

# HEALTH CONSULTATION

A Review of Biota Data  
an Examination of Crayfish Samples

MARION PRESSURE TREATING COMPANY

MARION, UNION PARISH, LOUISIANA

EPA FACILITY ID: LAD008473142

Prepared by:

Louisiana Department of Health and Hospitals  
Office of Public Health  
Section of Environmental Epidemiology and Toxicology  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## I. INTRODUCTION

At the request of concerned residents living near the Marion Pressure Treating Company site, the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) has reviewed available biota data from Marion Pressure Treating Company (MPTC) in Marion, Union Parish, Louisiana. The data examined in this health consultation are from crayfish samples collected and analyzed from June 2000, through September 2000 [1]. This document serves as a review of a possible pathway of human exposure by consumption of contaminated crayfish. SEET will use this information to help decide what further public health actions, if any, are needed.

## II. BACKGROUND AND STATEMENT OF ISSUES

From 1964 to 1989, the now-defunct Marion Pressure Treating Company (MPTC) used a creosote injection process to treat wood and wood products such as bridge pilings, railroad ties, fence posts and utility poles. The property on which the company operated is now known as the MPTC site [2].

The MPTC site is a 10-acre tract of land in the city of Marion, Union Parish, Louisiana, along State Highway 551, approximately 0.5 mile north of the junction of State Highways 551 and 33 (Appendix A, Figure 1). The site contaminants, however, have migrated off site, so that as many as 20 acres of land have been impacted. The site is mostly rural, bound to the north, east, and south by a pine forest, and to the west by State Highway 551.

The city of Marion has a reported population of approximately 775 people. According to a United States Environmental Protection Agency (EPA) contractor, approximately 46 residences and 11 businesses are located within a 0.5 mile radius of the site. Most of the city's residents live within 1 mile of the site. No on-site residences have been identified.

Overall, the site has little recreational value and is not attractive to young children or other trespassers. Currently, a 6-foot fence has been erected to surround the entire area. Big Creek, a small surface water body with an intermittent flow, is approximately 500 feet east-southeast of the site. Big Creek empties into Bayou de Loutre, approximately 7.5 miles to the south. Recreational uses are not possible within the reaches of Big Creek near the MPTC site because the depth of the water is very shallow, with many areas completely dry.

Wood treatment facilities such as the MPTC are the largest source of creosote in the environment. Creosote is a synthetic chemical that contains many compounds, particularly polycyclic aromatic hydrocarbons (PAHs). The MPTC site comprises a former processing area, a consolidation area, a tank product storage area, and drainage ditches on the east and west sides of

(MRLs) were used for comparison. RfDs and MRLs are estimates of daily exposures to contaminants that are unlikely to cause adverse noncancer health effects, even if exposure occurs over a lifetime. The cancer risk comparison values in this health consultation are based on the EPA's chemical-specific cancer slope factors (SF), representing an estimated lifetime risk of one excess cancer in 10,000 ( $1 \times 10^{-4}$ ) people exposed for a lifetime, with an assumed exposure period of 15 years.

The scenario used to estimate exposure assumes that a trespasser or recreational visitor is an older child (age 6 to 18 years); therefore, SEET used varying assumptions for body weight, ranging from 16 to 70 kilograms. The assumed crayfish consumption rates were 4 ounces of crayfish meat per meal, two meals per month for 15 years (see tables 4, 5 and 6). Consumption rates were based on a survey of shellfish consumption patterns conducted in 1992 for the greater New Orleans, Louisiana area. This survey estimates a median consumption of 2 to 3 pounds of whole boiled crayfish per meal [3]. It is estimated that 10 pounds of whole boiled crayfish equal 1 pound of crayfish meat (the edible portion); therefore, if consumers are eating 2 to 3 pounds of whole crayfish per meal, they would be ingesting approximately 4 ounces of meat.

