B.1.114. Various studies conducted for Lake Pontchartrain also considered information on water quality in the IHNC. An environmental analysis of Lake Pontchartrain, conducted in 1980, noted that the canal showed definite evidence of a "salt wedge" which occurs during a flooding tide. This phenomenon occurs because the canal is connected to the gulf. More saline (and more dense) gulf water moves along the bottom, and probably is the primary source of chlorides shown in Table B-22.

B.1.115. An investigation of the nutrients and toxic substance chemistry of the tidal passes into Lake Pontchartrain was conducted by the University of New Orleans under a contract from the Corps of Engineers as part of the Lake Pontchartrain Hurricane Protection Study. One of the sampling stations was located in the IHNC near the entrance to Lake Pontchartrain. Nutrient data indicated that in comparison to the passes at Chef Menteur and Rigolets, the IHNC had higher average concentrations of ammonia, nitrite plus nitrate, orthophosphate, and total phosphorus. Although none of these constituents exceeded EPA criteria, the ammonia concentration indicated that certain industries along the waterway could be contributing additional quantities of ammonia above natural levels.

TABLE B-22
WATER QUALITY DATA[1]
INNER HARBOR NAVIGATION CANAL

	CRITERIA		RECORDED DATA		
	STATE[2]	EPA[3]	MEAN	MAXIMUM	MINIMUM
Temperature (^{o}C)	35	--	20.4	34.5	3.9
Dissolved Oxygen (mg/L)	4.0 (min)	5.0 (min)	7.2	13.4	0.1
BOD_5 (mg/L)	--	--	2.7	10.6	0.7
pH	6.5 - 9.0	6.5 - 9.0	7.5	9.8	3.4
NO_3 - Nitrogen (mg/L)	--	--	0.87	2.0	0.06
Phosphorous - Total (ug/L)	--	50	189	310	30
Total Coliform per 100 Ml	--	--	9,050	333,000	0
Fecal Coliform per 100 Ml	200[4]	200[4]	8,119	240,000	0
Total Dissolved Solids (mg/L)	--	--	8,515	22,068	16
Chlorides (mg/L)	--	--	4,916	12,000	16
Sulfates (mg/L)	--	--	119	540	29

1 Composite of data from various sampling stations 1970-1982
2 LDEQ 1989 numerical criteria for IHNC - Mississippi River Lock to Lake Pontchartrain (Estuarine)
3 EPA Quality Criteria for Water, 1986
4 Primary Contact Recreation: Monthly log mean

B.1.116. Another portion of the study analyzed Phase I sediment and tissue samples. The analyses conducted on these samples were for base-neutral extractable organic priority pollutants and other toxic substances. There was a total of 23 EPA base-neutral organic priority pollutants identified in replicate IHNC sediment samples. Twenty-one additional base-neutral organics were identified at least to chemical class. Samples of oysters also were analyzed and a total of 19 EPA base neutral organic priority pollutants was identified. Five other specific base-neutral organic compounds of probable anthropogenic origin were detected among the 136 individual base-neutral extractable organics identified to chemical class. The majority of the pollutants detected were polynuclear aromatic hydrocarbons (PAH's), the major source of which is considered to be the combustion of fossil fuels and/or other organic combustibles. The presence of such compounds as low molecular weight alkylated aromatics suggests the occurrence of direct inputs of some low boiling petroleum distillates such as gasoline. Four of the PAH's were carcinogenic: methyl phenanthrene, benzo(a) anthracene, chrysense, and benzo(k) flouranthene. Analyses of the water column indicated diethylphthalate and dibutylphthalate were present in concentrations that may be toxic to chronically exposed aquatic organisms. This study indicated that of the three tidal passes into Lake Pontchartrain, the IHNC has the highest general organic pollutant burden, the highest level of PAH contamination, and the highest level of industrial organics pollution. This organic pollution occurs from industries along the bank, urban and rural air particulate matter fallout, terrestrial runoff, and ship traffic.

< Actual value is less than value shown

B.1.117. In summary, water quality problems in the IHNC include DO, coliform, pH, heavy metals, organics, and some pesticides. This has resulted in the LDEQ classifying the IHNC as "Water Quality Limited."

LAKE PONTCHARTRAIN

B.1.118. The water in Lake Pontchartrain near the entrance of the IHNC is affected by water from the canal, especially the water of the IHNC north of the MR-GO confluence. A sampling station is located in the lake near the canal entrance, and provides an indication of water quality in the area. Values for selected parameters are shown in Table B-23. These data show high average DO levels, high phosphorus concentrations, low BOD levels, and occasional pH levels above and below state or EPA criteria. Mean fecal coliform levels exceeded the state criteria of 200 counts/100 mL. The maximum copper concentration (9 mg/L) exceeded the saltwater EPA acute criteria level of 2.9 ug/L, but the mean copper concentration (2.6 ug/L) was below this criteria. The maximum lead concentration (10 ug/L) exceeded the EPA chronic criteria level of 5.6 ug/L, but the mean lead concentration (0.8 ug/L) was well below this criteria level. Both the maximum (0.2 ug/L) and mean (<0.28 ug/L) mercury concentration possibly exceeded the chronic criteria level of 0.025 ug/L. The maximum cyanide concentration (30 ug/L) exceeded the acute criteria level of 1 ug/L, but the mean cyanide concentration (O.3 ug/L) was below this criteria level. Several pesticides were detected in Lake Pontchartrain. The maximum concentration of chlordane (<0.1 ug/L) possibly exceeded the acute criteria level of 0.09 ug/L. The mean chlordane concentration (0.002 ug/L) was less than the chronic criteria level of 0.004 ug/L. The maximum mirex concentration (0.01 ug/L) exceeded the chronic criteria level of 0.001 ug/L, but the mean mirex concentration (0.0004 ug/L) was well below this level. The maximum PCB concentration (<0.1 ug/L) possibly exceeded the chronic criteria level of 0.03 ug/L. The mean PCB concentration (0.003 ug/L) was well below the chronic criteria. Both the maximum (<0.1 ug/L) and mean (<0.002 ug/L) toxaphene concentrations possibly exceeded the chronic criteria level of 0.0002 ug/L. As noted in a preceding paragraph, the IHNC near the entrance in the lake contains a significant number of organic compounds. Nevertheless, Lake Pontchartrain near the IHNC exhibits reasonably good water quality.

TABLE B-23
WATER QUALITY DATA
LAKE PONTCHARTRAIN (Vicinity of IHNC)
Period of Record: April 1967 through January 1981

	CRITERIA		RECORDED DATA		
	STATE[1]	EPA[2]	MEAN	MAXIMUM	MINIMUM
Temperature (°C)	32	--	21.2	32.0	6.1
Dissolved Oxygen (mg/L)	4.0 (min)	5.0 (min)	8.2	13.6	1.1
BOD_5 (mg/L)	--	--	2.1	17.6	0.0
pH	6.5 - 9.0	6.5 - 8.5	7.6	9.7	4.1
NO_3 - Nitrogen (mg/L)	--	--	0.640	2.6	0.00
Phosphorous - Total (ug/L)	--	25	97	600	10
Total Coliform per 100 Ml	--	--	1,785	26,000	4
Fecal Coliform per 100 Ml	200[3]	200[3]	269	12,000	0
Total Dissolved Solids (mg/L)	--	--	6,477	16,333	5
Chlorides (mg/L)	--	250	2,882	8,750	18
Sulfates (mg/L)	--	250	190	1,100	18

1 LDEQ 1989 numerical criteria for Lake Pontchartrain - West of Highway 11 Bridge (Estuarine)
2 EPA Quality Criteria for Water, 1986
3 Primary Contact Recreation: Monthly log mean

< Actual value is less than value shown

MISSISSIPPI RIVER-GULF OUTLET (GIWW)

B.1.119. There are no active sampling stations located along the Mississippi River-Gulf Outlet, with the exception of a Corps of Engineers station along the IWW near the Paris Road Bridge (MR-GO). Table B-24 shows the water quality parameters at this station for the time period 1967-1981.

