California Environmental Protection Agency
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

AMENDMENTS FOR THE AIRBORNE TOXIC CONTROL MEASURE FOR IN-USE DIESEL-FUELED TRANSPORT REFRIGERATION UNITS (TRU) AND TRU GENERATOR SETS, AND FACILITIES WHERE TRUs OPERATE

Stationary Source Division
Emissions Assessment Branch

September 2010

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State of California
AIR RESOURCES BOARD

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Public Hearing to Consider

PROPOSED AMENDMENT OF THE AIRBORNE TOXIC CONTROL MEASURE FOR IN-USE DIESEL-FUELED TRANSPORT REFRIGERATION UNITS (TRU) AND TRU GENERATOR SETS, AND FACILITIES WHERE TRUs OPERATE

To be considered by the Air Resources Board on November 18, 2010, at:

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State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENT OF THE AIRBORNE TOXIC CONTROL MEASURE FOR IN-USE DIESEL-FUELED TRANSPORT REFRIGERATION UNITS (TRU) AND TRU GENERATOR SETS, AND FACILITIES WHERE TRUs OPERATE

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Staff Report: Initial Statement of Reasons
for the Proposed Amendment of the Airborne Toxic Control Measure
for In-Use Diesel-Fueled Transport Refrigeration Units (TRU)
and TRU Generator Sets, and Facilities where TRUs Operate

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EXECUTIVE SUMMARY

The California Air Resources Board (ARB or Board) staff is proposing amendments to the existing regulations affecting transport refrigeration units (TRU) and TRU generator sets (gen set). When we refer to TRUs in this report, we also include TRU gen sets unless otherwise specified. These proposed amendments affect the TRU Airborne Toxic Control Measure[1] that the Board approved for adoption on February 26, 2004. All characterizations of benefits and impacts are relative to the estimates in the 2003 ARB Staff Report for the 2004 TRU regulation (ARB, 2003). The proposed 2010 amendments to the TRU regulation are included here as Appendix A.

Implementation of the TRU regulation is reducing diesel particulate matter (PM) emissions and the associated health risk in communities near distribution centers, railyards, and ports. The end goal of the existing regulation is to upgrade the in-use TRUs to 85 percent PM control or better, with the compliance schedule based on a seven-year operational life for the equipment. Staff believes that three changes are needed now to respond to new information that affects upcoming compliance deadlines. The proposed amendments would:

1. Add an interim, lower cost retrofit option for a subset of TRU engines due to very limited availability of the most effective retrofit devices. To expand the range of options, owners could retrofit model year 2003 and some 2004 TRUs with Level 2 (50 percent PM control) filters now for compliance with the December 2010 requirements (December 2011 for some 2004 TRUs). TRUs that comply by using Level 2 retrofits would need to be upgraded to meet 85 percent emission controls via retrofit or replacement in seven years.

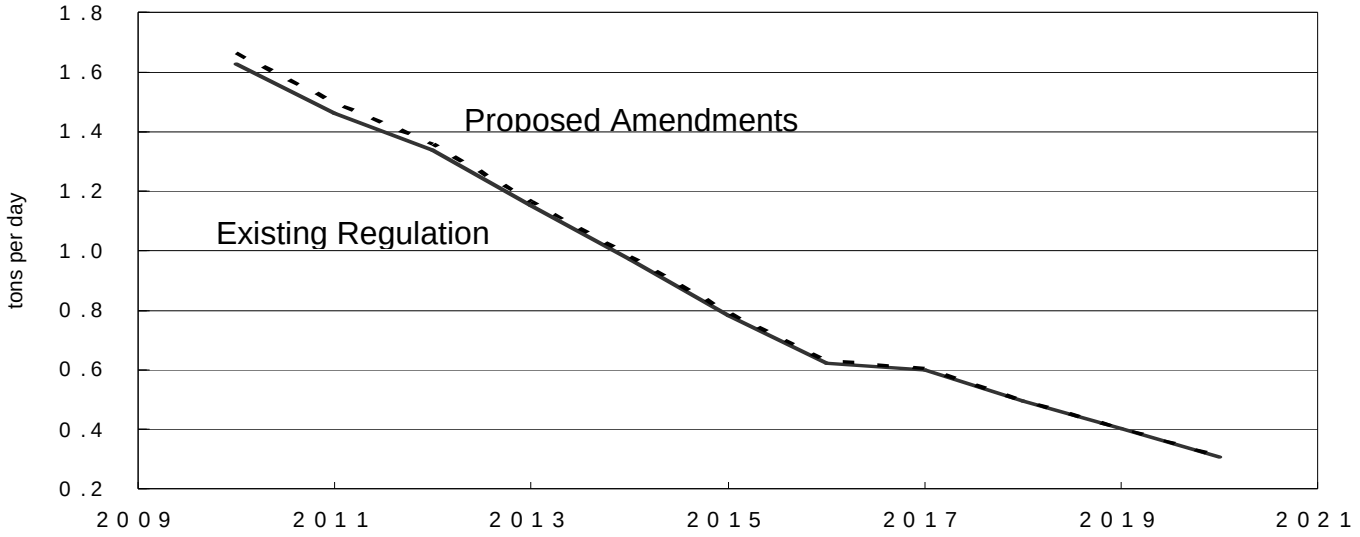
2. Phase in provisions that link the schedule to upgrade TRU "flexibility engines" to the actual emissions profile of the engines, rather than the labeled engine model year. The existing TRU regulation establishes an upgrade schedule based on the engine model year. TRU manufacturers are selling significant quantities of new TRUs with flexibility engines that rely on older, less effective control technology instead of the latest technology. While this is permitted under the federal and State regulations for new engines, it delays turnover to cleaner engines. The amendments would use the emissions profile (characterized as the "effective model year") to define when the flexibility engines need to be upgraded. Future purchases of flexibility engines would be regulated based on the effective model year of the engine. However, to preserve prior-year investments that TRU owners have already made in purchasing new TRUs that are equipped with a higher-emitting flexibility engine, the manufacture year of the engine (typically a later date than the effective model year) would be used.

[1]Title 13, CCR section 2477 is known as the Transport Refrigeration Unit Airborne Toxic Control Measure and establishes in-use performance standards, recordkeeping, and facility reporting requirements for TRUs.

3. Increase reporting by TRU manufacturers to assist TRU owners with compliance.

With the proposed amendments, the TRU regulation would continue to substantially decrease diesel PM and NOx emissions, but defer a small portion of the expected emission reductions from now until the 2017-2018 period. Figure ES-1 shows the decline in diesel PM emissions expected under the TRU regulation, and the change with the proposed 2010 amendments. The overall deferred reductions from the proposed amendments amount to 0.04 tons PM per day statewide in 2010, steadily decreasing to 0.001 tons PM per day statewide by 2018. The amendments would also allow TRU owners selecting a two-step retrofit path to realize near-term cost savings while still reducing diesel PM now.

Figure ES-1: Statewide Diesel PM Emissions from TRUs With Existing Regulation and Proposed 2010 Amendments



To evaluate the health impact of deferring these emission reductions for the seven-year period, we conservatively assumed that an individual living near a large distribution center was exposed to the maximum increment of higher emissions for a full 70 years. This would increase the maximum potential cancer risk by less than one in a million.

A. Background

TRUs are refrigeration systems (powered by an integral diesel engine) to protect perishable goods transported in insulated truck and trailer vans, rail cars, and domestic shipping containers. TRU gen sets provide onboard electric power to electrically driven refrigeration systems that are used in shipping containers and trailers.

Federal and State regulations establish progressively more stringent emission standards that TRU engine manufacturers must meet over time. These standards are

characterized by emission "tier" levels that apply to a range of manufacturing model years.

To reduce PM emissions from in-use engines, ARB verifies diesel PM retrofit devices based on levels of PM control. Table ES-1 shows the PM control associated with the emissions tiers for new engines and the emissions levels for retrofit devices.

Table ES-1: Effectiveness of PM Emission Standards for New TRU Engines vs PM Control Levels for Verified Retrofit Devices

New TRU Engines: Emissions Tiers	% PM Control	Retrofit Devices: Emissions Levels
Tier 0 Engine	None	-
Tier 1 Engine	20%	-
Tier 2 Engine	40%	-
-	50%	Level 2 Retrofit
Tier 4i Engine	70%	-
-	85%	Level 3 Retrofit
Tier 4f Engine	97%	-

ARB adopted the existing TRU regulation in 2004 to accelerate the cleanup of existing TRUs through retrofit, engine repower, or unit replacement. The compliance schedule is based on the model year of the existing engine – the oldest model year TRU engines had to be upgraded first. The schedule provides a seven-year operational life for the equipment. Ultimately, all TRUs must have 85 percent PM control to fully comply with the regulation. Currently, only the Level 3 retrofit can provide the 85 percent control. New model year 2010 TRU engines are Tier 4i with 70 percent PM control. Tier 4f engines with 97 percent PM control will be produced beginning in 2013.

Under the existing regulation, the owners of model year 2003 and 2004 TRUs can currently choose from the following compliance paths:

1. Retrofit the existing TRU with a Level 3 (85 percent PM control) filter system at a cost of about $6,000.

2. Replace the existing unit with a new TRU (equipped with 70 percent PM control) at a cost of $20,000-$25,000 now, then upgrade that TRU with a Level 3 retrofit or another new TRU (equipped with at least 85 percent PM control) in seven years. Owners selecting this path typically have higher use existing TRUs that are at or beyond their useful life and need to be replaced anyway for operational and reliability reasons.

3. Repower the TRU engine with a new engine (equipped with 70 percent PM control) at a cost of $5,500-$9,750 now, then upgrade that engine or TRU with a

Level 3 retrofit or another new TRU (equipped with at least 85 percent PM control) in seven years.

4. Use an alternative technology, like an electric standby-equipped TRU or cryogenic temperature control system.

B. Add an Interim, Lower Cost Retrofit Option for a Subset of TRUs

Issue: Over the next year, more than 4,000 existing engines need to be upgraded to comply with the TRU regulation. The model year 2003 engines must upgrade by the end of 2010 and the 2004 engines must do so by the end of 2011. As of this report, there is a single ARB-verified Level 3 filter system available for these TRUs. After some setbacks in the field testing that required redesign, this unit received its ARB verification in June 2010. Since June, the sole manufacturer has produced about 50 units for sale, far short of the more than 1,200 units that need to be purchased and installed by December 31, 2010, under the existing regulation.

However, two manufacturers are producing several models of Level 2 filters, which have been successfully installed on thousands of model year 2002 and older TRUs at a cost of $3,650 to $4,750 for each filter. These filters for model year 2002 TRUs are compatible with the model year 2003 engine technology as well. The Level 2 filters have an established network of dealers and installers; the filters have also have been thoroughly demonstrated.

Proposal: Amend the TRU regulation to allow Level 2 filters to be used for interim compliance on this subset of model year 2003 and some 2004 (less than 25 horsepower) engines. There is a sufficient supply of the Level 2 filters, plus capacity at dealers and installers, to meet the demand over the next few months. Model year 2003 and 2004 (<25 hp) engines are also compatible with Level 2 filters. This proposed amendment would give TRU owners an additional, cheaper option now (retrofit a Level 2 filter on an existing TRU) and allow them to defer for seven years the need to retrofit to a Level 3 filter or purchase a new TRU with an engine that meets the most stringent PM in-use standard.

Controlling diesel PM from a portion of the affected TRUs by 50 percent, rather than the current 85 percent, means that fewer of the expected emission reductions will be realized between 2010 and 2017, as compared to the original TRU regulation. There would also be a net savings for the TRU owner on the compliance costs due to the regulation, based on the lower cost to purchase Level 2 rather than Level 3 retrofit technology now, and deferral of the upgrade to Level 3 control to the 2017 timeframe.

The impact from this provision would be to temporarily defer a very small quantity of the anticipated emission reductions from the TRU regulation – 0.012 tons PM per day statewide in 2010 – steadily decreasing to less than 0.004 tons PM per day by 2017 and to zero from 2018 on. This assumes that all owners using the retrofit option would

comply using a Level 2 filter. The near-term emissions impact would be less if owners are able to obtain and install the limited number of available Level 3 filters.

C. Link Compliance Schedule for Flexibility Engines to Their Emissions Tier

Issue: When staff evaluated the reductions in emissions and heath risk associated with the original TRU regulation, we assumed that TRU engines manufactured in a specific year would meet the emission standards applicable for that year. However, federal and State regulations for new TRU engines allow manufacturers to certify a portion of new TRU engines to a less effective emission standard. This provision for "flexibility engines" is intended to provide equipment manufacturers with more time to design, engineer, and produce equipment for each successive phase of cleaner engines. As a result, a new TRU for sale could contain a new engine with older, less effective control technology based on emission standards for prior model years. Based on data provided by TRU original equipment manufacturers, there are significantly more flexibility engines being used in California than originally anticipated. This diminishes the emission reductions being achieved with the regulation.

Proposal: The proposed TRU amendments would specify that for future purchases of TRUs with flexibility engines, the emissions tier or effective model year would be used to determine the compliance schedule to upgrade that engine. However, many TRU owners were unaware that purchasing a TRU equipped with a flexibility engine would trigger an earlier requirement to upgrade compared to a TRU engine with the latest emission controls. For TRUs with flexibility engines that were purchased prior to the effective date of the TRU amendments, the compliance schedule would be based on the year the engine was manufactured. While this temporarily defers a very small quantity of the anticipated emission reductions expected in 2010 – 0.025 tons PM per day – it provides the full seven-year operational life to these TRUs before upgrades would be required.

D. Expand Reporting by TRU Manufacturers

Issue: To implement the proposed amendment to address flexibility engines, staff will need additional data from the TRU manufacturers. In addition, staff is working on enhancements to the TRU on-line registration system – ARBER - to make data entry by TRU owners easier and to reduce data entry errors. Staff is also working to improve estimates of TRU populations and statewide emissions.

Proposal: To help accomplish these goals, ARB staff is proposing to require the TRU manufacturers to periodically report data on each TRU and TRU engine for the coming production year as well as production information for previous years.

E. Impacts of Proposed 2010 Amendments to TRU Regulation

Emission Impacts. Even with no changes to the existing TRU regulation, expanded use of higher emitting flexibility engines will slightly increase PM and NOx emissions

compared to the regulatory estimates in the 2003 Staff Report. While this does not mean a net increase in emissions; it does mean that all of the expected emission reductions will not be realized. With the proposed change for flexibility engines, this loss of emission reductions will end by 2018. The proposal to allow owners of model year 2003 and 2004 (<25 hp) TRUs to use a Level 2 filter as an interim compliance strategy would mean 50 percent PM control instead of 85 percent control on a subset of engines until 2017 or 2018. The combined, maximum impact of the proposed amendments would be approximately 0.04 tons per day of diesel PM reductions not realized statewide in 2010, decreasing to zero in 2018. The impact on NOx emissions is expected to range from a high of 0.10 tons per day of unrealized reductions in 2010, decreasing to nearly zero by 2020.

Compliance Cost Impacts. There will be cost savings due to allowing use of lower cost Level 2 filters for model year 2003 and 2004 (<25 hp) TRUs in the near-term. The total savings would be about $2.1 million (annualized over the seven-year operational life and presented in 2010 dollars). However, since the engines with Level 2 retrofits still operating in 2017 and 2018 would need to upgrade again to Level 3 PM control, the deferred compliance costs would be about $1.79 million in 2010 dollars. The net savings for TRU owners would be about $310,000 in 2010 dollars. The proposed amendments do not affect the cost of repowering a unit with a cleaner engine to maintain compliance.

There are no end-user compliance costs related to the amendment addressing the past use of flexibility engines. Together, the TRU manufacturers would incur total one-time costs of about $19,000 for flexibility engine reporting, total one-time costs of $25,000 for the initial prior production reports, and total annual costs of $8,000 for 18 years of periodic update reports. The total cost to all of the TRU manufacturers combined adds to nearly $150,000 over the 18 years of implementation. Staff anticipates that the manufacturers can significantly reduce the cost of preparing and submitting these reports through automation and electronic reporting.

With a net savings for TRU owners of $310,000 and a net cost to TRU manufacturers of $150,000, the overall cost impact of the proposed amendments is a savings of $160,000 in 2010 dollars.

Public Health Impacts. Staff applied the estimated emissions impacts to dispersion models to estimate the change in public exposure to PM. Staff then applied that exposure to risk models and found that the change in the public health risk to be negligible. Under the proposed amendments, a small increment of diesel PM emission reductions would not be realized for seven years, ranging from 0.001 to 0.04 tons per day statewide, compared to the original TRU regulation.

Using the State's cancer risk modeling protocols and assuming constant exposure to the maximum emissions for a 70-year life, the increase in the maximum individual cancer risk near a large distribution center would be less one in a million.

Environmental Justice. The proposed 2010 amendments to the TRU regulation are consistent with ARB environmental justice policies. They restore the emission reduction benefits that would otherwise be lost to the future use of flexibility engines, while deferring a small portion of the expected reductions to accommodate technology availability. The proposed amendments have a negligible net effect on emissions and public health risks in communities near distribution centers, rail yards, intermodal facilities or ports.