Maximum concentrations of metals of concern include arsenic, barium and manganese (see Appendix B, Table 1). Arsenic and manganese were both detected in crayfish tissue samples from sampling location SD12 at 3.4 milligrams/kilogram (mg/kg) and 3,450 mg/kg, respectively. Barium was detected at 737 mg/kg from sampling location SD15. Barium and manganese were found in concentrations higher than the RfD. Arsenic was found at a concentration higher than the MRL for inorganic arsenic. SEET used 20% of the maximum arsenic concentration to represent the bioavailable inorganic arsenic percentage in the crayfish [7].

In addition, 2-methylnaphthalene a semi-volatile organic compound (SVOC), was detected in crayfish tissue samples. HAC values are not available for 2-methylnaphthalene, therefore, naphthalene is listed as a surrogate (substitute), because of its similarity in structure to 2-methylnaphthalene. Although it did not exceed the EPA's RfD, 2-methylnaphthalene was included as a chemical of potential concern (COPC) because of its historical association with site activities at the MPTC.

The overall carcinogenic (cancer-causing) potential of a mixture of PAHs is often expressed as the benzo(a)pyrene toxic equivalent (TEQ) concentration. The TEQ is an estimate of the pure benzo(a)pyrene concentration that would have the same carcinogenic potential as the mixture of PAHs in the sample. The available toxicological evidence indicate that no appreciable interactions between different PAH compounds; therefore, adding the effects of multiple PAHs is appropriate [4]. The maximum concentrations of the PAHs in the crayfish whole body tissue samples obtained from the sampling locations in Figure 2 are listed in Appendix B, Table 2, as

### C. Exposure Analysis

Several factors affect human exposure to crayfish, including the rate of ingestion of contaminated crayfish, the percent of crayfish caught and consumed from the contaminated water body, and the COPC concentration in the crayfish. If it is assumed that all crayfish ingested by an individual came from Big Creek or the Unnamed Tributary, the ingestion rate has a direct impact on whether the pathway risk is acceptable. In the assessment of the potential for human exposure to crayfish, exposure doses were calculated for each of the contaminants of concern for a range of body weights on the basis of EPA's assumption that a trespasser or a recreational visitor to Big Creek or the Unnamed Tributary would be between the ages of 6 to 18 with limited exposure to crayfish trapping and recreation [1].

#### *Assessing Noncancer Exposure*

Crayfish collected from Big Creek and the Unnamed Tributary contained arsenic, barium, manganese, 2-methylnaphthalene, and 2,3,7,8-TCDD. Each COPC's maximum concentration exceeded its respective HAC value, with the exceptions of 2-methylnaphthalene and 2,3,7,8-TCDD. It is important to note however, that a chemical's environmental concentration is not the same as an exposure dose, which is the amount of a chemical that an individual is exposed to, or in this case, ingests via contaminated crayfish. Assessing how much of a chemical enters the body via ingestion of contaminated crayfish requires consideration of several variables. Calculation of the estimated exposure doses for noncancer effects requires taking into account the maximum concentration of each COPC, the ingestion rate (4 ounces of crayfish meat per meal), human body weight, and the frequency (meals/day) as well as the duration (years) of meals. On the basis of crayfish located in Big Creek and the Unnamed Tributary, SEET assumed a conservative frequency for human consumption of crayfish meals of 2 meals per 30 days. The duration of meals was shortened from 15 years (used for carcinogenic risk) to 6 years, because the availability of crayfish is seasonal, only for approximately 5 months per year [5]. According to this information, none of the calculated estimated exposure doses for arsenic, barium, manganese, naphthalene, or 2,3,7,8-TCDD exceeded RFDs or MRLs used for noncancer endpoints (see Appendix B, Table 4).