TABLE B-24
WATER QUALITY DATA
IWW NEAR PARIS RD BRIDGE N.O., LA.[1]
Period of Record: 9/13/67 through 4/6/81

PARMETER	NOBS	AVE	MAX	MIN	BEG-DATE	END-DATE
10 WATER TEMP CENT	616	22.2	42.0	3.1	67/09/13	81/01/29
20 AIR TEMP CENT	250	22.4	36.0	3.9	67/09/13	73/04/06
64 DEPTH OF STREAM MEAN(FT)	75	20.3	55.0	11.0	72/01/04	73/03/21
70 TURB JKSN JTU	38	44.2	200.0	0.0	72/10/20	73/06/28
80 COLOR PT-CO UNITS	38	59	260	10	72/10/20	73/06/28
81 AP COLOR PT-CO UNITS	38	130	440	20	72/10/20	73/06/28
94 CNDUCTVY FIELD MICROMHO	92253	12850	51600	20	67/10/03	81/04/06
95 CNDUCTVY AT 25C MICROMHO	31	11890	13200	9700	79/01/01	79/01/02
299 DO PROBE MG/L	420	7.1	11.8	0.9	67/09/13	81/01/29
310 BOD 5 DAY MG/L	39	2.3	8.6	0.1	72/10/20	73/06/28
400 PH SU	680	7.56	13.60	4.10	67/09/13	81/01/29
410 T ALK CACO3 MG/L	38	85	112	40	72/10/20	73/06/28
515 RESIDUE DISS-105 C MG/L	39	45	176	4	72/10/20	73/06/28
549 RESIDUE VOL NSET MG/L	39	11	53	0	72/10/20	73/06/28
550 OIL-GRSE TOT-SXLT MG/L	17	4.3	14.1	0.0	73/04/20	73/06/28
610 NH3+NH4- N TOTAL MG/L	40	0.236	1.320	0.080	72/10/20	73/06/28
620 NO3-N TOTAL MG/L	39	0.922	3.000	0.000	72/10/20	73/06/28
680 T ORG C C MG/L	17	6.6	18.3	2.6	73/04/20	73/06/28
900 TOT HARD CACO3 MG/L	39	1155	4263	140	72/10/20	73/06/28
940 CHLORIDE TOTAL MG/L	475	5737	15211	42	67/09/13	73/06/28
945 SULFATE SO4-TOT MG/L	26	202	748	40	73/04/10	73/06/28
1002 ARSENIC AS,TOT UG/L	26	< 14	37	< 10	73/04/10	73/06/28
1045 IRON FE,TOT UG/L	39	< 208	1300	< 100	72/10/20	73/06/28
1051 LEAD PB,TOT UG/L	8	< 500	< 500	< 500	72/10/20	72/12/29
1092 ZINC ZN,TOT UG/L	8	< 100	< 100	< 100	72/10/20	72/12/29
31504 TOT COLI MFIM LES /100ML	38	3833	53000	0	72/10/20	73/06/28
31616 FEC COLI MFM-FCBR /100ML	36	275	1000	0	72/10/20	73/06/28
32240 TANNIN LIGNIN MG/L	39	0.3	4.1	0.0	72/10/20	73/06/28
32260 CTE MG/L	17	0.02	0.02	0.02	73/04/20	73/06/28
32270 CHLORO- FORM EXT MG/L	17	0.0	0.0	0.0	73/04/20	73/06/28
39330 ALDRIN TOT UG/L	17	< 0.025	< 0.025	< 0.025	73/04/20	73/06/28
39380 DIELDRIN TOTUG/L	17	< 0.025	< 0.025	< 0.025	73/04/20	73/06/28
70301 DISS SOL SUM MG/L	449	11108	27973	3310	67/09/13	72/06/27
70507 PHOS-T ORTHO MG/L P	39	0.328	3.200	0.000	72/10/20	73/06/28
71900 MERCURY HG,TOTAL UG/L	6	< 1.5	4.0	< 1.0	72/10/20	72/12/14

1 STORET Data from USEPA. (USACE Station: 11COELMN, 76042)
< Actual value is less than value shown.

B.1.120. The minimum DO level of 0.9 mg/L is below the LDEQ minimum criteria of 4.0 mg/L, but the average is 7.1 mg/L. Of the 420 observations for DO, 46 (or 11% of the total) were below the LDEQ minimum criteria of 4.0 mg/L. Such low levels could result from a combination of high BOD industrial wastes, stormwater discharge, and local domestic waste. A similar DO problem would be expected to exist at the present time.

< Actual value is less than value shown

B.1.121. The maximum temperature recorded was 42°C, also violating the 35°C LDEQ criteria. Numerous excursions both above and below the state criteria for pH are noted. Such extremes can have adverse effects on aquatic life, even more so if changes from one extreme to the other occur rapidly. Conductivity ranged from a minimum of 20 micromhos/cm to a maximum of 51,600 micromhos/cm during the period of record (92,253 observations from 1967 through 1981).

B.1.122. Since the segment is designated for Oyster Propagation, the bacterial standard #4 applies. It states that the fecal coliform median MPN shall not exceed 14 fecal coliforms per 100/mL, and not more than 10% of the samples shall exceed an MPN of 43/100mL for a 5-tube decimal dilution test in those portions of the are most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. Given the limited data ranging from October 1972 through June 1973, it appears probable that this criteria is violated quite frequently. The average of 275/100mL exceeds the 14/100mL criteria and 58% (21 of the 36 values) exceed the 43/100mL criteria when only a 10% exceedance is allowed. Again, as in the IHNC, the coliform problem is in part due to coliform contamination from the municipal wastes influxing from adjacent waterways, local domestic wastes, as well as accumulated benthic deposits conducive to coliform regrowth.

B.1.123. Metals and pesticides were also analyzed periodically at this station between 1972 and 1973. Of the metals with criteria, only lead, zinc, and mercury exceeded or possibly exceeded their respective criteria. All eight samples were measured to be <500 ug/L for lead; possibly exceeding the EPA acute criteria of 140 ug/L. All eight zinc values were measured to be <100 ug/L; possibly exceeding the EPA acute criteria of 95 ug/L. One value in six exceeded the 2.1 ug/L EPA acute criteria for mercury at 4.0 ug/L. One value in 26 exceeded the 36 ug/L EPA chronic criteria for arsenic with a value of 37 ug/L. Pesticides were below the applicable saltwater acute criteria.

B.1.124. This segment of the IWW from the Inner Harbor Navigation Canal to Chef Menteur Pass (MR-GO) is currently classified by LDEQ as fully supporting it's overall designated uses (primary contact recreation, secondary contact recreation, fish and wildlife propagation, and oyster propagation). Separately, LDEQ classifies this segment as threatened for primary contact recreation, secondary contact recreation, and fish and wildlife propagation. Suspected sources are channelization and upstream sources. Suspected causes are organic enrichment/low DO, salinity/TDS/chlorides, pathogen indicators, and oil and grease.

B.1.125. Given the limited data available for the Mississippi River-Gulf Outlet, it appears that the MR-GO exhibits water quality similar to the IHNC, with higher salinity levels due to saltwater intrusion from the Gulf of Mexico.

PROPOSED MITIGATION SITE

B.1.126. There are no sampling stations located in the proposed mitigation site. The area is located to the northeast of the new lock construction site, in the large triangular shaped body of shallow, brackish water. The triangular area is bounded by Bayou Bienvenue (Main Outfall Canal) on the north and west, the Back Protection Levee of the 9th Ward on the south, and a landfill and sewerage treatment plant on the east. Water samples collected near the mitigation site as a part of the 1993 sampling program are presented in Tables 30-36. Copper possibly exceeded the 1986 EPA saltwater aquatic life criteria of 2.9 ug/L, with a value of <14 ug/L. Nickel possibly exceeded the EPA saltwater chronic criteria of 8.3 ug/L with a value of <23 ug/L. Other metals detected in the proposed disposal area were cadmium, lead, zinc, aluminum, iron, manganese, and magnesium. Since there was only a single sample analyzed, a generalization cannot be made as to the existing water quality in the area. However, the water quality appears to be similar to the quality of water in the IHNC, although fluctuations do exist.

