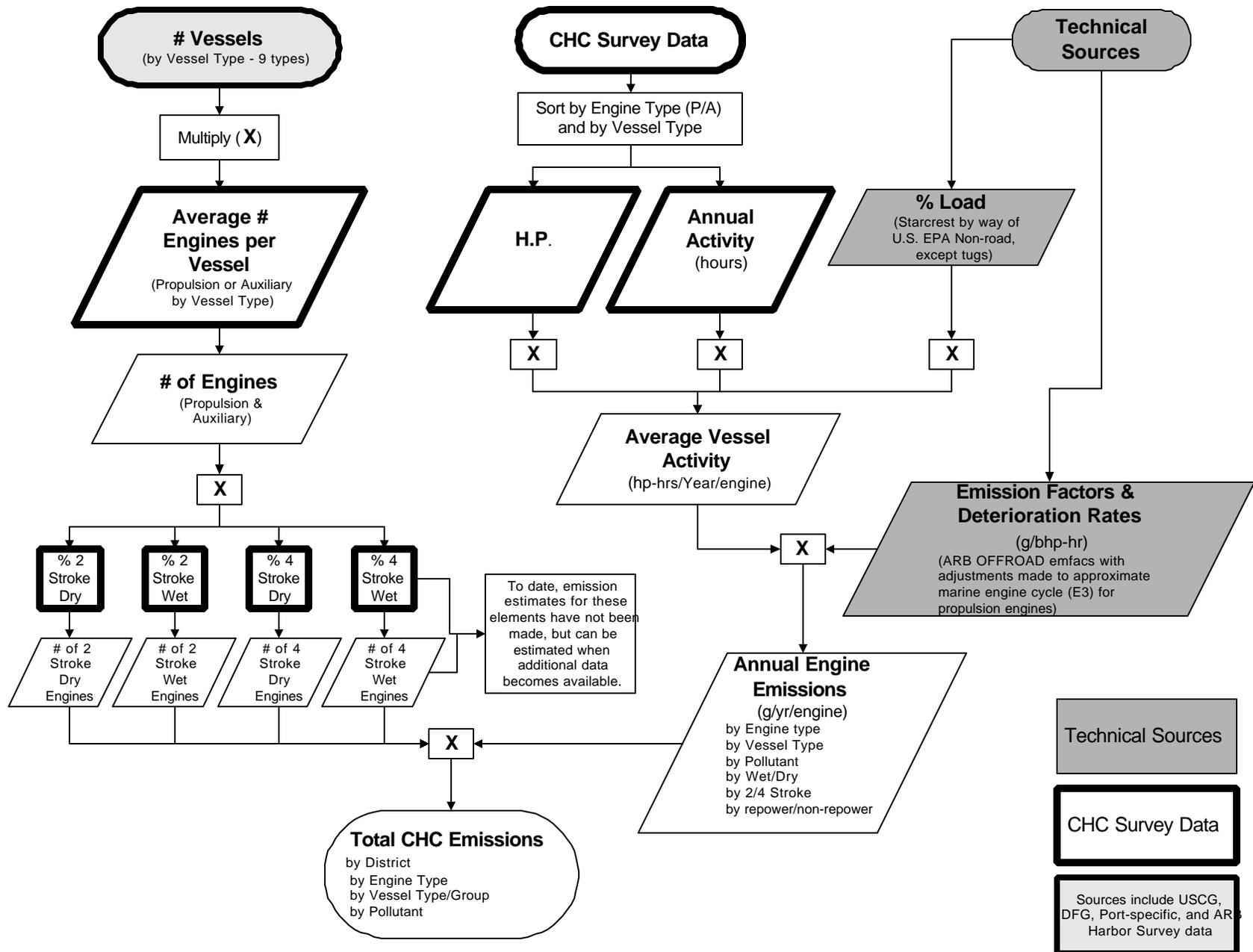


Appendix A

Commercial Harbor Craft Emission Estimation Flow Chart

Commercial Harbor Craft EMS Estimation Flow Chart



Appendix B

Statewide Commercial Harbor Craft Survey

DRAFT - Do Not Cite or Quote

**State of California
Environmental Protection Agency
Air Resources Board**

Statewide Commercial Harbor Craft Survey

Final Report



**Stationary Source Division
Emissions Assessment Branch**

March 2004

TABLE OF CONTENTS

<u>Contents</u>	<u>Page</u>
I. Introduction and Background.....	2
II. Vessel Information Survey Results.....	3
A. Vessel Age	5
B. Vessel Use.....	6
C. Types of Fishing	7
D. Annual Fuel Use	8
E. Percent of Hours Operated at Various Distances off the California Coast .	9
III. Auxiliary/Propulsion Engine Survey Results	10
A. Auxiliary Engine	10
B. Propulsion Engine	11
C. Horsepower and Model Year	13
D. Hours of Operation.....	14

Figures and Tables

Table 1: Number of Vessels and the Associated Home Port.....	4
Table 2: Commercial Harbor Craft Use	7
Table 3: Commercial Harbor Craft Fishing Type and Vessel Quantity	7
Table 4: Annual Fuel Usage By Vessel Type.....	8
Table 5: Quantity of Auxiliary Engines and Average Horsepower	10
Table 6: Quantity of Propulsion Engines and Average Horsepower	12
Table 7: Propulsion and Auxiliary Model Years and Horsepower Ranges.....	13
Figure 1: Vessel Age Range with Population Weighted Average Vessel Age.....	5
Figure 2: Percent of Vessel Hours Operated at Varying Distances from Shore	9
Figure 3: Harbor Craft Auxiliary Engine Manufacturers	11
Figure 4: Harbor Craft Propulsion Engine Manufacturers.....	12
Figure 5: Vessel and Engine Age Range with Population Weighted Average	14
Figure 6: Average Engine Hours of Operation Per Year.....	15
Figure 7: Total Engine Hours of Operation Per Year.....	15

Appendix: Commercial Harbor Craft Survey

I. Introduction and Background

In December 2002, the Air Resources Board (ARB or Board) conducted the Statewide Commercial Harbor Craft Survey (Commercial Harbor Craft Survey or survey). The survey was intended to collect information about the various commercial harbor craft operating in California's coastal waters, harbors, and ports. The information was collected to help update the statewide emissions inventory for commercial marine vessels operating in the State. This report provides an overview of the results from the survey. A copy of the survey is provided in the appendix.

Commercial harbor craft are vessels used for commercial purposes or to support public services.¹ There are several types of harbor craft including crew and supply boats, charter fishing vessels, commercial fishing vessels, ferry/excursion vessels, pilot vessels, towboat or push boats, tug boats and work boats. The Statewide Commercial Harbor Craft survey requested vessel owners and operators to submit the following information for each commercial harbor craft:

- Vessel name
- U.S. Coast Guard Documentation Number
- Home Port
- Vessel Age
- Vessel Use
- Type of Fishing, (If a fishing vessel)
- Annual Fuel Usage
- Percent of Hours Operated at Various Distances Off California Coast
- Number of Auxiliary and Propulsion Engines
- Engine Location (Port, Starboard, Center)
- Engine Make (manufacturer)
- Engine Model
- 2 or 4 Stroke Engine
- Model year
- Engine Horsepower
- Annual Hours of Operation
- Estimated Fuel Usage (1999, 2000, 2001)
- Wet or Dry Exhaust (Propulsion Engine Only)

The survey was distributed to approximately 5,000 potential owners and operators. The majority of the contacts were located in California with a small percentage being out-of-state contacts. Addresses of potential harbor craft owners and operators were obtained primarily from the U.S. Coast Guard and the California Department of Fish and Game. A total of 704 surveys were returned providing data on approximately 900 vessels and over 1900 engines. In the following sections, the results for the survey are presented including the types of vessels in use, engine specifications (i.e., make, model, horsepower) and annual activity of the vessel.

¹The survey did not collect information on recreational vessels or the larger oceangoing vessels generally used to transport cargo.

II. Vessel Information Survey Results

The respondents to the survey 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, and the percent of time the vessel is operated at various distances off California's coast. Information for 909 vessels was collected in the survey. Not all surveys had data entered for every data field. Blank data fields were not included in average or population numbers in the survey summaries.

The majority of the respondents, 66%, reported information for 1 vessel, 17% reported owning or operating 2 to 5 vessels and 18% reported owning 6-20 vessels. In this section the vessel information described above is summarized.

Table 1 provides a summary of the home ports for the vessels reported in the survey. For the purpose of the survey, home port is defined on the survey as the principal place for loading or unloading of passengers, or the loading or unloading of supplies, and normally used for the overnight berthing of the vessel. In total there were 99 home ports identified. Several vessels were reported to have home ports outside of California. Out-of-state ports included Honolulu, Seattle, and Portland. For these vessels, follow-up discussions with the vessel owners revealed that, in most cases, these vessels spent only a few months of the year in California waters.

Table 1: Number of Vessels and the Associated Home Port

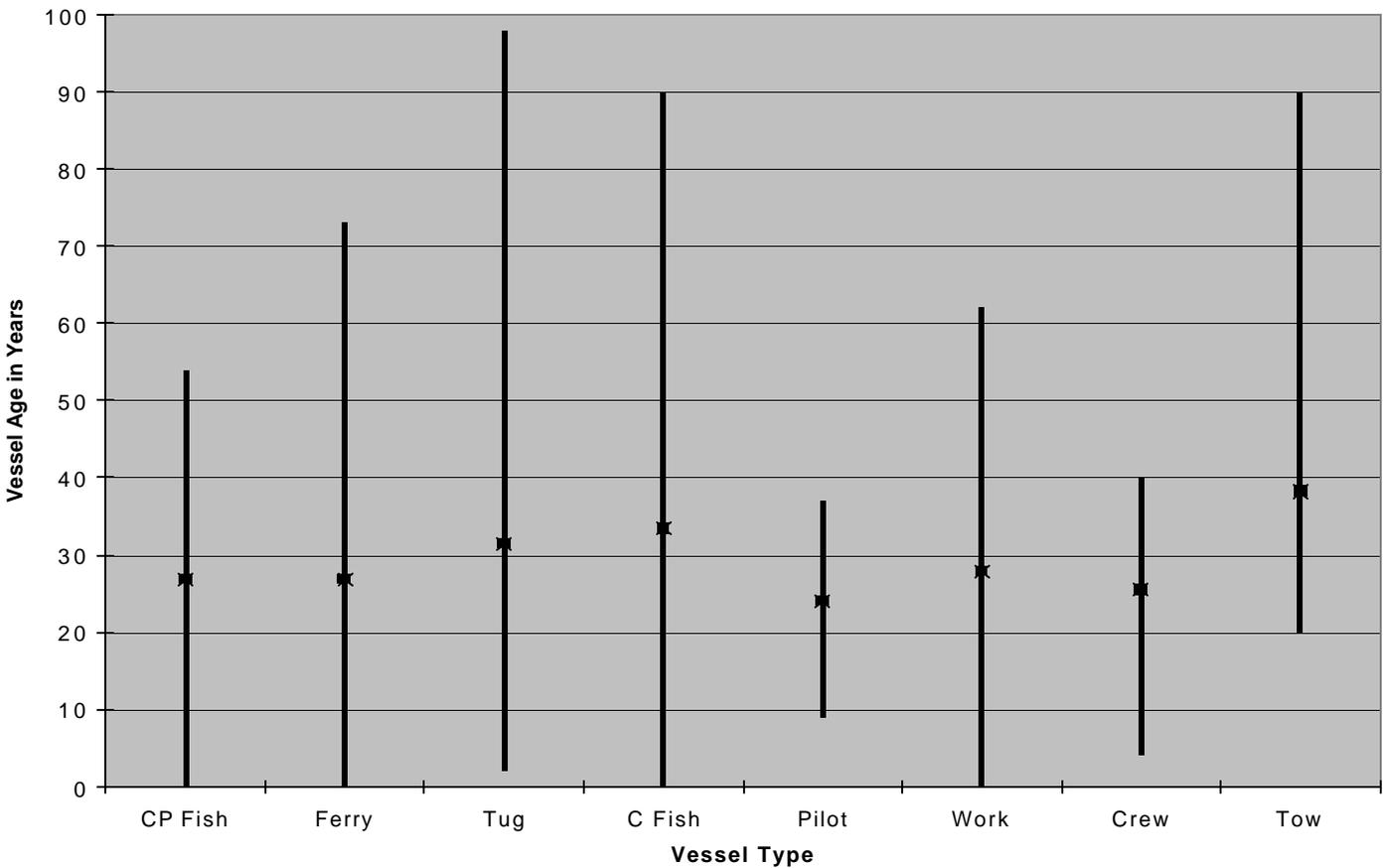
Home Port	Number of Vessels Reported
San Diego	86
San Francisco	64
Los Angeles	61
Bodega Bay; San Pedro ²	40
Moss Landing	37
Newport	35
Unknown	34
Long Beach; Fort Bragg	30
Santa Barbara	27
Crescent; Santa Cruz	24
Eureka	23
Monterey	22
Morro Bay	20
Half Moon Bay	18
Two Harbors, Catalina	17
Richmond; Port of San Luis	16
Channel Island	15
Pillar Point Harbor; Ventura	14
Alameda; Mission Bay; Sausalito	10
Sacramento	9
Port Hueneme; Redondo Beach	7
Dana Point; Marina del Rey	6
Brookings; Larkspur; Oxnard; Seattle, WA	5
Goleta; Honolulu, HI; Oakland; Oceanside; Petaluma	4
Balboa Island; Berkeley; Emeryville; Humboldt Bay; Point Arena; Port of Stockton; Rio Vista; Shelder Cove; Terminal Island; Vallejo	3
Angel Island; Charlston; Coos Bay; Gold Beach; Huntington Harbor; Marshall; McAvoy Harbor/Bay Point; Portland, OR; San Leandaro; Spring Valley; Stockton; Tomales Bay; West Sacramento; Westport; Wilmington	2
Albion; Arcata; Arona Cove; Astoria; Avalon; Bakersfield; Bellingham; Carmel; Carpenteria; Chehalis; Chico; Costa Mesa; Crockett Marina; Dillon Beach; El Granada (Pillar Point Harbor); Florence; Ilwaco; King Salmon - Eureka; Lake Havasu; Lake Tahoe; Martinez; Napa; Pinole; Point San Pablo Harbor; Port Sonoma; Princeton by the Sea; Quilcene; Reedsport; S. Lake Tahoe; Sequim; Sherman Island; Steamboat Slough; Winchester Bay; Zephyr Cove	1

²This table list all home ports with the boats per port. For example, Bodega Bay and San Pedro ports reported 40 boats each.

A. Vessel Age

The age of the vessels reported in the survey ranged from 99 years old to new (2002), with most vessel types having an average vessel age around 30 years. The vessel age for commercial passenger fishing, ferry, crew and work boats were similar with a population weighted average age of about 27 years. Commercial fishing and tug boats tended to have slightly older vessels, with an average vessel age around 32 years. Tow boats were the oldest on average at 39 years. In Figure 1, this data is summarized with the long vertical lines representing the vessel age range and the square dots representing the weighted average vessel age.

Figure 1: Vessel Age Range with Population Weighted Average Vessel Age



B. Vessel Use

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

Commercial Fishing Vessels: Self-propelled vessels dedicated to the search for, and collection of, fish for the purpose of sale at market.

Commercial Passenger Fishing Vessels: Self-propelled vessels for hire by the general public (seven or more people) dedicated to the search for, and collection of, fish for the purpose of sport or personal consumption.

Crew and Supply Boats: Self-propelled vessel used for carrying personnel and supplies to and from off-shore and in-harbor locations (including, but not limited to, off-shore work platforms, construction sites, and other vessels).

