TEXAS DEPARTMENT OF HEALTH

SEAFOOD SAFETY DIVISION AND
HEALTH RISK ASSESSMENT AND TOXICOLOGY PROGRAM

ANALYSIS OF RISK

FROM CONSUMPTION OF FISH

TAKEN FROM THE LOWER NECHES RIVER

NOVEMBER 1995

BACKGROUND

In 1986-87, as part of the U.S. Environmental Protection Agency (EPA) National Bioaccumulation Study, samples of edible fish tissue were collected and analyzed for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) at 39 sites in EPA Region 6 (the term dioxin will be used as a general term to include all dioxin and furan congeners detected, including the most toxic form 2,3,7,8-TCDD). Targeted sites were those thought to be producers of dioxin and were located downstream of bleached kraft pulp and paper mill discharges (EPA, 1990). Multiple species of fish were collected so that risk from consumption of different species could be compared. EPA decided to screen results against the EPA fish tissue criterion of $1x10^{-4}$ for a person consuming 6.5 grams of fish per day for 70 years. This represents a risk of one excess cancer in 10,000 persons exposed to approximately one 8 ounce meal per month over a lifetime. Exceedance of this risk level signified to the EPA that a fish consumption advisory should be considered, while exceedance of the $1x10^{-3}$ level, or one excess cancer in 1000 persons exposed over a lifetime, would signify the need for considering a fish consumption ban (EPA, 1990).

Limited sampling of fish in the Neches River indicated elevated levels of 2,3,7,8-TCDD in two of two fish caught downstream of Temple Inland Forest Products Corporation, located in Evadale, Texas, approximately 20 miles north of Beaumont. A toxicity equivalency concentration (TEC) was used to provide a cumulative concentration of dioxin and furan congeners found. The $1x10^{-4}$ criterion was exceeded for the average TEC in these two samples. EPA released the information in September of 1990.

- The two fish samples reported in 1990 had an average toxicity equivalency concentration of 7.1 parts per trillion (ppt) with a maximum TEC of 9.1 ppt found in spotted gar.

EPA recommended that a fish consumption advisory be issued by Texas Department of Health (TDH) or further sampling be instigated to determine the extent of the dioxin contamination. EPA-Region 6 requested the state's assistance in collecting samples. Based on the fish results and EPA recommendations, Texas Department of Health issued a fish consumption advisory on the Neches River South of U.S. 96 near Evadale to the Interstate 10 Bridge, limiting consumption to no more than one meal per month and advising no consumption for women of child-bearing age and children. The advisory was issued on September 19, 1990. Approximately one year later, further sampling was conducted by Texas Department of Health (TDH), Division of Shellfish Sanitation Control. Three of four sample composites of edible fish tissue caught in the Neches River in the advisory area indicated elevated levels of 2,3,7,8-TCDD, further substantiating the TDH advisory. The Environmental Epidemiology Program of Texas Department of Health had concluded that a 3 ppt toxicity equivalency concentration level in fish would equate to a $1x10^{-4}$ risk level given a 15 gram consumption level over 70 years.

- The four fish samples reported in 1991 had an average toxicity equivalency concentration of 4.26 ppt with a maximum TEC of 7.04 ppt found in a carp composite.

In December of 1992, Texas Department of Health was provided with a grant from Temple Inland to conduct analysis of fish tissue in the advisory area of the Neches River. Temple Inland had implemented controls over the processes that produced dioxin and postulated that fish downstream of the site would have reduced levels of dioxin in tissue. Two separate sampling events were planned for Spring and Fall of 1993. Eleven fish samples were collected on each sampling event at four sites along the advisory area of the Neches River.

- Eleven samples collected in the spring of 1993 had an average TEC of 1.7 parts per trillion (ppt) with a maximum concentration of 7.7 ppt found in a composite alligator gar. Eleven samples collected in the fall of 1993 had an average TEC of 1.3 ppt, with a maximum TEC of 3.1 ppt found in a composite largemouth bass.

The average TEC for dioxins in fish from the advisory area of the Neches River had significantly decreased in the period of time between 1990 and 1993. In order to perform a comprehensive assessment of risk for consumers of fish from the Lower Neches River, 32 additional samples were collected downstream of the advisory area to Sabine Lake Public health concerns were related to the presence of one State Superfund site and one Federal Superfund Site in this area. Samples were analyzed for priority pollutants, including metals, pesticides, PCB's, volatile and semi-volatile organic chemicals.

The International Creosoting Superfund Site is located in Beaumont, Texas, immediately south of the Neches River advisory area, and is a former wood-treating and asphalt operation. Waste discharges have included diesel fuel, cement materials, sewer discharge, and gasoline. Brakes Bayou, which is adjacent to the Creosoting Site and the Neches River near Interstate 10 may have received discharge from the site.

On January 18, 1994, the Texas Department of Health Aquatic Life Survey Team collected four fish samples from the Neches River near Interstate 10 and six fish samples from Brakes Bayou, adjacent to the International Creosoting Superfund Site. Laboratory analyses performed included pesticides, metals, volatile and semi-volatile organic chemicals, and polychlorinated biphenyls (PCB's). These 10 samples were analyzed by a contract lab.

Volatile and semi-volatile organic chemicals were below detection limits for all fish collected near the International Creosoting Superfund Site. All pesticides were reported below detection limits, except for dieldrin, and DDT metabolites, which were found

at insignificant levels in terms of public health. Metals were found at insignificant levels of concern in terms of public health. One Smallmouth Buffalo of the ten fish samples collected contained an elevated level of aroclor 1260. Two other Smallmouth Buffalo of similar size contained no PCB's.

In May of 1995, Texas Department of Health collected seven additional Smallmouth Buffalo samples from Brakes Bayou and the Neches River near the Interstate 10 bridge, in order to determine whether PCB contamination existed. These 10 samples were analyzed by the Texas Department of Health lab. None of the ten samples analyzed by TDH lab contained any detectable level of PCB's.

