Appendix B

Summary of Survey Results

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Appendix B

Statewide Barge and Dredge Vessel Survey Summary

I. Introduction and Background

In November 2007, the Air Resources Board (ARB or Board) approved the commercial harbor craft regulation (CHC regulation) to significantly reduce diesel PM (PM) and oxides of nitrogen (NO_x) from diesel-fueled engines on commercial harbor craft (CHC) vessels. The regulation is significantly reducing PM and NO_x emissions from CHC engines.

One of the basic requirements of the adopted CHC regulation is that in-use engines on ferries, tugboats, and towboats operating in regulated California waters must meet the most current U.S. Environmental Protection Agency (U.S. EPA) marine engine emissions standards through a compliance schedule based on the age and annual use of the engine.

Barge and dredge vessel engines were not included in the in-use engine requirements of the CHC regulation because information at the time indicated that barge and dredge vessel engines were regulated under the Portable Engine Airborne Toxic Control Measure (Portable Engine ATCM) by being registered in the Portable Equipment Registration Program (PERP) or by local air district permitting. The adopted CHC regulation requires those engines registered in PERP or permitted by a local district prior to January 1, 2009 to be exempt from the CHC regulation. In order to simplify regulatory obligations and provide consistency for barge and dredge vessel owner/operators to be subject to a single statewide regulation, the ARB staff began evaluating the barge and dredge vessel category and conducted a survey of those engines in 2009.

In January 2010, the PERP registration program was amended to make CHC registered in that program subject to the requirements of the CHC regulation. Since the CHC regulation currently has no in-use requirements for barges and dredge vessels, it is necessary to amend this regulation and to require all barge and dredge vessel engines, including those registered in PERP or under local district permits, to be subject to the CHC regulation. The primary reason for taking this action is to provide consistency for barge and dredge vessel owner/operators and bring these in-use engines under the requirements of a single regulation.

The barge and dredge vessel survey was conducted on a statewide basis and requested the submittal of the following vessel and engine information for (see attached survey):

- Company Name
- Vessel Name
- U.S. Coast Guard Documentation Number
- Vessel Use/Type
- Annual Fuel Usage
- Percent of Hours Operated Various Distances Off California Coast
- Auxiliary or Propulsion Engine
- Engine Make (manufacturer)
- Engine Model
- Model Year
- Engine Horsepower (Maximum Rated)
- Total Engine Displacement
- Number of Cylinders
- Annual Hours of Operation
- Home Port
- IMO (international Maritime Organization) Identification Number
- MSSI (Maritime Mobile Service Identities) Number
- Year Vessel Built
- Vessel Length
- Vessel Width
- Owner, or Operator, or Owner/Operator and Contact Information
- Barge or Dredge Type
- Engine Position
- PERP Registration Number
- Barge/Dredge Activity (increase, decrease, no change)
- Operation in port or county and percent operation time
- Engine Type (off-road or marine)
- Engine Use (generator, pump, etc.)
- Engine Family

The survey was distributed to every potential owner/operator the ARB could identify using internal and public sources. The majority of the contacts were located in California with a small percentage being out-of-state. Some information about potential barge and dredge owner/operators was obtained from the PERP records and on-line searches.

The barge and dredge vessel survey provided data for approximately 100 barge and dredge vessels and approximately 400 engines. In the following sections, the results for the survey is presented including the types of vessels in use, engine specifications (i.e., make, model, horsepower) and annual activity by vessel type.

II. Vessel Information Survey Results

The survey respondents were requested to provide information on the vessels that they owned or operated including the home port of each vessel, the primary use for the vessel, the annual fuel usage, locations their vessels operated, and the percent of time the vessel is operated at various distances off California's coast. An example the survey is located at the end of this Appendix.

Table 1 provides a summary of the vessels home ports reported in the survey. The home port is defined on the survey as the principal place normally used for the overnight berthing of the vessel and aggregated by local air pollution control district (district).

Information for approximately 100 vessels was collected in the barge and dredge vessel survey. Not all surveys had data for every data field. Blank data fields were not included in average or population numbers in the survey summaries.

In this section the vessel information described is summarized.