Ferry/Excursion Vessel: A vessel owned, controlled, operated, or managed for public use in the transportation of persons or property, except rowboats, sailing boats, barges under 20 tons dead weight carrying capacity, and vessels that are under the burden of five tons net register and under 30 feet in length.

Pilot Vessels: Self-propelled vessels used to guide ocean-going vessels safely into and out of a port or harbor.

Towboat/Push Boats: Self-propelled vessel designed to tow/push barges and pontoons. The hull is usually rectangular in plan and has little freeboard (the portion of the side of a hull that is above the water).

Tug Boats: Self-propelled vessel for the towing (and pushing) of ships or other floating structures such as barges in ports/harbors.

Work Boats: Self-propelled vessel that performs duties such as fire/rescue, law enforcement, hydrographic surveys, spill/response, research, training, and construction (including drilling) vessels.

Other: Any vessel use that does not fit with the categories identified above.

As shown in Table 2, commercial fishing and commercial passenger fishing vessels are the most commonly reported use for the vessels with approximately 59% or 62% of the vessels reporting these uses. Ferry or excursion vessels accounted for 9% of the vessels and tugboats, about 8%.

There are 67 vessels reported as "other." Vessels in the other category included vessels used for a variety of uses: excursion/dinner cruises, diving, and commercial sailing boats.

Table 2: Commercial Harbor Craft Use

Vessel Use	Quantity Vessels	Percent of Total
Commercial Fishing Boats	488	51%
Commercial Passenger Fishing Boats	107	11%
Ferry/Excursion Boats	87	9%
Tug Boats	78	8%
Work Boats	70	7%
Other	67	7%
Tow Boats	22	2%
Crew Boats	21	2%
Pilot Boats	9	1%

C. Types of Fishing

For fishing vessels, the survey also requested the respondent to identify what type of fishing is typically done with the vessel. Table 3 lists vessel types and fishing types. The survey identified eight common types of fishing techniques used by the commercial fishing fleet: drift gill netting (DG net), rakes-air lifts, trolling, set gill netting (SG net), trawling, purse seine, trapping and other.

Table 3: Commercial Harbor Craft Fishing Type and Vessel Quantity³

Fishing Vessel Type	Fishing Type	# of Vessels	Percent of Total
Commercial Fishing Boats	Trolling	316	66 %
	Trapping	133	28 %
	Other	116	24 %
	Trawling	45	9 %
	SG Net	29	6 %
	Purse Seine	28	6 %
	DG Net	18	4 %
	Rakes-air lifts	3	1 %
Commercial Passenger Fishing Boats	Other ⁴	36	34 %
	Trolling	27	25 %
	Trapping	1	1%

³ A single vessel may have reported more than one type of fishing therefore the total number of vessels reported in Table 3 will exceed those in Table 2.

⁴ Other fishing types included, jigging, hook and line, drifting, rod and reel, urchin diving, and charter sport fishing.

D. Annual Fuel Use

The survey requested vessel owners/operators to report the annual fuel used for each vessel for the years 1999 through 2001. Table 4 lists the annual fuel used (in gallons) by specific harbor craft. In each case, the annual fuel listed is the combined usage for propulsion and auxiliary engines. Tug boats had the largest reported fuel usage with approximately 5,374,440 gallons used on average for the years 1999 through 2001. Overall, there was approximately a 21% increase in the amount of fuel over the years 1999 to 2001.⁵

Table 4: Annual Fuel Usage by Vessel Type (gallons/year)

Vessel Type	1999	2000	2001	3 Year Average
Tug Boats	4,298,616	5,767,290	6,057,414	5,374,440
Ferry/Excursion Boats	4,577,713	4,690,666	5,483,619	4,917,333
Commercial Fishing Boats	2,368,236	2,460,528	2,457,169	2,428,644
Tow Boats	1,927,041	1,948,787	2,013,727	1,963,185
Commercial Passenger Fishing Boats	1,260,409	1,411,427	1,565,839	1,412,558
Crew Boats	676,404	832,137	894,812	801,118
Work Boats	678,078	630,888	672,449	660,472
Pilot Boats	199,726	199,970	200,105	199,934
Total	15,986,223	17,941,693	19,345,134	17,757,683

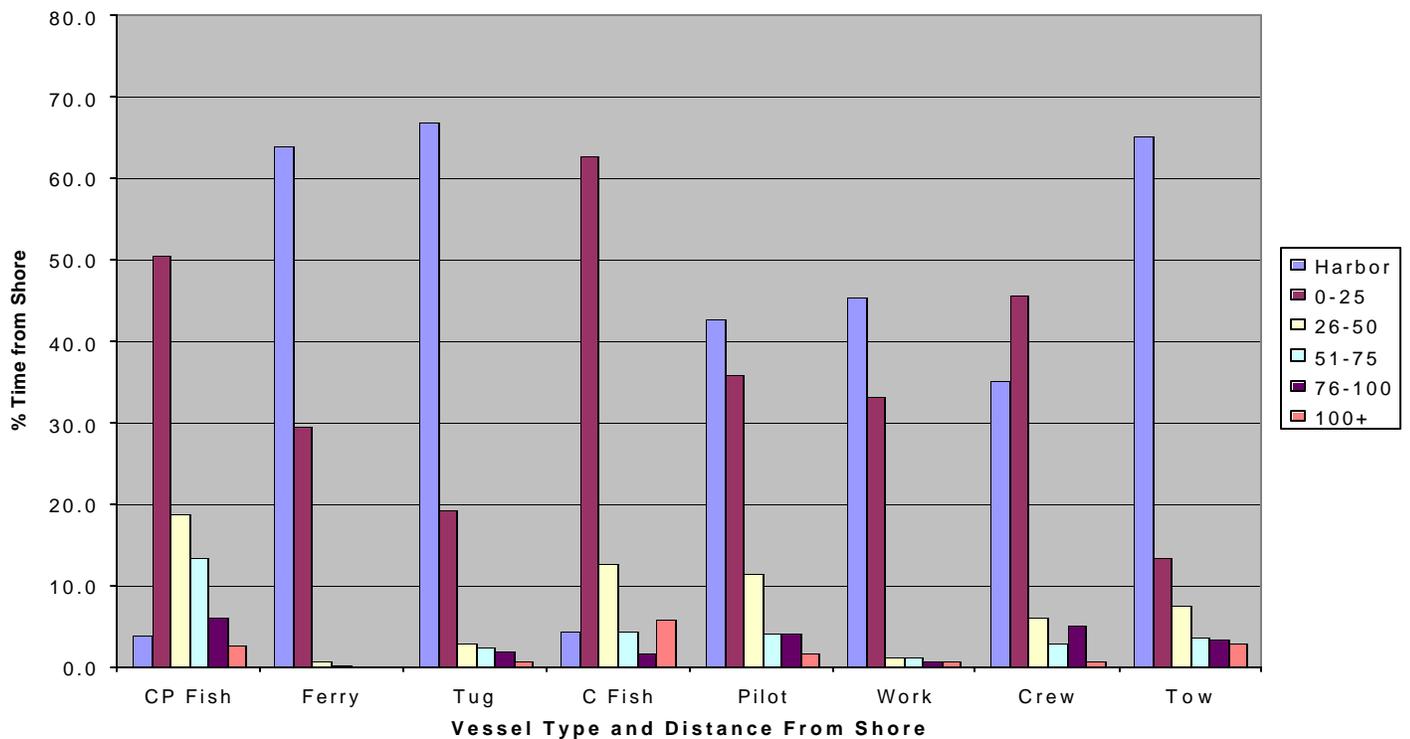
⁵ The survey collected data on the total annual fuel usage (Form B) per vessel and the annual fuel use per engine (Form C). In most cases, the total annual fuel usage and annual fuel per engine agreed within about 10%. However, the differences were higher in ferries, tugs, and fishing vessels primarily due to the lack of reporting on the per engine fuel usage. Because the response to the query on total annual fuel usage per vessel was higher, only the annual vessel totals are presented here.

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

The Commercial Harbor Craft Survey requested vessel owners provide the percent of hours operated at various distances off the California coast. The options were harbor operations, 0-25 miles, 26-50, 51-75, 76-100, or greater than 100 miles from the California shore. The survey results are presented in Figure 2. Overall, the data demonstrated that, for the majority of the time, most commercial harbor craft operate within 25 miles of the California coast.

For example, commercial passenger fishing vessels reported spending over 50% of the hours of operation at distances 0-25 miles from shore. The hours operated further off shore steadily declined with distance. Nineteen percent of hours were spent at 26-50 miles off shore and less than 1% at 76-100 miles. Ferries, in comparison, operate 65% of the time in the harbor area and 30% in the 0-25 mile zone.

Figure 2: Percent of Vessel 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 1,241 propulsion engines and 586 auxiliary engines was submitted. In this section, summaries are provided of the information received on the vessel engines.

A. Auxiliary Engines

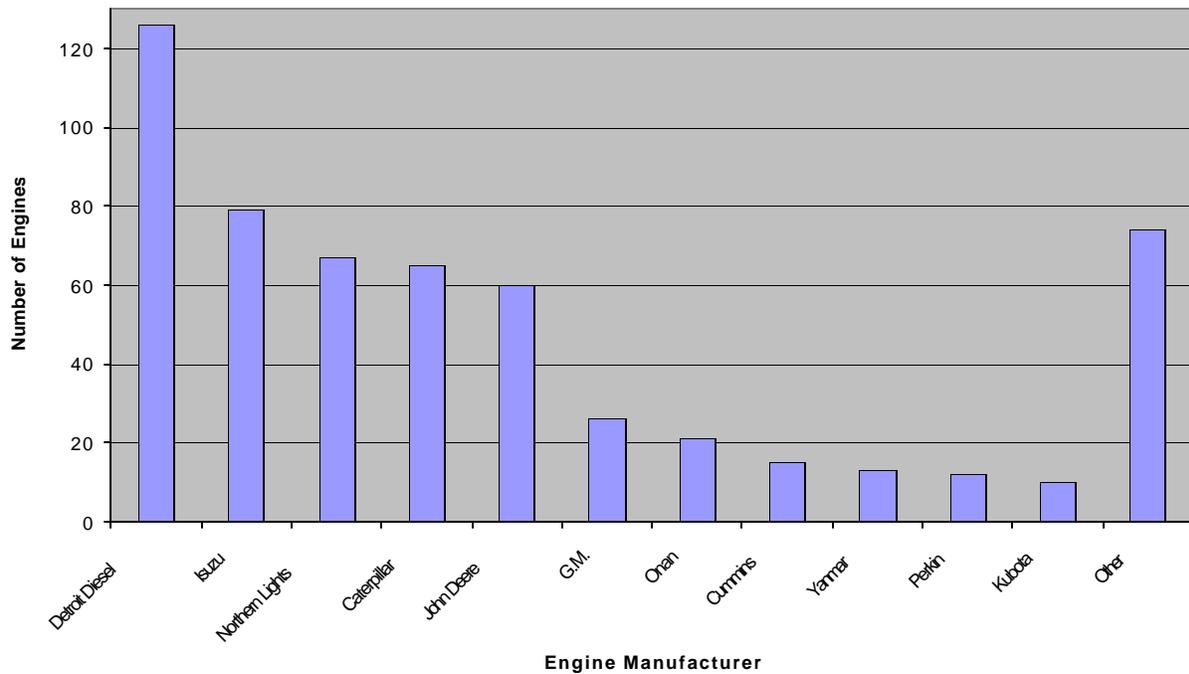
Auxiliary engines are used to power various on-board equipment such as electrical lights, refrigeration units, and radios. Of the vessels reported in the survey, 40% or 375 reported having auxiliary engines. For those vessels with auxiliary engines, 56% reported having one auxiliary engine. Approximately 38% reported having two auxiliary engines and 5% reported having three to five auxiliary engines. Data provided on auxiliary engines include make and model, model year, horsepower data, annual hours of operation and annual fuel usage. As shown in Table 5, the horsepower range for auxiliary engines ranged from 6 to 400 horsepower with an overall average of about 75 horsepower.

Table 5: Quantity of Auxiliary Engines and Average Horsepower

Vessel Category	# Auxiliary Engines	Horsepower	
		Range	Average
Commercial Fishing Boats	212	6 - 300	71
Tug Boats	120	7 - 300	111
Ferry Boats	98	10 - 400	94
Commercial Passenger Fishing Boats	82	4 - 185	50
Other	34	10 - 240	56
Work Boats	26	9 - 221	101
Crew Boats	22	16 - 110	79
Tow Boats	21	18 - 175	79
Pilot Boats	1	N/A	30

As shown in Figure 3, the most prominent engine manufacturer of vessel auxiliary engines from the survey was Detroit Diesel comprising 22% of the engines. Other more common manufacturers were Isuzu, Northern Lights, Caterpillar, and John Deere. Included in the other category were 27 different manufacturers such as, Honda, Kubota, and Thermo King. It is possible that some survey respondents may have included the name of the manufacturer of the piece of equipment powered by the diesel engine as opposed to the actual manufacturer of the engine.

Figure 3: Harbor Craft Auxiliary Engine Manufacturers



B. Propulsion Engines

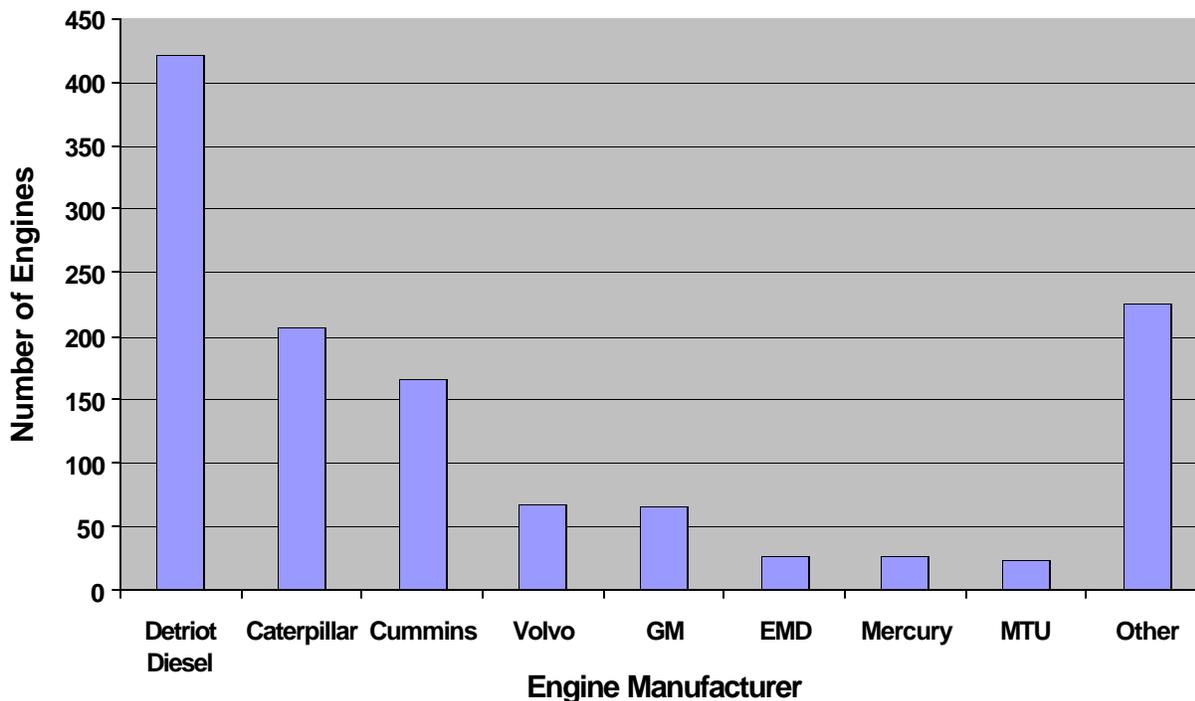
The majority of the vessels had one propulsion engine. Of the vessels reported, 63% had one propulsion engine, 33% had two propulsion engines, and about 3% had three or more engines. Data provided on propulsion engines included make and model, model year, horsepower data, annual hours of operation, and annual fuel usage. As shown in Table 6, the reported horsepower for the propulsion engines ranged from 8 to 3,600 horsepower with an overall average of about 500 horsepower. Tug boats tended to have larger engines with an average of over 1,200 horsepower.

