APPENDIX L
Air Quality Analysis

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC WORST CASE SCENARIO CONSTRUCTION 20191

Assumptions for Cumbustable Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	0	300	8	240	0
Tug Boat	1	1200	8	240	2304000
Diesel Dump Truck	30	300	8	240	17280000
Diesel Excavator	1	300	8	240	576000
Clam Shell Dredge	1	175	8	240	336000
Diesel Pile Drivers	1	300	8	240	576000
Cement Batch Plant	0	300	8	240	0
Diesel Cranes	2	175	8	240	672000
Diesel Graders	2	300	8	240	1152000
Diesel Tractors/Loaders/Backhoes	2	100	8	240	384000
Diesel Bull Dozers	3	300	8	240	1728000
Diesel Front End Loaders	3	300	8	240	1728000
Diesel Fork Lifts	2	100	8	240	384000
Diesel Pump for Dredge Slurry	1	300	12	240	864000

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Tug Boat (1200 hp Stern Drive)	0.242	1.040	6.757	0.180	0.174	0.842	530.801
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Clam Shell Dredge	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Pile Drivers	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Cement Batch Plant	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Pump for Dredge Slurry	0.640	2.360	6.530	0.520	0.500	0.730	529.600

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC WORST CASE SCENARIO CONSTRUCTION 20191

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tug Boat	0.614	2.641	17.156	0.457	0.442	2.138	1347.708
Diesel Dump Truck	8.379	39.418	104.544	7.807	7.617	14.091	10206.812
Diesel Excavator	0.216	0.825	2.920	0.203	0.197	0.470	340.417
Clam Shell Dredge	0.189	0.903	2.151	0.170	0.163	0.274	198.392
Diesel Pile Driver	0.381	1.454	4.538	0.317	0.311	0.463	336.228
Cement Batch Plant	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Diesel Cranes	0.326	0.963	4.236	0.252	0.244	0.541	392.636
Diesel Graders	0.444	1.727	6.005	0.419	0.406	0.939	680.835
Diesel Tractors/Loaders/Backhoes	0.783	3.474	3.055	0.580	0.563	0.402	292.451
Diesel Bull Dozers	0.686	2.628	9.064	0.628	0.609	1.409	1021.252
Diesel Front End Loaders	0.724	2.952	9.521	0.666	0.647	1.409	1021.062
Diesel Fork Lifts	0.838	3.284	3.622	0.588	0.571	0.402	292.324
Diesel Pump for Dredge Slurry	0.609	2.247	6.217	0.495	0.476	0.695	504.247
Total Emissions	**14.188**	**62.515**	**173.031**	**12.584**	**12.247**	**23.234**	**16634.366**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTABLE EMISSIONS-IHNC WORST CASE SCENARIO CONSTRUCTION 2019

Construction Worker Personal Vehicle Commuting to Construction Sight-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	30	240	30	30	0.32	0.38	0.71
CO	12.4	15.7	30	240	30	30	2.95	3.74	6.69
NOx	0.95	1.22	30	240	30	30	0.23	0.29	0.52
PM-10	0.0052	0.0065	30	240	30	30	0.00	0.00	0.00
PM 2.5	0.0049	0.006	30	240	30	30	0.00	0.00	0.00
							-		

Heavy Duty Trucks Delivery Supply Trucks to Construction Sight									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	240	4	4	0.02	0.03	0.05
CO	1.32	3.21	60	240	4	4	0.08	0.20	0.29
NOx	4.97	12.6	60	240	4	4	0.32	0.80	1.12
PM-10	0.12	0.33	60	240	4	4	0.01	0.02	0.03
PM 2.5	0.13	0.36	60	240	4	4	0.01	0.02	0.03

	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	365	0	0	-	0.00	-
CO	12.4	15.7	60	365	0	0	-	0.00	-
NOx	0.95	1.22	60	365	0	0	-	0.00	-
PM-10	0.0052	0.0065	60	365	0	0	-	0.00	-
PM 2.5	0.0049	0.006	60	365	0	0	-	0.00	-

POV Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.
Fleet Charactorization: Personal Operated Vehicles (POVs) commuting to work were 50% are pick up trucks and 50% passenger cars.

