Appendix F

Draft General Conformity Determination and Air Emissions Estimates

U.S. Army Corps of Engineers
Galveston District

U.S. Army Corps of Engineers
Galveston District
Draft
General Conformity Determination

for

Proposed Port Freeport Channel Widening
Brazoria County, Texas

November 2006

Professional Engineer Statement

The attached Draft General Conformity Determination Document and estimate of air contaminant emissions is released on October 18, 2006, under the authority of Ruben I. Velasquez, P.E., Registration No. 69126, for the purpose of evaluation and discussion. This preliminary document is not to be used for construction, bidding, or permitting purposes.

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Acronyms and Abbreviations

BRHND	Brazos River Harbor Navigation District
CAA	Federal Clean Air Act
CFR	Code of Federal Regulations
CY	cubic yards
DEIS	Draft Environmental Impact Statement
DOT	U.S. Department of Transportation
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
HGB	Houston/Galveston/Brazoria
LOA	length over all
MMCY	million cubic yards
MPRSA	Marine Protection and Sanctuaries Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	nitrogen oxides
SIP	Texas State Implementation Plan
TCEQ	Texas Commission on Environmental Quality
tpd	tons per day
tpy	tons per year
TxLED	Texas Low-Emission Diesel
U.S.	United States
UPCA	upland confined placement area
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

1.0 INTRODUCTION

The Brazos River Harbor Navigation District (BRHND) of Brazoria County, Texas (also known as Port Freeport) applied to the U.S. Army Corps of Engineers (USACE), Galveston District, for a Clean Water Act Section 404 permit and Rivers and Harbors Act Section 10 permit for dredge and fill activities related to the widening of portions of the Freeport Ship Channel on 14 April 2005. Activities subject to the jurisdiction of the USACE would include dredging in navigable waters to widen portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel and placement of fill in waters of the United States (U.S.). Based on the Section 10/404 permit application submitted by Port Freeport, the USACE determined that the permitting action for the proposed dredge and fill activities constitutes a major Federal action. In accordance with the National Environmental Policy Act (NEPA), a Draft Environmental Impact Statement (DEIS) has been prepared to analyze and disclose the potential impacts of the proposed project and reasonable alternatives on the natural and human environment.

The project is located in the Freeport Harbor Channel, Brazoria County, Texas (Figure 1). Specifically, the project site is located along the northern edge of the Freeport Harbor Jetty and Entrance Channels, between the towns of Surfside and Quintana. The project can be located on the U.S. Geological Survey quadrangle map entitled Freeport, Texas. Approximate UTM Coordinates: NAD83, UTM 14N, 861095.730029, 3206475.762543.

Port Freeport proposes to widen portions of the Freeport Ship Channel. The project includes widening the Freeport Harbor Jetty Channel beginning at Channel Station 63+35 (see Figure 1) with a gradual widening, at the authorized depth, up to an additional 150 feet for about 1,835 feet to Channel Station 45+00. From that point to Channel Station 40+00 the widening would be less gradual from the additional 150 feet to an additional 200 feet. Through the rest of the Jetty Channel and to the end of the Freeport Harbor Entrance Channel (Channel Station -260+00), the channel would be widened an additional 200 feet. The length of channel proposed for widening is about 6.1 miles, of which 5.7 miles would be widened by 200 feet. The project depth will remain the same at 45 feet in the Jetty Channel and 47 feet in the Entrance Channel.

The widening would generate approximately 3.2 million cubic yards (MMCY) of new dredged material. Approximately 2.9 MMCY of the new work material would consist of clay material and about 300,000 cubic yards (CY) would consist of silty/sand material. If approved by EPA under Section 103 of Marine Protection and Sanctuaries Act (MPRSA) and by USACE for placement under Section 102 of MPRSA, an ODMDS previously designated as a one-time use site would be redesignated for placement of the 2.9 MMCY of clay/silt material. The 300,000 CY of silty/sand material would be used beneficially and placed on Quintana Beach in front of the Seaway upland confined placement area (UPCA). The beach on either side of this location has been enhanced through General Land Office or other programs, leaving a "gap" in front of the Seaway UPCA. Placement of the material in this location would fill the gap, allowing for continuous beach use and providing some protection from erosion for the Seaway UPCA.

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PBS&J
6504 Bridge Point Pkwy, Ste. 200
Austin, Texas 78730
Phone: (512) 329-8342 Fax: (512) 327-2453

3,500 1,750 0 3,500
Feet

N
W E
S

Freeport
STAUFFER TURNING BASIN
BRAZOS HARBOR
UPPER TURNING BASIN
BRAZOSPORT TURNING BASIN
LOWER TURNING BASIN
JETTY CHANNEL
Quintana
Surfside Beach
ENTRANCE & JETTY CHANNELS
ENTRANCE CHANNEL
PA-1
PA-7
PA-3
PA-2 (Seaway)
PA-85
PA-86/87
PA-88
EPA ODMDS (Maintanence Site)
45-Ft Project New Work Site
GULF OF MEXICO

Figure 1
Freeport Harbor Ship Channel

Prepared for: USACE, Galveston District	
Job No.: 441591.00	Scale: 1:50,000
Prepared by: EMonshaugen	Date: 06/08/2006
File: N:/44159100/Projects/Final/Fig1.mxd	

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Additional information regarding the proposed project is presented in the DEIS.

1.1 PURPOSE

The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight-only operations for larger vessels, and (c) restrictions that do not allow the larger vessels to enter the Port when winds exceed 20 knots or crosscurrents exceed 0.5 knots. The maximum ship dimensions permitted by the pilots at Freeport Harbor are: 825-foot length over all (LOA), 145-foot maximum beam, and 42-foot draft. These problems are discussed in more detail below.

LOA Restrictions – The length limitation of 825 feet is enforced because cross winds and currents force tankers to "crab" at an angle through the entrance channel. Ships of greater length than 825 feet are not able to clear the jetties under adverse wind and current conditions. Waivers on ship length are granted on a case-by-case basis for ships as large as 900-foot LOA and 160-foot beam to transit the Freeport Harbor Channel, provided that wind is less than 15 knots and that there is no more than a 0.5 knot cross current at the mouth of the jetties. About three to four ships per month are granted these waivers. Numerous requests have been submitted for ships in the 920- to 950-foot LOA range to transit the Channel and these requests have been denied. When denied access to Freeport Harbor, these ships normally divert to Corpus Christi or New Orleans.

Beam Restrictions – The maximum beam permitted under normal operations is 145 feet. Vessels with larger beams will require waivers to enter the channel.

One-Way Traffic Restriction – Because of the 400-foot width of the entrance and main channels, one-way ship traffic is always in effect in the Freeport Harbor Channel. This can result in delays when ship schedules coincide.

Daylight-Only Operation Restriction – Because of channel dimensions as well as the nature of the cargo of ships calling at Freeport Harbor, daylight-only operation is enforced on all vessels greater than 750 feet LOA or over 107 feet wide. This can result in waiting time of up to 12 hours, if ship arrival/ departure occurs at dark.

1.2 NEED

The project need is the elimination of the operational constraints to allow vessels to avoid delays, thereby reducing shipping costs and logistical problems and increasing vessel safety.

As discussed in the DEIS, the USACE has previously noted the problems mentioned above; i.e., that the relatively narrow (400-foot wide) entrance and main channels limit the Freeport Harbor Channel to one-way for all vessels and daylight-only operation for the larger vessels. They also note that "the light-loading, one-way traffic, and daylight-only operation result in significantly higher costs to users of the

Port Freeport than would be experienced if the harbor were enlarged and deepened. The transportation savings that would result from improvements at Freeport Harbor would be an economic benefit to the nation." Thus the USACE has confirmed the need for the project and that the project serves the national interest.