SUMMARY AND DISCUSSION

B.1.127. The information reviewed and analyzed in this report is sufficient to characterize the general water quality of the study area, and to provide a basis for assessing the impacts of the considered alternatives. This discussion is based not only on specific station data as set forth in previous paragraphs,

< Actual value is less than value shown

but also considers information available in various reports and documents which address a portion or all of the study area.

B.1.128. In general, DO in the study area is high and BOD low, however, there are some problem areas. DO depression generally occurs in the IHNC and MR-GO. Industrial, stormwater and nonpoint source discharges, low flushing actions and stagnant conditions, result in BOD values as high as 10.6 mg/L and DO values as low as 0.1 mg/L. Water flowing from the IHNC into the GIWW combines with industrial discharges, stormwater, and nonpoint sources resulting in similar problems; however, these problems decrease as the GIWW flows eastward.

B.1.129. An analysis of total and fecal coliform values indicates high levels of coliform throughout most of the study area. The Mississippi River had average levels (over a 10-year period of record) of 3,182 and 392 for total and fecal coliform, respectively. Both were less than state criteria. In the IHNC, and adjacent MR-GO, urban runoff, storm water discharge, and small amounts of domestic sewage, all combine with a sluggish flow to yield the highest coliform levels in the study area. The characteristics of New Orleans stormwater runoff are such that high levels of bacterial contamination are present. Sewer line settlement and fracture has occurred to the degree that much of the runoff is contaminated with domestic sewage. A composite of data from various measurements made in the IHNC for total and fecal coliform counts yielded average values of 9,050 and 8,119/100 mL, respectively. The maximum measured value for fecal coliform was 240,000/100 mL. From the limited data on fecal coliform in the MR-GO, it appears that levels are elevated in this water body also with an average of 275/100 mL.

B.1.130. Most of the water from the IHNC flows through the GIWW; however, the canal connects with Lake Pontchartrain and some discharge travels to that body of water. A review of data from the lake near the IHNC entrance indicates fecal coliform levels exceed the state criteria by 30 percent.

B.1.131. Heavy metals were present in most of the waters tested. In the Mississippi River, metals possibly violating the criteria included chromium, copper, mercury, and lead. The IHNC contained copper, mercury, and lead which possibly exceeded the EPA criteria. In the MR-GO lead, zinc and mercury exceeded or possibllly exceeded the EPA criteria. Copper and mercury were the two metals with the most potential to violate the criteria in the waters sampled.

B.1.132. Other contaminants detected at various sampling stations included pesticides, high nutrients, base-neutral organic priority pollutants, and organic compounds.

B.1.133. Thus, water in the study area may be classified as occasionally polluted by bacterial contamination, heavy metals, and some pesticides, high nutrients, and organic compounds.

B.1.134. The freshwater that flows into the IHNC comes from local rainfall, freshwater sources of Lake Pontchartrain, and the flow of Mississippi River waters through the IHNC lock. Saltwater intrusion into the surface water and marshlands occurs as a result of tidal flows, long term geological processes associated with subsidence of the delta, and the presence of the MR-GO.

B.1.135. Salinity increases in the areas adjacent to the MR-GO have occurred because the MR-GO provides a more direct route of flow from the high salinity waters of the Gulf of Mexico into the upper areas of the estuarine system. The MR-GO is a straight and deep channel in comparison with the natural meandering shallow lagoons and characteristically sluggish water movement found in the area. Greater volumes, more rapid mixing, and deeper penetration of saltwater are responsible for higher salinities in surface waters and marsh areas adjacent to the MR-GO.

B.1.136. Conductivity is a measure of dissolved ionized solids in water, and provides a means for estimating salinity. Although there are no clear demarcations between fresh, brackish, and saltwater, freshwater is generally considered to have a conductance of less than 7,700 micromhos/cm, saltwater a conductance more than 20,000 micromhos/cm, and brackish water the range between the two figures. Table B-25 lists average, maximum, and minimum conductivity measurements for the sampling stations

< Actual value is less than value shown

located in the study area. Salinity intrusion into Lake Pontchartrain has occurred through the IHNC from the MR-GO.

B.1.137. Data from the sampling stations were reviewed to determine if any salinity trends were evident. The location with the most available data was the Mississippi River at Belle Chasse station. Although all stations showed some increases in conductivity over time, there was insufficient data to indicate a definite trend.

TABLE B-25
WATER QUALITY DATA
CONDUCTIVITY

Station[1]	Waterway	Conductivity (Micromhos/cm) Mean	Maximum	Minimum
1	Mississippi River at New Orleans	406	608	257
2	Mississippi River at Belle Chasse, Louisiana	429	1640	260
3	IHNC Forebay	540	862	368
4	Lake Pontchartrain at IHNC Entrance	4,755	21,700	292
5	IWW near Paris Road Bridge	12,850	51,600	20

[1] Period of Record	Station
January 1970 to September 1988	1
October 1977 to July 1992	2
November 1975 to July 1979	3
June 1974 to January 1981	4
October 1967 to April 1981	5

PROJECTED WATER QUALITY

INTRODUCTION

B.1.138. This section sets forth the projected impacts to water quality in the study area which might be reasonably expected as a result of the implementation of each of the considered alternatives, including the no-project alternative. These impacts utilize data from previous investigations, detailed studies conducted to obtain information on specific aspects of potential water quality impacts, and on the results of computer modeling.

B.1.139. Elutriate analyses conducted in 1979, 1981, and 1982 were utilized in writing this report, as was the elutriate analysis conducted in 1993. The latter appears in Tables B-26 through B-36 following this section.

B.1.140. The elutriate test is a simplified simulation of the dredging and disposal process wherein predetermined amounts of dredging site water and sediment are mixed together to approximate a dredged material slurry. The test provides an indication of the chemical constituents likely to be released to the water column during a dredging/disposal operation.

< Actual value is less than value shown

B.1.141. In general, elutriate data was compared to the LDEQ or EPA freshwater acute aquatic life criteria for the Mississippi River and the LDEQ or EPA saltwater acute aquatic life criteria for the IHNC and the proposed mitigation site. The acute criteria was employed due to the localized, short-term water quality effects which dredging/disposal operations typically produce. In cases where no criteria for aquatic life criteria exists and there is a significant increase from ambient water concentration to elutriate concentration, the parameter as well as its effects will be discussed. This writeup only focuses on obvious violations of criteria or increases in concentrations, Tables B-26 through B-36 provide the data in its entirety. Increases where the values for ambient water and elutriate concentrations are both known to be less than the value shown are not discussed. As previously discussed, direct comparisons between measured values and criteria are not always possible. In particular, many parameters are "known to be less than the value shown". Exceedances should thus be regarded as "possible exceedances".

B.1.142. Samples were collected on May 10 and 11, 1993 by NOD personnel. Analysis for the 1993 elutriate analysis utilized sediment samples taken from the IHNC at 4 sites, which were mixed with the appropriate water source. (See plate B-11A).

B.1.143. Site A is in the IHNC channel south of the existing lock between the St. Claude Avenue crossing and the Mississippi River. This sediment was mixed with Mississippi River water to form the elutriate. All material dredged from this location will be used as random backfill or discharged into the Mississippi River. The results are shown in Table B-26, which shows one composite sediment sample compared to the applicable freshwater acute aquatic life criteria.

B.1.144. Site C is located in the IHNC channel north of the existing lock and south of North Claiborne Avenue. This sediment was mixed with the IHNC water sample and is compared to the applicable saltwater acute aquatic life criteria in Tables B-27, B-28 and B-29. The material dredged from this location will be used as random backfill or discharged into the Mississippi River. The depths of the sediment sample at Site C are as follows: CR1-AT (0-1 feet depth) , CR1-AM (1-5 feet depth) , and CR1-AB (4-9 feet depth). This elutriate is an indicator of the effects of dredging activities as opposed to disposal activities.