F. Public Outreach and Comments

In developing the proposed 2010 amendments to the TRU regulation, ARB staff conducted three public workshops and worked closely with stakeholders, including TRU owners and fleet operators, trade associations, trade journal reporters, TRU original equipment manufacturers, TRU dealers and service centers, truck and trailer dealers, brokers and leasing companies, diesel particulate matter emissions control system manufacturers, environmental groups, engine rebuilders, and other interested parties.

Stakeholders provided informal comments during the workshops and prior to release of the 45-day public notice. TRU owners and trade associations have expressed support for the amendments related to changing the requirements for model year 2003 and 2004 (<25 hp) engines to Level 2 PM control. Similarly, the TRU manufacturers, dealers, and owners are supportive of the amendment that allows existing flexibility engines to use the manufacture date as the model year of the engine. The TRU manufacturers are generally willing to cooperate with the periodic recordkeeping requirements; however, they are concerned about the security of confidential production information. Current California law provides the necessary protection for TRU manufacturers' data by allowing them to declare the data as confidential or trade secret. ARB staff has worked through this concern with manufacturers in other competitive industries and developed effective procedures to protect such data.

G. Staff Recommendation for Board Action

ARB staff recommends the Board approve the proposed 2010 amendments to the TRU regulation as presented in Appendix A of this Staff Report.

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I. Introduction

A. Overview

This Staff Report: Initial Statement of Reasons for Proposed Rulemaking (Staff Report) provides the basis for the California Air Resources Board (ARB or Board) staff's proposal to amend the regulations affecting transport refrigeration units (TRU)[2]. The primary purpose of the proposed TRU ATCM 2010 amendments is to change the in-use performance standard for model year (MY) 2003 TRU engines from the Ultra-Low-Emission TRU (ULETRU) in-use standard to either ULETRU or the less stringent Low-Emission TRU (LETRU) in-use standard. This change is needed because the control technology that is needed for the retrofit compliance option to meet ULETRU has limited availability while the technology for meeting LETRU is readily available.

Requirements for "flexibility" engines used in TRUs by original equipment manufacturers under the Transitional Program for Equipment Manufacturers are also clarified. In addition, new reporting requirements for TRU original equipment manufacturers are proposed. The proposed TRU ATCM 2010 amendments are provided in Appendix A of this Staff Report.

This Staff Report discusses California's estimated population of affected TRU engines, the emissions impacts, and the health risk impacts associated with the proposed TRU ATCM 2010 amendments. Potential environmental, health, and economic impacts of the proposed TRU ATCM 2010 amendments are discussed, as well as the alternatives that were considered.

The basis of the original TRU ATCM and background information can be found in the *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate*, October 2003 (ARB,2003). For the remainder of this report, the original 2003 staff report will be referred to as the 2003 Staff Report.

B. Need for Regulation

ARB's mission is to protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the economy of the State. ARB's vision is that all individuals in California, especially children and the elderly, can live, work, and play in a healthful environment – free from potential harmful exposure to air pollution. To help achieve this, ARB has adopted regulations to control emissions from many different sources, including diesel-fueled engines. Diesel-fueled engine exhaust is a significant health concern

[2]Title 13, California Code of Regulations (CCR) section 2477 is known as the Transport Refrigeration Unit Airborne Toxic Control Measure (TRU ATCM) and establishes in-use performance standards, recordkeeping, and facility reporting requirements for TRUs.

because it is a source of unhealthful air pollutants including particulate matter, gaseous and particulate-phase toxic air contaminants (TAC), nitrogen oxides (NO_x), carbon monoxide, and hydrocarbons.

In 1998, the Board identified diesel PM as a TAC with no specified threshold exposure level below which adverse health impacts would be expected, pursuant to Health and Safety Code (HSC) sections 39650 through 39675. A needs assessment for diesel PM was conducted between 1998 and 2000 pursuant to HSC sections 39658, 39665, and 39666. This resulted in ARB staff developing, and the Board approving, the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (Diesel RRP) in 2000 (ARB, 2000). The Diesel RRP presented information on the available options for reducing diesel PM and recommended regulations to achieve these reductions. The Diesel RRP's scope addressed all categories of mobile and stationary diesel engines and included control measures for off-road diesel PM sources, such as those covered by the TRU ATCM. The ultimate goal of the Diesel RRP is to reduce, by 2020, California's diesel PM emissions and associated potential cancer risks by 85 percent from the 2000 levels.

The federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (U.S. EPA) to establish National Ambient Air Quality Standards (standards) for pollutants considered harmful to public health, including fine particulate matter (PM2.5) and ozone. The South Coast and San Joaquin Valley Air Basins are the two areas in the State that exceed the annual PM2.5 standards. These air basins are required by federal law to develop State Implementation Plans (SIP) describing how they will attain the standards by 2015. U.S. EPA further requires that all necessary emission reductions be achieved one calendar year sooner – by 2014 – in recognition of the annual average form of the standard. Diesel PM emission reductions are needed because diesel PM contributes to ambient concentrations of PM2.5.

C. Regulatory Authority

Several sections of the California Health and Safety Code (HSC) provide ARB with authority to adopt the TRU ATCM and these TRU ATCM 2010 amendments. HSC sections 39600 (General Powers) and 39601 (Standards, Definitions, Rules, and Measures) confer to ARB, the general authority and obligation to adopt rules and measures necessary to execute the Board's powers and duties imposed by State law. HSC sections 43013(b) and 43018 provide broad authority for adopting measures to reduce TACs and other air pollutant emissions from vehicular and other mobile sources. HSC section 39618 classifies refrigerated trailers as off-road mobile sources under ARB jurisdiction.

More specifically, California's Air Toxics Program, established under California law by AB 1807 (Stats. 1983, Ch. 1047) and set forth in Health and Safety Code sections 39650 through 39675, mandates the identification and control of air toxics in California. The identification phase of the Air Toxics Program requires ARB, with participation of other state agencies, such as the Office of Environmental Health Hazard

Assessment (OEHHA), to evaluate the health impacts of, and exposure to, substances and to identify those substances that pose the greatest health threat as TACs. ARB's evaluation is made available to the public and is formally reviewed by the Scientific Review Panel (SRP) established under Health and Safety Code section 39670. Following ARB's evaluation and SRP's review, the Board may formally identify a TAC at a public hearing. Following the identification of a substance as a TAC, Health and Safety Code sections 39658, 39665, 39666, and 39667 requires ARB, with the participation of the air pollution control and air quality management districts, and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance.

As discussed above, the Board identified diesel PM as a TAC and in October 2000, ARB published a "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles." In the Diesel Risk Reduction Plan, ARB identified TRU emissions associated with refrigerated warehouse distribution centers as creating potential cancer risks and included off-road engines in the plan to reduce diesel PM emissions.

On February 26, 2004, the Board approved for adoption the TRU ATCM, establishing in-use performance standards for TRUs and TRU gen sets that would be phased in commencing on December 31, 2008. The Office of Administrative Law (OAL) approved the TRU ATCM, which was codified at title 13, CCR, section 2477 on November 10, 2004, and the regulation became effective 30 days later upon being certified by the California Secretary of State.

Staff requested U.S. EPA grant authorization to adopt and enforce the TRU ATCM pursuant to Clean Air Act (CAA) section 209(e)(2). U.S. EPA granted California authorization to enforce the TRU ATCM on January 16, 2009[3] (U.S. EPA, 2009).

ARB delayed the enforcement of the TRU ATCM's in-use performance standards until January 2010, because U.S. EPA's authorization was granted after the first compliance date, creating uncertainty for the regulated community.

[3] 74 Fed. Reg, 3030 (January 16, 2009)

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II. Summary of Proposed TRU ATCM 2010 Amendments

Staff is proposing to amend the TRU ATCM to change the in-use performance standards for two model years and two horsepower categories. In addition, the in-use requirements for "flexibility" engines will be clarified. Also, new reporting requirements for TRU and TRU gen set original equipment manufacturers (TRU OEM) are being proposed.

A. Background Information on Emissions Standards for New Off-Road Engines

TRU and TRU gen set engines utilize off-road engines.[4] Off-road engine standards adopted by U.S. EPA [5] and ARB (CCR, 2010) require new off-road engines to become progressively cleaner. In developing the new engine standards, ARB staff worked closely with U.S. EPA to develop a harmonized federal and State program to more effectively control emissions from off-road equipment.

The new engine emission standards are divided into four increasingly stringent levels (tiers); the allowed emission level (standard) and effective dates vary with horsepower category. Until the mid-1990's, off-road diesel engines were not subject to any emission standards (commonly referred to as "Tier 0" or "uncontrolled engines"). Engines that are used in TRUs and nearly all of the TRU gen sets are less than 50 horsepower (hp). TableII-1 illustrates how these standards change over time for the horsepower categories for engines used in TRUs. The numerical standards vary by category, but the downward trend in emissions is the same for all horsepower categories.

Table II-1: ARB and U.S. EPA PM Emission Standards for New Non-Road/Off-Road Diesel Engines Used in TRUs

Off-road Standard Tier	Less than 11 hp		11 hp to less than 25 hp		25 hp to less than 50 hp	
	PM Standard[1]	Tier Effective Date[2]	PM Standard[1]	Tier Effective Date[2]	PM Standard[1]	Tier Effective Date[2]
Tier 0	N/A[3]		N/A		N/A	
Tier 1	0.75	2000-2004	0.60	2000-2004	0.60	1999-2003
Tier 2	0.60	2005-2007	0.60	2005-2007	0.45	2004-2007
Tier 4 interim	N/A[3]	N/A	N/A	N/A	0.22	2008-2012
Tier 4 final	0.30	2008+	0.30	2008+	0.02	2013+

1. Emission rates expressed in grams per brake horsepower-hour (g/bhp-hr)
2. Effective dates indicate when the tier standards are in effect and start on January 1 of the first year shown and extend to December 31 of the second year shown, except that "+" means "and subsequent years".
3. N/A means "Not Applicable"

[4] Off-road is the term used in California to identify an internal combustion engine that is neither used to propel a vehicle designed and intended for highway use or an engine used to power a stationary source. Off-road is used interchangeably with the term "nonroad," which is used in the federal Clean Air Act and regulations adopted by the U.S. Environmental Protection Agency (U.S. EPA)

[5] Title 40 Code of Federal Regulations, Parts 89 and 1039

The two lowest horsepower categories shown in Table II-1 were combined for the TRU ATCM's in-use standards because less than 25 hp engines are generally used in straight truck (bobtail) TRUs. Engines used in trailer TRUs and TRU gen sets are generally from the 25 hp to less than 50 horsepower category. Further discussion is provided below for these two horsepower categories on the history of the tiers.

Less than 25 hp category: As Table II-1 shows, Tier 1 standards became effective for less than 25 hp engines on January 1, 2000, continuing through December 31, 2004. Between January 1, 2005 and the end of 2007, Tier 2 was in effect for this horsepower category. There was no Tier 3 standard for this category. Tier 4 final (Tier 4f) became effective January 1, 2008 and subsequent years. There was no Interim Tier 4 (Tier 4i) standard for this category, like there is for the 25 hp to less than 50 hp category.

25 hp to less than 50 hp category: Table II-1 also shows that on January 1,1999, the Tier 1 standards became effective for 25 to less than 50 hp engines and continued through the end of 2003. Between January 1, 2004 and the end of 2007, Tier 2 standards were in effect. Again, there was no Tier 3 standard for this horsepower category. Tier 4 standards are divided into two stages: Tier 4i, which began the beginning of 2008 and is in effect through the end of 2012; and Tier 4f, which will become effective January 1, 2013, and will be effective in subsequent years. The Tier 4f standards will likely necessitate the use of advanced exhaust after-treatment technologies, and will result in diesel engines that will be over 94 percent cleaner (PM) than Tier 0 engines.

B. Background Information on Existing In-Use Requirements

As adopted in 2004, the TRU ATCM's in-use performance standards require that in-use TRU and TRU gen set engine PM emissions be reduced by the end of the seventh year after the engine model year (MY). There are two levels of in-use standard stringency: the Low-Emission TRU (LETRU) in-use standard, which reduces diesel PM by at least 50 percent, and the more stringent Ultra-Low-Emission TRU (ULETRU) in-use standard, which reduces diesel PM by at least 85 percent.

As originally adopted, LETRU applies to MY 2002 and older TRU and TRU gen set engines. Seven years after complying with LETRU, these MY 2002 and older engines are required to meet the ULETRU in-use standard. For example, a model year 2002 engine is required to meet the LETRU in-use standard by December 31, 2009, and then meet the ULETRU in-use standard by December 31, 2016. As originally adopted, MY 2003 and subsequent model year engines are required to skip LETRU and meet ULETRU by the end of the seventh year after the engine model year; for example MY 2003 engines must meet ULETRU by December 31, 2010. The TRU ATCM requires that all TRU and TRU gen set engines must eventually meet the ULETRU in-se standard.

As shown in Table II-2 below, compliance with the existing in-use standards can be achieved several ways. For less than 25 hp engines, LETRU can be achieved by using

an engine certified to meet 0.30 grams per brake horsepower-hour (g/bhp-hr) PM, or by retrofitting the engine with a Level 2 Verified Diesel Emissions Control Strategy (VDECS). VDECS that are typically used on TRUs are diesel particulate filters (DPF) that control particulate matter engine exhaust emissions. These DPFs must be verified by ARB to control the PM emissions to the level claimed by the manufacturer and must be shown to meet durability requirements.[6] For 25 hp or greater engines, LETRU can be achieved by using an engine certified to meet 0.22 g/bhp-hr PM, or by retrofitting the engine with a Level 2 VDECS, which reduces diesel PM by at least 50 percent.

ULETRU can be achieved by using an engine certified to meet 0.02 g/hp-hr PM, or by retrofitting the engine with a Level 3 VDECS, which reduces diesel PM by at least 85 percent. All TRU and TRU gen set engines must eventually meet ULETRU. As currently adopted, MY 2003 and subsequent model year TRU and TRU gen set engines skip LETRU and must meet ULETRU by the end of the seventh year after the engine model year.

Table II-2: Existing TRU and TRU Gen Set In-Use Performance Standards

Horsepower Category	Engine Emissions Certification for PM	Retrofit Level of VDECS
Low-Emission TRU In-Use Standard		
<25	0.30 g/hp-hr	Level 2 or better (>50 percent PM reduction)
>25	0.22 g/hp-hr	Level 2 or better(>50 percent PM reduction)
Ultra-Low-Emission TRU In-Use Standard		
<25	N/A[1]	Level 3 (>85 percent PM reduction)
>25	0.02 g/hp-hr	Level 3 (>85 percent PM reduction)

1. N/A means “Not Applicable”, another compliance option must be chosen.

Another compliance option is to use an Alternative Technology, such as electric standby or hybrid electric TRUs, or hybrid cryogenic temperature control systems. To qualify as an Alternative Technology, these technologies must be used in a way that eliminates the diesel engine operations at facilities where TRUs operate. For example, the TRU engines can run on the road, but not at distribution centers, where they must run on electricity or use cryogenic cooling. Under the TRU ATCM, if diesel PM emissions are eliminated to qualify as an Alternative Technology, the technology meets the ULETRU standard and would also be a compliance option to meet the LETRU standard, since ULETRU is more stringent than LETRU.

Many owners have elected to maintain their TRUs and TRU gen sets in compliance by repowering these units with new replacement engines or rebuilt replacement engines that meet a more stringent emissions standard than the engines being replaced. At this time, although an owner choosing to repower a TRU with a new Tier 4i engine would meet the LETRU standard, it could not be used to comply with the ULETRU standard.

[6] Title 13. California Code of Regulations (CCR), section 2700 through 2710.

However, repowering with a newer model year Tier 4i or Tier 2 engine would have the effect of keeping a unit in compliance by resetting the in-use compliance requirements and dates, which are based on the engine model-year designation. For example, if a MY 2002 35 hp engine is repowered with a new MY 2009 Tier 4i replacement engine, it would be in compliance until the end of 2016, when it must meet ULETRU.

New replacement engines may be manufactured to meet current or prior-tier new engine emissions standards. A new replacement engine that meets the tier of the emissions standard that is in effect when it was manufactured would use the engine model year to determine compliance requirements and dates. The engine model year is indicated on the engine's emissions label when it is manufactured to meet the emissions standards that are currently in effect at the time of manufacture.

A new replacement engine that is manufactured to meet a prior-tier standard that is no longer in effect at the time of manufacture would use the effective model year for determining compliance requirements. The effective model year is the last year that the prior-tier standard was in effect. For example, a 35 hp new replacement engine that meets Tier 2, but was installed in 2009, when Tier 4i was in effect, would have an effective model year of 2007 (the last year that Tier 2 was in effect), and would be required to meet ULETRU by December 31, 2014, seven years after the effective model year. More discussion and details related to effective model year will be presented later in this staff report.

A rebuilt replacement engine that meets a prior tier new engine emissions standard also resets the in-use compliance requirements and compliance dates, which would be based on the rebuilt engine's effective model year. Similar to the case of the new replacement engine, a rebuilt replacement engine that meets a current new engine standard would use an effective model year, which would be the same as the rebuild year; and if it meets a prior-tier standard, the effective model year would be the last year that the prior-tier standard was in effect.

