = LETHARGIC; EL = ELONGATED; AV = SOIL AVOIDANCE; AS = AT THE SURFACE; HE = HEMORHAGING; NF = NOT FOUND

* added 14-day worms to their respective day jars

APPENDIX E: *Lactuca sativa* TEST RAW DATA

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Toxicity Tests Test Species: Lettuce Seed *(Lactuca sativa)*

8-10-04 JY Approximately 100g of soil was added to each of 3 replicate petri dishes and 40 lettuce seeds (Black Seeded Simpson variety) were added to each replicate. 90 grams of sand were used to cover each replicate. A total of 3 site soils, 1 lab control and 1 reference soil were used. The petri. dishes were kept moist and incubated at 24 ± 2°C in complete darkness for 48 hours. Started at 1500 hrs

8-11-04 JY Temperature reads 26°C

8-12-04 JY Temperature reads 26°C. Removed petri. dishes from darkness and initiated a 16 hour light and 8 hour darkness photoperiod. Light intensity = 3980 Lux

8-13-04 JY Temperature reads 26°C
Light intensity = 3990 Lux / 4100 Lux center

8-14-04 Temperature reads 26°C

8-15-04 Temperature reads 26°C. Removed and counted germinated seeds.

RESULTS	A	B	C
Control	33	36	36
Ref	33	38	30
2 (50%)	31	37	37
3	35	28	27
1	15	29	34

To repeat tests with Buttercrunch variety JY

COMMENTS:

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Toxicity Tests Test Species: Lettuce Seed *(Lactuca sativa)*

9-14-04 JOY Started the lettuce seed tests by adding 100 g of soil to each of 3 replicate test vessels. Refer to the Lettuce Seed Germination Test sheet for the number of samples. Added 40 lettuce seeds (buttercrunch variety) to each replicate. and covered seeds with approximately 50 g of sand. Incubated test vessels (petri dishes) at 24 ± 2°C in the dark for the first 48 hrs. Temperature reads 24.6°C, No light

9-15-04 Temperature reads 25°C, No light

9-16-04 Temperature reads 25°C. Removed seeds from darkness after the 48-hour period. Started 16hr light and 8 hr dark photoperiod. Light intensity = 4600 LUX

9-17-04 JOY Temperature reads 24.4°C

9-20-04 JOY Temperature reads 24.6°C

9-21-04 JOY Temperature reads 24.8°C. Light intensity 4700 lux (side). Removed petri dishes from light and counted germinated seeds. Checked pH of the soils.

COMMENTS:

LETTUCE SEED GERMINATION TEST DATA SHEET

Industry/Study: Davis Timber Toxicity Tests Site Location: Mississippi Test Species: *Lactuca sativa*
Test Vessel Location: Walk-in Incubator Test Temperature: 24+ 2 °C Room # F114
Photoperiod: Initial 48 hours in complete darkness Final 72 hours at 16 hr Light:8 hr Dark Analyst: JY/LG

Sample ID	REP	Temp (°C)	pH		Lettuce Seeds		Percent Germination
			Initial	Final	# Grown	# Germinated	
Control	A	24	7.1	7.3	40	38	95
	B		—	—	40	37	92.5
	C		—	—	40	36	90
Ref-1	A	24	5.1	5.2	40	JY 3 29	72.5
	B		—	—	40	39	97.5
	C		—	—	40	31	77.5
DT-002-SS	A	24	5.3	5.3	40	19	47.5
	B		—	—	40	38	95
	C		—	—	40	30	75
DT-002-SS (50%)	A	24	5.8	6.5	40	34	85
	B		—	—	40	33	82.5
	C		—	—	40	29	72.5
DT-003-SS	A	24	5.8	5.6	40	28	70
	B		—	—	40	JY 35 25	62.5
	C		—	—	40	30	75
	A						
	B						
	C						
	A						
	B						
	C						
	A						
	B						
	C						

COMMENTS:
Started tests on 9/14/04 – JY
Terminated tests on 9/21/04 – JY

atis Timber Lettuce Seedling Germination Tests
ile: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

piro - Wilk's test for normality

D = 0.288

= 0.948

ritical W (P = 0.05) (n = 15) = 0.881
ritical W (P = 0.01) (n = 15) = 0.835

---

ata PASS normality test at P=0.01 level. Continue analysis.

