B.1.68. Toxic substances. The LDEQ has also established numerical criteria for several toxic substances that are of particular concern for the State of Louisiana. These substances were selected for human health considerations, taste and odor problems, persistence and bioaccumulative capabilities, and potential negative effects on aquatic biota. Table B-13 is a listing of these substances and their criteria.

TABLE B-13
1989 LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
NUMERICAL CRITERIA FOR SPECIFIC TOXIC SUBSTANCES

(In micrograms per liter (ug/L) or parts per billion (ppb) unless otherwise stated)

	Aquatic Life Protection				Human Health	
Toxic Substance	Freshwater Acute	Freshwater Chronic	Marine Acute	Non Marine Chronic	Drinking Supply[1]	Drinking Supply[2]
Pesticides and PCB's						
Aldrin	3.00	-	1.300	-	0.04 ng/L	0.04 ng/L[3]
Chlordane	2.40	0.0043	0.090	0.0040	0.19 ng/L	0.19 ng/L
DDT	1.10	0.0010	0.130	0.0010	0.19 ng/L	0.19 ng/L
TDE (DDD)	0.03	0.0060	1.250	0.2500	-	-
DDE	52.5	10.500	0.700	0.1400	-	-
Dieldrin	2.50	0.0019	0.710	0.0019	0.05 ng/L	0.05 ng/L
Endosulfan	0.22	0.0560	0.034	0.0087	0.47	0.64
Endrin	0.18	0.0023	0.037	0.0023	0.26	0.26
Heptachlor	0.52	0.0038	0.053	0.0036	0.07 ng/L	0.07 ng/L
Hexachlorocyclohexane (gamma BHC, Lindane)	2.00	0.0800	0.160	-	0.011	0.02
Polychlorinated Biphenols, Total (PCB's)	2.00	0.0140	10.00	0.0300	0.03 ng/L	0.03 ng/L
Toxaphene	0.73	0.0002	0.210	0.0002	0.24 ng/L	0.24 ng/L
2,4-Dichlorophenoxyacetic acid (2,4-D)	-	-	-	-	100.0	-
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP, Silvex)	-	-	-	-	10.00	-
Volatile Organic Chemicals						
Benzene	2249	1125	2700	1350	1.1	12.5
Carbon Tetrachloride (Tetrachloromethane)	2730	1365	15000	7500	0.22	1.2
Chloroform (Trichloromethane)	2890	1445	8150	4075	5.3	70
Ethylbenzene	3200	1600	8760	4380	2.39 mg/L	8.1 mg/L[4]
1, 2-Dichloroethane (EDC)	11800	5900	11300	5650	0.36	6.8
1, 1, 1-Trichloroethane	5280	2640	3120	1560	200	31.34 mg/L
1, 1, 2-Trichloroethane	1800	900	-	-	0.56	6.9
1, 1, 2, 2-Tetrachloroethane	923	462	902	451	0.16	1.8
1, 1-Dichloroethylene	1160	580	22400	11200	0.05	0.58
Trichloroethylene	3900	1950	200	100	2.8	21
Tetrachloroethylene	850	425	130	65	0.65	2.5
Toluene	1270	635	950	475	9.1 mg/L	69.3 mg/L
Vinyl Chloride (Chloroethylene)	-	-	-	-	1.9	35.8
Bromoform (Tribromomethane)	2930	1465	1790	895	5.1	45
Bromodichloromethane	-	-	-	-	5.3	70
Methylene chloride (Dichloromethane)	19300	9650	25600	12800	4.4	87
Methyl chloride (Chloromethane)	55000	27500	27000	13500	5.3	70
Dibromochloromethane	-	-	-	-	5.3	70
1-3 Dichloropropene	606	303	79	39.5	0.18	3.0

TABLE B-13 (continued)

Toxic Substance	Aquatic Life Protection				Human Health	
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Drinking Water Supply[1]	Non Drinking Water Supply[2]
Acid - Extractable Organic Chemicals						
2-Chlorophenol	258	129	-	-	0.100	126.4
3-Chlorophenol	-	-	-	-	0.100	-
4-Chlorophenol	383	192	535	268	0.100	-
2, 3-Dichlorophenol	-	-	-	-	0.040	-
2, 4-Dichlorophenol	202	101	-	-	0.300	232.6
2, 5-Dichlorophenol	-	-	-	-	0.500	-
2, 6-Dichlorophenol	-	-	-	-	0.200	-
3, 4-Dichlorophenol	-	-	-	-	0.300	-
Phenol (Total)	700	350	580	290	5.000	5.000[5]
Base/Neutral Extractable Organic Chemicals						
Benzidine	250	125	-	-	0.08 ng/L	0.17 ng/L
Hexachlorobenzene	-	-	-	-	0.24 ng/L	0.24 ng/L
Hexachlorobutadiene[6]	5.1	1.02	1.6	0.32	0.09	0.11
Metals						
Arsenic	360	190	69.00	36.00	50.00	-
Chromium III (Tri)[7]	(980,1700,3100)	(120,210,370)	515	103.0	50.00	-
Chromium VI (Hex)	16	11	1.100 mg/L	50.00	50.00	-
Zinc[8]	(65,120,210)	(59,110,190)	95.00	86.00	5.000 mg/L	-

1 Applies to surface waterbodies designated as a Drinking Water Supply and also protects for primary and secondary contact recreation and fish consumption.
2 Applies to surface waterbodies not designated as a Drinking Water Supply and protects for primary and secondary contact recreation and fish consumption.
3 ng/L = nanograms per liter, parts per trillion
4 mg/L = milligrams per liter, parts per million
5 total phenol as measured by the 4 - aminoantipyrine (4AAP) method
6 Includes Hexachloro-1,3-butadiene
7 Hardness-dependent criteria for fresh water based on the following natural logarithm formulas for acute and chronic protection respectively: acute = e(0.8190[ln(hardness)]+3.688), chronic = e(0.8190[ln(hardness)]+1.561), numbers in parenthesis represent criteria in ug/L at hardness values of 50, 100, 200 mg/L $CaCo_3$ rounded off a whole numbers

8 Hardness-dependent criteria for fresh water based on the following natural logarithm formulas for acute and chronic protection respectively: acute = e(0.8473[ln(hardness)]+0.8604), chronic = e(0.8473[ln(hardness)]+0.7614), numbers in parenthesis represent criteria in ug/L at hardness values of 50, 100, 200 mg/L $CaCo_3$ rounded off to whole numbers

EPA WATER QUALITY CRITERIA

B.1.69. The EPA has established ambient water quality criteria applicable to surface waters in the study area. These criteria are shown in Tables B-14, B-15, and B-16. The numerical criteria listed in Tables B-14, B-15, and B-16 have been developed for various physical parameters, nutrients, metals, PCB's, and organic pesticides for uses of freshwater aquatic life, marine and estuarine aquatic life, and public water supply, respectively.

EPA WATER QUALITY TABLES

B.1.70. EPA water quality tables follow.

