



## Texas Department of Health

William R. Archer III, M.D.  
Commissioner

<http://www.tdh.state.tx.us>

Patti J. Patterson, M.D., M.P.H.  
Executive Deputy Commissioner

1100 West 49th Street  
Austin, Texas 78756-3199  
512/ 458-7111

December 8, 1997

Mr. Chris Herrington  
City of Austin  
Drainage Utility Department  
Environmental Resources Management Division

Dear Mr. Herrington,

Enclosed is the information you requested from your later dated November 18, 1997. We currently aren't utilizing any spreadsheet for our fish tissue data so I enclosed this hard copy. If further information is needed please contact the Seafood Safety Division at (512) 719 - 0215. Thank You.

Sincerely,

Gary B. Heideman  
Environmental Specialist III  
Seafood Safety Division  
Texas Department of Health

**TEXAS DEPARTMENT OF HEALTH  
SEAFOOD SAFETY DIVISION  
HEALTH RISK ASSESSMENT AND TOXICOLOGY PROGRAM**

**ANALYSIS OF RISK  
FROM CONSUMPTION OF FISH TAKEN FROM  
TOWN LAKE**

## BACKGROUND

Town Lake is on the Colorado River and is 525 acres in size. It is located within and owned by the City of Austin. Public parks occupy much of the shoreline. The lake is a source of cooling water for steam generating plants, municipal water, and recreation. The fish population includes largemouth bass, white bass, striped bass, catfish, and sunfish.

In 1985, Texas Department of Health (TDH) collected 58 fish samples from Town Lake between Tom Miller Dam and Longhorn Dam. These samples indicated levels of chlordane which exceeded the FDA action level of 300 parts per billion (ppb) in three species of fish, including carp, gizzard shad, and striped bass. Additional fish species showed lower levels of chlordane. Other chemicals detected included PCB's and DDT metabolites, along with very low levels of dieldrin and commonly detected metals.

In July of 1987, the Austin-Travis County Health Department issued a health advisory, reinforcing the results of the 1985 TDH study. The advisory recommended no consumption of carp, shad, and striped bass and limited consumption of all other species.

In June of 1990, TDH issued an advisory expanding the list of fish species affected. The advisory recommended no consumption of any species of fish caught in Town Lake due to contamination with chlordane.

In November of 1994, the City of Austin requested TDH to re-evaluate the advisory for Town Lake. Previous data collected by a number of agencies, including City of Austin, the United States Geological Survey, Texas Water Commission, and the Lower Colorado River Authority (LCRA) showed an apparent decrease in chlordane levels in fish tissue.

In February and July of 1995, fifteen fish samples were collected from Town Lake and analyzed by TDH lab for pesticides and PCB's. All fifteen samples contained elevated levels of chlordane. Additionally, DDT and its metabolites were found at levels of public health concern. PCB's were found in five of the fifteen fish.

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Channel Catfish; 63 cm	Freshwater Drum; 56 cm	Gizzard Shad; 45,41,41 cm	Flathead Catfish; 58 cm	Redhorse Sucker; 58 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 2/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	740	240	170	160	140
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	210	22	37	34	32
DDE	5	960	150	150	220	130
DDT	10	100	24	14	16	11
o,p'-DDE	5	--	5.5	12	7.1	9.4
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	2.6	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Freshwater Drum; 70 cm	Flathead Catfish; 63 cm	Blue Catfish; 63 cm	Striped Bass; 72 cm	White Bass; 43 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 7/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	380	280	51	270	230
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	nd	71	14	71	nd
DDE	5	520	290	66	300	290
DDT	10	nd	nd	nd	nd	nd
o,p'-DDD	5	--	--	--	16	16
o,p'-DDE	5	--	--	--	--	--
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Largemouth Bass; 50 cm	Largemouth Bass; 50 cm	Largemouth Bass; 47 cm	Common Carp; 56 cm	Common Carp; 56 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 7/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	34	36	19	150	160
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	nd	nd	nd	nd	nd
DDE	5	18	34	20	210	280
DDT	10	nd	nd	nd	nd	nd
o,p'-DDD	5	--	--	--	30	--
o,p'-DDE	5	--	--	--	12	--
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

**PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE**

PCB Aroclor	Detection Limit (ppb)	Channel Catfish; 63 cm	Freshwater Drum; 56 cm	Gizzard Shad; 45,41,41 cm	Flathead Catfish; 58 cm	Redhorse Sucker; 58 cm
		CONCENTRATION (PPB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	240	110	56	62	49
1262	40	nd	nd	nd	nd	nd

## PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE

PCB Aroclor	Detection Limit (ppb)	Freshwater Drum; 70 cm	Flathead Catfish; 63 cm	Blue Catfish; 63 cm	Striped Bass; 72 cm	White Bass; 43 cm
		CONCENTRATION (PPB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	nd	nd	nd	nd	nd
1262	40	nd	nd	nd	nd	nd

**PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE**

PCB Aroclor	Detection Limit (ppb)	Largemouth Bass; 50 cm	Largemouth Bass; 50 cm	Largemouth Bass; 47 cm	Common Carp; 56 cm	Common Carp; 57 cm
		CONCENTRATION (PFB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	nd	nd	nd	nd	nd
1262	40	nd	nd	nd	nd	nd

## RISK SUMMARY

CHEMICAL	AVERAGE CONCENTRATION (PPB)	CANCER RISK
PCB AROCLOR 1260	34.5	$4.9 \times 10^{-5}$
CHLORDANE	204	$4.9 \times 10^{-5}$
DDE	235	$1.5 \times 10^{-5}$
DDT	11	$6 \times 10^{-7}$
DDD	35	$1.5 \times 10^{-6}$
HEXACHLOROBENZENE	0.17	$5 \times 10^{-8}$
<b>CUMULATIVE LIFETIME CARCINOGENIC RISK</b>		<b><math>1.1 \times 10^{-4}</math></b>

Chlordane, DDE, DDT, DDD, hexachlorobenzene, and aroclor 1260 are all classified as (B2) probable human carcinogens, based on increased incidence of hepatic carcinoma in laboratory animals. Persons consuming fish from Town Lake may be exposed to a number of these chemicals simultaneously. Since each of these chemicals is capable of inducing the same health effect (liver cancer), the risk is additive for all six. The cumulative risk is based on a 70 kg adult consuming one eight ounce meal per week for a period of 30 years.

### CONSUMPTION LIMIT

One 8 ounce meal per week

## CONCLUSION

In 1985, the Texas Department of Health collected 58 fish samples from Town Lake for analysis of organic chemicals of public health concern. An advisory was issued as a result of elevated levels of chlordane found in a large number of the fish. Polychlorinated biphenyls and DDT metabolites were also found.

At the request of the City of Austin, TDH collected fifteen fish from Town Lake in 1995 for a re-assessment of the risk associated with consumption of fish taken by the public. The majority of the fish contained elevated levels of chlordane, DDT and its metabolites, and PCB Aroclor 1260. A very low level of hexachlorobenzene was found in one fish. All of these chemicals are classified as (B2) probable human carcinogens based on increased incidence of liver cancer in laboratory animals.

It appears that chlordane levels in several species of fish have decreased over the 10 year period. However, there is very little control over comparison of the number of samples of each species collected or the size of fish being compared between the 1985 and 1995 data sets.