Datis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 7.15

Table Chi-square value = 13.28 (alpha = 0.01, df = 4)
Table Chi-square value = 9.49 (alpha = 0.05, df = 4)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Patis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	COntrol	3	1.249	1.345	1.296
2	Ref-1	3	1.019	1.412	1.169
3	DT002SS	3	0.760	1.345	1.051
4	50% DT002SS	3	1.019	1.173	1.110
5	DT003SS	3	0.912	1.047	0.983

Patis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	COntrol	0.002	0.048	0.028	3.72
2	Ref-1	0.045	0.212	0.123	18.16
3	DT002SS	0.086	0.292	0.169	27.83
	50% DT002SS	0.007	0.081	0.047	7.30
	DT003SS	0.005	0.068	0.039	6.92

Datis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.171	0.043	1.479
Within (Error)	10	0.288	0.029	
Total	14	0.459		

Critical F value = 3.48 (0.05,4,10)
Since F < Critical F FAIL TO REJECT Ho: All equal

Datis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	COntrol	1.296	0.925		
2	Ref-1	1.169	0.825	0.914	
3	DT002SS	1.051	0.725	1.767	
4	50% DT002SS	1.110	0.800	1.338	
5	DT003SS	0.983	0.692	2.254	

Dunnett table value = 2.47 (1 Tailed Value, P=0.05, df=10,4)

Datis Timber Lettuce Seedling Germination Tests
File: lettuce1 Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	COntrol	3			
2	Ref-1	3	0.261	28.3	0.100
3	DT002SS	3	0.261	28.3	0.200
4	50% DT002SS	3	0.261	28.3	0.125
5	DT003SS	3	0.261	28.3	0.233

Datis Timber Lettuce Seedling Germination Tests
File: lettuce2 Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	3	0.057	0.019	0.537
Within (Error)	8	0.284	0.035	
Total	11	0.341		

Critical F value = 4.07 (0.05,3,8)
Since F < Critical F FAIL TO REJECT Ho: All equal

Datis Timber Lettuce Seedling Germination Tests
ile: lettuce2 Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Ref-1	1.169	0.825		
2	DT002SS	1.051	0.725	0.769	
3	50% DT002SS	1.110	0.800	0.382	
4	DT003SS	0.983	0.692	1.208	

Dunnett table value = 2.42 (1 Tailed Value, P=0.05, df=8,3)

Datis Timber Lettuce Seedling Germination Tests
ile: lettuce2 Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Ref-1	3			
2	DT002SS	3	0.335	40.7	0.100
3	50% DT002SS	3	0.335	40.7	0.025
	DT003SS	3	0.335	40.7	0.133

Datis Timber Lettuce Seedling Germination Tests
File: lettuce2 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.284

W = 0.960

Critical W (P = 0.05) (n = 12) = 0.859
Critical W (P = 0.01) (n = 12) = 0.805

Data PASS normality test at P=0.01 level. Continue analysis.

Datis Timber Lettuce Seedling Germination Tests
'ile: lettuce2 Transform: ARC SINE(SQUARE ROOT(Y))

'..rtlett's test for homogeneity of variance
'alculated B1 statistic = 4.30

'able Chi-square value = 11.34 (alpha = 0.01, df = 3)
'able Chi-square value = 7.81 (alpha = 0.05, df = 3)

'ata PASS B1 homogeneity test at 0.01 level. Continue analysis.

Appendix C

Addendum to Soil and Sediment Toxicity Tests

ADDENDUM

Results of Toxicity Screening with Davis Timber Soil Samples DT-SS-007 and DT-SS-008

It was determined after the chemical analyses of the Davis Timber site soils that the locations with the maximum pentachlorophenol (PCP) concentrations were DT-SS-007 and DT-SS-008. However, samples from these 2 locations were not used in the toxicity or bioaccumulation tests. Therefore, toxicity screen tests were initiated to determine the acute toxicity of the soils from these 2 locations to the earthworm, *Eisenia foetida* and the freshwater amphipod, *Hyalella azteca*.

