

Appendix B

Stationary Emergency/Standby Diesel-Fueled Engine Survey

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I. Introduction and Background

In September 2002, the Air Resources Board (ARB or Board) conducted the Stationary Emergency/Standby Diesel-Fueled Engine Survey (survey or ES Survey). The intent of the survey was to obtain a representative sampling of the average number of hours that stationary emergency/standby diesel-fueled engines were operated in California for the purposes of maintenance and testing, interruptable service contracts (ISCs), and emergencies. The information gathered would enable us to determine how many engines would potentially be affected by the proposed airborne toxic control measures (ATCMs) for stationary compression-ignition engines and would also aid in enhancing our statewide inventory of stationary diesel-fueled engines.

Using contact information obtained from the local air quality management and air pollution control districts' (districts) permit data and the California Energy Commission's list of back-up generators, the survey was distributed to approximately 3,000 private companies and facilities and public entities, including county, city, state, and federal agencies throughout California. Surveys included a requested due date of September 30, 2002, or October 11, 2002 (survey recipients in the San Joaquin Valley received their package two weeks later, and therefore, were allotted more time). The survey was also available on the ARB web site and an e-mail notice was sent to the approximately 750 subscribers of the stationary diesel risk reduction e-mailing list. A copy of the cover letter and the actual survey can be found in Section IV of this Appendix.

More than 800 surveys were returned with data for approximately 3,200 engines, while 69 surveys were returned from facilities stating they do not currently have stationary emergency/standby diesel-fueled engines. The majority of the surveys that contained an explanation cited changes in facility operation as the reason for the change in engine status.

The stationary emergency/standby diesel-fueled engine survey requested engine owners/operators to submit the following information for each applicable engine:

- engine make (manufacturer)
- model
- horsepower rating
- model year
- approximate age (if model year unknown)
- actual annual hours of operation for 1999 through 2001 for each purpose:
 - maintenance and testing
 - interruptable service contract
 - emergencies

In requesting the survey, the ARB stated that specific survey responses or the names of businesses would not be published but that the data from the survey would be analyzed

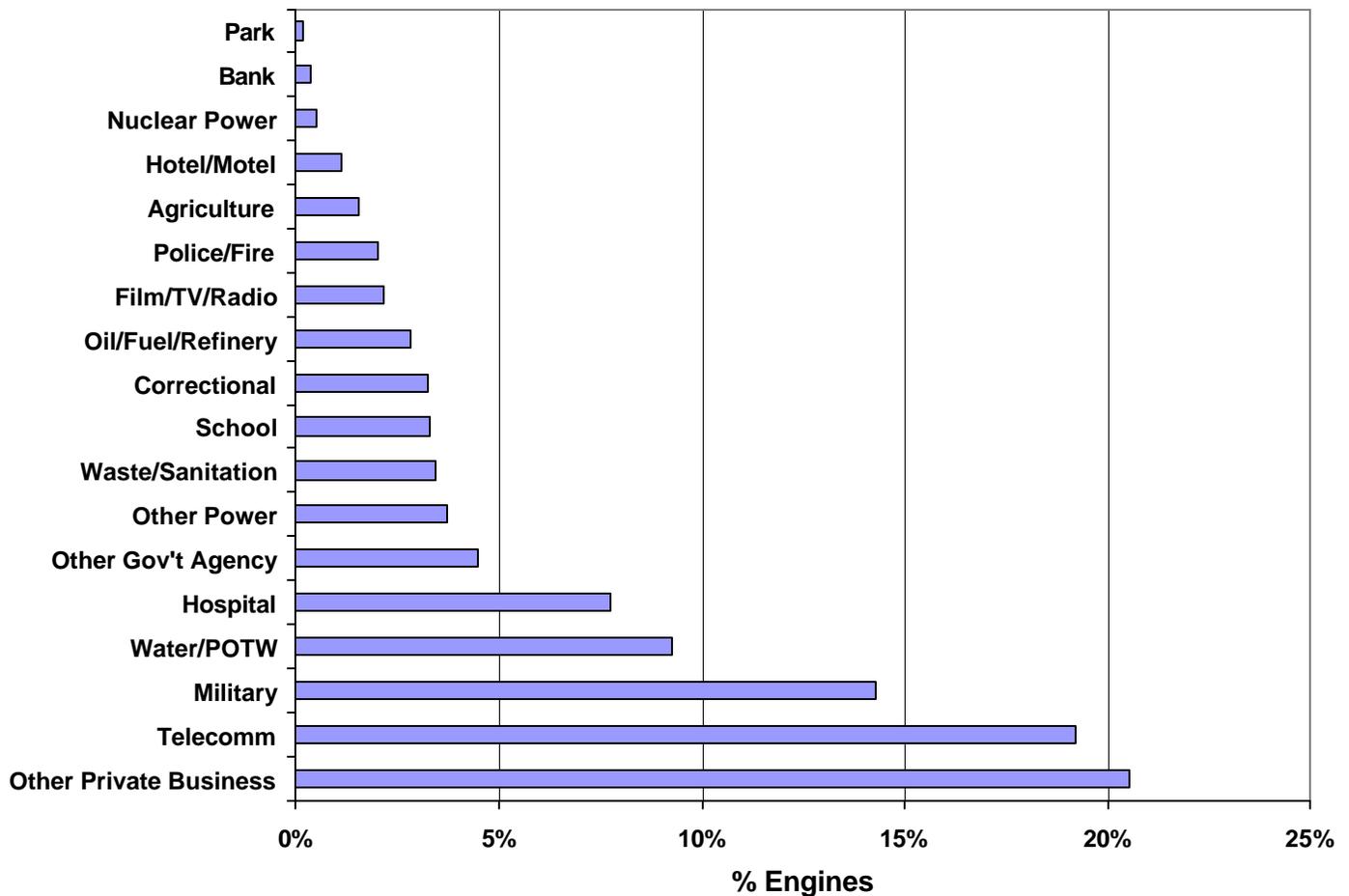
and discussed in public workshops and reports. A brief summary of staff's initial survey analysis was presented at a public workshop in November 2002.