Air Emissions For CementBatch Plant			
	Float in Place (FIP)		Cast in Place (CIP)
Description	Cubic Ft	Description	Cubic Yards
Lock Floor	262,027	Gate bay Lock Floor River Side	31,881
Gatebay Culvert	363,918	Gate bay Lock Floor Lake Side	31,881
Lower Gatebay	426,912	5	75,636
GatebayTop of Gate BA	78,642	Gate bay RS	40,517
River Side	262,027	Chamber Monolith 1	8,419
Gatebay Culvert	363,918	Chamber Monolith 2	7,761
Lower Gatebay	224,506	Chamber Monolith 3	6,116
Gatebay	426,912	Chamber Monolith 4	7,761
Top of Gate Bay	78,642	Chamber Monolith 5	8,419
Monolith 1 East & West	728,047	Gate bay LS	40,517
Monolith 2 West	746,085	Total	258,908
Monolith 3 West	587,438	Emission Factor (lbs/yd3)	0.0533
Monolith 4 West	746,085	Total PM-10 (lbs)	13797
Monolith 5	727,972	Tons PM-10	6.9
Total	6,023,131		
Cubic Yards	222,856		
Emission Factor (lbs/yd3)	0.0533		
Total PM-10 (lbs)	11876		
Tons PM-10	5.9		

Source for Quantities of Concrete IHNC LOCK Inner Harbor Navigational Canal New Orleans, Louisiana. New Lock Cast-In-Place vs. Float-in-Place Appendix E Comparison Quantities Appendix E Comparison Quantities, April 2007.

Emission Factors Source: AP 42, Fifth Edition, Volume I Chapter 11: Mineral Products Industry. Section 11.2 Concrete Batching. See Table 11.12-6 Uncontrolled PM-10 (lb/yd3)

Conversion 0.037

CALCULATION SHEET-FUGITIVE DUST-IHNC-WORST CASE SCENARIO CONSTRUCTION YEAR 2019

Fugitive Dust Emissions at New Construction Site.					
Construction Site	**Emission Factor tons/acre/month (1)**	**Total Area-Construction Site/month**	**Months/yr**	**Total PM-10 Emissions tns/yr**	**Total PM-2.5 (2)**
Fugitive Dust Emissions	0.11	10.42	12	13.75	2.75

1. Environmental Protection Agency (EPA) 2001. Procedures Document for National Emission Inventory, Criteria Air Pollutants 1985-1999. EPA-454/R-01-006. Office of Air Quality Planning and Standards Research Triangle Park NC 27711. MRI= Midwest Research Institute, Inventory of Agricultural Tiling, Unpaved Roads, Airstrips and construction Sites., prepared for the U.S. EPA, PB 238-929, Contract 68-02-1437 (November 1996)

2. 20% of the total PM-10 emissions are PM-2.5 (EPA 2006).

Coastruction Site Area	**Demension (ft)**			**Total**
Proposed Prioject	**Length**	**Width**	**Units**	**Acres/month**
Total				**10.42**

Conversion Factors	**Feet to Miles**	**Acres to sq ft**	**Sq ft to acres**	**Sq ft in 0.5 acres**
	5280	0.000022957	43560	21780

Total Area Imapacted	**26.0**
Assume that 40% of the project area will be disturbed during any given month.	40%
Area Impacted per month	10.42

CALCULATION SHEET-SUMMARY OF EMISSIONS-IHNC WORST CASE SCENARIO CONSTRUCTION 2019

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)						
Emission source	VOC	CO	NOx	PM-10	PM-2.5	SO_2
Construction Equipment Combustable Emissions	14.19	62.51	173.03	12.58	12.25	23.23
Construction Site-fugitive PM-10	NA	NA	NA	13.75	2.75	NA
Construction Workers Commuter & Trucking	0.76	6.98	1.63	0.03	0.03	NA
Cement Batch Plant	NA	NA	NA	5.94	NA	NA
Total emissions	14.95	69.49	174.66	32.30	15.03	23.23
De minimis threshold	100.00	100.00	100.00	100.00	100.00	100.00

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC CONSTRUCTION AVERAGE YEAR

Assumptions for Cumbustable Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	0	300	8	240	0
Tug Boat	1	1200	8	240	2304000
Diesel Dump Truck	2	300	8	240	1152000
Diesel Excavator	1	300	8	240	576000
Clam Shell Dredge	1	175	8	240	336000
Diesel Pile Drivers	1	300	8	240	576000
Cement Batch Plant	1	300	8	240	576000
Diesel Cranes	2	175	8	240	672000
Diesel Graders	2	300	8	240	1152000
Diesel Tractors/Loaders/Backhoes	2	100	8	240	384000
Diesel Bull Dozers	3	300	8	240	1728000
Diesel Front End Loaders	3	300	8	240	1728000
Diesel Fork Lifts	2	100	8	240	384000
Diesel Pump for Dredge Slurry	1	300	12	240	864000