Hyalella azteca toxicity tests

Even though the 2 samples were soil samples, it is possible that the sampling locations could become inundated with water during storm events. Therefore, the soil samples were overlain with overlying and tested as whole sediments without dilution. The *H. azteca* toxicity tests were performed following to the methods described in EPA/600/R-99/064 entitled: "*Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*" (USEPA, 2000) with minor modification. Because of inadequate soil samples, only 4 replicates of each sample were set up.

The acute toxicity tests were terminated after 10 days because of acute toxicity in the test sediments. The survival of *H. azteca* in the 2 test sediments were both 0 percent. Laboratory control sediment *H. azteca* survivorship was 92.5 percent. Under the conditions of the *H. azteca* acute sediment toxicity tests, the survival of *H. azteca* in Davis Timber sediment samples DT-SS-007 and DT-SS-008 was significantly different (P=0.05) from the survival of *H. azteca* in the laboratory control sediment. Refer to Table 1-1 for specific details.

Eisenia foetida Toxicity Tests

The *E. foetida* whole soil toxicity were performed following a modification of EPA guideline EPA/600/3-88/029 entitled: "*Protocols for Short Term Toxicity Screening of Hazardous Waste Sites*" (Greene et al., 1989). During the initial 24 hours of the test worms in soil sample DT-SS-007 exhibited complete soil avoidance and 100 percent mortality, therefore, a 50% dilution series was performed for sample DT-SS-007. The soil was diluted using the artificial soil used as laboratory control. Sample DT-SS-008 also exhibited some avoidance behavior but with no mortality. The results of the acute toxicity tests with *E. foetida* are presented in Table 1-2. With the exception of sample DT-SS-007 (100%) which had 0 percent survival, there was 100 percent survival of *E. foetida* in test soil DT-SS-008 and all of the dilutions of sample DT-SS-007. Laboratory control soil *E. foetida* survivorship was also 100 percent. Under the conditions of the *E. foetida* acute soil toxicity tests, the survival of *E. foetida* in Davis Timber sample DT-SS-007 was significantly different (P=0.05) from the survival of *E. foetida* in the laboratory control soil. Refer to Table 1-2 for specific details.

Table 1-1. Survival of *Hyalella azteca* After 10-Days of Exposure to Sediments from the Davis Timber Site

Sample ID	Number Exposed[a]	Number Alive	Percent Survival
Control	40	37	92.5
DT-SS-007	40	0	0[b]
DT-SS-008	40	0	0[b]

[a] Forty organisms were exposed per sample, equally divided among 4 replicates
[b] Significantly different (P=0.05) from the control

Table 1-2. Survival of *Eisenia foetida* After 14-Days of Exposure to Soil Samples from the Davis Timber Site

Sample ID	Number Exposed[a]	Number Alive	Percent Survival
Control	40	37	100
DT-SS-007 (100%)	30	0	0[b]
DT-SS-007 (25%)	40	40	100
DT-SS-007 (12.5%)	40	40	100
DT-SS-007 (6.25%)	40	40	100
DT-SS-008	40	40	100

[a] Forty organisms were exposed per sample, equally divided among 4 replicates
[b] Significantly different (P=0.05) from the control

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil Toxicity Tests Test Species: *Earthworm (Eisenia foetida)*

10-4-04 JDV Added approximately 200 grams of soil from sample 007 and 008 plus control to each of 3 replicate test vessels (Mason jars). Added 10 adult earthworms to each replicate and incubated vessels at 22 ± 2°C. Samples 007 and 008 showed avoidance. More so for 007 than 008

10-5-04 JDV There was severe mortality in sample 007. Removed dead and live worms from 007 and prepared a 25%, 12.5% and 6.25% dilution series. Added 10 worms to each of 4 replicate dilutions and incubated at 22 ± 2°C. All worms had burrowed in the dilutions after 1 hour

10-6-04 JDV – Temperature reads 22°C, Light ~ 900 Lux

10-7-04 JDV – Temperature = 22°C

10-8-04 JDV – Temperature = 22°C

10-10-04 JDV – Temperature = 22°C Light ~ 900 Lux

10-11-04 JDV Temperature = 22°C. Removed control and sample 008 worms, counted worms, hydrated soils and added worms back to soil

10-12-04 JDV Temperature = 22°C. Removed the worms from the dilution series, counted worms and hydrated soils. Added worms back to soil.