The Bailey Waste Disposal Site is part of a saltwater marshland near the confluence of the Neches River and Sabine Lake. This site is approximately 15 miles downstream of the Neches River advisory area. The site has historically received waste from industry, municipal trash, and construction debris. It was closed in 1971 and placed on the EPA National Priority List in 1984. The following chemicals of concern have been found in groundwater, surface water, and soil: volatile organic chemicals, including benzene and chloroform; heavy metals, including copper, lead, and arsenic; and polyaromatic hydrocarbons.

On January 18, 1994, the Texas Department of Health Aquatic Life Survey Team collected 15 fish samples in four locations near the Bailey Site - the Neches River 1/4 mile west and upstream of Bailey, a discharge canal located off the southeastern corner of the Bailey Site, the Neches River 1/4 mile east and downstream of Bailey, and Sabine Lake near the mouth of the Neches River.

Laboratory analyses included pesticides and PCB's, metals, volatile organic chemicals, and semi-volatile organic chemicals. The samples were analyzed by the Texas Department of Health lab.

Levels of chemicals found were near or below detection limits for all 15 fish taken from the four locations near the Bailey Site. The two volatile chemicals reported above detection limits were acetone, which originates from rinsing of transport jars; and carbon disulfide, which is a widely reported degradation product of fish tissue in the laboratory. Polyaromatic hydrocarbons, polychlorinated biphenyls, and pesticides were all below detection limits. Metals were found at insignificant levels of concern in terms of public health.

2,3,7,8 TETRACHLORODIBENZO-P-DIOXIN (2378-TCDD)

Dioxin is a general term for a group of 75 related chemical compounds, with the most toxic form being 2,3,7,8-TCDD. This chemical is an unwanted by-product created from several sources, including bleach kraft paper mills using chlorine to make wood colored pulp into white paper. Dioxin in the body is water insoluble, stored in body fat and metabolized very slowly if at all. Biotransformation of dioxin in sediments and aquatic systems is slow with a persistent half life of one to three years. The bioconcentration factor in fish has been estimated to be in the range of 5000 (EPA, 1992).

Dioxin has been strongly implicated as a carcinogen, producing an increased incidence of tumors, in multiple sites, in laboratory animals fed concentrations in the diet in the parts per trillion range. Soft tissue sarcomas were the predominant form of cancer found. The mechanism of carcinogenicity has not been conclusively demonstrated. EPA has designated 2,3,7,8-TCDD as a probable human carcinogen (class B2) (IRIS, 1994). Other toxic effects of 2,3,7,8-TCDD include fetotoxicity, teratogenesis (birth defects), degenerative changes of the liver and thymus, neurotoxicity and porphyria (destruction of hemoglobin). The most obvious toxicological sign is a severe type of dermatitis known as chloracne (IRIS, 1994).

EPA criteria are designed for long term protection of consumers of locally caught fish and shellfish. EPA advises that states should issue fish consumption advisories when the excess lifetime risk of cancer exceeds $1x10^{-4}$ and if the $1x10^{-3}$ criterion is exceeded, states should consider a fish consumption ban for that area. Under the EPA assumption that the average daily diet consists of 6.5 gms of seafood, a concentration of 7 ppt or more would be required to exceed the advisory level and a concentration of 70 ppt would be required to exceed the closure level. At 0.7 ppt 2,3,7,8-TCDD in edible fish tissue, the excess lifetime risk of cancer would equal $1x10^{-5}$ in a 70 kg adult exposed over a 70 year lifetime (EPA, 1990). In assessing the risk to human health from dioxin contaminated fish consumption, the concentration term is determined using a toxicity weighted total concentration (TEC) for furan and dioxin congeners with comparison to 2,3,7,8-TCDD.

The EPA assumptions of 6.5 grams per day consumption and an exposure period of 70 years are guidelines for states use and were not used in the present risk assessment. However, they are included as a historical reference for previous assessments of risk in the Neches River and in other dioxin contaminated areas of Texas. Texas Department of Health has considered an average exposure period of 30 years and an EPA recommended consumption rate of 30 grams per day (one 8 ounce meal/week) in the present risk assessment.

EPA data on fish contaminated with dioxins in the Neches River below Evadale in 1990 was limited to the following (EPA, 1990):

LOCATION	SPECIES	CONCENTRATION (PPT)
Neches River (below Evadale)	Spotted Gar	9.1
	Largemouth Bass	5.13

TDH data on fish contaminated with dioxins in the Neches River below Evadale in **1991** was limited to the following:

Neches River, 3 miles south of Hwy 93 - 3 blue catfish

2378-TCDD = 0.95 parts ppt
***TEC** = 0.95 ppt

Neches River, 3 miles south of Hwy 96 - 4 largemouth bass

2378-TCDD = 1.82 ppt
TEC = 3.71 ppt

Neches River, 3 miles north of I-10 at Tiger Bayou - 2 blue catfish

2378-TCDD = 5.34 ppt
TEC = 5.34 ppt

Neches River, 3 miles north of I-10 at Tiger Bayou - 3 carp

2378-TCDD = 6.57 ppt
TEC = 7.04 ppt

***Toxicity equivalency factors (TEF) for dioxins and furans (EPA, 1993):**

Analyte	TEF	Analyte	TEF
2,3,7,8-TCDD	1.0	2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDD	0.5	1,2,3,7,8-PeCDF	0.05
1,2,3,4,7,8-HxCDD	0.1	2,3,4,7,8-PeCDF	0.5
1,2,3,6,7,8-HxCDD	0.1	1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDD	0.1	1,2,3,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDD	0.01	1,2,3,7,8,9-HxCDF	0.1
OCDD	0.001	2,3,4,6,7,8-HxCDF	0.1
		1,2,3,4,6,7,8-HpCDF	0.01
		1,2,3,4,7,8,9-HpCDF	0.01
		OCDF	0.001