C. Proposed Amendment for MY 2003 (25 hp and greater) - Change In-Use Standard from ULETRU to LETRU

Staff is proposing that the in-use standards for MY 2003 TRU engines in the 25 hp and greater horsepower category be changed to allow owners to comply with the in-use standards by meeting either the ULETRU or LETRU standards. Under the current regulation, the compliance options for MY 2003 TRU engines are currently limited. New engines that meet ULETRU are currently not in production and Level 3 VDECS (85 percent PM control) are not readily available in the marketplace in sufficient numbers to retrofit the MY 2003 engines that need to comply by the end of 2010. The amendments would allow owners to comply in the near-term by installing either a Level 2 (50 percent diesel PM control) VDECS or a Level 3 VDECS (85 percent diesel PM control). The compliance date for meeting either the ULETRU or LETRU standard would still be December 31, 2010.

Level 2 VDECS, for meeting the LETRU standards, are readily available on the market and have been installed in thousands of MY 2002 and older TRUs. The existing dealer and installation network is well established and will be able to meet product demand. An additional advantage is that Level 2 VDECS cost about $1,300 to $2,000 less than a Level 3 VDECS, so near-term compliance costs would be reduced during the current down-economy. Further, extending existing verifications to MY 2003 engines is straightforward since the MY 2003 engines in the 25 to <50 hp category also meet Tier 1, like the MY 1999 to MY 2002 engines for which Level 2 verifications have been approved. As Table II-1 shows, 2003 was the last year that Tier 1 was in effect for 25 hp to less than 50 hp engines. Also, model year 2004 engines were the first year that new engines were required to meet the cleaner Tier 2 standards, which makes these engines a better match for Level 3 VDECS that must achieve 85 percent PM reductions.

The proposed amendments would also require that all MY 2003 engines remaining in service meet the ULETRU standard by December 31, 2017, seven years after the initial compliance date for those owners who chose to comply by meeting the LETRU standard in 2010. As stated above, all TRU and TRU gen set engines must eventually meet the ULETRU in-use standard. So, if the owner chose to comply with ULETRU in 2010, there would be no subsequent compliance date for meeting a more stringent in-use standard.

Staff published TRU Advisory 10-19 in July 2010 to inform MY 2003 TRU and TRU gen set owners of its intent to propose this amendment to the Board. Advisory 10-19 also informed affected owners that the compliance date would continue to be December 31, 2010.

Table II-3 shows this proposed amendment using the underline convention to show added requirements. In the row for MY 2003, the letter “U” stands for ULETRU. The letter “L” stands for LETRU, and is shown underlined, indicating this in-use standard would be an option under the amendments. Again, if “L” is chosen in 2010, “U” is still required in 2017.

Table II-3: ≥25 HP TRU and TRU Gen Set Engines
Proposed In-Use Compliance Dates for In-Use Standards

Engine MY	In-Use Compliance Year[7]													
	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				U or L	U or L	U or L	U or L	U or L	U or L	U or L	U	U	U	U
'04					U	U	U	U	U	U	U	U	U	U
'05						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10'											U	U	U	U
'11												U	U	U
'12													U	U
'13														U

D. Proposed Amendment for MY 2003 and 2004 (less than 25 hp) - Change In-Use Standard from ULETRU to LETRU

Staff is proposing similar amendments to those proposed above for both MY 2003 and 2004 engines in the less than 25 hp category. The amendments would allow owners to comply by either meeting the ULETRU or LETRU in-use standards. The compliance dates for meeting one of the standards would remain December 31, 2010, for MY 2003 engines, and December 31, 2011, for MY 2004 engines. MY 2004 engines in the less than 25 hp category are included in the proposed amendment because Tier 1 was effective through 2004, so Level 2 VDECS would be a good match with these engines (explained further below). This is in contrast with the 25 hp and greater category because Tier 1 ended in 2003 for the 25 to 50 hp new engine standard.

The amendments are necessary because for MYs 2003 and 2004, compliance options are relatively limited. Repowering with an engine that meets an in-use emissions standard is not an option for meeting the ULETRU standard. This is because the new off-road engine standards do not require these engines to have PM exhaust after-treatment emissions controls that would reduce emissions at least 85 percent from 2000 levels, which is what is needed to meet the ULETRU in-use standard (note Table II-2 indicates "N/A", or not applicable for this horsepower category which means that another compliance option must be chosen).

[7] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no requirements since in-use compliance year precedes model year . Dark shaded areas without letter codes have no in-use standard requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.

Furthermore, while a Level 3 VDECS has been verified for the < 25 hp category, it cannot be used with TRUs because it cannot fit inside the TRU housing. Also, unless the TRU was equipped with electric standby when new, electric standby would not be a viable Alternative Technology option because retrofitting is very expensive.

In contrast, Level 2 VDECS meeting LETRU standards are readily available on the market for most truck TRUs and have been installed in hundreds of MY 2002 and older TRUs. Dealer and installation networks are established and these products have been demonstrated. In addition, since MY 2003 and 2004 engines are the last two years of Tier 1 in this hp category, they are the same engines as the MY 2000 through 2002 engines (all meet Tier 1), so Level 2 VDECS verifications are straightforward. As noted above, Table II-1 shows that 2004 was the last year that Tier 1 was in effect for less than 25 hp engines and model year 2005 engines were the first year that new engines were required to meet the cleaner Tier 2 standards, making these engines a better match for Level 3 VDECS that must achieve 85 percent PM reductions.

This proposed amendment would still require the ULETRU standard to be met by December 31, 2017, for MY 2003 and by December 31, 2018, for MY 2004 engines, seven years after the initial compliance date for the owners who chose to comply with LETRU in 2010 and 2011. If the owner chose to comply with ULETRU in 2010, there would be no subsequent compliance date for meeting a more stringent in-use standard.

As discussed above, staff published TRU Advisory 10-19 in July 2010, to inform MY 2003 and 2004 TRU and TRU gen set owners of this proposed amendment and informed affected owners that they should make plans to choose a compliance option and place orders in time to comply by December 31, 2010.

Table II-4 shows this proposed amendment in the rows for MY 2003 and 2004, using the same lettering conventions as in Table II-2, above. As an example, the row for MY 2004 engines shows that compliance with either ULETRU of LETRU is required by December 31, 2011, and if LETRU is chosen in 2011, then ULETRU would still be required by December 31, 2018.

Table II-4: <25 HP TRU and TRU Gen Set Engines
Proposed In-Use Compliance Dates and In-Use Standards

Engine MY	In-Use Compliance Year[8]													
	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				U or L	U or L	U or L	U or L	U or L	U or L	U or L	U	U	U	U
'04					U or L	U or L	U or L	U or L	U or L	U or L	U or L	U	U	U
'05						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10											U	U	U	U
'11												U	U	U
'12													U	U
'13														U

E. Other Proposed TRU ATCM 2010 Amendments

Several other amendments that are considered to be essential in the short term are also being proposed for the TRU ATCM 2010 amendments.

1. Requirements for "Flexibility" Engines

Background on Flexibility Engines

When U.S. EPA and ARB adopted new engine emission standards for off-road diesel engines, they included "flexibility" provisions.[9] The flexibility provisions are also called the Transitional Program for Equipment Manufacturers (TPEM or flexibility engine) and allow equipment manufacturers to produce limited numbers of equipment with engines that meet less stringent emission standards for up to seven years after a new tier of emissions standards has gone into effect. In doing so, the number of engines used cannot exceed 80 percent of the total engines produced in a production year, expressed as cumulative yearly percentage increments for each production year that flexibility engines are produced. The intent of TPEM is to give more time for equipment manufacturers to change equipment designs to be compatible with new engines

[8] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no requirements since in-use compliance year precedes model year . Dark shaded areas without letter codes have no requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.

[9] Title 40 Code of Federal Regulations, section 89.102 (40 CFR 89.102), 40 CFR 1039.625, 40 CFR 1068.265, and title 13, CCR section 2423(d))(CFR, 2010a; CFR, 2010b; CFR, 2010c; CCR, 2010)

meeting the new standards, since dimensions, engine mounts, and controls may be affected.

For example, under the federal and state flexibility provisions, when Tier 1 off-road new engine standards went into effect in 2000, TRU OEMs were allowed to install pre-Tier 1 "flexibility" engines (i.e. non-certified engines) for up to seven years. Later, when new engines were required to meet the Tier 2 standards, TRU OEMs were allowed to install a limited number of flexibility engines meeting pre-Tier 1 or Tier 1 emission standards. Similar allowances are made each time the tier standard changes.

Table II-5 displays the tier standards that apply to TRU engines, the PM emissions limits and years that each tier standard was in effect, along with the last year that flexibility engines were allowed to be used.

Table II-5: Flexibility Engine Allowances

Emissions Standard in Effect	PM Emissions Limit (g/hp-hr)	Tier Standard Effective Years	Last Year of Seven-Year Flexibility Engine Usage Period
Tier 1 (<11 hp)	0.75	2000-2004	2012
Tier 1 (11-<25 hp)	0.60	2000-2004	2012
Tier 2 (<25 hp)	0.60	2005-2007	2015
Tier 4f (<25 hp)	0.30	2008 and Subsequent	2016
Tier 1 (25 to ≤50 hp)	0.60	1999-2003	2011
Tier 2 (25 to <50 hp)	0.45	2004-2007	2015
Tier 4i (25 to <50 hp)	0.22	2008-2012	2020
Tier 4f (25 to <50 hp)	0.02	2013 and Subsequent	2021

As described above, flexibility engines are manufactured to meet a less stringent, prior-tier standard than the standard currently in effect for new engine certification. An example of what actually happened follows: looking at the 25 to less than 50 hp category in row 6, after Tier 2 went into effect in 2004, TRU manufacturers installed Tier 1 engines in TRUs during 2004 and 2005.

Until now, the practice of manufacturers in identifying the model year of flexibility engines has varied. Many engine emissions labels have identified the model year as the last year that the flexibility engine's tier was in effect even though the engine may have been manufactured several years after the next tier was in effect. ARB's term for this model-year designation is the "effective model year" of the flexibility engine. Other engines have emission labels identifying the model year of the flexibility engine as the engine's manufacture date. This variance of identification has resulted in confusion for ARB and stakeholders.

Table II-6 lists the new engine tier standards that apply to TRU and TRU gen set engines, the years that each tier is effective, and the corresponding effective model years that result for these tiers when ARB's term is applied to flexibility engines.

Table II-6: Effective Model Year

Prior-Tier Engine Emissions Standard	Tier Standard Effective Years	Effective Model Year[1]
Tier 1, under 25 hp (truck)	2000-2004	2004
Tier 2, under 25 hp (truck)	2005-2007	2007
Tier 1, 25-50 hp (trailer)	1999-2003	2003
Tier 2, 25-50 hp (trailer)	2004-2007	2007
Tier 4i, 25-50 hp (trailer)	2008-2012	2012[2]

1. Engines that meet a prior tier (less stringent than currently in effect) have an effective model year that is the last year that the prior tier was in effect.
2. Effective model year applies for this tier only after Tier 4f becomes effective in 2013 for 25 to less than 50 hp engines.

Use of the effective model year of the flexibility engine effectively shortens the operational life[10] of the TRU engine. Under the TRU ATCM, the operational life of an engine is typically seven years – that is, an engine is not required to meet a more stringent in-use performance standard until seven years after the denoted model year of the engine. By using the effective model year (which may be one to two years before the engine's manufacture date) the operational life of the engine may be shortened several years.

To address this shortened operational life, a TRU manufacturer and many TRU fleets have requested that Tier 1 flexibility engines that were manufactured and installed in trailer TRUs during Tier 2 (e.g. during 2004, 2005, or 2006) be allowed to use the actual engine manufacture year as the model year, even though many engine labels on these engines show the effective model year as the last year of the prior tier (MY 2003 for Tier 1). Two TRU manufacturers have provided information on their use of flexibility engines. Over 10,000 flexibility engines have been directed to the California market and over 37,000 have been directed to the U.S. market.

Staff has evaluated the flexibility engine data provided by TRU manufacturers and found that these flexibility engines' actual certification values for PM are below the Tier 2 standard. However, in the case of oxides of nitrogen plus non-methane hydrocarbon (NO_X+NMHC) emissions, the certification values were somewhat above the Tier 2 standard.

Staff has further found that many TRU owners unknowingly purchased TRUs with flexibility engines in the past and were unaware that flexibility engines may have a shortened operational life under the TRU ATCM in comparison to engines that denoted a model year based upon year of manufacture.

Proposed Amendment

Staff has determined that it would be appropriate to amend the regulation to allow owners of flexibility engines purchased prior to the effective date of the amendments to

[10] Operational life is the life of the engine or unit as allowed under the regulation. Operational life should be distinguished from useful life, as defined under new engine standards and used for survivability (engine mortality over time) in engine population inventory reports.

use the engine manufacture year to determine compliance requirements and deadlines under the TRU ATCM. This would ensure that TRU owners obtain the benefits of a full seven-year operational life. Staff is also proposing that flexibility engines installed in TRUs after the effective date of the amendments would be required to use the "effective model year" of the flexibility engine to determine future ULETRU compliance dates. As stated, the effective model year of the flexibility engine would be the last year that the flexibility engine's tier standard was in effect for new engine compliance. Compliance with the in-use standards would then be required by the end of the seventh year after the effective model year of the flexibility engine.

Staff is further proposing that TRU OEMs be required to report to ARB information on the use of flexibility engines, including the serial numbers of the TRU units with flexibility engines. ARB would then use the unit serial number to identify the information in the ARB Equipment Registration (ARBER) system and would change the model year of the affected engines to be the manufacture year. The upcoming ULETRU compliance date would also be changed in ARBER, based on the engine manufacture year instead of the effective model year. Since flexibility engine labels often show the effective model year, a notation would also be added to each affected ARBER record to explain the reason for the discrepancy to enforcement staff that may observe this discrepancy in the field.

In order to retain the emission reduction benefits of the regulation in future years, limiting the operational life of flexibility engines in 2011 and beyond is critical. Beginning in 2013 the new off-road engine standards in the 25 to <50 hp category will transition from Tier 4i to Tier 4f. This action will result in PM reductions of about 90 percent (0.22 g/hp-hr goes to 0.02 g/hp-hr) and NOx reductions of almost 40 percent (5.6 g/hp-hr goes to 3.5 g/hp-hr). Limiting the operational life of flexibility engines in the future will ensure that these PM and NOx reductions will be achieved as expeditiously as intended. Staff believes that using the effective model year for future flexibility engine use would discourage their use since operational life is affected and would result in dirtier earlier tier flexibility engines being phased out sooner.

By way of example, if a flexibility engine meeting Tier 4i is installed in a TRU manufactured in 2013, when Tier 4f is in effect, the flexibility engine's effective model year would be 2012, so the flexibility engine would be required to meet the ULETRU in-use standard seven years later, by the end of 2019. Had a MY 2013 engine meeting Tier 4f been installed, compliance would be required by the end of 2020. So, the use of a flexibility engine in 2013 would result in the loss of a year of operational life under the proposed amendments. Continued use of flexibility engines meeting Tier 4i (effective MY 2012) in 2014 would result in the loss of an additional year of operational life because the ULETRU compliance date would still be 2019.

Staff is further proposing that if a TRU OEM installs flexibility engines after January 1, 2011, they would be required to disclose the following information to the end user before sale is completed: a) that a flexibility engine is installed; b) the effective model year of the engine; and c) the resulting in-use compliance date, seven years after the effective model year.

2. Reporting Requirements for TRU and TRU Gen Set OEMs

The TRU ATCM includes requirements for California-based TRUs and TRU gen sets to be registered with ARB. Registration is voluntary for units that are based outside of California. Complying units are issued an ARB Identification Number (IDN) that is affixed to the unit housing. The purpose of registration is to provide a way to track compliance and make enforcement inspections a more efficient, less time-consuming process for owner/operators through the use of prescreened registration information. Owners may register online, using ARB's Equipment Registration (ARBER) system, or manually using paper forms. Online application is encouraged to reduce errors and allow ARBER to instantly issue IDNs.

Staff is working on enhancements to the ARBER system to make data entry by TRU owners easier and to further reduce data entry errors. Staff is also working to improve estimates of TRU populations and statewide emissions. To accomplish these goals, ARB staff is proposing to require the TRU and TRU gen set OEMs to periodically report unit and engine data for the coming production year as well as production information for previous years. Information that is needed includes the TRU models that will be in production, along with the engine information for each model. Specifically, OEMs would be required to report the manufacturer of the engine installed in the TRU; the engine model and family; the rated horsepower and speed, displacement, exhaust emissions control system, and tier standard of the engine; and ARB's Executive Order certifying the engine for use in off-road equipment.

In addition, staff has been working to improve the quality of the data in ARBER and simplify the registration process. Also, improvements in estimates of TRU populations and statewide emissions is needed. Currently, there is no existing, comprehensive, reliable database that provides TRU and TRU gen set production numbers that can be used for this purpose. To facilitate this work, the TRU ATCM 2010 amendments would require the TRU and TRU gen set OEMs to report to ARB on production information for five previous calendar years, or alternatively, unit and engine information for specific unit and engine serial numbers. Periodic reporting would also be required going forward, unit and engine information needed to improve emissions estimates.

F. Alternatives Considered

Staff considered alternatives to each of the proposed TRU ATCM amendments.

