October 19, 2011

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James Goldstene
Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Public Hearing to Consider Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Dear Mr. Goldstene:

This letter transmits comments prepared by Sierra Research on behalf of the California Trucking Association regarding the above-captioned rulemaking. As you are aware, and is discussed in detail in Appendix C to the Initial Statement of Reasons (ISOR) for this rulemaking, the staff has developed an updated emissions inventory for transportation refrigeration units (TRUs). At the request of the California Trucking Association, Sierra Research has performed a review of the updated emissions inventory. This letter and the attached presentation slides summarize the results of that review.

It should be noted that the updated TRU inventory, and in particular the emission factors selected for use by CARB staff in the updated inventory, are generally based on the OFFROAD2007 model. The OFFROAD2007 model has previously been shown to overestimate emissions for specific types of equipment—for example, equipment subject to the in-use, off-road regulation. This is illustrated in Slide 3 of the attached presentation, which presents the results of a Sierra Research analysis of PM emissions from equipment subject to the non-road in-use regulation performed on behalf of the Associated General Contractors of America. As shown in that slide, the original OFFROAD2007-based inventory vastly overstated PM emissions; this was acknowledged by CARB staff, who subsequently revised the inventory drastically downward to address flaws in OFFROAD2007.

Although CARB staff have attempted to revise the TRU inventory to address similar issues with OFFROAD2007 and to improve the accuracy of the TRU inventory, Sierra's review has identified the following three areas of concern that appear to lead to an overestimation of baseline TRU emissions:

1. The basic emission factors used to estimate TRU emissions appear to overstate TRU PM emissions;

2. The magnitude of the increase in emissions expected from TRU units over time, (which is also referred to as the emissions deterioration rate) is overstated, leading to overestimates of TRU PM and NOx emissions; and

3. The assumed annual hours of operation by TRU units have been updated using suspect data that appear to overestimate TRU PM and NOx emissions.

Basic Emission Factors

During the original development of the TRU regulation in 2003 and 2004, the fact that TRU engines operate over a duty cycle that is different than that of similar engines used in different applications was an issue that was raised and accepted by CARB staff and the staff of the U.S. Environmental Protection Agency (EPA). This led to EPA's adoption of a special four-mode test cycle for engines used exclusively in TRU applications and the acceptance of that cycle by CARB. This four-mode cycle is found in the EPA regulations in Section 1039.645 of Title 40 Code of Federal Regulations. That CARB staff accepts that the four-mode cycle is representative of TRU operation is documented on pages C-27 to C-33 of Appendix C of the ISOR, where CARB describes how it used the four-mode cycle to estimate engine load factors, a key parameter in the emission inventory update.

Although CARB staff acknowledges that the four-mode cycle is representative of TRU operation, the basic emission factors used by CARB staff in the emission inventory are based on the eight-mode test that is used to characterize the operation of similar engines used in other applications. That this is the case is confirmed by CARB staff's statement on page C-66 of Appendix C of the ISOR, which acknowledges that emission factors and deterioration rates from the OFFROAD2007 model were used to prepare the updated TRU emission inventory.

In order to estimate the impact of the four-mode cycle versus the eight-mode cycle on emissions, modal emissions data are required. Fortunately, the modes of the four-mode cycle are also part of the eight-mode cycle that is used to certify the engines used in TRU and other applications. Therefore, all that is required to estimate the emissions differences are the modal data that underlie the emission values and that must be reported to CARB staff in order to obtain emissions certification of new TRU engines, which are limited in number as shown in Table 23 of Appendix C of the ISOR. However, despite the fact that the existing TRU regulation requires the submission of modal data (see sections Section 2477(d)(14), (e)(1)(A)1.a.1. and (e)(1)(A)2.a.1., Title 13, California Code of Regulations), it is Sierra's understanding that CARB staff apparently failed to require the submission of those data.[1]

[1] See the attached email exchanges between CARB staff and Sierra Research, September 2011.

The potential impact of the difference in TRU emissions over the four mode cycle as compared to the eight mode cycle upon which the updated TRU inventory is based could be substantial. In the original ISOR for the TRU regulation on page VII-7, CARB staff stated the following:

> *U.S. EPA's May 23, 2003 proposal allows the use of a new steady-state test cycle for TRU engines (ref 40 CFR Part 89, Subpart G, section 1039.645). The proposed test cycle is intended to be more representative of the way TRU engines actually operate than the currently used 8-mode test cycle, which includes modes of operation that TRUs never use (e.g. idle at no-load, 10 percent and 100 percent of rated torque at rate speed, and 100 percent of rated torque at intermediate speed). The proposed test cycle has four modes: 75 percent and 50 percent torque at maximum test speed, and 75 percent and 50 percent torque at intermediate test speed. The weighting factors for each of these four modes would be split equally at 25 percent. TRU engine manufacturers have told staff that some Tier 1 and many Tier 2 TRU engines may be able to meet the LETRU in-use performance standards, if the engine certification data is evaluated with the steady-state TRU test cycle. Initial staff evaluation of modal engine certification data indicates that emission factors will be less for the proposed test cycle compared to the current test cycle. The amount of PM emission factor reduction ranges from 25 percent to 60 percent, depending on engine model. But, staff found that nitrogen oxide (NOx) emission factors may increase for some engines when using the proposed steady state TRU test cycle.*
>
> *Staff supports the proposed TRU test cycle, provided manufacturers use the test cycle for all pollutants. Staff also supports this provision of EPA's proposal, as applied to new engine certifications since it allows an optimized reduction of actual emissions and prevents the costly over-design of the emission control system to cover modes of operation that are not used in practice.*

Given that CARB staff indicates that it has no modal emissions data from TRU engines upon which to gauge the impacts of the four-mode test cycle relative to the eight-mode cycle, Sierra Research solicited such data from engine manufacturers and was able to obtain data on a confidential basis for three indirect-injection Diesel engines similar to those used in TRU applications certified to current Tier III emission standards. How those data can be used to compute the differences in the four- and eight-mode cycles is illustrated for one engine in Slide 8 of Sierra's attached presentation. As shown, the results of Sierra's analysis indicate a 10% increase in NOx emissions and a 58% reduction in NOx emissions, both of which are generally consistent with what CARB staff reported in the original TRU ISOR. The average impacts for the three engines for which Sierra had data indicated 58% lower PM emissions and 15% higher NOx emissions over the four-mode cycle compared to the eight-mode cycle.