TABLE B-14
1986 EPA *FRESHWATER* AQUATIC LIFE CRITERIA
(All values in ug/L except where noted)

Parameter	Chronic (24-Hour Average)	Acute (Maximum at Any Time)	Chronic[1] (4-Day Average)	Acute[2] (1-Hour Average)
Aesthetic Qualities	(Narrative statement - SEE CRITERIA DOCUMENT)			
Aldrin[P]	-	3.0	-	-
Alkalinity	(20 mg/L MINIMUM)			
Ammonia	(Criteria are pH and temperature dependent-SEE CRITERIA DOCUMENT)			
Arsenic(III)[P]	-	-	190	360
Boron	(750 ug/L for long-term irrigation on sensitive crops)			
Cadmium[4,P]	-	-	1.1/1.6/2	3.9/6.2/8.6
Chlordane[P]	0.0043	2.4	-	-
Chlorine	-	-	11	19
Chlorpyrifos	-	-	0.041	0.083
Chromium (VI)[P]	-	-	11	16
Chromium(III)[4]	-	-	210/289/370	1700/2420/3100
Color	(Narrative statement - SEE CRITERIA DOCUMENT)			
Copper[4,P]	-	-	12/17/21	18/22/34
Cyanide[P]	-	-	5.2	22
DDT[P]	0.0010	1.1	-	-
Demeton[P]	0.1	-	-	-
Dieldrin[P]	0.0019	2.5	-	-
Endosulfan[P]	0.056	0.22	-	-
Endrin[P]	0.0023	0.18	-	-

Gases, Total Dissolved	(Narrative statement - SEE CRITERIA DOCUMENT)			
Guthion	0.01	-	-	-
Heptachlor[P]	0.0038	0.52	-	-
Hexachlorocyclohexane (Lindane)[P]	0.080	2.0	-	-
Iron	1000	-	-	-
Lead[4,P]	-	-	3.2/5.3/7.7	82/137/200
Malathion	0.1	-	-	-
Mercury[P]	-	-	0.012	2.4
Methoxychlor	0.03	-	-	-
Mirex	0.001	-	-	-
Nickel[4,P]	-	-	160/222/280	1400/1999/2500
Oil and Grease	(Narrative statement - SEE CRITERIA DOCUMENT)			
Oxygen, Dissolved	(Warmwater and Coldwater Matrix - SEE CRITERIA DOCUMENT)			
Parathion	-	-	0.013	0.065
Polychlorinated Biphenyls (PCB's)[P]	0.014	2.0	-	-
Pentachlorophenol (PCP)[3,P]	-	-	3.5/13/43	5.5/20/68
pH	(6.5 - 9.0 su)	-	-	-
Selenite (inorganic)[P]	35	260	-	-
Silver[4,P]	-	4.1/8.2/13	-	-
Solids (Suspended) and Turbidity	(Narrative statement - SEE CRITERIA DOCUMENT)			
Sulfide-Hydrogen Sulfide	2.0	-	-	-
Temperature	(Species dependent criteria - SEE CRITERIA DOCUMENT)			
Toxaphene[P]	-	-	0.0002	0.73
Zinc[4,P]	-	-	110/149/190	120/165/210

1 4-day average concentration not to be exceeded more than once every 3 years on the average.
2 1-hour average concentration not to be exceeded more than once every 3 years on the average.
3 pH dependent criteria. Values presented are for 6.5/7.8/9.0 standard pH units.
4 Hardness dependent criteria. Values presented are for 100/150/200 mg/L as $CaCO_3$.
P Priority Pollutant

TABLE B-15
1986 EPA *SALTWATER* AQUATIC LIFE CRITERIA
(All values in ug/L)

Parameter	Chronic (24-Hour Average)	Acute (Maximum at Any Time)	Chronic[1] (4-Day Average)	Acute[2] (1-Hour Average)
Aesthetic Qualities	(Narrative statement - SEE CRITERIA DOCUMENT)			
Aldrin[P]	-	1.3	-	-

Arsenic(III)[P]	-	-	36
69			
Cadmium[P]	-	-	9.3
43			
Chlordane[P]	0.004	0.09	-
-			
Chlorine	-	-	7.5
13			
Chlorpyrifos	-	-	0.0056
0.011			
Chromium (VI)[P]	-	-	50
1,100			
Color	(Narrative statement - SEE CRITERIA DOCUMENT)		
Copper[P]	-	-	-
2.9			
Cyanide[P]	-	-	-
1.0			
DDT[P]	0.0010	0.13	-
-			
Demeton[P]	0.1	-	-
-			
Dieldrin[P]	0.0019	0.71	-
-			
Endosulfan[P]	0.0087	0.034	-
-			
Endrin[P]	0.0023	0.037	-
-			
Gases, Total Dissolved	(Narrative statement - SEE CRITERIA DOCUMENT)		
Guthion	0.01	-	-
-			
Heptachlor[P]	0.0036	0.053	-
-			
Hexachlorocyclohexane (Lindane)[P]	-	0.16	-
-			
Lead[P]	-	-	5.6
140			
Malathion	0.1	-	-
-			
Mercury[P]	-	-	0.025
2.1			
Methoxychlor	0.03	-	-
-			
Mirex	0.001	-	-
-			
Nickel[P]	-	-	8.3
75			
Oil and Grease	(Narrative statement - SEE CRITERIA DOCUMENT)		
Polychlorinated Biphenyls (PCB's)[P]	0.030	10	-
-			
Pentachlorophenol (PCP)[P]	-	-	7.9
13			
pH	(6.5 - 8.5 su)	-	-
-			
Phosphorus (elemental)	0.10	-	-
-			
Selenite (inorganic)[P]	54	410	-
-			
Silver[P]	-	2.3	-
-			
Sulfide-Hydrogen Sulfide	2.0	-	-
-			
Temperature	(Species dependent criteria - SEE CRITERIA DOCUMENT)		
Toxaphene[P]	-	-	0.0002
0.21			
Zinc[P]	-	-	86
95			

1 4-day average concentration not to be exceeded more than once every 3 years on the average.
2 1-hour average concentration not to be exceeded more than once every 3 years on the average.
P Priority Pollutant

TABLE B-16
1986 EPA *HUMAN HEALTH* CRITERIA
(Units per liter)

Parameter	Fish and Water Ingestion	Fish Consumption Only	Drinking Water M.C.L.[1]	Organo-leptic Criteria[2]
Acenapthene[P]		-	-	-
0.02 mg				
Acrolein[P]		320 ug	780 ug	-
-				
Acrylonitrile[P,C]		0.58/0.058/0.006 ug	6.5/0.65/0.065 ug	-
-				
Aesthetic Qualities		(Narrative Statement - SEE CRITERIA DOCUMENT)		
- -				
Aldrin[P,C]		0.74/0.074/0.0074 ng	0.79/0.079/0.0079 ng	-
-				
Antimony[P]		146 ug	45,000 ug	-
-				
Arsenic[P,C]		22/2.2/0.22 ng	175/17.5/1.75 ng	0.05
mg -				
Asbestos[P.C]		300,000/30,000/3,000 Fibers	-	-
-				
Bacteria		(For Primary Recreation And Shellfish Uses - SEE CRITERIA DOCUMENT)		
Barium		-		-
1.0 mg -				
Benzene[P,C]		6.6/0.66/0.066 ug	400/40/4 ug	-
-				
Benzidine[P,C]		1.2/0.12/0.01 ng	5.3/0.53/0.05 ng	-
-				
Beryllium[P,C]		68/6.8/0.68 ng	1170/117/11.71 ng	-
-				
Cadmium[P]		10 ug	-	0.010
mg -				
Carbon Tetrachloride[P,C]		4/0.4/0.04 ug	69.4/6.94/0.69 ug	-
-				
Chlordane[P,C]		4.6/0.46/0.046 ng	4.8/0.48/0.048 ng	-
-				
Chloroethyl Ether(BIS-2)[P,C]		0.3/0.03/0.003 ug	13.6/1.36/0.136 ug	-
-				
Chloroform[P,C]		1.9/0.19/0.019 ug	157/15.7/1.57 ug	-
-				
Chloroisopropyl Ether (BIS-2)[P]		34.7 ug	4.36 mg	-
-				
Chloromethyl Ether (BIS)[C]		[37.6/3.76/0.376]X10^{-6} ug	[18.4/1.84/.184]x10^{-3} ug	-
-				
2-Chlorophenol[P]		-	-	-
.1 ug				
4 Chlorophenol		-		-
- .1 ug				
Chlorophenoxy Herbicides(2,4,5,-TP)(Silvex)		10 ug		-
10 ug -				
Chlorophenoxy Herbicides(2,4-D)		100 ug		-
100 ug -				
Chloro-4 Methyl-3 Phenol		-		-
- 3000 ug				