Table 1: Vessel Quantity and Associated Air District Home Port

Barge and Dredge Operating Locations*	Number of Vessels Reported**
Bay Area AQMD	37
South Coast AQMD	10
Other	6
San Diego County APCD	4
North Coast Unified AQMD	2
Imperial County APCD	1
Sacramento Metropolitan AQMD	1
San Joaquin Valley Unified APCD	1
Ventura County APCD	1
Yolo/Solano AQMD	1
Total	64

* - Includes overlap between districts of individual barge and dredge vessels operations during the year.

** - Information about the location of all barge and dredge vessel operations was not provided in the survey submittal

A. Vessel Use

The survey requested information on the primary use for each vessel. The following vessel types were specified on the survey:

Barge: A vessel having a flat-bottomed rectangular hull with sloping ends and built with or without a propulsion engine.

Dredge: A vessel designed to remove earth from the bottom of waterways, by means of including, but not limited to, a scoop, a series of buckets, or a suction pipe. Dredges include, but are not limited to, hopper dredges, clamshell dredges, or pipeline dredges

B. Annual Fuel Use

The barge and dredge vessel survey requested vessel owner/operators to report annual fuel use for 2008. Table 2 lists the annual fuel used (in gallons).

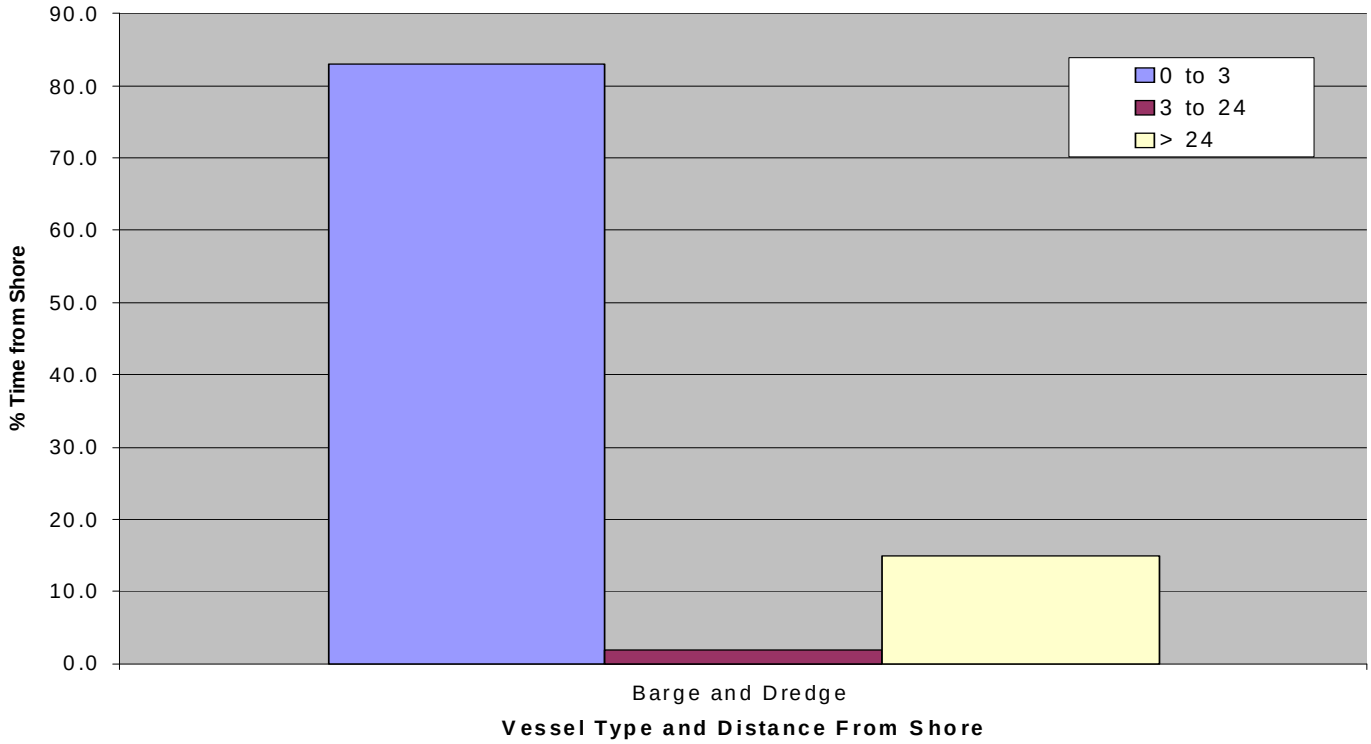
Table 2: Annual Fuel Usage (gallons/year)