1.3 GENERAL CONFORMITY

This project, as a Federal action, is subject to the General Conformity Rule promulgated by the U.S. Environmental Protection Agency (EPA). The rule mandates that the Federal government not engage in, support, or provide financial assistance for licensing or permitting, or approving any activity not conforming to an approved state implementation plan. In Texas, the applicable plan is the Texas State Implementation Plan (SIP), an EPA-approved plan for the regulation and enforcement of the National Ambient Air Quality Standards (NAAQS) in each air quality region within the state.

The General Conformity Rule is applicable only to nonattainment and maintenance areas. The Freeport Channel Widening Project would be located in Brazoria County, Texas. Brazoria County is included in the eight-county Houston/Galveston/Brazoria (HGB) ozone nonattainment area, which is classified as "moderate" in terms of its degree of compliance with the current 8-hour ozone standard. This classification affects facilities that generate the ozone precursors, oxides of nitrogen (NO_x), and volatile organic compounds (VOC).

Based on an evaluation of air contaminant emissions associated with this project, it has been determined that a General Conformity Determination for NO_x emissions would be required. Emissions of VOC for this project are exempt from a General Conformity Determination because they are below the emissions threshold requiring such an analysis.

The USACE, PBS&J, and representatives of the Port of Freeport have participated in meetings with the EPA on 12 July 2006, and with the TCEQ on 18 July 2006, to discuss the proposed Freeport Channel Widening Project and the initial approach to General Conformity Determination. During these meetings, the staff was informed of the project and provided with a preliminary estimate of construction and operating emissions.

This document represents the Draft General Conformity Determination prepared on behalf of the USACE, Galveston District, pursuant to the Clean Air Act (CAA), Section 176(c)(1), to assess whether the emissions that would result from the proposed Freeport Channel Widening Project are in conformity with the SIP for the HGB ozone nonattainment area.

2.0 REGULATORY BACKGROUND – GENERAL CONFORMITY

The General Conformity Rule establishes conformity in coordination with and as part of the NEPA process. The rule takes into account air pollution emissions associated with actions that are federally funded, licensed, permitted, or approved, and ensures emissions do not contribute to air quality degradation, thus preventing the achievement of State and Federal air quality goals. The EPA promulgated the General Conformity Rule on 30 November 1993 (EPA, 1993). The rule implements the CAA conformity provision in Title I, Section 176(c)(1), "Limitation on Certain Federal Assistance," which mandates that the Federal government not engage in, support, or provide financial assistance for licensing or permitting, or approving any activity not conforming to an approved implementation plan. In Texas, the applicable plan is the Texas SIP, an EPA-approved plan for the regulation and enforcement of the NAAQS in each air quality region within the state. This rule is designed to ensure that Federal actions do not cause or contribute to air quality violations in areas that do not meet the NAAQS. The General Conformity Rule is codified at Title 40 Code of Federal Regulations (CFR) Part 51, Subpart W, and Title 40 CFR Part 93, "Determining Conformity of Federal Actions to State or Federal Implementation Plans."

The Texas Commission on Environmental Quality (TCEQ), has promulgated its own corresponding regulations under 30 TAC § 101.30, "Conformity of General Federal Actions to State Implementation Plans" (TCEQ, 1999). Unless specifically exempted, this rule applies to all Federal actions except programs and projects requiring funding or approval from the U.S. Department of Transportation (DOT), the Federal Highway Administration (FHWA), the Federal Transit Administration, or the Metropolitan Planning Organization. These types of programs and projects must instead comply with the conformity provisions implemented in the Transportation Conformity Rule issued by the DOT on 24 November 1993.

Title I, Section 176(c)(1) of the CAA defines conformity to an implementation plan as the upholding of "an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards and achieving expeditious attainment of such standards." Conforming activities or actions should not, through additional air pollutant emissions, result in the following:

- Cause or contribute to new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or interim emission reductions or other milestones in any area.

In short, general conformity refers to the process of evaluating plans, programs, and projects to determine and demonstrate they meet the requirements of the CAA and the SIP. The purpose of this General Conformity requirement is to assure Federal agencies consult with state and local air quality districts to

assure these regulatory entities know about the expected impacts of a Federal action and would include expected emissions in their SIP emissions budget.

Pursuant to the General Conformity Rule, a Federal agency; e.g., the USACE, must make a General Conformity Determination for all Federal actions in nonattainment or maintenance areas where the total of direct and indirect emissions of a nonattainment pollutant or its precursors exceeds levels established by the regulations. For the HGB nonattainment area, the threshold level is 100 tons per year (tpy) for either NO_x or VOC. In addition, even if the total of direct and indirect emissions of VOC or NO_x do not exceed the 100 tpy threshold levels, when the total of direct and indirect emissions of any pollutant from the Federal action represents 10% or more of a nonattainment or maintenance area's total emissions of those pollutants, then the action is defined as a regionally significant action and a conformity determination would still be applicable.

3.0 APPLICABILITY

Consistent with Section 176(c)(1) of the CAA, a Federal action is generally defined as any activity engaged in or supported in any way by any department, agency, or instrumentality of the Federal government (40 CFR 51.852). Federal actions include providing Federal financial assistance or issuing a Federal license, permit, or approval. Where the Federal Action is a permit, license, or other approval for some aspect of a non-Federal undertaking, the relevant activity is the part, portion, or phase of the non-Federal undertaking that requires the Federal Permit, license, or approval.

The proposed Freeport Channel Widening Project will require USACE approval under the Clean Water Act Section 404 permit and Rivers and Harbors Act Section 10 permit for dredge and fill activities related to the widening of portions of the Freeport Ship Channel. Activities subject to the jurisdiction of the USACE would include dredging in navigable waters to widen portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel and placement of fill in waters of the U.S. Based on the Section 10/404 permit application submitted by Port Freeport to the USACE in April 2005, the USACE determined that the permitting action for the proposed dredge and fill activities constitutes a major Federal action.

The Port of Freeport is in Brazoria County, within the HGB ozone nonattainment area, which is classified as "moderate" in terms of its degree of compliance with the current 8-hour ozone standard. This area is in attainment or is unclassified in terms of attainment for all other criteria pollutants. Pursuant to the General Conformity Rule, a General Conformity Determination is required for each year where the total of direct or indirect emissions caused by the Freeport Channel Widening Project would equal or exceed 100 tpy of NO_x or 100 tpy of VOC (40 CFR 51.853). The rule does not apply (i.e., a General Conformity Determination is not required) to actions where the total of direct or indirect emissions is below these emissions levels. In addition, even if the total of direct and indirect emissions of VOC or NO_x do not exceed the 100 tpy threshold levels, when the total of direct and indirect emissions of any pollutant from the Federal action represents 10% or more of a nonattainment or maintenance area's total emissions of those pollutants, then the action is defined as a regionally significant action and a conformity determination would be still be applicable.

The general conformity regulations require the inclusion of direct and indirect impacts of the Federal action in the conformity applicability analysis if those impacts are reasonably foreseeable and subject to continuing agency responsibility. Only those air emissions of NO_x and VOC related to the Federal action; i.e., those considered to be jurisdictional by the USACE, should be considered in this General Conformity Determination.

The proposed Freeport Channel Widening Project has been evaluated in terms of the USACE's continuing program responsibility, and the relevant direct and indirect emissions are those associated with the widening of the Freeport Entrance Channel and Jetty Channels such as emissions from dredging,

dredge support equipment, construction equipment used in the placement of dredged material, and employee vehicles used to commute to and from the work sites.

4.0 AIR EMISSIONS INVENTORY

For purposes of this Draft General Conformity Determination, an air emissions inventory was prepared for project-related activities based on the schedule and other assumptions as provided by the project sponsors. Air emissions estimates were calculated using techniques appropriate for a specific emissions generating activity or source. The basis, emission factors, and summary of emissions are provided in Appendix A of this document.