TABLE B-16 (continued)

Parameter	Fish and Water Ingestion	Drinking Water M.C.L.[1]	Organo-leptic Criteria[2]
Chromium (VI)[P]	50 ug	-	0.05 mg
Chromium(III)	170 mg	-	3,433 mg
Color	(Narrative statement - SEE CRITERIA DOCUMENT)	-	-
Copper[P]	-	-	1 mg
Cyanide[P]	200 ug	-	200 ug
DDT[P,C]	0.24/0.024/0.0024 ng	0.24/0.024/0.0024 ng	-
Dibutyl Phthalate[P]	34 mg	154 mg	-
Dichlorobenzenes[P]	400 ug	2.6 mg	-
Dichlorobenzidine[P,C]	0.103/0.01/0.001 ug	0.204/0.20/0.002 ug	-
1,2 Dichloroethane[P,C]	9.4/0.94/0.094 ug	2,430/243/24.3 ug	-
Dichloroethylenes[P,C]	0.33/0.033/0.003 ug	18.5/1.85/0.185 ug	-
2,4-Dichlorophenol	3.09 mg		-
Dichloropropene[P]	87 ug	14.1 mg	0.3 ug
Dieldrin[P,C]	0.71/0.071/0.0071 ng	0.76/0.076/0.0076 ng	-
Diethyl Phthalate[P]	350 mg	1.8 g	-
2,4-Dimethylphenol[P]	-	-	400 ug
Dimethyl Phthalate[P]	313 mg	2.9 g	-
2,4 Dinitrotoluene[C]	1.1/0.11/0.011 ug	91/9.1/0.91 ug	-
2,4 Dinitro-o-Cresol[P]	13.4 ug	765 ug	-
2,3,7,8-TCDD (Dioxin)[P,C]	[0.13/0.013/0.0013]X10^{-6} ug	[0.14/0.014/.0014]x10^{-6} ug	-
Diphenylhdrazine[P]	422/42/4 ng	5.6/0.56/0.056 ug	-
Di-2-EthylHexyl Phthalate[P]	15 mg	50 mg	-
Endosulfan[P]	74 ug	159 ug	-
Endrin[P]	1 ug	-	0.0002 mg
Ethylbenzene[P]	1.4 mg	3.28 mg	-
Fluoranthene[P]	42 ug	54 ug	-
Halomethanes[P,C]	1.9/0.19/0.019 ug	157/15.7/1.57 ug	-
Heptachlor[P,C]	2.78/0.28/0.028 ng	2.85/0.29/0.029 ng	-
Hexachloroethane[C]	19/1.9/0.19 ug	87.4/8.74/0.87 ug	-
Hexachlorobenzene[P,C]	7.2/0.72/0.072 ng	7.4/0.74/0.074 ng	-

TABLE B-16 (continued)

Parameter	Fish and Water Ingestion	Fish Consumption Only	Drinking Water M.C.L.[1]	Organo-leptic Criteria[2]
Hexachlorobutadiene[P,C]	4.47/0.45/0.045 ug		500/50/5 ug	-
Hexachlorocycohexane-Alpha[P,C]	92/9.2/0.92 ng		310/31/3.1 ng	-
Hexachlorocyclohexane-Beta[P,C]	163/16.3/1.63 ng		547/54.7/5.47 ng	-
Hexachlorocyclohexane-Gama[P,C]	186/18.6/1.86 ng		625/62.5/6.25 ng	-
Hexachlorocyclohexane-Technical[P,C]	123/12.3/1.23 ng		414/41.4/4.14 ng	-
Hexachlorocyclopentadiene[P]	206 ug		-	-
1 ug				
Iron	0.3 mg			-
.3 mg	-			
Isophorone[P]	5.2 mg		520 mg	-
Lead[P]	50 ug		-	0.05 mg
Manganese	50 ug		100 ug	
50 ug	-			
Mercury[P]	144 ng		146 ng	0.002 mg
Methoxychlor	100 ug			-
0.1 mg	-			
Monochlorobenzene[P]	488 ug		-	-
20 ug				
Nickel[P]	13.4 ug		100 ug	-
Nitrates	10 mg			-
10 mg	-			
Nitrobenzene[P]	19.8 mg		-	-
30 ug				
Nitrosodibutylamine N[P,C]	64/6.4/0.64 ng		5,868/587/58.7 ng	-
Nitrosodiethylamine N[P,C]	8/0.8/0.08 ng		12400/1,240/124 ng	-
Nitrosodimethylamine N[P,C]	14/1.4/0.14 ng		160000/16,000/1600 ng	-
Nitrosodiphenylamine N[P,C]	49000/4,900/490 ng		161000/16,100/1610 ng	-
Nitrosopyrrolidine N[P,C]	160/16/1.6 ng		919000/91,900/9190 ng	-
Oil And Grease	(Narrative Statement - SEE CRITERIA DOCUMENT)			
PCBs[P,C]	0.79/0.079/0.0079 ng		0.79/0.079/0.0079 ng	-
Pentachlorobenzene	74 ug			85 ug
-	-			
Pentachlorophenol[P]	1.01 mg		-	-
Phenol[P]	3.5 mg		-	-
0.3 mg				
Polynuclear Aromatic Hydrocarbons[P,C]	28/2.8/0.28 ng		311/31.1/3.11 ng	-
Selenium[P]	10 ug		-	0.01 mg
Silver[P]	50 ug		-	0.05 mg
Solids(Dissolved)And Salinity	-			-
250 mg	-			

TABLE B-16 (continued)

Parameter	Fish and Water Ingestion	Fish Consumption Only	Drinking Water M.C.L.[1]	Organo-leptic Criteria[2]
Tainting Substances (Narrative Statement - SEE CRITERIA DOCUMENT)				
1,2,4,5 Tetrachlorobenzene[P]		38 ug	48 ug	-
1,1,2,2-tetrachloroethane[P,C]		1.7/0.17/0.017 ug	107/10.7/1.07 ug	-
Tetrachloroethylene[P,C]		8/0.8/0.08 ug	88.5/8.85/0.88 ug	-
Thalium[P]		13 ug	48 ug	-
Toluene[P]		14.3 mg	424 mg	-
Toxaphene[P,C]		7.1/0.71/0.07 ng	7.3/0.73/0.07 ng	0.005 mg -
1,1,1-trichloroethane[P]		18.4 mg	1.03 g	-
1,1,2-trichloroethane[P,C]		6/0.6/0.06 ug	418/41.8/4.18 ug	-
Trichloroethylene[P,C]		27/2.7/0.27 ug	807/80.7/8.07 ug	-
2,4,5-trichlorophenol		2,600 ug		-
- 1 ug				
2,4,6-trichlorophenol[P,C]		12/1.2/0.12 ug	36/3.6/0.36 ug	-
2 ug				
Vinyl Chloride[P,C]		20/2/0.2 ug	5246/525/52.5 ug	-
-				

1 M.C.L. is maximum contaminant level

2 To control undesirable taste and order quality of ambient water. It should be recognized that organoleptic data have limitations as a basis for establishing water quality criteria, and have no demonstrated relationship to potential adverse human health effects.

P Priority Pollutant

C Carcinogenic pollutant. For the maximum protection of human health from the potential carcinogenic effects resulting from exposure to these pollutants, the ambient water concentrations should be zero. The levels presented are for $10^{-5}/10^{-6}/10^{-7}$ incremental increase of cancer risk over the lifetime.