Retain Existing Provisions

This alternative would retain both the ULETRU standard and the December 31, 2010, compliance date. This would effectively eliminate retrofit as a compliance option since the Level 3 VDECS retrofit has limited availability. Compliance options would effectively be limited to the more available choices: unit replacements, new and rebuilt engine repowers, and Alternative Technologies. Compliance costs would be greater than the Level 2 retrofit to meet LETRU, as demonstrated by the comparisons in Table II-7 (ARB, 2010).

Table II-7: Compliance Cost Comparisons for Trailer TRUs

Compliance Option	Compliance Cost per Unit
Retrofit with Level 2 VDECS to meet LETRU	$3,650 to $4,750
Retrofit with Level 3 VDECS to meet ULETRU	$5,000 to $6,000
New Engine Repower	$5,500 to $9,750
Rebuilt Engine Repower	$6,250
Unit Replacement	$19,000 to $25,000

Retrofitting trailer TRUs with electric standby (an Alternative Technology) is not economically attractive because it would cost more than replacing the engine and has never been attempted, to staff's knowledge.

Retaining the existing provisions would also negatively impact TRU owners that purchased units with flexibility engines. By not adjusting the regulation requirements to allow the use of the manufacture year for flexibility engines installed prior to 2011, TRU owners would loose one to two years of operational life. This would create hardship for TRU owners that were unaware that flexibility engines were used in the TRU units that they purchased. Finally, retaining the existing provisions would prevent staff from making improvements to ARBER and the TRU emissions inventory.

Delay In-Use Compliance Date for MY 2003 Engines by One Year

In lieu of changing of the in-use standard going from ULETRU to LETRU for MY 2003 engines in the 25 hp and greater power category, and for MY 2003 and 2004 engine in the less than 25 hp category, staff considered and rejected retaining the ULETRU in-use standard and delaying the in-use compliance date by one year. Staff's evaluation found that the short-term compliance costs for this alternative would be greater because a Level 3 VDECS (meeting ULETRU) costs $1,300 to $2,000 more than a Level 2 VDECS (meeting LETRU) for trailer TRUs. However, the overall statewide compliance cost for this alternative would be about $500,000 less (in 2010 dollars) than the proposed amendment after annualizing the costs and discounting to 2010 dollars. This is because the proposed amendment includes both the 2010 LETRU compliance costs and the 2017 ULETRU compliance costs while the alternative has only ULETRU compliance costs in 2011.

However, this alternative has a number of drawbacks. First, no diesel PM reductions would be realized for a year, which would negatively impact residents living near distribution centers due to exposure to elevated diesel PM emissions. Second, since 65 percent of compliance has been through engine repower with a cleaner engine, the NOx+NMHC reductions would also be delayed for one year. Third, the near-term economic relief for the down economy, a benefit of the proposed amendment, would be lost - specifically, the near-term savings realized by the Level 2 VDECS retrofit compliance ($1,300 to $2,000 per unit savings). Additionally, if a fleet owned MY 2003 and 2004 engines, the economic impact would be more severe in 2011, when both compliance dates came due.

An additional consideration is the impact that suspending the standard for a year would have on VDECS manufacturers, new replacement engine manufacturers, and rebuilt replacement engine manufacturers. Delaying the standard for a year would mean that manufacturing and installation operations would be suspended for a year. Then production, distribution, and installation would need to ramp up again in 2011 to twice the levels of a normal phase compliance year to meet the needs of MY 2003 and 2004 engine compliance.

Past delays in the compliance schedule have shown staff that they cause a significant level of uncertainty that is detrimental to timely compliance. Most owners stop evaluating compliance options, put off field testing of compliance technology, and postpone purchase decisions until the new compliance deadline approaches. The uncertainty also affects compliance technology manufacturers, who delay their product development, testing, and verification work. Staff believes that delays cause lower rates of compliance.

On the other hand, staff is concerned that since TRU Advisory 10-19 was issued, instructing owners of MY 2003 engines to comply by December 31, 2010, there would be negative consequences if this alternative is not rejected. First, staff knows that some owners have in good-faith, already invested in LETRU compliance technologies so they will be at a competitive disadvantage with those owners that may delay, if the alternative was accepted. Second, compliance technology manufacturers and dealers have already gone to considerable expense, having launched marketing promotions for the LETRU compliance options.

Given these potential adverse impacts, staff rejected this alternative.

<u>Only Allow a One-Year Adjustment for “Flexibility” Engines</u>

Staff also considered and rejected providing a maximum of one additional year of useful life for flexibility engines. Although this would have restored a measure of fairness to the owner who purchased a TRU with a flexibility engine, it would still leave an inequity for the end user who has an engine manufacture year of more than one year. Given the small impact on emissions for flexibility engines installed prior to 2011, providing TRU owners the full operational life is appropriate.

III. EMISSIONS INVENTORY AND HEALTH RISK

In this chapter, staff provides estimates of the impact of the proposed amendments on the TRU emissions inventory. The emissions inventory estimates for the proposed amendments utilize the same assumptions and data sources as the methodology used in the 2003 Staff Report (see Appendix D of the 2003 Staff Report). The specific emissions impacts for each of the proposed amendment are listed below and combined in Section E of this chapter. The emissions impacts represent emission reductions that were anticipated but will not be realized due to needed adjustment to the existing TRU ATCM.

A. MY 2003 and MY 2004 Engine Populations

As discussed in Chapter II, staff is proposing to amend the in-use standards from ULETRU or Level 3 VDECS to allow LETRU or Level 2 VDECS as well as ULETRU for MY 2003 engines in both the <25 hp and the 25 to <50 hp categories and for MY 2004 engines in the <25 hp category. Staff estimated the population of affected engines using the assumptions for sales of MY 2003 and MY 2004 TRUs and the survival rates from Appendix D of the 2003 Staff Report. A summary of the population of affected engines in calendar year (CY) 2010 by equipment type and hp category is provided in Table III-1 below.

Table III-1: Summary of Population of Affected MY 2003 and MY 2004 Engines (2010)

Equipment Type	Horsepower Category (hp)	Approximate Number of TRUs	Number of TRU Generator Sets
California-based truck van	Less than 15	840	N/A
California-based truck van	15- <25	300	N/A
California-based semi-trailer	25- <50	2,040	N/A
Out-of state semi-trailer	25- <50	670	N/A
Railcar	25- <50	150	N/A
California-based TRU gen set (shipping container)	25- <50	N/A	300
Total		4,000	300

N/A – Not Applicable
All values rounded.

B. Emissions from MY 2003 and MY 2004 Engines

The change in emissions from the affected MY 2003 and MY 2004 engines due to the proposed amendments is estimated by multiplying the TRU population, the annual

hours of engine operation, engine hp, load factor, and the change in emission factors between ULETRU and LETRU. PM emission factors were reduced 25 percent from those in the OFFROAD model to incorporate data that was provided by the engine manufacturers at the time of the earlier analysis. This factor was also used in the Addendum to Appendix D of the 2003 Staff Report. The average annual hours of engine operation, average engine power ratings, and load factors as listed in Appendix D of the 2003 Staff Report are shown in Table III-2.

Table III-2: Annual Hours of Operation, Average Engine Power, and Load Factors for TRUs by Equipment Type

Equipment Type	Horsepower Category (hp)	Annual Engine Operation (hours)	Average Engine Power (hp)	Load Factor
California-based truck van	Less than 15	1,038	10	0.64
California-based truck van	15-25	1,038	17	0.64
California-based semi-trailer	25-50	1,465	34	0.53
Out-of state semi-trailer	25-50	1,465	34	0.53
Railcar	25-50	1,465	34	0.53
California-based TRU gen set (shipping container)	25-50	1,100	31	0.45

Emission factors for Particulate Matter (PM) and Oxides of Nitrogen (NO_x), as estimated for ARB's OFFROAD model and listed in Appendix D of the 2003 Staff Report, are shown in Table III-3.

Table III-3: Off-road Emission Factors for TRUs by Equipment Type

Equipment Category	Horsepower Category (hp)	PM Emission Factors (g/hp-hr)	NOx Emission Factors (g/hp-hr)
California-based truck van	Less than 15	0.47	6.08
California-based truck van	15-25	0.38	5.79
California-based semi-trailer	25-50	0.60	5.55
Out-of state semi-trailer	25-50	0.60	5.55
Railcar	25-50	0.60	5.55
California-based TRU gen set (shipping container)	25-50	0.60	5.55

The current in-use standard of ULETRU requires a PM reduction of 85 percent. The proposed in-use standard of LETRU requires a PM reduction of 50 percent. Therefore,

a change from ULETRU to LETRU would result in 35 percent less PM control (41 percent less PM reduction) for the affected engine population than originally estimated.

The emission reductions that would be lost from the proposed amendment is estimated to be 0.041 tons/day (tpd) of diesel PM in 2010 and 0.013 tpd in 2017 if the entire affected population retrofitted with Level 2 VDECS. However, based on the Level 2 VDECS retrofits on 2002 engines, staff has estimated that approximately 30 percent of the population will retrofit (with approximately 65 percent repowering and 5 percent using alternative technology), decreasing the emission reductions lost to approximately 0.012 tpd in 2010. The change in PM emissions ends after 2018 as all the surviving affected MY 2003 and MY 2004 engines will be subject to ULETRU then. As NO_x emissions are not affected by the change to allow LETRU, there would be no change to the NO_x emissions impact projected in the 2003 Staff Report.

C. Population of Flexibility Engines

Staff has estimated the population of TRU flexibility engines from information provided by the TRU Original Equipment Manufacturers (OEM) in 2010. The population of TRU flexibility engines was not estimated in 2003. Appendix D of the 2003 Staff Report estimated populations using sales data of TRUs and therefore assumed that the sales year would also be the model year of the engine. To estimate the emissions from flexibility engines that were not accounted for in 2003, staff estimated the percentage of the overall population represented by flexibility engines. A summary of these populations is shown in Table III-4. As shown in the table, a large percentage of the flexibility engines were installed in the first year after a change in engine tier standards.

Table III-4: Flexibility Engine Population Share by MY and Horsepower Category[1]

Horsepower Category (hp)	Model Year	Percent of Nationwide Share
25- <50[2]	2004	56
	2005	18
	2006	0
Less than 25[3]	2004	0
	2005	50
	2006	5

1. Flexibility engine population in emissions estimate are all Tier 1 engines.
2. Tier 2 engine standard effective starting in 2004 for 25-< 50 hp.
3. Tier 2 engine standard effective starting in 2005 for < 25 hp.

D. Emissions from Flexibility Engines

The change in emissions due to the use of flexibility engines associated with the proposed amendments is due to the unknown prior use of flexibility engines instead of the more stringent, current tier engines. While the amendment offers an adjustment in compliance dates for prior flexibility engines, it also clarifies compliance dates for future flexibility engines which preserve the intended emissions reductions when more stringent tiers come into effect. This change is estimated by multiplying the TRU population using flexibility engines, the annual hours of operation, engine hp, load factor, and the change in emission factors between the year of manufacture as a flexibility engine and the effective MY (the last year that the prior tier met by flexibility engine was in effect). The annual hours of engine operation, average engine power, and average load factors using the methodology in Appendix D of the 2003 Staff Report are shown in Table III-5.

Table III-5: Annual Hours of Operation, Average Engine Power, and Average Load Factors for Flexibility Engines by Horsepower Category

Horsepower Category (hp)	Annual Hours of Operation (hours)	Average Engine Size (hp)	Average Load Factor
Less than 15	1,038	10	0.64
15- <25	1,038	17	0.64
25-< 50	1,465	34	0.53

Emission factors for diesel PM and $NO_{x,}$ for flexibility engines are shown in Table II-6.

Table III-6: Off-road Emission Factors for Flexibility Engines by Horsepower Category

Horsepower Category (hp)	PM Emission Factors (g/hp-hr)				NOx Emission Factors (g/hp-hr)			
Year	2003	2004	2005	2006	2003	2004	2005	2006
Less than 15	0.47	-	0.38	0.38	6.08	-	4.37	4.37
15- <25	0.38	-	0.38	0.38	5.79	-	4.57	4.57
25- <50	0.60	0.43	0.38	-	5.55	5.10	4.95	-

The incremental change in diesel PM emissions due to the proposed amendment for flexibility engines is 0.025 tpd in 2010 and 0.010 tpd in 2012. After 2012, the incremental change becomes negligible as the surviving flexibility engines are required to meet ULETRU. The incremental change in NO_x emissions from the proposed

amendment for flexibility engines is 0.10 tpd in 2010 and is due to the higher emissions from the previous tier engines.

E. Total Combined Emissions Impacts from Proposed Amendment

Table III-7 presents staff's estimate of anticipated emission reduction that will not be achieved due to the proposed amendments. Overall emissions impact from both proposed amendment categories is estimated to be 0.04 tpd of diesel PM and 0.10 tpd of NO_x in 2010. For additional information, see Appendix D of the 2003 Staff Report.

Table III-7: Overall Emissions Impacts from Proposed TRU ATCM 2010 Amendments (2010)

	Affected MY 2003 and MY 2004 Engines	Flexibility Engines Adjustment	Total Overall Emissions
PM Emissions (tpd)	0.012	0.025	0.04
NOx Emissions (tpd)	0.0	0.10	0.10

All values rounded.

Table III-8 provides a summary of the overall incremental annual statewide diesel PM changes that will result from the TRU ATCM 2010 amendments in tons/year in 2010 through 2020. The summary is based on a 30 percent usage of Level 2 VDECS for compliance by the affected MY 2003 and MY 2004 engines. Emission reductions that were anticipated but will not be realized are highest in 2010 and are approximately 0.012 tpd of diesel PM for affected MY 2003 and MY 2004 engines dependent on compliance method and approximately 0.025 tpd of diesel PM for flexibility engine adjustments, for a total of 0.04 tpd. This emissions increase will primarily occur in years 2010 through 2012 with negligible increase after 2017 for affected MY 2003 and MY 2004 and after 2012 for the flexibility engine adjustments. Emission reductions that will not be realized for NO_x result only from the flexibility engine adjustments and are approximately 0.10 tpd in 2010.

Table III-8: Statewide Diesel PM Emission Reductions Attributable to the Existing TRU Regulation and Subset of Reductions to be Deferred Under the Proposed 2010 TRU Amendments

Year	Emission Reductions to be Achieved by Existing TRU Regulation (2003 Staff Report)		Emission Reductions to be Deferred Under the Proposed 2010 TRU Amendments					
			Affected MY 2003 and MY 2004 Engines		Flexibility Engine Adjustment		Total	
	PM (tpd)	NO_x (tpd)	PM (tpd)	NO_x (tpd)	PM (tpd)	NO_x (tpd)	PM (tpd)	NO_x (tpd)
2010	0.600	0.922	0.012	0	0.025	0.10	0.037	0.10
2011	0.695	0.935	0.012	0	0.024	0.10	0.036	0.10
2012	0.739	0.937	0.011	0	0.010	0.09	0.021	0.09
2013	0.765	0.941	0.010	0	0.003	0.09	0.013	0.09
2014	0.786	0.958	0.009	0	0.003	0.08	0.012	0.08
2015	0.811	0.990	0.007	0	0.003	0.07	0.010	0.07
2016	0.805	0.926	0.006	0	0.002	0.06	0.008	0.06
2017	0.664	0.862	0.004	0	0.002	0.05	0.006	0.05
2018	0.610	0.903	0.000	0	0.001	0.04	0.001	0.04
2019	0.559	0.950	0.000	0	0.001	0.02	0.001	0.02
2020	0.525	1.002	0.000	0	0.000	0.01	0.000	0.01

All values rounded.

F. Health Risk

The Board listed diesel PM as a toxic air contaminant in 1998 based on its potential to cause cancer, premature death, and other health effects. NO_x is a precursor to the formation of ozone and contributes to secondarily formed PM in the lower atmosphere. The Office of Environmental Health Hazard Assessment (OEHHA) has shown both chronic cancer and non-cancer health impacts due to exposure to diesel PM, but the cancer health risk impacts are generally higher than the non-cancer health impacts. For this analysis, only cancer risks were addressed for diesel TRUs. A summary of the risks reported in the 2003 Staff Report and impacts estimated as a result of the proposed amendments are provided below.

In the 2003 Staff Report, ARB staff estimated potential cancer risks from diesel TRU using activities at a distribution center where 35 horsepower diesel TRU engines operate. The potential excess cancer risk from diesel PM was estimated to be approximately 130 chances in a million up to one-half mile from a large facility operating 2,000 hours per week. These estimates were based on the year 2000 fleet average emission rate (0.7 grams PM per brake horsepower-hr (g/bhp-hr)). The 2010 estimated fleet average emission rate is 0.24 g PM/bhp-hr or about a factor of 3 lower. As a result of the significant change in the average emission rate of TRUs over the past 10 years, this same facility in 2010 (without the existing TRU regulation) would have an updated excess cancer risk of about 45 chances per million. The existing TRU regulation reduces excess cancer risks near distribution centers to approximately 33 chances per million. With the deferred emission reductions from the proposed 2010 amendments,

the excess cancer risk would increase by less than one chance per million in each of seven years. All parameters and assumptions, along with the methodology for estimating these cancer risks, are found in Appendix E of the 2003 Staff Report (ARB, 2003).