The limited data in this assessment indicate that a person consuming Town Lake fish would be exposed to a number of carcinogenic chemicals simultaneously that will primarily affect the liver. Carcinogenic risk to the liver is calculated as 1 in 10,000 persons exposed to one eight ounce meal per week for 30 years.

The risk level for Town Lake fish exceeds TDH criteria for issuance of a fish consumption advisory. The Texas Department of Health recommends that a fish consumption advisory be issued when the  $1 \times 10^{-4}$  risk level is exceeded for persons consuming 30 grams of fish per week for a period of 30 years. The number of samples used in this assessment is very small; however, it must be considered that historical data indicate the same chemicals have persisted in Town Lake fish over a period of 10 years.

### Recommendations:

- 1) The current data set indicates that the Town Lake advisory should remain in effect.
- 2) The advisory should be modified from a "no consumption limit" to a "one eight ounce meal per week" limit, based on EPA risk based methodology and TDH policy for issuance of fish consumption advisories.

## TOWN LAKE RESULTS - 1985

SPECIES #samples avg. size	CHLORDANE	DDT/DDE/DDD	PCB'S
CARP n=6 20"	0.666	0.87	0.088
GIZZARD SHAD n=7 15"	0.644	1.29	0.180
STRIPED BASS n=2 17.5"	0.360	0.49	0.128
WHITE BASS n=1 8"	0.23	0.36	none
CHANNEL CATFISH n=2 16.5"	0.156	0.23	0.077
BLACK BASS n=7 10"	0.030	0.07	none
SUNFISH n=11 7"	0.017	0.04	0.005

**CHLORDANE IN TOWN LAKE FISH  
1985 VS. 1995**

SPECIES	CHLORDANE-1985		CHLORDANE-1995	
	#samples	avg. size	#samples	avg. size
COMMON CARP	0.666 n=6	20"	0.155 n=2	22"
GIZZARD SHAD	0.644 n=7	15"	0.170 n=1	17"
WHITE BASS	0.23 n=1	8"	0.23 n=1	17"
CHANNEL CATFISH	0.156 n=2	16.5"	0.74 n=1	25"
LARGEMOUTH BASS	0.030 n=7	10"	0.030 n=3	20"

✓ TOWN LAKE TNL 1-1 DAM 02/26/85 SHAD 15"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE DIELDRIN  
1.96 0.59 0.58 3.6 0.04  
PCB (ppm)  
0.59

✓ TOWN LAKE TNL 1-2 DAM 02/26/85 SHAD 15"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.04 <0.4 <1.6 0.6 3.9

✓ TOWN LAKE TNL 1-3 DAM 02/26/85 CARP 22"  
PESTICIDES (ppm) CHLORDANE pp'DDD pp'DDT pp'DDE DIELDRIN  
1.43 0.20 1.90 0.67 0.049  
PCB (ppm)  
0.148

✓ TOWN LAKE TNL 1-4 DAM 02/26/85 CARP 18"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.02 <0.4 <1.6 0.6 6.5

✓ TOWN LAKE TNL 1-5 DAM 02/26/85 BLACK BASS 15"  
PESTICIDES (ppm) DDT DDE  
0.015 0.065  
PCB (ppm) None Detected

✓ TOWN LAKE TNL 1-6 DAM 02/26/85 BLACK BASS 15"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.14 <0.4 <1.6 <0.7 6.3

✓ TOWN LAKE TNL 1-7 DAM 02/26/85 BLACK BASS COMP 2-10"  
PESTICIDES (ppm) CHLORDANE pp'DDD pp'DDT pp'DDE  
0.061 0.023 0.025 0.10

✓ TOWN LAKE TNL 1-8 DAM 02/26/85 BLACK BASS COMP 11", 12"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.11 <0.4 <1.6 0.6 5.2

✓ TOWN LAKE TNL 1-9 DAM 02/26/85 BLACK BASS COMP 7", 10", 5-8"  
PRIORITY POLLUTANTS (ppm)  
TRACE 4-CHLORO-3-CRESOL <1 ppm  
NO OTHERS DETECTED

✓ TOWN LAKE TNL 1-10 DAM 02/26/85 RED EARED SUNFISH COMP 2-6", 2-7"  
PESTICIDES (ppm) DDE  
0.031  
PCB (ppm) None Detected

✓ TOWN LAKE TNL 1-11 DAM 02/26/85 RED EARED SUNFISH COMP 5", 7", 8", 2-6"  
PRIORITY POLLUTANTS (ppm) None Detected

✓ TOWN LAKE TNL 1-12 DAM 02/26/85 YELLOW BELLY SUNFISH COMP 7", 8", 2-6", 2-5"  
PESTICIDES (ppm) CHLORDANE DDE  
0.059 0.043  
PCB (ppm) None Detected

✓ TOWN LAKE TNL 2-1 POWER PLANT 02/26/85 SHAD COMP 9", 12"  
PESTICIDES (ppm) DDE DDD DDT CHLORDANE DIELDRIN  
0.286 0.060 0.072 0.485 0.034  
PCB (ppm)  
0.113

✓ TOWN LAKE TNL 2-2 POWER PLANT 02/26/85 SHAD COMP 9", 12"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.3 0.04 <0.3 <1.7 0.6 3.8

TOWN LAKE ✓ TNL 2-3 POWER PLANT 02/26/85 SHAD 17"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE DIELDRIN  
0.91 0.34 0.37 1.1 0.024  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-4 POWER PLANT 02/26/85 SHAD 17"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.3 0.04 <0.3 <1.5 0.7 3

TOWN LAKE ✓ TNL 2-5 POWER PLANT 02/26/85 SHAD 16"  
PRIORITY POLLUTANTS (ppm) p,p'-DDE p,p'-DDD p,p'-DDT  
1.4 TRACE TRACE

TOWN LAKE ✓ TNL 2-6 POWER PLANT 02/26/85 CARP 17"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE DIELDRIN  
0.52 0.14 0.17 0.57 0.008  
PCB (ppm) 0.15

TOWN LAKE ✓ TNL 2-7 POWER PLANT 02/26/85 CARP 28"  
PESTICIDES (ppm) CHLORDANE DDT DDE DDD DIELDRIN  
0.21 0.012 0.147 0.043 0.014  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-8 POWER PLANT 02/26/85 CARP 18"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.05 <0.4 <1.5 0.7 4.6

TOWN LAKE ✓ TNL 2-9 POWER PLANT 02/26/85 CARP 20½"  
PRIORITY POLLUTANTS (ppm) None Detected

TOWN LAKE ✓ TNL 2-10 POWER PLANT 02/26/85 WHITE BASS 8"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE DIELDRIN  
0.23 0.055 0.12 0.19 0.01  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-11 POWER PLANT 02/26/85 BLACK BASS COMP 12", 14"  
PESTICIDES (ppm) CHLORDANE DDT DDE  
0.066 0.022 0.074  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-12 POWER PLANT 02/26/85 RIO GRANDE PERCH 7"  
PESTICIDES (ppm) DDE DDD DDT CHLORDANE  
0.11 0.03 0.045 0.088  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-13 POWER PLANT 02/26/85 RED EARED SUNFISH 8"  
PESTICIDES (ppm) DDE  
0.018  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 2-14 POWER PLANT 02/26/85 YELLOW BELLY SUNFISH 8"  
PESTICIDES (ppm) DDE  
0.018  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 3-1 BARTON CREEK 02/26/85 CARP 18"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE  
0.259 0.110 0.084 0.440  
PCB (ppm) 0.078