Given the magnitude of the potential impacts associated with properly accounting for the actual operating modes of TRU engines on PM emissions, and the corresponding impacts on the staff's health risk assessment, Sierra strongly recommends that the Board direct staff to immediately obtain the modal data necessary to definitively address this issue from engine manufacturers and provide a transparent analysis of those data as part of a revision to the TRU inventory. This is the only way in which to ensure the accuracy of the TRU emission inventory that the Board is relying on as the basis for the revisions to the TRU regulation. As noted above, submission of modal data is already required as part of the existing TRU regulation and since it forms the basis for all manufacturer submissions related to new engine certification by CARB, there is nothing to prevent staff from quickly obtaining the data and revising the TRU inventory.

Emission Deterioration Rates

In estimating emissions deterioration for TRU engines, CARB staff indicates on page C-66 of the ISOR that it assumed a 20,000-mile life for TRU engines and further assumed that emissions deterioration would continue unabated throughout that period. However, Section 1039.101, Title 40, Code of Federal Register (which is incorporated by reference into CARB regulations applicable to TRU engine certification) sets the useful life of smaller engines used in TRU and other applications (rated at less than 25 horsepower) at 3,000 hours and that for larger engines used in TRU and other applications at 5,000 hours. What these useful lives imply is that, in order to achieve a total lifetime of 20,000 hours, TRU engines undergo several "rebuilds" in which the engines and emission-related components are refurbished. As a result of each of these refurbishments, emissions would be expected to be lowered from their deteriorated rate toward the emission rates associated with the engines when new. In any case, a more reasonable assumption would be to cap deterioration at 3,000 and 5,000 hours, respectively, for smaller and larger TRU engines. Sierra strongly recommends that the Board direct CARB staff to revise the TRU inventory to correct this problem with deterioration rates in order to improve the accuracy of the TRU emission inventory.

Assumed Annual Hours of Operation

As described in Appendices B and C to the ISOR, CARB's assumed annual activity values for TRUs are derived from data collected from "facility reports" that 80 "large" facilities were required to submit to CARB pursuant to the TRU regulation. As indicated on page B-2 of the ISOR, data from 22 of these 80 facilities had to be discarded because they were "unusable," according to CARB staff. Although CARB staff claims to have reviewed and corrected questionable data, there is no documentation of the changes that were made or the criteria used by the staff to conclude that the data were reliable for use in developing emissions inventories.

The average annual operating hours by facility type are shown in Table 1, along with the percent of total TRUs in the facility report accounted for by each facility type. Also shown are the maximum, minimum, and standard deviations associated with the individual facility values for each facility type.

Table 1
Summary of TRU Activity Data from CARB Facility Reports

Type	Number	% of TRUs	Annual Operating Hours per TRU per Reported Facility			
			Average	Std Dev	Max	Min
Dairy	3	6	1624	174	1788	1441
Foodservice	15	21	1927	582	2888	967
Grocery	25	57	1520	720	3540	503
Meat	2	7	3149	-	3785	2512
Produce	10	9	1323	780	2640	82

As shown by the standard deviation, maximum, and minimum values for the facilities in each facility type, the variation in average operating hours per TRU varies widely between facility types. Ratios of the maximum to the minimum annual average TRU operation reported by facility type vary dramatically. For example, for facility types where three or more facilities reported, the ratios of maximum to minimum average TRU operation for different facilities are 3, 7, and 32 for foodservice, grocery distribution, and produce distribution, respectively. These large ratios and the lack of detail regarding the facility reports suggest that while the average annual TRU operating hour values may appear reasonable, that may be happenstance and the actual values may differ significantly.

Another problem with CARB's analysis is that the staff has provided no data to suggest that the percentage of total TRUs reported by facility type in the facility reports bears any relationship to the percent of TRUs actually operating in California in transporting those types of products.

A further problem with facility survey data is that they include only the total number of truck and trailer based TRUs operating at each facility and the total annual hours of operation of all TRUs at the facility. As a result, these data are completely unsuited for determining annual hours of either truck or trailer TRU operation, which should have been recorded directly if they were intended for use in emission inventory development. CARB staff attempts to remedy this problem using statistical methods as described on pages C-22 through C-25 of the ISOR; however, this statistical approach is inappropriate because it separates facilities with trucks and trailers from those that had only trailers, and the results of CARB staff's methodology are clearly erroneous when applied to subsets of the facility survey data. For example, when applied to the food service and produce fleets, with 15 facilities reporting, the annual hours estimated at food service facilities for trailer TRUs was 1,619 hours while that for truck TRUs was a much greater 2,686 hours. Conversely, at produce fleet facilities, the result was a trailer TRU operation rate of 1,975 hours and a truck TRU operation rate of 556 hours, or more than five times less than the estimate obtained for food service facilities using exactly the same methodology.

Overall, while the facility data are more recent than the data used in the previous TRU inventory, CARB staff has failed to demonstrate that they are either valid or that they have been properly analyzed.