4.1 PROJECT EMISSIONS

The emission sources for the Freeport Channel Widening Project consist of marine and land-based mobile sources that will be utilized as scheduled for the one-year duration of the project. The marine emission sources will include three types of dredges; clamshell, hydraulic, and hopper, as well as support equipment such as tugboats, tenders, runabouts, and shrimp boats. The land-based emission sources will include both off-road equipment consisting of the bulldozers utilized for dredged material placement sites and on-road vehicles for employees commuting to and from the work site. The marine emission sources and off-road equipment will consist primarily of diesel-powered engines. The on-road employee vehicles will consist primarily of gas powered vehicles.

Project emissions were estimated for the projected years of construction, starting during the fourth quarter of 2007 through to the end of 2008. These emissions were based on projected equipment use and scheduling provided by the project sponsors. Engine load factors and emission factors were determined using EPA guidelines (EPA, 2000, 2004). Emissions of NO_x and VOC were estimated in tons per year for each piece of equipment. The emissions were then categorized and totaled and broken out on annual basis for each year for which dredging is projected to occur. The project emissions inventory included the following air emissions sources:

- Nonroad Mobile Equipment including:
  - Dredging Activities – dredges and support marine vessels
  - Land-side Dredged Material Placement – bulldozing equipment; and
- On-Road Mobile Sources – employee commuter vehicles

4.1.1 Dredging Activities

Air emissions directly related with the dredging equipment including the main propulsion engine, generators used to drive the dredge pumps, and emissions from support equipment such as tugs and runabouts were calculated on an annual basis based on the anticipated type of activity, engine use, horsepower, load factor, and anticipated hours of operation during the construction period. It was assumed that the widening project would occur in three phases:

- Phase 1 – A 24-inch hydraulic cutter dredge would be used for pumping and on-shore placement of 300,000 cubic yards (CY) of silt and sandy material;
- Phase 2 – A bucket crane dredge would be used to mechanically dredge 150,000 CY of clay material onto a barge for future on-shore placement; and
- Phase 3 – A hopper dredge would be used to dredge 2,750,000 CY of clay material for placement at Dredged Material Placement areas.

When not dredging, air contaminant emissions were also estimated from dredging vessels when sailing as ocean going vessels; e.g., during periods of mobilization to the dredging site or during transport and placement of the dredged material.

Estimated emissions from the use of dredging equipment and from use of tug boats and miscellaneous marine vessels in support of the dredging activities were based on the emission factor algorithms referenced from EPA's technical report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data," EPA 420-R-00-002, February 2000. This technical report is a compilation of engine and fuel usage test data from various types of marine vessels including bulk carriers, container ships, dredges, tankers, and tugboats. As presented in this document, emission factors may be determined based on an emission factor algorithm that is applicable to all marine engine sizes since, according to the EPA's document, the emissions data showed no statistically significant difference across engine sizes.

4.1.2 Land-side Dredged Material Placement – Bulldozing Equipment

It is anticipated that land-side dredged material placement activities would occur only in support of the Phase I activities in the year 2007 and would include working and compacting of the dredged material on-shore within a localized area of placement using bulldozing equipment. Air contaminant emissions from the combustion of diesel fuel in the bulldozing equipment were calculated on an annual basis based on the anticipated type horsepower, load factor, anticipated hours of operation, and emission factors generated using the EPA's NONROAD 2005 model. This computer model may be used to calculate emissions for many nonroad equipment types, categorizing them by horsepower rating and fuel type available for specific years, for a specific geographic area, state or county. The NONROAD 2005 model was utilized to provide emission factors for the bulldozers that may be available for use in Brazoria County for the model year 2007.

It is expected that Texas Low-Emission Diesel (TxLED) will be available for use in nonroad equipment such as bulldozers during the proposed construction period pursuant to the TxLED requirements of the SIP. However, for conservatism, a reduction in NO_x emissions was not assumed in the final summary of emissions for this equipment in support of this project.

4.1.3 On-Road Mobile – Employee Commuter Vehicles

Mobile source emissions associated with the Freeport Channel Widening Project construction would be generated from employee commuter vehicles to and from the worksite. It was assumed that commuter

vehicles would include a mix of cars and light-duty trucks burning primarily gasoline. Mobile source emission factors were estimated using the EPA's mobile-source emissions model, MOBILE6.2 based on vehicle information and other input options specific to Brazoria County as provided by the TCEQ's Air Quality Planning and Implementation Division.

MOBILE6.2 is an emission factor model that may be used to calculate emission factors, in grams per mile, for different vehicle types under various operating conditions. These emission factors were multiplied by the type and number of vehicles and the estimated number of miles traveled to and from the worksite to estimate the annual emissions resulting from employee vehicles.

4.2 SUMMARY OF NO_X AND VOC Emissions

For comparison with the thresholds defined in the General Conformity Rule, the estimated annual emissions of NO_x and VOC are summarized in Tables 1 and 2 for each year of anticipated construction activities. Emissions of carbon monoxide, sulfur dioxide, and particulate matter are not considered in the General Conformity evaluation as this area is unclassified or in attainment with the NAAQS for each of those pollutants.

TABLE 1

SUMMARY OF NO_x EMISSIONS
(tpy)

Activity	2007	2008
Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels	84.98	196.21
Dredging Vessel Propulsion in Transit During Mobilization or Placement of Dredged Material	75.61	72.65
Land-side Dredged Material Placement – Bulldozing Equipment	0.51	–
On-Road – Employee Commuter Vehicles	0.02	0.02
Totals	**161.13**	**268.88**

As shown in Table 1, the estimate of NO_x emissions for the project would exceed the conformity threshold; i.e., greater than 100 tpy, for the years 2007 and 2008. Therefore, a General Conformity Determination for NO_x emissions would be required for each of these years.

TABLE 2

SUMMARY OF VOC EMISSIONS
(tpy)

Activity	2007	2008
Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels	1.10	2.50
Dredging Vessels in Transit During Mobilization or Placement of Dredged Material	0.71	0.64
Land-side Dredged Material Placement – Bulldozing Equipment	0.04	--
On-Road – Employee Commuter Vehicles	0.03	0.03
Totals	**1.88**	**3.17**

As shown in Table 2, the estimate of VOC emissions for the project would be exempt from a General Conformity Determination because they are below the 100 tpy threshold for the year 2007 and 2008.

5.0 PRELIMINARY GENERAL CONFORMITY DETERMINATION

The proposed Freeport Channel Widening Project would conform to the applicable SIP if, for each pollutant that exceeds the threshold rates (100 tpy of NO_x or VOC), the total of direct and indirect emissions from the action is in compliance or consistent with all relevant requirements and milestones contained in the applicable SIP. Under the TCEQ General Air Quality Rules 30 TAC § 101.30, "Conformity of General Federal Actions to State Implementation Plan," a Federal action required to have a conformity determination for a specific pollutant would be determined to conform to the SIP if it meets one of several requirements in 30 TAC §101.30(h), "Criteria for Determining Conformity of General Federal Actions" (TCEQ, 1999).

Based on available information, it is believed that the USACE action in approving the Freeport Channel Widening Project can meet the requirements of TCEQ Chapter 101, § 101.30(h)(1)(E)(i)(I). This section of the TCEQ's General Conformity Rule applies to an ozone nonattainment area; i.e., NO_x or VOC emissions, where the EPA has approved a revision to an area's attainment demonstration after 1990 and the state makes a determination that "the total of direct and indirect emissions from the action, or portion thereof, is determined and documented by the TCEQ to result in a level of emissions, which, together with all other emissions in the nonattainment area, would not exceed the emissions budgets specified in the SIP."

The emissions budget for General Conformity purposes is defined in the TCEQ General Air Quality Rules §101.30(8). In summary, the emissions budget is that portion of the total allowable emissions used as a basis for the latest approved revision of the SIP that is allocated to mobile sources; any stationary source or class of stationary sources; to any federal action or class of actions; to any class of area sources; or to any subcategory of the emissions inventory. According to a letter from the EPA to the Federal Energy Regulatory Commission dated 24 August 2005 (copy in Appendix B), the EPA revoked the 1-hour ozone standard on 15 June 2005, and thus, this standard in no longer in effect for the Houston-Galveston Area. Any General Conformity Determination must be based on the new 8-hour ozone standard and the corresponding attainment dates and de minimis levels.