TOWN LAKE ✓ TNL 3-2 BARTON CREEK 02/26/85 CARP 16"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.07 <0.4 <1.6 <0.7 4.5

TOWN LAKE	TNL 3-3 BARTON CREEK	02/26/85	CARP	18"					
	PESTICIDES (ppm)	CHLORDANE	DDD	DDT	DDE				
		0.05	0.012	0.012	0.089				
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-4 BARTON CREEK	02/26/85	CARP	17"					
	PRIORITY POLLUTANTS (ppm)	None Detected							
TOWN LAKE	TNL 3-5 BARTON CREEK	02/26/85	SHAD	17"					
	PESTICIDES (ppm)	DDD	DDT	DDE	CHLORDANE				
		0.021	0.031	0.12	0.175				
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-6 BARTON CREEK	02/26/85	SHAD	16"					
	HEAVY METALS (ppm)	As	Hg	Cd	Pb	Cu	Zn		
		<0.2	0.05	<0.3	<1.6	1	4.4		
TOWN LAKE	TNL 3-7 BARTON CREEK	02/26/85	BLACK BASS COMP	4-10"					
	PESTICIDES (ppm)	CHLORDANE	DDE						
		0.023	0.042						
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-8 BARTON CREEK	02/26/85	BLACK BASS COMP	12", 13"					
	HEAVY METALS (ppm)	As	Hg	Cd	Pb	Cu	Zn		
		<0.2	0.19	<0.4	<1.5	<0.6	5.6		
TOWN LAKE	TNL 3-9 BARTON CREEK	02/26/85	BLACK BASS COMP	5-9"					
	PRIORITY POLLUTANTS (ppm)	None Detected							
TOWN LAKE	TNL 3-10 BARTON CREEK	02/26/85	RIO GRANDE PERCH COMP	5-7"					
	PESTICIDES (ppm)	DDE							
		0.018							
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-11 BARTON CREEK	02/26/85	RIO GRANDE PERCH COMP	3-8", 2-9"					
	HEAVY METALS (ppm)	As	Hg	Cd	Pb	Cu	Zn		
		<0.3	0.11	<0.3	<1.7	<0.7	4.1		
TOWN LAKE	TNL 3-12 BARTON CREEK	02/26/85	WARMOUTH SUNFISH COMP	8", 7", 3-6"					
	PESTICIDES (ppm)	None Detected							
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-13 BARTON CREEK	02/26/85	RED EARED SUNFISH COMP	5", 9", 2-6"					
	PESTICIDES (ppm)	DDE							
		0.010							
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-14 BARTON CREEK	02/26/85	YELLOW BELLY SUNFISH COMP	8"					
	PESTICIDES (ppm)	DDE							
		0.042							
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 3-15 BARTON CREEK	02/26/85	BLACK BASS COMP	5-8"					
	PESTICIDES (ppm)	DDE							
		0.022							
	PCB (ppm)	None Detected							
TOWN LAKE	TNL 4-1 RED BUD ISLAND	02/26/85	SHAD	16"					
	PESTICIDES (ppm)	DDD	DDT	DDE	CHLORDANE				
		0.023	0.030	0.37	0.334				
	PCB (ppm)	None Detected							
		0.10							
TOWN LAKE	TNL 4-2 RED BUD ISLAND	02/26/85	SHAD	15"					
	HEAVY METALS (ppm)	As	Hg	Cd	Pb	Cu	Zn		
		<0.2	0.03	<0.4	<1.5	0.5	3.7		

TOWN LAKE ✓ TNL 4-3 RED BUD ISLAND 02/26/85 BLACK BASS 16"  
PESTICIDES (ppm) CHLORDANE DDT DDE  
0.046 0.014 0.059  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 4-4 RED BUD ISLAND 02/26/85 BLACK BASS 16"  
HEAVY METALS (ppm) As Hg Cd Pb Cu Zn  
<0.2 0.14 <0.4 <1.6 0.6 3.9

TOWN LAKE ✓ TNL 4-5 RED BUD ISLAND 02/26/85 BLACK BASS COMP 2-14"  
PESTICIDES (ppm) DDE  
0.028  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 4-6 RED BUD ISLAND 02/26/85 BLACK BASS COMP 11", 12", 2-7"  
PRIORITY POLLUTANTS (ppm) None Detected

TOWN LAKE ✓ TNL 4-7 RED BUD ISLAND 02/26/85 YELLOW BELLY SUNFISH COMP 7", 10", 3-8"  
PESTICIDES (ppm) CHLORDANE DDD DDT DDE  
0.133 0.028 0.025 0.173  
PCB (ppm)  
0.052

TOWN LAKE ✓ TNL 4-8 RED BUD ISLAND 02/26/85 LONG EARED SUNFISH COMP 2-7", 6"  
PESTICIDES (ppm) DDE  
0.025  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 4-9 RED BUD ISLAND 02/26/85 WARMOUTH COMP 2-8", 6"  
PESTICIDES (ppm) None Detected  
PCB (ppm) None Detected

TOWN LAKE ✓ TNL 1-1 04/04/85 STRIPED BASS 18"  
PESTICIDES (ppb) DDE DDD DDT CHLORDANE DIELDRIN  
450 79 240 520 21  
PCB (ppb)  
185

TOWN LAKE ✓ TNL 1-2 04/04/85 REDEAR SUNFISH COMP 10", 11"  
PESTICIDES (ppb) DDE  
27  
PCB (ppb) None Detected

TOWN LAKE ✓ TNL 1-3 04/04/85 SHAD 15"  
PESTICIDES (ppb) DDE DDD DDT CHLORDANE DIELDRIN  
860 149 210 570 21  
PCB (ppb)  
350

TOWN LAKE ✓ TNL 3-1 04/04/85 STRIPED BASS 17"  
PESTICIDES (ppb) DDE DDD DDT CHLORDANE  
160 25 22 200  
PCB (ppb)  
71

TOWN LAKE ✓ TNL 3-2 04/04/85 CARP 20"  
PESTICIDES (ppb) DDE DDD DDT CHLORDANE DIELDRIN  
460 91 48 310 8  
PCB (ppb)  
110

TOWN LAKE ✓ TNL 3-3 04/04/85 SHAD 17"  
PESTICIDES (ppb) DDE DDT CHLORDANE  
74 11 73  
PCB (ppb)  
71

TOWN LAKE TNL 3-1 04/15/85 CHANNEL CATFISH 17"  
PESTICIDES (ppb) DDE DDD DDT CHLORDANE  
325 26 49 254  
PCB (ppb)  
100

TOWN LAKE TNL 4-1 04/15/85 CHANNEL CATFISH 16"  
PESTICIDES (ppb) DDE CHLORDANE  
68 58  
PCB (ppb)  
55

The following samples were collected from Town Lake.