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IV. ENVIRONMENTAL AND HEALTH IMPACTS OF PROPOSED AMENDMENTS

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. Because ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code section 21080.5, the CEQA environmental analysis requirements may be included in the Initial Statement of Reasons (ISOR) for this rulemaking. In the ISOR, ARB must include a "functionally equivalent" document, rather than adhering to the format described in CEQA of an Initial Study, a Negative Declaration, and an Environmental Impact Report. In addition, staff will respond, in the Final Statement of Reasons for the proposed regulation, to all significant environmental issues raised by the public during the public review period or at the Board public hearing. Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- An analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- An analysis of reasonably foreseeable feasible mitigation measures (CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts); and
- An analysis of reasonably foreseeable alternative means of compliance with the proposed regulation.

ARB staff's analysis of these requirements is presented below. The proposed TRU ATCM 2010 amendments reduce the cost of complying with the ATCM while still ensuring the emissions and risks from TRU diesel engines are mitigated.

A. Statewide Emissions Impacts

ARB staff has estimated the incremental emissions which were anticipated but may not be realized with the proposed TRU ATCM 2010 amendments for 2010 through 2020 as shown in Table IV-1. As stated earlier, statewide emissions from these specific engine model year categories are a small portion of the total TRU emissions. However, these emission reductions are important in achieving the Board's goals in the Diesel Risk Reduction Plan (ARB, 2000) and Goods Movement Action Plan (CalEPA, 2007), as well as attaining and maintaining ambient air quality standards.

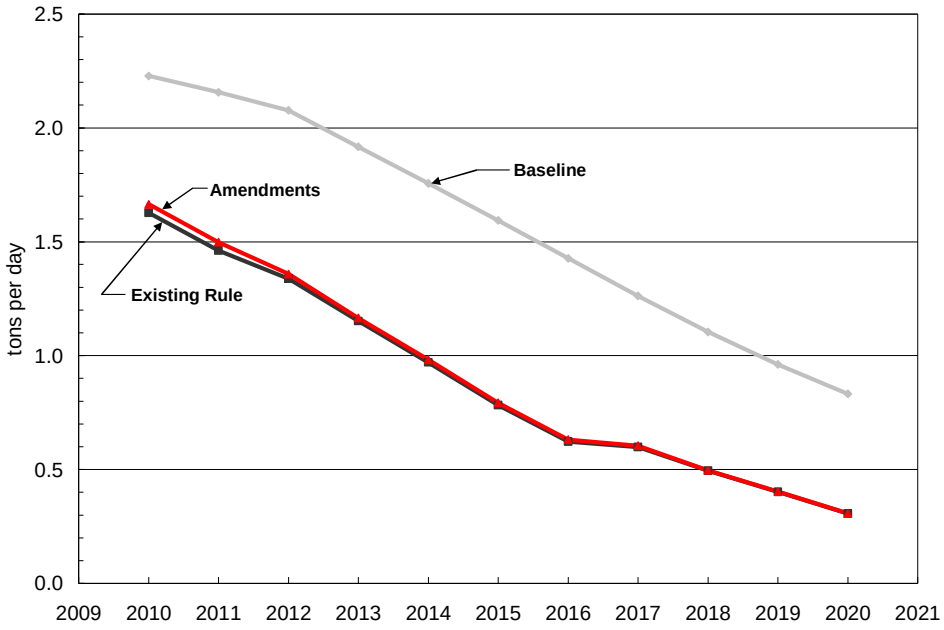
Table IV-1: Statewide Diesel PM Annual Unrealized Emission Reductions for 2010 to 2020 Attributable to Proposed TRU ATCM 2010 Amendments

Year	Affected MY 2003 and MY 2004 Engines		Flexibility Engine Adjustment		Total	
	PM (tpd)	NO_x (tpd)	PM (tpd)	NO_x (tpd)	PM (tpd)	NO_x (tpd)
2010	0.012	0	0.025	0.10	0.037	0.10
2011	0.012	0	0.024	0.10	0.036	0.10
2012	0.011	0	0.010	0.09	0.021	0.09
2013	0.010	0	0.003	0.09	0.013	0.09
2014	0.009	0	0.003	0.08	0.012	0.08
2015	0.007	0	0.003	0.07	0.010	0.07
2016	0.006	0	0.002	0.06	0.008	0.06
2017	0.004	0	0.002	0.05	0.006	0.05
2018	0.000	0	0.001	0.04	0.001	0.04
2019	0.000	0	0.001	0.02	0.001	0.02
2020	0.000	0	0.000	0.01	0.000	0.01

Values are rounded.

The projected total statewide diesel PM emission incremental changes from the proposed TRU ATCM 2010 amendments are presented in Figure IV-1 as a comparison to the TRU ATCM and the TRU baseline as estimated in the 2003 Staff Report. The diesel PM emissions from TRUs in 2010 were estimated to be about 1.6 tpd in the 2003 Staff Report, dropping to about 0.31 tpd in 2020. The incremental change in PM emissions that would occur as a result of the proposed TRU ATCM 2010 amendments drops from 2010 through 2020, with the impacts becoming negligible after 2018. As discussed in Chapter III, the only incremental NO_x emission impacts are due to the use of flexibility engines which have higher emissions. This amendment allows the adjustment of compliance dates for prior flexibility engines, but limits the life of future flexibility engines to preserve emission reductions.

Figure IV-1: Projected Statewide Diesel PM Emissions for Baseline, TRU ATCM and with Proposed TRU ATCM 2010 Amendments



As Figure IV-1 shows, the emissions impact from the proposed TRU ATCM 2010 amendments is negligible, but nonetheless represents an adverse, although not substantial, emissions impact. The highest concentrations of diesel PM from TRUs are expected to occur at locations where numerous TRUs operate such as distribution facilities, ports and intermodal facilities. These locations could see slightly increased concentrations of approximately 0.04 tpd of diesel PM.

B. Health Impacts

The impacts associated with the proposed TRU ATCM 2010 amendments would result in slight increases of ambient particulate matter (PM) emissions and exposure to diesel PM and NO_x. Estimating the impact of the diesel PM emission due to the proposed TRU ATCM 2010 amendments on potential cancer risk depends on location of the emission impacts. The diesel PM emission impacts between the end of 2010 and the end of 2017 due to the proposed TRU ATCM 2010 amendments may result in a small increase in potential health risks of less than one per million (see Chapter III for additional details).

Staff believes that the majority of TRU owners will continue to comply with the in-use emissions standards by repowering with new replacement engines and TRU gen set owners will continue to replace the entire unit. If there is a change in this trend, so that more owners elect to retrofit with exhaust aftertreatment systems, a 2 to 5 percent fuel

penalty is typically associated with diesel particulate filters; and the increased fuel use would translate into increased carbon dioxide (CO_2) emissions. While this potentially could occur, staff does not believe the TRU ATCM 2010 amendments, by themselves, would cause a significant change in the use of the retrofit option over the repower option. In general newer engines are expected to be more fuel efficient than the older engines being replaced, but there is some uncertainty whether this will be the case when engine manufacturers may need to utilize exhaust aftertreatment technologies to meet Tier 4 final new engine emissions standards in the 25 horsepower (hp) to less than 50 hp category.

C. Environmental Impacts

ARB staff anticipates that the proposed TRU ATCM 2010 amendments to allow owner's to comply by meeting either the LETRU or ULETRU requirements and adjust the compliance deadline for prior flexibility engines, but limit use of future flexibility engines, will not significantly increase criteria, toxic, and greenhouse gas (GHG) emissions. As shown in Table VI-1, emissions reductions not realized consist of 0.037 tpd of PM and 0.10 tpd of NO_x in 2010. There would not be any change to the impacts discussed in the 2003 Staff Report for potential compliance methods including diesel particulate filters (DPF).

D. Global Warming Impacts

The following sections provide an overview of the current understanding of the potential climate impacts of the pollutants emitted by diesel engines, which are used to power all but a few TRUs and TRU gen sets.

Particulate Matter (PM): PM from diesel engine exhaust is composed of combustion particles consisting of elemental and organic carbon and sulfate, all of which can form aerosols. Atmospheric aerosols play an important role in the climate system through modifications of the global energy budget: directly, by the scattering and absorption of radiation; indirectly, by the modification of cloud properties. Black carbon typically emitted as a fraction of PM from combustion processes, is the main light-absorbing component of aerosols and thereby causes global warming. In recent years, there has been increased attention to black carbon for its global warming potential through direct and semi-direct effects.

Overall, the climate impact assessment of PM emitted by diesel engines is rather complex: radiative forcing of black carbon is positive (climate warming impact), while radiative forcing of sulfate particles is negative (cooling impact). The particles emitted from diesel engines represent a variety of compositions and sizes. The magnitude of the overall direct climate impact of black carbon emitted from diesel engines and information on emissions of diesel-exhaust particles, such as detailed characterization of chemical composition, microphysical characteristics and the fate of the particles in the environment are not well known. (ARB, 2008) A better characterization of diesel

engine emissions is needed to improve the understanding of the climate change impacts from control strategies.

Nitrogen oxides (NO_x): Through the production of tropospheric ozone, emissions of NO_x have a climate warming impact. However, by affecting the concentration of hydroxyl radical (OH), they reduce the levels of methane, providing a cooling effect. The net climate impact of changes in NO_x emissions will depend on whether ozone or methane production dominates. At this time, there is no consensus on which action is likely to dominate or on the overall magnitude of the impact due to changes in NO_x emissions resulting from the regulation. (ARB, 2008)

Conclusion: With the proposed TRU ATCM 2010 amendments, the TRU ATCM would continue to substantially decrease diesel PM and NO_x emissions, but defer a very small portion of the expected emission reductions until the 2017-2018 period. Additionally, staff expects the proposed TRU ATCM 2010 amendments to have a negligible effect on global warming.

E. Reasonably Foreseeable Mitigation Measures

ARB staff has concluded that the emissions impact from the proposed TRU ATCM 2010 amendments will be negligible and will not have a significant adverse impact on the environment. The proposed TRU ATCM 2010 amendments are necessary in that they will add a compliance option for affected MY 2003 and MY 2004 engines and clarify the standards with regard to flexibility engines while ensuring that the goals of the ATCM to reduce emissions and risks from TRU diesel engines continue to be met.

F. Reasonably Foreseeable Alternative Means of Compliance with the Proposed ATCM

Having found that the amendments will not result in any significant environmental effects, it is not necessary to address alternatives to the proposed amendments under CEQA. However, staff has considered alternatives to the regulation as discussed in Chapter II of this report.

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V. ECONOMIC IMPACTS

This chapter discusses the estimated incremental costs and incremental economic impacts associated with implementation of the proposed TRU ATCM 2010 Amendments. The expected equipment incremental costs for potential compliance options, the cost and associated economic impacts on businesses, as well as an analysis of the cost-effectiveness of proposed TRU ATCM 2010 amendments to the regulation are presented. Estimates in this section are based on the costs incurred and incremental emissions during the years of 2010 to 2027. The costs, presented as net present value (NPV) in 2010 dollars, are included with an explanation of the methodology used in Section C.

A. Summary of the Economic Impacts

In assessing the costs and savings associated with the proposed TRU ATCM 2010 amendments, ARB staff developed estimates for regulatory costs and savings associated with the proposed amendments to the in-use standards for MY 2003 and MY 2004 engines for TRU operators, as well as the regulatory costs of additional recordkeeping and reporting for the OEMs. The estimated regulatory costs for TRU operators include the incremental capital cost differential between installing a Level 2 VDECS to meet LETRU rather than installing a Level 3 VDECS for ULETRU adjusted for the estimated percentage of use of VDECS for compliance, the cost of a Level 3 VDECS on the surviving TRUs in 2017, and the time value of money associated with the additional ULETRU step. If a business chooses to replace the TRU engine rather than retrofit with a VDECS, there is no incremental cost from the proposed TRU ATCM 2010 amendments as engine replacement is a compliance option in both regulatory scenarios. The proposed amendment to provide additional compliance time for flexibility engines has no change in economic impacts from the original TRU ATCM as the original economic impacts were based on year of sale, not the model year of the engine. However, it does provide some relief to businesses that were anticipating expenditures based on the model year of the TRU purchased, but are currently faced with unexpected early expenditures based on the model year of the engine.

There will be compliance cost savings due to changing the in-use standard to allow compliance to be achieved with the optional LETRU standard because the Level 2 VDECS required to meet the LETRU standard costs about $2,000 less than the Level 3 VDECS required to meet ULETRU. The total savings would be about $2.1 million (annualized over the seven year operational life and presented in 2010 dollars). However, since the affected engines still operating in 2017 and 2018 would still need to meet ULETRU, these compliance costs would reduce the savings by about $1.79 million in 2010 dollars. After considering the additional cost to OEMs for recordkeeping and reporting, staff estimates that the net cost savings for compliance with the proposed TRU ATCM 2010 amendments to the regulation to be approximately $160,000 (2010 dollars) from 2010 through 2027.

Staff evaluated the economic impacts the proposed TRU ATCM 2010 amendments had on businesses by estimating the effect of the regulatory costs on small businesses and typical businesses. The impact produces a significant cost savings in early years for all business, but has a cost impact in later years if the TRU owner decides to comply with ULETRU when the engine is 14-years old. The OEMs incur annual reporting costs that are not significant; however they have an initial report that includes the previous five years of data.

One state agency would be impacted by the proposed TRU ATCM 2010 amendments to the regulation. The California Department of Corrections operates refrigerated trucks and trailers used to service correctional facilities, three TRUs of which are impacted by this amendment to the in-use engine standards. The capital cost savings to this state agency is estimated to be a maximum of $6,000. Refrigerated trucks and trailers are owned and operated by at least 25 local school districts and county agencies, which may have maximum cost savings of $10,000, and by the Federal Bureau of Prisons, which may have maximum cost savings of $4,000.

Cost-effectiveness is expressed in terms of costs in dollars per unit of emissions reduced (pounds or tons). As the proposed TRU ATCM 2010 amendments will generate cost savings and emissions reductions that were anticipated but will not be realized, we will not describe the impacts in terms of cost-effectiveness.

B. Legal Requirements

In this section we explain the legal requirements that must be satisfied in analyzing the economic impacts of the proposed TRU ATCM 2010 amendments to the TRU ATCM.

Section 11346.3 of the Government Code requires State agencies assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed amended regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses in other states. Also, California state agencies are required to estimate the cost or savings to any State or local agency in accordance with instructions adopted by the Department of Finance (DOF). The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

In addition, Health and Safety Code section 57005 requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding 10 million dollars in any single year. Because the estimated cost of the TRU ATCM 2010 amendments to the TRU ATCM does not exceed 10 million dollars in any single year, the proposed TRU ATCM 2010 amendments to the TRU ATCM do not constitute a major regulation.

The following is a description of the methodology used to estimate costs as well as ARB staff's analysis of the economic impacts on California businesses, as well as, federal, State, and local agencies.

C. Methodology for Estimating Costs Associated with Proposed Amendments

In this section, the estimated costs associated with the proposed TRU ATCM 2010 amendments are discussed. Briefly, the methodology entailed:

- Estimating the regulatory costs associated with the proposed amendments to the in-use performance standards for MY 2003 and MY 2004 engines.
- Estimating the regulatory costs of additional recordkeeping and reporting for the OEMs. The only costs associated with the flexibility engine adjustment are OEM reporting to identify TRUs with flexibility engines. No additional reporting costs are anticipated for TRU owners since the required information will be provided by the OEM and the registration updates will be done by ARB staff.
- Costs were estimated in 2010 dollars and also adjusted to NPV using a five percent discount rate.

1. Differential in VDECS Retrofit Costs for Level 2 and Level 3:

The estimated costs for purchasing and installing VDECS in an in-use TRU were determined using manufacturers suggested cost data from the Level 2 VDECS manufacturers and the Level 3 VDECS manufacturers. There are currently two Level 2 VDECS manufacturers with two sizes of VDECS and one Level 3 VDECS manufacturer marketing VDECS for TRUs. The estimated costs included the cost of the filter, new injectors as required by the VDECS verifications, and the labor for installation. Staff's estimate of the average costs for purchase and installation of a VDECS retrofit, as well as the cost differential are shown in Table V-1.

Table V-1: Estimated Average VDECS Retrofit Costs by Equipment Type (2010 Dollars)

Equipment Type	Horsepower Category (hp)	Cost of Level 2 VDECS[1]	Cost of Level 3 VDECS[1]	Incremental Cost Decrease between Level 3 and Level 2
California-based truck van	Less than 15	$3,650	$6,000	$2,350
California-based truck van	Less than 25	$3,650	$6,000	$2,350
California-based semi-trailer	25- <50	$4,705	$6,000	$1,295
Out-of-state semi-trailer	25- <50	$4,705	$6,000	$1,295
Railcar	25- <50	$4,705	$6,000	$1,295
California-based container on semi-trailer/railcar	25- <50	$4,705	$6,000	$1,295

1. Includes VDECS, labor, and ancillary equipment costs.

Table V-2 presents estimates of the number of affected engines in 2010 and 2011 and cost of installing Level 2 VDECS on these engines. Staff has adjusted the incremental cost assuming that about 30 percent of TRU operators are expected to comply with the TRU ATCM by retrofitting with a VDECS. This percentage adjustment is based on the compliance percentage for 2002 engines. The detailed calculations associated with this cost savings estimate are located in Matrix 1 of Appendix B: Proposed TRU ATCM 2010 Amendments In-Use Compliance Cost Estimates.