#### *Assessing Cancer Exposure*

Crayfish collected from Big Creek and the Unnamed Tributary contained arsenic, a known human carcinogen, and benzo(a)pyrene, classified by EPA as a probable human carcinogen (Group B2) on the basis of an increase in the incidence of tumors in laboratory animals [6]. The same variables used to calculate estimated exposure doses for noncancer effects were used in the calculation of cancer risk levels, with two differences. First, a duration of 15 years was used instead of 6 years, and secondly, an additional variable was included, the EPA chemical-specific

including the lungs and the immune, endocrine, reproductive, and nervous systems, have not achieved structural or functional maturity; these organ systems continue to develop throughout childhood and adolescence. Children can also differ from adults in absorption, metabolism, storage, and excretion of toxicants, any of which could result in higher biologically effective doses to target organs. Children's exposures to toxicants may be more significant than adults' because children consume more food and liquids in proportion to their body weight than do adults. SHEET evaluated the potential public health hazards to children who may trespass or recreate at Big Creek and/or the Unnamed Tributary. SHEET found no public health hazard to children.

#### **IV. CONCLUSIONS**

Review of the data suggests that there is no public health hazard from limited exposure to crayfish from Big Creek and/or the Unnamed Tributary. SHEET has reached this conclusion because essentially no completed or potential pathway exists by which a person could be exposed to contaminants in crayfish meat. Big Creek and the Unnamed Tributary are small, intermittent streams with very shallow water supplies overall, and many areas are completely dry. Therefore, neither stream is able to support an adequate environment to sustain fish or crayfish for human consumption.

#### **V. RECOMMENDATIONS**

None.

#### **VI. PUBLIC HEALTH ACTION PLAN**

##### *Past Actions*

1. In May 2003, SHEET obtained EPA Human Health Risk Assessment (HHRA) sampling data in a searchable, sortable format, allowing SHEET to provide public health information in this health consultation to the Marion community in a more expedient fashion.
2. In February 2001, SHEET staff conducted a public meeting to present the Public Health Assessment (PHA) to the Marion community [3].
3. In August 2001, SHEET staff administered a needs assessment to the residents living near the MPTC site. A summary of the findings can be located in the MPTC PHA.

## LIST OF ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
COPC	Contaminant of Potential Concern
ED	Exposure Dose
EPA	Environmental Protection Agency
HAC	Health-based Assessment Comparison Values
HC	Health Consultation
HHRA	Human Health Risk Assessment
HpCDF	Heptachlorinated Dibenzofuran
HxCDD	Hexachlorinated Dibenzo-p-Dioxin
HxCDF	Hexachlorinated Dibenzofuran
LDHH	Louisiana Department of Health and Hospitals
MPTC	Marion Pressure Treating Company
MRL	Minimal Risk Level
OCDD	Octachlorinated Dibenzo-p-Dioxin
OCDF	Octachlorinated Dibenzofuran
OPH	Office of Public Health
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCDDs	Polychlorinated Dibenzo-p-Dioxins
PCDFs	Polychlorinated Dibenzofurans
PeCDD	Pentachlorinated Dibenzo-p-Dioxins
PeCDF	Pentachlorinated Dibenzofuran
PHA	Public Health Assessment
RfD	Reference Dose
R/F/S	Remedial Investigation/Feasibility Study
SEHET	Section of Environmental Epidemiology and Toxicology
SF	Slope Factor
SVOCs	Semi-volatile Organic Compounds
TCDD	Tetrachlorinated Dibenzo-p-Dioxin
TCDF	Tetrachlorinated Dibenzofuran
TEQ	Toxic Equivalency Quotient
kg	Kilogram
mg/kg	Milligrams per Kilogram
mg/kg/day	Milligrams per Kilogram per Day

## VII. REFERENCES

1. Tetra Tech. Remedial investigation and feasibility study for Marion Pressure Treating Company, Marion, Union Parish, Louisiana, Human Health Risk Assessment; 2001.
2. Anderson, A., Rice, J. A survey of fish and shellfish consumption by residents of the Greater New Orleans area. Prepared for Louisiana Department of Environmental Quality. Conducted under Contract No. 24400-91-18; 1992 Mar.
3. Louisiana Department of Health and Hospitals, Office of Public Health, Section of Environmental Epidemiology and Toxicology. Public health assessment for the Marion Pressure Treating Company, Marion, Union Parish, Louisiana. 2002 Aug.
4. Agency for Toxic Substances and Disease Registry. Toxicological profile for polycyclic aromatic hydrocarbons (PAHs). Atlanta: US Department of Health and Human Services; 1995.
5. Louisiana Department of Wildlife and Fisheries. Available at: URL: [www.wlf.state.la.us](http://www.wlf.state.la.us)
6. Integrated Risk Information System (IRIS). Office of Research and Development, National Center for Environmental Assessment. Washington, DC: Environmental Protection Agency, 2001. Available at: URL: <http://www.epa.gov/iris>
7. Agency for Toxic Substances and Disease Registry. Toxicological profile for arsenic. Atlanta: US Department of Health and Human Services; 2000.
8. Van den Berg et. al. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environmental Health Perspectives. Volume 106, Number 12, Pages 775 through 792; 1998.