For the HGB nonattainment area, the most recently approved SIP revision is the 2004 Mid-Course Review SIP (TCEQ, 2004), based on attainment of the 1-hour ozone standard, and associated emissions trading programs approved by the EPA on 6 September 2006 (EPA, 2006). In this SIP, the emissions budgets for NO_x and VOC are based on emissions inventories for 1999 updated for the year 2000, where appropriate, and projected 2007. For moderate nonattainment areas, such as the HGB nonattainment area, the attainment year under the 8-hour ozone standard should be 2009. However, the emissions inventory in the most recently approved SIP is based on the attainment year 2007, and thus, the budgets in the applicable categories and subcategories of the emissions inventory for 2007 were used in this analysis to represent the emissions budgets for the attainment year 2009.

The inventory of emissions of NO_x and VOC is summarized in the SIP from the emissions inventories for the five general categories of emission sources: stationary point, area, on-road mobile, nonroad mobile, and biogenics. As discussed in the 2004 SIP revision, nonroad mobile sources are a subset of the area source category. This subcategory includes aircraft operations, marine vessels, recreational boats, railroad locomotives, and a very broad category of nonroad equipment that includes engines mounted on construction equipment.

Based on information provided in the 2004 SIP revision, the motor vehicle emissions budget for 2007 is 186.13 tons per day (tpd) of NO_x and 89.99 tpd of VOC. The area source emissions weekday budget for 2007 is 144.86 tpd day of NO_x and 234.49 tpd of VOC. This area source emissions budget is further broken out in the SIP as shown on Table 3:

TABLE 3

SIP 2007 WEEKDAY HGB NONATTAINMENT AREA SOURCE EMISSIONS SUMMARY[1]
(tpd)

SIP Area Source Emissions Categories	NO_x	VOC
Low-level Nonroad Mobile (not including ships)	64.53	50.62
2007 HGB Ships	40.03	0.96
Area Sources (other than nonroad mobile sources and ships)	40.3	182.86
TOTALS	144.86	234.49

[1]TCEQ, 2004.

The 2007 HGB Ship emissions inventory is based on the 1997 Houston Galveston Area Vessel Emissions Inventory data from a detailed shipping emissions project described in the previous December 2000 SIP revision and follow-on work performed under the same project (TCEQ, 2000). This vessel emissions inventory includes emissions from ocean-going vessels, dredges (main engine, generators, and auxiliary engines), tugboats, towboats, and other commercial marine vessels. The Nonroad Mobile emissions inventory includes emissions from equipment associated with agricultural, aircraft, commercial, construction, ground support (airport), industrial, lawn and garden, railroad maintenance, logging, locomotives, oil and gas, recreational, and recreational marine equipment.

As shown on Table 1, the highest estimated annual emissions of NO_x during the Freeport Channel Widening Project are 268.88 tpy in 2008. For comparison to the SIP Area Source Emissions budget, the highest annual NO_x emission rate for the proposed project may be broken out as shown on Table 4.

TABLE 4

PROJECT NO_X EMISSIONS COMPARED TO SIP 2007
WEEKDAY AREA SOURCE EMISSIONS BUDGET[1]

SIP Area Source Emissions Categories	Project Activity	Maximum Annual NO_x Emissions (tpy)	Maximum Annual NO_x Emissions (tpd)	SIP Emissions Budget (tpd)	% of SIP Emissions Budget
HGB Ships	Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels including Transit and Mobilization	268.86 (2008)	0.74	40.03	1.8
Nonroad Mobile	Land-side Dredged Material Placement – Bulldozing Equipment	0.51 (2007)	0.021	64.53	0.03
Area Source (All)	Total Dredging and Nonroad Equipment	269.37	0.76	144.86	0.5
On-Road Mobile	On-Road – Employee Commuter Vehicles	0.02 (2007 or 2008)	0.0008	186.13	0.0004

[1]TCEQ, 2004.

As shown on Table 4, NO_x emissions from the project dredging activities during 2008 would represent less than 2% of the 2007 HGB Ship emissions budget. The project nonroad mobile equipment emissions during the year 2007 would represent about 0.03% of the SIP 2007 Nonroad Emissions Budget for NO_x. Combined emissions from project nonroad mobile sources including emissions from dredging activities and land-side equipment would represent about 0.5% of the total SIP 2007 Area Source Emissions Budget. Air emissions from employee commuter vehicles would represent about 0.0004% of the SIP 2007 Motor Vehicle Emissions Budget.

Based on an evaluation of the proposed project emissions and consideration of the interaction and information exchanged during the meetings with the TCEQ and the EPA, it is believed that the total of direct and indirect emissions of NO_x resulting from the USACE action subject to this general conformity evaluation would result in a level of emissions that are well within the 2007 Area Source Category Emissions Budget and within the emissions budget for the 2007 HGB Ships and Nonroad Mobile subcategories in the most recently approved SIP revision. As the Freeport Channel Widening Project is not unusual in scope for an area like the HGB, it is anticipated that emissions from each year of the

project will be less than an increase of 10% of the VOC and NO_x emissions inventories for the entire HGB nonattainment area. Therefore, emissions from the activities subject to the USACE action would not be considered regionally significant for purposes of General Conformity. Because of this, it is expected that emissions from the project construction would not:

- Cause or contribute to new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or interim emission reductions or other milestones in any area.

Pursuant to the General Conformity Rule (40 CFR 51.855), this Draft General Conformity Determination is being provided to demonstrate that the proposed Freeport Channel Widening Project would comply with the requirements of the General Conformity Rule and would be in conformity with the SIP. As specified in the TCEQ General Rules, Chapter 101, 101.30(h)(1)(E)(i)(I), the state must make a determination and document that the total of direct and indirect emissions from the action, or portion thereof, would result in a level of emissions which, together with all other emissions in the HGB nonattainment area, would not exceed the emissions budgets specified in the SIP. Therefore, it is requested that the TCEQ review this draft and provide a formal determination and confirmation. Once written confirmation is received, this information will be relied upon by the USACE as a basis for making a Final General Conformity Determination for the proposed Freeport Channel Widening Project.

6.0 REFERENCES

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Appendix A

Summary of Estimated Air Emissions

LIST OF TABLES

Table 1. Summary of Emissions by Engine Type and by Activity
Freeport Channel Widening Project

Engine Type - Activity	Emissions by Engine Type (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Propulsion - Dredging	19.66	149.42	3.40	3.59	25.02	2.13
Dredge Pumps - Dredging	3.97	40.23	0.91	0.96	6.63	0.35
Main Engine - Crane Dredging	0.12	1.19	0.03	0.03	0.20	0.01
Secondary - Dredging	10.42	90.34	2.05	2.16	14.98	1.11
Propulsion - Oceangoing	7.99	78.82	1.78	1.88	13.00	0.73
Secondary - Oceangoing	6.91	69.44	1.57	1.65	11.44	0.62
Vehicles	0.66	0.05	0.001	0.002	0.001	0.06
Construction	0.14	0.51	0.02	0.02	0.02	0.04
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**

Table 2. Summary of Emissions from Propulsion Engines During Dredging Activities
Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.017	0.086	0.002	0.002	0.015	0.002
Runabout	0.017	0.086	0.002	0.002	0.015	0.002
Small Tug	0.124	0.648	0.015	0.016	0.112	0.016
Large Tug	0.248	1.296	0.030	0.032	0.223	0.031
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.012	0.062	0.001	0.002	0.011	0.001
Large Tug	0.419	4.248	0.096	0.101	0.699	0.037
Employee Vehicles	--	--	--	--	--	--
Hopper	9.065	91.969	2.074	2.188	15.144	0.807
Runabout	0.938	4.901	0.113	0.120	0.845	0.118
Shrimpboat	8.826	46.123	1.068	1.126	7.955	1.111
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Dredging	**19.66**	**149.42**	**3.40**	**3.59**	**25.02**	**2.13**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Propulsion Engines During Dredging	**39.4%**	**34.7%**	**34.9%**	**34.9%**	**35.1%**	**42.1%**