Table 6: Quantity of Propulsion Engines and Average Horsepower

Vessel Category	# Propulsion Engines	Horsepower	
		Range	Average
Commercial Fishing Boats	516	8 – 1,485	230
Commercial Passenger Fishing Boats	192	80 – 1,400	381
Ferry Boats	164	35 – 3,110	733
Tug Boats	144	24 – 3,600	1,274
Work Boats	99	15 – 1,300	239
Other	89	28 - 764	281
Crew Boats	50	225 - 750	439
Tow Boats	38	24 – 1,500	500
Pilot Boats	15	230 - 550	408

The most prominent engine manufacturer of vessel propulsion engines from the survey was Detroit Diesel comprising 34% of the engines. Figure 4 illustrates other common manufacturers to be Caterpillar, Cummins and Volvo. Included in the other category were 34 different manufacturers such as Bray Marine, International, and Deutz. It is possible that some survey respondents may have included the engine name other than the actual engine manufacturer, such as a vessel manufacturer.

Figure 4: Harbor Craft Propulsion Engine Manufacturers



The respondents to the survey were requested to provide information on whether the vessels propulsion exhaust was wet or dry. Wet exhaust is exhaust that exits the engine under the water, whereas, dry exhaust is emitted into the air, above water. Fifty-two percent of the propulsion engines were reported as having dry exhaust and 46% wet exhaust. The remaining 2% of the vessels did not have the exhaust type specified.

C. Horsepower and Model Year

Table 7 listed below shows the survey population for associated model years and horsepower ranges for propulsion engines and auxiliary engines. For both propulsion and auxiliary engines, about 80% were 1970 or newer models. About 10% were pre-1970 model years and roughly 10% did not indicate the engine age.

Table 7: Propulsion and Auxiliary Model Years and Horsepower Ranges⁶

Propulsion Engines

Model Year	Horsepower Range									Total
	No HP Data	< 50	51 - 75	76 - 100	101 - 175	176 - 250	251 - 500	501 - 750	> 751	
No Age Data		5	5	9	14	31	20	0	4	88
1905 - 1939	0	0	1	1	1	0	0	0	0	3
1940 - 1949	1	1	3	2	12	3	5	0	0	27
1950 - 1959	1	0	3	6	7	4	11	2	1	35
1960 - 1969	0	4	2	8	4	12	29	6	5	70
1970 - 1979	3	4	4	16	34	65	86	16	18	246
1980 - 1989	5	8	6	14	35	44	73	21	28	234
1990 - 1999	1	14	11	7	26	46	101	23	46	275
2000 - 2002	2	6	14	7	16	26	88	26	48	233
Total	13	42	49	70	149	231	413	94	150	

Auxiliary Engines

Model Year	Horsepower Range									Total
	No HP Data	< 50	51 - 75	76 - 100	101 - 175	176 - 250	251 - 500	501 - 750	> 751	
No Age Data		19	7	4	9	10	0	0	0	49
1905 - 1939	0	1	0	0	0	0	0	0	0	1
1940 - 1949	1	1	1	0	0	1	0	0	0	4
1950 - 1959	0	3	5	1	0	0	2	0	0	11
1960 - 1969	0	5	11	4	4	0	0	0	0	24
1970 - 1979	3	27	17	30	13	5	0	0	0	95
1980 - 1989	6	36	17	16	25	12	1	0	0	113
1990 - 1999	19	64	17	19	33	6	3	0	0	161

⁶The totals in this table do not match the total number of engines reported in the survey since about 140 engines did not have the age or horsepower reported.

2000 - 2002	19	34	7	16	12	5	1	0	0	94
Total	48	190	82	90	96	39	7	0	0	

Figure 5 provides a graphical representation of the vessel and engine model year range and average model year reported for each vessel type. In Figure 5, the long bar indicates the range model year reported for the vessel (V), propulsion engine (P) or auxiliary engine (A) and the rectangular box the population weighted vessel or engine average model year for the specified category. While most categories had a fairly large range in model years reported, overall, the average age for vessels was about 30 years old and the engine average was fairly new, 1980 and newer model years.

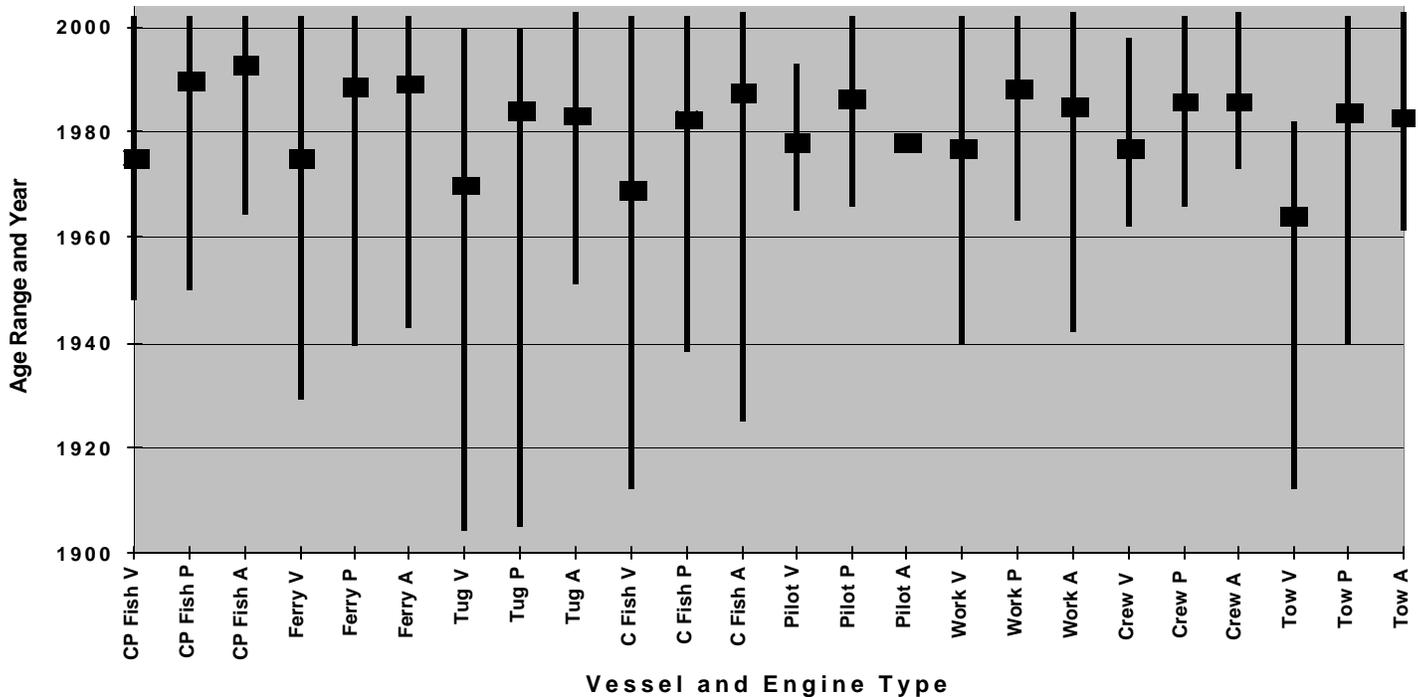


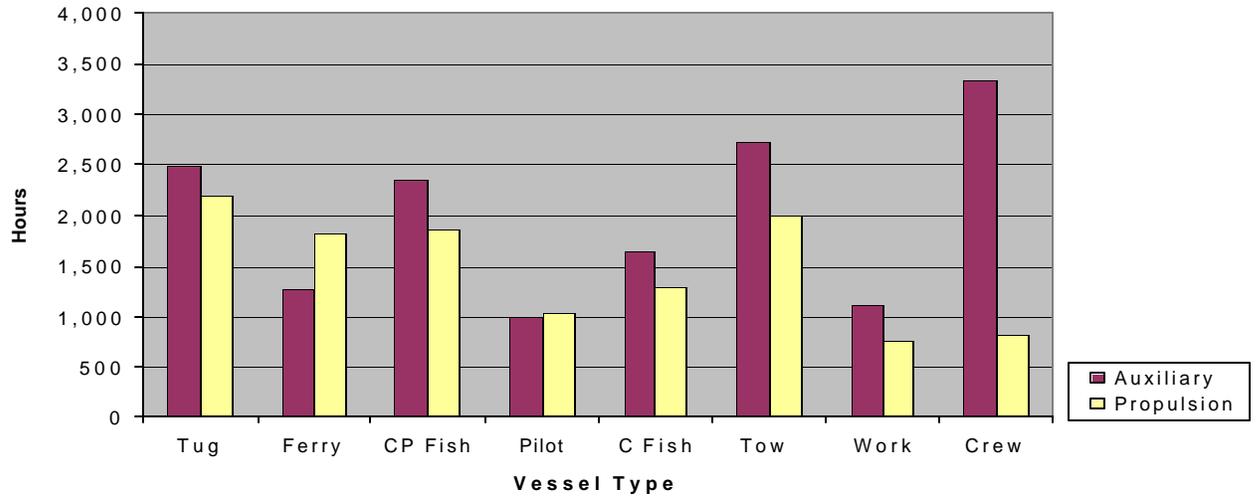
Figure 5: Vessel and Engine Age Range with Population Weighted Average

V = vessel
P = propulsion engine
A = auxiliary engine

D. Hours of Operation

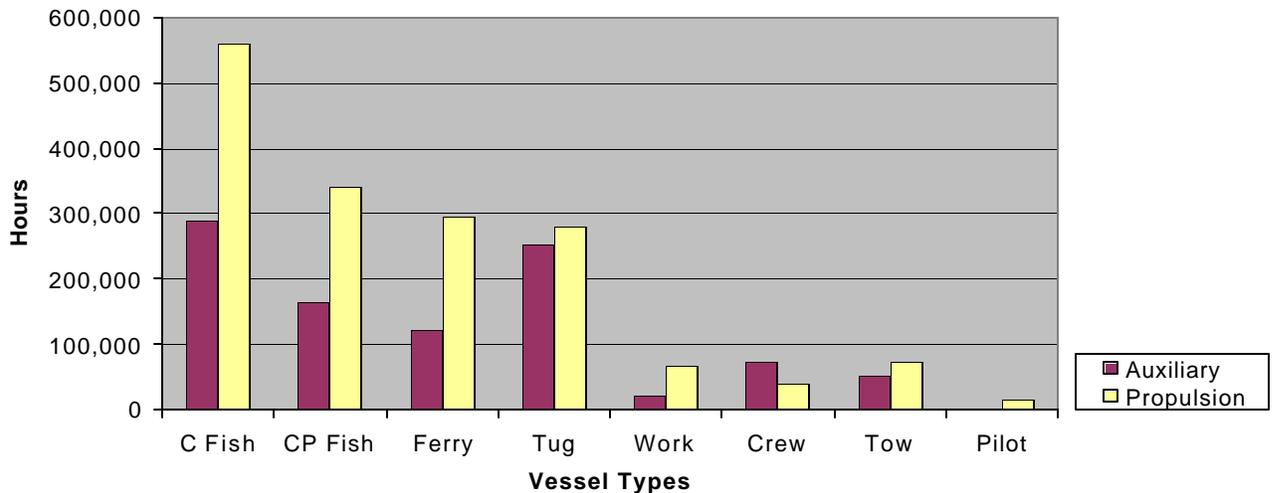
Figure 6 provides information on the average number of hours of operation per year for propulsion and auxiliary engines by vessel type. With respect to propulsion engine operation, on average, tug boats, commercial fishing boats, and tow boats operated the most hours averaging approximately 2,000 hours per year. Crew boats and work boats had the lowest average hours of operation reported, at less than 1,000 hours per year. For auxiliary engines, with the exception of ferries and pilots boats, they operated for more hours on a yearly basis than the propulsion engines.

Figure 6: Average Engine Hours of Operation Per Year



For all vessels, the total combined hours of operation for the propulsion engines was 1,668,000 hours and for auxiliary engines, 975,000 hours. As shown in Figure 7, commercial fishing boats reported the highest number of combined hours of operation for the propulsion engines at over 550,000 hours annually. Combined, the hours of operation of the propulsion engines for commercial fishing, commercial passenger fishing, ferries, and tug boats accounted for over 88% of the total hours reported. Similarly the hours of operation of the auxiliary in these same vessel categories accounted for 85% of the total hours of operation for auxiliary engines reported in the survey.

Figure 7: Total Engine Hours of Operation Per Year



Appendix

Commercial Harbor Craft Survey

Commercial Harbor Craft Survey

December 16, 2002

RETURN DATE: February 14, 2003

California Environmental Protection Agency



Air Resources Board

TABLE OF CONTENTS

THIS PACKET CONTAINS:

	<u>Page</u>
I. Survey Forms	I - 2
II. Survey Overview and Instructions	II - 2
III. Supporting Attachments	
A) Sample Forms	III - 2
B) Confidential Information Submittal Form	III - 5
C) Electronic Data Submittal Form	III - 6
D) Excerpts from the California Code of Regulations pertaining to the handling of confidential information: Title 17, California Code of Regulations, Sections 91000 to 91100	III - 7

IF YOUR PACKET IS MISSING ANY ITEMS LISTED ABOVE, PLEASE CONTACT:

Mr. Kirk Rosenkranz at (916) 327-7843 or krosenkr@arb.ca.gov

Facsimile number (916) 327-6251

Part I

Survey Forms

(these are the forms you will return to the California
Air Resources Board)

**2002 Commercial Harbor Craft Survey
PART I: SURVEY FORMS
Form A: Owner/Operator Information**

Page ___ of ___

Please complete the "Owner/Operator" Information Only Once

Owner/Operator: _____
Address: _____
City/State: _____
ZIP Code: _____

check one: Owner?
Operator?
Owner/Operator?

Contact Name (and title): _____ Confidential? _____
Phone Number: _____ (yes or no) Note 1
E-mail Address: _____

Please Identify the Vessels for Which You Are Providing Survey Information:

Vessel Name

U.S. Coast Guard Documentation Number

Note 1: If you want your information to be held confidential, please complete the Confidentiality Form (found in Part III.B. of this Survey)

**2002 Commercial Harbor Craft Survey
PART I: SURVEY FORMS
Form B: Vessel Information**

Page ___ of ___

Please complete one form for each vessel (Note 1):

- 1) Vessel Name: _____
 2) Home Port (Note 2): _____
 3) Vessel Age: _____
 4) Please indicate the use for the vessel listed on line "1)":

- Vessel Use:**
- | | | | | | |
|------------------------------|--------------------------|--------------------|--------------------------|-----------------------|--------------------------|
| Commercial Passenger Fishing | <input type="checkbox"/> | Commercial Fishing | <input type="checkbox"/> | Crew and supply boat | <input type="checkbox"/> |
| Ferry/Excursion | <input type="checkbox"/> | Pilot | <input type="checkbox"/> | Towboat/Push boat | <input type="checkbox"/> |
| Tug Boat | <input type="checkbox"/> | Work Boat | <input type="checkbox"/> | Other (specify) _____ | |

4a) If a Fishing Vessel, type of fishing done:

- | | | | | | |
|--------------------|--------------------------|------------------------|--------------------------|-------------|--------------------------|
| Drift gill netting | <input type="checkbox"/> | Set gill netting | <input type="checkbox"/> | Purse seine | <input type="checkbox"/> |
| Rakes, air lifts | <input type="checkbox"/> | Trawling | <input type="checkbox"/> | Trapping | <input type="checkbox"/> |
| Trolling | <input type="checkbox"/> | Other (please specify) | _____ | | |

5) Total Annual Fuel Usage: 1999: _____ 2000: _____ 2001: _____

6) Percent of Hours Operated at Various Distances Off California's Coast

Harbor Operations Only	_____ %
0 – 25 miles	_____ %
26 – 50 miles	_____ %
51 – 75 miles	_____ %
76 – 100 miles	_____ %
greater than 100 miles	_____ %

Note 1: If you have more than one vessel to report and need additional forms, please contact Kirk Rosenkranz (contact information on Page II-3 of Part II, "Survey Overview and Instructions").