Inventory Sensitivity Analysis

Based on the results of Sierra's review of the updated TRU inventory, a sensitivity analysis was performed to assess the magnitude of the impacts associated with the factors identified using a modified version of CARB's updated TRU emission inventory (this modified inventory has also been provided under separate cover as part of Sierra's comments on this rulemaking item). This analysis and the results are presented on Slides 11 through 14 of the attached presentation.

As shown, the revised baseline PM emission inventory, as well as the inventory with a three-year delay in implementation of the TRU rule, falls below CARB's current assessment of emissions with the TRU regulation in place. Similarly, the revised NOx inventory with the three-year delay is essentially equivalent to CARB's current assessment of emissions with the TRU regulation in place. Finally, as shown on Slide 14, the result of the revised inventory indicates a cost-effectiveness value of $406 per pound of PM emissions eliminated by the rule compared to the $83 per pound currently being claimed by CARB staff and the $10-$20 per pound originally claimed by CARB staff when the TRU rule was originally adopted.

Sincerely,

James Lyons
Senior Partner

Attachments: Powerpoint Presentation
Email Exchanges
CD containing modified TRU inventory

Review of CARB TRU Inventory

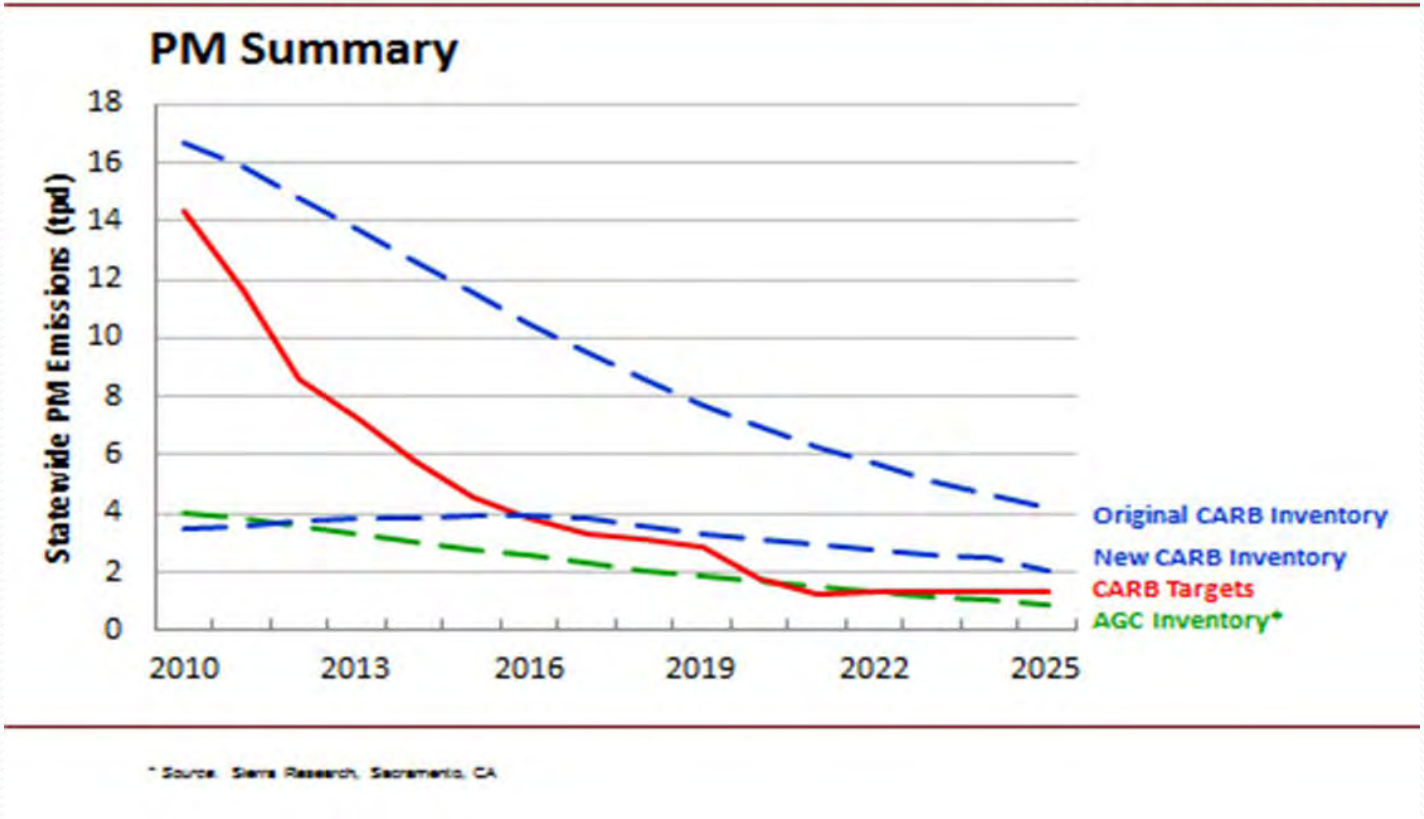
Jim Lyons
Sierra Research, Inc
October 2011
www.sierraresearch.com

Overview

- TRU Inventory Is Based on OFFROAD2007.
- OFFROAD2007 Has Been Shown Previously to Be Flawed.
- TRU Emission Factors Are Not Accurate.
- TRU Activity Estimates Are Not Documented.

Previous Problems with OFFROAD2007

AGC of America
THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA
Quality People. Quality Projects.