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Tug Boat (1200 hp Stern Drive)	0.242	1.040	6.757	0.180	0.174	0.842	530.801
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Clam Shell Dredge	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Pile Drivers	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Cement Batch Plant	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Pump for Dredge Slurry	0.640	2.360	6.530	0.520	0.500	0.730	529.600

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC CONSTRUCTION AVERAGE YEAR

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tug Boat	0.614	2.641	17.156	0.457	0.442	2.138	1347.708
Diesel Dump Truck	0.559	2.628	6.970	0.520	0.508	0.939	680.454
Diesel Excavator	0.216	0.825	2.920	0.203	0.197	0.470	340.417
Clam Shell Dredge	0.189	0.903	2.151	0.170	0.163	0.274	198.392
Diesel Pile Driver	0.381	1.454	4.538	0.317	0.311	0.463	336.228
Cement Batch Plant	0.387	1.473	4.621	0.305	0.298	0.463	336.228
Diesel Cranes	0.326	0.963	4.236	0.252	0.244	0.541	392.636
Diesel Graders	0.444	1.727	6.005	0.419	0.406	0.939	680.835
Diesel Tractors/Loaders/Backhoes	0.783	3.474	3.055	0.580	0.563	0.402	292.451
Diesel Bull Dozers	0.686	2.628	9.064	0.628	0.609	1.409	1021.252
Diesel Front End Loaders	0.724	2.952	9.521	0.666	0.647	1.409	1021.062
Diesel Fork Lifts	0.838	3.284	3.622	0.588	0.571	0.402	292.324
Diesel Pump for Dredge Slurry	0.609	2.247	6.217	0.495	0.476	0.695	504.247
Total Emissions	**6.755**	**27.197**	**80.077**	**5.602**	**5.436**	**10.545**	**7444.236**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTABLE EMISSIONS-IHNC CONSTRUCTION AVERAGE YEAR

Construction Worker Personal Vehicle Commuting to Construction Sight-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	30	240	30	30	0.32	0.38	0.71
CO	12.4	15.7	30	240	30	30	2.95	3.74	6.69
NOx	0.95	1.22	30	240	30	30	0.23	0.29	0.52
PM-10	0.0052	0.0065	30	240	30	30	0.00	0.00	0.00
PM 2.5	0.0049	0.006	30	240	30	30	0.00	0.00	0.00
							-		

Heavy Duty Trucks Delivery Supply Trucks to Construction Sight									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	240	2	2	0.01	0.02	0.03
CO	1.32	3.21	60	240	2	2	0.04	0.10	0.14
NOx	4.97	12.6	60	240	2	2	0.16	0.40	0.56
PM-10	0.12	0.33	60	240	2	2	0.00	0.01	0.01
PM 2.5	0.13	0.36	60	240	2	2	0.00	0.01	0.02

USACE COMMUTE									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	365	0	0	-	0.00	-
CO	12.4	15.7	60	365	0	0	-	0.00	-
NOx	0.95	1.22	60	365	0	0	-	0.00	-
PM-10	0.0052	0.0065	60	365	0	0	-	0.00	-
PM 2.5	0.0049	0.006	60	365	0	0	-	0.00	-

POV Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.
Fleet Charactorization: Personal Operated Vehicles (POVs) commuting to work were 50% are pick up trucks and 50% passenger cars.

CEMENT BATCH PLANT PM-10 EMISSIONS CONSTRUCTION AVERAGE YEAR

Air Emissions For CementBatch Plant			
	Float in Place (FIP)		Cast in Place (CIP)
Description	Cubic Ft	Description	Cubic Yards
Lock Floor	262,027	Gate bay Lock Floor River Side	31,881
Gatebay Culvert	363,918	Gate bay Lock Floor Lake Side	31,881
Lower Gatebay	426,912	5	75,636
GatebayTop of Gate BA	78,642	Gate bay RS	40,517
River Side	262,027	Chamber Monolith 1	8,419
Gatebay Culvert	363,918	Chamber Monolith 2	7,761
Lower Gatebay	224,506	Chamber Monolith 3	6,116
Gatebay	426,912	Chamber Monolith 4	7,761
Top of Gate Bay	78,642	Chamber Monolith 5	8,419
Monolith 1 East & West	728,047	Gate bay LS	40,517
Monolith 2 West	746,085	Total	258,908
Monolith 3 West	587,438	Emission Factor (lbs/yd3)	0.0533
Monolith 4 West	746,085	Total PM-10 (lbs)	13797
Monolith 5	727,972	Tons PM-10	6.9
Total	6,023,131		
Cubic Yards	222,856		
Emission Factor (lbs/yd3)	0.0533		
Total PM-10 (lbs)	11876		
Tons PM-10	5.9		