Vessel Type	Auxiliary Engines	Propulsion Engines
Barges (2008)	2,021,788	No info
Dredges (2008)	505,629	No info
Total	2,527,417	

C. Percent of Hours Operated at Various Distances off the California Coast

The survey requested vessel owner/operators provide the percent of hours operated at various distances off the California coast. The options were 0-3 miles, 3-24 miles, and greater than 24 miles. The survey results are presented in Figure 1. Overall, most barge and dredge vessels operate within 3 miles of the California coast.

Figure 1: Percent of Barge and Dredge Engine Hours Operated at Varying Distances from Shore



III. Auxiliary/Propulsion Engine Survey Results

For each vessel, the survey requested information on the number, type, and annual activity of auxiliary and propulsion engines. Data for 350 auxiliary engines and 6 propulsion engines was submitted. This section summarizes the information received about vessel engines.

A. Auxiliary Engines

Auxiliary engines on barges and dredges are used to power a variety of on-board equipment such as pumps, and electrical lights. As shown in Table 3, the horsepower range for auxiliary engines ranged from 5 to 2,934 horsepower with an overall average of about 346 horsepower. 20 percent of barges and dredges have one auxiliary engine, 20 percent have two auxiliary engines, 20 percent have three auxiliary engines, and 40 percent have four or more auxiliary engines. Data provided on auxiliary engines include make and model, model year, horsepower data, annual hours of operation and annual fuel usage.

Table 3: Quantity of Auxiliary Engines and Average Horsepower

Vessel Category	# Auxiliary Engines	Horsepower	
		Range	Average
Barge	304	5 – 2,934	346
Dredge	81	99 – 2,600	800

B. Propulsion Engines

Few barge and dredge vessels have propulsion engines. Table 4 lists the reported propulsion engines horsepower ranges and averages.

Table 4: Quantity of Propulsion Engines and Average Horsepower

Vessel Category	# Propulsion Engines	Horsepower	
		Range	Average
Barge	2	NA	NA
Dredge	4	1,125 – 4,640	2,880

C. Horsepower and Model Year

Table 6 shows the barge and dredge vessel survey response population with model year and horsepower ranges for auxiliary engines. The barge and dredge vessel survey data shows that about 3 percent of the auxiliary engines were 1969 and older model year, 97 percent were model years 1970 and newer, and about 60 percent of the engines were 2000 or newer models.

Table 6: Barge and Dredge Vessel Auxiliary and Propulsion Model Years and Horsepower Ranges[5]

Auxiliary Engines

Model Year	Horsepower Range									
	No HP Data	< 50	51 - 75	76 - 100	101 - 175	176 - 250	251 - 500	501 - 750	> 751	Total
No Age Data		1	4	5	9	11				30
1905 - 1939										
1940 - 1949							1			1
1950 - 1959							2			2
1960 - 1969		1			1	4		1	1	8
1970 – 1979		1		6	8	11	4			30
1980 – 1989		1				7	15	4	3	30
1990 – 1999	2	2	3	3	8	15	12	5	6	56
2000 – 2007	2	6	11	10	17	22	88	16	20	192
Total	4	12	18	24	43	70	122	26	30	349

Propulsion Engines

Model Year	Horsepower Range									
	No HP Data	< 50	51 - 75	76 - 100	101 - 175	176 - 250	251 - 500	501 - 750	> 751	Total
No Age Data										
1905 – 1939										
1940 – 1949										
1950 – 1959										
1960 – 1969										
1970 – 1979									2	2
1980 – 1989										
1990 – 1999										
2000 – 2008									2	2
Total									4	4

[5]The totals in this table do not match the total number of engines reported in the survey since there were engines that did not have the age or horsepower reported.