Basic Emission Estimation Methodology

Emissions = EF * LF * HP * Pop * Activity

Where:

EF = emission factor

LF = load factor

HP = average rated horsepower of engines in the horsepower range

Pop = number of engines

Activity = annual average number of operating hours per engine

Problems with Emission Factors

- Emission factors are not representative of TRU operations.
  - Based on standard eight-mode test, and not on the unique four-mode TRU cycle.
  - The four-mode cycle certification is allowed under 40 CFR 1039.645 and is also part of CARB's TRU ATCM rulemaking.
- Change in emissions with engine age is overstated.
  - 20,000-hour engine life is used instead of 3,000 to 5,000 hours between engine rebuilds.

TRU Cycle

- Four-mode cycle acknowledged by CARB in 2003 and allowed for engine certification.
  - PM reduced by 25% to 60% (2003 ISOR, Page VII-6).
  - Possible NOx increase (2003 ISOR, Page VII-6).
- In 2003, CARB committed to collect more data and update inventory (2003 ISOR, Page D-13).
- Staff is using four-mode cycle to estimate TRU load factors in 2011 (2011 ISOR, Pages C-28 to C-33).
- But staff is still using eight-mode cycle for emission factors (2011 ISOR, Page C-66).

TRU Cycle

- Data needed to adjust TRU emission factors from eight-mode to four-mode cycle are readily available to CARB staff from engine manufacturers.
  - Eight-mode testing has to be performed in order to obtain CARB certification of TRU engines.
  - While manufacturers generally report composite values, CARB staff can require engine manufacturers to provide modal test results in order to obtain certification.
  - Limited effort by CARB staff would be required as there are only eight TRU engine types considered by CARB staff to be “common” (2011 ISOR, Table 23).

TRU Cycle Impacts

(Tier III – 35 hp, IDI Engine)

CARB EIGHT MODE CERTIFICATION CYCLE

Mode	Load	WF	NOx (g/h*WF)	PM (g/h*WF)
1	100%	0.15	17.96	0.38
2	75%	0.15	18.13	0.12
3	50%	0.15	13.47	0.12
4	10%	0.10	2.94	0.10
5	100%	0.10	7.76	0.89
6	75%	0.10	7.84	0.10
7	50%	0.10	5.46	0.05
8	0%	0.15	1.18	0.03
			74.74	1.79

NOx (g/kWh)	PM (g/kWh)
5.85	0.14

CARB FOUR MODE CERTIFICATION CYCLE

Mode	Load	WF	NOx (g/h*WF)	PM (g/h*WF)
2	75%	0.25	30.22	0.20
3	50%	0.25	22.45	0.21
6	75%	0.25	19.59	0.24
7	50%	0.25	13.65	0.13
			85.91	0.78

NOx (g/kWh)	PM (g/kWh)
6.41	0.06

Ratio 4 mode/8 mode NOx =	1.10
Ratio 4 mode/8 mode PM =	0.42

Emission Factors (cont.)

- EF_{engine} = Zero Hour Emissions + Deterioration Factor (DF)
- DF_{engine} = Value x Cumulative Hours of Operation
- CARB staff assumes 20,000-hour lifetime, but fails to account for engine rebuilds at ~3,000 hours for <25 hp and ~5,000 hours for >25 hp engines.
- Engine deterioration has a large impact on emissions inventory.