B.1.145. Site G is located adjacent to the Galvez Street Wharf in the IHNC between North Claiborne Avenue and Florida Avenue. This sediment was mixed with the proposed mitigation site water and is compared to the applicable criteria in Tables B-30, B-31 and B-32. The material dredged from this location will be pmped to the MR-GO disposal site. The depths of each sediment samples at Site G are as follows: GR1-AT (0-1 feet depth), GR1-AM (1-4 feet depth), and GR1-AB (4-9 feet depth).

B.1.146. Site E is located in the IHNC near the turning basin at Florida Avenue. The sediment from these samples was also mixed with the proposed mitigation site water. The material dredged from the location will be pumped to the MR-GO disposal site. Tables B-33, B-34, B-35 and B-36 show the elutriate analysis and comparison to the applicable saltwater acute aquatic life criteria. ER1-AT (1-1.5 feet depth), ER1-AB (1.5-6 feet depth), ER2-BT (0-8 feet depth), and ER2-BB (8-12 feet depth) were analyzed. Two vibracore samples were collected for site E.

FUTURE WITHOUT-PROJECT CONDITIONS

B.1.147. Projected future water quality conditions for the study area were modeled in conjunction with the New Orleans-Baton Rouge Metropolitan Area Water Resources Study, completed by the New Orleans District Corps of Engineers in 1981. Data from that study, combined with additional information, provides an overview of future conditions.

B.1.148. Occasional DO and fecal coliform violations would likely occur in the Mississippi River during periods of low flow. Such violations could be eliminated by instituting improved sewage treatment practices. Pesticide exceedances of EPA criteria should be greatly reduced due to prohibitions on the most toxic and persistent compounds. Occasional Mississippi River criteria violations for chromium, copper, mercury, and lead would likely continue, as would the IHNC criteria violations for copper, mercury and lead. Criteria violations along the MR-GO would also be expected to continue. Continued implementation

< Actual value is less than value shown

and enforcement of EPA effluent limitation requirements should result in a gradual reduction of heavy metals and the number of carcinogens, but it is unlikely they would be completely eliminated.

B.1.149. In the IHNC and MR-GO a continuation of fecal coliform violations is expected, and occasional DO violations are anticipated. DO, pH, and fecal coliform violations are expected to continue along the southern shore of Lake Pontchartrain. Jefferson Parish has recently constructed and began operation of a regional wastewater treatment facility which has an outfall in the Mississippi River rather than stormwater drainage canals leading to the lake. This will significantly reduce municipal related pollution. The southern portion of Lake Pontchartrain has been identified as eutrophic, and the condition is expected to remain the same.

FUTURE WITH-PROJECT CONDITIONS

B.1.150. There are currently four replacement plans under consideration during this phase of study. All four plans include: cutting a bypass channel on the east bank of the IHNC between North Claiborne Avenue and Florida Avenue, construction of a temporary construction site for off-site construction of lock modules (graving site) and construction of the new lock north of North Claiborne Avenue. The four plans have the following lock dimensions, ship lock at 36 foot depth, barge lock at 22 foot depth:

Width	Depth	Length
110'	22'	900'
110'	22'	1200'
110'	36'	900'
110'	36'	1200'

B.1.151. The primary differences between the water quality impacts for the four plans is the amount of excavated material which would require disposal and the location and amounts of disposal. No new turning basin is required since the existing turning basin is of sufficient size. Vessel traffic will not be interrupted through the existing lock during construction of the new lock. The existing lock is to be demolished after construction of the new lock is completed. Vessel traffic will be halted for short periods (up to one month) during the construction period. The bypass channel would be constructed, the lock constructed at a temporary construction site (graving site), the channel work completed, and the existing lock would be demolished. Water quality impacts could result from the new lock construction; removal, transport, and disposal of dredged material; demolition of the existing lock; construction of graving site; and other construction related activities.

B.1.152. Water quality impacts could result from the placement of steel sheet piles, transportation and placement of material, and operation of the equipment used during construction. Dredged material will be used in one of many ways: random backfill, pumped to MR-GO disposal site (between Bayou Bienvenue and the MR-GO, near the intersection of the MR-GO and the IHNC); pumped to the proposed mitigation site (between Bayou Bienvenue and the Back Protection Levee); pumped into the Mississippi River; or stockpiled and used for backfill. Placement and driving of the piles would cause slight localized short term impacts by increasing turbidity in the immediate construction area. Material spillage may cause local impacts, however, this could be minimized or eliminated by proper hauling/dumping techniques. Since minimal closure of the existing lock would be required during construction, general water quality in the IHNC and beyond should not be affected, other than for turbidity adjacent to the disposal and construction area.

Water quality impacts from construction of the graving site could also be expected. This site is located along the north bank of the MR-GO/GIWW, immediately west of the Paris Road bridge. The proposed work consists of excavation in a dry condition behind the current line of flood protection. Flood protection along the MR-GO will follow the present line of levee protection and tie into the graving site hurricane protection levees. Floodside protection of the site will consist of a tie-in dike, a cofferdam cell and a sand or crushed stone closure with sheetpile protection to protect against high tides. The closure shall be removed after a lock module is completed and ready for transfer to another site, and the closure

< Actual value is less than value shown

reinstalled to facilitate the construction of other modules. Water quality impacts due to construction and operation at the graving site are expected to be similar to those impacts described in the previous paragraph.

B.1.153. Total excavation varies depending upon the project alternative. Total excavation quantities follow and include dredging of: the north bypass channel, the new lock, the main channel north of the new lock, the south bypass channel, the main channel south of the new lock, utility corridors, and the existing lock forebay from the Mississippi River to St. Claude Avenue.

Lock Alternative	Total Excavation (cubic yards)
900' X 36'	2,832,000
1200' X 36'	3,043,000
900' X 22'	1,533,000
1200' X 22'	1,633,000

B.1.154. Of these amounts, an estimated 873,000 cubic years for the ship lock alternatives or 690,000 cubic yards for the barge lock alternatives would be dredged for the North Bypass Channel. The portion of this material excavated to a depth of 5 feet will be pumped to the MR-GO site. The remaining portion of this material excavated below a depth of 5 feet will be pumped to the mitigation site for wetland restoration.

An estimated 1,100,000 cubic yards for the 1200 foot by 36 foot alternative; 883,000 cubic yards for the 900 foot by 36 foot alternative; 310,000 cubic yards for the 1200 foot by 22 foot alternative; and 210,000 cubic yards for the 900 foot by 22 foot alternative would be required for the new lock construction. This material would be disposed of in the MR-GO site.

Dredging of the main channel north of the new lock is estimated to be 58,000 cubic yards for the 1200 foot by 36 foot alternative and 56,000 cubic yards for the 900 foot by 36 foot alternative. This material would be disposed of in the MR-GO site. No excavation for the barge lock alternatives are expected for the main channel north of the new lock.

Excavation estimates for the south bypass channel are 145,000 cubic yards for all four alternatives. The excavated material is to be used as random backfill. Excavation estimates for the main channel south of the new lock are 440,000 cubic yards, 110,000 cubic yards, 213,000 cubic yards and 213,000 cubic yards for the 1200 foot by 36 foot, 900 foot by 36 foot, 1200 foot by 22 foot, 900 foot by 22 foot alternatives, respectively. This material would be used as random backfill.

For both ship lock alternatives, 227,000 cubic yards of material will be dredged from St. Claude to the river. For the 1200 foot by 36 foot alternative 55,000 cubic yards of the total 227,000 cubic yards will be used for random backfill. The remainder will be pumped to the river. For the 900 foot by 36 foot alternative the total 227,000 cubic yards will be pumped to the river. For both of the barge lock alternatives 150,000 cubic yards of material will be dredged and used for random backfill. Utility corridors to be dredged expect to yield approximately 200,000 cubic yards for the ship lock alternatives and 125,000 cubic yards for the barge lock alternatives. All material dredged from the utility corridors will be stockpiled and used as backfill. Thus, the primary water quality impacts from this plan would result from the handling and disposal of this dredged material. The following paragraphs discuss the impacts associated with the dredging/disposal operations.