The 3,200 engines included in the returned surveys represent approximately 17 percent of the current estimated stationary emergency/standby diesel-fueled engine statewide inventory. Information regarding the statewide inventory can be found in Chapter IV.

II. Survey Response

As stated in section I, the ES Survey was distributed to approximately 3,000 private and public entities. Figure B-1 below shows the types of facilities that responded to the survey and their corresponding response rates.

Figure B-1: Facility Survey Responses



The "Other Private Businesses" category in the chart above includes building property management companies, retail stores, and many other miscellaneous business types. The "Agriculture" category includes food growing and production facilities, wineries, and meat processing facilities. Of the total responses, 50 percent were from private companies/facilities, 42.5 percent were from public agencies (county, city, state, and federal), and 7.5 percent (248 engines) were undetermined. Of the 248 undetermined facility engines, 188, or 76 percent, were from hospitals. Since survey respondents supplied facility names only, staff were not always able to determine if the hospitals were public or private facilities.

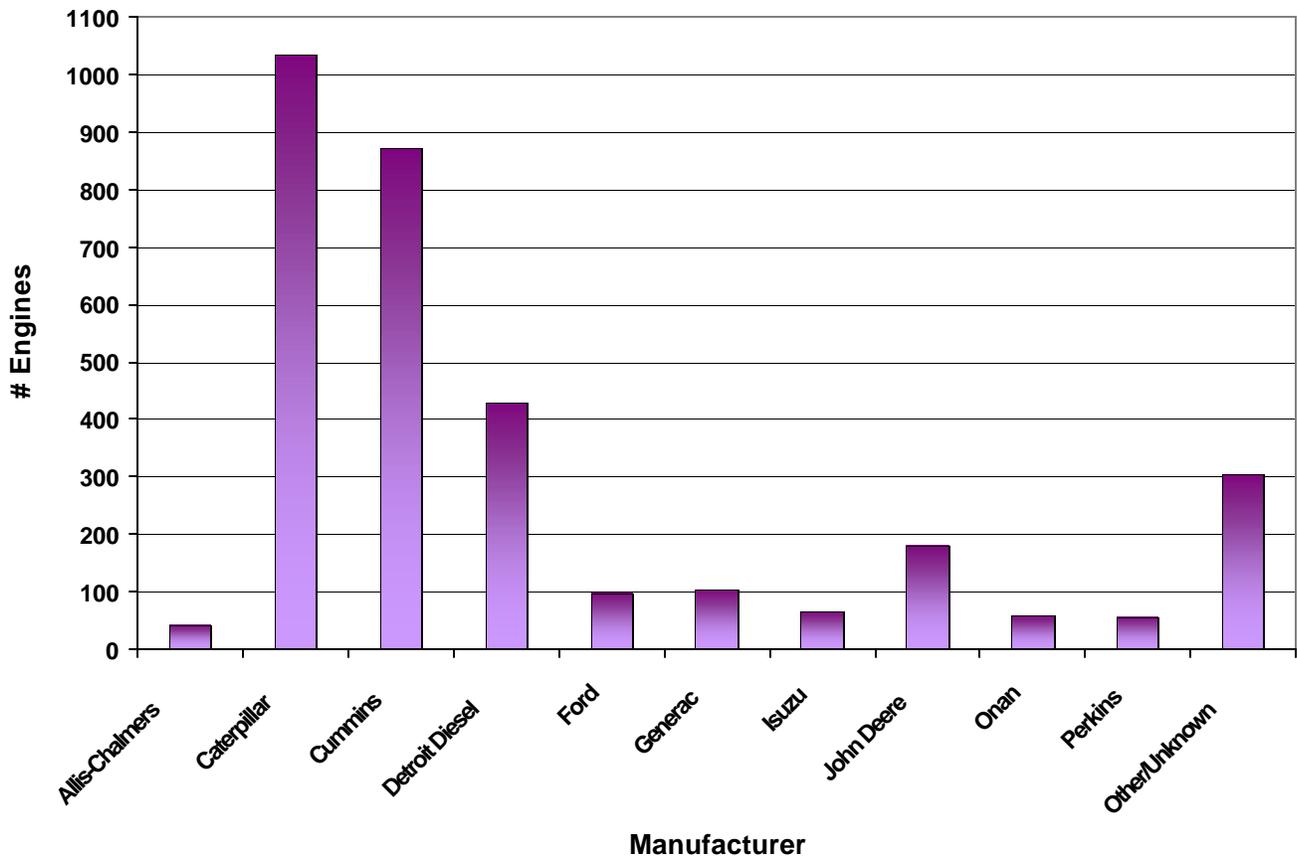
III. Survey Results

The figures and tables in this section represent the results of the key data fields from the ES Survey. Not all records had data for every field, so null values were not included in averages or population numbers.

A. Engine Manufacturers