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## CERTIFICATION

This Marion Pressure Treating Company Site, A Review of Biota Data, health consultation was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures at the time the health consultation was begun.



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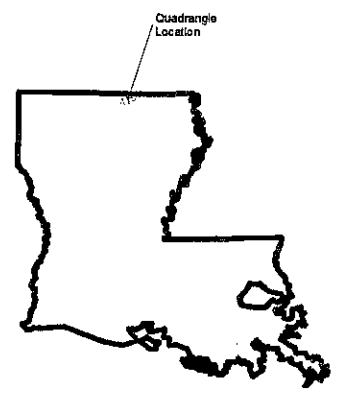
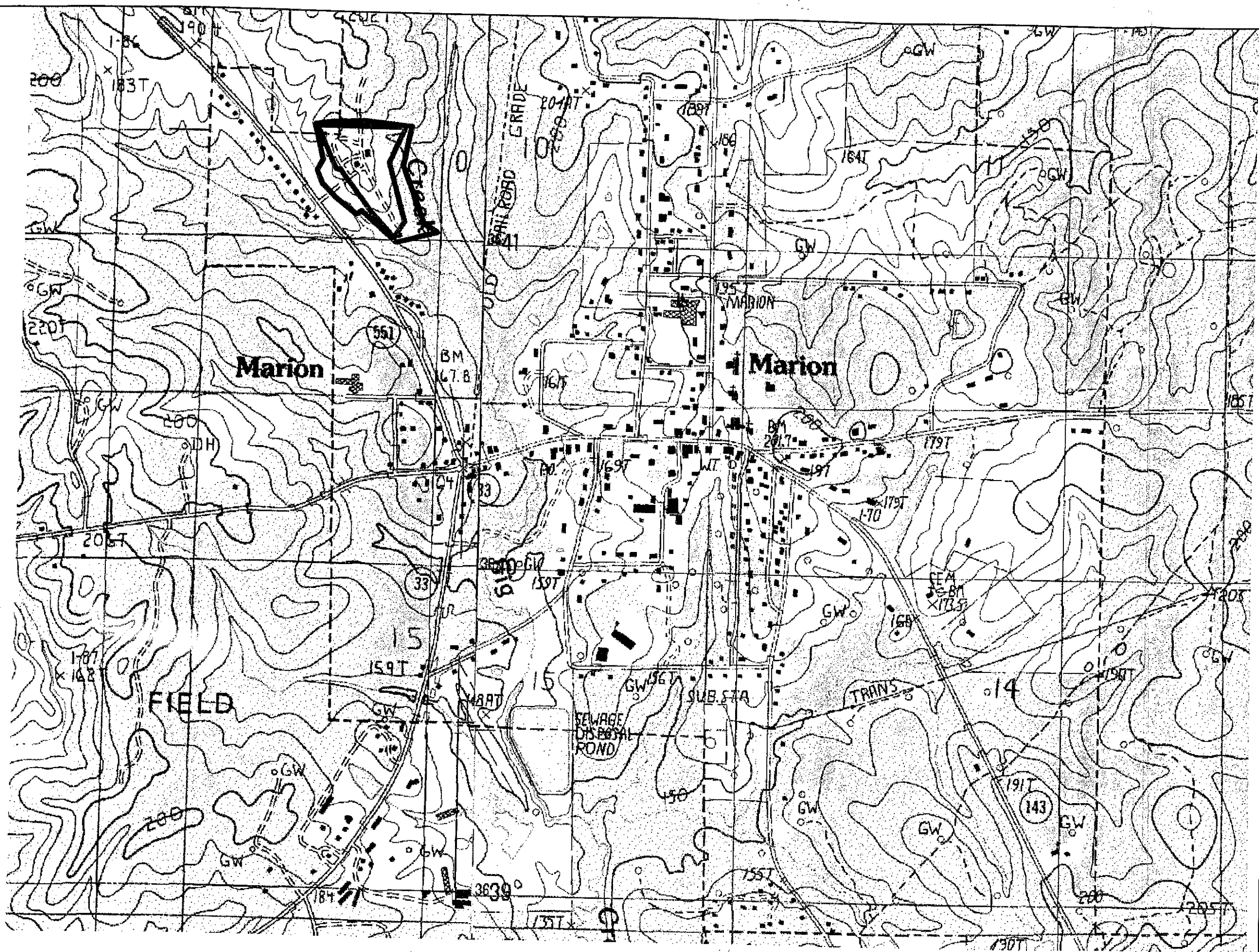
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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