TEFs for all non-2,3,7,8-substituted congeners are zero

FISH SAMPLE DESCRIPTION INFORMATION
NECHES RIVER ADVISORY AREA
DOWNSTREAM OF THE TEMPLE INLAND SITE

SAMPLE LOCATION DATE COLLECTED	SAMPLE NO.	SPECIES	SAMPLE TYPE; LENGTH (cm)
TEN MILE CREEK MAY 1993	TI1	CHANNEL CATFISH	COMPOSITE; 34,38,38
	TI2	ALLIGATOR GAR	COMPOSITE; 70,66
OUTFALL SLOUGH MAY 1993	TI3	BLUE CATFISH	COMPOSITE; 48,62,46
	TI4	YELLOW CATFISH	SINGLE; 74
	TI5	LARGEMOUTH BASS	SINGLE; 36
NORTH SLOUGH MAY 1993	TI6	COMMON CARP	COMPOSITE; 42,46,45,42,37
	TI7	FRESHWATER DRUM	COMPOSITE; 40,43,36
2 MILES SOUTH OF RR BRIDGE MAY 1993	TI8	BLUE CATFISH	COMPOSITE; 56,46,46,44,40
	TI9	COMMON CARP	COMPOSITE; 38,38,34,37,37
	TI10	FRESHWATER DRUM	COMPOSITE; 45,39,33
	TI11	STRIPED BASS	SINGLE; 44
TEN MILE CREEK NOVEMBER 1993	TI12	BLUE CATFISH	COMPOSITE; 64,55
	TI13	YELLOW CATFISH	SINGLE; 55
	TI14	FRESHWATER DRUM	COMPOSITE; 42,44,38
OUTFALL SLOUGH NOVEMBER 1993	TI15	SMALLMOUTH BUFFALO	COMPOSITE; 46,44,38
NORTH SLOUGH NOVEMBER 1993	TI16	LARGEMOUTH BASS	COMPOSITE; 42,38,34
	TI17	WHITE CRAPPIE	COMPOSITE; 30,33,34
	TI18	CHANNEL CATFISH	COMPOSITE; 42,45
2 MILES SOUTH OF RR BRIDGE NOVEMBER 1993	TI19	LARGEMOUTH BASS	COMPOSITE; 36,37
	TI20	LARGEMOUTH BASS	COMPOSITE; 45,46,47
1/4 MILE NORTH OF RR BRIDGE NOVEMBER 1993	TI21	CHANNEL CATFISH	COMPOSITE; 39,36,34
	TI22	FRESHWATER DRUM	SINGLE; 44

POLYCHLORINATED DIOXINS and FURANS IN FISH TISSUE TAKEN FROM THE NECHES RIVER NEAR TEMPLE INLAND
May 1993

Sample #	TI1	TI2	TI3	TI4	TI5	TI6	TI7	TI8	TI9	TI10	TI11
FURANS (ppt)											
2378 TCDF	ND[a]	2[b]	ND	ND	ND	1.9	ND	ND	ND	ND	1.2
12378 PeCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23478 PeCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123478 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123678 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123789 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1234678 HpCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1234789 HpCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIOXINS (ppt)											
TCDDs (total)	0.79	7.4	1.5	2.4	ND	1.9	0.6	0.97	3.8	ND	0.73
2378 TCDD	0.79	7.4	1.5	2.4	ND	1.1	0.6	0.97	1.2	ND	0.73
12378 PeCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123478 HxCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123678 HxCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123789 HxCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1234678 HpCDD	ND	5.8	7.7	7.3	ND	4.7	3.7	6.1	7.2	2.6	ND
OCDD	7	30	31	38	ND	30	33	25	47	32	8.3
TOXICITY WEIGHTED CONCENTRATION[c] PG/G	0.8	7.7	1.6	2.5	ND	1.4	0.7	1.0	1.3	0.06	0.74

[a] non-detectable
[b] units listed in pg/g (parts per trillion)
[c] concentration determined by using toxicity weighted total concentrations for furan and dioxin congeners with comparison to 2,3,7,8 TCDD

POLYCHLORINATED DIOXINS and FURANS IN FISH TISSUE TAKEN FROM THE NECHES RIVER NEAR TEMPLE INLAND November 1993

Sample #	TI12	TI13	TI14	TI15	TI16	TI17	TI18	TI19	TI20	TI21	TI22
FURANS (ppt)											
2378 TCDF	ND[a]	ND	1.8[b]	6.9	ND	ND	ND	ND	ND	ND	ND
12378 PeCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23478 PeCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123478 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123678 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123789 HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1234678 HpCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1234789 HpCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIOXINS (ppt)											
TCDDs (total)	1.7	1.8	0.69	2.9	ND	ND	ND	0.71	0.63	2.7	4.9
2378 TCDD	1.7	1.8	0.69	2.3	ND	ND	ND	0.71	0.63	1.5	ND
12378 PeCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HxCDDs (total)	ND	ND	5.3	ND	ND	ND	ND	ND	ND	3.6	12
123478 HxCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123678 HxCDD	ND	ND	2.5	ND	ND	ND	ND	ND	ND	3.6	5.9
123789 HxCDD	ND	ND	2.7	ND	ND	ND	ND	ND	ND	ND	5.9
1234678 HpCDD	7.1	8.5	6.4	6.9	ND	ND	ND	ND	ND	13	14
OCDD	33	46	42	30	ND	ND	ND	9.4	ND	65	130

TOXICITY WEIGHTED CONCENTRATION[c] (pg/g)	1.8	1.93	1.5	3.09	ND	ND	ND	0.72	0.63	1.69	1.47

[a] nondetectable
[b] units listed in pg/g (parts per trillion)
[c] concentration determined by using toxicity weighted total concentrations for furan and dioxin congeners with comparison to 2,3,7,8 TCDD