As shown in Figure B-2 below, the most prominent engine manufacturers of stationary diesel-fueled engines from the ES Survey were Caterpillar and Cummins, comprising 32 and 27 percent of the engines, respectively. Included in the "Other/Unknown" category were manufacturers that represented less than 40 engines each, such as Waukesha, White, Kohler, General Motors, Hino, Mitsubishi, Volvo, Komatsu, to name a few. The "Other/Unknown" category comprised nine percent of the engines. It is also important to note that it is possible that some survey respondents included the name of the backup generator manufacturer as opposed to the engine manufacturer.

Figure B-2: Engine Manufacturers



B. Horsepower and Model Year

Table B-1 shows the number of engines listed in specific horsepower ranges. The ranges correlate to those used in the stationary diesel-fueled engine statewide inventory. The largest number of the engines from the survey were within the 251 to 500 horsepower range, the average and median ratings were 604 and 360 horsepower, respectively. Our survey targeted engines greater than or equal to 50 horsepower, so while we received some data for the smaller engines, they were not included in the table at right or in the average or median horsepower ratings.

Since the stationary diesel-fueled engine statewide inventory groups engines by both model year and horsepower, Tables B-2 and B-3 below show the survey engine population for the same horsepower ranges and model year ranges used in the inventory.

Table B-2 displays the engines by model year while Table B-3 displays the engines by horsepower. There were 561 engines rated over 50 horsepower that did not have model year or age data, while only 101 engines had no horsepower data.