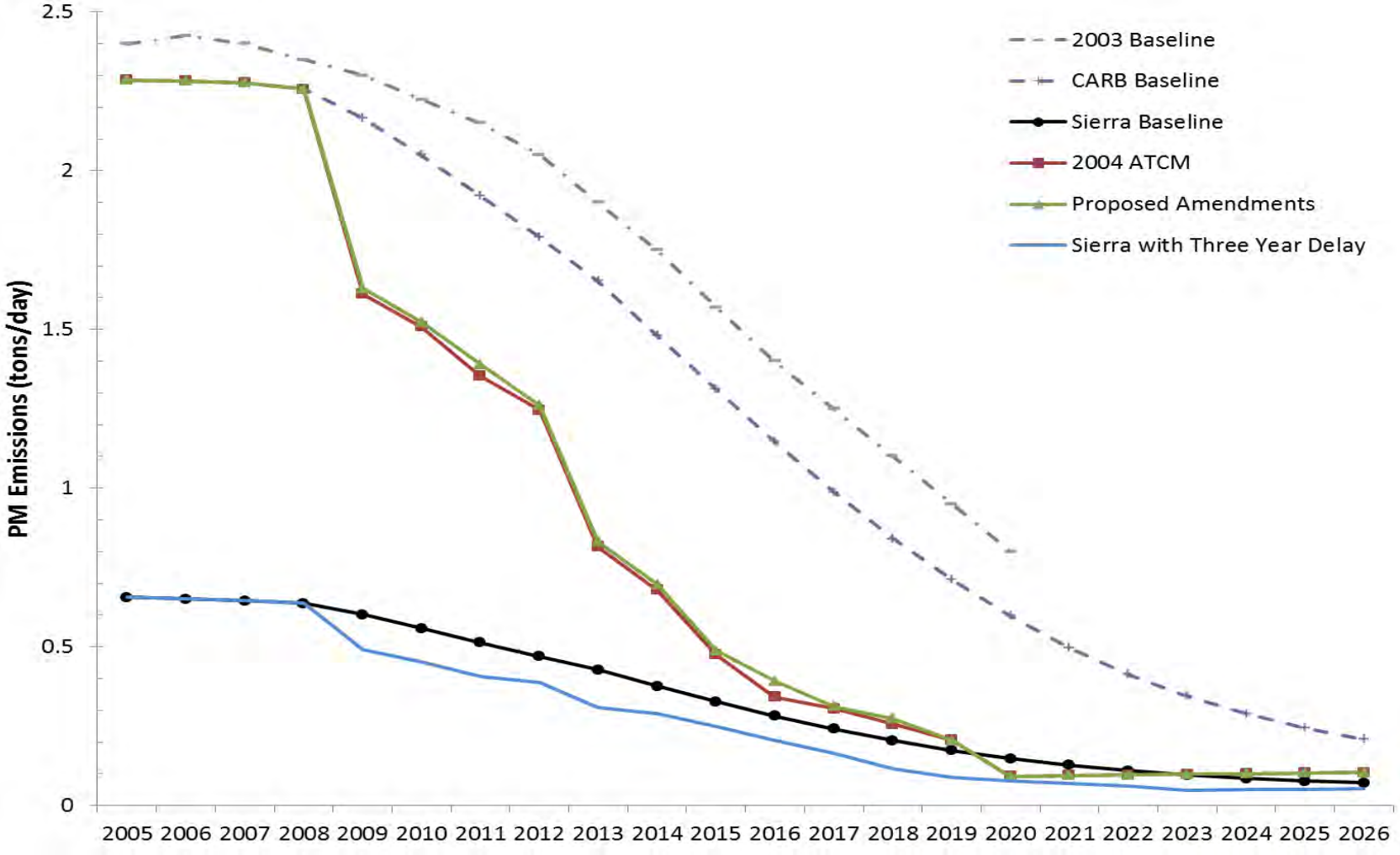
Activity

- CARB staff is using activity data from 2006 facility surveys.
- Facility survey data arenot suitable for use in estimating TRU activity.
  - Survey data are not publicly available – only CARB summaries of the data have been provided.
  - Data are not available for individual TRUs.
  - Data are not separated for truck and trailer TRUs.
  - CARB “statistical analysis” is flawed.

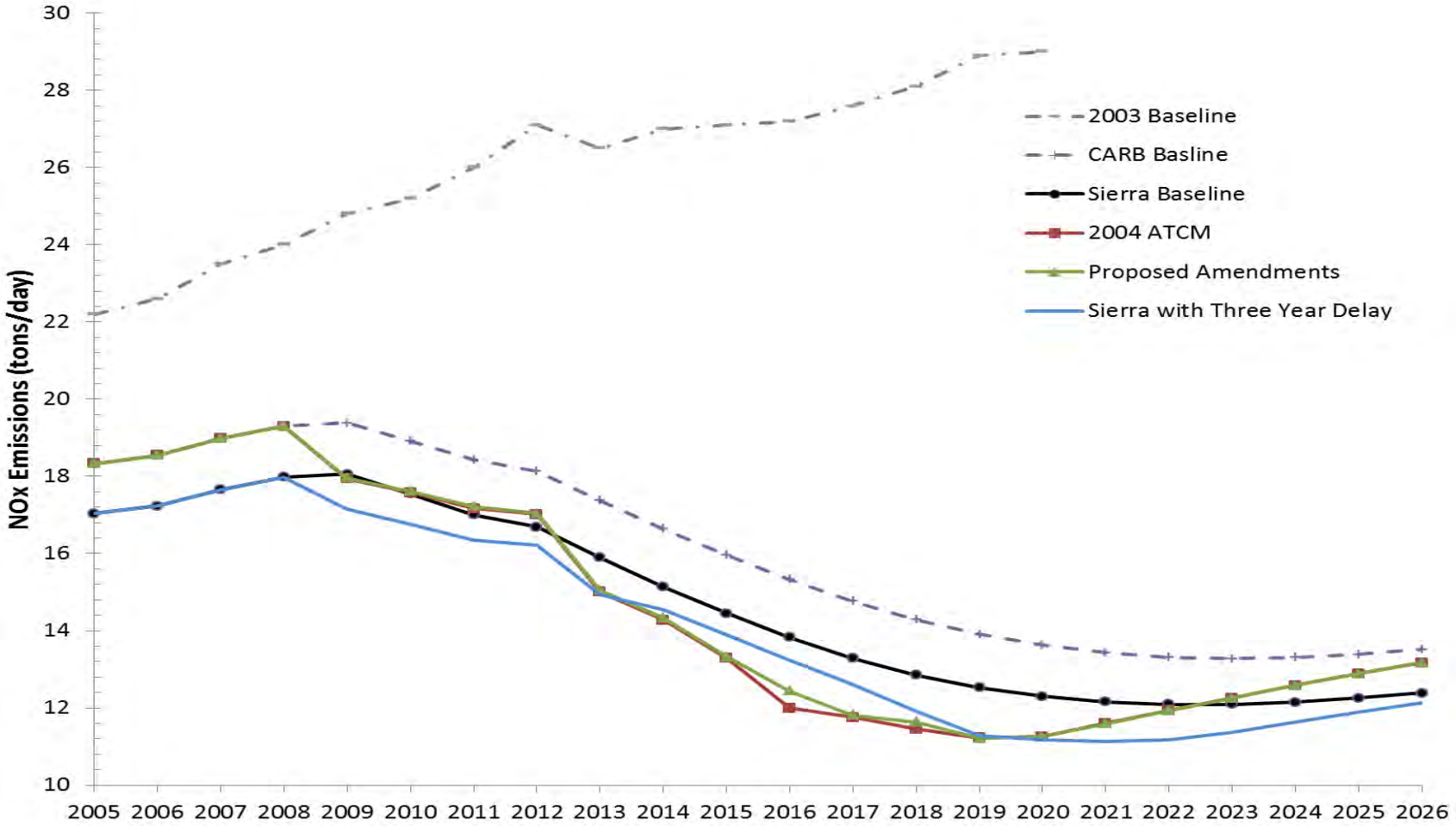
Sensitivity Analysis

- Assumptions:
  - Average activity data from three Tier III engines.
  - Use 2003 inventory activity data.
  - Cap deterioration rate at 3,000 hours for <25 hp and at 5,000 hours for > 25 hp.
- For the four-mode cycle, emissions inventory experiences 15% increase in NOx emissions and 58% reduction in PM emissions.