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Roberta Erlwein  
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50 0 50 100 Miles  
State Location Map

**LEGEND**

- Site Features
- NEW FENCE
- OPERATIONAL BOUNDARY

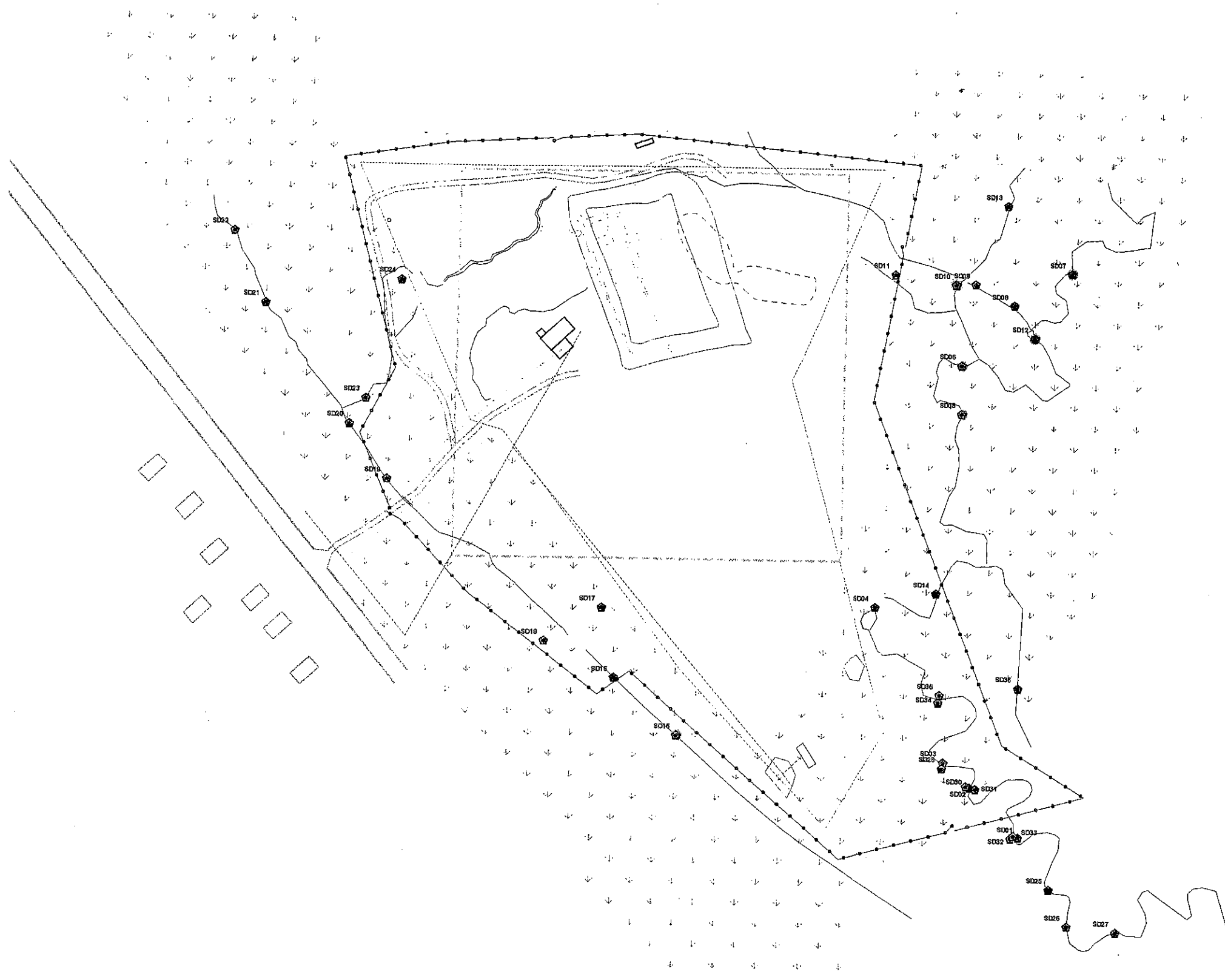
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MARION PRESSURE TREATING COMPANY  
MARION, LOUISIANA