Table B-1: Horsepower Ranges

HP Range	# Engines
51-120	592
121-175	332
176-250	317
251-500	632
501-750	375
751-1000	222
>1000	575
<i>Total</i>	<i>3,045</i>

Table B-2: Model Year and Horsepower Ranges (by Horsepower)

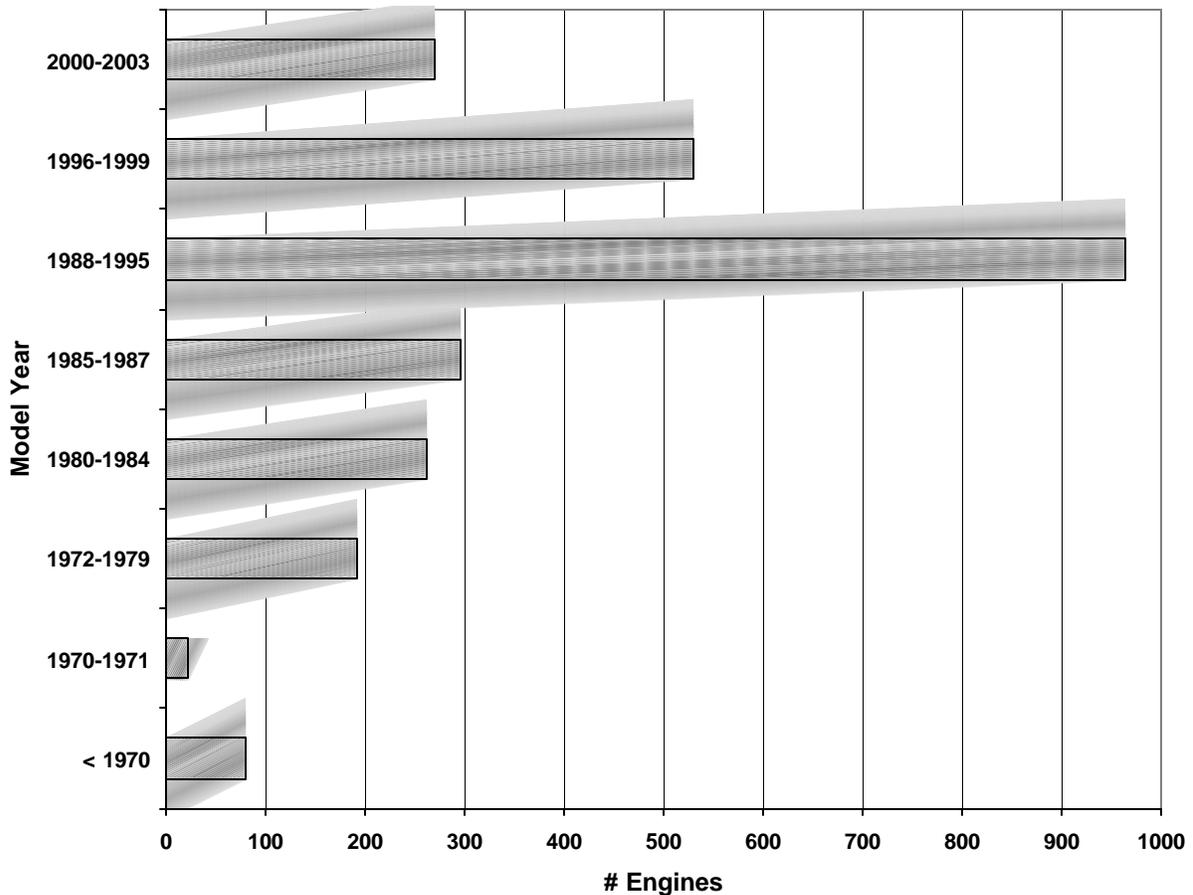
Model Year Range	No HP Data	51-120	121-175	176-250	251-500	501-750	751-1000	>1000
No Age Data		206	44	38	79	83	23	88
< 1970	6	7	15	18	12	9	3	9
1970-1971	2	2	-	-	10	-	2	5
1972-1979	8	23	16	23	36	32	15	34
1980-1984	12	34	29	27	57	35	28	39
1985-1987	10	50	35	37	88	30	24	22
1988-1995	29	162	111	99	204	108	63	177
1996-1999	20	72	53	52	100	48	40	137
2000-2003	14	36	29	23	46	30	24	64