< Actual value is less than value shown

Existing Tailbay and Sites C, G, & E (1993 Elutriate Testing)

B.1.155. Three sites from the 1993 elutriate analysis are in the existing tailbay area, sites C, G, and E. Site C was analyzed using IHNC water, G and E were analyzed using water from the proposed mitigation site. Thus, site C can be analyzed to determine the impacts of dredging the IHNC, while sites G and E can be analyzed to determine the impacts of disposal in the proposed mitigation site and the MR-GO disposal site.

B.1.156. Three depths of the sample collected at Site C in 1993 were mixed with IHNC water and analyzed as elutriates (See Para. B.1.144). These data were compared to the EPA or LDEQ saltwater acute criteria (See Tables B-27, B-28, and B-29). Two metals were shown to increase to a concentration above the stated criteria; copper and zinc. Copper increased from an ambient water concentration of <14 ug/L to 110 ug/L for the 0-1 foot elutriate mixture, 200 ug/L for the 1-5 foot elutriate mixture, and 81 ug/L for the 5-9 foot elutriate mixture. Elutriates prepared from all three depth levels, and possibly the ambient water, exceeded the acute saltwater aquatic life criteria of 2.9 ug/L for copper. Zinc concentrations rose from an ambient water concentration of <20 ug/L to 82 ug/L for the 0-1 foot elutriate mixture, 220 ug/L for the 1-5 foot elutriate mixture, and 120 ug/L for the 5-9 foot elutriate mixture. The acute saltwater aquatic life criteria for zinc is 95 ug/L.

B.1.157. Other parameters showing significant increases from ambient water concentration to elutriate concentrations were: barium (66 ug/L ambient water to 140 ug/L, 250 ug/L, and 420 ug/L, respectively), magnesium (250,000 ug/L ambient water to 290,000 ug/L, 260,000 ug/L, and 260,000 ug/L, respectively), manganese (180 ug/L ambient water to 2,300 ug/L, 310 ug/L, and 81 ug/L, respectively), and bis(2-ethylexyl)phthalate (1 ug/L ambient water to 2 ug/L, 7 ug/L, and 1 ug/L, respectively). Elutriate samples listed above are for 0-1 foot depth, 1-5 foot depth, and 5-9 foot depths, respectively. No saltwater aquatic life criteria exists for the above parameters. The physical and chemical properties of barium generally will preclude the existence of the toxic soluble form under usual marine and fresh water conditions. Calcium and magnesium are the two most common cations defining the hardness of a waterbody. In general, these metal ions are not cause for concern to health, although there are some indications that they may influence the effect of other metal ions on some organisms. Few data are available on the toxicity of manganese to marine organisms. The major problem with manganese may be concentration (bioaccumulation) in the edible portions of molluscs. The available data for phthalate esters indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,944 ug/L and would occur at lower concentrations among species that are more sensitive than those tested (Ref. 14 and 15).

B.1.158. Two site locations, G and E, were mixed with water samples from the proposed disposal location area and are presented in Tables B-30 through B-36 Site G samples, GR1-AT, GR1-AM, and GR1-AB were taken from 0-1 foot depth, 1-4 foot depth, and 4-9 foot depth of sediment, respectively. These data were compared to the EPA or LDEQ saltwater acute criteria (Tables B-30, B-31 and B-32. Two metals showed an increase in elutriate concentration over ambient water concentration to a concentration above the stated criteria; namely copper and zinc. Copper concentrations increased from an ambient water concentration of <14 ug/L to 28 ug/L for the 0-1 foot elutriate mixture, 38 ug/L for the 1-4 foot elutriate mixture, and <100 ug/L for the 4-9 foot elutriate mixture. The acute saltwater aquatic life criteria for copper is 2.9 ug/L. Zinc concentrations rose from an ambient water level of <20 ug/L to 81 ug/L for the 0-1 foot elutriate mixture, 86 ug/L at 1-4 foot elutriate mixture, and 310 ug/L at 4-9 foot elutriate mixture. The acute saltwater aquatic life criteria for zinc is 95 ug/L.

B.1.159. Other parameters, which have no saltwater aquatic life criteria, but show significant increases from ambient water concentrations to elutriate mixture concentrations for Site G were: barium (120 ug/L ambient water to 190 ug/L, 740 ug/L, and 810 ug/L, respectively), iron (530 ug/L ambient water to 680 ug/L, 1,600 ug/L, and 170 ug/L, respectively), manganese (250 ug/L ambient water to 1,300 ug/L, 400 ug/L, and 260 ug/L, respectively), and bis(2-ethylexyl)phthalate from 1 ug/L ambient water to 1 ug/L, 75 ug/L, and <3 ug/L, respectively. All elutriate samples listed are for 0-1 foot elutriate mixture, 1-4 foot elutriate mixture, and 4-9 foot depth elutriate mixtures, respectively. Barium, manganese and phthalate esters are discussed in Para. B.1.157. Iron, because it is complexed or relatively inactive chemically or physiologically, has little effect on aquatic life (Ref. 16).

< Actual value is less than value shown

B.1.160. Site E samples ER1-AT and ER1-AB were taken from the first vibracore run at depths of 1-1.5 foot and 1.5-6 feet sediment depths, respectively. Samples ER2-BT and ER2-BB were taken from a second vibracore run at depths of 0-8 feet and 8-12 feet sediment depth, respectively.

B.1.161. Concentrations are shown in the following order: ER1-AT, ER1-AB, ER2-BT, and ER2-BB. These data were compared to the EPA or LDEQ saltwater acute criteria (Tables B-33, B-34, B-35 and B-36). Two metals are shown to increase to a concentration above the stated criteria; namely copper and zinc. Copper increased from an ambient water concentration of <14 ug/L to 34 ug/L, 29 ug/L, 18 ug/L, and 60 ug/L, respectively. Elutriates prepared from all 4 depths, and possibly the ambient water, exceeded the acute saltwater aquatic life criteria for copper of 2.9 ug/L. Zinc concentrations increased from an ambient water concentration of <20 ug/L to 100 ug/L, 95 ug/L, 69 ug/L, and 120 ug/L, respectively. Therefore, two of the four elutriate samples exceeded the saltwater acute saltwater aquatic life criteria of 95 ug/L for zinc.

B.1.162. Other parameters, which have no saltwater aquatic life criteria, but show increases in concentrations of the elutriate at Site E over the ambient water sample were: barium (120 ug/L ambient water to 890 ug/L, 810 ug/L, 730 ug/L, and 820 ug/L, respectively), and calcium (100,000 ug/L ambient water to 170,000 ug/L, 300,000 ug/L, 150,000 ug/L, and 140,000 ug/L, respectively). A few parameters showed significant increases in one elutriate sample while the concentration did not significantly increase or even decreased in another sample. These are iron (530 ug/L ambient water to 86 ug/L, 440 ug/L, 210 ug/L, and 1,500 ug/L, respectively), manganese (250 ug/L to 180 ug/L, 25 ug/L, 1,300 ug/L, and 480 ug/L, respectively), acenaphthene (10 ug/L ambient water to 7 ug/L, 15 ug/L, 70 ug/L, and 13 ug/L, respectively), and 2-methylnaphthalene (10 ug/L ambient water to 3 ug/L, 2 ug/L, 30 ug/L, and 13 ug/L, respectively). The available data for acenaphthene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 970 ug/L and would occur at lower concentrations among species that are more sensitive than those tested. The available data for naphthalene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2.350 ug/L and would occur at lower concentrations among species that are more sensitive than those tested (Ref. 15).