PM Inventory Comparison

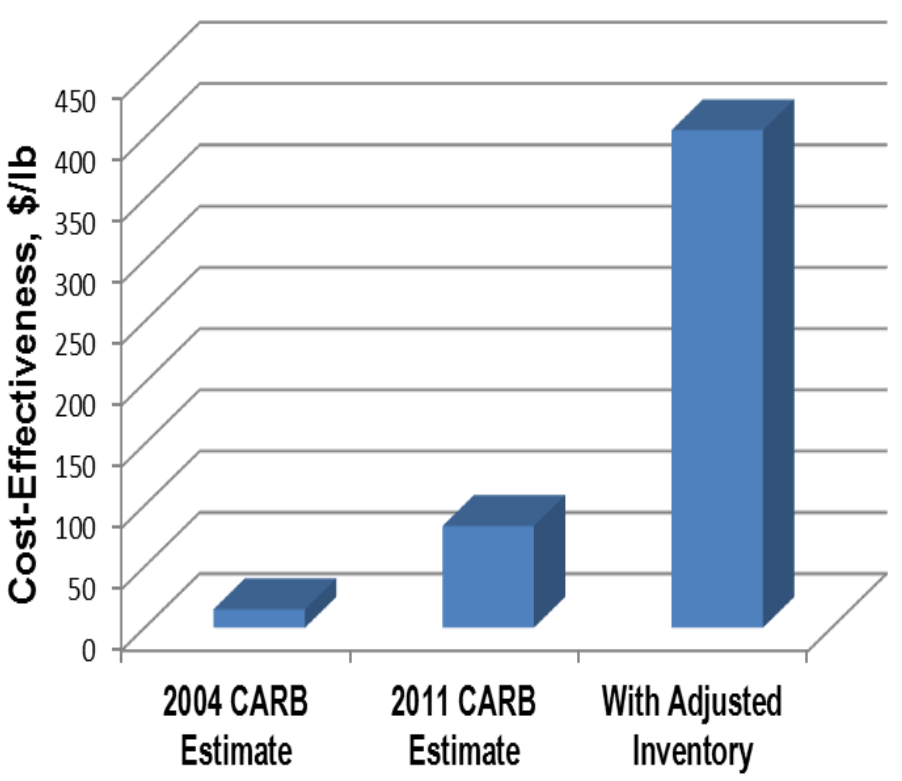


NOx Inventory Comparison



TRU ATCM Cost-Effectiveness

- 2003 Staff Report = $10-$20/lb PM emissions eliminated
- 2011 Staff Report = $83/lb PM emissions eliminated
- 2011 With Sensitivity Case Results = $406/lb PM emissions



Recommendations

- Adjust emission factors to reflect four-mode test results.
- Revise deterioration calculations.
- Use 2003 activity estimates or collect new data.
- Revise risk assessment to reflect changes in PM emission factors.

Source: http://www.energy.ca.gov/2011publications/CEC-600-2011-007/CEC-600-2011-007-SD.pdf

Thank You For Your Attention

- Questions?
- Contact Information

Jim Lyons
Sierra Research, Inc.
1801 J Street, Sacramento, CA 95811
Tel 916-273-5138
Email jlyons@sierraresearch.com

From: Jim Lyons
Sent: Friday, September 02, 2011 4:37 PM
To: Dolney, Nicole@ARB
Cc: Lourenco, Jackie@ARB (jlourenc@arb.ca.gov)
Subject: RE: call

Nicole, I spoke with Jackie Lourenco who said that they could ask for the eight mode data from the manufacturers if you ask them to do so. You'd want the data for Tier 1, Tier 2 and Tier 3 engines used in TRUs (along with Tier 4 for the small engines and interim Tier 4 for the larger engines) which as I recall generally consists of two or three models each from Yanmar and Kubota.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Friday, September 02, 2011 9:46 AM
To: Jim Lyons
Subject: RE: call

3 pm at ARB. I'll meet you downstairs at 3.

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Friday, September 02, 2011 9:13 AM
To: Dolney, Nicole@ARB
Subject: RE: call

That would be great Nicole – also despite the long distance travel required, I'd be happy to come over for a face to face. Let me know.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Friday, September 02, 2011 8:55 AM
To: Jim Lyons
Subject: RE: call

We'll be here until 4. Does 3 pm work?

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, September 01, 2011 5:08 PM
To: Dolney, Nicole@ARB
Subject: RE: call

Hi Nicole,

Afternoon would be best for me – how late will you all be there?

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, September 01, 2011 12:08 PM
To: Jim Lyons
Subject: RE: call

Hi Jim,

We can be available for a meeting tomorrow. One of my staff will be gone on vacation, but we'll do our best to answer all your questions.

What time would you be available? Excluding 11 pm. ☺

N

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, September 01, 2011 10:18 AM
To: Dolney, Nicole@ARB
Subject: RE: call

Thanks Nicole.

As I indicated in my last voice mail, I'd like to talk to you some more about the facility reports as a source of activity information and about emission factors. I also still need to review what's been done in terms of malfunction frequencies and deterioration rates for retrofit engines.

Look forward to talking with you.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, September 01, 2011 9:40 AM
To: Jim Lyons
Subject: RE: call

Jim,

We've posted the emissions inventory and inventory supporting documentation on the ARB website at: http://www.arb.ca.gov/msei/msei.htm.
The technical support document (Appendix C) is part of the staff report.