D. Hours of Operation

Figure 2 provides information on the average number of hours of operation per year for auxiliary and propulsion engines by vessel type. Barge and dredge vessels averaged 550 and 1,510 hours, respectively, annually.

Figure 2: Average Engine Hours of Operation Per Year

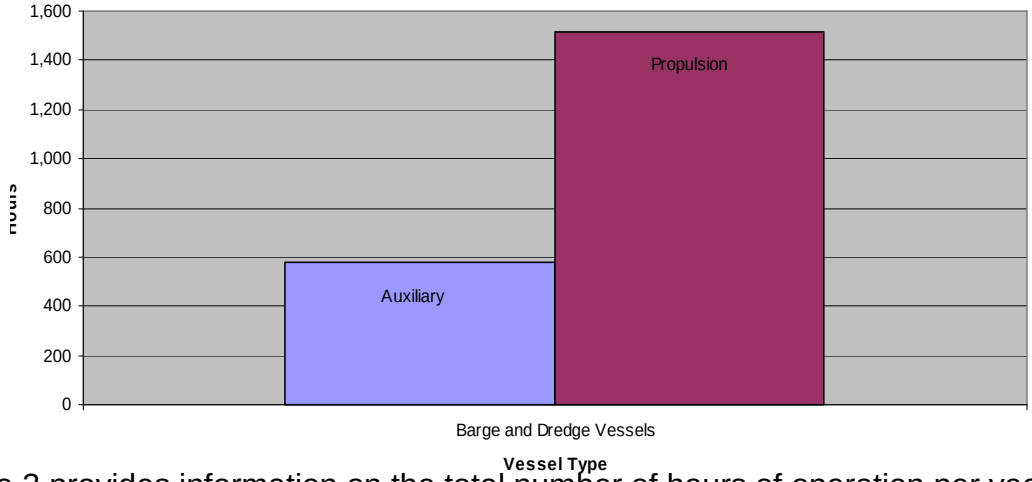
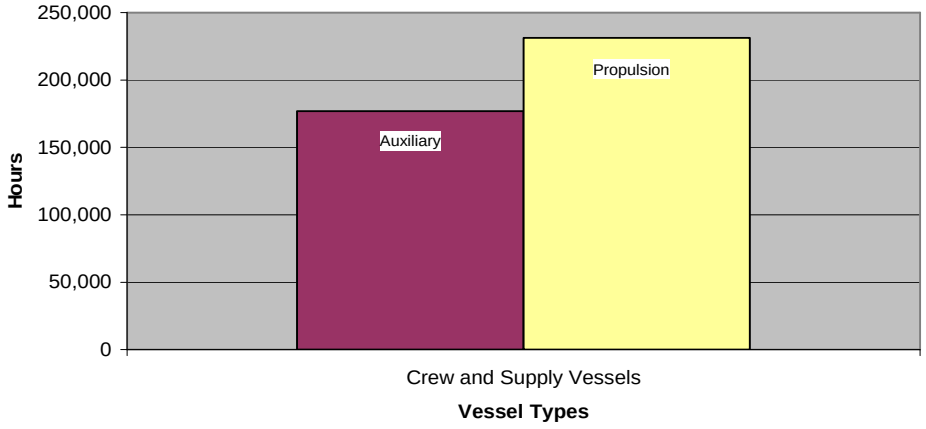


Figure 3 provides information on the total number of hours of operation per year for auxiliary and propulsion engines by vessel type. Barge and dredge vessels totaled 139,130 and 12,100 hours, respectively, annually.

Figure 3: Total Engine Hours of Operation Per Year



Attachment I

Barge and Dredge Vessel Survey
Sample Forms

SURVEY INSTRUCTIONS

Before filling out the survey form, please read the following instructions carefully. A sample form is included for your assistance.

Explanations for each survey data field are provided below. If you operate more than one vessel, **please complete one survey form for each vessel you operate.**

Survey Data Fields

CONTACT / OWNER / OPERATOR INFORMATION

Contact, Owner, and Operator Information: Complete box(es) with appropriate information.