CARCINOGENS DETECTED IN FISH TAKEN FROM THE LOWER NECHES RIVER BY THE TEXAS DEPARTMENT OF HEALTH IN 1993

CHEMICAL	MEAN CONCENTRATION	ASSOCIATED EXCESS LIFETIME CANCER RISK
Polychlorinated Dioxins and Furans	1.39 parts per trillion (average toxicity weighted concentration)	$4x10^{-5}$
Chlordane	15.9 parts per billion	$3.8x10^{-6}$
DDE	0.59 parts per billion	$3.7x10^{-8}$
Dieldrin	0.34 parts per billion	$1x10^{-7}$
Heptachlor epoxide	0.44 parts per billion	$7.3x10^{-7}$
CUMULATIVE EXCESS LIFETIME CANCER RISK		$4.4x10^{-5}$

Dioxin, chlordane, DDE, dieldrin, and heptachlor expoxide are all classified as (B2) probable human carcinogens, based on increased incidence of hepatic carcinoma in laboratory animals. Persons consuming fish from the Lower Neches River may be exposed to a number of these chemicals simultaneously. Since each of these chemicals is capable of inducing the same health effect, the risk is additive for all five. The cumulative risk is based on a 70 kg adult consuming one meal per week for a period of 30 years.

SUMMARY OF RESULTS

YEAR	1990	1991	1995
# Samples	2	4	54
Analyses performed	dioxin	dioxin	22 dioxin 32 priority pollutants
Dioxin concentration	7.1 ppt	4.3 ppt	1.39 ppt
Criteria for risk assessment	**EPA** $1x10^{-4}$ risk level 70 kg adult 70 year exposure 6.5 gram/day consumption	**TDH** $1x10^{-4}$ risk level 70 kg adult 70 year exposure 15 gram/day consumption	**TDH** $1x10^{-4}$ risk level 70 kg adult 30 year exposure 30 gram/day consumption
Excess lifetime cancer risk	$1x10^{-4}$	$1.4x10^{-4}$	$4x10^{-5}$

The data collected in 1990-1991 exceeded the criteria established by both EPA and TDH for issuance of a fish consumption advisory. The excess cancer risk was based only on the dioxin level in fish.

Of the priority pollutants scanned in 32 fish caught in the lower Neches River in 1995, only DDE, dieldrin, chlordane, and heptachlor expoxide were detected at levels near or below detection limits in the majority of samples. Dioxin concentrations were near or below detection levels for 21 of 22 fish caught in the advisory area. One fish (gar) contained 7.7 ppt dioxin. The carcinogenic risk from fish consumption was additive to include average levels of both dioxins and low level pesticides.

The validity of analysis of PCB's by the contract lab was questionable, particularly for the one sample (Smallmouth Buffalo) taken immediately downstream of the advisory area, which contained an elevated level of Aroclor 1260 (personal memo, 1994). There was no pattern of PCB contamination detected in two other Smallmouth buffalo of similar size. The Texas Department of Health laboratory analyzed seven additional samples from this area of the Neches River and fifteen samples further downstream of the advisory area and found no detectable levels of PCB's. Thus, for quality control/quality assurance reasons, the PCB data provided by the contract lab was not included in this risk assessment.

The additive carcinogenic risk from TDH 1995 results indicate an plausible upper bound risk of developing cancer from consumption of contaminated fish of approximately 4 in 100,000 for adults consuming an average of one 8 oz meal per week of fish from the Lower Neches River for 30 years.

The TDH advisory issued in 1990 was extremely limited in terms of exposure factors considered, and was based on dioxin contamination only. The current investigation takes into account not only dioxins, but all contaminants of public health concern.

The overall carcinogenic risk from fish consumption in the lower Neches River has decreased over the four year period of Texas Department of Health investigation from $1x10^{-4}$ to $4x10^{-5}$, even with the consideration that additional carcinogens have been added into the 1995 risk calculations.

CONCLUSION

As a result of the EPA National Bioaccumulation Study of 1990, a fish consumption advisory was issued for the Lower Neches River between Evadale and Interstate 10. Fish from this area were found to be contaminated with dioxins at levels that exceeded both EPA and TDH criteria for issuance of a fish consumption advisory. The area was investigated by EPA as part of a study to determine the extent of dioxin contamination in fish located downstream of bleach kraft paper mills.

In 1993, Temple Inland Industries requested Texas Department of Health to re-evaluate the need for an advisory on the Neches River. In previous years, Temple Inland had altered processes to reduce the amount of dioxin being discharged downstream of the site. Twenty-two samples collected from within the advisory area showed a significantly decreased level of dioxin in fish tissue.

Additional public health concerns were raised for the Lower Neches River, including Sabine Lake, by the presence of two Superfund sites located downstream of the advisory area. The Texas Department of Health conducted a comprehensive investigation of the Lower Neches River by collecting 32 additional fish samples downstream of the advisory area and analyzing them for priority pollutants.

For public protection, TDH considers the potential adverse health effects from the simultaneous presence of all chemicals that may be present in a particular fish. The very low levels of the few pesticides found are inherently found in the food supply and contribute an insignificant level of risk to Neches River fish. All other priority pollutants were below detection limits. The average level of dioxin has significantly decreased to a level of insignificant public health concern. For people who consume one 8 ounce meal per week of Neches River fish for 30 years, we estimate the excess lifetime cancer risk due to dioxin and low level pesticides to be four excess cancers per 100,000 ($4x10^{-5}$) exposed persons. For dioxin, the Texas Department of Health recommends that a fish consumption advisory be issued when the $1x10^{-4}$ risk level is exceeded for 70 kg adults consuming one 8 ounce meal per week for 30 years.

Based on Texas Department of Health criteria, a fish consumption advisory is no longer necessary for the Neches River between Evadale and Interstate 10. Further, an advisory for the area between Interstate 10 and Sabine Lake is not recommended. Texas Department of Health concludes that fish taken from the Lower Neches River present no apparent evidence of increased risk of developing cancer over a lifetime of exposure.