Note 2: The "home port" is the principal place for embarkation or debarkation of passengers, or the loading or unloading of supplies, and is normally used for the overnight berthing of the vessel.

2002 Commercial Harbor Craft Survey
PART I: SURVEY FORMS
Form C: Propulsion/Auxiliary Engine Information

Page ___ of ___

Vessel Name: _____

Propulsion/Auxiliary Engines (one form per vessel) (Note 1)

Engine Number	Propulsion (P) or Auxiliary (A)	Placement Note 2	Make and Model	Repower Note 3	Model Year	Horsepower	2 or 4 stroke	Annual Hours of Operation	Estimated Annual Fuel Usage (gallons) Note 4			Propulsion Engines Only - Engine Exhaust: Wet or Dry Note 5
									1999	2000	2001	
1												
2												
3												
4												
5												
6												
7												

Note 1: For additional forms, please contact Kirk Rosenkranz (contact information on Page II-3 of Part II, "Survey Overview and Instructions").

Note 2: For propulsion engines only – Is the engine on the port side (P), the starboard side (S), or in the center (C)?

Note 3: Was the engine a repower that was funded in full or in part with monies from a State or local air quality program (such as Carl Moyer)?

Note 4: If you are unable to provide fuel usage information by engine, please leave these spaces blank. The ARB will use an alternative method to estimate.

Note 5: "Wet Exhaust" is released at or below the waterline and "Dry Exhaust" is released to the air.

Part II

Survey Overview and Instructions

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

SURVEY OVERVIEW

The Air Resources Board's (ARB) commercial harbor craft survey is intended to collect information about the various commercial harbor craft operating in California's coastal waters, harbors, and ports. This information is being collected to help update the emissions inventory for commercial marine vessels operating in the State. Below, we have provided information about the Survey in a question and answer format.

What is the ARB's authority to conduct this Survey?

This request for information is made pursuant to sections 39600, 39607, 39665, 39701, and 41511 of the California Health and Safety Code and section 91100, Title 17 of the California Code of Regulations. These sections authorize the ARB to require the submission of information needed by the ARB to estimate atmospheric emissions and carry out its other statutory responsibilities.

Why is the Survey necessary?

The ARB maintains a statewide emissions inventory for all sources of air emissions such as cars, trucks, marine vessels, construction equipment, industrial facilities, and architectural coatings. The ARB's emission inventory is regularly updated to reflect the most up-to-date emission information, including results of surveys such as this one.

The commercial harbor craft component in the emissions inventory has not been updated on a statewide basis for more than 10 years. It is necessary for us to gather information about the current in-use fleets in California. That way, we can reflect current fleet populations and provide a more accurate estimate of emissions in the emissions inventory for commercial harbor craft.

Who should complete the Survey form?

All owners/operators of commercial harbor craft that are operated in California are being asked to complete the Survey.

Do I have to complete the Survey?

Yes. State law requires that you provide the requested information by completing and returning the Survey. If the Survey does not apply to you, please state in the Survey why it does not apply to you and return it to the address indicated.

What information needs to be provided in the Survey?

The Survey requests specific information about each vessel. This includes information like who owns or operates the vessel, how the vessel is used, and where its home port is. The Survey also requests information on the propulsion and

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

auxiliary engines on the vessel, including the make and model, the horsepower, and the engine's age. Information on the typical operating parameters is also requested, including the annual hours of operation, how far offshore the vessel is operated, and an estimate of annual fuel usage.

If the Survey information is claimed as confidential, how will it be treated?

The ARB has adopted regulations to protect the confidentiality of trade secrets (Title 17, CCR, sections 91000 to 91022). A summary of ARB's confidentiality regulations can be found in Part II of the Survey on the "Confidential Information Submittal Form." You should fill out this form if you wish to designate any Survey information as confidential.

When do I need to return the Survey, and where do I send it?

Please return the Survey by February 14, 2003 to:

California Air Resources Board
Attn: Kirk Rosenkranz
Stationary Source Division
P.O. Box 2815
Sacramento, CA 95812-2815
CONFIDENTIAL MATERIALS ENCLOSED (if that's the case)

In an effort to simplify and streamline the data gathering process, we have made the Survey forms available electronically. If you prefer to submit the Survey forms electronically, please see the Electronic Submittal Form in Part II for the information about how to obtain a diskette (or download the Survey from the Internet). To access the Survey on our website, go to:

<http://www.arb.ca.gov/diesel/documents/harborcraft.htm>

Who can I call if I have questions about the Survey?

If you have any questions, please contact the following staff person:

Kirk Rosenkranz (916) 327-7843 krosenkr@arb.ca.gov

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

SURVEY INSTRUCTIONS

Before you begin filling out the Survey form, please read the instructions carefully. Included for your assistance are sample forms.

THE SURVEY FORM

Explanations for each Survey data field are provided below. If you own and/or operate more than one vessel, **we need the owner/operator information (Part A) once**. Please complete the vessel information (Part B) and engine information (Part C) for each vessel you own/operate. If you need additional forms, those can be downloaded from the website listed above. If that method is unavailable to you, please contact Kirk Rosenkranz at (916) 327-7843, and he will work with you to make arrangements to get additional forms to you.

Survey Data Fields

Form A: Owner/Operator Information

Owner/Operator: Please enter the name of the owner/operator of the vessel(s).

“Owner,” “Operator,” and “Owner/Operator”: Please place a mark (an “X” or a check mark) on the appropriate line indicating whether you own the vessel, operate the vessel, or own and operate the vessel.

Confidential: Please indicate as to whether or not you would like the ARB to treat your information as confidential information. If you designate information as confidential, you also need to fill out the confidential information submittal form and return that to the ARB with your Survey.

Address/City/State/ZIP Code: Mailing address, city, state, and ZIP code of company. Also, if the vessel is harbored elsewhere, please provide the address of the vessel.

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

Phone Number: Enter the phone number of the contact person.

E-mail Address: Enter the e-mail address of the contact person, if available.

Vessel Name: Enter the name of each vessel you own/operate.

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

U.S. Coast Guard Documentation Number: Please enter the U.S. Coast Guard documentation number assigned your vessel(s). If your vessel(s) are) is not documented with the U.S. Coast Guard, please provide the agency the vessel is documented with and the identification number assigned.

Form B: Vessel Information

(As a reminder, for the purposes of this Survey, “commercial harbor craft” are defined as vessels used for commercial purposes or to support public services. We have categorized commercial harbor craft into a number of categories, including Crew and Supply Boats, Charter Fishing Vessels, Commercial Fishing Vessels, Ferry/Excursion Vessels, Pilot Vessels, Towboat/Push Boats, Tug Boats, and Work Boats. Additional information about these categories is found below. Typically, harbor craft have one or more engines, with individual engines generally rated between 50 and 6,500 horsepower. We are not collecting information for recreational vessels that are used solely for one’s personal use.)

Vessel Name: Enter the vessel name for which the data is being provided.

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

Vessel Age: Enter the age of the vessel.

Vessel Use: Please select the most appropriate type of commercial harbor craft from the seven types of harbor craft shown on the form. If there is more than one vessel for which you are providing information, please use additional forms. Descriptions of the different types are as follows:

Commercial Fishing Vessels: **self-propelled vessels dedicated to the search for, and collection of, fish for the purpose of sale at market.**

Commercial Passenger Fishing Vessels: **self-propelled vessels for hire by the general public (seven or more people) dedicated to the search for, and collection of, fish for the purpose of personal consumption.**

Crew and Supply Boats: **self-propelled vessel used for carrying personnel and supplies to and from off-shore and in-harbor locations (including, but not limited to, off-shore work platforms, construction sites, and other vessels).**

Ferry/Excursion Vessel: **a vessel owned, controlled, operated, or managed for public use in the transportation of persons or property, except rowboats, sailing boats, barges under 20 tons dead weight**

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

carrying capacity, and vessels that are under the burden of five tons net register and under 30 feet in length.

Pilot vessels: **self-propelled vessels used to guide ocean-going vessels safely into and out of a port or harbor.**

Towboat/Push boat: **self-propelled vessel designed to tow/push barges and pontoons. The hull is usually rectangular in plan and has little freeboard (the portion of the side of a hull that is above the water).**

Tug boats: **self-propelled vessel for the towing (and pushing) of ships or other floating structures such as barges in ports/harbors.**

Work boats: **self-propelled vessel that performs duties such as fire/rescue, law enforcement, hydrographic surveys, spill/response, research, training, and construction (including drilling) vessels.**

If a Fishing Vessel, type of fishing done: If you select one of the fishing vessel types as the type of harbor craft you own and/or operate, please select the most appropriate type of fishing you do.

Total Annual Fuel Usage: Please provide an estimate of the total annual fuel use for 1999, 2000, and 2001 for the vessel identified in Item #1.

Percent Hours Operated At Distance Off California's Coast: Please enter your best estimate of the percentage of total hours of operation spent in the ranges of distances shown.

Form C: Propulsion/Auxiliary Engine Information

Vessel Name: Enter the vessel name for which the data is being provided.

Engine #: Please assign each engine a number in numeric order.

Propulsion (P) or Auxiliary (A): Please designate whether the engine you are providing information for is a propulsion engine or an auxiliary engine.

Placement: For propulsion engines only, please indicate if the engine is located on the port side (p), the starboard side (s), or in the center (c).

Make and Model: Please provide the name of the manufacturer and the model number of each propulsion engine on the vessel. If there is more than one engine of the same type on the vessel, you can indicate that as follows:

If you have two engines of the same make, model, horsepower, and age, you would write "x2" next to the make and model information

2002 Commercial Harbor Craft Survey
PART II: SURVEY OVERVIEW AND INSTRUCTIONS

Repower: Please indicate whether or not the engine listed is a repower that was funded in full or in part with monies from a state or local air quality program (such as Carl Moyer).

Model Year: Please provide the model year of the engine. If the engine is a repower, please provide when the repower was completed, whether it was a part of a State or local repower program, and the name of the program.

Horsepower: Please provide the horsepower of the engine.

2 stroke or 4 stroke: Please indicate if the engine is 2-stroke or 4-stroke.

Annual Hours of Engine Operation: Please enter the estimated hours of operation for each engine.

Estimated Annual Fuel Usage (last three years): Please provide an estimate of the annual fuel use for each engine for 1999, 2000, and 2001. If you are unable to allocate the fuel use by engine type, please leave these spaces blank. The ARB will use an alternative method to estimate these values.

Engine Exhaust - Wet or Dry: For propulsion engines only, please identify whether the engine exhaust from your vessel is wet (at or below the waterline) or dry (to the air).

Part III

Supporting Attachments

- A) Sample Forms
- B) Confidential Information Submittal Form
- C) Electronic Data Submittal Form
- D) Excerpts from the California Code of Regulations pertaining to the handling of confidential information:
 - Title 17, California Code of Regulations,
 - Sections 91000 to 91100

2002 Commercial Harbor Craft Survey
PART III: SUPPORTING ATTACHMENTS
Sample Form A: Owner/Operator Information

Please complete the "Owner/Operator" Information Only Once

Owner/Operator: Alan Torqueson
Address: 1234 Main Street
City/State: Everyville, CA
ZIP Code: 99999

check one: Owner? _____
Operator? _____
Owner/Operator? X

Contact Name (and title): same
Phone Number: (916) 555-5555
E-mail Address: atorques@fishingman.com

Confidential? no
(yes or no) Note 1

Please Identify the Vessels for Which You Are Providing Survey Information:

<u>Vessel Name</u>	<u>U.S. Coast Guard Documentation Number</u>
<u>Glorious Day</u>	<u>VN99999999</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Note 1: If you want your information to be held confidential, please complete the Confidentiality Form (found in Part III.B. of this Survey)

**2002 Commercial Harbor Craft Survey
PART III: SUPPORTING ATTACHMENTS**

Sample Form C: Propulsion/Auxiliary Engine Information

Vessel Name: Glorious Day

Propulsion/Auxiliary Engines (one form per vessel) (Note 1)

Engine Number	Propulsion (P) or Auxiliary (A)	Placement Note 2	Make and Model	Repower Note 3	Model Year	Horsepower	2 or 4 stroke	Annual Hours of Operation	Estimated Annual Fuel Usage (gallons) Note 4			Propulsion Engines Only - Engine Exhaust: Wet or Dry Note 5
									1999	2000	2001	
1	P		Detroit Diesel 12V-71TA	no	1982	580	2	3,500	32,500	35,250	34,900	dry
2	A		Detroit Diesel 3-71N	no	1982	62	2	1,000	2,250	2,100	2,175	dry
3												
4												
5												
6												
7												

Note 1: For additional forms, please contact Kirk Rosenkranz (contact information on Page II-3 of Part II, "Survey Overview and Instructions").

Note 2: For propulsion engines only – Is the engine on the port side (P), the starboard side (S), or in the center (C)?

Note 3: Was the engine a repower that was funded in full or in part with monies from a State or local air quality program (such as Carl Moyer)?

Note 4: If you are unable to provide fuel usage information by engine, please leave these spaces blank. The ARB will use an alternative method to estimate.

Note 5: "Wet Exhaust" is released at or below the waterline and "Dry Exhaust" is released to the air.

**2002 Commercial Harbor Craft Survey
PART III: SUPPORTING ATTACHMENTS**

CONFIDENTIAL INFORMATION SUBMITTAL FORM

If you wish to designate any information contained in your survey data as **CONFIDENTIAL INFORMATION**, please provide the information requested below and return it with your completed Survey form.

In accordance with Title 17, California Code of Regulations (CCR), Sections 91000 to 91022, and the California Public Records Act (Government Code Section 6250 et seq.), the information that a company provides to the Air Resources Board (ARB) may be released (1) to the public upon request, except trade secrets which are not emissions data or other information which is exempt from disclosure or the disclosure of which is prohibited by law, and 2) to the Federal Environmental Protection Agency, which protects trade secrets as provided in Section 114(c) of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulation, and 3) to other public agencies provided that those agencies preserve the protections afforded information which is identified as a trade secret, or otherwise exempt from disclosure by law (Section 39660(e)).

Trade Secrets as defined in Government Code 6254.7 are not public records and therefore will not be released to the public. However, the California Public Records Act provides that air pollution emission data are always public records, even if the data comes within the definition of trade secrets. On the other hand, the information used to calculate information is trade secret.

If any company believes that any of the information it may provide is a trade secret or otherwise exempt from disclosure under any provision of law, **it must identify the confidential information as such at the time of submission to the ARB and must provide the name, address, and telephone number of the individual to be consulted**, if the ARB receives a request for disclosure or seeks to disclose the data claimed to be confidential. The ARB may ask the company to provide documentation of its claim of trade secret or exemption at a later date. Data identified as confidential will not be disclosed unless the ARB determines, in accordance with the above referenced regulations, that the data do not qualify for a legal exemption from disclosure. The regulations establish substantial safeguards before any such disclosure.