Table V-2: Incremental Cost Savings from Proposed Amendment Extending the Level 2 VDECS Requirement to MY 2003 and MY 2004 Engines (2010 Dollars)

Equipment Type	Horsepower Category (hp)	Number of TRUs Affected		Number of TRUs Expected to Use Level 2		Incremental Level 2 VDECS Cost Savings (2010 Dollars)	
		2010	2011	2010	2011	2010	2011
California-based truck van	Less than 15	403	442	121	133	$2,350	$2,253
California-based truck van	15-<25	149	161	45	40	$2,350	$2,233
California-based semi-trailer	25-<50	2,038	0	611	0	$1,295	N/A
Out-of-state semi-trailer	25-<50	672	0	202	0	$1,295	N/A
Railcar	25-<50	150	0	45	0	$1,295	N/A
California-based container on semi-trailer/railcar	25-<50	292	0	45	0	$1,295	N/A

2. Future Level 3 VDECS Costs

If Level 2 VDECS are installed on MY 2003 and MY 2004 engines, an additional ULETRU compliance step must be performed on surviving engines by December 31 of the 14th year after the model year of the engine (2017 for MY 2003 engines and 2018 for MY 2004 engines less than 25 hp). Again, staff has adjusted the incremental cost assuming that about 30 percent of TRU operators are expected to comply with the TRU ATCM by retrofitting with a VDECS. This is a conservative assumption as staff anticipates that most TRU operators with Level 2 VDECS will comply with the regulation in 2017 and 2018 by replacing their existing TRUs rather than retrofitting with a Level 3 VDECS because these TRUs will be at the end of their useful service life. Table V-3 presents estimates of the number of surviving engines in 2017 and the cost of installing Level 3 VDECS on the surviving engines. These costs were derived by applying a five percent discount rate to the 2010 costs listed in Table V-1. The detailed calculations associated with this cost estimate are located in Matrix 1 of Appendix B: Proposed TRU ATCM 2010 Amendments In-Use Compliance Cost Estimates.

Table V-3: Costs from Proposed Amendment Extending the Level 3 VDECS Compliance Deadline for MY 2003 and MY 2004 Engines to 2017 and 2018 (2010 Dollars)

Equipment Type	Horsepower Category (hp)	Number of TRUs Affected		Number of TRUs Expected to Use Level 3 VDECS		Level 3 VDECS Cost (2010 Dollars)	
		2017	2018	2017	2018	2017	2018
California-based truck van	Less than 15	126	132	38	40	$4,190	$3,981
California-based truck van	15-25	47	48	14	14	$4,190	$3,981
California-based semi-trailer	25-50	638	0	191	0	$4,190	$3,981
Out-of state semi-trailer	25-50	211	0	63	0	$4,190	$3,981
Railcar	25-50	47	0	14	0	$4,190	$3,981
California-based container on semi-trailer/railcar	25-50	92	0	28	0	$4,190	$3,981

3. Flexibility Engine Adjustments

Staff anticipates that the only change in costs from flexibility engines from the economic analysis in the 2003 Staff Report is attributed to the one-time reporting cost for TRU manufacturers. In the 2003 Staff Report, capital costs were expected in the year of sale, not the effective engine model year, therefore there is no incremental change in capital cost as this amendment proposes to return the costs to year of sale rather than the 7th year after the effective engine model year. There are increased emissions impacts associated with this adjustment as the emissions for the year of sale (Tier 2 in effect) were estimated from the current tier engines (Tier 2) for the year of sale, which is lower than the emissions than the emissions from the flexibility engines (Tier 1).

4. Operation and Maintenance Costs

Staff does not anticipate that there will be a significant change in the operating and maintenance costs for the proposed Level 2 VDECS in-use standard compared to the current Level 3 VDECS standard as noted in the 2003 Staff Report.

5. Recordkeeping and Reporting Costs

Under staff's proposal, OEMs are required to report flexibility engine data to ARB, as well as unit and engine data for both prior and current production years. The cost for collecting and reporting this data to ARB was estimated by contacting the OEMs for estimates of the time to prepare these reports. The flexibility engine reporting and the initial prior production reporting will occur in 2010 and is based on estimates provided

by the OEMs for reporting of flexibility engines. ARB staff estimates a cost of about $19,000 for initial reporting of flexibility engines and $25,000 for initial reporting of five years of data for prior production years. Based on ARBER registrations, ARB estimates that approximately 10,000 TRUs per year will require prior year production reporting for an estimated cost of $5,000. Current production year reporting is estimated to be approximately $3,400 per year based on an estimate of the number of models per production year.

D. Total Regulatory Costs

Table V-4 provides the regulatory costs attributed to the proposed TRU ATCM 2010 amendments from the calculations located in Matrix 1 and Matrix 2 of Appendix B. The in-use engine regulatory costs are derived from the cost differential between Level 2 and Level 3 VDECS, the future cost of Level 3 VDECS in 2017, and the reporting cost. The net total regulatory cost savings for the TRU ATCM 2010 amendments over the years 2010 to 2027 are estimated to be about $160,000 (2010 dollars).

Table V-4: Total Estimated Regulatory Costs for Proposed TRU ATCM 2010 Amendments (2010 Dollars)

Proposed TRU ATCM 2010 Amendments	Regulatory Cost or (Savings)
NPV Incremental Cost Savings for MY 2003 and MY 2004 < 25 hp Savings (2010 $)	($810,000)
NPV Incremental Cost Savings for MY 2003 > 25 hp Savings (2010 $)	($1,290,000)
NPV ULETRU Cost for MY 2003 and MY 2004 < 25 hp (2010 $)	$460,000
NPV ULETRU Cost for MY 2003 > 25 hp (2010 $)	$1,330,000
NPV OEM Reporting Cost (2010 $)	$150,000
Operating and Maintenance Cost (2010 $)	$0
NPV Net Total Cost or (Savings) (2010 $)	**($160,000)**

All values rounded.

E. Estimated Costs to Businesses

The costs and economic impacts on businesses are presented in this section. The overall impact on business competitiveness, employment, and other impacts on business are also presented.

1. Potential Impact on Employment, Business Creation, Elimination or Expansion

a. Potential Impact on Employment

The proposed TRU ATCM 2010 amendments are not expected to cause a measurable change in California employment and payroll. The proposed TRU ATCM 2010 amendments are likely to result in no change in employment in businesses as compared to the 2003 Staff Report.

b. Potential Impact on Business Creation, Elimination, or Expansion

The proposed TRU ATCM 2010 amendments would have a positive impact on the status of California businesses. The proposed TRU ATCM 2010 amendments reduce the economic burden on businesses which have affected MY 2003 and MY 2004 engines, and extend the current compliance dates for flexibility engines. These businesses may benefit from the proposed addition of a less expensive compliance alternative for MY 2003 and MY 2004 engines, and the proposed relief from the unexpected compliance costs associated with flexibility engines.

c. Potential Impact on Business Competitiveness

The proposed TRU ATCM 2010 amendments would have no significant impact on the ability of California businesses to compete with businesses in other states. The proposed TRU ATCM 2010 amendments are likely to result in no change in business competitiveness as compared to the 2003 Staff Report, as Non-California-based TRUs operating in California will be required to meet the same regulatory requirements as California-based TRUs.

2. Estimated Regulatory Cost for Small and Typical Business

About 80 percent of the companies that own TRUs are considered small businesses, having less than 20 TRUs. The estimated regulatory cost for small and typical business is presented in Table V-5. The estimated regulatory cost savings from these TRU ATCM 2010 amendments for a small business ranges from $2,000 for one unit to $40,000 for 20 units, with an average of $21,000. The estimated regulatory cost savings for a typical business ranges from $42,000 for 21 units to $100,000 for 50 units with an average of $71,000. The estimated regulatory costs for OEMs are estimated at about $44,000 initially and about $8,000 per year thereafter.

Table V-5: Estimated Incremental Regulatory Cost Savings for Small and Typical Business (2010 Dollars)

Year	Incremental Cost Savings to Small Business		Incremental Cost Savings to Typical Business		Cost to OEMs
	1 Unit	20 units	21 Units	50 Units	
Capital Cost Savings (2010 $)	$2,000	$40,000	$42,000	$100,000	N/A
Annualized Capital Cost Savings (2010 $)	$400	$8,000	$8,000	$40,000	N/A
OEM Initial Reporting Costs (2010 $)	N/A	N/A	N/A	N/A	$44,000
OEM Annual Reporting Costs (2010 $)	N/A	N/A	N/A	N/A	$8,000

All values rounded.

F. Cost to Local, State, and Federal Agencies

One state agency would be impacted by the proposed TRU ATCM 2010 amendments to the regulation. The California Department of Corrections operates refrigerated trucks and trailers used to service correctional facilities, three of which are impacted by this amendment to the in-use engine requirements. The capital cost savings to this state agency is estimated to be a maximum of $6,000. Refrigerated trucks and trailers are owned and operated by at least 25 local school districts and local agencies, which may have a maximum cost savings of $10,000, and by the Federal Bureau of Prisons, which may have a maximum cost savings of $4,000.

The proposed TRU ATCM 2010 amendments are not expected to add significant costs above those already required to implement and enforce the proposed amended regulation. ARB's administrative costs for outreach, educational efforts, and technical assistance would be absorbed within existing budgets and resources.

G. Cost-Effectiveness

Cost-effectiveness is expressed in terms of costs in dollars per unit of emissions reduced (pounds or tons). As the proposed TRU ATCM 2010 amendments to the TRU ATCM will generate cost savings and emissions reductions not realized, it is not practical to describe the impacts in terms of cost-effectiveness.

Table V-6 shows the range of cost effectiveness for ARB regulations. The cost savings and emission reductions lost from the proposed TRU ATCM 2010 amendments are negligible and do not affect the original cost-effectiveness range of the TRU ATCM as presented in the 2003 Staff Report.

Table V-6: Comparison of Diesel PM Cost Effectiveness of the Proposed TRU ATCM 2010 Amendments to Other ARB Regulations

Regulation or Airborne Toxic Control Measure	Diesel PM Cost- Effectiveness
	Dollars/ Pound PM
Commercial Harbor Craft (2007)	$29
Commercial Harbor Craft (2010 Amendments)	$35
In-Use Off-Road Diesel Vehicles	$40
Cargo Handling Equipment Proposal	$41
Solid Waste Collection Vehicle Rule	$28
Stationary Diesel Engine ATCM	$4 - $26
Transport Refrigeration Unit ATCM (2004)	$10 - $20
Transport Refrigeration Unit ATCM (2010 Amendments)	$10 - $20

VI. Public Outreach and Future Activities

A. Public Outreach

Staff has provided opportunities for participation in the rulemaking process. Staff's public outreach efforts included three public workshops at which draft regulatory concepts, language, emissions impacts, health risk impacts, and economic impacts were provided. Staff's public outreach efforts included meetings, webcasts, teleconferences, telephone contacts, and emails with TRU owners and fleet operators, trade associations, trade journal reporters, TRU original equipment manufacturers, TRU dealers and service centers, truck and trailer dealers, brokers, leasing companies, diesel particulate matter emissions control system manufacturers, environmental groups, engine rebuilders, and other interested parties. Staff also created a website and maintained an email address list that includes over 5,100 addresses to automatically update interested parties about rulemaking developments. The TRU website can be accessed at: http://www.arb.ca.gov/diesel/tru.htm

B. Environmental Justice

The proposed amendments result in a short-term negligible increase diesel PM emissions and will impact diesel PM emissions at distribution centers, grocery stores, and other facilities where TRUs operate. Communities near distribution centers are often more heavily impacted by TRUs operating at these locations. On December 13, 2001, the Board approved "Policies and Actions for Environmental Justice," which formally established a framework for integration of environmental justice into ARB's programs, consistent with the directive of California state law. These policies apply to all communities in California; however, environmental justice issues have been raised specifically in the context of low-income areas and ethnically diverse communities. The proposed amendments are consistent with our environmental justice policy to reduce health risk in all communities, including those with low-income and ethnically diverse populations.

C. Future Activities

When staff began this rule amendment process our goal was to bring to the Board a series of amendments addressing implementation, enforcement, and economic issues. As we progressed through the first two workshops, the number of potential amendments grew as did the number of possible approaches to address issues and concerns. It became clear to staff that additional data collection and analysis would be needed before we would be in a position to recommend specific rule changes to the Board. However, there were several amendments that required Board action in 2010 because of compliance dates that become effective at the end of the year. As a result, staff decided to bring the rulemaking forward in two phases. Phase 1, which is the subject of this Staff Report, would address time-critical amendments that urgently need Board approval before the end of the year.

Phase 2, which we tentatively plan to bring to the Board in July 2011, would address the remaining issues and concerns that are not as time-critical. This will provide staff additional time to adequately develop the remaining proposed amendments, address stakeholder concerns, and complete the necessary update to the emissions inventory. Below is a list of the issues we will be working on:

Changes to Emission Standards

- Clarify ULETRU standard for less than 25 hp engines meeting Tier 4f – require highest level VDECS retrofit available or alternative technology when 7 years old

Changes to the Compliance Schedule

- Extend LETRU compliance period by one year for complying by original December 31, 2008, compliance date (engine model years 2001 and older)
- Extend LETRU compliance period by one year for complying by December 31, 2009, compliance date (engine model year 2002)
- Provide an alternative compliance schedule for low-use TRUs using automated GPS/wireless recordkeeping

Sell Thru Provisions

- Establish the "effective model year" for TRUs where the difference between the model year of the engine and model year of the TRU is no more than 1 year to be the more recent model year

Monitoring, Reporting, Recordkeeping, and Labeling Provisions

- Require OEMs to provide unit labels identifying the effective model year
- Require engine rebuilders to provide labels identifying the effective model year
- Require engine rebuilders, sellers, and installers to provide unit and engine data to ARB and purchaser
- Add monitoring, recordkeeping, and reporting requirements for Alternative Technologies, such as hybrid-electric TRUs and hybrid cryogenic temperature control systems
- Clarify dealer registration requirements and handling of noncompliant units

Other Proposed Changes

- Clarify purchase, transport, and storage requirements for noncompliant units
- Exempt TRUs used during State or federal declared emergencies
- Provide Executive Officer authority to grant limited exemptions where complying technology has not been delivered on time or is not available
- Extend compliance co-responsibility to the entity that arranges transport (e.g. brokers, shippers, or receivers)
- Clarify the existing prohibition on the sale of noncompliant units

VII. RECOMMENDATION

ARB staff recommends the Board approve the proposed TRU ATCM 2010 amendments to the regulations, as presented in Appendix A, for the following reasons:

Proposed Amendment to the In-Use Emissions Standards for MY 2003 and MY 2004 Engines

- Level 3 VDECS were anticipated being available as a compliance option for TRUs early in 2010. This has not occurred. Amending the ULETRU requirements is necessary given that there is only one Level 3 VDECS currently available, that verification of this VDECS did not occur until July 2010, that the availability of this VDECS is limited, that the supporting dealer network is in the initial stages of development, and that there are no Level 3 VDECS that fit in the TRU housing for <25 hp units.
- Level 2 VDECS are readily available on the market, and have been installed in thousands of model year (MY) 2002 and older TRUs, so the dealer and installation network is established and these products have been thoroughly demonstrated.
- Level 2 VDECS are compatible with MY 2003 engines in the 25 hp to less than 50 hp category and the VDECS verifications have been extended to include this model year.
- Level 2 VDECS are compatible with MY 2003 and 2004 engines in the less than 25 hp category and the VDECS verifications have been extended to include this model year.

Flex Engine Provisions

- Staff finds that because TRU owners were unaware that purchasing a TRU equipped with a flexibility engines would not have the same operating life as an engine meeting the tier standards in effect at the time of manufacture, using the manufacturer year for flexibility engines installed in the past is appropriate. However, going forward, the effective model year for flexibility engines needs to be used to provide an incentive to original equipment manufacturers to install the cleanest engines that are available in new equipment as soon as possible and to ensure that if flexibility engines that meet dirtier prior-tier standards are installed in new equipment, they are cleaned up as soon as possible. The effective model year of an engine that was manufactured to a prior tier standard that was not the standard currently in effect at the time of manufacture would be the last year that the prior tier standard was in effect.

Reporting Provisions

- To facilitate staff efforts to provide enhancements to the ARBER registration system, making it easier for owners to register, and to improve the emissions inventory, TRU and TRU gen set OEMs need to periodically report unit and engine data for the coming production year and prior production years.

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REFERENCES

(ARB, 2000) California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. Sacramento, California. October 2000.

(ARB, 2003) Air Resources Board, *Staff Report: Initial Statement of Reasons for proposed Rulemaking of the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities where TRUs Operate*, October 2003.

(ARB, 2008) Air Resources Board, *Initial Statement of Reasons for Proposed Rulemaking: Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels Within California Waters and 24 Nautical Miles of the California Baseline*. June 2008.

(ARB, 2010) Air Resources Board, *Diesel PM Control Technology Options for complying with TRU ATCM,* August 2010

(CalEPA, 2007) Business, Housing, and Transportation Agency, and California Environmental Protection Agency, *Goods Movement Action Plan.* January 2007.