Table B-3: Model Year and Horsepower Ranges (by Model Year)

HP Range	No Age Data	< 1970	1970-1971	1972-1979	1980-1984	1985-1987	1988-1995	1996-1999	2000-2003
No HP Data		6	2	8	12	10	29	20	14
51-120	206	7	2	23	34	50	162	72	36
121-175	44	15	-	16	29	35	111	53	29
176-250	38	18	-	23	27	37	99	52	23
251-500	79	12	10	36	57	88	204	100	46
501-750	83	9	-	32	35	30	108	48	30
751-1000	23	3	2	15	28	24	63	40	24
>1000	88	9	5	34	39	22	177	137	64

Figure B-3 below shows the number of engines in each model year range. The average engine age was 12 years and the median age was 10 years.

Figure B-3: Engine Distribution by Model Year



As shown in the figure above, the largest model year group was 1988-1995, making up 37 percent of all of engines for which age or model year data was received.

C. Hours of Operation

The ES Survey requested actual hours of operation for three calendar years (1999 through 2001) for each of the following purposes: maintenance and testing, interruptable service contracts (ISC), and emergencies. Hours of operation data was received for 3,038 engines and the averages are presented in Table B-4. The data shows that stationary emergency/standby diesel-fueled engines operate approximately 31 hours per year on

Table B-4: Average Hours of Operation

Activity	Year		
	1999	2000	2001
Maintenance & Testing	22	22	21
Interruptable Service Contract*	1	3	4
Emergency/Standby	6	6	8
Total	29	31	33
Avg. Total	31		

* Includes all engines that reported hours of operation data for any purpose.

average. The majority of those hours (approximately 77 percent) are for maintenance and testing, while only about 20 percent of the annual hours are for actual emergency operation.

Table B-5: Reported ISC Hours

	Year		
	1999	2000	2001
# Engines	77	165	198
Total # Engines**	236		
Max Hours	543.6	2160.8	210
Average Hours	8.06	27.79	39.77
Overall Average	25.82		

** The total number of engines that reported ISC hours during at least one of the years (1999-2001).

indicates, there was an increase in the number of ISC hours for each year. The increase from 1999 to 2000 was 245 percent and from 2000 to 2001, the increase was 43 percent. However, not all engines experienced an increase from one calendar year to the next (see Table B-6).

For ISCs, the averages given are for all engines that have reported hours of operation. Since there are very few engines that indicated any hours of operation for an ISC program (about 8 percent), the average hours for ISC in Table B-4 are low. Table B-5 shows the data for engines that specifically reported ISC hours. As the table

Table B-6: Increase in ISC Hours

Year	Engines with Increase in Hours	
	#	%
1999 to 2000	131	56%
2000 to 2001	147	62%
1999 to 2001	164	69%

While an emergency/standby engine's primary purpose is to provide service in the event of an emergency, such situations generally do not arise often, so the average annual

Table B-7: Emergency/Standby Hours

Year	# Engines	% Engines	Average Hours
1999	998	33%	5.84
2000	1091	36%	6.45
2001	1251	41%	8.44

hours of emergency operation are low. Table B-7 shows the number of engines that reported emergency/standby hours of operation and the average annual hours. Over the three-year period, the average annual operation for emergency/standby purposes was 7 hours.