B.1.163. In summary, the water quality impacts in the IHNC, proposed mitigation site and the MR-GO disposal site are expected to be minimal, mostly related to the potential of temporary increased concentrations of ammonia, copper, manganese, and zinc. The existing tailbay would be excavated with a hydraulic dredge (pipeline) and pumped to the MR-GO disposal site and used as random backfill. Excavation of part of the IHNC east bank would also be conducted, with the excavated material to be disposed of in the proposed mitigation site and the MR-GO disposal site. At the IHNC connecting area, sediment would be expected to contain constituents deposited in the bottom over a period of time. Elutriate data from a mixture of IHNC water and sediment taken from the bottom in 1982 indicate the only potential problem constituents would be ammonia, copper, and manganese. Elutriate data from 1993 indicated copper, manganese, and zinc were potential problem constituents, ammonia was not considered in 1993 effort. The concentration of ammonia as NH_4 is approximately 50% higher than the level which contains the criterion amount of un-ionized ammonia. Copper is relatively plentiful in the natural environment and is the result of industrial sources including petroleum refiners. Copper criterion is based upon the protection of animal species and does not appear to bioaccumulate in animal tissues. Although the 1982 elutriate copper concentrations were about six times the level of the ambient mixture water and range from two to fourteen times for the 1993 elutriate data, most were still generally within the range of concentrations normally found in the Mississippi River, the IHNC and surrounding areas. Historic monitoring shows that copper levels in the waters of the project area frequently exceed the applicable acute criteria under ambient conditions. Manganese is normally imported to the United States, and is used in metal alloys, dry-cell batteries, fertilizer additives, and chemical reagents. Available data indicate manganese is a cargo transported on the GIWW and MR-GO, and spillage during offloading could be a source of the high levels in the sediments. Some of the industries located in the area may be users of manganese, and spillage or discharge could lead to the pollution levels. In addition, manganese tends to flocculate and settle out of the water column. Elutriate samples from 1982 and 1993 showed levels of manganese ranging from 13 to 2,300 ug/L, with greater concentrations in the upper sediment levels. The relatively small amount of material containing high levels of manganese would be dredged in a short time frame, and its effluent would be diluted by the effluent from continued placement of dredged material. Zinc is abundant in surface water and is used as an oxide pigment in rubber and paint, in agricultural

< Actual value is less than value shown

fertilizers and sprays and battery production. Zinc is known to bioaccumulate in animal tissue. Elutriate testing showed zinc concentration levels ranging from 69 ug/L to 310 ug/L, the upper end of which exceeds the acute criteria of 95 ug/L. Additional localized, short-term pollution, primarily turbidity, would occur during the actual dredging and disposal operations.

Existing Forebay and Site A (1993 Elutriate Testing)

B.1.164. Water quality impacts would also be likely to occur from the hydraulic dredging in the lock forebay. Material from this operation would be discharged into the Mississippi River and used as random backfill. Slight increases in ammonia concentrations could occur, depending upon the time of disposal. A criterion has been established for un-ionized ammonia, and the amount of this parameter in total ammonia is dependent upon temperature and pH. Discharging the dredged material at lower temperatures would reduce the potential for the formation of un-ionized ammonia. However, the estimated amount of material containing higher levels of ammonia as NH_4 is low. The impact to the Mississippi River water would be slight.

B.1.165. A composite sample from Site A (between Mississippi River and St. Claude Avenue) was analyzed for the 1993 elutriate testing which was mixed with Mississippi River (Table B-26). These data were compared to the applicable freshwater acute aquatic life criteria. Three metals were shown to increase to a concentration above the stated criteria: chromium, copper and zinc. Total chromium increased from 4 ug/L for ambient Mississippi River water to 17 ug/L for the elutriate mixture. This concentration exceeds the acute criteria of 16 ug/L for Chromium (VI). It should be noted that the criteria is for Chromium VI and not total chromium and therefore should be interpreted only as a possible criteria violation. Copper increased from <14 ug/L to 190 ug/L which exceeds the acute criteria of 22 ug/L. Zinc criteria of 120 ug/L is exceeded by the elutriate concentration of 190 ug/L, up from an ambient water concentration of 100 ug/L.

B.1.166. Other parameters, which have no freshwater aquatic life criteria, but show a significant increase from the ambient water to the elutriate mixture were: aluminum (4,200 ug/L to 12,000 ug/L), iron (3,900 ug/L to 12,000 ug/L), magnesium (14,000 ug/L to 34,000 ug/L), manganese (160 ug/L to 2,400 ug/L) and potassium (4,000 ug/L to 14,000 ug/L). As noted in Table B-26, the elutriate mixtures were not analyzed for a large percentage of the listed parameters due to breakage of the sample jars. Aluminum, magnesium, and potassium are also common cations defining the hardness of a waterbody. In general, these metal ions are not cause for concern to health, although there are some indications that they may influence the effect of other metal ions on some organisms. For example, freshwater criteria levels for metals become less stringent as the hardness of a waterbody increases.

B.1.167. As with excavation from the tailbay, there is a potential for increased concentrations of manganese. A 1982 elutriate test showed dissolved manganese concentrations of only 4 and 6 ug/L, while an elutriate test taken in 1979 indicated an extremely high level of dissolved manganese (4,200 ug/L). The 1993 elutriate test showed a manganese level of 2,400 ug/L with an ambient water concentration of 160 ug/L.

B.1.168. A review of water quality data for the Mississippi River indicates average manganese levels of 191 ug/L were noted at the Carrollton gage upstream of the IHNC entrance, and 240 ug/L at Belle Chasse downstream of the entrance.

B.1.169. As the nearest downstream water intake is 4.7 miles from the IHNC lock, no impact to that public water supply is expected for the following reasons:

a. A study of the disposal of hydraulic dredged material in the New Orleans Harbor indicated constituents settled out of the water within 100 yards downstream of the dredge (Ref. 17).

b. The manganese would be discharged in a highly sediment-laden mixture into a stream which contains a large amount of sediment, providing an excellent environment for adsorption of the manganese.

< Actual value is less than value shown

c. Water in the Mississippi River presently contains levels of manganese which are three to seven times the criterion for domestic water supplies.

d. Manganese does not cause acute water column impacts under normal dilution and mixing conditions (Ref. 15).

B.1.170. During the period of disposal into the river, suspended sediment would increase and DO would tend to decrease. The average daily sediment load in the Mississippi River at Tarberts Landing, Mississippi, is 630,000 tons per day. Based on the projected excavation rate, the amount of material disposed into the river would be 27,000 tons per day, or about 4 percent of the average load.

B.1.171. Suspended sediment loads at New Orleans normally are less than at Tarberts Landing, so the added amount would be a higher percentage, about 7 percent. Considering the variation in flow conditions, a range of 3 to 7 is more appropriate. Thus, suspended sediment loads would be increased over the period of dredging (estimates range from 4 to 5 days dependent upon the alternative selected). During the same period of time, DO levels would decrease in the disposal area; however, studies conducted in 1975-1976 indicated DO levels rapidly returned to pre-disposal concentrations. For example, DO levels 100 yards downstream of the disposal site were 93 percent of those levels upstream of the site.

B.1.172. In summary, the water quality impacts in the Mississippi River are expected to be minimal, mostly related to the potential temporary increased concentrations of ammonia, copper and zinc. The forebay would be excavated with a hydraulic dredge and used as backfill or discharged into the Mississippi River. Ammonia increases could occur, depending upon the time of disposal. Discharging the dredged material at a lower temperature would reduce the potential for un-ionized ammonia. Copper, which is industrially generated, was elevated to 190 ug/L in the elutriate, exceeding the acute criteria of 22 ug/L, for an increase 13 times the ambient water concentration. Copper concentrations in the Mississippi River are not normally this high, but because of the swift water movement in the river and the large area of the mixing zone, adverse impacts are not expected. Zinc, used for industrial purposes, increased to 190 ug/L, nearly twice the ambient water concentration of the Mississippi River. Zinc concentrations have not historically been this high but again due to the large mixing zone of the Mississippi River and the swift movement of the water, no adverse effects are expected.

SUMMARY OF OVERALL EFFECTS

B.1.173. No significant, long-term changes in water quality will result from implementation of this project. Existing water quality conditions show that the Mississippi River possibly violates aquatic life criteria for chromium, copper, mercury and lead. Likewise, the IHNC possibly violates copper, mercury and lead aquatic life criteria. The MR-GO possibly violates lead, zinc, and mercury criteria. Most water samples contain levels of copper and mercury in exceedance of the aquatic life criteria.