Table 3. Summary of Emissions from Dredge Pumps During Dredging Activities
Freeport Channel Widening Project

	Emissions from Dredge Pumps (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.423	4.293	0.097	0.102	0.707	0.038
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	3.543	35.942	0.811	0.855	5.918	0.315
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Pump Engine During Dredging	**3.97**	**40.23**	**0.91**	**0.96**	**6.63**	**0.35**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Dredge Pumps During Dredging	**8.0%**	**9.4%**	**9.3%**	**9.3%**	**9.3%**	**7.0%**

Table 4. Summary of Emissions from Main Crane Engine During Dredging Activities
Freeport Channel Widening Project

	Emissions from Main Crane Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.118	1.195	0.027	0.028	0.197	0.010
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Crane Engine During Dredging	**0.12**	**1.19**	**0.03**	**0.03**	**0.20**	**0.01**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Main Crane Engine During Dredging	**0.2%**	**0.3%**	**0.3%**	**0.3%**	**0.3%**	**0.2%**

Table 5. Summary of Emissions from Secondary and/or Auxiliary Engines During Dredging Activities
Freeport Channel Widening Project

	Emissions from Secondary Engines During Dredging (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.294	1.537	0.036	0.038	0.265	0.037
Anchor Tender	0.004	0.010	0.0003	0.0003	0.002	0.001
Runabout	0.006	0.016	0.0004	0.0004	0.003	0.001
Small Tug	0.011	0.031	0.001	0.001	0.006	0.002
Large Tug	0.011	0.031	0.001	0.001	0.006	0.002
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.048	0.252	0.006	0.006	0.044	0.006
Runabout	0.004	0.011	0.000	0.000	0.002	0.001
Large Tug	0.014	0.073	0.002	0.002	0.013	0.002
Employee Vehicles	--	--	--	--	--	--
Hopper	8.201	83.201	1.877	1.980	13.700	0.730
Runabout	0.064	0.180	0.004	0.005	0.033	0.011
Shrimpboat	1.765	4.995	0.123	0.130	0.912	0.314
Employee Vehicles	**--**	**--**	**--**	**--**	**--**	**--**
Total from Secondary Engine During Dredging	**10.42**	**90.34**	**2.05**	**2.16**	**14.98**	**1.11**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Secondary Engines During Dredging	**20.9%**	**21.0%**	**21.0%**	**21.0%**	**21.0%**	**21.9%**

Table 6. Summary of Emissions from Propulsion Engines During Ocean-going Activities
Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.007	0.035	0.001	0.001	0.006	0.001
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.124	0.648	0.015	0.016	0.112	0.016
Large Tug	0.248	1.296	0.030	0.032	0.223	0.031
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.002	0.009	0.0002	0.0002	0.001	0.0002
Large Tug	0.066	0.345	0.0080	0.0084	0.060	0.008
Employee Vehicles	--	--	--	--	--	--
Hopper	7.539	76.493	1.725	1.820	12.595	0.671
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Ocean-going	**7.99**	**78.82**	**1.78**	**1.88**	**13.00**	**0.73**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Propulsion Engines During Ocean-going	**16.0%**	**18.3%**	**18.2%**	**18.2%**	**18.2%**	**14.4%**

Table 7. Summary of Emissions from Secondary and/or Auxiliary Engines During Ocean-going Activities
Freeport Channel Widening Project

	Emissions from Secondary and/or Auxiliary Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.100	0.522	0.012	0.013	0.090	0.013
Anchor Tender	0.001	0.004	0.0001	0.0001	0.0000	0.0003
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.011	0.031	0.001	0.001	0.006	0.002
Large Tug	0.011	0.031	0.001	0.001	0.006	0.002
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.007	0.035	0.0008	0.0009	0.006	0.001
Runabout	0.001	0.002	0.00004	0.00004	0.0003	0.0001
Large Tug	0.002	0.006	0.0002	0.0002	0.001	0.0004
Employee Vehicles	--	--	--	--	--	--
Hopper	6.782	68.804	1.552	1.637	11.329	0.604
Runabout	**--**	**--**	**--**	**--**	**--**	**--**
Shrimpboat	**--**	**--**	**--**	**--**	**--**	**--**
Employee Vehicles	**--**	**--**	**--**	**--**	**--**	**--**
Total from Secondary Engine During Ocean-going	**6.91**	**69.44**	**1.57**	**1.65**	**11.44**	**0.62**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Secondary Engines During Ocean-going	**13.9%**	**16.1%**	**16.1%**	**16.1%**	**16.0%**	**12.3%**

Table 8. Summary of Emissions from Employee Vehicles
Freeport Channel Widening Project

	Emissions from Employee Vechicles (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	0.189	0.014	0.0003	0.0007	0.0002	0.018
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	0.030	0.002	0.00005	0.0001	0.00003	0.003
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	0.442	0.033	0.0007	0.0016	0.0005	0.042
Vehicles Total	**0.66**	**0.05**	**0.001**	**0.002**	**0.001**	**0.06**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Employee Vehicles	**1.3%**	**0.01%**	**0.01%**	**0.02%**	**0.001%**	**1.3%**

Table 9. Summary of Emissions from Construction Equipment
Freeport Channel Widening Project

	Emissions from Nonroad Construction Equipment Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	0.14	0.51	0.02	0.02	0.02	0.04
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Construction Total	**0.14**	**0.51**	**0.02**	**0.02**	**0.02**	**0.04**
Project Total	**49.87**	**430.01**	**9.76**	**10.29**	**71.28**	**5.05**
% of Project Total from Construction Equipment Engine	**0.3%**	**0.1%**	**0.2%**	**0.2%**	**0.0%**	**0.8%**

Table 10. General Conformity Emissions Summary
Freeport Channel Widening Project

		Tons per Year			
		NO_x		VOC	
		2007	2008	2007	2008
Marine Vessels - Dredging	Dredges	63.43	154.96	0.58	1.36
	Anchor Tender	0.097	--	0.003	--
	Runabouts	1.53	3.73	0.040	0.095
	Tugs	6.33	--	0.09	--
	Shrimpboat	13.60	37.52	0.38	1.05
	Subtotal	84.98	196.21	1.10	2.50
Marine Vessels - Oceangoing	Dredges	73.21	72.65	0.65	0.64
	Anchor Tender	0.039	--	0.001	--
	Runabouts	0.01	--	0.00	--
	Tugs	2.36	--	0.06	--
	Shrimpboat	--	--	--	--
	Subtotal	75.61	72.65	0.71	0.64
Construction	Dozers	0.51	--	0.04	--
Employee	Vehicles	0.02	0.02	0.03	0.03
	Total	**161.13**	**268.88**	**1.88**	**3.17**

Table A-1. Assumptions for Phase 1 Marine Equipment Engine HP, Load Factor, and Hours of Operation

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560	20	100%	12	240
				Secondary	Diesel	0.4	160	20	100%	12	240
				Auxiliary	Diesel	0.4	1,350	24	100%	12	288
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50	20	100%	12	480
				Auxiliary	Diesel	0.2	17	20	100%	12	480
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	20	100%	12	240
				Auxiliary	Diesel	0.2	22	20	100%	12	240
	Towing Tug (Large)	1	1,500	Propulsion	Diesel	0.4	1,500	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
Mobilization / Demobilization	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560		0%		0
				Secondary	Diesel	0.4	160	24	100%	4	96
				Auxiliary	Diesel	0.4	1,350	24	100%	4	96
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50		0%		0
				Auxiliary	Diesel	0.2	17		0%		0
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	24	100%	4	96
				Auxiliary	Diesel	0.2	22	24	100%	4	96
	Towing Tug (Large)	1	1,500	Main Engine	Diesel	0.4	1,500	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
Total Engine Hours in Phase 1											4,512
Total Engine Hours for all Phases											58,326
Percent of Total Engine Hours - Phase 1 Engine Hours											7.7%