<u>Date</u>	<u>Sample #</u>	<u>Species</u>	<u>Length</u>	<u>Weight</u>
2/02/95	TNL - 6b	Channel Catfish	63 cm	3950 gm
02/03/95	TNL - 9b	Freshwater Drum	56 cm	2450 gm
02/08/95	TNL - 10b	Gizzard Shad	45 cm	1200 gm ✓
			41 cm	825 gm
			41 cm	800 gm
02/08/95	TNL - 12b	Flathead Catfish	58 cm	2400 gm
02/08/95	TNL - 13b	Gray Redhorse Sucker	58 cm	3125 gm

samples TNL 12b,13b were captured at coordinates Lat. 30°14.818 N Long. 97°43.172 W.

TOWN LAKE TDH LAB

POLYCHLORINATED BIPHENYLS

SAMPLE #	D. L.	AROCLOR #							
		1016	1221	1232	1242	1248	1254	1260	1262
TNL-6b	40	<40	<40	<40	<40	<40	<40	240	<40
TNL-9b	40	<40	<40	<40	<40	<40	<40	110	<40
TNL-10b	40	<40	<40	<40	<40	<40	<40	56	<40
TNL-12b	40	<40	<40	<40	<40	<40	<40	62	<40
TNL-13b	40	<40	<40	<40	<40	<40	<40	49	<40

units given in ug/kg (parts per billion) wet weight  
D.L. = Detection Limit

SAMPLE #						
COMPOUND:	D.L.	6b	9b	10b	12b	13b
p,p'DDT	10	100 ✓	24 ✓	14 ✓	16 ✓	11
p,p'DDD	10	210 ✓	22 ✓	37 ✓	34 ✓	32
p,p'DDE	5.0	960 ✓	150 ✓	150 ✓	220 ✓	130
ALDRIN	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
DEILDRLN	6.0	28 ✓	<6 ✓	<6 ✓	9 ✓	<6 ✓
ENDRIN	6.0	<6 ✓	<6 ✓	<6 ✓	<6 ✓	<6 ✓
CHLORDANE	10	740 ✓	240 ✓	170 ✓	160	140
HEPTACHLOR	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
HEPTACHLOR EPOX	4.0	<4 ✓	<4 ✓	<4 ✓	<4 ✓	<4 ✓
METHOXYCHLOR	30	<30 ✓	<30 ✓	<30 ✓	<30 ✓	<30 ✓
TOXAPHENE	100	<100 ✓	<100 ✓	<100 ✓	<100 ✓	<100 ✓
HEXACHLOROBENZENE	2.0	2.6 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
MALATHION	20	<20 ✓	<20 ✓	<20 ✓	<20 ✓	<20 ✓
ETHYL PARATHION	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10 ✓
METHYL PARATHION	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10 ✓
DIAZINON	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10 ✓
CHLOROPYRIFOS	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10 ✓
ENDOSULFAN	10	<10 ✓	<10	<10 ✓	<10 ✓	<10
ENDOSULFAN SULFATE	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10 ✓
ALACHLOR	8.0	<8 ✓	<8 ✓	<8 ✓	<8 ✓	<8
DACTHAL	3.0	<3 ✓	<3 ✓	<3 ✓	<3 ✓	<3
ALPHA BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
BETA BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
DELTA BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
LINDANE	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2 ✓
o,p'-DDE	--	--	5.5 ✓	12 ✓	7.1	9.4

units given in  $\mu\text{g}/\text{kg}$  (parts per billion) wet weight  
D.L. = Detection Limit

*Mirax ?  
Dude Sulfan I  
II*

The following samples were collected from Town Lake.

TAILRACE BELOW TOM MILLER DAM

<u>DATE</u>	<u>SAMPLE #</u>	<u>SPECIES</u>	<u>#</u>	<u>LENGTH</u>	<u>WEIGHT</u>
07/06/95	TNL - 22	Freshwater Drum	001	70 cm	6250 gm
07/06/95	TNL - 23	Flathead Catfish	001	63 cm	3500 gm ✓
07/06/95	TNL - 24	Blue Catfish	001	63 cm	2850 gm

HOLLY STREET POWER PLANT, CONGRESS STREET BRIDGE

<u>DATE</u>	<u>SAMPLE #</u>	<u>SPECIES</u>	<u>#</u>	<u>LENGTH</u>	<u>WEIGHT</u>
07/05/95	TNL - 25*	Striped Bass	001	72 cm	4600 gm
07/05/95	TNL - 26*	White Bass	001	43 cm	1520 gm
07/05/95	TNL - 27**	Largemouth Bass	001	50 cm	2050 gm
07/05/95	TNL - 28**	Largemouth Bass	001	50 cm	2100 gm
07/05/95	TNL - 29*	Largemouth Bass	001	47 cm	1780 gm
07/05/95	TNL - 30*	Common Carp	001	56 cm	2600 gm
07/05/95	TNL - 31*	Common Carp	001	57 cm	2750 gm

\* - denotes collected at Holly Street Power Plant.

\*\* - denotes collected at Congress Street Bridge.

PESTICIDES

PESTICIDE	Detection Limit* (PPB)	LOCATION AND SAMPLE NO.									
		22 ✓	23 ✓	24 ✓	25 ✓	26	27	28	29	30	31
CONCENTRATION (PPB)											
ALDRIN	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2
ALACHLOR	8.0	<8 ✓	<8 ✓	<8 ✓	<8	<8	<8	<8	<8	<8	<8
alpha-BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2
beta-BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2
delta-BHC	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2
CHLORDANE	10	380 <sup>b</sup> ✓	280 <sup>b</sup> ✓	51 <sup>b</sup> ✓	270 <sup>b</sup>	230 <sup>b</sup>	34 <sup>b</sup>	36 <sup>b</sup>	19 <sup>b</sup>	150 <sup>b</sup>	160 <sup>b</sup>
CHLORPRYRIFOS	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10
P,p'-DDD	10	<10 ✓	71 ✓	14 ✓	71	<10	<10	<10	<10	91	98
P,p'-DDE	5.0	520 ✓	290 ✓	66 ✓	300	290	18	34	20	210	280
P,p'-DDT	10	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10	<10
DACTHAL	3.0	<3 ✓	<3 ✓	<3 ✓	<3	<3	<3	<3	<3	<3	<3
DIAZINON	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10
DIELDRIN	6.0	<6 ✓	<6 ✓	<6 ✓	<6 ✓	<6	<6	<6	<6	<6	<6
ENDOSULFAN I	10	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10	<10
ENDOSULFAN II	10	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10	<10
ENDOSULFAN sulfate	10	<10 ✓	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10
ENDRIN	6.0	<6 ✓	<6 ✓	<6 ✓	<6 ✓	<6	<6	<6	<6	<10	<10
HEPTACHLOR	2.0	<2 ✓	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2
HEPTACHLOR EPOXIDE	4.0	<4 ✓	<4 ✓	<4 ✓	<4	<4	<4	<4	<4	<4	<4
HEXACHLOROBENZENE	2.0	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2	<4
LINDANE	2.0	<2 ✓	<2 ✓	<2 ✓	<2	<2	<2	<2	<2	<2	<4
MALATHION	20	<20 ✓	<20 ✓	<20 ✓	<20 ✓	<20	<20	<20	<20	<20	<20
METHOXYCHLOR	30	<30 ✓	<30 ✓	<30 ✓	<30 ✓	<30	<30	<30	<30	<30	<30
MIREX	8.0	<8 ✓	<8 ✓	<8 ✓	<8 ✓	<8	<8	<8	<8	<8	<8
ETHYL PARATHION	10	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10	<10
METHYL PARATHION	10	<10 ✓	<10 ✓	<10 ✓	<10	<10	<10	<10	<10	<10	<10
TOXPHENE	100	<100 ✓	<100 ✓	<100 ✓	<100 ✓	<100	<100	<100	<100	<100	<100
o,p'-DDD	10	--	--	--	16	16	--	--	--	30	--
o,p'-DDE	10	--	--	--	--	--	--	--	--	12	--