Prepared 7 replicates of sample 007 (50%) and added 10 worms to each replicate.

Rep A = 5 grams Rep B = 6 grams

10-13-04 JDV Temperature = 22°C

10-14-04 JDV Temperature = 22°C

COMMENTS:

14-DAY EARTHWORM TOXICITY TEST LOGSHEET

Industry/Study: Davis Timber Soils Location: Mississippi Species/Age: *Eisenia foetida*/Adult
Temperature (°C): 22 +/- 2 Date/Start Time: 10/4/04 1400 Date/Stop Time: 10/18/04
10/5/04 dilutions 10/6/04

Sample ID	REP	pH (s.u)		Weight (grams)		DAILY SURVIVAL					
		Initial	Final	Initial	Final	Day 0	Observ	Day 7	Observ	Day 14	Observ
Control	A	6.39		5		10	N	10	N	10	N
	B	—	—	4.5		10	N	10	N	10	N
	C	—	—	4.0		10	N	10	N	10	N
	—	—	—	—	—	—	—	—	—	—	—
DT-SS-007 100%	A	5.15		4.5		10	Avoid	Ø	—	—	—
	B	—	—	4.5		10	"	Ø	—	—	—
	C	—	—	5		10	"	Ø	—	—	—
	—	—	—	—	—	—	—	—	—	—	—
DT-SS-007 25%	A	4.77		4		10	N	10	N	10	N
	B	—	—	4		10	N	10	N	10	N
	C	—	—	4		10	N	10	N	10	N
	D	—	—	4		10	N	10	N	10	N
DT-SS-007 12.5%	A	4.69		4		10	N	10	N	10	N
	B	—	—	4.5		10	N	10	N	10	N
	C	—	—	4.5		10	N	10	N	10	N
	D	—	—	4		10	N	10	N	10	N
DT-SS-007 6.25%	A	4.60		45		10	N	10	N	10	N
	B	—	—	5.0		10	N	10	N	10	N
	C	—	—	3.5		10	N	10	N	10	N
	D	—	—	4.5		10	N	10	N	10	N
DT-SS-008	A	4.82		4		10	AV	10	*	10	N
	B	—	—	4.5		10	AV	10	*	10	N
	C	—	—	4.5		10	AV	10	*	10	N
	—	—	—	—	—	—	—	—	—	—	—
ANALYST				JM		JM	—	JM	—	JM	—

Key: HERR = Hemorrhaging; N = None; LE = Lethargic; AV = Soil Avoidance; NF = Not found; EL = Elongated
COMMENTS: * Worms alive and burrowed. Bunched together with lots of slime

DAILY OBSERVATIONS LOG

Industry/Study: Davis Timber Soil/Sed Toxicity Tests Test Species: *Hyalella azteca*

10-4-04 JDV Added ~100 grams of soil from sample 007 and 008 to each of 4 replicate test vessels (300 mL beakers). Added overlying water and incubated at 22±2°C.

10-5-04 JDV Renewed overlying water and added 10 Hyalella to each replicate vessel. Fed each replicate 1mL YCTM

10-6-04 Renewed overlying water and measured temp + DO L.T.
collected water samples from all three A, B, D

10-7-04 LT Renewed overlying water and measured temp + DO - collected for Ammonia
Fed each replicate 1 mL YCTM

10-8-04 LT Renewed overlying water + measured temp+DO collected for ammonia. Fed each replicate 1 mL YCTM

10-10-04 JDV Renewed overlying water in each replicate after temperature and D.O. measurement. Fed each replicate 1mL YCTM

10-11-04 JDV Measured DO and temperature. Renewed overlying water and fed each replicate 1mL YCTM

10-12-04 JDV Measured DO and temperature. Renewed overlying water per protocol and fed each replicate 1mL YCTM.

10-13-04 JDV Measured temperature & DO. Renewed overlying water (AM & PM) and fed each replicate 1mL YCTM

10-14-04 JDV Measured temperature and DO. Renewed overlying water (AM & PM) and fed each replicate 1mL YCTM.