In accordance with the provisions of Title 17, California Code of Regulations, Sections 91000 to 91022, and the California Public Records Act (Government Code Sections 6250 et seq.)

Company Name: _____ declares that all the information submitted in response to the California Air Resources Board's information request on the Survey is confidential "trade secret" information, and request that it be protected as such from public disclosure. All inquiries pertaining to the confidentiality of this information should be directed to the following person:

Date: _____	(Signature)	Mailing Address: _____
_____	(Printed Name)	_____
_____	(Title)	_____
_____	(Telephone Number)	_____

ELECTRONIC DATA SUBMITTAL FORM

To simplify and streamline the data gathering process, we have made the "Harbor Craft Survey" available electronically. You can download the Survey from our website or we can send you a diskette if you complete this form and return it to us by fax. Microsoft Word97 or 2000 is required to complete the Survey electronically.

Internet Access: <http://www.arb.ca.gov/diesel/documents/harborcraft.htm>

If you would like us to send you a diskette containing the Survey, please complete the form below.

California Air Resources Board
Stationary Source Division
P.O. Box 2815
Sacramento, CA 95812-2815

Attention: Kirk Rosenkranz
Phone Number: (916) 327-7843
Fax Number: (916) 327-6251

Date: _____

Name: _____

Company: _____

Phone Number: _____

Fax Number: _____

Mailing Address: _____

Subchapter 4. Disclosure of Public Records

Article 1. General

§91000. Scope and Purpose.

This subchapter shall apply to all requests to the state board under the California Public Records Act (Government Code Sections 6250 et seq.) for the disclosure of public records or for maintaining the confidentiality of data received by the state board. Written guidelines shall govern the internal review of such requests.

NOTE: Authority cited: Sections 39600 and 39601(a), Health and Safety Code. Reference: California Public Records Act, Chapter 3.5 (commencing with Section 6250), Division 7, Government Code.

§91001. Disclosure Policy.

It is the policy of the state board that all records not exempted from disclosure by state law shall be open for public inspection with the least possible delay and expense to the requesting party.

NOTE: Authority cited: Sections 39600 and 39601(a), Health and Safety Code. Reference: Section 6253, Government Code; Black Panther Party v. Kehoe (1974) 42 Cal.App.3d 645.

Article 2. Board's Requests for Information

§91010. Request Procedure.

The state board shall give notice to any person from whom it requests information that the information provided may be released (1) to the public upon request, except trade secrets which are not emission data or other information which is exempt from disclosure or the disclosure of which is prohibited by law, and (2) to the federal Environmental Protection Agency, which protects trade secrets as provided in Section 114(c) of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulations.

NOTE: Authority cited: Sections 39600, 39601 and 39602, Health and Safety Code. Reference: Sections 39701, 41510, 41511, 41512 and 42705, Health and Safety Code; and Section 6253, Government Code.

§91011. Submissions of Confidential Data.

Any person submitting to the state board any records containing data claimed to be “trade secret” or otherwise exempt from disclosure under Government Code Section 6254 or 6254.7 or under other applicable provisions of law shall, at the time of submission, identify in writing the portions of the records containing such data as “confidential” and shall provide the name, address and telephone number of the individual to be contacted if the state board receives a request for disclosure of or seeks to disclose the data claimed to be confidential. Emission data shall not be identified as confidential. The state board shall not disclose data identified as confidential, except in accordance with the requirements of this subchapter or Section 39660(e) of the Health and Safety Code.

NOTE: Authority cited: Sections 39600 and 39601, Health and Safety Code. Reference: Sections 39660, 39701, 41500, 41511, 41512 and 42705, Health and Safety Code; Sections 6253, 6254 and 6254.7, Government Code; Natural Resources Defense Council v. EPA, 489 F.2d 390 (5th Cir. 1974) (6 ERC 1248); Northern California Police Practices Project v. Craig (1979) 90 Cal.App.3d 116; Uribe v. Howie (1971) 19 Cal.App.3d 194.

Article 3. Inspection of Public Records

§91020. Disclosure Policy.

§91021. Disclosure Procedure.

NOTE: Authority cited: Section 39601, Health and Safety Code. Reference: Sections 6253-6257, Government Code.

§91022. Disclosure of Confidential Data.

- (a) This section shall apply to all data in the custody of the state board
 - (1) designated “trade secret” prior to the adoption of this subchapter,
 - (2) considered by the state board or identified by the person who submitted the data as confidential pursuant to this subchapter, or
 - (3) received from a federal, state or local agency, including an air pollution control district, with a confidential designation, subject to the following exceptions:

- (A) Except for the time limits specifically provided in subsection (b), only subsections (c) and (d) of this section shall apply to information submitted pursuant to Health and Safety Code section 39660(e).
 - (B) Appropriate portions of an application for approval, accreditation, or certification of a motor vehicle emission control device or system shall be kept confidential until such time as the approval, accreditation, or certification is granted, at which time the application (except for trade secret data) shall become a public record, except that estimates of sales volume of new model vehicles contained in an application shall be kept confidential for the model year, and then shall become public records. If an application is denied, it shall continue to be confidential but shall be subject to the provisions of this section.
 - (C) If disclosure of data obtained after August 9, 1984 from a state or local agency subject to the provisions of the Public Records Act is sought, the state board shall request that the agency which provided the data determine whether it is confidential. The state board shall request that it be notified of the agency's determination within ten days. The state board shall not release the data if the agency determines that it is confidential and so notifies the state board; provided, however, that the data may be released with the consent of the person who submitted it to the agency from which it was obtained by the state board.
- (b) Upon receipt of a request from a member of the public that the state board disclose data claimed to be confidential or if the state board itself seeks to disclose such data, the state board shall inform the individual designated pursuant to Section 91011 by telephone and by mail that disclosure of the data is sought. The person claiming confidentiality shall file with the state board documentation in support of the claim of confidentiality. The documentation must be received within five (5) days from the date of the telephone contact or of receipt of the mailed notice, whichever first occurs. In the case of information submitted pursuant to Health and Safety Code section 39660(e), the documentation must be received within 30 days of the date notice was mailed pursuant to that section. The deadlines for filing the documentation may be extended by the state board upon a showing of good cause made within the deadline specified for receipt of the documentation.
 - (c) The documentation submitted in support of the claim of confidentiality shall include the following information:
 - (1) the statutory provision(s) under which the claim of confidentiality is asserted;
 - (2) a specific description of the data claimed to be entitled to confidential treatment;

- (3) the period of time for which confidential treatment is requested;
 - (4) the extent to which the data has been disclosed to others and whether its confidentiality has been maintained or its release restricted;
 - (5) confidentiality determinations, if any, made by other public agencies as to all or part of the data and a copy of any such determinations, if available; and
 - (6) whether it is asserted that the data is used to fabricate, produce, or compound an article of trade or to provide a service and that the disclosure of the data would result in harmful effects on the person's competitive position, and, if so, the nature and extent of such anticipated harmful effects.
- (d) Documentation, as specified in subsection (c), in support of a claim of confidentiality may be submitted to the state board prior to the time disclosure is sought.
- (e) The state board shall, within ten (10) days of the date it sought to disclose the data or received the request for disclosure, or within 20 days of that date if the state board determines that there are unusual circumstances as defined in Government Code Section 6256.1, review the request, if any, and supporting documentation, if received within the time limits specified in subsection (b) above, including any extension granted, and determine whether the data is entitled to confidential treatment pursuant to Government Code Section 6254, 6255 or 6254.7 or other applicable provisions of law and shall either:
- (1) decline to disclose the data and, if a request was received, provide to the person making the request and to the person claiming the data is confidential a justification for the determination pursuant to Government Code Section 6255; or
 - (2) provide written notice to the person claiming the data is confidential and, if a request was received, to the person requesting the data that it has determined that the data is subject to disclosure, that it proposes to disclose the data, and that the data shall be released 21 days after receipt of the notice by the person claiming confidentiality, unless the state board is restrained from so doing by a court of competent jurisdiction. The state board shall release the data in accordance with the terms of the notice unless so restrained.
- (f) Should judicial review be sought of a determination issued in accordance with subsection (e), either the person requesting data or the person

claiming confidentiality, as appropriate, may be made a party to the litigation to justify the determination.

NOTE: Authority cited: Section 39601, Health and Safety Code.
Reference: Sections 6253, 6254, 6254.7, 6255, 6256, 6256.1, 6258 and 6259, Government Code.

Appendix C

Vessel Profiles of Commercial Harbor Craft

2003 Vessel Profiles for Commercial Fishing

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Commercial Fishing	Propulsion	< 50	32.21	8 to 50	23 (1981)	1942 to 2000	375.36	40 to 800
Commercial Fishing	Propulsion	51 - 120	85.03	51 to 120	25 (1979)	1925 to 2001	814.52	5 to 3800
Commercial Fishing	Propulsion	121 - 175	151.44	125 to 175	27 (1977)	1938 to 2002	1153.05	5 to 5000
Commercial Fishing	Propulsion	176 - 250	213.75	180 to 250	23 (1981)	1945 to 2002	1013.79	3 to 4500
Commercial Fishing	Propulsion	251 - 500	338.23	255 to 500	17 (1987)	1943 to 2002	1733.37	5 to 7500
Commercial Fishing	Propulsion	501 - 750	583.6	520 to 675	14 (1990)	1981 to 2001	2920	200 to 4000
Commercial Fishing	Propulsion	751 - 1000	892.2	800 to 1000	21 (1983)	1954 to 1994	5380	3500 to 8000
Commercial Fishing	Propulsion	1001 - 1500	1485	1485	2 (2002)	2002	2400	2400
Commercial Fishing	Propulsion	unknown	na	na	29 (1975)	1940 to 2002	692.5	25 to 2400
Commercial Fishing	Auxiliary	< 50	29.21	6 to 50	17 (1987)	1925 to 2003	1252.14	2 to 6000
Commercial Fishing	Auxiliary	51 - 120	79.56	53 to 120	17 (1987)	1948 to 2002	1992.21	40 to 8000
Commercial Fishing	Auxiliary	121 - 175	152.56	125 to 166	14 (1990)	1979 to 1999	3073.33	950 to 7500
Commercial Fishing	Auxiliary	176 - 250	233	180 to 250	17 (1987)	1980 to 1998	1640	200 to 2500
Commercial Fishing	Auxiliary	251 - 500	277	260 to 300	24 (1980)	1954 to 1999	3500	500 to 5000
Commercial Fishing	Auxiliary	unknown	na	na	17 (1987)	1940 to 2002	1265.79	20 to 4000

2003 Vessel Profiles for Charter Fishing

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Charter Fishing	Propulsion	< 50	na	na	na	na	na	na
Charter Fishing	Propulsion	51 - 120	87.5	80 to 95	14 (1990)	1980 to 1999	1650	100 to 3200
Charter Fishing	Propulsion	121 - 175	156.67	135 to 175	25 (1979)	1950 to 1999	957	135 to 1700
Charter Fishing	Propulsion	176 - 250	221.72	180 to 250	13 (1991)	1970 to 2001	1055.26	100 to 2500
Charter Fishing	Propulsion	251 - 500	370.46	255 to 500	15 (1989)	1953 to 2002	1663.42	150 to 5000
Charter Fishing	Propulsion	501 - 750	586.67	530 to 650	9 (1995)	1981 to 2001	2474.44	600 to 3700
Charter Fishing	Propulsion	751 - 1000	825	825	3 (2001)	2001	na	na
Charter Fishing	Propulsion	1001 - 1500	1342.5	1285 to 1400	4 (2000)	2000	1225.6	900 to 1828
Charter Fishing	Auxiliary	< 50	29.14	5 to 50	10 (1994)	1970 to 2002	1706.18	50 to 5000
Charter Fishing	Auxiliary	51 - 120	80.33	59 to 107	16 (1988)	1964 to 2002	2616.69	100 to 5640
Charter Fishing	Auxiliary	121 - 175	132.5	125 to 140	18 (1986)	1975 to 1996	3750	2500 to 5000
Charter Fishing	Auxiliary	176 - 250	185	185	3 (2001)	2001	na	na
Charter Fishing	Auxiliary	Unknown	na	na	9 (1995)	1988 to 2000	2792.73	40 to 16000

2003 Vessel Profiles for Ferries

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Ferries	Propulsion	< 50	45	35 to 50	30 (1974)	1965 to 1993	6040	600 to 8760
Ferries	Propulsion	51 - 120	96.81	65 to 120	26 (1978)	1939 to 2002	1448.75	100 to 5000
Ferries	Propulsion	121 - 175	165	160 to 175	32 (1972)	1943 to 2001	1347	375 to 2500
Ferries	Propulsion	176 - 250	224.29	190 to 250	16 (1988)	1969 to 2002	1641.43	50 to 8760
Ferries	Propulsion	251 - 500	384.8	280 to 500	16 (1988)	1960 to 2000	1325.1	50 to 6467
Ferries	Propulsion	501 - 750	658.39	550 to 740	18 (1986)	1973 to 2002	1524.46	100 to 4000
Ferries	Propulsion	751 - 1000	930	930	19 (1985)	1985	2000	2000
Ferries	Propulsion	1001 - 1500	1285	1285	2 (2002)	2002	2500	2500
Ferries	Propulsion	1501 - 2000	1699.23	1535 to 2000	1999	1989 to 2002	2720.38	1500 to 3626
Ferries	Propulsion	2001 - 3000	2498.5	2300 to 2682	1999	1996 to 2001	3125	2000 to 4000
Ferries	Propulsion	> 3000	3110	3110	5 (1999)	1999	2500	2500
Ferries	Propulsion	Unknown	na	na	20 (1984)	1984	150	150
Ferries	Auxiliary	< 50	26.82	10 to 50	12 (1992)	1943 to 2002	1309.61	20 to 3833
Ferries	Auxiliary	51 - 120	81.56	60 to 101	19 (1985)	1954 to 2002	1049.94	10 to 2500
Ferries	Auxiliary	121 - 175	147.33	133 to 165	12 (1992)	1985 to 2001	1720.22	1200 to 2500
Ferries	Auxiliary	176 - 250	206.43	185 to 250	11 (1993)	1985 to 2000	1305.71	120 to 2500
Ferries	Auxiliary	251 - 500	400	400	13 (1991)	1981 to 2001	600	600
Ferries	Auxiliary	Unknown	na	na	10 (1994)	1987 to 1997	694.5	60 to 1530

2003 Vessel Profiles for Crew and Supply and Pilot Boats

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Crew and Supply	Propulsion	< 50	na	na	na	na	na	na
Crew and Supply	Propulsion	51 - 120	na	na	na	na	na	na
Crew and Supply	Propulsion	121 - 175	na	na	na	na	na	na
Crew and Supply	Propulsion	176 - 250	225	225	9 (1995)	1990 to 1998	350	25 to 1000
Crew and Supply	Propulsion	251 - 500	447.2	270 to 500	21 (1983)	1972 to 2002	728.08	42 to 2919
Crew and Supply	Propulsion	501 - 750	600	550 to 750	13 (1991)	1980 to 2000	978	660 to 1200
Crew and Supply	Propulsion	Unknown	na	na	23 (1981)	1981	1000	1000
Crew and Supply	Auxiliary	< 50	24	16 to 32	10 (1994)	1989 to 1999	1300	100 to 2500
Crew and Supply	Auxiliary	51 - 120	92.5	80 to 110	24 (1980)	1973 to 1988	3658	308 to 5110
Crew and Supply	Auxiliary	Unknown	na	na	2 (2002)	2002	3555	1000 to 5110
Pilot	Propulsion	< 50	na	na	na	na	na	na
Pilot	Propulsion	51 - 120	na	na	na	na	na	na
Pilot	Propulsion	121 - 175	na	na	na	na	na	na
Pilot	Propulsion	176 - 250	236.67	230 to 250	23 (1981)	1970 to 2003	464.67	200 to 994
Pilot	Propulsion	251 - 500	356	300 to 450	22 (1982)	1966 to 2003	827.2	40 to 1531
Pilot	Propulsion	501 - 750	546.67	545 to 550	11 (1993)	1973 to 2002	1483.33	1100 to 2250
Pilot	Auxiliary	< 50	30	30	26 (1978)	1978	994	994