(CFR, 2010a) Title 40, Code of Federal Regulations, Part 89, section 89.102. *Effective dates, optional inclusion, flexibility for equipment manufacturers.* Current as of September 1, 2010.

(CFR, 2010b) Title 40, Code of Federal Regulations, Part 1039, section 1039.625. *What requirements apply under the program for equipment manufacturer flexibility?* Current as of September 1, 2010.

(CFR, 2010c) Title 40, Code of Federal Regulations, Part 1068, section 1068.265. *What provisions apply to engines that are conditionally exempted from certification?* Current as of September 1, 2010.

(CCR, 2010) Title 13, California Code of Regulations, section 2423. *Exhaust Emission Standards and Test Procedures – Off-Road Compression Ignition Engines.* Operative 1-6-2006 (Register 2005, No. 49).

(U.S. EPA, 2009) *California State Nonroad Engine and Vehicle Pollution Control Standards; Authorization of Transport Refrigeration Unit Engine Standards, Notice of Decision.* Federal Register, Vol. 74, No. 11, page 3030, Friday, January 16, 2009, Notices.

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APPENDIX A

PROPOSED AMENDMENT OF AIRBORNE TOXIC CONTROL MEASURE FOR IN-USE DIESEL-FUELED TRANSPORT REFRIGERATION UNITS (TRU) AND TRU GENERATOR SETS, AND FACILITIES WHERE TRUs OPERATE

TITLE 13, CALIFORNIA CODE OF REGULATIONS SECTION 2477

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Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

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Amend article 8, Off-Road Airborne Toxic Control Measures, and section 2477, within division 3, chapter 9, title 13, California Code of Regulations, to read as follows: (Note: Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions.)

Article 8. Off-Road Airborne Toxic Control Measures

Section 2477. Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate.

(a) **Purpose**. Diesel particulate matter (PM) was identified in 1998 as a toxic air contaminant. This regulation implements provisions of the Diesel Risk Reduction Plan, adopted by the Air Resources Board in October, 2000, as mandated by the Health and Safety Code Sections 39650-39675, to reduce emissions of substances that have been determined to be toxic air contaminants. Specifically, this regulation will use a phased approach to reduce the diesel PM emissions from in-use transport refrigeration units (TRUs) and TRU generator (gen) set equipment used to power electrically driven refrigerated shipping containers and trailers that are operated in California.

(b) **Applicability**.

(1) Except as provided in subsection (c), this regulation applies to owners and operators of diesel-fueled TRUs and TRU gen sets (see definition of operator and owner in subsection (d) that operate in the state of California. This specifically includes:

(A) Operators and owners of California-based TRUs and TRU gen sets that are installed on trucks, or trailers, shipping containers, or railcars; and

(B) Operators and owners of non-California-based TRUs and TRU gen sets that are installed on trucks, trailers, shipping containers, or trailers.

(2) This regulation applies to facilities located in California with 20 or more loading dock doors serving refrigerated areas where perishable goods are loaded or unloaded for distribution on trucks, trailers, shipping containers, or rail cars that are equipped with TRUs and TRU gen sets and that are owned, leased, or contracted for by the facility, its parent company, affiliate, or subsidiary that are under facility control (see definition).

(3) To the extent not already covered under subsections (b)(1) and (b)(2), above, subsection (g) of this regulation shall apply to any person engaged in this State in the business of selling to an ultimate purchaser, or renting or leasing new or used TRUs or TRU gen sets, including, but not limited to, manufacturers, distributors, and dealers.

(4) TRU and TRU gen set original equipment manufacturers that directly or indirectly sell or offer for sale TRUs and TRU gen sets to the California market.

~~(4)~~(5) Severability. If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulations is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

(c) **Exemptions**. This regulation does not apply to military tactical support equipment.

(d) **Definitions**. For purposes of this regulation, the following definitions apply:

(1) "Affiliate or Affiliation" refers to a relationship of direct or indirect control or shared interests between the subject business and another business.

(2) "Alternative Fuel" means natural gas, propane, ethanol, methanol, or advanced technologies that do not rely on diesel fuel, except as a pilot ignition source at an average ratio of less than 1 part diesel fuel to 10 parts total fuel on an energy equivalent basis. Alternative fuels also means any of these fuels used in combination with each other or in combination with other non-diesel fuels. Alternative-fueled engines shall not have the capability of idling or operating solely on diesel fuel at any time.

(3) "Alternative-Fueled Engine" means an engine that is fueled with a fuel meeting the definition of alternative fuel.

(4) "Alternative Diesel Fuel" means any fuel used in diesel engines that is not commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g. recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer Tropsch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:

(A) The additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or

(B) The additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or

(C) The additive and base fuel are not mixed until vehicle or engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

(5) “ARB” means the California Air Resources Board.

(6) “B100 Biodiesel Fuel” means 100% biodiesel fuel derived from vegetable oil or animal fat and complying with ASTM D 6751-02 and commonly or commercially known, sold, or represented as “neat” biodiesel or B100. B100 biodiesel fuel is an alternative diesel fuel.

(7) “B100 Biodiesel-Fueled” (compression-ignition engine) means a compression-ignition engine that is fueled by B100 biodiesel fuel.

(8) “Business” means an entity organized for profit including, but not limited to, an individual, sole proprietorship, partnership, limited liability partnership, corporation, limited liability company, joint venture, association or cooperative; or solely for purposes of the Prompt Payment Act (Government Code 927 et seq.), a duly authorized nonprofit corporation.

(9) “California-Based TRUs and TRU Gen Sets” means TRUs and TRU gen sets equipped on trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals within California.

(10) “CARB Diesel Fuel” means any diesel fuel that is commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81 and meets the specifications defined in *13 CCR 2281, 13 CCR 2282, and 13 CCR 2284*.

(11) “Carbon Monoxide (CO)” means a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

(12) "Carrier” means any person, party, or entity who undertakes the transport of goods from one point to another.

(13) "Certification" means the obtaining of an Executive Order for a new offroad compression-ignition engine family that complies with the off-road compression-ignition emission standards and requirements specified in the California Code of Regulations, Title 13, Section 2423. A "certified engine" is an engine that belongs to an engine family that has received a certification Executive Order.

(14)"Certification Data" means the ARB Executive Order number and related exhaust emission data for each test cycle mode used to certify the engine family and obtain the certification level shown in the certification Executive Order. Such data includes modal exhaust emissions data for nitrogen oxides, nonmethane hydrocarbons, carbon monoxide, and particulate matter includes, as a minimum, torque, engine speed, weighting factor, power, mass emission rate (grams per hour), and certification test fuel.

(15)“Compression Ignition (CI) Engine” means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

(16)“Consignee” (see receiver).

(17)"Consignor” (see shipper).

(18)"Cryogenic Temperature Control System" means a heating and cooling system that uses a cryogen, such as liquid carbon dioxide or liquid nitrogen that is routed through an evaporator coil that cools air blown over the coil. The cryogenic system uses a vapor motor to drive a fan and alternator, and a propane-fired heater superheats the carbon dioxide for heating and defrosting. Electrically driven fans may be used instead of a vapor motor and heating and defrost needs may be met by using electric heaters and/or vehicle engine coolant.

(19)"Deterioration Factor (DF)" means a factor that is applied to the certification emission test data to represent emissions at the end of the useful life of the engine. Separate DFs apply to each measured pollutant, except that a combined NMHC+NOx DF applies to engines that do not use aftertreatment devices. Decreasing emissions over time would not be allowed to offset increasing emissions of the other pollutant in this combined DF.

(20)“Diesel Fuel” means any fuel that is commonly or commercially known, sold, or represented as diesel fuel, including any mixture of primarily liquid hydrocarbons – organic compounds consisting exclusively of the elements carbon and hydrogen – that is sold or represented as suitable for use in an internal combustion, compression-ignition engine.

(21)“Diesel-Fueled” means fueled by diesel fuel or CARB diesel fuel in whole or in part, except as allowed for a pilot ignition source under the definition for “alternative fuel”.

(22)"Diesel Oxidation Catalyst (DOC)" means the use of a catalyst to promote the oxidation processes in diesel exhaust. Usually refers to an emission control device that includes a flow-through substrate where the surfaces that contact the exhaust flow have been catalyzed to reduce emissions of the organic fraction of diesel particulates, gas-phase hydrocarbons, and carbon monoxide.

(23)"Diesel Particulate Filter (DPF)" means an emission control technology that reduces PM emissions by trapping the particles in a flow filter substrate. Periodically the collected particles are either physically removed or oxidized (burned off) in a process called regeneration.

(24)"Diesel Particulate Matter" means the particles found in the exhaust of diesel-fueled CI engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

(25)"Dual-Fuel Engine" means an engine designed to operate on a combination of alternative fuel, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG), and conventional fuel, such as diesel or gasoline. These engines have two separate fuel systems, which either inject both fuels simultaneously into the engine combustion chamber or fumigate the gaseous fuel with the intake air and inject the liquid fuel into the combustion chamber.

(26) "Effective model year" or "effective engine model year" is an alternative model-year designation (see definition of "model year") for a new replacement engine, rebuilt replacement engine, or flexibility engine when the engine does not meet, at the time of manufacture, the most stringent emission tier standard for a new engine in effect for the horsepower rating of the engine. When an engine is manufactured to meet a less stringent prior-tier emissions standard than is currently in effect, the effective model year is the last year that the prior-tier emission standard was in effect. Table 1 lists the tier standards that apply to TRUs and TRU gen sets and the corresponding effective model years.

Table 1
Effective Model Year

Prior-Tier Engine Emissions Standard	Tier Standard Effective Years	Effective Model Year
Tier 1, 25-50 Hp (trailer)	1999-2003	2003
Tier 1, under 25 Hp (truck)	2000-2004	2004
Tier 2, 25-50 Hp (trailer)	2004-2007	2007
Tier 2, under 25 Hp (truck)	2005-2007	2007
Tier 4i, 25-50 hp (trailer)	2008-2012	2012[11]

[11] Effective model year applies for this tier only after Tier 4f becomes effective in 2013 for 25 to less than 50 hp engines.

~~(26)~~(27) "Emergency" means any of the following times:

(A) A failure or loss of normal power service that is not part of an "interruptible service contract" (see definition in subsection (d));

(B) A failure of a facility's internal power distribution system, provided the failure is beyond the reasonable control of the operator;

(C) When an affected facility is placed under an involuntary "rotating outage" (see definition in subsection (d)).

~~(27)~~(28) "Emission Control Strategy" means any device, system, or strategy employed with a diesel-fueled CI engine that is intended to reduce emissions. Examples of emission control strategies include, but are not limited to, particulate filters, diesel oxidation catalysts, selective catalytic reduction systems, alternative fuels, fuel additives used in combination with particulate filters, alternative diesel fuels, and combinations of the above.

~~(28)~~(29) "Emissions Rate" means the weight of a pollutant emitted per unit of time (e.g., grams per second).

~~(29)~~(30) "Executive Officer" means the Executive Officer of the California Air Resources Board or his or her delegate.

~~(30)~~(31) "Facility" means any facility where TRU-equipped trucks, trailers, shipping containers or railcars are loaded or unloaded with perishable goods. This includes, but is not limited to, grocery distribution centers, food service distribution centers, cold storage warehouses, and intermodal facilities. Each business entity at a commercial development is a separate facility for the purposes of this regulation, provided the businesses are "independently owned and operated" (see definition in subsection (d)).

~~(31)~~(32) "Facility Control (of TRUs or TRU Gen Sets)" means the TRUs or TRU gen sets located at the facility are owned or leased by the facility, its parent company, affiliate, or a subsidiary, or under contract for the purpose of providing carrier service to the facility, and the TRUs' or TRU gen sets' arrival, departure, loading, unloading, shipping and/or receiving of cargo is determined by the facility, parent company, affiliate, or subsidiary (e.g scheduled receiving, dispatched shipments).

~~(32)~~(33) "Fischer-Tropsch Diesel Fuel" See "ultra-low-aromatic synthetic diesel fuel".

(34) "Flexibility engine" means an engine installed in new equipment by an original equipment manufacturer under the Transitional Program for Equipment Manufacturers in accordance with title 40 Code of Federal Regulations (40 CFR)

sections 89.102 and 1039.625, and title 13 CCR section 2423(d). Such engines shall use the “effective model year” designation for purposes of compliance with this subarticle, except as allowed under subsection (e)(1)(B)5.a.

~~(33)~~(35)"Fuel Additive” means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion and has any of the following effects: decreased emissions, improved fuel economy, increased performance of the engine; or assists diesel emission control strategies in decreasing emissions, or improving fuel economy or increasing performance of the engine.

~~(34)~~(36)"Generator Set (gen set)” means a CI engine coupled to a generator used as a source of electricity.

~~(35)~~(37)"Hybrid Cryogenic Temperature Control System” means a temperature control system that uses a cryogenic temperature control system in conjunction with a conventional TRU.

~~(36)~~(38) “Independently Owned and Operated” means a business concern that independently manages and controls the day-to-day operations of its own business through its ownership and management, without undue influence by an outside entity or person that may have an ownership and/or financial interest in the management responsibilities of the applicant business or small business.

~~(37)~~(39)"Intermodal Facility” means a facility involved in the movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes. Such a facility is typically involved in loading and unloading refrigerated shipping containers and trailers to and from railcars, trucks, and ocean-going ships.

~~(38)~~(40)"Interruptible Service Contract” means any arrangement in which a nonresidential electrical customer agrees to reduce or consider reducing its electrical consumption during periods of peak demand or at the request of the System Operator in exchange for compensation, or assurances not to be blacked out or other similar non-monetary assurances.

~~(39)~~(41)"In Use TRU, TRU gen set, or engine” means a TRU, TRU gen set, or engine that is not a “new” TRU, TRU gen set, or engine.

~~(40)~~(42) “Low Emission TRU (LETRU or L)” means a TRU or TRU gen set that meets the performance standards described under paragraph (e)(1)(A)1. or (e)(1)(A)2.

~~(41)~~(43) “Manufacturer” means a business as defined in Government Code § 14837(c).

~~(42)~~(44) “Military tactical support equipment (TSE)” means equipment that meets military specifications, owned by the U.S. Department of Defense and/or the U.S. military services, and used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

~~(43)~~(45) “Model Year (MY)” means the following:

(A) The designation used for engines manufactured to meet the emissions tier standard in effect for new engines at time of manufacture (see alternative designation, “effective model year, defined above); and

(B) The diesel-fueled engine manufacturer’s annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

~~(44)~~(46) “New TRU, TRU Gen Set, or Engine" means any TRU, TRU gen set, or engine that has never been subject to a retail sale or lease to an “ultimate purchaser” (see definition in subsection (d)).

~~(45)~~(47) “Nitrogen Oxide (NOx)” means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition.

~~(46)~~(48)”Non-California-Based TRUs and TRU Gen Sets” means TRUs and TRU gen sets that are equipped on or used in trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals outside of California and operate in California from time to time for the purpose of transporting perishable goods into or out of the state.

~~(47)~~(49) “Non-methane Hydrocarbons (NMHC)” means the sum of all hydrocarbon air pollutants except methane. NMHCs are precursors to ozone formation.

~~(48)~~(50) “Operate” means to start, cause to function, program the temperature controller, select an operating program or otherwise control, fuel, monitor to assure proper operation, or keep in operation.

~~(49)~~(51) “Operator” means any person, party or entity that operates a TRU or TRU gen set for the purposes of transporting perishable goods, excluding an employee driver and third party maintenance and repair service, and including but not limited to:

(D) Manufacturer, producer, supplier, carrier, shipper, consignor, consignee, receiver, distribution center, or warehouse of perishable goods;

(E) An individual, trust, firm, joint stock company, business concern, partnership, limited liability company, association, or corporation including but not limited to, a government corporation;

(F) Any city, county, district, commission, the state or any department, agency, or political subdivision thereof, any interstate body, and the federal government or any department or agency thereof to the extent permitted by law.

~~(50)~~(52) "Owner" means any person that legally holds the title (or its equivalent) showing ownership of a TRU or TRU gen set, excluding a bank or other financial lending institution, and including but not limited to:

(A) Manufacturer, producer, supplier, carrier, shipper, consignor, consignee, receiver, distribution center, warehouse;

(B) An individual, trust, firm, joint stock company, business concern, partnership, limited liability company, association, or corporation including but not limited to, a government corporation;

(C) Any city, county, district, commission, the state or any department, agency, or political subdivision thereof, any interstate body, and the federal government or any department or agency thereof to the extent permitted by law.

~~(51)~~(53) "Owner/Operator" means a requirement applies to the owner and/or operator of a TRU or TRU gen set, as determined by agreement or contract between the parties if the two are separate business entities.

~~(52)~~(54) "Parent Company" means a company that has a controlling interest in another company, usually through ownership of more than one-half the voting stock.

~~(53)~~(55) "Particulate Matter (PM)" means the particles found in the exhaust of CI engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

~~(54)~~(56) "Rated Brake Horsepower" means the power delivered, according to the statement of the engine manufacturer, at the rated speed.

~~(55)~~(57) "Real Emission Reductions" means that an action is taken that results in reductions in the PM emission rate of an in-use engine (e.g. a VDECS is installed that reduced the PM emissions rate by more than 50%).