Source for Quantities of Concrete IHNC LOCK Inner Harbor Navigational Canal New Orleans, Louisiana. New Lock Cast-In-Place vs. Float-in-Place Appendix E Comparison Quantities Appendix E Comparison Quantities, April 2007.

Emission Factors Source: AP 42, Fifth Edition, Volume I Chapter 11: Mineral Products Industry. Section 11.2 Concrete Batching. See Table 11.12-6 Uncontrolled PM-10 (lb/yd3)

Conversion 0.037

CALCULATION SHEET-FUGITIVE DUST-IHNC-CONSTRUCTION AVERAGE YEAR

Fugitive Dust Emissions at New Construction Site.					
Construction Site	**Emission Factor tons/acre/month (1)**	**Total Area-Construction Site/month**	**Months/yr**	**Total PM-10 Emissions tns/yr**	**Total PM-2.5 (2)**
Fugitive Dust Emissions	0.11	10.42	12	13.75	2.75

1. Environmental Protection Agency (EPA) 2001. Procedures Document for National Emission Inventory, Criteria Air Pollutants 1985-1999. EPA-454/R-01-006. Office of Air Quality Planning and Standards Research Triangle Park NC 27711. MRI= Midwest Research Institute, Inventory of Agricultural Tiling, Unpaved Roads, Airstrips and construction Sites., prepared for the U.S. EPA, PB 238-929, Contract 68-02-1437 (November 1996)

2. 20% of the total PM-10 emissions are PM-2.5 (EPA 2006).

Coastruction Site Area	**Demension (ft)**			**Total**
Proposed Prioject	**Length**	**Width**	**Units**	**Acres/month**
Total				**10.42**

Conversion Factors	**Feet to Miles**	**Acres to sq ft**	**Sq ft to acres**	**Sq ft in 0.5 acres**
	5280	0.000022957	43560	21780

Total Area Imapacted	**26.0**
Assume that 40% of the project area will be disturbed during any given month.	40%
Area Impacted per month	10.42

CALCULATION SHEET-SUMMARY OF EMISSIONS-IHNC CCONSTRUCTION AVERAGE YEAR

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)						
Emission source	VOC	CO	NOx	PM-10	PM-2.5	SO_2
Construction Equipment Combustable Emissions	6.76	27.20	80.08	5.60	5.44	10.55
Construction Site-fugitive PM-10	NA	NA	NA	13.75	2.75	NA
Construction Workers Commuter & Trucking	0.73	6.83	1.07	0.02	0.02	NA
Cement Batch Plant	NA	NA	NA	5.94	NA	NA
Total emissions	7.49	34.03	81.15	25.31	8.20	10.55
De minimis threshold	100.00	100.00	100.00	100.00	100.00	100.00

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC TRAFFIC DELAY 2014

Assumptions for Cumbustable Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	0	300	8	240	0
Tug Boat	1	1200	8	240	2304000
Diesel Dump Truck	2	300	8	240	1152000
Diesel Excavator	1	300	8	240	576000
Clam Shell Dredge	1	175	8	240	336000
Diesel Pile Drivers	1	300	8	240	576000
Cement Batch Plant	0	300	8	240	0
Diesel Cranes	2	175	8	240	672000
Diesel Graders	2	300	8	240	1152000
Diesel Tractors/Loaders/Backhoes	2	100	8	240	384000
Diesel Bull Dozers	3	300	8	240	1728000
Diesel Front End Loaders	3	300	8	240	1728000
Diesel Fork Lifts	2	100	8	240	384000
Diesel Pump for Dredge Slurry	1	300	12	240	864000

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Tug Boat (1200 hp Stern Drive)	0.242	1.040	6.757	0.180	0.174	0.842	530.801
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Clam Shell Dredge	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Pile Drivers	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Cement Batch Plant	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Pump for Dredge Slurry	0.640	2.360	6.530	0.520	0.500	0.730	529.600