2003 Vessel Profiles for Tugs

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Tugs	Propulsion	< 50	32	24 to 40	13 (1991)	1988 to 1993	4450	900 to 8000
Tugs	Propulsion	51 – 120	95	95	99 (1905)	1905	400	400
Tugs	Propulsion	121 – 175	146.67	130 to 160	26 (1978)	1957 to 2001	916.67	50 to 2500
Tugs	Propulsion	176 – 250	212.5	180 to 240	24 (1980)	1979 to 1981	800	300 to 1500
Tugs	Propulsion	251 – 500	383.2	260 to 500	26 (1978)	1956 to 2003	1293.22	200 to 4500
Tugs	Propulsion	501 – 750	590.91	550 to 600	22 (1982)	1966 to 1995	2052.44	1400 to 3024
Tugs	Propulsion	751 – 1000	900.53	805 to 1000	25 (1979)	1966 to 2000	1526.21	709 to 2640
Tugs	Propulsion	1001 – 1500	1388.1	1100 to 1500	23 (1981)	1967 to 2003	2610.53	1300 to 4500
Tugs	Propulsion	1501 – 2000	1950	1650 to 2000	16 (1988)	1972 to 2000	2350	890 to 4200
Tugs	Propulsion	2001 – 3000	2268.71	2150 to 2500	6 (1998)	1970 to 2002	3868.17	600 to 7500
Tugs	Propulsion	> 3000	3283.33	3125 to 3600	13 (1991)	1971 to 2001	3866.67	2000 to 4800
Tugs	Auxiliary	< 50	29.08	7 to 47	30 (1974)	1952 to 2000	955	400 to 1800
Tugs	Auxiliary	51 – 120	86.15	54 to 115	21 (1983)	1951 to 2003	2757.72	375 to 8000
Tugs	Auxiliary	121 – 175	151.73	125 to 165	20 (1984)	1966 to 2001	2501.27	135 to 6000
Tugs	Auxiliary	176 – 250	199.06	180 to 235	18 (1986)	1974 to 2001	2552.08	125 to 4400

2003 Vessel Profiles for Tows

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Tows	Propulsion	< 50	na	na	na	na	na	na
Tows	Propulsion	51 - 120	na	na	na	na	na	na
Tows	Propulsion	121 - 175	170	165 to 175	43 (1961)	1940 to 1982	446	420 to 472
Tows	Propulsion	176 - 250	na	na	na	na	na	na
Tows	Propulsion	251 - 500	330.83	255 to 430	25 (1979)	1951 to 2002	1120	400 to 1920
Tows	Propulsion	501 - 750	582.5	530 to 600	21 (1983)	1961 to 2002	3072.5	500 to 3820
Tows	Propulsion	751 - 1000	na	na	na	na	na	na
Tows	Propulsion	1001 - 1500	1300	1100 to 1500	6 (1998)	1997 to 1998	4000	4000
Tows	Auxiliary	< 50	27	27	37 (1967)	1961 to 1972	1100	650 to 1550
Tows	Auxiliary	51 - 120	78.89	54 to 110	19 (1985)	1967 to 2002	3082.22	2000 to 4300
Tows	Auxiliary	121 - 175	175	175	26 (1978)	1978	4300	4300

2003 Vessel Profiles for Work Boats

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Work	Propulsion	< 50	43	15 to 50	8 (1996)	1980 to 2001	625.27	25 to 1800
Work	Propulsion	51 – 120	89.89	60 to 115	15 (1989)	1971 to 2001	338.46	90 to 900
Work	Propulsion	121 – 175	142.86	135 to 150	10 (1994)	1973 to 2002	920	25 to 2080
Work	Propulsion	176 – 250	212.27	180 to 250	26 (1978)	1969 to 1995	662.89	70 to 1300
Work	Propulsion	251 – 500	364.38	290 to 426	18 (1986)	1963 to 2001	856.67	30 to 2090
Work	Propulsion	501 – 750	600	600	2 (2002)	2002	na	na
Work	Propulsion	751 – 1000	782	764 to 800	26 (1978)	1966 to 1990	750	500 to 1000
Work	Auxiliary	< 50	25.4	18 to 32	12 (1992)	1966 to 2002	483	150 to 1040
Work	Auxiliary	51 – 120	78	66 to 90	21 (1983)	1968 to 1998	500	500
Work	Auxiliary	121 – 175	146	146	28 (1976)	1976	na	na
Work	Auxiliary	176 – 250	195	176 to 221	28 (1976)	1942 to 2001	1014.17	30 to 2600

2003 Vessel Profiles for Other Commercial Harbor Craft

Vessel Type	Engine Use	HP Range	Average HP	Range (hp)	Average Age	Range (yrs)	Average Annual Use (hrs)	Range (hrs)
Other	Propulsion	< 50	37.44	22 to 50	15 (1989)	1976 to 1998	49.43	1 to 100
Other	Propulsion	51 – 120	77.13	55 to 120	22 (1982)	1951 to 2002	720.62	40 to 2600
Other	Propulsion	121 – 175	135.71	130 to 140	15 (1989)	1979 to 2000	321.67	65 to 1000
Other	Propulsion	176 – 250	219.75	200 to 238	13 (1991)	1974 to 2002	537.91	52 to 1500
Other	Propulsion	251 – 500	325	300 to 400	26 (1978)	1943 to 1998	495.83	100 to 1100
Other	Propulsion	501 – 750	596.67	550 to 660	32 (1972)	1958 to 1984	2535.43	600 to 3500
Other	Propulsion	751 – 1000	850	859	15 (1989)	1989	900	900
Other	Auxiliary	< 50	28.54	10 to 48	17 (1987)	1963 to 2001	577.17	2 to 2500
Other	Auxiliary	51 – 120	70	60 to 80	21 (1973)	1958 to 1988	1054.36	200 to 3024

Appendix D

Commercial Harbor Craft Emission Factor Evaluation

The text planned for this Appendix will include a detailed analysis of the emission factors available and their strengths and weaknesses for use in estimating emissions from commercial harbor craft. That text will be added after the process of evaluating the available emission factors has been completed and the emission factors to be used in the published version of the commercial harbor craft emission inventory have been finalized.

Appendix E

Establishing a Correlation Between the “C1” and “E3” Engine Test Cycles

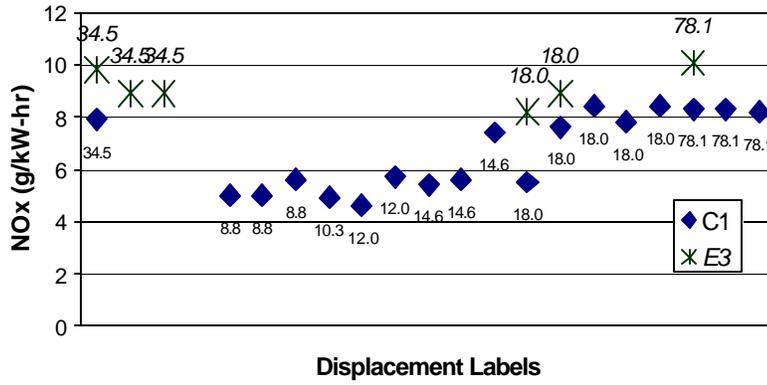
Correlating the “C1” and “E3” Engine Testing Cycles

The OFFROAD zero hour emission factors are based on a “C1”, 8 mode- engine test cycle. For marine propulsion engines, the “E3” test cycle is more representative of actual use. Factors were developed to adjust the C1 based emission factors to an E3 based emission factor by comparing the emissions from similar engines tested on both a C1 and an E3 test cycle. Data was obtained from the U.S. EPA certification database for Caterpillar, Cummins, Detroit Diesel Corporation, and John Deere engines. Engines were matched by the engine displacement and, based on a regression analysis on the emissions test results, the adjustment factors were determined. The following charts show the emissions comparison for the different engine manufacturers. For the linear regression, the average of the emissions results for engines with similar displacement on the different test cycles were plotted. It was concluded based on the analysis to adjust the OFFROAD emission factors used for propulsion engines by the following adjustment factors to reflect the E3 test cycle:

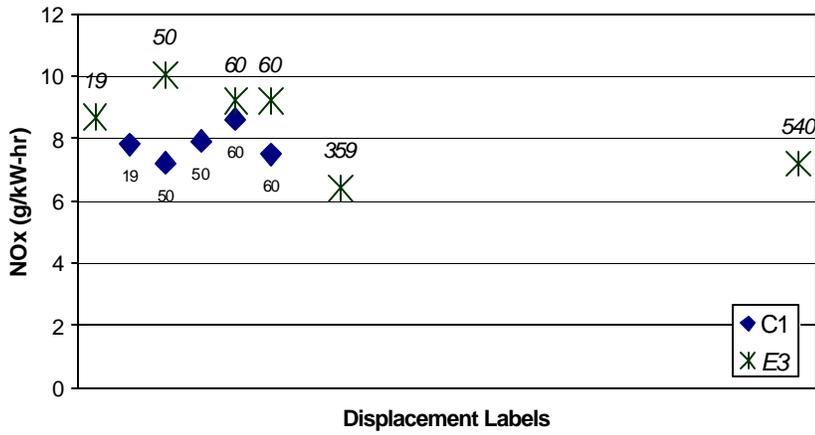
Pollutant	Adjustment Factor
NOx	1.19
HC	No adjustment
CO	0.73
PM	0.94

The following graphs are were used to compare the “C1” and “E3” cycles.

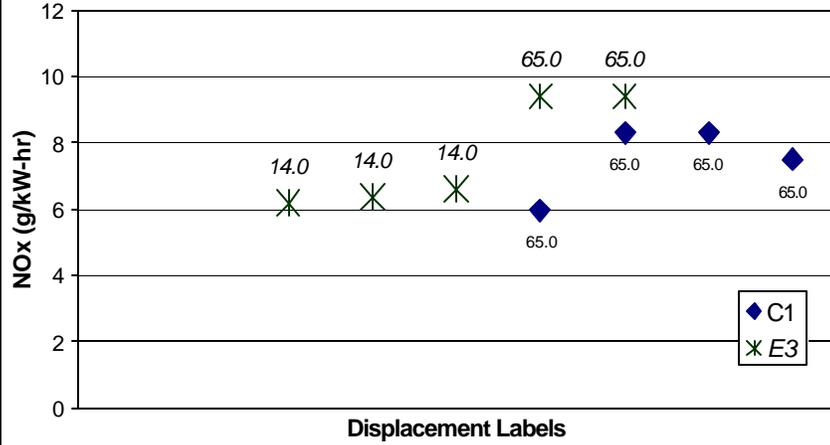
Caterpillar C1 & E3 Test Cycles



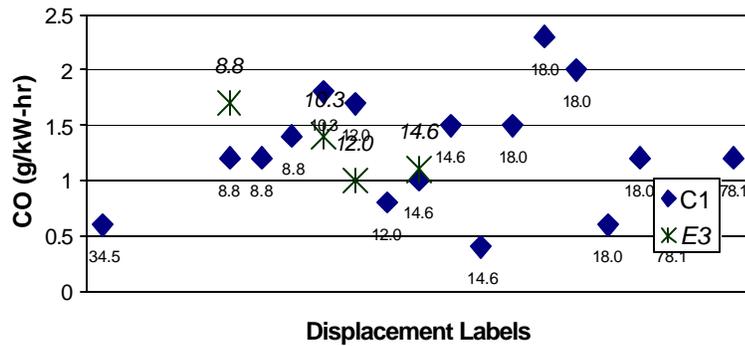
Cummins C1 & E3 Test Cycles



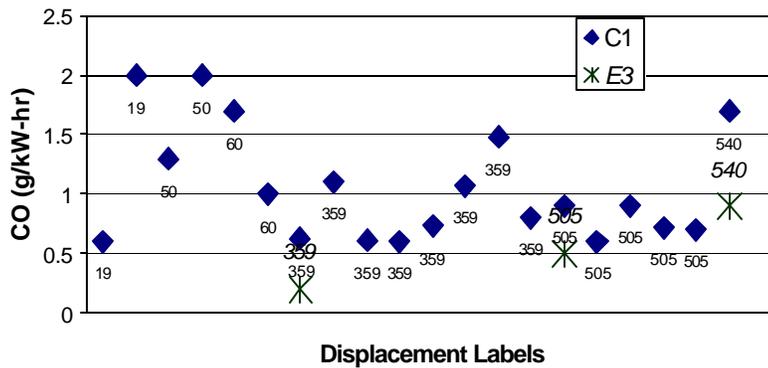
Detroit Diesel Corp. C1 & E3 Test Cycles