REFERENCES

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2. EPA, 1992. National Study of Chemical Residues in Fish. Office of Science and Technology, Wash. D.C.

3. EPA, 1993. Guidance for Assessing Chemical Contaminant Data For Use in Fish Advisories. Volume I, Fish Sampling and Analysis.

4. EPA, 1994. Guidance for Assessing Chemical Contaminant Data For Use In Fish Advisories. Volume II, Risk Assessment and Fish Consumption Limits.

5. IRIS, 1994. Integrated Risk Information System. National Library of Medicine, Wash. D.C.

6. Personal Memo, 1994. Enseco Analysis of Fish from International Creosoting.

TEXAS DEPARTMENT OF HEALTH
AUSTIN TEXAS
INTER-OFFICE

TO: Richard E. Thompson, R.S., Director
Division of Shellfish Sanitation Control

THRU: Kirk Wiles, R.S., Assistant Director
Division of Shellfish Sanitation Control

FROM: Lisa R. Williams, M.S., Toxicologist
Division of Shellfish Sanitation Control

DATE: April 15, 1994

SUBJECT: ENSECO analyses of fish from International Creosoting

On March 21, we received a fax reporting PCB's and pesticides in fish from the Neches River near International Creosoting. The highest PCB level was 1.1 ppm and DDT metabolites were all nondetectable. The risk statement followed close behind this data. Then on April 7, we got a call from Diane Lowry at ENSECO, stating that there had been some misidentification errors on PCB's and DDT metabolites and that revised data would be sent. You can imagine how disturbing this was.

She explained that in the project that followed International Creosoting, a "huge" DDT peak was found and that this gave them a more positive identification for DDT and metabolites, which made them think they should go back to the previous project and make sure that the DDT was correct. After additional extraction techniques, they found that DDT and metabolites were actually slightly above detection and that PCB's had not changed.

She went on into a lengthy explanation of how they had learned from this experience and that it would not happen again because of some corrective measures they would be taking in the future in fish analysis. The analytical explanation was beyond my knowledge so we set up a conference call with Gary Fest, myself, four Enseco chemists, and Diane.

Gary was somewhat disturbed by the fact that revised data had been sent and by their seemingly low knowledge in extracting multiple chemicals in fish. He went on to explain the extraction and fractionating techniques used at the state lab and that each species sometimes needed to be handled differently. They asked if he would mind acting as a consultant when problems arose. After the phone call, Gary told me that if they had run a few thousand of these, they would know how to handle fish and that they were experts in single analysis in fish but not in multiple analyses. He said that their error was not serious, but raises confidence issues and agreed to run 3 confirmatory analyses of fish from the Rio Grande. Enseco asked if we could give them some idea as to what to look for prior to the analyses, which Gary and I replied with a strong no. He explained that each sample is taken as a blind sample at the State Lab and I explained that we don't always know what we are looking for.

FISH SAMPLE DESCRIPTION INFORMATION

NECHES RIVER AND BRAKES BAYOU
NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

SAMPLE LOCATION	SAMPLE NO.	SPECIES	SAMPLE TYPE; LENGTH
INTERSTATE 10 BRIDGE	IC1	Freshwater Drum	single; 47
	IC2	Smallmouth Buffalo	single; 64
	IC3	Smallmouth Buffalo	single; 47
	IC4	Longnose Gar	single; 121
BRAKES BAYOU	IC5	Blue Catfish	single; 60
	IC6	Blue Catfish	single; 60
	IC7	Flathead Catfish	single; 56
	IC8	Southern Flounder	single; 34
	IC9	Smallmouth Buffalo	composite; 51,45
	IC10	Common Carp	composite; 61,50
INTERSTATE 10 BRIDGE	IC11	Smallmouth Buffalo	single; 40
	IC12	Smallmouth Buffalo	single; 43
	IC13	Smallmouth Buffalo	single; 42
	IC14	Smallmouth Buffalo	single; 31
	IC15	Smallmouth Buffalo	single; 47
BRAKES BAYOU	IC16	Smallmouth Buffalo	single; 41
	IC17	Smallmouth Buffalo	single; 41

METALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

	CONCENTRATION (PPM)					
SAMPLE NO.*	ARSENIC	CADMIUM	COPPER	LEAD	MERCURY	ZINC
IC1	<0.4	<0.02	0.99	<0.2	0.064	3.9
IC2	<0.5	<0.02	0.68	<0.2	0.14	3.1
IC3	<0.4	<0.02	0.68	<0.2	0.028	5.0
IC4	<0.4	<0.01	0.86	<0.2	0.084	3.1
IC5	<0.4	<0.02	0.58	<0.2	0.062	6.4
IC6	<0.2	<0.01	0.76	<0.2	0.11	3.9
IC7	<0.2	<0.01	0.68	<0.2	0.17	3.5
IC8	<0.2	<0.01	0.81	<0.2	0.037	3.6
IC9	<0.4	<0.02	0.77	<0.2	0.039	3.7
IC10	<0.4	<0.02	1.1	<0.2	0.022	5.3

*samples analyzed by ENSECO

PESTICIDES IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

PESTICIDE	DETECTIONLIMIT[a] (PPB)	SAMPLE NO.									
		IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
ALPHA-BHC	1.7	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
BETA-BHC	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LINDANE	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DELTA-BHC	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDRIN	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR EPOX	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALPHA-ENDOSULFAN	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
p,p'-DDE	3.3	3.6	57	8.9	5.7	3.5	2.1[c]	nd	nd	nd	nd
DIELDRIN	3.3	nd	nd	11	nd	nd	nd	nd	nd	nd	nd
ENDRIN	3.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BETA-ENDOSULFAN	3.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
p,p'-DDD	3.3	nd	34	6.3	nd	3.4	2.2[c]	nd	nd	nd	nd
ENDRIN ALDEHYDE	3.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
p,p'-DDT	3.3	nd	81	4.0	nd	nd	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	3.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORDANE	1.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHOXYCLOR	17	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DACTHAL	3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ETHYL PARATHION	8.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL PARATHION	8.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	8.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROPYRIFOS	8.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]detection limits for sample IC2 were four times the levels reported above, samples analyzed by ENSECO
[b]non-detectable
[c]reported at less than quantitation limits