10-15-04 JDV Measured water quality and ended test.

COMMENTS:

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: Control Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: _____

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 -- 10/5/04 JM	A	23.1	7.4	6.87	43	56	188	130.7
1 -- 10/6/04 L.T.	B	22.2	5.19	6.77	44	52	194	142.3
2 -- 10/7/04 L.T.	C	22.0	4.07					140.0
3 -- 10/8/04 LT.	D	22.1	4.00					140.7
4 -- 10/9/04	A	—	—					
5 -- 10/10/04 JM	B	22.0	6.1					
6 -- 10/11/04 JM	C	22.0	4.7					
7 -- 10/12/04 JM	D	22.5	4.67					
8 -- 10/13/04 JM	A	22.5	4.64					
9 -- 10/14/04 JM	B	22.2	4.71					
10 -10/15/04 JM	C	22.2	5.1					
11 -- 10/16/04	D							
12 -- 10/17/04	A							
13 -- 10/18/04	B							
14 -- 10/19/04	C							

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D				
0 -- 10/5/04	N	N	N	N				
1 -- 10/6/04	N	N	N	N				
2 -- 10/7/04	N	N	N	N				
3 -- 10/8/04	N	N	N	N				
4 -- 10/9/04	—	—	—	—				
5 -- 10/10/04	N	N	N	N				
6 -- 10/11/04	N	N	N	N				
7 -- 10/12/04	N	N	N	N				
8 -- 10/13/04	N	N	N	N				
9 -- 10/14/04	N	N	N	N				
10 -10/15/04	N	N	N	N				
11 -- 10/16/04								
12 -- 10/17/04								
13 -- 10/18/04								
14 -- 10/19/04								
# ALIVE	9	10	10	8				

COMMENTS:

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-007 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: _____

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 -- 10/5/04 JM	A	23.1	7.4	7.43	62	74	198	210.0
1 -- 10/6/04 LT	B	22.0	4.82	6.97	59	76	188	187.5
2 -- 10/7/04 LT	C	22.1	4.72					185.0
3 -- 10/8/04 LT	D	21.9	5.28					173.0
4 -- 10/9/04	A	—	—					
5 -- 10/10/04 JM	B	22.0	6.5					
6 -- 10/11/04 JM	C	22.0	5.3					
7 -- 10/12/04 JM	D	22.1	4.34					
8 -- 10/13/04 JM	A	22.2	4.55					
9 -- 10/14/04 JM	B	22.1	4.63					
10 -10/15/04 JM	C	22.0	4.11					
11 -- 10/16/04	D							
12 -- 10/17/04	A							
13 -- 10/18/04	B							
14 -- 10/19/04	C							

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D				
0 -- 10/5/04	N	N	N	N				
1 -- 10/6/04	N	N	N	N				
2 -- 10/7/04	N	N	N	N				
3 -- 10/8/04	N	N	N	N				
4 -- 10/9/04	—	—	—	—				
5 -- 10/10/04	N	N	N	N				
6 -- 10/11/04	N	N	N	N				
7 -- 10/12/04	N	N	N	N				
8 -- 10/13/04	N	N	N	N				
9 -- 10/14/04	N	N	N	N				
10 -10/15/04	N	N	N	N				
11 -- 10/16/04								
12 -- 10/17/04								
13 -- 10/18/04								
14 -- 10/19/04								
# ALIVE	Ø	Ø	Ø	Ø				

COMMENTS:

SHORT-TERM AMPHIPOD TOXICITY TEST DATA SHEET

Industry/Study: Davis Timber Sediment Test Location: Mississippi Test Species: *Hyalella azteca* Room # F114
Sample ID: DT-SD-008 Vessel Location: Room Ambient Photoperiod: 16 hr L:8 hr D Analyst: _____