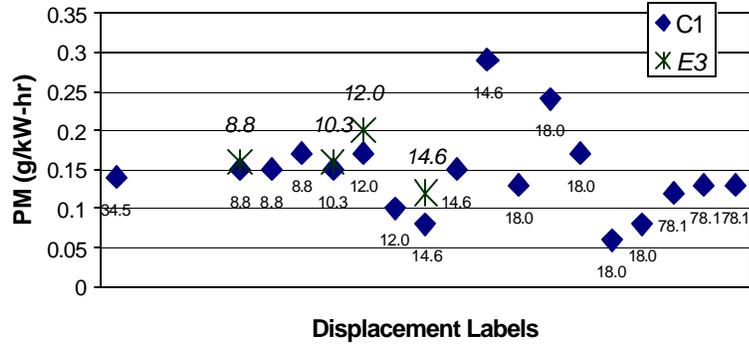
Caterpillar C1 & E3 Test Cycles



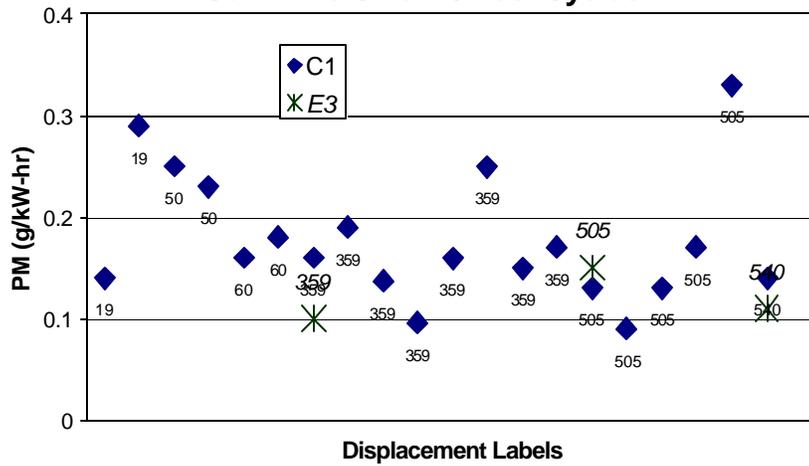
Cummins C1 & E3 Test Cycles



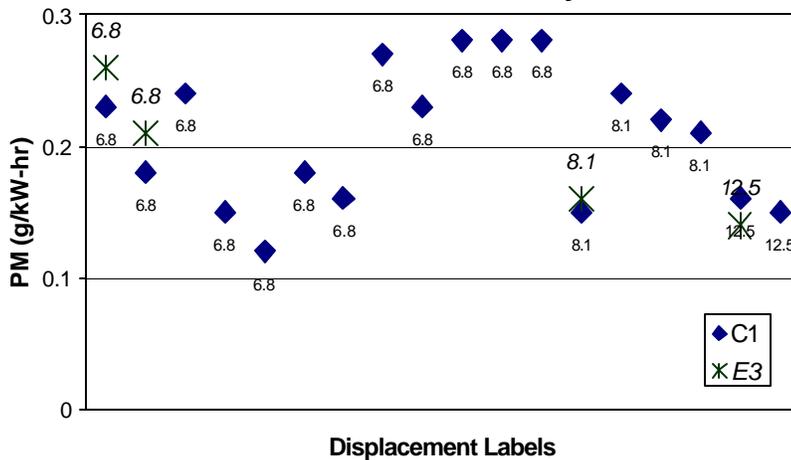
Caterpillar C1 & E3 Test Cycles

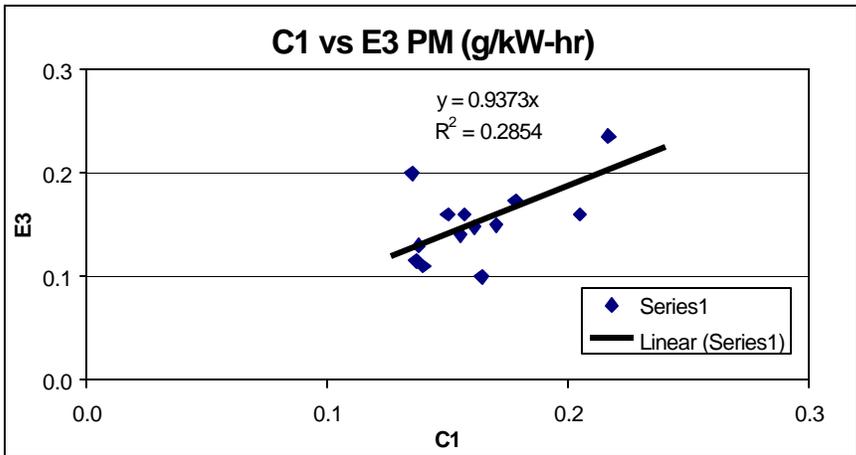
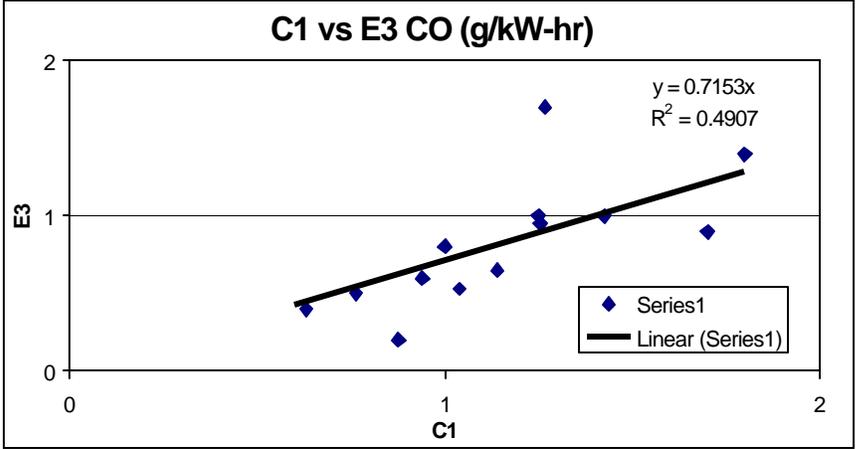
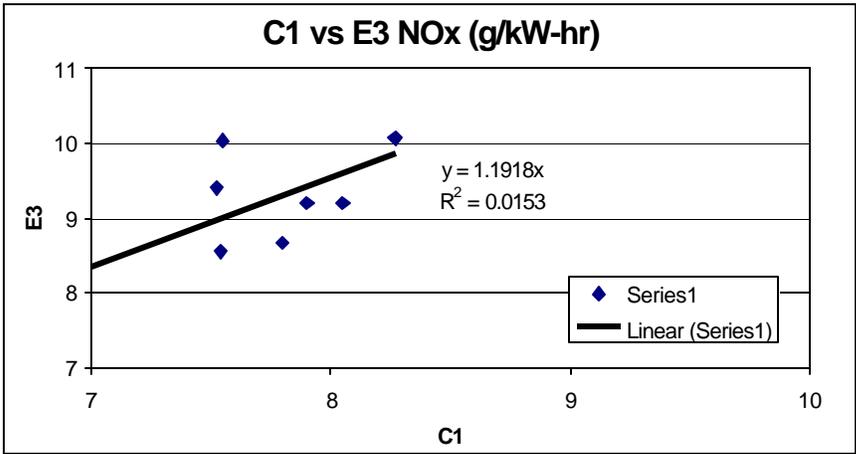


Cummins C1 & E3 Test Cycles



John Deere C1 & E3 Test Cycles





Appendix F

**Development of An Estimate of Commercial Harbor Craft
Normal Engine Life, and the Pollutant-specific Emission Factor
Deterioration Factors Used**

Harborcraft Inventory Deterioration Rate Tables

Emission factor deterioration rates were developed for the following commercial harbor craft engine uses and major vessel groupings:

- Fishing Propulsion
- Fishing Auxiliary
- Ferry/Excursion Propulsion
- Ferry/Excursion Auxiliary
- Work Propulsion
- Work Auxiliary

1. Determining Useful Life of Engines

Background data for OFFROAD useful life

Table 18: On-Road Diesel Engine Average Speed and Useful Life (OFFROAD)

	Avg. Speed (mph)	Useful Life (mi)	Useful Hours (hr)
LHDD (25-50 hp)	30.00	120000	4000
MHDD (51-250 hp)	30.57	185000	6052
HHDD (>250 hp)	22.97	290000	12625

LHDD - Light-heavy-duty diesel

MHDD - Medium-heavy-duty diesel

HHDD - Heavy-heavy-duty diesel

Use EPA and OFFROAD methodology to determine useful life from survey data

Using median age as the useful life (reference OFFROAD 50% of engine population survive beyond the useful life or U.S. EPA Scrapage curve) applied to engine age distribution from survey. For each engine Vessel group and HP category, we determined the median age of the engines and the average annual activity. The useful life in hours was calculated by multiplying the median engine age by the average annual activity.

Useful life (hrs) = median age X average annual activity

Useful life hrs (median age *annual usage)							
Grouped HP Ranges	Fishing Aux	Fishing Pro	Transport Aux	Transport Pro	fishing/Trans pro/aux combined	Work Aux	Work Propulsion
0-50	10783	7906	11040	229520	11993	25830	9710
51-120	28792	19171	38067	33321	29203	63655	4235
121-250	35976	23625	20854	15436	22469	54947	17431
251-500	28000	22314	7200	16528	22170	54536	23486
>500		12662		17752	18930	54536	29147
all engines	17625	23103	20229	20518	20873	54536	30845

Since fishing auxiliary, fishing propulsion, transport auxiliary, and transport propulsion useful life categories were similar, that data was combined and a new combined useful life was determined. This combined data was used for all four of those categories. Since both work auxiliary and work propulsion engines had significantly different useful life data, those categories were not combined. After combining, the final useful life values are listed in the following table:

Useful life hrs (median age *annual usage)			
Grouped HP Ranges	Fishing/Transport Propulsion and Auxiliary Engines (combined)	Work Auxiliary	Work Propulsion
0-50	11993	25830	9710
51-120	29203	63655	4235
121-250	22469	54947	17431
251-500	22170	54536	23486
>500	18930	54536	29147
all engines	20873	54536	30845

	Fishing Aux.				Fishing Prop			
HP Range	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs
0-50	126	8	1348	10783	12	23	351	7906
51-120	86	14	2057	28792	100	23	834	19171
121-250	24	13	2767	35976	256	23	1027	23625
251-500	6	8	3500	28000	268	13	1716	22314
>500	0				40	5	2814	12662
all engines	289	10	1763	17625	709	17	1359	23103

	Transport Aux				Transport Prop			
HP Range	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs
0-50	31	9	1299	11040	3	38	6040	229520
51-120	48	22	1730	38067	20	23	1449	33321
121-250	25	13	1604	20854	25	12	1286	15436
251-500	2	12	600	7200	81	15	1102	16528
>500					72	6	1932	11595
all engines	118	13	1556	20229	218	13	1584	20588

Combined Trans/Fishing/Aux/pro

HP Range	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs				
0-50	179	9	1333	11993				
51-120	254	20	1460	29203				
121-250	330	19	1215	22469				
251-500	357	14	1584	22170				
>500	231	10	1893	18930				
all engines	1317	14	1491	20873				

	Work Aux				Work Prop			
HP Range	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs	Engine count	Median Age (yrs)	Avg Annual Usage Hours	Useful life hrs
0-50	19	31	833	25830	12	8	1214	9710
51-120	71	23	2768	63655	19	15	282	4235
121-250	42	23	2389	54947	37	23	775	17431
251-500	1				58	22	1092	23486
>500	1				121	11	2650	29147
all engines	145	23	2371	54536	613	17	1814	30845

2. Calculating Deterioration Factor Tables

Deterioration Rates

Use OFFROAD deterioration factors (percent increase in emissions per percent useful life) applied to harbor craft useful life (UL) and OFFROAD emission zero hour (ZH) emission factors.

*Table 17: Deterioration Rates for Diesel Engines
(% increase per % useful life consumed
(From OFFROAD))*

HP	Deterioration Factor			
	HC	CO	NOx	PM
25-50	0.51	0.41	0.06	0.31
51-120	0.28	0.16	0.14	0.44
121-250	0.28	0.16	0.14	0.44
>250	0.44	0.25	0.21	0.67

CALCULATING DETRIORATED EMISSION FACTORS

Emission factors are composed of zero-hour emissions and deterioration rates. The emission factors can be expressed by the following equations:

Deteriorated Emission Factor

$$EF = ZH + DR * Hrs$$

And

Deterioration Rate

$$DR = (ZH * DF) / UL$$

Where: EF = emission factor, in grams per horsepower-hour (g/hp-hr)
(CALCULATED)

ZH = zero-hour emission rate, or when the equipment is new (g/hp-hr)
(Modified OFFROAD VALUES)

Hrs = cumulative hours, or total number of hours accumulated on the
equipment (HARBORCRAFT data)

DR = deterioration rate, or the increase in ZH emissions as the
equipment is used (g/hp-hr²) (CALCULATED)

DF = deterioration factor (% increase per % useful life consumed)
(OFFROAD)

UL = useful life of engine (in hours) (Harborcraft survey Median age*
average annual activity)

[Note: Tables containing the emission factors and deterioration estimates will be inserted here in the next iteration.]

Appendix G

Sample Raw HARBOR Model Output

2003 Engine-specific Emission Estimates for
ARB Commercial Harbor Craft Survey Engines

The following key is provided to assist the reader in understanding the data fields of the raw output from the HARBOR model. The HARBOR model output provides information for each of the 1,800+ engines reported as a part of the ARB's Commercial Harbor Craft Survey.

Column 1 - Engine Use: A = Auxiliary, P = Propulsion (one line item for each engine)

Column 2 – Vessel Type (as identified by the vessel owner/operator):

COF = Commercial Fishing Vessel

CHF = Charter Fishing Vessel

FRY = Ferry/Excursion Vessel

CNS = Crew and Supply Vessel

POV = Pilot Vessel

TUG = Tug Boat

TOW = Tow Boat

WBT = Work Boat

OTS = Others

Column 3 – Year (Model year of the engine)

Column 4 – Engine Horsepower

Column 5 – Hours (Annual hours the engine was used)

Column 6 – Percent Engine Load (43% for all vessels, except tugs; 31% for tugs)

Column 7 – Cumulative Use (Average Annual Engine Use by Vessel Type * Engine Age)

Column 8 – Baseline PM Emission Factor (OFFROAD Emfac, based on engine model year)

Column 9 – Deterioration Rate of PM Emfac (based on engine life and average annual use)

Column 10 – Deterioration PM Emfac (amount emission factor increases due to deterioration)

Column 11 – Total PM Emfac (factoring in deterioration, column 8 + column 10)

Column 12 – Annual Ems of PM ($Hp * Load * Annual\ hours * PM\ Emfac$), tpy per engine

Column 13 – Baseline HC Emission Factor (OFFROAD Emfac, based on engine model year)

Column 14 – Deterioration Rate of HC Emfac (based on engine life and average annual use)

Column 15 – Deterioration HC Emfac (amount emission factor increases due to deterioration)

Column 16 – Total HC Emfac (factoring in deterioration, column 8 + column 10)

Column 17 – Annual Ems of HC ($Hp * Load * Annual\ hours * HC\ Emfac$), tpy per engine

Column 18 – Baseline NOx Emission Factor (OFFROAD Emfac, based on engine model year)

Column 19 – Deterioration Rate of NOx Emfac (based on engine life and average annual use)

Column 20 – Deterioration NOx Emfac (amount emission factor increases due to deterioration)

Column 21 – Total NOx Emfac (factoring in deterioration, column 8 + column 10)

Column 22 – Annual Ems of NOx ($Hp * Load * Annual\ hours * NOx\ Emfac$), tpy per engine

Column 23 – Baseline CO Emission Factor (OFFROAD Emfac, based on engine model year)

Column 24 – Deterioration Rate of CO Emfac (based on engine life and average annual use)

Column 25 – Deterioration CO Emfac (amount emission factor increases due to deterioration)

Column 26 – Total CO Emfac (factoring in deterioration, column 8 + column 10)

Column 27 – Annual Ems of CO ($Hp * Load * Annual\ hours * CO\ Emfac$), tpy per engine

Column 28 – Stroke (2 or 4)

Column 29 – Engine exhaust wet, dry, or unknown

Column 30 – Engine repowered (T or F)