CALCULATION SHEET-COMBUSTABLE EMISSIONS-IHNC TRAFFIC DELAY 2014

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tug Boat	0.614	2.641	17.156	0.457	0.442	2.138	1347.708
Diesel Dump Truck	0.559	2.628	6.970	0.520	0.508	0.939	680.454
Diesel Excavator	0.216	0.825	2.920	0.203	0.197	0.470	340.417
Clam Shell Dredge	0.189	0.903	2.151	0.170	0.163	0.274	198.392
Diesel Pile Driver	0.381	1.454	4.538	0.317	0.311	0.463	336.228
Cement Batch Plant	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Diesel Cranes	0.326	0.963	4.236	0.252	0.244	0.541	392.636
Diesel Graders	0.444	1.727	6.005	0.419	0.406	0.939	680.835
Diesel Tractors/Loaders/Backhoes	0.783	3.474	3.055	0.580	0.563	0.402	292.451
Diesel Bull Dozers	0.686	2.628	9.064	0.628	0.609	1.409	1021.252
Diesel Front End Loaders	0.724	2.952	9.521	0.666	0.647	1.409	1021.062
Diesel Fork Lifts	0.838	3.284	3.622	0.588	0.571	0.402	292.324
Diesel Pump for Dredge Slurry	0.609	2.247	6.217	0.495	0.476	0.695	504.247
Total Emissions	**6.368**	**25.724**	**75.456**	**5.297**	**5.138**	**10.082**	**7108.008**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTABLE EMISSIONS-IHNC TRAFFIC DELAY 2014

Construction Worker Personal Vehicle Commuting to Construction Sight-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	30	240	30	30	0.32	0.38	0.71
CO	12.4	15.7	30	240	30	30	2.95	3.74	6.69
NOx	0.95	1.22	30	240	30	30	0.23	0.29	0.52
PM-10	0.0052	0.0065	30	240	30	30	0.00	0.00	0.00
PM 2.5	0.0049	0.006	30	240	30	30	0.00	0.00	0.00
							-		

Heavy Duty Trucks Delivery Supply Trucks to Construction Sight									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	240	4	4	0.02	0.03	0.05
CO	1.32	3.21	60	240	4	4	0.08	0.20	0.29
NOx	4.97	12.6	60	240	4	4	0.32	0.80	1.12
PM-10	0.12	0.33	60	240	4	4	0.01	0.02	0.03
PM 2.5	0.13	0.36	60	240	4	4	0.01	0.02	0.03

USACE COMMUTE									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	365	0	0	-	0.00	-
CO	12.4	15.7	60	365	0	0	-	0.00	-
NOx	0.95	1.22	60	365	0	0	-	0.00	-
PM-10	0.0052	0.0065	60	365	0	0	-	0.00	-
PM 2.5	0.0049	0.006	60	365	0	0	-	0.00	-

POV Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.
Fleet Charactorization: Personal Operated Vehicles (POVs) commuting to work were 50% are pick up trucks and 50% passenger cars.

CEMENT BATCH PLANT ANNUAL PM-10 EMISSIONS TRAFFIC DELAY 2014

Air Emissions For CementBatch Plant			
	Float in Place (FIP)		Cast in Place (CIP)
Description	Cubic Ft	Description	Cubic Yards
Lock Floor	262,027	Gate bay Lock Floor River Side	31,881
Gatebay Culvert	363,918	Gate bay Lock Floor Lake Side	31,881
Lower Gatebay	426,912	5	75,636
GatebayTop of Gate BA	78,642	Gate bay RS	40,517
River Side	262,027	Chamber Monolith 1	8,419
Gatebay Culvert	363,918	Chamber Monolith 2	7,761
Lower Gatebay	224,506	Chamber Monolith 3	6,116
Gatebay	426,912	Chamber Monolith 4	7,761
Top of Gate Bay	78,642	Chamber Monolith 5	8,419
Monolith 1 East & West	728,047	Gate bay LS	40,517
Monolith 2 West	746,085	Total	258,908
Monolith 3 West	587,438	Emission Factor (lbs/yd3)	0.0533
Monolith 4 West	746,085	Total PM-10 (lbs)	13797
Monolith 5	727,972	Tons PM-10	6.9
Total	6,023,131		
Cubic Yards	222,856		
Emission Factor (lbs/yd3)	0.0533		
Total PM-10 (lbs)	11876		
Tons PM-10	5.9		

Source for Quantities of Concrete IHNC LOCK Inner Harbor Navigational Canal New Orleans, Louisiana. New Lock Cast-In-Place vs. Float-in-Place Appendix E Comparison Quantities Appendix E Comparison Quantities, April 2007.