B.1.174. Elutriate testing shows that elevated concentrations above acute aquatic life criteria can possibly be expected during dredging and disposal operations. Historic testing shows that copper levels periodically exceed the applicable acute aquatic life criteria for ambient water conditions. Levels of zinc in ambient waters of the project area generally do not exceed the chronic or acute aquatic life criteria levels. However, the elutriate testing shows that zinc and copper levels will possibly increase above the acute aquatic life criteria in the Mississippi River, IHNC, and the waters adjacent to the MR-GO disposal area and the proposed mitigation site.

B.1.175. Because dredging and disposal activities have only localized, short-term effects, long-term water quality impacts are not expected. Slight increases in concentration of other parameters may be expected as a result of dredging activities, although no long-term changes in water quality will result since dredging is a short-term, localized action.

B.1.176. Increases in concentrations of suspended sediments during the dredging period would also be expected. Because of the normal heavy sediment load carried by the Mississippi River, the increase in suspended solids would not cause any significant adverse impacts. Increased suspended solids in the IHNC

< Actual value is less than value shown

and the waters adjacent to the MR-GO disposal area and the proposed mitigation site are also expected, but due to the short duration of dredging and disposal, impacts would not be significant. Once project construction is complete, all water quality constituents, with the exception of turbidity, are expected to return to normal levels and no long-term changes in water quality are expected.

B.1.177. The highest turbidity levels will occur during disposal into the proposed mitigation site and the MR-GO disposal site. Confinement dikes would be erected around the border of the site to confine the dredged material in the proposed mitigation sites, but turbidity levels could remain elevated inside the dikes until the created marsh is established with vegetation. Likewise, low-level dikes would be constructed to confine the dredged material in the MR-GO disposal site. Turbidity affects water quality in several ways. The suspended sedimentary particles decrease the light penetration and interferes with the photosynthetic production of oxygen. At the same time these particles absorb solar energy from the sunlight and transform this energy into heat, thus elevating the temperature of the water. The fact that oxygen is less soluble in warm water than in cold water coupled with the decreased photosynthetic oxygen production can result in decreased oxygen levels.

B.1.178. Further testing as required by LDEQ may be conducted to supplement the data provided in this report.

TABLE B-26
ELUTRIATE ANALYSIS
SITE AR1-1C, mixed with Mississippi River water

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	Mississippi Water	Elutriate	Applicable Acute Criteria
Antimony	<12,000	<3	<60	
Arsenic (total)	7,700	<3	15	360
Arsenic (III)				360
Beryllium	920	<0.6	0.67	
Cadmium	<1,000	0.3	0.3	6.2
Chromium (total)	19,000	4	17	
Chromium (VI)				16
Chromium (III)				1700
Copper	23,000	<14	190	22
Lead	27,000	6.3	11	137
Mercury	<100		<0.20	2.4
Nickel	25,000	<23	<23	1999
Selenium	<600	<3	<3	
Silver	<1,800	<0.4	<0.4	8.2
Thallium	<400	<2	<2	
Zinc	95,000	100	190	120
Aluminum	13,000,000	4,200	12,000	
Barium	160,000	94	150	
Boron	20,400	<100	140	
Calcium	7,600,000	44,000	31,000	
Cobalt	12,000	<11	<11	
Iron	23,000,000	3,900	12,000	
Magnesium	5,900,000	14,000	34,000	
Manganese	1,200,000	160	2,400	
Molubdenum	<20,400	<1	<100	
Potassium	2,200,000	4,000	14,000	
Vanadium	29,000	<13	27	
TRP Hydrocarbons	14,000	<1,000	broken	
Aldrin	<3.5		broken	3.0
A-BHC	<3.5	<0.05	broken	
B-BHC	<3.5	<0.05	broken	

< Actual value is less than value shown

TABLE B-26 (continued)

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	Mississippi Water	Elutriate	Applicable Acute Criteria
G-BHC	<3.5	<0.05	broken	2.0
D-BHC	<3.5	<0.05	broken	
PPDDD	<6.9	<0.01	broken	0.03
PPDDE	<6.9	<0.1	broken	52.5
PPDDT	<6.9	<0.1	broken	1.1
Heptachlor	<3.5	<0.05	broken	0.52
Dieldrin	<6.9	<0.1	broken	2.5
A-Endosulfan	<3.5	<0.05	broken	
B-Endosulfan	<6.9	<0.1	broken	
Endosulfan				0.22
Endosulfan sulfate	<6.9	<0.1	broken	
Endrin	<6.9	<0.1	broken	0.18
Endrin Aldehyde	<6.9	<0.1	broken	
Heptachlor Epoxide	<3.5	<0.05	broken	
Methoxychlor	<3.5	<0.5	broken	
Chlordane	<3.5	<0.05	broken	2.4
Toxaphene	<350	<5	broken	0.73
PCB-1016	<67	<1	broken	2.0
PCB-1221	<135	<2	broken	2.0
PCB-1232	<67	<1	broken	2.0
PCB-1242	<67	<1	broken	2.0
PCB-1248	<67	<1	broken	2.0
PCB-1254	<67	<1	broken	2.0
PCB-1260	<67	<1	broken	2.0
Phenol	<670	<10	broken	700
2-Chlorophenol	<670	<10	broken	258
2-Nitrophenol	<670	<10	broken	
2,4-Dimethylphenol	<670	<10	broken	
2,4-Dichlorophenol	<670	<10	broken	202
4-Chloro-3-Methylphenol	<670	<10	broken	
2,4,6-Trichlorophenol	<670	<10	broken	
2,4-Dinitrophenol	<3,300	<50	broken	
4-Nitrophenol	<3,300	<50	broken	
2-Methyl-4,6-Dinotrophenol	<3,300	<50	broken	
Pentachlorophenol	<3,300	<50	broken	20
Benzoic Acid	<3,300	<50	broken	
2-Methylphenol	<670	<10	broken	
4-Methylphenol	<670	<10	broken	
2,4,5-Trichlorophenol	<3,300	<50	broken	
Benzyl Alcohol	<670	<10	broken	
N-Nitrosodimethylamine			broken	
Bis(2-Chloroisopropyl)Ether	<670	<10	broken	
N-Nitroso-Di-N-Propylamine	<670	<10	broken	
Nitrobenzene	<670	<10	broken	
Isophorone	<670	<10	broken	
Bis(2-Chloroethoxy)Methane	<670	<10	broken	
2,6-Dinitrotoluene	<670	<10	broken	
2,4-Dinitrotoluene	<670	<10	broken	
1,2-Diphenylhydrazine			broken	
Benzidine			broken	250
3,3'Dichlorobenzidine	<1,300	<20	broken	
Bis(2-Chloroethyl)Ether	<670	<10	broken	
1,3-Dichlorobenzene	<670	<10	broken	
1,4-Dichlorobenzene	<670	<10	broken	
1,2-Dichlorobenzene	<670	<10	broken	
Hexachloroethane	<670	<10	broken	
1,2,4-Trichlorobenzene	<670	<10	broken	
Naphthalene	<670	<10	broken	

< Actual value is less than value shown

TABLE B-26 (continued)