WATER QUALITY MEASUREMENTS

DAY-DATE-INIT	REP	Temp. (° C)	DO (mg/L)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µmhos/cm)	Ammonia (mg/L)
0 -- 10/5/04 JV	A	23.1	7.2	6.86	45	56	154	204.3
1 -- 10/6/04 LT	B	21.6	4.52	6.35	42	50	150	188.1
2 -- 10/7/04 LT	C	22.1	3.70					194.0
3 -- 10/8/04 LT	D	22.0	3.39					167.1
4 -- 10/9/04	A	—	—					
5 -- 10/10/04 JV	B	22.1	4.39					
6 -- 10/11/04 JV	C	22.0	4.30					
7 -- 10/12/04 JV	D	22.1	4.11					
8 -- 10/13/04 JV	A	22.1	4.01					
9 -- 10/14/04 JV	B	21.8	3.88					
10 -- 10/15/04 JV	C	21.8	4.0					
11 -- 10/16/04	D							
12 -- 10/17/04	A							
13 -- 10/18/04	B							
14 -- 10/19/04	C							

DAILY OBSERVATIONS: SURVIVAL/REPLICATE

DAY-DATE	A	B	C	D				
0 -- 10/5/04	N	N	N	N				
1 -- 10/6/04	N	N	N	N				
2 -- 10/7/04	N	N	N	N				
3 -- 10/8/04	N	N	N	N				
4 -- 10/9/04	—	—	—	—				
5 -- 10/10/04	N	N	N	N				
6 -- 10/11/04	N	N	N	N				
7 -- 10/12/04	N	N	N	N				
8 -- 10/13/04	N	N	N	N				
9 -- 10/14/04	N	N	N	N				
10 -- 10/15/04	N	N	N	N				
11 -- 10/16/04								
12 -- 10/17/04								
13 -- 10/18/04								
14 -- 10/19/04								
# ALIVE	0	0	0	0				

COMMENTS:

Appendix D

Fish Species List: Sizes, Weights, and Number in Composite Samples, and Total Gram Weight

Fish Species: Sizes, Weights, and Number in Composite Samples, and Total Gram Weight.
DAVIS TIMBER SUPERFUND SITE
Hattiesburg, Mississippi

Station			Largest		Smallest			
			Length (mm)	Weight (g)	Length (mm)	Weight (g)	# in composite	Total gram weight
DT-REF04-LMB	Largemouth bass	*Micropterus salmoides*	105	11	53	2	9	43
DT-REF04-YEB	Yellow bullhead	*Ameiurus natalis*	78	5	48	2	6	15
DT-REF04-BLGS	Bluegill - small	*Lepomis macrochirus*	103	19	61	3	15	103
DT-REF04-BLGL	Bluegill - large	*Lepomis macrochirus*	125	33	112	26	5	143
DT-BP-DOS	Dollar sunfish	*Lepomis marginatus*	87	11	44	1	13	47
DT-BP-WAM	Warmouth	*Lepomis gulosus*	87	12	60	3	10	53
DT-BP-BLG	Bluegill	*Lepomis macrochirus*	119	25	58	2	14	110
DT-WMC-RSF	Redear sunfish	*Lepomis microlophus*	N/A*	N/A	N/A	N/A	2	N/A
DT-WMC-WAM	Warmouth	*Lepomis gulosus*	N/A	N/A	N/A	N/A	10	N/A
DT-WMC-BLG	Bluegill	*Lepomis macrochirus*	100	14	50	2	20	91
FISH COLLECTED BY THE STATE								11-Feb-04
DT-CCL-BLG01	Bluegill	*Lepomis macrochirus*	N/A	N/A	N/A	N/A	2	N/A
DT-CCL-BLG02	Bluegill	*Lepomis macrochirus*	N/A	N/A	N/A	N/A	8	N/A
DT-CCL-RSF01	Redear sunfish	*Lepomis microlophus*	N/A	N/A	N/A	N/A	5	N/A

REF04 = Reference Station
BP = Beaver Pond
WMC = West Mineral Creek
* - Information not available

Appendix E

Hurricane Katrina Sediment Sample Results

6.9 Davis Timber (NPL)

Sediment samples were collected at two locations, DT01 and DT02, as shown on Figure 10. Because of dry conditions, surface water samples, which were planned, were not collected at these locations. Both samples were analyzed for extractable organic compounds and dioxins. Sample DT01SDS is the split sample at station DT01SD. The extractable organic analytical results are summarized below. The miscellaneous extractable organic compound (TIC) data are not summarized but can be found in the complete data appended to this report. The dioxin results are summarized in Table 6.4 at the end of Section 6.