Contact Name (and Title): Enter the name and title of the person to be contacted by the ARB in case we have questions about the information provided.

Operator Information: If the vessel operator is different from the contact , please enter the name, title, and company information of the person or company which currently operates the vessel.

Owner Information: If the vessel owner is different from the operator, enter the name, title, and company information of the person or company having all the incidents of ownership, including the legal title, or is the mortgagor of the vessel.

Company Name: Enter the name of the company that corresponds with the contact, operator, or owner.

Mailing Address/City/State/ZIP Code: Mailing address, City, State, and ZIP code of the contact person, owner, or operator.

Date: Enter the date the survey form was completed.

Email: Enter the email address of the contact person.

Phone: Enter the phone number of the contact, operator, or owner.

Fax: Enter the fax number of the contact, operator, or owner.

VESSEL INFORMATION

Vessel Name: Enter the name of the vessel being reported (one vessel per sheet).

Year Build: Enter the year the vessel was built.

Length and Width: Enter the length and width of the vessel.

Home Port: Enter the vessel's home port. A vessel's home port is the principal place for embarkation or debarkation, or the loading or unloading of supplies, and is normally used for the overnight berthing of the vessel.

U.S. Coast Guard Number: Please enter the U.S. Coast Guard documentation number assigned to the vessel. If the vessel is not documented with the U.S. Coast Guard, please provide the International Maritime Organization Identification (IMO ID) and/or the Maritime Mobile Service Identities (MSSI) number (preferably the latter).

VESSEL INFORMATION (continued)

Vessel Type: Please check the box(s) best describing the vessel, either dredge, barge, or other. If other, please describe other on the line below. If the vessel is used for more than one type of operation, check all boxes that apply.

Type of Dredge or Barge: Provide a descriptive name for the dredge or barge which describes the primary function. i.e. hopper dredge, derrick barge, construction barge, tank barge, etc.

Dredge / Barge Activity Level: Please estimate the rate of increase or decrease in this vessel's activity in percent per year. This helps us estimate growth rates of this industry for our emission inventory model.

2008 OPERATING AREA INFORMATION

Port or County: Please list the areas where this vessel operated in 2008, either the California county or port and the percent of time spent in each area.

PERP ENGINE INFORMATION

Portable Engine Registration Program (PERP) Engines: Engines in your fleet we have been able to identify as registered in PERP are listed on the sheet with the tab labeled "PERP". The engine information available from the registration data is included. If this information is current, you may cut and paste this block of engine information to the vessel engine information sheet for the appropriate vessel.

VESSEL ENGINE INFORMATION

Propulsion/Auxiliary Engines: Please enter the following information about your vessel's propulsion and auxiliary engines in the appropriate space provided (one line per engine). If information is not applicable, please mark "N/A". If the information is not available, please make your best estimate.

Propulsion Engine

Engine Position: Enter the position of the propulsion engine on the vessel (i.e. port, starboard, bow thruster etc.)

Engine Type: Enter the engine type either marine, off-road (nonroad) or on-road engine.

Auxiliary Engine

PERP Registered: Please enter the PERP (Portable Engine Registration Program) registration number if the engine is currently registered with PERP.

Engine Type: Enter the engine type either marine, off-road (nonroad) or on-road engine.

Engine Use Description: Please describe what function the engine provides power for on the vessel, such as electric generator, deck winch, suction pump, etc.

Manufacturer: Enter the name of the manufacturer of each engine.

Engine Family: Enter the engine family of each engine on the vessel, or enter NA if there is no applicable family.

Model: Please provide the model number of each engine.

Model Year: Please provide the model year of each engine.

Number of Cylinders: Please provide the number of cylinders for each engine.

Total Engine Displacement: Please provide the total displacement of each engine in liters.

Maximum Rated Horsepower: Please provide the maximum rated horsepower of each engine.

Annual Fuel Consumed: Please provide your best estimate of the annual fuel use for each engine for 2008. If you are unable to allocate the fuel use by engine, please provide total fuel consumption per vessel at the bottom. ARB will then use an alternative method to estimate the "per engine" fuel use.