DESCRIPTIVE WATER QUALITY CRITERIA

B.1.71. Aesthetic qualities. All waters free from substances attributable to wastewater or other discharges that:

a. settle to form objectionable deposits;

b. float as debris, scum, oil, or other matter to form nuisances;

c. produce objectionable color, odor, taste, or turbidity;

d. injure or are toxic or produce adverse physiological responses in humans, animals or plants; and

e. produce undesirable or nuisance aquatic life.

B.1.72. Color. Waters shall be virtually free from substances producing objectionable color for aesthetic purposes; the source of supply should not exceed 75 color units on the platinum-cobalt scale for domestic water supplies, and increased color (in combination with turbidity) should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life.

B.1.73. Dissolved oxygen. Water should contain sufficient DO to maintain aerobic conditions in the water column and, except as affected by natural phenomena, at the sediment-water interface. Numerical criteria are available for varying aquatic life stages for coldwater and warmwater species.

B.1.74. Fecal coliform bacteria.

a. Bathing waters. Based on a minimum of five samples equally spaced over a 30-day period, the geometric mean of the E. coli density should not exceed 126 per 100 Ml for freshwater bathing. For the above sampling period, the geometric means of the enterococci density should not exceed 33 and 35 per 100 Ml for freshwater and marine bathing, respectively.

b. Shellfish harvesting waters. The median fecal coliform bacterial concentration should not exceed 14 MPN/100 Ml for the taking of shellfish, with not more than 10 percent of samples exceeding 43 MPN/100 Ml.

B.1.75. Oil and grease. For domestic water supply: virtually free from oil and grease, particularly from the tastes and odors that emanate from petroleum products. For aquatic life: (1) levels of individual petrochemicals in the water column should not exceed 0.01 times the lowest continuous flow 96-hour LC_{50} to several important freshwater or marine species, each having a demonstrated high susceptibility to oils and petrochemicals; (2) levels of oils or petrochemicals in the sediment which cause deleterious effects to the biota should not be allowed; and (3) surface waters shall be virtually free from floating nonpetroleum oils of vegetable or animal origin, as well as petroleum derived oils.

B.1.76. Settleable and suspended solids. Freshwater fish and aquatic life: settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life.

B.1.77. Tainting substances. Materials should not be present in concentrations that individually or in combination produce undesirable flavors which are detectable by organoleptic tests performed on the edible portions of aquatic organisms.

The LDEQ general criteria state that "all waters of the state shall be capable of supporting desirable diversified species of fish, shellfish and wildlife." Therefore, EPA criteria for freshwater or marine aquatic life, Tables B-15 and B-16, respectively, are held to apply to all surface waters. Also, EPA criteria for the protection of human health apply to all surface waters.

GENERAL DESCRIPTION OF WATER QUALITY PARAMETERS

B.1.78. Suspended solids in urban runoff consist mainly of particulate material which has accumulated along curbs and gutters of streets and roadways, although much of it had originated in other parts of the drainage area. Some of the more important sources of solids are eroded soil particles, particularly from construction sites or other unvegetated soil surfaces but also to an important extent from grassed areas, dirt and dust, fuel residue and other material including rubber, metal and synthetic substances associated with vehicular traffic, fallout from combustion of fossil fuels and other materials, solid waste and debris from poorly managed or exposed material storage sites, dumps and landfills, animal wastes, and leaves and other plant residue. Many pollutants become attached to the accumulating solid particles, and metals and organic compounds become physically or chemically adsorbed to clay particles. Excessive suspended solids levels in water generate unsightly turbidity plumes, and may interfere with the ability of sight - dependent fish and other organisms to obtain food, or may clog their gills or feeding apparatus.

B.1.79. Turbidity in water is caused by materials that inhibit light penetration and reduce the clarity of the water. It may be caused by microorganisms or various minerals, including plant detritus, silica and sediment particles. The turbidity of a water sample is a measure of the reduction in intensity of visible light passing through the sample. Turbidity affects the aquatic system by limiting light transmission and the process of photosynthesis which is vital to biological productivity. It is sometimes used as a broad indicator of suspended solids levels.

B.1.80. The pH level of a water body is a chemical measure of its tendency toward acidity or alkalinity. A pH value of 7.0 indicates neutrality. Most natural waters are slightly basic, with pH values between 7.0 and 8.0. Technically, pH is the $\log_{10}$ of the reciprocal of the hydrogen ion concentration in water. Wide deviations of pH from the neutral or slightly basic range may signal the presence of important contaminants, particularly toxic substances. Industrial wastewater, for example, is often highly acidic.

B.1.81. Biochemical oxygen demand (BOD) is a useful indicator of biodegradable organic material, including natural materials such as simple sugars, fats and proteins, and more complex organic chemicals synthesized by man. For the most part, biodegradable materials are not toxic to aquatic organisms. Their primary importance from a water quality perspective is that their decaying process requires either dissolved or combined oxygen, and the oxygen supply of the receiving water body may become dangerously depleted. Since certain levels of dissolved oxygen are needed to sustain life and permit normal functioning of aquatic species and to prevent the existence of undesirable anaerobic conditions, excessive BOD levels in runoff may produce oxygen deficits, depending on the assimilative capacity of the receiving water and its rate of natural reaeration. The most common BOD measurement is an oxygen consumption test over a five-day period. The ultimate BOD level may be estimated by extrapolation from test results over different time periods.

B.1.82. Chemical oxygen demand (COD) is a general indicator of the amount of potentially biodegradable material in water. Various industrial chemicals and other organic chemicals that degrade slowly or only under highly oxidized conditions are better represented by COD than by BOD. The COD test does not distinguish between stable and unstable organic matter and is therefore not directly related to BOD values in samples of industrial wastewater, urban runoff or receiving water.

B.1.83. Nutrients occur in nature in many forms. Nitrogen is an essential component of all proteins, chlorophyll and other important biological compounds. In organic matter, nitrogen decomposes from complex proteins through amino acids to ammonia, nitrites and nitrates, and is also synthesized from nitrates into plant and animal biomass (nitrogen fixation). The natural nitrogen cycle depends on microbiological activity for these processes. Nitrogen is present in urban runoff in many forms, including

ammonia, organic nitrogen, nitrites and nitrates. Kjeldahl nitrogen refers to a laboratory process that is used to measure the ammonia content of a nitrogen sample.

B.1.84. Nitrates are the end product of the aerobic stabilization of organic nitrogen, but they may also result from excessive fertilizer applications or from untreated domestic wastewater. Chemical fertilizer plants produce high nitrate levels in their wastewater. Despite their many sources, nitrates do not normally persist at high levels in natural water bodies, but become converted to biomass by natural processes. When nitrate levels in runoff greatly exceed the biological requirements of a receiving water body, eutrophication (over - enrichment) may occur, resulting in algal blooms or other undesirable conditions. Nitrites are seldom present in natural surface waters at significant levels except under polluted conditions and in the presence of ammonia.

B.1.85. Phosphorus occurs most commonly in nature as phosphates and orthophosphates and is a constituent of fertile soils, plants and animal tissue. It is an essential nutrient along with nitrogen for biological productivity and also undergoes cycles of decomposition and photosynthesis. It is ordinarily more abundant in urban runoff than in natural waters, and originates in domestic and industrial wastes, detergents and fertilizers. Phosphorus is often the critical parameter in the eutrophication of lakes and other water bodies that act as nutrient sinks.

B.1.86. Pathogenic bacteria in water may be harmful to humans, particularly if ingested while swimming. Organisms that are discharged from the intestinal tracts of humans or animals in fecal material may be pathogenic to humans or may alternatively serve as useful indicators of fecal pollution and the probable presence of pathogens. The most commonly employed pathogenic indicators are in the coliform group of bacteria, which consist predominantly of harmless organisms.