\*detection limits

<sup>b</sup>degraded Chlordane pattern

## POLYCHLORINATED BIPHENYLS

SAMPLE #	D. L.	AROCLOR #							
		1016	1221	1232	1242	1248	1254	1260	1262
TNL-22	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-23	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-24	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-25	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-26	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-27	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-28	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-29	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-30	40	<40	<40	<40	<40	<40	<40	<40	<40
TNL-31	40	<40	<40	<40	<40	<40	<40	<40	<40

units given in ug/kg (parts per billion) wet weight

D.L. = Detection Limit

TEXAS DEPARTMENT OF HEALTH  
DIVISION OF SHELLFISH SANITATION CONTROL

INFORMATION REQUEST

DATE OF REQUEST: Nov. 18, 1997

NAME: Chris Herrington

COMPANY: City of Austin Drainage Utility Dept.

ADDRESS: P.O. Box 1088 - DUD

CITY: Austin, TX ZIP: 78767

INFORMATION REQUESTED: \_\_\_\_\_

1) Town Lake data 85-'95

2) Risk Assessment from '95

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VERBAL REQUEST \_\_\_\_\_ WRITTEN REQUEST

INFORMATION TAKEN BY: C. BH

DATE MAILED: \_\_\_\_\_ BY: \_\_\_\_\_



**TO:** Texas Department of Health  
Seafood Safety Division  
Health Risk Assessment and Toxicology Program

**FROM:** City of Austin  
Drainage Utility Department  
Environmental Resources Management Division

**DATE:** 18 November 1997

**SUBJECT:** Open Records Act Request for Town Lake Fish Tissue Burden Data

The City of Austin Drainage Utility Department is formally requesting all of the fish tissue burden data collected from Town Lake in Austin, Texas, by the Health Risk Assessment and Toxicology Program. This data was used in the preparation of the reports entitled "Analysis of Risk From Consumption of Fish Taken From Town Lake."

We would like copies of the toxicological reports on the fish tissue for all fish collected from 1985 to the present. If possible, we would like this data in an electronic format such as a comma-delimited spreadsheet or text file which may be mailed on 3.5" diskettes or sent via e-mail to "herrington\_c@earth.ci.austin.tx.us". Otherwise, you may mail paper copies to:

Chris Herrington  
City of Austin Drainage Utility Department  
P. O. Box 1088 - DUD  
Austin, Tx 78767

If you have any questions regarding this request, please contact Chris Herrington at (512) 499-2840 or (512) 499-6337 fax.

Sincerely,

Chris Herrington  
City of Austin  
Drainage Utility Department

RECEIVED

NOV 21 1997

SEAFOOD SAFETY DIVISION

Site

**TEXAS DEPARTMENT OF HEALTH  
SEAFOOD SAFETY DIVISION  
HEALTH RISK ASSESSMENT AND TOXICOLOGY PROGRAM**

**ANALYSIS OF RISK  
FROM CONSUMPTION OF FISH TAKEN FROM  
TOWN LAKE**

## BACKGROUND

Town Lake is on the Colorado River and is 525 acres in size. It is located within and owned by the City of Austin. Public parks occupy much of the shoreline. The lake is a source of cooling water for steam generating plants, municipal water, and recreation. The fish population includes largemouth bass, white bass, striped bass, catfish, and sunfish.

In 1985, Texas Department of Health (TDH) collected 58 fish samples from Town Lake between Tom Miller Dam and Longhorn Dam. These samples indicated levels of chlordane which exceeded the FDA action level of 300 parts per billion (ppb) in three species of fish, including carp, gizzard shad, and striped bass. Additional fish species showed lower levels of chlordane. Other chemicals detected included PCB's and DDT metabolites, along with very low levels of dieldrin and commonly detected metals.

In July of 1987, the Austin-Travis County Health Department issued a health advisory, reinforcing the results of the 1985 TDH study. The advisory recommended no consumption of carp, shad, and striped bass and limited consumption of all other species.

In June of 1990, TDH issued an advisory expanding the list of fish species affected. The advisory recommended no consumption of any species of fish caught in Town Lake due to contamination with chlordane.

In November of 1994, the City of Austin requested TDH to re-evaluate the advisory for Town Lake. Previous data collected by a number of agencies, including City of Austin, the United States Geological Survey, Texas Water Commission, and the Lower Colorado River Authority (LCRA) showed an apparent decrease in chlordane levels in fish tissue.

In February and July of 1995, fifteen fish samples were collected from Town Lake and analyzed by TDH lab for pesticides and PCB's. All fifteen samples contained elevated levels of chlordane. Additionally, DDT and its metabolites were found at levels of public health concern. PCB's were found in five of the fifteen fish.

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Channel Catfish; 63 cm	Freshwater Drum; 56 cm	Gizzard Shad; 45.41.41 cm	Flathead Catfish; 58 cm	Redhorse Sucker; 58 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 2/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	740	240	170	160	140
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	210	22	37	34	32
DDE	5	960	150	150	220	130
DDT	10	100	24	14	16	11
o,p'-DDE	5	--	5.5	12	7.1	9.4
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	2.6	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Freshwater Drum; 70 cm	Flathead Catfish; 63 cm	Blue Catfish; 63 cm	Striped Bass; 72 cm	White Bass; 43 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 7/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	380	280	51	270	230
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	nd	71	14	71	nd
DDE	5	520	290	66	300	290
DDT	10	nd	nd	nd	nd	nd
o,p'-DDD	5	--	--	--	16	16
o,p'-DDE	5	--	--	--	--	--
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

## PESTICIDES IN FISH TISSUE TAKEN FROM TOWN LAKE

Pesticide	Detection Limit (ppb)	Largemouth Bass: 50 cm	Largemouth Bass: 50 cm	Largemouth Bass: 47 cm	Common Carp: 56 cm	Common Carp: 56 cm
		CONCENTRATION (PPB)				
SAMPLES COLLECTED 7/95						
ALDRIN	2	nd	nd	nd	nd	nd
ALACHLOR	8	nd	nd	nd	nd	nd
alpha-BHC	2	nd	nd	nd	nd	nd
beta-BHC	2	nd	nd	nd	nd	nd
delta-BHC	2	nd	nd	nd	nd	nd
CHLORDANE	10	34	36	19	150	160
CHLORPYRIFOS	10	nd	nd	nd	nd	nd
DDD	10	nd	nd	nd	nd	nd
DDE	5	18	34	20	210	280
DDT	10	nd	nd	nd	nd	nd
o,p'-DDD	5	--	--	--	30	--
o,p'-DDE	5	--	--	--	12	--
DACTHAL	3	nd	nd	nd	nd	nd
DIAZINON	10	nd	nd	nd	nd	nd
DIELDRIN	6	nd	nd	nd	nd	nd
ENDOSULFAN I	10	nd	nd	nd	nd	nd
ENDOSULFAN II	10	nd	nd	nd	nd	nd
ENDOSULFAN SULFATE	10	nd	nd	nd	nd	nd
ENDRIN	6	nd	nd	nd	nd	nd
HEPTACHLOR	2	nd	nd	nd	nd	nd
HEPTACHLOR EPOXIDE	2	nd	nd	nd	nd	nd
HEXACHLOROBENZENE	2	nd	nd	nd	nd	nd
LINDANE	2	nd	nd	nd	nd	nd
MALATHION	20	nd	nd	nd	nd	nd
METHOXYCHLOR	30	nd	nd	nd	nd	nd
MIREX	8	nd	nd	nd	nd	nd
ETHYL PARATHION	10	nd	nd	nd	nd	nd
METHYL PARATHION	10	nd	nd	nd	nd	nd
TOXAPHENE	100	nd	nd	nd	nd	nd

**PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE**

PCB Aroclor	Detection Limit (ppb)	Channel Catfish; 63 cm	Freshwater Drum; 56 cm	Gizzard Shad; 45.41-41 cm	Flathead Catfish; 58 cm	Redhorse Sucker; 58 cm
		CONCENTRATION (PPB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	240	110	56	62	49
1262	40	nd	nd	nd	nd	nd

**PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE**

PCB Aroclor	Detection Limit (ppb)	Freshwater Drum; 70 cm	Flathead Catfish; 63 cm	Blue Catfish; 63 cm	Striped Bass; 72 cm	White Bass; 43 cm
		CONCENTRATION (PPB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	nd	nd	nd	nd	nd
1262	40	nd	nd	nd	nd	nd

**PCB'S IN FISH TISSUE TAKEN FROM TOWN LAKE**

PCB Aroclor	Detection Limit (ppb)	Largemouth Bass; 50 cm	Largemouth Bass; 50 cm	Largemouth Bass; 47 cm	Common Carp; 56 cm	Common Carp; 57 cm
		CONCENTRATION (PPB)				
1016	40	nd	nd	nd	nd	nd
1221	40	nd	nd	nd	nd	nd
1232	40	nd	nd	nd	nd	nd
1242	40	nd	nd	nd	nd	nd
1248	40	nd	nd	nd	nd	nd
1254	40	nd	nd	nd	nd	nd
1260	40	nd	nd	nd	nd	nd
1262	40	nd	nd	nd	nd	nd

## RISK SUMMARY

CHEMICAL	AVERAGE CONCENTRATION (PPB)	CANCER RISK
PCB AROCLOR 1260	34.5	$4.9 \times 10^{-5}$
CHLORDANE	204	$4.9 \times 10^{-5}$
DDE	235	$1.5 \times 10^{-5}$
DDT	11	$6 \times 10^{-7}$
DDD	35	$1.5 \times 10^{-6}$
HEXACHLOROBENZENE	0.17	$5 \times 10^{-8}$
<b>CUMULATIVE LIFETIME CARCINOGENIC RISK</b>		<b><math>1.1 \times 10^{-4}</math></b>

Chlordane, DDE, DDT, DDD, hexachlorobenzene, and aroclor 1260 are all classified as (B2) probable human carcinogens, based on increased incidence of hepatic carcinoma in laboratory animals. Persons consuming fish from Town Lake may be exposed to a number of these chemicals simultaneously. Since each of these chemicals is capable of inducing the same health effect (liver cancer), the risk is additive for all six. The cumulative risk is based on a 70 kg adult consuming one eight ounce meal per week for a period of 30 years.

### CONSUMPTION LIMIT

One 8 ounce meal per week

## CONCLUSION

In 1985, the Texas Department of Health collected 58 fish samples from Town Lake for analysis of organic chemicals of public health concern. An advisory was issued as a result of elevated levels of chlordane found in a large number of the fish. Polychlorinated biphenyls and DDT metabolites were also found.

At the request of the City of Austin, TDH collected fifteen fish from Town Lake in 1995 for a re-assessment of the risk associated with consumption of fish taken by the public. The majority of the fish contained elevated levels of chlordane, DDT and its metabolites, and PCB Aroclor 1260. A very low level of hexachlorobenzene was found in one fish. All of these chemicals are classified as (B2) probable human carcinogens based on increased incidence of liver cancer in laboratory animals.

It appears that chlordane levels in several species of fish have decreased over the 10 year period. However, there is very little control over comparison of the number of samples of each species collected or the size of fish being compared between the 1985 and 1995 data sets.

The limited data in this assessment indicate that a person consuming Town Lake fish would be exposed to a number of carcinogenic chemicals simultaneously that will primarily affect the liver. Carcinogenic risk to the liver is calculated as 1 in 10,000 persons exposed to one eight ounce meal per week for 30 years.

The risk level for Town Lake fish exceeds TDH criteria for issuance of a fish consumption advisory. The Texas Department of Health recommends that a fish consumption advisory be issued when the  $1 \times 10^{-4}$  risk level is exceeded for persons consuming 30 grams of fish per week for a period of 30 years. The number of samples used in this assessment is very small; however, it must be considered that historical data indicate the same chemicals have persisted in Town Lake fish over a period of 10 years.

### Recommendations:

- 1) The current data set indicates that the Town Lake advisory should remain in effect.
- 2) The advisory should be modified from a "no consumption limit" to a "one eight ounce meal per week" limit, based on EPA risk based methodology and TDH policy for issuance of fish consumption advisories.

## TOWN LAKE RESULTS - 1985

SPECIES #samples avg. size	CHLORDANE	DDT/DDE/DDD	PCB'S
CARP n=6 20"	0.666	0.87	0.088
GIZZARD SHAD n=7 15"	0.644	1.29	0.180
STRIPED BASS n=2 17.5"	0.360	0.49	0.128
WHITE BASS n=1 8"	0.23	0.36	none
CHANNEL CATFISH n=2 16.5"	0.156	0.23	0.077
BLACK BASS n=7 10"	0.030	0.07	none
SUNFISH n=11 7"	0.017	0.04	0.005

**CHLORDANE IN TOWN LAKE FISH  
1985 VS. 1995**

SPECIES	CHLORDANE-1985		CHLORDANE-1995	
	#samples	avg. size	#samples	avg. size
COMMON CARP	0.666		0.155	
	n=6	20"	n=2	22"
GIZZARD SHAD	0.644		0.170	
	n=7	15"	n=1	17"
WHITE BASS	0.23		0.23	
	n=1	8"	n=1	17"
CHANNEL CATFISH	0.156		0.74	
	n=2	16.5"	n=1	25"
LARGEMOUTH BASS	0.030		0.030	
	n=7	10"	n=3	20"

# SUGGESTED CHLORDANE VALUES

There are two values for the chlordane contained in this report: the value obtained using standard LCRA methods and mathematical processes, referred to as the "reported level," and the value obtained using the mathematical method suggested by the Texas Department of Health, referred to as the "suggested level." The reported level was obtained by comparing isomer to isomer using a certified isomer standard, as detailed in SW846 method 8080. The suggested level was obtained by quantitating the three isomers: alpha, gamma, and trans-nonachlor, from a technical standard (containing a combination of up to 44 chlordane isomers). Those three values were then averaged to produce the final suggested chlordane value.