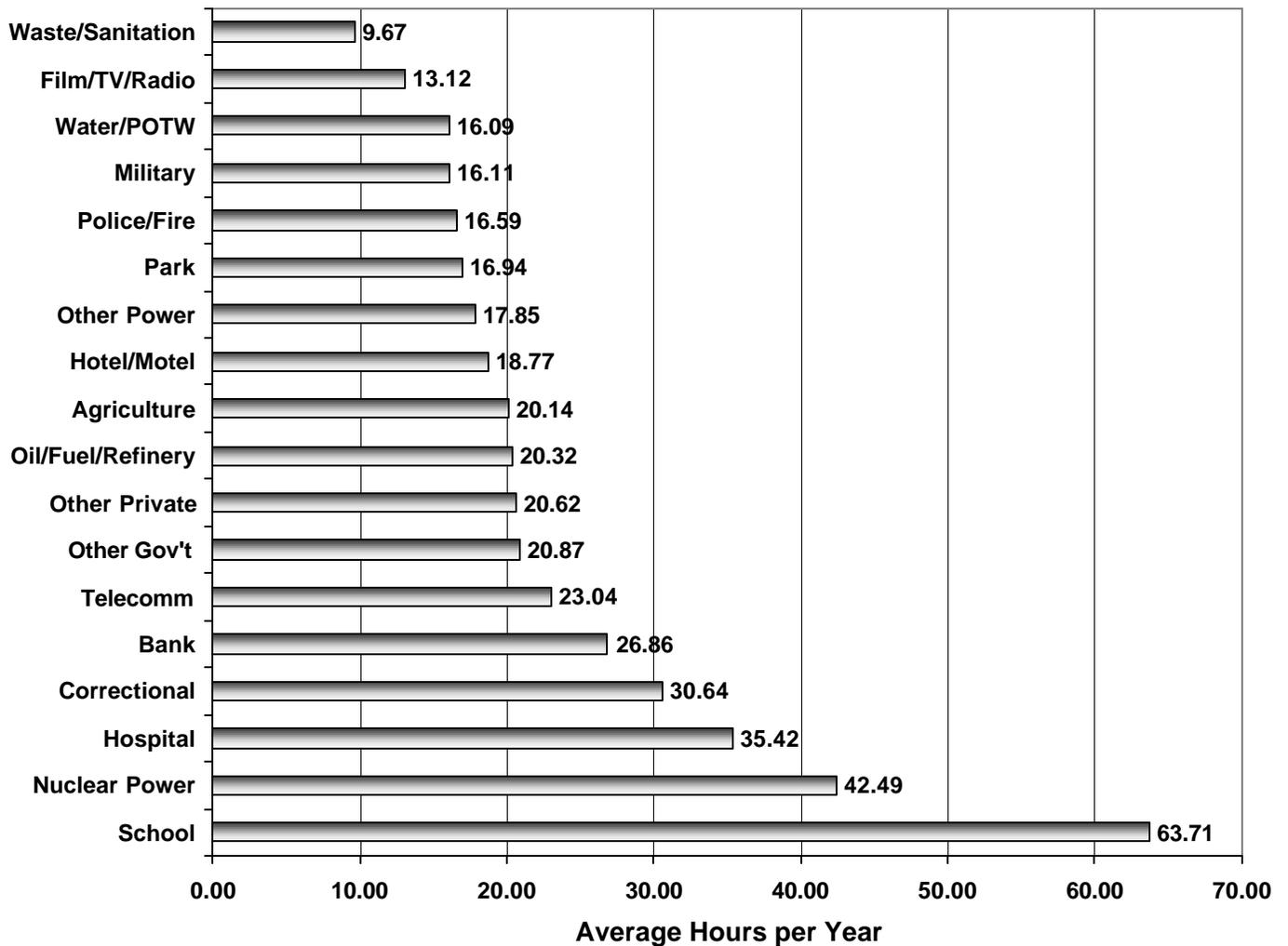
Although maintenance and testing hours comprise 77 percent of the average annual emergency/standby engine use, 95 percent of the engines run for 50 hours per year or less on average for that purpose. Table B-8 shows the percentages for 10, 20, 30, 40, and 50 hours per year.

Table B-8: Maintenance and Testing Average Hours Per Year

	Average Hours per Year				
	≤ 50	≤ 40	≤ 30	≤ 20	≤ 10
# Engines	2883	2880	2605	1632	927
% Engines	95%	92%	86%	54%	30.5%

Depending on the type of facility, maintenance and testing hours can vary. The required amount of hours that emergency/standby engines are tested each year are usually mandated by either legislation and/or facility, company, or corporate policy. Figure B-4 indicates the three-year average annual maintenance and testing hours of operation for each facility type identified.

Figure B-4: Average Annual Maintenance & Testing Hours by Facility Type



Engines operated by public agencies were run, on average, 21 hours per year for maintenance and testing, and private facilities had an average operation of 22 annual hours. For all engines included in the survey, the overall average maintenance and testing hours were 21.7 hours per year. It is important to note that the four facility types above that averaged more than 30 hours per year were schools, nuclear power plants, hospitals, and correctional facilities. Schools, which averaged almost 64 hours per year, comprised only three percent of the engines from the survey, nuclear power plants comprised one percent, hospitals comprised eight percent, and correctional facilities comprised eight percent, for a combined total of 15 percent.