Emission Factors Source: AP 42, Fifth Edition, Volume I Chapter 11: Mineral Products Industry. Section 11.2 Concrete Batching. See Table 11.12-6 Uncontrolled PM-10 (lb/yd3)

Conversion 0.037

IDLING VEHICLES CUED AT BRIDGES TRAFFIC DELAY 2014

Air Emissions From Idling Personally Operated Vehicles & Buses (POVs) and Commercial Vehicles (COM) at Intersections on Claiborne Avenue (2013)												
	Minutes Waited (1)		(2013) Total Emissions per Pollutant (grams per year) (2)					(Existing) total Emissions per Pollutant (tons per year)				
Border Crossing		Minutes	VOC	CO	NOx	PM-2.5	PM-10	VOC	CO	NOx	PM-2.5	PM-10 (3)
Claiborne Bridge	-	987,909	67,138	1,368,975	103,365	1,670	1,778	0.07	1.40	0.11	0.00	0.00

1.Source: Regional Planning Commission Inner Harbor Navigation Canal Lock Replacemnt Project Traffic Impact Analysis (2008).
2. Source: EPA 2005 Office of Transportation and Air Quality Emission Fact Idling Vehicle Emissions. EPA420-F-05-023 August 2005.
3. PM-10 includes the PM-2.5 in calculation total.

Type of Vehicle POV & COM	Percent Composition
LDGV-**POV**	63%
LDGT-**POV**	20%
HDDV-VIIIa-**COM**	0%
LDDV-**POV**	1%
LDDT-**POV**	5%
HDDV-VIIIb-**COM**	3%
MC-**POV**	1%
Urban Bus-**POV**	1%
School Bus-POV	1%
POV total	**92%**
COM total	**8%**
Source: RPC 2008 and MOBILE6	

Closure Event	Estimated Emissions as a Result of Increase or Decrease in Wait Time (tons/yr)				
	VOC	**CO**	**NOx**	**PM-2.5**	**PM-10**
Claiborne Bridge	0.07	1.40	0.11	0.00	0.00
Total Reduction	**0.07**	**1.40**	**0.11**	**0.00**	**0.00**

East Orleans Parish Attainment Status: In Attainment for All NAAQS

Conversion Factors	gram to ton
	0.00000102

s by Pollutant and Vehicle Type (Emission Factors)										
Emission Factors	**Units**	**LDGV**	**LDGT**	**HDDV VIIIa**	**LDDV**	**LDDT**	**HDDV VIIIb**	**MC**	**Urban Bus**	**School Bus**
VOC	g/min	0.063	0.1	0.071	0.042	0.06	0.084	0.32	0.07	0.095
CO	g/min	1.55	1.69	0.593	0.149	0.129	0.764	5.02	0.819	0.49
NOx	g/min	0.081	0.089	0.804	0.085	0.089	0.935	0.027	1.21	0.839
PM 2.5	g/min	0.001	0.001	0.014	0.006	0.005	0.015	0.001	0.024	0.03
PM 10	g/min	0.001	0.001	0.015	0.007	0.006	0.016	0.001	0.026	0.033

Source: EPA 2005 Office of Transportation and Air Quality Emission Fact Idling Vehicle Emissions. EPA420-F-05-023 August 2005
Note: Emission factors were generated by MOBILE6.2 EPA and they represent national average emissions for idling vehicles for representative year classes (1980-2005) found on U.S. highways in 2005
Note: SOx is not presented in the calculations because emissions are the result of presence of sulfur content in fuel. Fuel standards for sulfur are reducing content in fuels incrementally.
Note: The Regional Planning Commission Provided vehicle fleet composition and minutes delayed caused by the 6 month closing of Claiborne Bridge
Key:
LDGV: Light-duty gasoline-fueled vehicles, up to 6000 lb Gross Vehicle Weight (GVW) (gasoline-fueled passenger cars)
LDGT: Light-duty gasoline-fueled trucks, up to 8500lbs GVW (includes pick-up trucks, passenger vans, sport utility vehicles)
HDDV VIIIa: Heavy-duty gasoline-fueled vehicle (31,000-60,000 lbs), long haul semi-trucks used to transport goods throughout the country
LDDV: Light -duty vehicles, up to 6000 lbs GVW (diesel engine passenger cars)
LDDT: Light-duty diesel trucks, up to 8500 lbs GVW (diesel engine light-duty trucks)
HDDV VIIIb: Heavy-duty diesel-fueled vehicles (over 60,000 lbs), long haul semi-trucks used to transport goods throughout the country
MC: Motorcycles (only those certified for highway use; all are gasoline-fueled)