*Larry Procter*  
 The reported level was obtained by using the standard technology applied in laboratories such as the Geochemical and Environmental Research Group, Texas A & M University, and represents a methodology widely recognized as accurate. The suggested level was obtained by a methodology that results in artificially inflated numbers. For this reason, the LCRA does not accept the suggested level as accurate and obtained these figures only because TDH requested application of the suggested methodology to obtain the suggested value.

Sample #	Reported Value			Suggested Chlordane Value
	Alpha	Gama	Trans	
3441A	1.0	<1.0	3.0	18.3
3442A	1.0	<1.0	7.0	33.6
3444A	1.0	<1.0	3.0	14.5
3446A	26.9	14.9	58.7	414.3
3447A	12.9	6.9	26.9	197.7
3448A	8.8	4.9	15.6	123.3
3449A	3.0	1.0	46.0	66.5
3450A 10	23.2	10.6	30.0	281.1
3451A	2.0	1.0	6.0	36.8
3452A	3.9	2.9	7.8	64.0
3453A	3.0	1.0	7.9	51.3
3455A	6.0	3.0	17.9	83.5
3456A	5.0	3.0	16.8	79.3
3457A	2.0	<1.0	5.0	22.4
3458A	4.9	3.0	16.8	76.2
3459A	16.0	10.0	26.9	177.0
3460A	31.7	23.7	31.7	298.1
3713A	2.0	1.0	4.0	18.8
3714A	18.9	10.0	32.9	206.8



*Lawrence Moreau*

*not possible to discern all peaks.*

*(Tech. chlordane)*

*is not only tech standard?*

DATE	SITE COLLECTOR	SITENAME	REFNUM	LAB	MEDIUM	4,4'-DDD	4,4'-DDD	4,4'-DDE	4,4'-DDE	4,4'-DDT	4,4'-DDT	CHLORDANE	CHLORDANE	DIELDRIN	DIELDRIN	SUNFISH	SUNFISH
						MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	Count	Count
02/27/95	304 Austin-Travis County Health Department	Town Lake	5490	Lab Not Known	Fish Tissue				0.018								
02/27/95	304 Austin-Travis County Health Department	Town Lake	5507	Lab Not Known	Fish Tissue	<	0.001	<	0.001	<	0.001	<					1

No lab sheets could be located for these samples so they were deleted from the database.

Chris Herrington  
06/05/98

Table A-8

TABLE I  
PESTICIDE ANALYSIS OF TOWN LAKE  
Fish (fillet) 1985

all values expressed in milligrams/kilo = parts per million (ppm)

EPA Allowable levels

- total DDT & metabolites - 5.0 ppm
- no other applicable values set

FDA Action levels  
1. Chlordane *300 ppm*

\*\* Value exceeds tolerance  
C Indicates composite test sample

Table from TL Report (1992)  
Claims that source is ATCHD  
but believed that IDH  
collected/analyzed data.

See records for request for complete data

Type	Date Collected	Chlordane	DDT <sup>1</sup>	DDD <sup>11</sup>	DDE <sup>111</sup>	Total 1,2,3	Dieldrin	(PCB)	
<b>BLACK BASS</b>									
1. EMS-51	2/27	-	0.015	-	0.065	-	-	-	
2. C-EMS-52	2/27	0.061	0.025	0.023	0.10	0.15	-	-	
3. C-EMS-60	2/27	0.066	0.022	-	0.074	-	-	-	
4. C-EMS-67	2/27	0.023	-	-	0.042	-	-	-	
5. C-EMS-72	2/27	-	-	-	0.022	-	-	-	
6. EMS-74	2/27	0.046	0.014	-	0.059	-	-	-	
7. C-EMS-75	2/27	-	-	-	0.028	-	-	-	
<b>STRIPPED BASS</b>									
8. EMS-112	4/04	0.520	0.240	0.079	0.450	0.769	0.021	0.185	
9. EMS-115	4/04	0.200	0.022	0.025	0.160	0.207	-	0.071	
<b>WHITE BASS</b>									
10. EMS-59	2/27	0.23	0.12	0.055	0.19	0.365	0.01	-	
<b>WARMOUTH BASS</b>									
11. C-EMS-69	2/27	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	
12. EMS-70	2/27	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	

*Southern*

Table A-8 (cont'd)

Type	Date Collected	Chlordane	DDT <sup>i</sup>	DDD <sup>ii</sup>	DDE <sup>iii</sup>	Total 1,2,3	Dieldrin	(PCB)
<b>SUNFISH</b>								
13. C-EMS-53	2/27	-	-	-	0.031	-	-	-
14. C-EMS-54	2/27	0.059	-	-	0.043	-	-	-
15. EMS-62	2/27	-	-	-	0.018	-	-	-
16. EMS-63	2/27	-	-	-	0.010	-	-	-
17. C-EMS-70	2/27	-	-	-	0.042	-	-	-
18. C-EMS-71	2/27	0.133	0.025	0.028	0.173	0.226	-	0.052
19. C-EMS-76	2/27	-	-	-	0.025	-	-	-
20. C-EMS-77	4/04	-	-	-	0.027	-	-	-
21. EMS-113	2/27	0.000	0.045	0.03	0.11	0.185	-	-
22. EMS-61	2/27	-	-	-	0.018	-	-	-
23. C-EMS-68	2/27	-	-	-	-	-	-	-
<b>CARP</b>								
24. EMS-50	2/27	**1.43	0.20	0.67	1.90	2.77	0.049	0.148
25. EMS-57	2/27	0.52	0.17	0.14	0.57	0.88	0.008	0.15
26. EMS-58	2/27	0.21	0.012	0.043	0.147	0.202	0.014	-
27. EMS-64	2/27	0.259	0.084	0.110	0.440	0.634	-	0.078
28. EMS-65	2/27	0.05	0.012	0.012	0.089	0.113	-	-
29. EMS-116	4/04	0.310	0.048	0.091	0.460	0.599	8.0	0.110
<b>SHAD</b>								
0. EMS-49	2/27	**1.96	0.58	0.59	3.6	4.77	0.04	0.59
11. C-EMS-55	2/27	0.485	0.072	0.060	0.286	0.418	0.034	0.113
12. EMS-56	2/27	0.91	0.37	0.34	1.0	1.81	0.024	-
13. EMS-66	2/27	0.175	0.031	0.021	0.12	0.172	-	0.10
14. EMS-73	2/27	0.334	0.030	0.023	0.37	0.423	0.021	0.350
15. EMS-114	4/04	0.570	0.210	0.149	0.860	1.219	-	0.350
16. EMS-117	4/04	0.073	0.011	-	0.074	0.085	-	0.071
<b>ATPISH</b>								
17. EMS-118	4/15	0.254	0.049	0.026	0.325	0.400	-	0.100
18. EMS-123	4/23	0.058	-	-	0.068	-	-	0.055

i, dichlorodiphenyltrichloroethane  
 ii, chemical metabolites of DDT

Philip Zbylot, M.D., M.P.H.  
 Word Processing: Margie Martinez  
 Source: ATCHN Unpublished Data, 1985