PCB'S IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

POLYCHLORINATED BIPHENYL	DETECTION LIMIT[a] (PPB)	CONCENTRATION (PPB) SAMPLE NO.									
		IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
AROCLOR 1016	33	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1221	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1232	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1242	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1248	33	46	nd	nd	nd	nd	nd	17[c]	nd	54	nd
AROCLOR 1254	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1260	33	38	1100	63	nd	20[c]	18[c]	23[c]	nd	44	20[c]
AROCLOR 1262	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]detection limit for sample IC2 was twice the level reported above, samples analyzed by ENSECO
[b]non-detectable
[b]reported at less than detection limit

PESTICIDES IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

PESTICIDE	DETECTIONLIMIT[a] (PPB)	SAMPLE NO.						
		IC11	IC12	IC13	IC14	IC15	IC16	IC17
ALDRIN	2.0	nd[b]	nd	nd	nd	nd	nd	nd
ALACHLOR	8.0	nd	nd	nd	nd	nd	nd	nd
ALPHA-BHC	2.0	nd	nd	nd	nd	nd	nd	nd
BETA-BHC	2.0	nd	nd	nd	nd	nd	nd	nd
DELTA-BHC	2.0	nd	nd	nd	nd	nd	nd	nd
CHLORDANE	20	nd	nd	nd	nd	nd	**140**	**210**
CHLORPYRIFOS	10	nd	nd	nd	nd	nd	nd	nd
p,p'-DDD	10	nd	nd	nd	nd	nd	nd	nd
p,p'-DDE	10	nd	nd	nd	nd	nd	nd	**13**
p,p'-DDT	10	nd	nd	nd	nd	nd	nd	nd
o,p'-DDT	5.0	nd	nd	nd	nd	nd	**13**	nd
DACTHAL	3.0	nd	nd	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd	nd	nd
DIELDRIN	6.0	nd	nd	nd	nd	nd	nd	**7.5**
ENDOSULFAN I	10	nd	nd	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd	nd	nd
ENDRIN	6.0	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR	2.0	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	4.0	nd	nd	nd	nd	nd	**3.9**[c]	**5.7**
HEXACHLOROBENZENE	2.0	nd	nd	nd	nd	nd	nd	nd
LINDANE	2.0	nd	nd	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd	nd	nd
MIREX	8.0	nd	nd	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd	nd	nd

[a]samples analyzed by TDH
[b]nondetectable
[c]reported below detection limits

PCB'S IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SUPERFUND SITE

POLYCHLORINATED BIPHENYL	DETECTION LIMIT[a] (PPB)	CONCENTRATION (PPB) SAMPLE NO.						
		IC11	IC12	IC13	IC14	IC15	IC16	IC17
AROCLOR 1016	40	nd[b]	nd	nd	nd	nd	nd	nd
AROCLOR 1221	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1232	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1242	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1248	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1254	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1260	40	nd	nd	nd	nd	nd	nd	nd
AROCLOR 1262	40	nd	nd	nd	nd	nd	nd	nd

[a]samples analyzed by TDH
[b]non-detectable

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

COMPOUND	DETECTION LIMIT[a] (PPM)	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
		CONCENTRATION (PPM)									
PHENOL	1.3	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-NITROPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DIMETHYLPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DICHLOROPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-METHYL-4-CHLOROPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,6-TRICHLOROPHENOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,5-TRICHLOROPHENOL	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DINITROPHENOL	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-NITROPHENOL	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,6-DINITRO-2-CRESOL	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PENTACHLOROPHENOL	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSO-n-DIMETHYLAMINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PYRIDINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSODIETHYLAMINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSODIBUTYLAMINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ANILINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROETHYL)ETHER	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZYL ALCOHOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-DICHLOROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
o-CRESOL	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROISOPROPYL)ETHER	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
m&p-CRESOL (coelute)	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROETHANE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSO-di-n-PROPYLAMINE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZOIC ACID	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a] non-detectable
[b] detection limits for sample IC2 were twice the levels reported above, samples analyzed by ENSECO

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

COMPOUND	DETECTION LIMIT[a] (PPM)	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
		CONCENTRATION (PPM)									

4-CHLOROANILINE	1.3	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBUTADIENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-METHYL-NAPTHALENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4,5-TETRACHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROCYCLOPENTADIENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLORONAPTHALENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOTAL NITROANILINES	6.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACENAPHTHYLENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHYL PHTHALATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,6-DINITROTOLUENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACENAPHTHENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBENZOFURAN	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DINITROTOLUENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUORENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-CHLORODIPHENYL ETHER	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIETHYL PHTHALATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-NITROSODIPHENYLAMINE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIPHENYL HYDRAZINE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-BROMODIPHENYL ETHER	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PHENANTHRENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ANTHRACENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DI-N-BUTYL PHTHALATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUORANTHENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PYRENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BIS(2-ETHYLHEXYL)ADIPATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BUTYLBENZYL PHTHALATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZ(A)ANTHRACENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]detection limits for sample IC2 were twice the levels reported above, samples analyzed by ENSECO
[b]non-detectable