Notes:

1. Hours of operation for Cutterhead dredge pump and cutter based on 20 hours/day and total phase duration of 12 days at rate of 25,000 CY per day.
2. Mobilization/Demobilization of pipeline using Large and Small Tug is assumed to be 12 days at a operating rate of 20 hrs/day. Mobilzation/Demobilzation of Cutterhead due to travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Cutterhead dredge is assumed to have a pontoon hull structure without propulsion. Dredge type and engine horsepower break-down is based on specifications for Ellicott's "Super-Dragon" Model Series 4170, available at www.dredge.com/specs/printer-friendly/4170.htm
4. Support equipment vessel (i.e. tugs, tenders, and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table A-2. Assumptions for Phase 2 Marine Equipment Engine HP, Load Factor, and Hours of Operation

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage %	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	18	100%	19	342
				Auxiliary	Diesel	0.4	205	18	100%	19	342
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	18	100%	19	342
				Auxiliary	Diesel	0.2	17	18	100%	19	342
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.8	2,000	16	100%	19	304
				Auxiliary	Diesel	0.4	67	16	100%	19	304
Mobilization / Demobilization	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	0	0%	0	0
				Auxiliary	Diesel	0.4	205	24	100%	2	48
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	24	100%	2	48
				Auxiliary	Diesel	0.2	17	24	100%	2	48
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.4	2,000	24	100%	2	48
				Auxiliary	Diesel	0.2	67	24	100%	2	48
Total Engine Hours in Phase 2											2,216
Total Engine Hours for all Phases											58,326
Percent of Total Engine Hours - Phase 2 Engine Hours											3.8%

Notes:

1. Hours of operation for Bucket Crane dredge based on 18 hours/day and total phase duration of 19 days at rate of 8,000 CY per day.
2. Mobilization/Demobilization setup for all equipment assumed to be 48 hours.
3. The main engine of the bucket crane dredge is not a propulsion engine but is used to power the bucket during dredging. The auxillary engine for the bucket dredge was based on the minimum auxiliary horsepower cited in Starcrest's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005, page 156. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.
4. Support equipment vessel (i.e. tugs and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table A-3. Assumptions for Phase 3 Marine Equipment Engine HP, Load Factor, and Hours of Operation

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hr/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	267	2,421
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	267	3,026
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	267	3,026
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	267	2,848
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	267	3,560
	Crew/Survey Boat (Runabout)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	267	5,447
				Auxiliary	Diesel	0.2	17	20.4	100%	267	5,447
	Shrimp Boat	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	267	12,816
				Auxiliary	Diesel	0.2	200	24	100%	267	12,816
Mobilization / Demobilization	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	24	100%	4	96
				Auxillary - Oceangoing	Diesel	0.8	3,345	24	100%	4	96
Total Engine Hours in Phase 3											51,598
Total Engine Hours for all Phases											58,326
Percent of Total Engine Hours - Phase 3 Engine Hours											88.5%

Notes:

1. Total cycle time for Hopper Dredge is assumed to be 81 minutes and hopper dredge downtime is assumed to be 15%.
   Minute break-down of hopper dredge cycle is as follows:
   - Load time with dredge pumps on is 45 minutes.
   - Propulsion engine operate continously during entire cycle time of 81 minutes.
   - Bottom dumping without pumpout pumps takes 5 minutes.
   - Auxillary engines operate continuously, 24 hours per day.
2. Mobilization/Demobilization of Hopper due travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Hopper Dredge engine horsepower breakdown is based on specification for Great Lakes Dredge & Dock Company "Sugar Island Trailing Suction Hopper Dredge" with 3,600 yd^3 hopper capacity and total installed power of 9,395 hp. Specification is available at http://www.gldd.com/upload/zip/fleet/SUGAR_ISLAND_FLEET_SHEET.pdf.
4. Support equipment vessel (i.e. crew boat and shripm boat) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005.
   Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table A-4. Marine Engine Emission Factors and Fuel Consumption Algorithms
(in g/kW-hr, for all marine engines)

Statistical Parameter	Exponent (x)	Intercept (b)	Coefficient (a)
CO	1	0	0.8378
NO_X	1.5	10.4496	0.1255
PM	1.5	0.2551	0.0059
PM2.5	1.5	0.2551	0.0059
PM10	1.5	0.2551	0.0059
SO_X	n/a	0	2.3735
VOC (HC)	1.5	0	0.0667

Notes:

1.) All regressions but SO_2 are in the form of:

Emissions Rate (g/hp-hr) = (a*(Fractional Load)$^{-x}$ + b) * 0.7457
where the conversion factor of 0.7457 kW/hp is used to calculate the emission factor in g/hp-hr

2.) Fractional Load is equal to actual engine output divided by rated engine output.

3.) The SO_2 regression is the form of:

Emissions Rate (g/hp-hr) = a*(Fuel Sulfur Flow in g/hp-hr) + b
where Fuel Sulfur Flow is the Fuel Consumption times the sulfur content of the fuel;
The sulfur content for the fuel consumption regression was set to 3300 parts per million (0.33 wt%)

4.) **Fuel Consumption (g/hp-hr) = (14.12 / (Fractional Load) + 205.717) * 0.7457**

5.) n/a is not applicable, n/s is not statistically significant.

6.) All information shown above is detailed in Table 5-1 of the EPA technical report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", EPA 420-R-00-002, February 2000.

Table B-1. Phase 1 Marine Equipment Emission Factors and Emission Rates - Cutterhead
Freeport Channel Widening Project

	Dredge											Mob/Demob										
	24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)	
	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Seconday	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
hp	2,560	160	1,350	750	67	50	17	100	22	1,500	67	2,560	160	1,350	750	67	50	17	100	22	1,500	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)																						
CO	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)																						
CO	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046
NO_X	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131
PM	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004
PM2.5	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003
PM10	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003
SO_X	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024
VOC (HC)	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.
A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.
The following assumptions applied to the load factor determination during dredging operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).
D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.
The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.
D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table B-2. Phase 2 Marine Equipment Emission Factors and Emission Rates - Bucket Crane
Freeport Channel Widening Project

	Dredge						Mob/Demob Setup					
	Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)		Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)	
	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary
hp	500	205	50	17	2,000	67	500	205	50	17	2,000	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.2	0.8	0.4	0.8	0.4	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)												
CO	0.780934	1.561869	1.561869	3.123737	0.780934	1.561869	0.780934	1.561869	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.838583	7.923056	8.162195	7.923056	8.162195	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.239417	0.196377	0.207619	0.196377	0.207619	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.217870	0.178703	0.188933	0.178703	0.188933	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.229841	0.188522	0.199314	0.188522	0.199314	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.613894	1.304627	1.407716	1.304627	1.407716	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.556090	0.069511	0.196607	0.069511	0.196607	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)												
CO	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046
NO_X	0.003493	0.000738	0.000180	0.000033	0.013974	0.000241	0.003493	0.000738	0.000180	0.000033	0.007198	0.000131
PM	0.000087	0.000019	0.000005	0.000001	0.000346	0.000006	0.000087	0.000019	0.000005	0.000001	0.000183	0.000004
PM2.5	0.000079	0.000017	0.000004	0.000001	0.000315	0.000006	0.000079	0.000017	0.000004	0.000001	0.000167	0.000003
PM10	0.000083	0.000018	0.000004	0.000001	0.000332	0.000006	0.000083	0.000018	0.000004	0.000001	0.000176	0.000003
SO_X	0.000575	0.000127	0.000031	0.000006	0.002301	0.000042	0.000575	0.000127	0.000031	0.000006	0.001241	0.000024
VOC (HC)	0.000031	0.000018	0.000004	0.000002	0.000123	0.000006	0.000031	0.000018	0.000004	0.000002	0.000173	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table B-3. Phase 3 Marine Equipment Emission Factors and Emission Rates - Hopper
Freeport Channel Widening Project