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	Mississippi Water	Elutriate	Applicable Acute Criteria
Hexachlorobutadiene	<670	<10	broken	5.1
Hexachlorocyclopentadiene	<670	<10	broken	
2-Chloronaphthalene	<670	<10	broken	
Acenaphthylene	<670	<10	broken	
Dimehtyl Phthalate	<670	<10	broken	
Acenaphthene	<670	<10	broken	
Fluorene	<670	<10	broken	
Diethyl Phthalate	<670	<10	broken	
4-Chlorophenyl Phenyl Ether	<670	<10	broken	
N-Nitrosodiphenyl Amine	<670	<10	broken	
4-Bromophenyl Ether	<670	<10	broken	
Hexachlorobenzene	<670	<10	broken	
Phenathrene	140	<10	broken	
Anthracene	<670	<10	broken	
Dibutylphthalate	160	<10	broken	
Fluoranathene	<670	<10	broken	
Pyrene	380	<10	broken	
Butylbenzylphthalate	<670	<10	broken	
Chrysene	200	<10	broken	
Benzo(a)Antharacene	130	<10	broken	
Bis(2-Ethylexyl)Phthalate	100	1	broken	
Di-N-Octyphthalate	<670	<10	broken	
Benxo(a)Fluoranthene	290	<10	broken	
Benzo(k)Fluoranthene	<670	<10	broken	
Benzo(a)Pyrene	86	<10	broken	
Indeno(1,2,3-C,D)Pyrene	69	<10	broken	
Dibenzo(A,H)Anthracene	<670	<10	broken	
Benzo(G,H,I)Perylene	<670	<10	broken	
Aniline			broken	
4-Chloroaniline	<670	<10	broken	
Dibenzofuran	<670	<10	broken	
2-Methylnaphthalene	<670	<10	broken	
2-Nitroaniline	<3,300	<50	broken	
3-Nitroaniline	<3,300	<50	broken	
4-Nitroaniline	<3,300	<50	broken	

TABLE B-27
ELUTRIATE ANALYSIS
SITE CR1-AT, mixed with IHNC water

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	IHNC Water	Elutriate	Applicable Acute Criteria
Antimony	<17,700	<3	<3	
Arsenic (total)	9,000	<3	3.8	69
Arsenic (III)				69
Beryllium	1,160	<0.6	<0.6	
Cadmium	<1,500	<3	<0.3	43
Chromium (total)	29,000	<2	3.3	
Chromium (III)				515
Chromium (VI)				1,100
Copper	59,000	<14	110	2.9
Lead	49,000	3.3	3.4	140

< Actual value is less than value shown

TABLE B-27 (continued)

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	IHNC Water	Elutriate	Applicable Acute Criteria
Mercury	<100		0.2	2.1
Nickel	32,000	<23	<23	75
Selenium	<900	<3	<6	
Silver	<2,700	<0.4	<0.4	2.3
Thallium	<600	<2	<2	
Zinc	180,000	<20	82	95
Aluminum	18,000,000	900	84	
Barium	530,000	66	140	
Boron	30,400	900	890	
Calcium	4,300,000	100,000	97,000	
Cobalt	13,000	<11	<11	
Iron	31,000,000	860	130	
Magnesium	7,700,000	250,000	290,000	
Manganese	760,000	180	2,300	
Molubdenum	<29,500	<1	<100	
Potassium	4,200,000	91,000	89,000	
Vanadium	40,000	<13	<13	
TRP Hydrocarbons	26,000	<1,000	<1,000	
Aldrin	<5	<0.05	<0.05	1.3
A-BHC	<5	<0.05	<0.05	
B-BHC	<5	<0.05	<0.05	
G-BHC	<5	<0.05	<0.05	0.160
D-BHC	<5	<0.05	<0.05	
PPDDD	<10	<0.01	<0.1	1.25
PPDDE	<10	<0.1	<0.1	0.7
PPDDT	<10	<0.1	<0.1	0.13
Heptachlor	<5	<0.05	<0.05	0.053
Dieldrin	<10	<0.1	<0.1	0.71
A-Endosulfan	<5	<0.05	<0.05	
B-Endosulfan	<10	<0.1	<0.1	
Endosulfan				0.034
Endosulfan sulfate	<10	<0.1	<0.1	
Endrin	<10	<0.1	<0.1	0.037
Endrin Aldehyde	<10	<0.1	<0.1	
Heptachlor Epoxide	<5	<0.05	<0.5	
Methoxychlor	<50	<0.5	<0.5	2.1
Chlordane	<5	<0.05	<0.05	0.09
Toxaphene	<500	<5	<5	0.21
PCB-1016	<97	<1	<1	10
PCB-1221	<190	<2	<2	10
PCB-1232	<97	<1	<1	10
PCB-1242	<97	<1	<1	10
PCB-1248	<97	<1	<1	10
PCB-1254	<97	<1	<1	10
PCB-1260	<97	<1	<1	10
Phenol	<970	<10	<14	580
2-Chlorophenol	<970	<10	<14	
2-Nitrophenol	<970	<10	<14	
2,4-Dimethylphenol	<970	<10	<14	
2,4-Dichlorophenol	<970	<10	<14	
4-Chloro-3-Methylphenol	<970	<10	<14	
2,4,6-Trichlorophenol	<970	<10	<14	
2,4-Dinitrophenol	<4,700	<50	<68	
4-Nitrophenol	<4,700	<50	<68	
2-Methyl-4,6-Dinotrophenol	<4,700	<50	<68	
Pentachlorophenol	<4,700	<50	<68	13
Benzoic Acid	<4,700	<50	<68	

< Actual value is less than value shown

TABLE B-27 (continued)

(Units are ug/L unless otherwise specified.)

Constituent	Bulk Sediments (ug/kg)	IHNC Water	Elutriate	Applicable Acute Criteria
2-Methylphenol	<970	<10	<14	
4-Methylphenol	<970	<10	<14	
2,4,5-Trichlorophenol	<4,700	<50	<68	
Benzyl Alcohol	<970	<10	<14	
N-Nitrosodimethylamine				
Bis(2-Chloroisopropyl)Ether	<970	<10	<14	
N-Nitroso-Di-N-Propylamine	<970	<10	<14	
Nitrobenzene	<970	<10	<14	
Isophorone	<970	<10	<14	
Bis(2-Chloroethoxy)Methane	<970	<10	<14	
2,6-Dinitrotoluene	<970	<10	<14	
2,4-Dinitrotoluene	<970	<10	<14	
1,2-Diphenylhydrazine				
Benzidine				125
3,3'Dichlorobenzidine	<1,900	<20	<27	
Bis(2-Chloroethyl)Ether	<970	<10	<14	
1,3-Dichlorobenzene	<970	<10	<14	
1,4-Dichlorobenzene	<970	<10	<14	
1,2-Dichlorobenzene	<970	<10	<14	
Hexachloroethane	<970	<10	<14	
1,2,4-Trichlorobenzene	<970	<10	<14	
Naphthalene	<970	<10	<14	
Hexachlorobutadiene	<970	<10	<14	1.6
Hexachlorocyclopentadiene	<970	<10	<14	
2-Chloronaphthalene	<970	<10	<14	
Acenaphthylene	<970	<10	<14	
Dimehtyl Phthalate	<970	<10	<14	
Acenaphthene	<970	<10	<14	
Fluorene	<970	<10	<14	
Diethyl Phthalate	<970	<10	<14	
4-Chlorophenyl Phenyl Ether	<970	<10	<14	
N-Nitrosodiphenyl Amine	<970	<10	<14	
4-Bromophenyl Ether	<970	<10	<14	
Hexachlorobenzene	<970	<10	<14	
Phenathrene	<970	<10	<14	
Anthracene	<970	<10	<14	
Dibutylphthalate	<970	<10	<14	
Fluoranathene	<970	<10	<14	
Pyrene	170	<10	<14	
Butylbenzylphthalate	<970	<10	<14	
Chrysene	<970	<10	<14	
Benzo(a)Antharacene	<970	<10	<14	
Bis(2-Ethylexyl)Phthalate	290	1	2	
Di-N-Octyphthalate	<970	<10	<14	
Benxo(a)Fluoranthene	170	<10	<14	
Benzo(k)Fluoranthene	<970	<10	<14	
Benzo(a)Pyrene	<970	<10	<14	
Indeno(1,2,3-C,D)Pyrene	<970	<10	<14	
Dibenzo(A,H)Anthracene	<970	<10	<14	
Benzo(G,H,I)Perylene	<970	<10	<14	
Aniline				
4-Chloroaniline	<970	<10	<14	
Dibenzofuran	<970	<10	<14	
2-Methylnaphthalene	<970	<10	<14	
2-Nitroaniline	<4,700	<50	<68	
3-Nitroaniline	<4,700	<50	<68	
4-Nitroaniline	<4,700	<50	<68	

< Actual value is less than value shown