B.1.87. Fecal coliforms are measured by federal and state regulatory agencies to monitor for the presence of human and/or animal fecal pollution in water. Total coliforms are also measured as a more general indicator of fecal pollution, but these organisms may also originate in natural soils. None of the coliform group are ideal indicators of fecal pollution since they do not always exist in the same proportions to the pathogens. In order to be a reliable indicator of fecal pollution, an indicator should have a somewhat longer survival time in water than intestinal pathogens, but should nevertheless die off soon after the pathogens, so that their absence would assure the bacteriological safety of the water. The E. coli bacterial strain has been promoted as a superior indicator of fecal pollution, and has been adopted by EPA as the regulatory parameter for human health in bathing waters. E. coli is expected to eventually replace fecal coliform as the official State of Louisiana indicator organism for primary contact recreation.

B.1.88. Many metals are known to be chronically or acutely toxic to various aquatic species above certain concentration levels in saltwater and in freshwater, usually as a function of hardness, or the levels of ionized calcium and magnesium in the water expressed as the equivalent concentration of calcium carbonate. Six metals, cadmium, chromium, copper, mercury, lead and arsenic, have been regularly monitored by Jefferson Parish in the study area and also by other agencies in the receiving waters. These metals and a seventh, zinc, will be briefly discussed as they relate to this study in the following paragraphs.

B.1.89. Cadmium usually occurs at low levels in the natural freshwater environment, often below 0.01 ug/L, but waters affected by municipal and/or industrial development probably have much higher concentrations. Industrial sources include effluents from petrochemical plants, metallurgical processes and electroplating. Since it is extremely toxic to fish, its EPA chronic and acute freshwater criteria are set at 1.6 and 6.2 ug/L, respectively for a carbonate hardness level of 150 mg/L. Cadmium's chronic and acute saltwater criteria is 9.3 ug/L and 43 ug/L, respectively.

B.1.90. Chromium is more common than cadmium in natural freshwater, typically at about 0.5 ug/L. Chromium salts are used for electroplating and in cleaning agents, and are also present in paints, fungicides and wood preservatives. The EPA and Louisiana criteria for chronic and acute toxicity to freshwater aquatic life are 11 and 16 ug/L, respectively at a hardness of 150 mg/L.

B.1.91. Copper is relatively plentiful in the natural freshwater environment, ranging from about 1 to 10 ug/L. Pertinent industrial sources of copper include petroleum refineries. The EPA chronic and toxic criteria for freshwater aquatic life are 17 and 26 ug/L at a hardness of 150 mg/L. The EPA acute criterion for saltwater aquatic life is 2.9 ug/L, no chronic criterion is defined.

B.1.92. Lead occurs in most natural freshwater at 1 ug/L or less. It is much more plentiful, however, in waters in and near inhabited areas. It is used in storage batteries and other metal products, but is no longer permitted in paint pigments and gasoline additives. The EPA chronic and acute freshwater aquatic life criteria for lead are 5.3 and 137 ug/L at a hardness of 150 mg/L. The saltwater aquatic life acute and chronic criteria are 5.6 ug/L and 140 ug/L, respectively.

B.1.93. Mercury background levels in natural freshwater may range from 0.01 to 0.1 ug/L. It is used in the electrolytic preparation of chlorine and caustic soda, in mercury battery cells and thermometers, and in various other laboratory and industrial applications. The EPA freshwater aquatic life criteria for mercury are 0.012 ug/L (chronic) and 2.4 ug/L (acute). The chronic criterion was derived on the basis that all mercury discharged to the environment is methyl mercury, the form that evolves in sediment and in fish and the aquatic food chain. It is known, however, that almost all mercury discharged is mercury (II), a much less toxic form. The FDA action level for the concentration of methylmercury in the edible portions of fish is considered to be a more relevant criterion for consumable species than the referenced chronic criterion. The saltwater aquatic life acute and chronic criteria are 0.025 ug/L and 2.1 ug/L, respectively.

B.1.94. Arsenic concentrations in freshwater areas vary widely but are usually 5 ug/L or more. Arsenic is emitted to the environment by coal - fuel power plants. The EPA and Louisiana criteria for chronic and acute toxicity to freshwater aquatic life are 190 and 360 ug/L, respectively. The saltwater aquatic life criteria are 36 ug/L and 69 ug/L, respectively.

B.1.95. The chemistry of zinc is similar to that of cadmium, but it is much more abundant in the environment, with a median surface water concentration in the United States of about 20 ug/L. It is used as an oxide pigment in rubber and paint, in agricultural fertilizers and sprays and battery production. It is also used in galvanizing of metal and in the production of metal alloys. Its EPA chronic and acute criteria for freshwater aquatic life are 149 and 165 ug/L at a hardness of 150 mg/L. The saltwater acute and chronic aquatic life criteria are 86 ug/L and 95 ug/L.

EXISTING WATER QUALITY

B.1.96. An analysis of existing water quality was conducted to determine existing water resource problems and to develop a background for water quality projections. Background water quality is used to verify projection methodologies and to identify water quality problems that merit particular attention.

B.1.97. The in-situ water quality was determined using available data from various stations which are sampled at periodic intervals. Stations have been established by the US Army Corps of Engineers, US Geological Survey (USGS), the Louisiana Department of Health Services, and the Louisiana Department of Natural Resources. As previously discussed, these data were compared with appropriate state and Federal criteria to evaluate existing water quality and determine whether criteria are met.

B.1.98. Measured parameters vary with the station and sampling agency. In general, the USGS, the Corps of Engineers, and the Louisiana Department of Natural Resources analyze for a wide variety of chemical and physical parameters, including pesticides and heavy metals, while the Louisiana Department of Health Services is more biologically-oriented with emphasis on coliforms. Common parameters such as temperature, pH, dissolved oxygen (DO), and solids are recorded for most stations.

B.1.99. To more effectively analyze existing water quality, surface waters were divided into several segments. These segments along with the historic sampling stations referenced in this report, consist of the Mississippi River at and below New Orleans, the IHNC, Lake Pontchartrain in the vicinity of the IHNC, the Mississippi River-Gulf Outlet and the proposed mitigation site.

MISSISSIPPI RIVER

B.1.100. The banks of the Mississippi River from Baton Rouge to the Gulf of Mexico are lined with more than 115 industrial plants. Among these industrial complexes are the largest petroleum refineries in the United States, several smaller refineries, and numerous and diverse petrochemical and chemical manufacturers. Most of these industries utilize the Mississippi River as a source of process or cooling water and all discharge their wastes into the river. Additionally, wastes from various municipalities are discharged into the Mississippi River. Pollutants contained in these and other wastes and inflows adversely affect the water quality.

B.1.101. There are four sampling stations located in the segment of the Mississippi River considered in this study. The New Orleans station is located approximately 10 miles upstream of the IHNC, and provides an
indication of the type and level of constituents in the river which might impact canal water. Values for Mississippi River water quality parameters at this station for the time frame, January 1970 through September 1988, are shown in Table B-17. This station was discontinued in 1988.