	Dredge									Mob/Demob Towing	
	Generic Large Hopper Dredge					Crew/Survey Boat (Runabout)		Shrimp Boat		Generic Large Hopper Dredge	
	Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxiliary - Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion - Oceangoing	Auxiliary - Oceangoing
hp	4,350	4,350	1,700	3,345	3,345	250	17	1,000	200	4,350	3,345
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.8	0.8	0.8	0.8	0.4	0.2	0.4	0.2	0.8	0.8
Age Factor	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)											
CO	0.780934	0.780934	0.780934	0.780934	0.780934	1.561869	3.123737	1.561869	3.123737	0.780934	0.780934
NO_X	7.923056	7.923056	7.923056	7.923056	7.923056	8.162195	8.838583	8.162195	8.838583	7.923056	7.923056
PM	0.196377	0.196377	0.196377	0.196377	0.196377	0.207619	0.239417	0.207619	0.239417	0.196377	0.196377
PM2.5	0.178703	0.178703	0.178703	0.178703	0.178703	0.188933	0.217870	0.188933	0.217870	0.178703	0.178703
PM10	0.188522	0.188522	0.188522	0.188522	0.188522	0.199314	0.229841	0.199314	0.229841	0.188522	0.188522
SO_X	1.304627	1.304627	1.304627	1.304627	1.304627	1.407716	1.613894	1.407716	1.613894	1.304627	1.304627
VOC (HC)	0.069511	0.069511	0.069511	0.069511	0.069511	0.196607	0.556090	0.196607	0.556090	0.069511	0.069511
Emission Rate (tons/hr)											
CO	0.002996	0.002996	0.001171	0.002304	0.002304	0.000172	0.000012	0.000689	0.000138	0.002996	0.002304
NO_X	0.030393	0.030393	0.011878	0.023371	0.023371	0.000900	0.000033	0.003599	0.000390	0.030393	0.023371
PM	0.000753	0.000753	0.000294	0.000579	0.000579	0.000023	0.000001	0.000092	0.000011	0.000753	0.000579
PM2.5	0.000686	0.000686	0.000268	0.000527	0.000527	0.000021	0.000001	0.000083	0.000010	0.000686	0.000527
PM10	0.000723	0.000723	0.000283	0.000556	0.000556	0.000022	0.000001	0.000088	0.000010	0.000723	0.000556
SO_X	0.005005	0.005005	0.001956	0.003848	0.003848	0.000155	0.000006	0.000621	0.000071	0.005005	0.003848
VOC (HC)	0.000267	0.000267	0.000104	0.000205	0.000205	0.000022	0.000002	0.000087	0.000025	0.000267	0.000205

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.
A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.
The following assumptions applied to the load factor determination during dredging operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).
D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.
The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.
D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table C-1. Marine Equipment Estimated Emissions for Phase 1 - Cutterhead
(tons per year)

Phase No.	Pollutant	Dredge	Dredge										Mobilization / Demobilization										Total Phase Emissions
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)				24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)		
			Main Pump	Secondary	Auxillary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Pump	Secondary	Auxillary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	
1	CO	Hydraulic	0.4231	0.0264	0.2678	0.1240	0.0111	0.0165	0.0056	0.0165	0.0036	0.2479	0.0111	0.0000	0.0106	0.0893	0.1240	0.0111	0.0000	0.0000	0.0066	0.0015	0.2479	0.0111	1.66
1	NOX	Hydraulic	4.2927	0.1382	1.3992	0.6478	0.0313	0.0864	0.0159	0.0864	0.0103	1.2956	0.0313	0.0000	0.0553	0.4664	0.6478	0.0313	0.0000	0.0000	0.0345	0.0041	1.2956	0.0313	10.60
1	PM2.5	Hydraulic	0.0968	0.0032	0.0324	0.0150	0.0008	0.0020	0.0004	0.0020	0.0003	0.0300	0.0008	0.0000	0.0013	0.0108	0.0150	0.0008	0.0000	0.0000	0.0008	0.0001	0.0300	0.0008	0.24
1	PM10	Hydraulic	0.1021	0.0034	0.0342	0.0158	0.0008	0.0021	0.0004	0.0021	0.0003	0.0316	0.0008	0.0000	0.0013	0.0114	0.0158	0.0008	0.0000	0.0000	0.0008	0.0001	0.0316	0.0008	0.26
1	SOX	Hydraulic	0.7069	0.0238	0.2413	0.1117	0.0057	0.0149	0.0029	0.0149	0.0019	0.2234	0.0057	0.0000	0.0095	0.0804	0.1117	0.0057	0.0000	0.0000	0.0060	0.0008	0.2234	0.0057	1.80
1	VOC	Hydraulic	0.0377	0.0033	0.0337	0.0156	0.0020	0.0021	0.0010	0.0021	0.0006	0.0312	0.0020	0.0000	0.0013	0.0112	0.0156	0.0020	0.0000	0.0000	0.0008	0.0003	0.0312	0.0020	0.20

Table C-2. Marine Equipment Estimated Emissions for Phase 2 - Bucket Crane
(tons per year)

			Dredge						**Mobilization / Demobilization**						Total Phase Emissions
			Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		
Phase No.	**Pollutant**	**Dredge**	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	
2	CO	Bucket Crane	0.1178	0.0483	0.0118	0.0040	0.4187	0.0140	0.0000	0.0068	0.0017	0.0006	0.0661	0.0022	0.69
2	NOX	Bucket Crane	1.1948	0.2523	0.0615	0.0113	4.2480	0.0733	0.0000	0.0354	0.0086	0.0016	0.3455	0.0063	6.24
2	PM2.5	Bucket Crane	0.0269	0.0058	0.0014	0.0003	0.0958	0.0017	0.0000	0.0008	0.0002	0.0000	0.0080	0.0002	0.14
2	PM10	Bucket Crane	0.0284	0.0062	0.0015	0.0003	0.1011	0.0018	0.0000	0.0009	0.0002	0.0000	0.0084	0.0002	0.15
2	SOX	Bucket Crane	0.1967	0.0435	0.0106	0.0021	0.6995	0.0126	0.0000	0.0061	0.0015	0.0003	0.0596	0.0011	1.03
2	VOC	Bucket Crane	0.0105	0.0061	0.0015	0.0007	0.0373	0.0018	0.0000	0.0009	0.0002	0.0001	0.0083	0.0004	0.07

Table C-3. Marine Equipment Estimated Emissions for Phase 3 - Hopper
(tons per year)

Phase No.	Pollutant	Dredge	Dredge									Mobilization / Demobilization		Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper		
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxillary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	
3	CO	Hopper	7.2519	9.0649	3.5426	6.5606	8.2007	0.9377	0.0638	8.8259	1.7652	0.2876	0.2211	46.72
3	NOX	Hopper	73.5751	91.9688	35.9418	66.5608	83.2010	4.9006	0.1804	46.1232	4.9945	2.9177	2.2436	412.61
3	PM2.5	Hopper	1.6595	2.0743	0.8107	1.5013	1.8766	0.1134	0.0044	1.0676	0.1231	0.0658	0.0506	9.35
3	PM10	Hopper	1.7506	2.1883	0.8552	1.5838	1.9797	0.1197	0.0047	1.1263	0.1299	0.0694	0.0534	9.86
3	SOX	Hopper	12.1150	15.1438	5.9183	10.9600	13.7001	0.8452	0.0329	7.9548	0.9120	0.4804	0.3694	68.43
3	VOC	Hopper	0.6455	0.8069	0.3153	0.5840	0.7299	0.1180	0.0114	1.1110	0.3142	0.0256	0.0197	4.68

Table C-4. Total Emissions from Marine Equipment
Freeport Channel Widening Project
(Tons per Year)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
		TOTAL	49.07	429.45	9.73	10.27	71.26	4.94