Nicole

Nicole Dolney
Manager, Off-Road Diesel Analysis Section
Planning and Technical Support Division
California Air Resources Board
916-322-1695
ndolney@arb.ca.gov

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, August 25, 2011 11:19 AM
To: Dolney, Nicole@ARB
Subject: RE: call

Thanks very much Nicole.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, August 25, 2011 10:59 AM
To: Jim Lyons
Subject: RE: call

We use DRs (deterioration rates) from OFFROAD2007 as well.
DR units are g/hp-hr^2 which are then multiplied by the cumulative hours on the equipment in that particular calendar year. We also cap the cumulative hours and deterioration at 20,000 hours. You can see this on Tab 9 of the spreadsheet model.

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, August 25, 2011 10:54 AM
To: Dolney, Nicole@ARB
Subject: RE: call

Yes, deterioration factors.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, August 25, 2011 10:47 AM
To: Jim Lyons
Subject: RE: call

Thanks. That helps.

Emission factors came from OFFROAD2007.
By DFs do you mean deterioration factors?

Load factor discussed on slide 17 at http://www.arb.ca.gov/diesel/tru/documents/slides_workshop-3_2011-06-29.pdf.

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, August 25, 2011 10:35 AM
To: Dolney, Nicole@ARB
Subject: RE: call

I'm not sure how major they are yet (that's what the weekend is for) but what I'm most focused on are:

Annual hours of operation
Load factors
Emission factors

It would help me quite a bit if there is any additional info you can share about where the load factors and emission factors (particularly DF's) came from.

Thanks and look forward to talking to you next week – probably Tuesday pm.

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, August 25, 2011 10:28 AM
To: Jim Lyons
Subject: RE: call

Either works. Tuesday is best before 11 am and after 1 pm.

Are there any 'major' issues you identified? If so, it would be nice to get a leg up on it this week since our posting date for the staff report is August 31 and the model September 2.

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, August 25, 2011 10:23 AM
To: Dolney, Nicole@ARB
Subject: RE: call

Great let me call you Tuesday/Wed. next week – is there a better day/time for you?

From: Dolney, Nicole@ARB [mailto:ndolney@arb.ca.gov]
Sent: Thursday, August 25, 2011 10:18 AM
To: Jim Lyons
Subject: RE: call

That would be great. Thanks. I'd like to get your feedback before the model is posted for the 45 day notice. It would be nice if we could discuss any issues before then.

I'm available tomorrow afternoon.

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Thursday, August 25, 2011 10:17 AM
To: Dolney, Nicole@ARB
Subject: call

Nicole; got your call. I'm tied up today with LCFS stuff. Will you be around tomorrow afternoon? Also, I'm spending the weekend pulling together all of my thoughts and concerns for the client. Would be happy to discuss that with your early-mid next week.

Thanks….

James M. Lyons
Sierra Research, Inc.
1801 J Street
Sacramento, CA 95811
Phone 916-444-6666 or 916-273-5138
jlyons@sierraresearch.com

No virus found in this message.
Checked by AVG - www.avg.com
Version: 10.0.1392 / Virus Database: 1520/3856 - Release Date: 08/25/11

No virus found in this message.
Checked by AVG - www.avg.com
Version: 10.0.1392 / Virus Database: 1520/3856 - Release Date: 08/25/11

From: Jim Lyons
Sent: Tuesday, September 27, 2011 5:30 PM
To: Sax, Todd@ARB
Subject: Re: TRU Inventory

Todd I guess the point was that Jackie Lourenco said she would request it if you asked but not if I did. Not sure from your email if you asked her to get it or not. As the modal data underlies every EO issued - can't see any way a manufacturer could refuse to provide it. Also if you go back to the 2003/4 rulemaking the agency is on record as saying they would do an analysis of 8 mode data and adjust the Tru inventory accordingly.

I've got limited data that corroborate the 2003 report conclusion if 60% reduction in pm with some nox increase ~15%.

I'll call Jackie again tomorrow and see if she will ask (particularly) given the limited number of mfrs and engines involved.

Sent from my iPhone

On Sep 27, 2011, at 6:07 PM, "Sax, Todd@ARB" <tsax@arb.ca.gov> wrote:

> Jim,
>
> We did go to the certification staff at ARB and ask if they receive modal data behind the engine certification. They have told us they do not get that information, and have not requested it from manufacturers in the past. We are not sure if EPA gets that information, and you are free to follow-up with them to see if they have anything above what we get.
>
> On the survey data and our emission factors we used all of the available data we could find to develop estimates for both equipment activity and emission factors. We are comfortable with our current assumptions, which are documented in the ISOR package.
>
> It seems like you have done your own analysis and that was what Nicole was alluding to in her email. So far in our discussions we don't think you've mentioned any data source we haven't reviewed, but we would be interested in reviewing your analysis to make sure.
>
> Todd

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Tuesday, September 27, 2011 9:19 AM
To: Sax, Todd@ARB
Cc: Parmer, Cory@ARB
Subject: RE: TRU Inventory

Thanks Todd. Again, if you'd rather discuss by phone (I'm out of town) let me know when and I'll give you call.

From: Sax, Todd@ARB [mailto:tsax@arb.ca.gov]
Sent: Tuesday, September 27, 2011 9:07 AM
To: Jim Lyons
Cc: Parmer, Cory@ARB
Subject: RE: TRU Inventory

Jim,

I'll get back to you later today.