TABLE B-17
WATER QUALITY DATA
MISSISSIPPI RIVER AT NEW ORLEANS, LOUISIANA[1]
Period of Record: January 1970 through September 1988

Parameter		Units	Number Values	Percent Un-detected	Mean	Maximum	Minimum
Water	Temp	Cent	152	-	18.285	31.000	1.500
Turbidity	Jkson	JTU	52	-	59.788	230.000	1.000
Color	PT-CO	Units	128	-	13.469	50.000	0.000
Conductivity		AT 25C	Micromho	154	-	405.690	608.000
	257.000						
DO		mg/L	142	-	8.198	13.300	5.400
BOD	5-day	mg/L	96	-	1.909	5.700	0.000
pH		SU	142	-	7.561	8.200	6.900
CO_2		mg/L	107	-	7.022	22.000	1.200
T Alkalinity		$CaC0_3$	mg/L	139	-	104.430	161.000
	65.000						
HCO_3 Ion	$HC0_3$	mg/L	107	-	124.130	172.000	79.000
Residue	Diss-105C	mg/L	3	-	233.330	270.000	180.000
Residue	Tot Nflt	mg/L	4	-	69.250	110.000	44.000
Total N	N	mg/L	65	-	2.095	4.000	0.710
Total KJEL	N	mg/L	84	-	0.785	2.300	0.200
$N0_2$ and $N0_3$	N-Total	mg/L	91	-	1.302	2.500	0.030
Phos-Tot		mg/L P	91	-	0.251	0.860	0.020
T Org C	C	mg/L	22	-	6.641	19.000	1.000
Cyanide	CN-Tot	mg/L	8	50	<0.005	<0.010	0.000
Tot Hard	$CaC0_3$	mg/L	124	-	149.070	210.000	99.000
NC Hard	$CaC0_3$	mg/L	119	-	46.042	83.000	29.000
Calcium	CA, Diss	mg/L	137	-	40.817	59.000	27.000
Magnesium	Mg, Diss	mg/L	137	-	11.804	20.000	4.600
Sodium	Na, Diss	mg/L	137	-	21.825	45.000	9.000
Sodium	Adsbtion	Ratio	116	-	0.757	1.500	0.400
Percent	Sodium	Percent	116	-	22.862	36.000	13.000
Potassium	K, Diss	mg/L	137	-	3.301	6.200	1.800
Chloride	Cl	mg/L	139	-	24.453	54.000	11.000
Sulfate	$S0_4$,Tot	mg/L	139	-	56.431	260.000	30.000
Fluoride	F, Diss	mg/L	135	-	0.397	1.100	0.100
Silica	Dissolved	mg/L	131	-	6.269	11.000	0.200
Arsenic	AS, Diss	ug/L	27	4	<1.482	5.000	0.000
Arsenic	AS, Susp	ug/L	11	-	<2.455	5.000	1.000
Arsenic	AS Tot	ug/L	16	-	<3.063	8.000	1.000

TABLE B-17 (continued)

Parameter		Units	Number Values	Percent Un-detected	Mean	Maximum	Minimum
Cadmium	CD, Diss	ug/L	44	41	<2.045	6.000	0.000
Cadmium	CD, Susp	ug/L	15	73	<2.067	20.000	0.000
Cadmium	CD, Tot	ug/L	20	65	<3.350	20.000	0.000
Chromium	CR, Diss	ug/L	27	74	<1.259	<20.000	0.000
Chromium	CR, Susp	ug/L	12	42	<6.583	20.000	0.000
Chromium	Hex-Val	ug/L	29	79	<0.862	<10.000	0.000
Chromium	CR, Tot	ug/L	18	22	<13.111	20.000	0.000
Cobalt	Co, Diss	ug/L	33	52	<2.182	6.000	0.000
Cobalt	Co, Susp	ug/L	13	38	<9.385	<50.000	0.000
Cobalt	Co, Total	ug/L	18	39	<13.222	<100.000	0.000
Copper	Cu, Diss	ug/L	43	28	<4.488	26.000	0.000
Copper	Cu, Susp	ug/L	13	31	5.077	16.000	0.000
Copper	Cu, Tot	ug/L	18	17	8.389	20.000	0.000
Iron	FE, Tot	ug/L	18	-	3712.800	7200.000	570.000
Iron	FE, Diss	ug/L	40	-	<30.800	230.000	10.000
Lead	Pb, Diss	ug/L	43	33	<4.186	10.000	0.000
Lead	Pb, Susp	ug/L	14	7	<22.714	<97.000	0.000
Lead	Pb, Tot	ug/L	18	6	<42.222	<200.000	0.000
Manganese	Mn, Susp	ug/L	14	-	169.720	310.000	40.000
Manganese	Mn, Tot	ug/L	18	-	<181.670	330.000	10.000
Manganese	Mn, Diss	ug/L	42	5	<16.000	<100.000	0.000
Nickel	Ni, Tot	ug/L	3	-	15.000	20.000	10.000
Zinc	Zn, Diss	ug/L	44	16	<17.25	60.000	0.000
Zinc	Zn, Susp	ug/L	14	21	16.429	60.000	0.000
Zinc	Zn, Tot	ug/L	19	5	<57.369	450.000	0.000
Selenium	Se, Diss	ug/L	17	-	<2.353	8.000	1.000
Selenium	Se, Susp	ug/L	11	55	0.909	6.000	0.000
Selenium	Se, Tot	ug/L	16	-	<3.000	11.000	1.000
Beta-D	AS CS137	Pc/L	5	-	6.177	11.000	4.500
Beta-S	AS CS137	Pc/L	5	-	6.808	16.000	2.400
Ra-226-0	Radon.MT	Pc/L	5	-	0.112	0.180	0.070
U-Nat	Dissolved	ug/L	3	-	1.233	1.500	0.800
Tot Coliform		NFIMENDO /100 Ml	31	-	3181.600	14000.000	420.000
Fec Coliform		MFM-FCBR /100 Ml	31	-	<421.902	1800.000	5.000
Fec Coliform		M-FCAGAD /100 Ml	30	-	362.330	660.000	120.000
Fecstrep	MFKFAGAR	/100 Ml	46	-	<871.955	6600.000	10.000
Fecstrep	MF M-Ent	/100 Ml	26	-	563.840	2400.000	100.000
Phenols	Total	ug/L	7	14	<4.714	18.000	0.000
Perthane	Whl Smpl	ug/L	9	44	<0.0356	<0.100	0.000
Napthalenes	Pc	ug/L	19	74	<0.026	<0.100	0.000
Aldrin	Tot	ug/L	26	81	<0.0019	<0.010	0.000
Gamma-BCH	Lindane	Tot ug/L	26	81	<0.0019	<0.010	0.000
Chlordane	Tech & Met	Tot ug/L	25	80	<0.0200	<0.100	0.000
DDD	Whl Smpl	ug/L	26	81	<0.0019	<0.010	0.000
DDE	Whl Smpl	ug/L	26	81	<0.0019	<0.010	0.000
DDT	Whl Smpl	ug/L	26	77	<0.0023	0.010	0.000
Dieldrin	Tot	ug/L	25	60	<0.0037	0.010	0.000
Endosulfan	Whl Smpl	ug/L	9	44	<0.0056	<0.010	0.000
Endrin	Tot	ug/L	26	73	<0.0027	0.010	0.000
Toxaphene	Tot	ug/L	21	76	<0.152	<1.000	0.000
Heptachlor	Tot	ug/L	26	81	<0.0019	<0.010	0.000
Methoxychlor		Whl Smpl ug/L	7	29	<0.0071	<0.010	0.000
PCB'S	Whl Smpl	ug/L	25	76	<0.024	<0.100	0.000
Malathion	Whl Smpl	ug/L	25	80	<0.0020	<0.010	0.000
Parathion	Whl Smpl	ug/L	25	80	<0.0020	<0.010	0.000

TABLE B-17 (continued)