Column 31 – Engine Manufacturer

Column 32 – Engine Model

A	COF	1999	50	200	0.43	6976	0.6	1.55E-05	0.1081	0.7081	0.0034	1.45	6.17E-05	0.4304	1.8804	0.0089	5.55	2.78E-05	0.1939	5.7499	0.0272	4.1	1.40E-04	0.9766	5.0766	0.0241	4	UNK	F	Isuzu	UNKNOWN
A	COF	1981	50	3000	0.43	36368	0.76	1.97E-05	0.7553	1.5173	0.1079	1.84	7.84E-05	3.0065	4.848	0.3447	6.88	3.45E-05	1.3226	8.2046	0.5833	5	1.71E-04	6.5533	11.5553	0.0216	4	UNK	F	John	Deere
A	COF	1996	50	1800	0.43	13952	0.76	1.97E-05	0.2746	1.0266	0.0442	1.8	7.65E-05	1.0674	2.8654	0.1222	6.88	3.45E-05	0.481	7.363	0.3141	5	1.71E-04	2.363	7.366	0.315	4	UNK	F	John	Deere
A	COF	1996	50	100	0.43	31392	0.76	1.97E-05	0.618	1.38	0.0033	1.84	7.84E-05	2.4998	4.3013	0.0102	6.88	3.45E-05	1.0821	7.9641	0.0189	5	1.71E-04	5.3618	10.3638	0.0246	4	DRY	F	John	Deere
A	COF	1988	50	3000	0.43	26160	0.76	1.97E-05	0.515	1.277	0.0888	1.8	7.65E-05	2.0014	3.7994	0.2701	6.88	3.45E-05	0.9018	7.7898	0.5534	5	1.71E-04	4.4681	9.4701	0.6733	4	WET	F	Kubota	UNKNOWN
A	COF	1999	50	4000	0.43	6976	0.6	1.55E-05	0.1081	0.7081	0.0071	1.45	6.17E-05	0.4304	1.8804	0.1783	5.55	2.78E-05	0.1939	5.7499	0.5445	4.1	1.40E-04	0.9766	5.0766	0.0241	2	DRY	F	MitsAn	SD-22
A	COF	1979	50	5	0.43	40112	0.84	1.37E-05	0.7996	1.6516	0.0002	1.84	7.84E-05	3.1451	4.8646	0.0006	6.88	3.45E-05	1.3827	8.2647	0.001	5	1.71E-04	6.8511	11.8511	0.0014	4	UNK	F	Perkins	UNKNOWN
A	COF	1997	50	300	0.43	10464	0.76	1.97E-05	0.206	0.968	0.0069	1.8	7.65E-05	0.8006	2.5966	0.0165	6.88	3.45E-05	0.3807	7.2427	0.0615	5	1.71E-04	1.7573	6.7893	0.0483	4	DRY	F	YamAr	UNKNOWN
A	COF	2002	53	3000	0.43	0	0.69	1.04E-05	0	0.69	0.052	0.99	9.49E-06	0	0.99	0.0746	6.9	3.31E-05	0	6.9	0.52	3.49	1.91E-05	0	3.49	0.263	4	UNK	F	Isuzu	UNKNOWN
A	COF	1979	54	2077	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0718	1.44	1.38E-05	0.552	1.9875	0.1057	12.97	6.22E-05	2.4861	15.4681	0.8223	4.82	2.64E-05	1.0573	5.8736	0.3122	4	UNK	F	GM	Mar-71
A	COF	1979	54	2077	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0718	1.44	1.38E-05	0.552	1.9875	0.1057	12.97	6.22E-05	2.4861	15.4681	0.8223	4.82	2.64E-05	1.0573	5.8736	0.3122	2	DRY	F	Perkins	UNKNOWN
A	COF	1986	55	500	0.43	31392	0.84	1.37E-05	0.3933	1.2401	0.0162	1.44	1.38E-05	0.432	1.8675	0.0249	12.97	6.22E-05	1.9536	14.5255	0.1946	4.82	2.64E-05	0.8274	5.6436	0.0736	4	DRY	F	Ford	Industrial
A	COF	1987	55	400	0.43	27904	0.84	1.37E-05	0.354	1.1968	0.0125	1.44	1.38E-05	0.384	1.8196	0.019	12.97	6.22E-05	1.7364	14.7084	0.1834	4.82	2.64E-05	0.7365	5.5517	0.0579	4	UNK	F	Isuzu	C-240
A	COF	2000	56	650	0.43	0	0.69	1.04E-05	0	0.69	0.0119	0.99	9.49E-06	0	0.99	0.0171	6.9	3.31E-05	0	6.9	0.119	3.49	1.91E-05	0	3.49	0.0802	4	UNK	F	Isuzu	4E1
A	COF	2000	56	225	0.43	0	0.69	1.04E-05	0	0.69	0.0041	0.99	9.49E-06	0	0.99	0.0069	6.9	3.31E-05	0	6.9	0.0412	3.49	1.91E-05	0	3.49	0.0206	4	UNK	F	Isuzu	C-240
A	COF	1980	60	2077	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0798	1.44	1.38E-05	0.552	1.9875	0.1174	12.97	6.22E-05	2.4861	15.4681	0.9137	4.82	2.64E-05	1.0573	5.8736	0.3468	4	UNK	F	Cummins	4B
A	COF	1948	60	0	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0	1.44	1.38E-05	0.552	1.9875	0	12.97	6.22E-05	2.4861	15.4681	0	4.82	2.64E-05	1.0573	5.8736	0	2	DRY	F	Detroit	Diesel
A	COF	1970	60	40	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0015	1.44	1.38E-05	0.552	1.9875	0.0023	12.97	6.22E-05	2.4861	15.4681	0.0176	4.82	2.64E-05	1.0573	5.8736	0.0067	4	DRY	F	Hercules	D-2300
A	COF	1994	60	2250	0.43	15696	0.69	1.04E-05	0.1632	0.6532	0.0546	0.99	9.49E-06	0.149	1.139	0.0729	8.76	4.30E-05	0.6936	9.4238	0.603	3.49	1.91E-05	0.2986	3.7898	0.2425	4	DRY	F	Isuzu	240
A	COF	1975	60	2000	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0789	1.44	1.38E-05	0.552	1.9875	0.113	12.97	6.22E-05	2.4861	15.4681	0.8798	4.82	2.64E-05	1.0573	5.8736	0.3341	2	DRY	F	Isuzu	240
A	COF	1999	60	3000	0.43	6976	0.69	1.04E-05	0.0726	0.7526	0.0651	0.99	9.49E-06	0.0662	0.1962	0.0801	6.9	3.31E-05	0.2309	7.1309	0.6884	3.49	1.91E-05	0.1332	3.6232	0.3091	4	UNK	F	Isuzu	4BD1
A	COF	1989	60	3000	0.43	24416	0.69	1.04E-05	0.2539	0.9439	0.0805	0.99	9.49E-06	0.2317	1.2127	0.1042	8.76	4.30E-05	1.0264	9.7894	0.8352	3.49	1.91E-05	0.4663	3.9663	0.3376	4	UNK	F	Isuzu	4BD1
A	COF	1996	60	3600	0.43	13952	0.69	1.04E-05	0.1451	0.6351	0.0831	0.99	9.49E-06	0.1324	1.1224	0.1117	8.76	4.30E-05	0.5865	9.3495	0.9306	3.49	1.91E-05	0.2665	3.7955	0.3739	4	DRY	F	Isuzu	5B4
A	COF	1989	60	1900	0.43	24416	0.69	1.04E-05	0.2539	0.9439	0.0403	0.99	9.49E-06	0.2317	1.2127	0.0521	8.76	4.30E-05	1.0264	9.7894	0.4176	3.49	1.91E-05	0.4663	3.9663	0.1688	4	UNK	F	Isuzu	C.J
A	COF	1978	60	500	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0192	1.44	1.38E-05	0.552	1.9875	0.0283	12.97	6.22E-05	2.4861	15.4681	0.22	4.82	2.64E-05	1.0573	5.8736	0.0835	4	DRY	F	Isuzu	UNKNOWN
A	COF	1987	60	2000	0.43	27904	0.84	1.37E-05	0.354	1.1968	0.008	1.44	1.38E-05	0.384	1.8196	0.1035	12.97	6.22E-05	1.7364	14.7084	0.8966	4.82	2.64E-05	0.7365	5.5517	0.3158	4	DRY	F	Isuzu	UNKNOWN
A	COF	1983	60	700	0.43	34880	0.84	1.37E-05	0.4426	1.2844	0.0296	1.44	1.38E-05	0.48	1.955	0.0381	12.97	6.22E-05	2.1705	15.1425	0.3015	4.82	2.64E-05	0.9194	5.7356	0.1142	4	DRY	F	Jimmy	271
A	COF	1992	60	3000	0.43	19184	0.69	1.04E-05	0.1995	0.8885	0.0799	0.99	9.49E-06	0.1821	1.1721	0.1	8.76	4.30E-05	0.6804	9.6694	0.8165	3.49	1.91E-05	0.3664	3.9664	0.328	4	UNK	F	CAterPMA	3304
A	COF	1996	65	2500	0.43	13952	0.69	1.04E-05	0.1451	0.6351	0.0643	0.99	9.49E-06	0.1324	1.1224	0.0865	8.76	4.30E-05	0.5865	9.3495	0.7201	3.49	1.91E-05	0.2665	3.7955	0.2893	2	UNK	F	CAterPMA	3304
A	COF	1990	65	2500	0.43	22672	0.69	1.04E-05	0.2358	0.9269	0.0713	0.99	9.49E-06	0.2152	1.2052	0.0528	8.76	4.30E-05	0.9631	9.7161	0.7484	3.49	1.91E-05	0.433	3.923	0.3022	2	WET	F	CAterPMA	3304
A	COF	1993	65	1500	0.43	34880	0.84	1.37E-05	0.4426	1.2844	0.0934	1.44	1.38E-05	0.48	1.955	0.0865	12.97	6.22E-05	2.1705	15.1425	0.6888	4.82	2.64E-05	0.9194	5.7356	0.2651	4	DRY	F	Isuzu	4JB
A	COF	1987	65	1000	0.43	10464	0.69	1.04E-05	0.1004	0.7980	0.0246	0.99	9.49E-06	0.0893	0.093	0.0306	8.76	4.30E-05	0.4399	9.2029	0.2833	3.49	1.91E-05	0.1989	3.6899	0.1137	4	UNK	F	Isuzu	UNKNOWN
A	COF	1990	67	2077	0.43	22672	0.69	1.04E-05	0.2358	0.9268	0.0611	0.99	9.49E-06	0.2152	1.2052	0.0796	8.76	4.30E-05	0.9631	9.7161	0.6409	3.49	1.91E-05	0.433	3.923	0.2588	4	WET	F	Isuzu	UNKNOWN
A	COF	1990	67	2077	0.43	22672	0.69	1.04E-05	0.2358	0.9268	0.0611	0.99	9.49E-06	0.2152	1.2052	0.0796	8.76	4.30E-05	0.9631	9.7161	0.6409	3.49	1.91E-05	0.433	3.923	0.2588	4	UNK	F	Isuzu	UNKNOWN
A	COF	1980	67	2000	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.0699	1.44	1.38E-05	0.552	1.9875	0.1262	12.97	6.22E-05	2.4861	15.4681	0.9825	4.82	2.64E-05	1.0573	5.8736	0.3731	4	UNK	F	Perkins	4-226
A	COF	1987	70	900	0.43	27904	0.84	1.37E-05	0.354	1.1968	0.0357	1.44	1.38E-05	0.384	1.8196	0.0543	12.97	6.22E-05	1.7364	14.7084	0.4392	4.82	2.64E-05	0.7365	5.5517	0.1658	4	UNK	F	Isuzu	UNKNOWN
A	COF	1996	70	1100	0.43	13952	0.69	1.04E-05	0.1451	0.6351	0.0305	0.99	9.49E-06	0.1324	1.1224	0.041	8.76	4.30E-05	0.5865	9.3495	0.3412	3.49	1.91E-05	0.2665	3.7955	0.1371	4	UNK	F	John	Deere
A	COF	1996	70	1100	0.43	13952	0.69	1.04E-05	0.1451	0.6351	0.0309	0.99	9.49E-06	0.1324	1.1224	0.0415	8.76	4.30E-05	0.5865	9.3495	0.3466	3.49	1.91E-05	0.2665	3.7955	0.1388	4	UNK	F	John	Deere
A	COF	1987	75	2077	0.43	27904	0.84	1.37E-05	0.354	1.1968	0.0803	1.44	1.38E-05	0.384	1.8196	0.1340	12.97	6.22E-05	1.7364	14.7084	1.086	4.82	2.64E-05	0.7365	5.5517	0.4099	2	WET	F	Detroit	Diesel
A	COF	1976	75	1500	0.43	40112	0.84	1.37E-05	0.9089	1.3507	0.072	1.44	1.38E-05	0.552	1.9875	0.109	12.97	6.22E-05	2.4861	15.4681	0.8248	4.82	2.64E-05	1.0573	5.8736	0.3132	2	UNK	F	Detroit	Diesel
A	COF	1976	75	1500	0																										

Appendix H

**Individual Components of District-specific
Commercial Harbor Craft Emission Estimates**

District-by-District Vessel Type Counts

District	Vessel Type/Population									Totals
	Commercial Fishing	Charter Fishing	Ferries	Crew and Supply	Pilot Vessels	Tug Boats	Tow Boats	Work Boats	Other	
Amador	0	0	0	0	0	0	0	0	0	0
Antelope Valley	0	0	0	0	0	0	0	0	0	0
Bay Area	757	113	137	19	0	53	23	29	53	1183
Butte	2	1	0	0	0	0	0	1	1	5
Calaveras	0	0	0	0	0	0	0	0	0	0
Colusa	0	0	0	0	0	0	0	0	0	0
El Dorado	16	4	3	1	0	0	0	0	0	24
Feather River	0	0	0	0	0	0	0	0	1	1
Glenn	0	0	0	0	0	0	0	0	0	0
Great Basin	1	0	0	0	0	0	0	0	0	1
Imperial	0	0	0	0	0	0	0	0	0	0
Kern	0	0	0	0	0	0	0	0	0	0
Lake	1	0	0	0	0	0	0	0	0	1
Lassen	0	0	0	0	0	0	0	0	1	1
Mariposa	0	0	0	0	0	0	0	0	0	0
Mendocino	204	6	3	0	0	0	0	1	1	215
Modoc	0	0	0	0	0	0	0	0	0	0
Mojave	0	0	0	0	0	0	0	0	0	0
Monterey Bay	356	19	13	0	0	0	0	0	7	395
North Coast	397	8	0	6	0	3	0	2	1	417
Northern Sierra	0	0	0	0	0	0	0	0	1	1
Northern Sonoma	149	11	4	1	0	0	0	0	1	166
Placer	14	3	4	1	0	0	0	0	2	24
Sacramento	19	4	2	0	0	5	3	8	2	43
San Diego	122	100	75	0	0	17	8	2	15	339
San Joaquin	18	6	5	1	1	1	0	1	1	34
San Luis Obispo	147	9	3	3	0	2	0	1	0	165
Santa Barbara	68	18	7	6	0	1	0	4	4	108
Shasta	0	0	0	0	0	0	0	0	0	0
Siskiyou	0	0	0	0	0	0	0	0	0	0
South Coast	304	220	141	32	30	41	1	39	39	848
Tehama	2	1	0	0	0	0	0	0	1	4
Tuolumne	0	0	0	0	0	0	0	0	0	0
Ventura	77	9	7	1	1	3	0	0	4	102
Yolo-Solano	15	4	1	0	0	2	0	2	0	24

Average Numbers of Engines Per Vessel Type

Vessel Type	Auxiliary	Propulsion
Charter Fishing	0.75	1.75
Commercial Fishing	0.46	1.11
Crew and Supply	1.11	2.5
Ferry	1.23	2
Pilot	0.14	1.71
Towboats	1.17	2
Tugboats	1.59	1.92
Work Boats	0.32	1.45
Others	0.46	1.12

Average Annual Emissions Per Engine Per Vessel Type (tpd)

Engine	Vessel Type	PM	HC	NOx	CO
Auxiliary	Commercial Fishing	0.0029	0.0064	0.0272	0.0175
Auxiliary	Charter Fishing	0.0024	0.0051	0.0222	0.0141
Auxiliary	Ferry/Excursion	0.0023	0.0044	0.0264	0.0132
Auxiliary	Crew & Supply	0.0040	0.0060	0.0376	0.0168
Auxiliary	Pilot	0.0033	0.0099	0.0210	0.0244
Auxiliary	Tug	0.0025	0.0043	0.0310	0.0136
Auxiliary	Tow	0.0028	0.0050	0.0318	0.0152
Auxiliary	Work	0.0018	0.0035	0.0271	0.0121
Auxiliary	Other	0.0024	0.0051	0.0261	0.0146
Engine	Vessel Type	PM	HC	NOx	CO
Propulsion	Commercial Fishing	0.0022	0.0037	0.0393	0.0092
Propulsion	Charter Fishing	0.0019	0.0031	0.0365	0.0079
Propulsion	Ferry/Excursion	0.0021	0.0032	0.0379	0.0087
Propulsion	Crew & Supply	0.0017	0.0031	0.0362	0.0079
Propulsion	Pilot	0.0019	0.0031	0.0392	0.0082
Propulsion	Tug	0.0025	0.0034	0.0433	0.0100
Propulsion	Tow	0.0029	0.0035	0.0469	0.0100
Propulsion	Work	0.0021	0.0035	0.0351	0.0088
Propulsion	Other	0.0024	0.0036	0.0381	0.0096