FIGURE 1  
AREA/VICINITY MAP

PREPARED FOR: BY:

SOURCE: MODIFIED FROM UNITED STATES GEOLOGIC SOCIETY, MARION WEST AND MARION EAST, LOUISIANA QUADRANGLES, REVISED 1988.



**LEGEND**

- Sediment Sample Locations**
  - SD01 Sediment Sample Location
  - SD05 Crayfish Sample Location
- Site Features**
  - NEW FENCE
  - STRUCTURES
  - SUMP
  - TANKER TRAILER
  - SHED
  - SOIL PILE
  - FORMER PROCESS AREA
  - FORMER SURFACE IMPONDMENT
  - CONSOLIDATION AREA
  - OPERATION AREA
  - 10 ACRE
  - HIGHWAY
  - DIRT ROAD
  - CULVERT
  - STREAM
  - WETLANDS
  - OVERHEAD ELECTRICAL
  - EXPOSED WATER LINES
  - RESIDENCES



MARION PRESSURE TREATING COMPANY  
MARION, LOUISIANA

FIGURE 4  
SEDIMENT (AND CRAYFISH)  
SAMPLING LOCATIONS

PREPARED FOR: BY:  

SOURCE: MODIFIED FROM M.J. DEFIELD AND COMPANY, AUGUST 2000.

**Table 1. Contaminants of Potential Concern Detected in Crawfish Whole Body Tissue Samples, Marion Pressure Treating Company, Union Parish, Louisiana, (June-September 2000).**

Contaminants of Potential Concern	Maximum Concentration Detected (mg/kg) <sup>1</sup>	Comparison Values	
		(mg/kg)	Source
<b>Metals</b>			
arsenic	Range 1.3 - 3.4	0.0003	Chronic Oral MRL <sup>2</sup>
barium	737	0.07	EPA Chronic Oral RFD <sup>3</sup>
manganese	3450	0.14	EPA Chronic Oral RFD
<b>Semi-volatiles</b>			
naphthalene*	0.01	0.02	EPA Chronic Oral RFD

<sup>1</sup> mg/kg -milligram per kilogram

<sup>2</sup> MRL -Minimal risk level for inorganic arsenic

<sup>3</sup> RFD -reference dose

\* used as a surrogate for 2-methylnaphthalene; included as a COPC because it is historically associated with the site

**Table 3. Maximum Poly-chlorinated dibenzo-p-dioxins / poly-chlorinated dibenzofurans (PCDDs/PCDFs) Concentrations Detected in Crayfish Whole Body Tissue Samples, Marion Pressure Treating Company, Union Parish, Louisiana, (June-September 2000).**