Parameter	Minimum	Units	Number Values	Percent Un-detected	Mean	Maximum	Minimum
Diazinon	Whl Smpl	ug/L	24	46	<0.0079	0.060	0.000
Mparathn	Whl Smpl	ug/L	25	80	<0.002	<0.010	0.000
2,4-D	Whl Smpl	ug/L	25	48	<0.0120	0.060	0.000
2,4,5-T	Whl Smpl	ug/L	25	60	<0.0056	0.040	0.000
Mirex	Whl Smpl	ug/L	13	62	<0.0038	<0.010	0.000
Silvex	Whl Smpl	ug/L	24	67	<0.0038	0.020	0.000
Trithion	Whl Smpl	ug/L	19	74	<0.0026	<0.010	0.000
Mirthion	Whl Smpl	ug/L	19	74	<0.0026	<0.010	0.000
Setteable	Matter	Ml/1/hr	6	-	<1.000	<1.000	1.000
Algae	Total	/Ml	31	-	1684.100	7500.000	57.000
Residue	Diss-180C	mg/L	133	-	243.420	348.000	145.000
Diss Sol	Sum	mg/L	121	-	224.700	315.000	139.000
Diss Sol	Tons per	Acre-ft	113		0.323	0.440	0.200
Tot N	As NO_3	mg/L	64	-	9.252	18.000	3.100
Mercury	Hg, Diss	ug/L	16	6	<0.419	<0.500	0.000
Mercury	Hg, Susp	ug/L	12	83	0.025	0.200	0.000
Mercury	Hg, Tot	ug/L	38	3	<0.466	1.800	0.000
Alpha-D	As U-Nat	ug/L	5	-	<6.300	9.600	2.300
Alpha-S	As U-Nat	ug/L	5	-	11.500	31.000	2.300
Beta-D	As SR-Y-90	Pc/L	5	-	5.420	8.700	3.600
Beta-S	As SR-Y-90	Pc/L	5	-	5.260	12.000	1.900

1 Storet Data from USEPA. (USGS STATION: 112WRD 07374508).
< Actual value is less than value shown.

B.1.102. These data indicate that compliance with criteria is generally good. Table B-18 shows a comparison of selected LDEQ stream specific criteria and EPA criteria with the recorded data. (Data from other segments will be compared to the same criteria.) The comparison indicates that the EPA criterion is exceeded for phosphorus. This criterion was established to prevent eutrophication; however, because of swift water movement and low light penetration, that problem does not exist in the Mississippi River.

TABLE B-18
SELECTED CRITERIA COMPARISONS
MISSISSIPPI RIVER AT NEW ORLEANS
Period of Record: January 1970 through September 1988

	CRITERIA		RECORDED DATA		
	STATE[1]	EPA[2]	MEAN	MAXIMUM	MINIMUM
Temperature (^oC)	32	--	18.3	31.0	1.5
Dissolved Oxygen (mg/L)	5.0 (min)	5.0 (min)	8.20	13.3	5.4
BOD_5 (mg/L)	--	--	1.91	5.70	0
pH	6.5-9.0	6.5-9.0	7.6	8.2	6.9
NO_3 - Nitrogen (mg/L)	--	10	0.82	2.0	0.1
Phosphorus - total (ug/L)	--	100	251	860	20

Total Coliform per 100 Ml	10,000[3]	--	3,182	14,000	420
Fecal Coliform per 100 Ml	200[4]	--	309(log)	1,800	80
Total Dissolved Solids (mg/L)	400	--	242	348	145
Chlorides (mg/L)	75	250	24	54	11
Sulfates (mg/L)	120	250	56	260	30

1 LDEQ 1989 numerical criteria for Mississippi River near New Orleans
2 EPA Quality Criteria for Water, 1986
3 Drinking Water Supply: Monthly arithmetic mean most probable number (MPN)
4 Primary Contact Recreation: Monthly log mean

B.1.103. As footnoted in Table B-17 many parameter values were reported as "actual value known to be less than value shown" because of detection limits. Also, because of the sampling interval stated in some of the criteria, exceedances can only be regarded as "possible exceedances." For metals only, EPA recommends comparing the dissolved fraction, not the total concentration to the criteria. As discussed below, for the metals listed in Table B-17 chromium, copper, lead and mercury may have exceeded the EPA freshwater aquatic life criteria. The maximum value (<20 ug/L) for dissolved chromium possibly exceeded the acute criteria level of 16 ug/L. The mean dissolved chromium concentration of <1.259 ug/L was well below the chronic criteria level of 11 ug/L. It should be noted that this criterion is for chromium VI and cannot be directly compared to chromium. The maximum dissolved copper concentration (26 ug/L) exceeded the acute criteria level of 22 ug/L. However, the mean dissolved copper concentration (<4.488 ug/L) was well below the chronic criteria level of 17 ug/L. The maximum dissolved lead concentration (10 ug/L) exceeded the chronic criteria level of 5.3 ug/L, but did not exceed the acute criteria level of 137 ug/L. However, the mean dissolved lead concentration (<4.186 ug/L) was below the chronic criteria. For dissolved mercury, both the maximum (<0.5 ug/L) and the mean (<0.419 ug/L) concentrations possibly exceeded the chronic criteria level of 0.012 ug/L, but did not exceed the acute criteria level of 2.4 ug/L. The maximum cyanide concentration (<10 ug/L) possibly exceeded the chronic criteria level of 5.2 ug/L, but did not exceed the acute criteria of 22 ug/L. The mean cyanide concentration (<5.0 ug/L) was below this chronic criteria. For chlordane, mirex and PCB's both the maximum and mean concentrations possibly exceeded the chronic criteria as both the maximum and mean concentrations for these parameters are known to be less than the values reported. The maximum heptachlor concentration possibly exceeded the chronic criteria as the maximum is known to be less than the value reported. Both the maximum and mean concentrations for DDT, dieldrin and endrin possibly exceeded the chronic criteria, however the mean concentrations are known to be less than the values reported. The maximum toxaphene concentration (<1.0 ug/L) possibly exceeded the acute criteria level of 0.73 ug/L. The mean toxaphene concentration (<0.152 ug/L) possibly exceeded the chronic criteria level of 0.0002 ug/L.

B.1.104. Another sampling station is located approximately 9 miles downstream of the entrance to the IHNC, operated by USGS. Originally located on the east side of the river near Violet, it was moved to Belle Chasse in 1977. Water quality data from both locations were reviewed to determine if there were any significant changes as the stream flowed past New Orleans. Data from the station at Violet, which had a period of record from 1973 through 1978, showed significant increases over the New Orleans station in levels of coliform and copper. Average fecal coliform levels were approximately 5 times greater at the Violet location; the log mean of the fecal levels was over five times the LDEQ criteria (1039 vs. 200). Concentrations of total copper were over three times greater than the upstream station, however, the mean dissolved copper concentrations differed by only 1 ug/L.

B.1.105. Data from the USGS station after relocation to Belle Chasse also show higher levels of copper and fecal coliform. Observations for the period of record 1977 through 1992 show an increase in average concentrations of total copper to nearly three and a half times the New Orleans location level, however the mean dissolved copper concentrations differed by only 2 ug/L. Average metal concentrations have decreased slightly for chromium, copper, arsenic, cadmium, nickel and manganese comparing the 1977-1987 and 1988-1993 averages. Lead, zinc, and iron average concentrations have actually increased between these two time periods.

B.1.06. Table B-19 shows mean concentrations at the USGS Mississippi River at Belle Chase station (USGS 07374525). Mean values are shown in two categories: 1977-1987 and 1988-1993. These

categories correspond with the onset of required disinfection of municipal wastewater discharges which began in 1988. This requirement has resulted in significantly lower average fecal coliform levels in the Mississippi River since 1988. From the time period 1977-1987, the average fecal coliform count was 1021 per 100 mL. From the time period 1988-1993, the average fecal coliform count was 298 per 100 mL, a 71% decrease from the 1977-1987 time period.

TABLE B-19
SELECTED MEAN CONCENTRATIONS

Mississippi River at Belle Chase (USGS, 07374525)

Parmeter (units)	1977-1987		1988-1993	
Fecal coliform (#/100 mL)	1,021 (log 565)		298 (log 154)	
Chromium (ug/L)	3.53		1.21	
Copper (ug/L)	6.59		5.42	
Lead (ug/L)		2.43		3.37
Mercury (ug/L)	0.11		0.10	
Zinc (ug/L)		15.5		26.7
Arsenci (ug/L)	1.76		1.42	
Cadmium (ug/L)	1.46		1.17	
Iron (ug/L)		20.5		26.5
Nickel (ug/L)	3.14		2.69	
Manganese (ug/L)		8.26		4.05

B.1.107. The Mississippi River water sample collected in 1993 confirms the existing water quality in the Mississippi River. This sample was collected upstream of the IHNC entrance near the eastbank of the river. Values are in-line with historic readings, and generally fall near the mean value recorded for the previous stations. See Table B-26 for analysis results.