TABLE 45  
 ANALYSIS OF TOXIC ORGANICS IN FISH TISSUE FROM TOWN LAKE  
 SEPTEMBER 1981

Checked & Locked  
 by CS4 05/12/98

Species Common Name: Scientific Name	Weight (g)	Tail Length (cm)	Organics (µg/kg) in Tissue				PCBs
			DDD	DDE	DDT		
Rio Grande Perch #1 <sup>3</sup> : <u>Cichlasoma cyanoguttatum</u>	173	19.1	380	880	260	<100	✓
Rio Grande Perch #2 <sup>3</sup> :	172	19.1	1,500 <sup>4</sup>	3,600 <sup>4</sup>	790 <sup>4</sup>	<100	✓
Redbreasted Sunfish #1 <sup>1</sup> : <u>Lepomis auritus</u>	236	20.7	160	670	380	<100	✓
Redbreasted Sunfish #2 <sup>1</sup> :	194	20.3	140	1,500	46	<100	✓
Redbreasted Sunfish #3 <sup>2</sup> :	91	17.2	350	1,400	290	<100	✓
Bluegill Sunfish #1 <sup>2</sup> : <u>Lepomis macrochirus</u>	165	15.9	100	380	150	<100	✓
Bluegill Sunfish #2 <sup>3</sup> :	94	15.9	79	490	79	<100	✓
Redear Sunfish #1 <sup>3</sup> : <u>Lepomis microlophus</u>	150	20.3	40	380	150	<100	✓
Redear Sunfish #2 <sup>3</sup> :	150	19.7	160	560	60	<100	✓
Largemouth Bass: <u>Micropterus salmoides</u>	428	31.8	40	370	40	<100	✓

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<sup>1</sup>ES-4 site. = Mopac  
<sup>2</sup>ES-5 site. = 1st  
<sup>3</sup>ES-6 site. = Basin  
<sup>4</sup>Sum of the DDT residue concentrations exceed the U.S. Food and Drug Administration cumulative standard of 5,000 µg/kg  
<sup>5</sup>Comp. of several fish approximately 5 cm in length used in analysis.

General WQ Data  
 NURP Survey Year 1981  
 Coker/Leen  
 Library

TABLE 46  
 ANALYSIS OF TOXIC ORGANICS IN FISH TISSUE FROM LAKE AUSTIN  
 SEPTEMBER 1981

Common Name: Species	Scientific Name	Weight (g)	Tail Length (cm)	Organics (µg/kg) in Tissue				
				DDD	DDE	DDT	PCBs	
Bluegill Sunfish #3 <sup>2</sup> :	<u>Lepomis macrochirus</u>	86	16.5	27	250	10	<100	
Bluegill Sunfish #4 <sup>2</sup> :		66	14.6	20	180	<10	<100	
Bluegill Sunfish #5 <sup>3</sup> :		102	17.2	73	380	120	<100	
Redear Sunfish #3 <sup>1</sup> :	<u>Lepomis microlophus</u>	160	20.3	280	870	200	<100	
Redear Sunfish #4 <sup>1</sup> :		185	23.5	24	87	30	<100	
Redear Sunfish #5 <sup>2</sup> :		76	15.9	85	230	10	<100	
Redear Sunfish #6 <sup>2</sup> :		59	15.3	20	120	<10	<100	
Redear Sunfish #7 <sup>3</sup> :		55	15.3	19	84	38	<100	
Longnose Gar #1 <sup>2</sup> :	<u>Lepisosteus osseus</u>	398	58.4	310	2,700	200	<100	
Longnose Gar #2 <sup>2</sup> :		295	58.4	40	560	<10	<100	

1 Fish taken from ES-1 site. ~~McFarland~~ Bull  
 2 Fish taken from ES-2 site. ~~W. C. Colburn~~ Dry N  
 3 Fish taken from ES-3 site. ~~Bull Creek~~ Tom Miller

TABLE 47  
 ANALYSIS OF METALS IN FISH TISSUE FROM TOWN LAKE  
 SEPTEMBER 1981

Species Common Name: Scientific Name	Metals (µg/kg) in Tissue						
	As	Cd	Cu	Hg	Pb	Zn*	
Rio Grande Perch #1 <sup>3</sup> : <u>Cichlasoma cyanoguttatum</u>	40	2.0	55	<17	500	9.9	✓
Rio Grande Perch #2 <sup>3</sup> :	60	2.5	75	<17	<50	9.1	✓
Redbreasted Sunfish #1 <sup>1</sup> : <u>Lepomis auritus</u>	60	<0.5	1,400	<17	<50	12.0	✓
Redbreasted Sunfish #2 <sup>1</sup> :	105	<0.5	960	<17	<50	21.0	✓
Redbreasted Sunfish #3 <sup>2</sup> :	25	<0.5	1,200	<17	200	13.0	✓
Bluegill Sunfish #1 <sup>2</sup> : <u>Lepomis macrochirus</u>	<20	<0.5	1,800	<17	<50	14.0	✓
Bluegill Sunfish #2 <sup>3</sup> :	<20	<0.5	14	<17	<50	7.5	✓
Redear Sunfish #1 <sup>3</sup> : <u>Lepomis microlophus</u>	55	<0.5	56	<17	<50	14.0	✓
Redear Sunfish #2 <sup>3</sup> :	45	<0.5	1,100	<17	<50	20.0	✓
Largemouth Bass: <u>Micropterus salmoides</u>	<20	<0.5	40	<17	<50	9.9	

\*Concentration in mg/kg.

<sup>1</sup>ES-4 site.

<sup>2</sup>ES-5 site.

<sup>3</sup>ES-6 site.

TABLE 48

ANALYSIS OF METALS IN FISH TISSUE FROM LAKE AUSTIN

ANALYSIS OF METALS IN FISH TISSUE FROM LAKE AUSTIN  
SEPTEMBER 1981

Common Name: Species	Scientific Name	Metals (µg/kg) in Tissue					
		As	Cd	Cu	Hg	Pb	Zn*
Bluegill Sunfish #3 <sup>2</sup> :	<u>Lepomis macrochirus</u>	<20	6.0	740	<17	<50	7.9
Bluegill Sunfish #4 <sup>2</sup> :		30	<0.5	95	38	<50	1.7
Bluegill Sunfish #5 <sup>3</sup> :		83	<0.5	60	<17	<50	14.0
Redear Sunfish #3 <sup>1</sup> :	<u>Lepomis microlophus</u>	40	<0.5	110	<17	<50	16.0
Redear Sunfish #4 <sup>1</sup> :		35	<0.5	50	<17	<50	25.0
Redear Sunfish #5 <sup>2</sup> :		30	<0.5	25	<17	<50	26.0
Redear Sunfish #6 <sup>2</sup> :		185	13.0	1,200	<17	<50	14.0
Redear Sunfish #7 <sup>3</sup> :		65	<0.5	25	30	<50	20.0
Longnose Gar #1:	<u>Lepisosteus osseus</u>	<20	4.5	1,500	<17	<50	7.8
Longnose Gar #2:		20	<0.5	85	<17	<50	10.0

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<sup>1</sup>Fish taken from ES-1 site.  
<sup>2</sup>Fish taken from ES-2 site.  
<sup>3</sup>Fish taken from ES-3 site.  
 \*Concentration in mg/kg.