Extractable Organic Compounds, Sediment:

Analyte	*Units*	*DT01SD*	*DT01SDS*	*DT02SD*
Pentachlorophenol	ug/kg	880	450 J	*940 U*
Chrysene	ug/kg	84 J	75 J	*380 U*
Fluoranthene	ug/kg	80 J	*340 U*	*380 U*
Pyrene	ug/kg	78 J	76 J	*380 U*

6.10 Chemfax, Inc. (Non-NPL)

Sediment samples were collected at four locations in Bernard Bayou, as shown on Figure 11. All samples were analyzed for volatile and extractable organic compounds. Sample CF04SDS is the split of the sample collected at location CF04SD.

Extractable Organic Compounds, Sediment:

Acetophenone, detected at an estimated concentration of 96 ug/kg, in sample CF04SD, was the only extractable organic compound detected in the samples collected at this site. Several miscellaneous extractable compounds (TICs) and unknown compounds were detected at generally low concentrations in samples from each of the four stations. These results are included in the complete data appended to the report. The VOC results are summarized below.

Volatile Organic Compounds, Sediment:

Analyte	*Units*	*CF01SD*	*CF02SD*	*CF03SD*	*CF04SD*	*CF04SDS*
Acetone	ug/kg	19 J	12 J	*11 UJ*	10 J	11 J
Unknown	ug/kg	6 J	6 J	8 J	6 J	8 J

6.11 Picayune Wood Treating (NPL)

Sediment samples were collected at three locations, PW01, PW02 and PW03, as shown on Figure 12. In addition, a surface water sample was also collected at location PW02. All samples were analyzed for extractable organic compounds. The analytical results are