B.1.108. In summary, potential water quality problems in the Mississippi River in the vicinity of New Orleans include heavy metals, pesticides and pathogens. Trace metal concentrations occasionally violate criteria levels. However, with the exception of minor increases in concentrations of lead, zinc and iron, trace metal concentrations have shown a decreasing trend with time because of improved industrial wastewater treatment. Most pesticides and other synthetic organic compounds are only detectable, if at all, at very low concentrations. Pesticide levels have been decreasing with time because of prohibitions on the most toxic and persistent compounds, and improved treatment of industrial wastewater has reduced the average concentrations of most other organic compounds. This segment of the Mississippi River is presently classified by LDEQ as fully supporting its designated uses of Secondary Contact Recreation, Fish and Wildlife Propagation, and Drinking Water Supply, but not supporting Primary Contact Recreation (Ref. 13). Fecal coliform is the primary parameter for determining Primary Contact Recreation support. If the fecal coliform levels violate the criteria <10% of the time the waterbody is said to fully support the designated use. If the level violates the criteria 11 to 25 % of the time, the waterbody is said to partially support the designated use. Likewise, greater than 25 % and the waterbody does not support the use. The data at the Mississippi River Belle Chase station for the period of 1988-1993 indicates that the fecal coliform levels violates the data approximately 16% of the time. Thus, for this time period, this segment partially supports its Primary Contact Recreation use.

INNER HARBOR NAVIGATION CANAL

B.1.109. The water quality of the IHNC is the result of discharges directly into the canal or from connecting streams, especially the Mississippi River. Direct discharges include stormwater runoff,

industrial point sources, and vessel discharges. There are no municipal waste outfalls in the IHNC, although small quantities of local domestic wastes may be discharged.

B.1.110. The Dwyer Street pumping station drains runoff from eastern New Orleans and has a capacity of 120 cubic feet per second (cfs). The Florida Avenue at IHNC pump station recently constructed and put into operation is located on the west side of the IHNC canal with a capacity of 3,650 cfs and discharges directly into the IHNC. Discharge of this runoff into the canal could introduce significant amounts of pollutants from urban runoff. An indication of the type and magnitude of pollutants can be obtained from model studies conducted for the 1981 New Orleans-Baton Rouge Metropolitan Area Urban Stormwater Assessment and the 1992 Jefferson and Orleans Parish Water Quality Management Reconnaissance Study. One of the results of these investigations was the development of predicted concentrations of stormwater contaminants, summarized in Table B-20, for Orleans Parish. A review of that data indicates discharge from the stormwater pumping stations could introduce significant levels of biological oxygen demand (BOD) and coliform during a relatively short period of time, creating a "slug" loading effect. That could cause oxygen depletion and high coliform levels to occur in the IHNC.

TABLE B-20
ORLEANS PARISH STORMWATER CONTAMINANTS

		Existing	Predicted Storm Runoff	
Parameter	Units	Dry Weather	NOBRMA[1]	Jeff-Orl[2]
TSS	mg/L	30	210	929
BOD_5	mg/L	10	40	22
COD	mg/L	75	110	123
TN	mg/L	5	5	--
TP	mg/L	1	1	--
Total Coliform	#/100 Ml	5×10^6	2×10^7	1.5×10^5
Fecal Coliform	#/100 Ml	5×10^5	2×10^6	1.5×10^4

[1] New Orleans-Baton Rouge Metropolitan Area
[2] Jefferson and Orleans Parish Water Quality Management Reconnaissance Study

B.1.111. Several industries located along the IHNC discharge waste into the canal, and significant discharges are shown in Table B-21. These industries are possibly the sources of heavy metals detected in various water samples collected in the IHNC. Historic water quality data indicate the presence of magnesium, manganese, iron, lead, zinc, chromium, cadmium, copper, mercury and nickel. Both the maximum (11 ug/L) and mean (3.42 ug/L) copper concentrations exceeded the EPA saltwater aquatic life acute criteria level of 2.9 ug/L. The maximum lead concentration (6 ug/L) exceeded the chronic criteria of 5.6 ug/L, although the mean concentration (1.0 ug/L) was well below the criteria. Both the maximum (<0.5 ug/L) and mean (<0.377 ug/L) mercury concentrations possibly exceeded the chronic criteria level of 0.025 ug/L. Thus, historically, there is an indication that the water is subject to periodic metals contamination.

B.1.112. The IHNC sample collected during the 1993 sampling effort is similar to the results of the historic sampling. Most of the same metals are present in similar concentrations. The concentration of copper at <14 ug/L possibly exceeded the EPA saltwater aquatic life criteria of 2.9 ug/L. The value of 3.3 ug/L for lead falls between the mean and maximum of the historic values of 1.0 to 6.0 ug/L, although the criterion is not exceeded. Nickel possibly exceeds the EPA saltwater aquatic life criteria of 8.3 ug/L with a value of <23 ug/L. Other IHNC water concentration values for parameters analyzed during this effort are shown in Tables B-27, B-28 and B-29.

TABLE B-21
INNER HARBOR NAVIGATION CANAL (EXISTING POINT SOURCE DISCHARGES)

Facility Name	SIC Code	Estimated Discharge	Wastewater Discharge (pounds per day)				
		MGD	BOD	COD	VS	TSS	NO_3
Standard Brands, Inc.	20	3.2	107	--	--	941	--
New Orleans Public Service Patterson	49	216	--	--	--	--	--
United States Gypsum Company	32	0.65	94	1,323	3,253	--	--
Alabama Great Southern Railroad Company	40	0.216	5.8	--	--	25.4	--
Owens-Illinois, Inc.	32	.2	--	103	134	--	0.16
Lone Star Industries	--	0.04	--	--	--	--	--
Belden Concrete	--	0.001	--	--	5.1	--	--
Ideal Cement Company	--	0.002	--	--	--	--	--
Bergeron Marine Svc, Inc.	3731		--				
Board of Commissioners of Orleans Levee District	5171						
Marmac Corp (McDonough Corporation)	3731						
Quality Reconditioning Service, Inc	7699						

B.1.113. Although no long term or continuous monitoring of water quality is available for the IHNC, numerous samples have been taken and analyzed by various agencies. Table B-22 shows a comparison of water quality data for several parameters with established state and Federal criteria. Average DO concentrations taken in 1972 through 1976 were 7.2 mg/L, which met existing criteria. Minimum DO levels were extremely low, however, with values as low as 0.1 mg/L. Such levels could result from a combination of high BOD industrial wastes, stormwater discharge from the stormwater pumping stations, and local domestic wastes all being discharged into a sluggish canal. A similar DO problem would be expected to exist at the present time. Variations in pH exceed both the upper and lower limits established by LDEQ and EPA. Such extremes can have adverse effects on aquatic life; even more so if changes from one extreme to the other occur rapidly. In 1977 and 1978, the Louisiana Department of Health and Human Resources analyzed 10 samples from the IHNC for total coliform; the average level exceeded 50,000/100 mL. Although the state bacterial standards are based on fecal coliform rather than total coliform, it would appear that fecal coliform criteria commensurate with designated uses of the IHNC are not being met. The coliform problem is in part due to coliform contamination from the municipal wastes influxing from the Mississippi River; however, local domestic wastes from developments along the IHNC, as well as accumulated benthic deposits conducive to coliform regrowth, probably contribute most to the coliform problem in the IHNC.