Contaminants Of Concern	Max. Conc. Detected (pg/g) <sup>1</sup>	Toxic Equivalency Factor <sup>6</sup>	Product <sup>2</sup>	Conc. (mg/kg) <sup>3</sup>	Excluding U TEOs <sup>4</sup>	1/2 Detection Limit (DL) TEOs <sup>5</sup>
2,3,7,8-TCDD	1	1	1	1.00E-06	0.00E+00	5.00E-07
1,2,3,7,8-PeCDD	1	5	5	5.00E-06	0.00E+00	2.50E-06
1,2,3,4,7,8-HxCDD	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
1,2,3,6,7,8-HxCDD	0.14	0.1	.014	1.40E-07	1.40E-08	1.40E-08
1,2,3,4,6,7,8-HpCDD	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
OCDD	146	0.0001	.0146	1.46E-04	0.00E+00	1.46E-08
2,3,7,8-TCDF	1	0.1	0.1	1.00E-06	0.00E+00	5.00E-08
1,2,3,7,8-PeCDF	5	0.05	0.25	5.00E-06	0.00E+00	1.25E-07
2,3,4,7,8-PeCDF	5	0.5	2.5	5.00E-06	0.00E+00	1.25E-06
1,2,3,4,7,8-HxCDF	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
1,2,3,6,7,8-HxCDF	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
2,3,4,6,7,8-HxCDF	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
1,2,3,7,8,9-HxCDF	5	0.1	0.5	5.00E-06	0.00E+00	2.50E-07
1,2,3,4,6,7,8-HpCDF	5	0.01	0.05	5.00E-06	0.00E+00	2.50E-07
1,2,3,4,7,8,9-HpCDF	5	0.01	0.05	5.00E-06	0.00E+00	2.50E-07
OCDF	0.62	0.0001	0.000062	1.00E-10	1.00E-10	1.00E-10
TOXIC EQUIVALENT					6.27E-08	6.04E-06

<sup>1</sup>pg/g - picograms per gram

<sup>2</sup>product - (maximum concentration detected)(TEF)

<sup>3</sup>mg/kg - milligrams per kilogram

<sup>4</sup>the excluding non-detect toxic equivalency quotient (U TEO) scenario calculates a toxic equivalency quotient excluding all non-detect data

<sup>5</sup>the 1/2 DL TEO scenario calculates a toxic equivalency quotient using a proxy value of 1/2 the detection limit in order to be conservative with regard to COCs that were non-detect during sampling

<sup>6</sup>Source: World Health Organization (WHO) [8]

**Table 5. Calculated Estimated Exposure Doses for Benzo(a)pyrene for Cancer Health Effects Based on Whole Body Crayfish Samples, Marion Pressure Treating Company, Union Parish, Louisiana, (June-September 2000).**

Bodyweight (kg) <sup>1</sup>	1 meal per month (mg/kg/day) <sup>2</sup>	2 meals per month (mg/kg/day)	6 meals per year (mg/kg/day)	1 meal per year (mg/kg/day)
16	4.41E-05	8.86E-05	2.18E-05	3.59E-06
20	3.64E-05	7.26E-05	1.78E-05	2.95E-06
24	2.86E-05	5.73E-05	1.40E-05	2.32E-06
28	2.52E-05	5.03E-05	1.23E-05	2.04E-06
32	2.21E-05	4.41E-05	1.08E-05	1.79E-06
36	1.95E-05	3.90E-05	9.58E-06	1.58E-06
42	1.69E-05	3.38E-05	8.30E-06	1.37E-06
46	1.53E-05	3.07E-05	7.53E-06	1.24E-06
50	1.40E-05	2.81E-05	6.89E-06	1.14E-06
54	1.30E-05	2.60E-05	6.38E-06	1.05E-06
58	1.22E-05	2.44E-05	6.00E-06	9.92E-07
62	1.14E-05	2.29E-05	5.62E-06	9.29E-07
66	1.06E-05	2.13E-05	5.23E-06	8.65E-07
70	9.9E-06	1.97E-05	4.85E-06	8.02E-07

<sup>1</sup>kg -kilogram

<sup>2</sup>mg/kg/day -milligram per kilogram per day