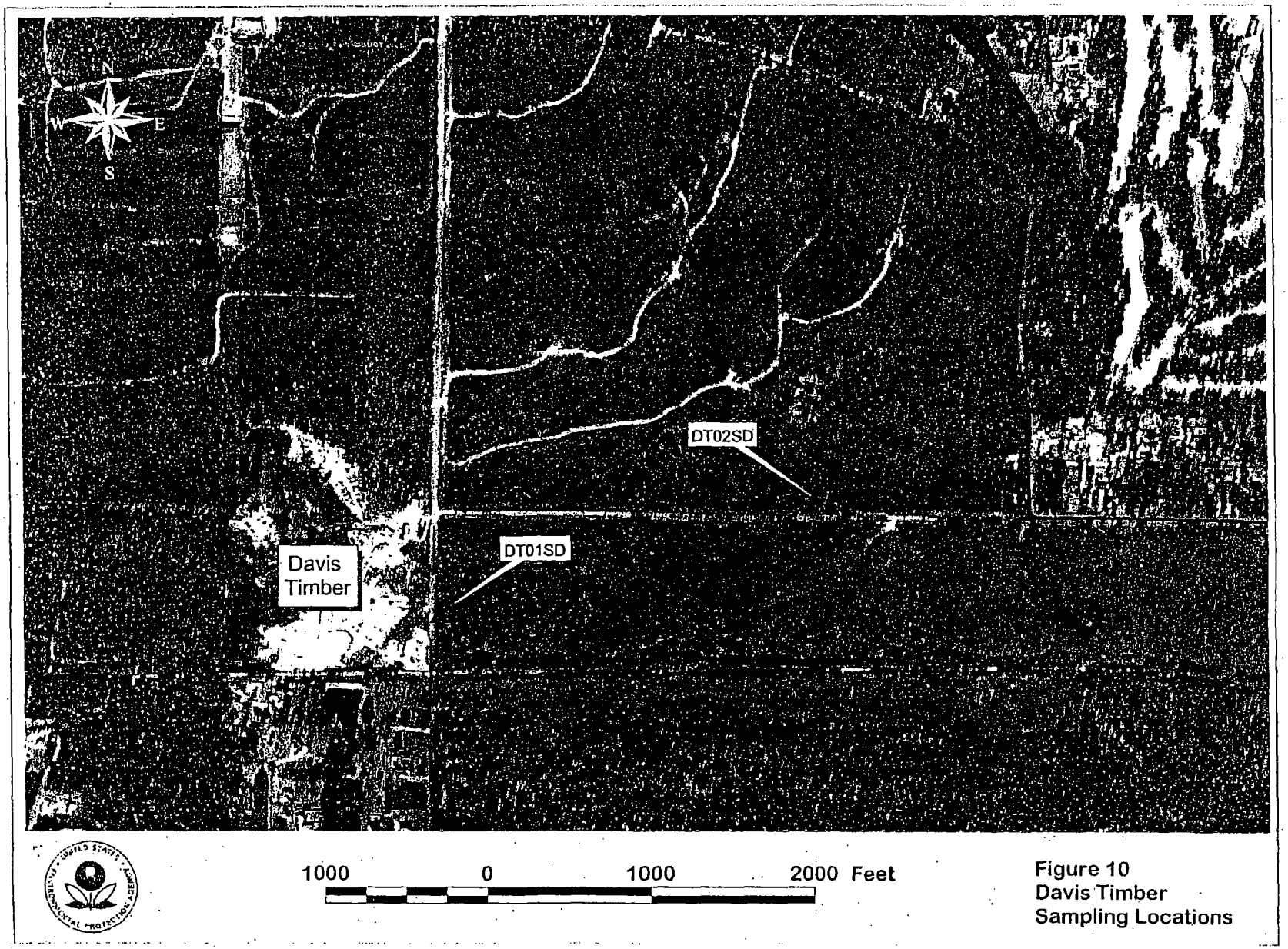

Figure 10
Davis Timber
Sampling Locations

Table 6.4
Dioxin Analytical Data Summary, Sediments
Davis Timber Superfund Site
Post-Katrina NPL and Non-NPL Superfund Site Evaluations

		DT01SD		DT01SDS		DT02SD	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NG/KG	13000		17000		1100	
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NG/KG	2400		3200		190	
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NG/KG	210		270		16	
1,2,3,4,7,8-Hexachlorodibenzodioxin	NG/KG	140		190		11	
1,2,3,4,7,8-Hexachlorodibenzofuran	NG/KG	93		120		7.6	
1,2,3,6,7,8-Hexachlorodibenzodioxin	NG/KG	560		710		50	
1,2,3,6,7,8-Hexachlorodibenzofuran	NG/KG	83		100		5.5	
1,2,3,7,8,9-Hexachlorodibenzodioxin	NG/KG	320		440		24	
1,2,3,7,8,9-Hexachlorodibenzofuran	NG/KG	33		41		2.7	
1,2,3,7,8-Pentachlorodibenzodioxin	NG/KG	45		60		2.9	
1,2,3,7,8-Pentachlorodibenzofuran	NG/KG	16		19		1.2	J
2,3,4,6,7,8-Hexachlorodibenzofuran	NG/KG	150		190		10	
2,3,4,7,8-Pentachlorodibenzofuran	NG/KG	35		43		3.2	
2,3,7,8-Tetrachlorodibenzodioxin	NG/KG	2.4		3.3		0.3	J
2,3,7,8-Tetrachlorodibenzofuran	NG/KG	3.4		4.5		*0.34*	*U*
Heptachlorodibenzodioxin (Total)	NG/KG	21000	J	27000	J	1800	J
Heptachlorodibenzofuran (Total)	NG/KG	7700	J	11000	J	610	J
Hexachlorodibenzodioxin (Total)	NG/KG	3300	J	4200	J	240	J
Hexachlorodibenzofuran (Total)	NG/KG	3200	J	4000	J	220	J
Octachlorodibenzodioxin	NG/KG	93000	J	92000	J	8600	J
Octachlorodibenzofuran	NG/KG	7700		9200		630	
Pentachlorodibenzodioxin (Total)	NG/KG	380	J	510	J	22	J
Pentachlorodibenzofuran (Total)	NG/KG	590	J	840	J	45	J
Tetrachlorodibenzodioxin (Total)	NG/KG	86	J	130	J	4.6	J
Tetrachlorodibenzofuran (Total)	NG/KG	100	J	140	J	5.7	J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	220		280		17	
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	230		300		18	
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	370		480		30	

Data Qualifiers

U-Analyte not detected at or above reporting limit.
J-Identification of analyte is acceptable; reported value is an estimate.