2008 Annual Operating Hours: Please enter the total annual operating hours for each engine and an estimate of the approximate distribution of where these hours were spent:

(1) within 3 miles of shore (including in-port activities);
(2) beyond 3 miles out to 24 miles from shore;
(3) beyond 24 miles from shore.

CONTACT / OWNER / OPERATOR INFORMATION

CONTACT

Date: _____

Contact Name: _____ Title: _____

Company Name: _____

Mailing Address: _____ Email: _____

City / State: _____ Phone: _____

ZIP Code: _____ Fax: _____

OPERATOR, if different from contact ☐ Same as Contact

Operator Name: _____ Title: _____

Company Name: _____

Mailing Address: _____ Email: _____

City / State: _____ Phone: _____

ZIP Code: _____ Fax: _____

OWNER, if different from operator ☐ Same as Operator

Owner Name: _____ Title: _____

Company Name: _____

Mailing Address: _____ Email: _____

City / State: _____ Phone: _____

ZIP Code: _____ Fax: _____

For each vessel that you operate, please complete one VESSEL FORM

PERP Engines (Auxilary Engines)

PERP Reg. #	Engine Type	Engine Use Description	Engine Family	Manufacturer	Model	Model Year	Number of Cylinders	Total Engine Displacement	Maximum Rated Horsepower

COMPANY & CONTACT INFORMATION

Company Name: M.T. Marine Services Contact Name: Maximillian Torque Date: 7/30/09

VESSEL INFORMATION

Vessel Name: Salty Year Build: 1981

Home Port: Any Port Length: 250

U.S. Coast Guard No.: VN99999999 Width: 50

☐ IMO ID ☑ MSSI No.: 123456789 Type of Dredge or Barge: Hopper Dredge

Vessel Type

Dredge ☑

Barge ☐

Other* ☐

*Describe Other:

Dredge / Barge Activity

Increasing: 5 % Yearly

Decreasing: % Yearly

No Change:

2008 OPERATING AREA INFORMATION

Port or County	Port or County	Port or County	Port or County	Port or County
Port of Los Angeles	Santa Barbara Co.	San Diego Co.		
25 %	25 %	50 %	%	%

ENGINE INFORMATION

Propulsion Engines

Engine Position	Engine Type	Engine Family	Manufacturer	Model	Model Year	Number of Cylinders	Total Engine Displacement	Maximum Rated Horsepower	2008 Annual Fuel Consumed: Gallons	2008 Annual Operating Hours: Total Hours	0 to 3 miles	>3 to 24 miles	>24 miles
Port	Marine	TCP64.4RDZPBR	Caterpillar	D-399	1996	16	64.4	1125	90,500	1,000	750	250	
Starboard	Marine	TCP64.4RDZPBR	Caterpillar	D-399	1996	16	64.4	1125	90,500	1,000	750	250	
Bow Thruster	Marine	TCP14.6RDZBWR	Caterpillar	3406	1996	8	14.6	325	3,000	200	200		

Auxiliary Engines

PERP Registered (If yes, enter reg.#)	Engine Type	Engine Use Description	Engine Family	Manufacturer	Model	Model Year	Number of Cylinders	Total Engine Displacement	Maximum Rated Horsepower	2008 Annual Fuel Consumed: Gallons	2008 Annual Operating Hours: Total Hours	0 to 3 miles	>3 to 24 miles	>24 miles
123456	Off Road	Generator	TCP32.2RDZMLR	Caterpillar	D-379	1996	8	32.2	536	30,500	1,550	1,300	250	
123457	Off Road	Generator	TCP32.2RDZMLR	Caterpillar	D-379	1996	8	32.2	536	30,500	1,550	1,300	250	
123458	Off Road	Dredge Pump	TCP32.2RDZMLR	Caterpillar	D-379	1996	8	32.2	565	30,500	1,550	1,300	250	
123459	Off Road	Dredge Pump	TCP32.2RDZMLR	Caterpillar	D-379	1996	8	32.2	565	30,500	1,550	1,300	250	

Total Fuel for all engines	306,000