Todd

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Tuesday, September 27, 2011 8:49 AM
To: Parmer, Cory@ARB
Cc: Sax, Todd@ARB
Subject: TRU Inventory
Importance: High

Cory, I'd sent the attached to Nicole but understand that she is out on vacation. Was hoping to get a response so that I'd better understand where you are at on the TRU inventory. If it would be easier to discuss by phone let me know and I'll give you a call. Thanks.

James M. Lyons

From: Jim Lyons
Sent: Wednesday, September 28, 2011 6:05 AM
To: Sax, Todd@ARB; Lourenco, Jackie@ARB (jlourenc@arb.ca.gov)
Cc: Parmer, Cory@ARB; Dolney, Nicole@ARB
Subject: RE: TRU Inventory

Importance: High

Jackie:

Sorry to bother you with this, and I'm not sure what internal communications have gone on at CARB, but it appears that there has been no request to engine manufacturers for eight mode data that could be used to evaluate differences in emission factors for TRU engines over the four mode cycle that CARB has determined is appropriate for characterizing their operation. I would hope that this could still be done quickly (the Board hearing is October 20) as I think it could have a major impact on the emission inventory and hence the assessment of the emission impacts of alternatives as well as the cost-effectiveness of the TRU regulation. The number of engines affected is limited as shown in the attached Table from the TRU staff report. While it would be nice to go back for a number of model years, even data for the last couple of years (assuming that they aren't just carry-overs) would be useful at this point.

Thanks very much for your attention to this matter and if you and Todd could keep me apprised of the status of the situation I would appreciate it.

Table 23: Load Factor for Most Common TRU Engines by Horsepower Manufacturer	Eng. Model	Rated Horsepower	Estimated Load
Yanmar	TK486V	33.9	0.53
Kubota	V2203	35.9	0.53
Yanmar	TK486E	31.9	0.52
Isuzu SE2.2	SE2.2	33.0	0.51
Kubota	D722	20.0	0.57
Yanmar	Tk3.74	22.1	0.53
Yanmar	TK370	13.4	0.56
Kubota	Z482	13.4	0.57

From: Sax, Todd@ARB [mailto:tsax@arb.ca.gov]
Sent: Tuesday, September 27, 2011 5:07 PM
To: Jim Lyons
Cc: Parmer, Cory@ARB; Dolney, Nicole@ARB
Subject: RE: TRU Inventory

Jim,

We did go to the certification staff at ARB and ask if they receive modal data behind the engine certification. They have told us they do not get that information, and have not requested it from manufacturers in the past. We are not sure if EPA gets that information, and you are free to follow-up with them to see if they have anything above what we get.

On the survey data and our emission factors we used all of the available data we could find to develop estimates for both equipment activity and emission factors. We are comfortable with our current assumptions, which are documented in the ISOR package.

It seems like you have done your own analysis and that was what Nicole was alluding to in her email. So far in our discussions we don't think you've mentioned any data source we haven't reviewed, but we would be interested in reviewing your analysis to make sure.

Todd

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Tuesday, September 27, 2011 9:19 AM
To: Sax, Todd@ARB
Cc: Parmer, Cory@ARB
Subject: RE: TRU Inventory

Thanks Todd. Again, if you'd rather discuss by phone (I'm out of town) let me know when and I'll give you call.

From: Sax, Todd@ARB [mailto:tsax@arb.ca.gov]
Sent: Tuesday, September 27, 2011 9:07 AM
To: Jim Lyons
Cc: Parmer, Cory@ARB
Subject: RE: TRU Inventory

Jim,

I'll get back to you later today.

Todd

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Tuesday, September 27, 2011 8:49 AM
To: Parmer, Cory@ARB
Cc: Sax, Todd@ARB
Subject: TRU Inventory
Importance: High

Cory, I'd sent the attached to Nicole but understand that she is out on vacation. Was hoping to get a response so that I'd better understand where you are at on the TRU inventory. If it would be easier to discuss by phone let me know and I'll give you a call. Thanks.

James M. Lyons
Sierra Research, Inc.
1801 J Street
Sacramento, CA 95811
Phone 916-444-6666 or 916-273-5138
jlyons@sierraresearch.com

Josh Willter

From: Donohoue, Dan@ARB [ddonohou@arb.ca.gov]
Sent: Thursday, September 29, 2011 3:20 PM
To: Jim Lyons
Cc: Sax, Todd@ARB; Lourenco, Jackie@ARB; Corey, Richard@ARB; Boyd, Rich@ARB
Subject: Request for Certification Data TRUs

Jim:

We've gone back to the certification submittals and confirmed that ARB does not have in its database, and to the best of our knowledge USEPA does not have the date either.

In our earlier rulemaking activities, SSD staff attempted to get this data but was unsuccessful in getting a robust enough data set to use. They also worked with stakeholders to do some in-use testing but could not generate sufficient support in the industry to make this happen. Based on our experience, we believe that the modal data would need to be supported by deterioration data and some in-use testing to adequately capture real world emissions from TRUs.

We are willing to pursue this on a longer-term basis but we believe that our current analysis is based on the best data available and fully supportable. This effort would need to be coordinated among SSD, PTSD, and MSOD.

As part of the longer term analysis of further upgrades to the off-road model for TRUs, we will request modal data from TRU engine manufacturers as well as deterioration data. However, we want to be very clear that we stand by our current analysis and that the requested data will be evaluated in the context of future refinements to the off-road model for TRUs.

Yours,

Dan Donohoue, SSD

From: Jim Lyons [mailto:JLyons@sierraresearch.com]
Sent: Wednesday, September 28, 2011 06:05 AM
To: Sax, Todd@ARB; Lourenco, Jackie@ARB
Cc: Parmer, Cory@ARB; Dolney, Nicole@ARB
Subject: RE: TRU Inventory

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