Table D-1. Dozer Emission Factors from NONROAD Model
(2007 Model Year)
Freeport Channel Widening Project

Range	HP	SCC	EQUIP	CLASSIFICATION	Engine Type	Fuel Type	VOC exhaust g/HP-hr	PM10 exhaust g/HP-hr	PM25 exhaust g/HP-hr	VOCCrank case g/HP-hr	CO exhaust g/HP-hr	NOx exhaust g/HP-hr	SO2 exhaust g/HP-hr
50 < HP <= 75	75	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.5376	0.4198	0.4072	0.0108	3.7378	5.0503	0.1822
75 < HP <= 100	100	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.5376	0.4198	0.4072	0.0108	3.7378	5.0503	0.1822
100 < HP <= 175	175	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.3678	0.2424	0.2351	0.0074	1.4623	4.6212	0.1642
175 < HP <= 300	300	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.3203	0.1984	0.1924	0.0064	1.2348	4.3835	0.1642
300 < HP <= 600	600	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.2798	0.1978	0.1919	0.0056	1.9510	5.0130	0.1642
600 < HP <= 750	750	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.2556	0.2100	0.2037	0.0051	2.3285	5.0029	0.1643
750 < HP <= 1000	1000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641
1000 < HP <= 1200	1200	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641
1200 < HP <= 2000	2000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.

Table D-2. Phase 1 NONROAD Emissions
Freeport Channel Widening Project

CO

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	1.23	0.087	0.004
Dozer	200	0.59	1	15	360	24.00	1.23	0.058	0.002
						Contract Total		**0.145**	**0.006**

NO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	4.38	0.308	0.013
Dozer	200	0.59	1	15	360	24.00	4.38	0.205	0.009
						Contract Total		**0.513**	**0.021**

$PM_{2.5}$

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.192	0.014	0.001
Dozer	200	0.59	1	15	360	24.00	0.192	0.009	0.000
						Contract Total		**0.023**	**0.001**

PM_{10}

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.198	0.014	0.001
Dozer	200	0.59	1	15	360	24.00	0.198	0.009	0.000
						Contract Total		**0.023**	**0.001**

SO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.164	0.012	0.000
Dozer	200	0.59	1	15	360	24.00	0.164	0.008	0.000
						Contract Total		**0.019**	**0.001**

VOC

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.33	0.023	0.001
Dozer	200	0.59	1	15	360	24.00	0.33	0.015	0.001
						Contract Total		**0.038**	**0.002**

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.
2. Load factors from Appendix A of Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

Table D-3. Total Emissions from NONROAD Equipment
FREEPORT CHANNEL WIDENING PROJECT

CONSTRUCTION PERIOD
(TONS OF EMISSIONS)

Pollutant	Phase 1	Phase 2	Phase 3
CO	0.145	n/a	n/a
NO_x	0.513	n/a	n/a
$PM_{2.5}$	0.023	n/a	n/a
PM_{10}	0.023	n/a	n/a
SO_x	0.019	n/a	n/a
VOC	0.038	n/a	n/a
TOTALS	0.761	**n/a**	**n/a**

Notes:

1. NONROAD Equipment for Phase 1 include the following:
   - 200 HP Diesel Bulldozer
   - 300 HP Diesel Bulldozer
2. No NONROAD Equipment used in Phase 2 or Phase 3.

Table E-1. Emission Factors for Employee Vehicles
Freeport Channel Widening Project

Fleet Year	Type of Vehicle	EPA Category[1]	Emisson Factor (g/mile)					
			CO[2]	NOx[2]	PM2.5[3]	PM10[3]	SO2[3]	VOC[2]
1	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
2	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
3	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988

Notes:

1. LDGV=light duty gasoline-fueled vehicles designated for transport of up to 12 people
   LDGT1=light duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6000 pounds or less
2. Emission factors for CO, NOx, and VOC are from MOBILE6.2 run using Brazoria County input file, "30aug2007brazi1a0", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/HGB/m62/2007/.
3. Emission factors for $PM_{2.5}$, PM_{10}, and SO_2 are from MOBILE6.2 run using Statewide PM1 and PM2 input files, "2007_wk_pm1_d13c5r4ihu.in" and "2007_wk_pm2_d13c5r4ihu.in", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/Statewide/m62/2007/.

Table E-2. Total Emissions from Employee Vehicles
Freeport Channel Widening Project

Phase	Type of Vehicle	EPA Category	Daily Vehicles (/day)	Daily Travel - Per Vehicle			Travel Days[3] (days/yr)	Annual Travel[4] (VMT/yr)	Annual Emissions[5] (tpy)					
				On-Site[1] (VMT)	Off-Site[2] (VMT)	Total (VMT)			CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1	Cars	LDGV	14	1	50.0	51.0	24	17,136	0.1292	0.0098	0.00022	0.00047	0.00013	0.0125
	Pickups	LDGT1	6	1	50.0	51.0	24	7,344	0.0597	0.0042	0.00009	0.00020	0.00007	0.0057
2	Cars	LDGV	3	1	50.0	51.0	19	2,907	0.0219	0.0017	0.00004	0.00008	0.00002	0.0021
	Pickups	LDGT1	1	1	50.0	51.0	19	969	0.0079	0.0006	0.00001	0.00003	0.00001	0.0007
3	Cars	LDGV	20	0	50.0	50.0	38	38,143	0.2875	0.0217	0.00048	0.00105	0.00029	0.0277
	Pickups	LDGT1	10	0	50.0	50.0	38	19,071	0.1550	0.0109	0.00024	0.00053	0.00018	0.0147
								Total Car Emissions	0.4386	0.0331	0.0007	0.0016	0.0004	0.0423
								Total Pickup Emissions	0.2225	0.0156	0.0004	0.0008	0.0003	0.0211
								TOTAL MOBILE EMISSIONS	**0.661**	**0.049**	**0.0011**	**0.0024**	**0.0007**	**0.063**

Notes:

1. Daily on-site VMT is estimated based on very minimal use of personal vehicles at the site.
2. Off-Plant VMT is assumed to be 50 miles/day round trip.
3. Travel days for Phase 1 and 2 is assumed to be daily for the duration of the phase. Travel for Phase 3 is assumed to be weekly for the duration of the phase.
4. Annual travel = Daily vehicles * Total VMT * Travel days/yr.
5. Annual emissions = Emission factor * Annual travel * 1lb/453.6 grams * 1ton/2000lb

Appendix B

EPA General Conformity Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

DEC 0 3 2004

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Conformity After the 1-hour Ozone Standards Revocation

FROM: Lydia N. Wegman, Director
Air Quality Strategies and Standards Division, OAQPS

TO: Steve Rothblatt, Director
Air and Radiation Division, Region V

This is in response to your electronic correspondence of November 23, 2004, requesting clarification on our policy for conformity determinations before the adoption of the State Implementation Plan (SIP), for the 8-Hour Ozone National Ambient Air Quality Standard. You stated that you need a written statement before December 10, 2004.

The General Conformity Regulations (40 C.F.R. 93.150-160) provide several options for Federal agencies to demonstrate conformity. One of the options in ozone nonattainment areas is to have the State document and determine that the emissions from the action, along with all other emissions in the area, will not exceed the emission budget in the applicable SIP. Since the conformity determination is expected to occur after June 15, 2005 (the date of the revocation of the 1-hour ozone standard) and before the adoption of the SIP for the 8-hour ozone standard, you asked if the existing 1-hour SIP could be considered the applicable SIP for the determination. Even after EPA revokes the 1-hour ozone standard for the area, the 1-hour ozone SIP would remain in place until it is revised. Therefore, we believe that the emission budgets in the 1-hour SIP would be applicable for the O'Hare project conformity determination. We expect that all parties will work together to ensure that the emissions from the airport and the expansion will be included in the 8-hour ozone SIP.

If you have further questions, please contact David Stonefield at (919) 541-5350.