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

COMPOUND	DETECTION LIMIT[a] (PPM)	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
		CONCENTRATION (PPM)									
BENZO(A)PYRENE	1.3	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
INDENO(1,2,3-CD)PYRENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBENZ(A,H)ANTHRACENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(G,H,I)PERYLENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZIDINE	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3,3'-DICHLOROBENZIDINE	2.6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROETHOXY)METHANE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-TRICHLOROBENZENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NAPTHALENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DI-N-OCTYL PHTHLATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(B)FLUORANTHENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(K)FLUORANTHENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHRYSENE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BIS(2-ETHYLHEXYL)PHTHLATE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ISOPHORONE	1.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a] detection limits for sample IC2 were twice the levels reported above, samples analyzed by ENSECO
[b] non-detectable

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

CHEMICAL	DETECTION LIMIT[a] (PPB)	SAMPLE NO.									
		IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
CHLOROMETHANE	20	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
VINYL CHLORIDE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICHLORODIFLUOROMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TRICHLOROFLUOROMETHANE	20	6.2[c]	4.2[c]	32	7[c]	4.2[c]	12[c]	nd	6.7[c]	7.5[c]	7.9[c]
1,1-DICHLOROETHENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYLENE CHLORIDE[d]	20	9.7[c]	31	14[c]	15[c]	9.2[c]	10[c]	10[c]	11[c]	14[c]	11[c]
CARBON DISULFIDE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROETHENE (TRANS)	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROETHENE (CIS)	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-DICHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL-T-BUTYL ETHER	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOCHLOROMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2-DICHLOROPROPANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROFORM	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TETRAHYDROFURAN	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-TRICHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBON TETRACHLORIDE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-DICHLOROPROPENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROPROPANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBROMOMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TRICHLOROETHENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICHLOROBROMOMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL METHACRYLATE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL ISOBUTYL KETONE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOLUENE	20	nd	2.7[c]	12[c]	13[c]	nd	10[c]	7.8[c]	7.5[c]	nd	nd

[a] samples analyzed by ENSECO
[b] non-detectable
[c] reported at less than quantitation limits
[d] common lab contaminant

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

COMPOUND	DETECTION LIMIT[a] (PPB)	SAMPLE NO.									
		IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
ETHYL METHACRYLATE	100	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HEXANONE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBROMOCHLOROMETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DIBROMOETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TETRACHLOROETHENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-TETRACHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ETHYL BENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOFORM	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
STYRENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-TETRACHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-TRICHLOROPROPANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ISOPROPYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-PROPYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROTOLUENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-CHLOROTOLUENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3,5-TRIMETHYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
T-BUTYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-TRIMETHYLBENZENE	20	nd	13[c]	nd	nd	nd	nd	nd	nd	nd	nd
SEC-BUTYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-DICHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
P-ISOPROPYLTOLUENE	20	nd	4.8[c]	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-BUTYLBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DIBROMO-3-CHLOROPROPANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-TRICHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NAPTHALENE	20	9.8[c]	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-TRICHLOROBENZENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOTAL XYLENES	20	nd	8.8[c]	nd	nd	nd	nd	nd	nd	nd	nd

[a] samples analyzed by ENSECO
[b] non-detectable
[c] reported at less than quantitation limits

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND BRAKES BAYOU NEAR THE INTERNATIONAL CREOSOTING SITE

COMPOUND	DETECTION LIMIT[a] (PPB)	SAMPLE NO.									
		IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10

1.3-DICHLOROPROPENE(TRANS)	20	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROPROPENE(CIS)	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-TRICHLOROETHANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROPROPANE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBUTADIENE	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETONE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACRYLONITRILE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROETHOXYETHENE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL ETHYL KETONE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]samples analyzed by ENSECO
bnon-detectable

FISH SAMPLE DESCRIPTION INFORMATION

NECHES RIVER AND SABINE LAKE
NEAR THE BAILEY SUPERFUND SITE

SAMPLE LOCATION	SAMPLE NO.	SPECIES	SAMPLE TYPE; LENGTH (cm)
1/4 MILE UPSTREAM OF BAILEY	B1	RED DRUM	SINGLE; 64
	B2	RED DRUM	SINGLE; 68
	B3	RED DRUM	SINGLE; 64
	B4	SHEEPSHEAD	SINGLE; 39
	B5	BLACK DRUM	SINGLE; 43
CANAL ADJACENT TO BAILEY	B6	RED DRUM	SINGLE; 54
1/4 MILE DOWNSTREAM OF BAILEY	B7	YELLOW PERCH	COMPOSITE; 29,27
	B8	BLACK DRUM	SINGLE; 32
	B9	BLACK DRUM	SINGLE; 44
	B10	BLACK DRUM	SINGLE; 61
SABINE LAKE	B11	SOUTHERN FLOUNDER	COMPOSITE; 37,41
	B12	BLACK DRUM	SINGLE; 43
	B13	BLACK DRUM	SINGLE; 46
	B14	RED DRUM	SINGLE; 56
	B15	RED DRUM	SINGLE; 53

METALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

SAMPLE NO.	ARSENIC (ppm)	COPPER (ppm)	LEAD (ppm)	MERCURY (ppm)	ZINC (ppm)
	DETECTION LIMIT (PPM)				
	0.04	0.4	0.4	0.02	0.4
B1	0.064	nd[a]	nd	0.289	3.48
B2	nd	nd	nd	0.258	3.67
B3	nd	nd	nd	0.257	3.72
B4	0.042	nd	nd	0.092	3.38
B5	nd	nd	nd	0.091	3.69
B6	0.034[b]	nd	nd	0.089	4.25
B7	0.082	nd	nd	0.209	4.20
B8	0.043	nd	nd	0.116	4.11
B9	0.052	nd	nd	0.1	3.35
B10	0.045	0.58	nd	0.093	5.33
B11	nd	nd	nd	0.114	2.90
B12	nd	nd	nd	0.244	3.87
B13	nd	nd	nd	0.107	3.42
B14	nd	nd	nd	0.163	3.60
B15	0.08	nd	nd	0.137	3.60