IV. Survey Package



Winston H. Hickox
Agency Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman

1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov



Gray Davis
Governor

September 10, 2002

Dear Madam/Sir:

Air Resources Board Survey on Stationary Emergency/Stand-by Diesel-Fueled Engines

We are writing to ask you to fill out the enclosed Air Resources Board (ARB) survey on stationary emergency/stand-by diesel-fueled engines. The short survey asks about the engines' make, model, age, and how many hours the engines were operated (actual hours of operation, not permitted hours) each year for the past three years. Below are answers to some questions you may have regarding the survey.

Why is the ARB requesting this information?

We are currently developing an airborne toxic control measure (ACTM) to control particulate matter emissions from stationary diesel-fueled engines. The survey responses will give us up-to-date information on annual hours of operation for emergency/stand-by engines. We will use the information to identify and evaluate the impacts of emission reduction strategies for emergency/stand-by engines.

Does the ARB have the legal authority to request the survey information?

Yes. State law authorizes the ARB to request and gather the information required to determine if measures are needed to protect the public health from toxic air contaminants.

What if my business/facility does not have any emergency/stand-by engines?

Simply include your business/facility contact information, check-mark the box at the top of the form, and return it to us.

What will the ARB do with my survey?

We will enter the information into a database for analysis. The results of this analysis may be discussed at future workshops and summarized in our technical documents. However, we will not publish your survey responses or the name of your business in our documents.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

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Madam/Sir
September 10, 2002
Page 2

When does the ARB need my survey?

Please return your survey by September 30, 2002. You may either fax it to us at (916) 327-6251, or mail it to the following address:

California Air Resources Board
Attn: SSD/EAB
P.O. Box 2815
Sacramento, CA 95812-2815

Who should I contact if I have questions regarding the survey?

You may contact Mr. Alex Santos at (916) 327-5638 or via e-mail at asantos@arb.ca.gov, or Ms. Lisa Williams at (916) 327-1498 or via e-mail at lwilliam@arb.ca.gov.

We would like to thank you in advance for responding to this survey.

Sincerely,

/s/

Daniel E. Donohoue, Chief
Emissions Assessment Branch

Enclosure

cc: Mr. Alex Santos
Air Resources Engineer
Emissions Assessment Branch

Ms. Lisa Williams
Air Resources Technician
Emissions Assessment Branch

California Air Pollution Control Officers Association

Business/Facility Name: _____
Address: _____
City: _____ Zip: _____
Contact Name: _____ Phone: () _____

Stationary Emergency/Stand-by Diesel-Fueled Engine Survey

- If your business/facility does not have any emergency/stand-by engines, please mark this box, fill in the contact information above, and return this form to us.
- If you are a "small business" (annual gross receipts of \$10,000,000 or less per Cal. Gov. Code Sec. 14837(d)(1)), please mark this box.

Instructions:

1. Please fill in your contact information above.
2. Please limit your responses to stationary diesel-fueled emergency/stand-by engines only. An emergency/stand-by engine is any engine used only when normal power or natural gas service fails (i.e., back-up generators), for emergency purposes (i.e., fire pumps, water pumps for flood relief, etc.), or for participation in interruptable load programs (i.e., during periods of fuel or energy shortage in order to minimize or decrease the scale or duration of power outages).
3. Please only indicate the approximate age of the engine if you do not know the model year.
4. Please fax this survey to **(916) 327-6251**, or mail it to the address on the back of this form.

Permit # (if permitted)	Engine Make	Engine Model	Horse- power	Model Year (if known)	Approx Age	Hours Operated Year 1999			Hours Operated Year 2000			Hours Operated Year 2001		
						Maint / Testing	Emerg / Standby	Other*	Maint / Testing	Emerg / Standby	Other*	Maint / Testing	Emerg / Standby	Other*
<i>Example</i>	<i>Cummins</i>	<i>3451D</i>				142	84	26	105	96	0	200	173	15

* If engine were operated for the purpose of participating in interruptable load programs, please write "ILP" next to the number in this box.