NORTH CLAIBORNE TRAFFIC DELAY YEAR 2014

TRAFFIC DELAY FROM CLOSING CLAIBORNE BRIDGE (6 MONTHS)															
	Emission Factors				Assumptions								Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	4 Axel Trucks	5 Axel Trucks	Mile/day	Day/yr	Number of Trucks 4-Axel	Number of Truck 5-Axel	Number of cars/day	Number of pick-up trucks/daY	Total Emisssions 4-Axel tns/yr	Total Emisssions 5-Axel tns/yr	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	0.55	0.7	2	60	1017	2802	12472	4119	0.04	0.26	2.24	0.88	3.42
CO	12.4	15.7	3.21	4.38	2	60	1017	2802	12472	4119	0.22	1.62	20.45	8.55	30.84
NOx	0.95	1.22	12.6	16.2	2	60	1017	2802	12472	4119	0.85	6.00	1.57	0.66	9.08
PM-10	0.0052	0.0065	0.36	0.42	2	60	1017	2802	12472	4119	0.02	0.16	0.01	0.00	0.19
PM 2.5	0.0049	0.006	0.33	0.36	2	60	1017	2802	12472	4119	0.02	0.13	0.01	0.00	0.17

POV Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.

Note: The Regional Planning Commission Provided vehicle fleet composition and minutes delayed caused by the 6 month closing of Claiborne Bridge

Conversion fa	gms to tons
	0.000001102

CALCULATION SHEET-FUGITIVE DUST-IHNC-TRAFFIC DELAY 2014

Fugitive Dust Emissions at New Construction Site.					
Construction Site	**Emission Factor tons/acre/month (1)**	**Total Area-Construction Site/month**	**Months/yr**	**Total PM-10 Emissions tns/yr**	**Total PM-2.5 (2)**
Fugitive Dust Emissions	0.11	10.42	12	13.75	2.75

1. Environmental Protection Agency (EPA) 2001. Procedures Document for National Emission Inventory, Criteria Air Pollutants 1985-1999. EPA-454/R-01-006. Office of Air Quality Planning and Standards Research Triangle Park NC 27711. MRI= Midwest Research Institute, Inventory of Agricultural Tiling, Unpaved Roads, Airstrips and construction Sites., prepared for the U.S. EPA, PB 238-929, Contract 68-02-1437 (November 1996)

2. 20% of the total PM-10 emissions are PM-2.5 (EPA 2006).

Coastruction Site Area	**Demension (ft)**			**Total**
Proposed Prioject	**Length**	**Width**	**Units**	**Acres/month**
Total				**10.42**

Conversion Factors	**Feet to Miles**	**Acres to sq ft**	**Sq ft to acres**	**Sq ft in 0.5 acres**
	5280	0.000022957	43560	21780

Total Area Imapacted	**26.0**
Assume that 40% of the project area will be disturbed during any given month.	40%
Area Impacted per month	10.42

CALCULATION SHEET-SUMMARY OF EMISSIONS-IHNC TRAFFIC DETOUR 2014

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)						
Emission source	VOC	CO	NOx	PM-10	PM-2.5	SO_2
Construction Equipment Combustable Emissions	6.37	25.72	75.46	5.30	5.14	10.08
Construction Site-fugitive PM-10	NA	NA	NA	13.75	2.75	NA
Construction Workers Commuter & Trucking	0.76	6.98	1.63	0.03	0.03	NA
Cement Batch Plant	NA	NA	NA	5.94	NA	NA
Traffic Detour	3.42	30.84	9.08	0.19	0.17	NA
Traffic Delays	0.07	1.40	0.11	0.00	0.00	NA
Total emissions	10.61	64.94	86.28	25.21	8.09	10.08
De minimis threshold	100.00	100.00	100.00	100.00	100.00	100.00