[a]nondetectable
[b]reported below quantitation limits

PESTICIDES IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

PESTICIDE	DETECTION LIMIT (PPB)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
		CONCENTRATION (PPB)														
DDT	10	nd*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DDD	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DDE	5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDRIN	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORDANE	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEPTACHLOR EPOX	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROPYRIFOS	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENDOSULFAN	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DACTHAL	3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALPHA BHC	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BETA BHC	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DELTA BHC	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*non-detectable

PCB'S IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

PCB	DETECTION LIMIT (PPB)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
		CONCENTRATION (PPB)														
1016	40	nd*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1260	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1262	40	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*non-detectable

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

COMPOUND	DETECTION LIMIT (PPM)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
		CONCENTRATION (PPM)														
PHENOL	2	nd*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-NITROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DIMETHYLPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DICHLOROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-METHYL-4-CHLOROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,6-TRICHLOROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,5-TRICHLOROPHENOL	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DINITROPHENOL	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-NITROPHENOL	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,6-DINITRO-2-CRESOL	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PENTACHLOROPHENOL	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSO-n-DIMETHYLAMINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PYRIDINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSODIETHYLAMINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSODIBUTYLAMINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ANILINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROETHYL)ETHER	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZYL ALCOHOL	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-DICHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
o-CRESOL	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROISOPROPYL)ETHER	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
m&p-CRESOL (coelute)	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROETHANE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-NITROSO-di-n-PROPYLAMINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZOIC ACID	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ISOPHORONE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis(2-CHLOROETHOXY)METHANE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-TRICHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*non-detectable

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

COMPOUND	DETECTION LIMIT (PPM)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
		CONCENTRATION (PPM)														
2-METHYL-NAPTHALENE	1	nd*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4,5-TETRACHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROCYCLOPENTADIENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLORONAPTHALENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOTAL NITROANILINES	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACENAPHTHYLENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHYL PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,6-DINITROTOLUENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACENAPHTHENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBENZOFURAN	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-DINITROTOLUENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUORENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-CHLORODIPHENYL ETHER	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIETHYL PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-NITROSODIPHENYLAMINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIPHENYL HYDRAZINE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-BROMODIPHENYL ETHER	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PHENANTHRENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ANTHRACENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DI-N-BUTYL PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUORANTHENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PYRENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BIS(2-ETHYLHEXYL)ADIPATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BUTYLBENZYL PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZ(A)ANTHRACENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHRYSENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BIS(2-ETHYLHEXYL)PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DI-N-OCTYL PHTHALATE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(B)FLUORANTHENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(K)FLUORANTHENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(A)PYRENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*non-detectable

SEMI-VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

COMPOUND	DETECTION LIMIT (PPM)	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
		CONCENTRATION (PPM)														
4-CHLOROANILINE	1	nd*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HEXACHLOROBUTADIENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NAPTHALENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
INDENO(1,2,3-CD)PYRENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBENZ(A,H)ANTHRACENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZO(G,H,I)PYRELENE	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*non-detectable

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE

COMPOUND	DL[a] (PPB)	SAMPLE NO.														
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
CHLOROMETHANE	47	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOMETHANE	47	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
VINYL CHLORIDE	47	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROETHANE	47	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICHLORODIFLUOROMETHANE	47	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TRICHLOROFLUOROMETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-DICHLOROETHENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYLENE CHLORIDE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBON DISULFIDE[c]	19	42	104	57	63	330	120	52	34	190	230	nd	72	47	23	nd
1,2-DICHLOROETHENE (TRANS)	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROETHENE (CIS)	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-DICHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL-T-BUTYL ETHER	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOCHLOROMETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2-DICHLOROPROPANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROFORM	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TETRAHYDROFURAN	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-TRICHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBON TETRACHLORIDE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-DICHLOROPROPENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROPROPANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBROMOMETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TRICHLOROETHENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICHLOROBROMOMETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL METHACRYLATE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL ISOBUTYL KETONE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROPROPENE(TRANS)	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROPROPENE (CIS)	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-TRICHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROPROPANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]detection limit [b]non-detectable [c]possible degradation product

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE (cont.)

COMPOUND	DL[a] (PPB)	SAMPLE NO.														
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
ETHYL METHACRYLATE	19	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HEXANONE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIBROMOCHLOROMETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DIBROMOETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TETRACHLOROETHENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-TETRACHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ETHYL BENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOFORM	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
STYRENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-TETRACHLOROETHANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
BROMOBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-TRICHLOROPROPANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ISOPROPYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-PROPYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROTOLUENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-CHLOROTOLUENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3,5-TRIMETHYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
T-BUTYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-TRIMETHYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SEC-BUTYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-DICHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-DICHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
P-ISOPROPYLTOLUENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DICHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-BUTYLBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-DIBROMO-3-CHLOROPROPANE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4- TRICHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NAPTHALENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-TRICHLOROBENZENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a]detection limit
[b]non-detectable

VOLATILE ORGANIC CHEMICALS IN FISH TISSUE TAKEN FROM THE NECHES RIVER AND SABINE LAKE NEAR THE BAILEY SUPERFUND SITE (cont.)

COMPOUND	DL[a] (PPB)	SAMPLE NO.														
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
HEXACHLORO-BUTADIENE	19	nd[b]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOLUENE	19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TOTAL XYLENES	56	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHYL ETHYL KETONE	94	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	135	nd	nd	nd
ACETONE[c]	94	nd	nd	340	nd	170	790	455	285	291900	8080	2440	330	99100	34900	nd
ACRYLONITRILE	94	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-CHLOROETHOXY-ETHENE	187	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[a] detection limit
[b] non-detectable
[c] common lab contaminant