~~(56)~~(58) "Receiver" means the person, party, or entity that receives shipped goods, cargo, or commodities.

~~(57)~~(59) “Refrigerated Trailer” means a trailer van, railcar, or shipping container equipped with a TRU or TRU gen set. Pursuant to Health and Safety Code section 39618, refrigerated trailers are mobile sources and shall be regulated by the ARB on a statewide basis.

~~(58)~~(60) “Rotating Outage” means a controlled involuntary curtailment of electrical power service to consumers as ordered by the system operator - see definition in subsection (d).

~~(59)~~(61) “Shipper” means the person, party, or entity who usually owns or supplies the commodities shipped by a carrier.

~~(60)~~(62) “System Operator” means one of the several organizations that control energy in California. System operators include, but are not limited to, the California Independent System Operator, the Los Angeles Department of Water and Power, the Imperial Irrigation District, the Sacramento Municipal Utility District.

~~(61)~~(63) “Terminal” means any place where a TRU or TRU gen set equipped truck, trailer, shipping container, railcar or TRU gen set is regularly garaged, maintained, operated, or dispatched from, including a dispatch office, cross-dock facility, maintenance shop, business, or private residence.

~~(62)~~(64)"Tier 4 Nonroad/Offroad Emission Standards" means the emission standards and associated procedures promulgated by U.S. Environmental Protection Agency in "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule" (Vol. 69, No. 124 Fed.Reg. pp. 38957-39273 (June 29, 2004).

~~(63)~~(65) “Transport Refrigeration Unit (TRU)” means refrigeration systems powered by integral internal combustion engines designed to control the environment of temperature sensitive products that are transported in trucks and refrigerated trailers. TRUs may be capable of both cooling and heating.

~~(64)~~(66) “TRU Generator Set (TRU gen set)” means a generator set that is designed and used to provide electric power to electrically driven refrigeration units of any kind. This includes, but is not limited to gen sets that provide electricity to electrically powered refrigeration systems for semi-trailer vans and shipping containers.

~~(65)~~(67) “Ultimate Purchaser” means with respect to a new TRU, TRU gen set, or engine, the first person who in good faith purchases a new TRU, TRU gen set, or engine for purposes other than resale.

~~(66)~~(68) “Ultra-Low-Aromatic Synthetic Diesel Fuel” means fuel produced from natural gas, coal, or biomass by the Fischer-Tropsch gas-to-liquid chemical conversion process, or similar process that meets the following properties:

Table ~~1~~2

Property	ASTM	Value
Sulfur Content (ppmw)	D5453-93	<1
Total Aromatic Content (wt %)	D5186-96	<1.5%
Polynuclear Aromatic Content (wt %)	D5186-96	<0.5%
Natural Cetane Number	D613-84	>74

~~(67)~~(69) “Ultra-Low Emission TRU (ULETRU or U)” means a TRU or TRU gen set that meets the performance standards described under subparagraph (e)(1)(A)1. and (e)(1)(A)2. or that uses an “alternative technology” in accordance with subparagraph (e)(1)(A)3.

~~(68)~~(70) “Verification Classification Level” means the classification assigned to a Diesel Emission Control Strategy by the Executive Officer as defined in the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emission from Diesel Engines (13 CCR Sections 2700 – 2710).* PM reductions correspond as follows: Level 1: ≥ 25%; Level 2: ≥50%; Level 3: ≥85% or 0.01 g/hp-hr.

~~(69)~~(71) “Verified Diesel Emission Control Strategy” (VDECS) means an emission control strategy designed primarily for the reduction of diesel particulate matter emissions that has been verified per the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13 CCR Sections 2700 – 2710)*. Examples of diesel retrofit systems that may be verified include, but are not limited to, diesel particulate filters, diesel oxidation catalysts, fuel additives (e.g. fuel-borne catalysts), alternative fuels (e.g. dual fuel), alternative diesel fuels, and combinations of the above.

(e) **Requirements**.

(1) **In-Use Operation**:

(A) **In-Use Performance Standards:** In accordance with the schedule set forth below in paragraph (e)(1)(B), no owner/operator shall operate a TRU or TRU gen set in California unless it meets the in-use emission category performance standards set forth below.

1. In-Use performance standard categories for TRU and TRU gen set engines with rated brake horsepower less than 25 horsepower (<25 hp) are shown in Table ~~2~~3, along with the engine certification standards or

the level of Verified Diesel Emission Control Strategy (VDECS) (see definition) that is necessary to qualify for each category.

Table ~~2~~3
<25 HP TRU and TRU Gen Set In-Use PM Performance Standards

In-Use Emission Category	Engine Certification (g/hp-hr)	Level of VDECS Equipped with
Low Emission TRU (LETRU or L)	0.30[12]	Level 2
Ultra-Low Emission TRU (ULETRU or U)	NA[13]	Level 3

a. Compliance can be achieved by:

I. Using a certified engine meeting the applicable nonroad/offroad emissions standards for all regulated pollutants and the in-use PM performance standard. Only engines for which certification data and deterioration factors have been provided to ARB shall be considered when determining compliance. The Executive Officer will consider such submittals, publish, and make available a list of qualifying engines.

II. Equipping the engine with the required Level of VDECS.

2. In-Use performance standard categories for TRU and TRU gen set engines with rated brake horsepower greater than or equal to 25 horsepower (≥25 hp) are shown in Table ~~3~~4, along with the engine certification standards or the level of VDECS that is necessary to qualify for each category.

Table ~~3~~4
≥25 HP TRU and TRU Gen Set In-Use PM Performance Standards

In-Use Emission Category	Engine Certification (g/hp-hr)	Level of VDECS Equipped with
Low Emission TRU (LETRU or L)	0.22[14]	Level 2
Ultra-Low Emission TRU (ULETRU or U)	0.02[15]	Level 3

[12] The Engine Certification value for the Low Emission TRU category corresponds to the "Interim" Tier 4 Nonroad/Offroad Emission Standards that are to go into effect in 2008.
[13] Not Applicable – must choose another compliance option ~~ARB and U.S. EPA will perform a technical review in 2007 to evaluate DOC or filter-based standard for <25 hp category new engines in 2013. If a more stringent "long term" level for new tier 4 (as identified in the Tier 4 Nonroad/Offroad Emission Standards) engines is adopted by U.S. EPA for this horsepower category, the Board will consider adopting an engine certification in-use performance standard for ULETRU for <25 hp TRUs and TRU gen sets~~.
[14] The Engine Certification value for Low Emission TRU category corresponds to the "Interim" Tier 4 Nonroad/Offroad Emission Standards that are to go into effect in 2008.

a. Compliance can be achieved by:

I. Using a certified engine meeting the applicable nonroad/offroad emissions standards for all regulated pollutants and the in-use PM performance standard. Only engines for which certification data and deterioration factors have been provided to ARB shall be considered when determining compliance. The Executive Officer will consider such submittals, publish, and make available a list of qualifying engines.

II. Equipping the engine with the required Level of VDECS.

3. As an alternative to meeting the ULETRU in-use performance standards in subsections (e)(1)(A)1. and 2., an owner/operator may operate a TRU or TRU gen set in California meeting one of the *Alternative Technology* options listed below. Alternative Technologies qualify to meet the ULETRU in-use performance standard only if the TRU or TRU gen set is operated under the conditions included in the description listed below.

a. Electric standby, provided that the TRU is not operated under diesel engine power while at a facility, except during an emergency.

b. Cryogenic temperature control systems or hybrid cryogenic temperature control systems, provided that the TRU does not operate under diesel engine power while at a facility, except during an emergency.

c. Alternative-fueled engines (see definition in subsection (d)). If the engine is a CI engine, a VDECS is required.

Note: If the engine is not a compression ignition diesel fueled engine, this regulation would not apply, but the engine may have to meet other emission standards (e.g. large spark-ignited engine standards if >25 hp).

d. Fuel exclusively with an alternative diesel fuel (see definition in subsection (d)) that has been verified as a VDECS, provided it is used in accordance with the requirements of subsection (e)(2)(A) and the alternative diesel fuel contains no conventional diesel or CARB diesel fuel.

e. Power by fuel cells. If a reformer is used with diesel fuel as the source of hydrocarbons, then emissions must be evaluated and verified through the *Verification Procedure Warranty and In-Use*

[15] The Engine Certification value for the Ultra-Low Emission TRU category corresponds to the ~~"Long Term"~~ Tier 4 "final" Nonroad/Offroad Emission Standards that will go into effect in 2012 or 2013.

Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13CCR section 2700 – 2710).

f. Equip with any other system approved by the Executive Officer to not emit diesel PM or increase public health risk while at a facility.

(B) **In-Use Compliance Dates**~~.~~: In-use compliance dates are based upon the engine MY or effective MY, except as allowed under subparagraph (e)(1)(B)5.a.

1. No owner/operator shall operate a 2001 and older model year (MY) TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in paragraph (e)(1)(A) for

   a. LETRU on or before December 31, 2008, and

   b. ULETRU on or before December 31, 2015, as shown in Tables ~~4~~5 and ~~5~~6.

2. No owner/operator shall operate a 2002 MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in paragraph (e)(1)(A) for

   a. LETRU on or before December 31, 2009, and

   b. ULETRU on or before December 31, 2016, as shown in Tables ~~4~~5 and ~~5~~6.

3. No owner/operator shall operate a 2003 MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in subsection (e)(1)(A) for

   a. LETRU on or before December 31, 2010, and

   b. ULETRU on or before December 31, 2017, as shown in Tables 5 and 6.

4. No owner/operator shall operate a ~~2003~~2004 MY and subsequent MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in paragraph (e)(1)(A) for ULETRU on or before December 31st of the seventh year past the ~~unit~~engine's model year, as shown in Tables ~~4~~5[16] and ~~5~~6[6], with the following exception:~~.~~

[16] Model years 2013 and subsequent (not shown in Table 5 and 6), shall meet ULETRU by December 31st of the seventh year after the engine model year or effective model year, except as allowed under subparagraph (e)(1)(B)5.

a. Less than 25 hp model year 2004 engines shall meet the in-use performance criteria set forth in paragraph (e)(1)(A), shown in Table 5, for:

I. LETRU on or before December 31, 2011, and

II. ULETRU by December 31, 2018.

Table 4~~5~~: <25 HP TRU and TRU Gen Set Engines
In-Use Compliance Dates

	In-Use Compliance Year[17]													
MY	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	U	U	U	U
'04					~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	U	U	U
'05[18]						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10											U	U	U	U
'11												U	U	U
'12													U	U
'13														U

[17] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no requirements since in-use compliance year precedes model year . Dark shaded areas without letter codes have no requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.

[18] TRUs and TRU gen sets with MY 200~~3~~5 engines and subsequent MY engines shall be required to comply with ULETRU requirements by the end of the seventh year after the model year or effective model year, except as allowed under subparagraph (e)(1)(B)5. ~~The exception to this is >25 hp 2013 and subsequent model years, since these model years would meet ULETRU in-use performance standards as new engines.~~

Table ~~5~~6: >25 HP TRU and TRU Gen Set Engines
In-Use Compliance Dates

MY	In-Use Compliance Year[19]													
	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	~~U~~L	U	U	U	U
'04[20]					U	U	U	U	U	U	U	U	U	U
'05						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10'											U	U	U	U
'11												U	U	U
'12													U	U
'13														U

5. Requirements for TRUs or TRU gen sets that are equipped with flexibility engines and operated in California.

   a. Flexibility engines installed in TRUs and TRU gen sets manufactured prior to [effective date of amendments], and operated in California shall meet the in-use performance standards of subsection (e)(1)(A) by December 31st of the seventh year after the TRU or TRU gen set engine's manufacture year instead of the effective model year provided the TRU or TRU gen set owner registers the flexibility engine equipped TRU or TRU gen set in ARBER in accordance with subsection (e)(1)(E) by [60 days after the effective date of these amendments].

   b. To allow TRU and TRU gen set owners to meet the registration requirements of subparagraph (a) above, the original equipment manufacturer shall by [30 days after the effective date of these amendments]:
      I. Provide the following unit and flexibility engine information to ARB in electronic format:

[19] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no requirements since in-use compliance year precedes model year . Dark shaded areas without letter codes have no requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.

[20] TRUs and TRU gen sets with MY 200~~3~~4 engines and subsequent MY engines shall be required to comply with ULETRU requirements by the end of the seventh year after the model year or effective model year, except as allowed under subparagraph (e)(1)(B)5.. ~~The exception to this is >25 hp~~Tier 4 final standards go into effect in 2013 ~~and subsequent model years, since these model years~~which would meet ULETRU in-use performance standards ~~as new engines~~ in the 25 hp to less than 50 hp category. If engines installed by original equipment manufacturers do not meet ULETRU in 2013, then subparagraph (e)(1)((A)5. applies.

i. TRU or TRU gen set manufacturer;
ii. TRU or TRU model name;
iii. TRU or TRU gen set serial number;
iv. TRU manufacture date;
v. Engine manufacturer
vi. Engine Family;
vii. Engine manufacture year; and
viii. Engine serial number;

II. Notify the TRU or TRU gen set owners in writing that:
i. The unit they own is equipped with a flexibility or TPEM engine; and
ii. The owner must register the TRU or TRU gen set that is equipped with a flexibility engine in ARBER by [60 days after the effective date of amendments];

III. Provide directly or through its dealers instructions and assistance on registration in ARBER to all owners of TRUs and TRU gen sets equipped with flexibility engines that request such help, which shall include specific instructions and assistance that ensures that information entered in ARBER is consistent with what appears on the unit label and engine emissions label, including the model year.

c. The following requirements shall apply to flexibility engines installed in TRUs and TRU gen sets manufactured after [the effective date of the amendments], and operated in California:

I. The owner of a TRU or TRU gen set that is operated in California shall comply with the in-use performance standards set forth in subsection (e)(1)(A) by December 31st of the seventh year after the engine's effective model year.

II. The original equipment manufacturer shall provide the following, written disclosures to the interested ultimate purchaser of a TRU or TRU gen set that is equipped with a flexibility engine prior to its sale:
i. The TRU or TRU gen set has a flexibility engine that meets a less stringent emissions standard than was in effect at the time the flexibility engine was manufactured;
ii. The effective model year of the flexibility engine;
iii. If the owner registers the unit in ARBER, the owner must report the effective model year of the engine, not the model year of engine manufacture, and failure to do so may result in the owner being cited;

iv. If the TRU or TRU gen set is operated in California, the owner will be responsible at a future date for the engine meeting the ULETRU in-use standard based on the effective model year of the engine, in accordance with subsection (e)(1)(B) .

(C) **Replacements Due to Failures**.

1. If a VDECS fails within its warranty period, the owner/operator of the TRU or TRU gen set must replace it with the same VDECS or a higher verification classification level, if available.

2. If a VDECS fails outside its warranty period and a higher verification classification level VDECS is available, then the owner/operator of the TRU or TRU gen set shall upgrade to the highest level VDECS required under paragraphs (e)(1)(A)1. and (e)(1)(A)2. that is determined to be cost-effective by the Executive Officer.

(D) **In-Use Recordkeeping and Reporting.** In-use recordkeeping and reporting shall be completed by the operator in accordance with the requirements of subsection (f)(1).

(E) **ARB Identification Numbering Requirements**. Identification numbers will be issued to help expedite the inspection procedure and prevent shipping delays.

1. California-based TRUs and TRU gen sets:

a. On or before January 31, 2009, owner/operators of all California-based TRUs and TRU gen sets subject to this regulation shall apply for an ARB identification number for all California-based TRUs or TRU gen sets operated by the operator by submitting an application that includes the information listed below.

I. Operator name, address, and contact information for the responsible official (e.g. phone number, email address, fax number).

II. Owner name, address, and contact information (if other than operator).

III. TRU or TRU gen set make, model, model year, and serial number.

IV. TRU engine make, model, model year, and serial number.

V. Terminal or terminals that the TRU-equipped truck or trailer is assigned to, with address and contact information.

VI. Other associated identification numbers, which may include (as applicable):

i. Vehicle Identification Number (VIN) of the TRU-equipped truck or trailer.

ii. Vehicle license number of the TRU-equipped truck or trailer.

iii. Railcar recording mark and car number.

iv. Shipping container number (for TRU-equipped shipping containers only).

v. Company equipment number (if any).

VII. Compliance status with paragraph (e)(1)(A) requirements. If compliance not as-yet required, mark N/A.

i. Date when compliance was achieved.

ii. What performance standard was met (e.g. LETRU or ULETRU).

iii. How compliance was achieved (e.g. new compliant TRU, TRU engine replacement, or description of VDECS that was used).

iv. Identify who did the installation work (if applicable).

b. Applications shall be submitted by one of the following methods:

I. Mail or deliver a physical report to ARB at the address listed immediately below:

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

II. Electronically submit through ARB's web site. The web address will be identified in an advisory.

c. TRUs and TRU gen sets added to an operator's TRU operations after January 31, 2009 shall be brought into compliance with subsection

(e)(1)(E). An application shall be submitted to ARB within 30 days of the unit entering the operator's control:

I. Requesting an ARB I.D. number for a new TRU or TRU gen set that was not previously numbered, or

II. Requesting a change in owner or operator (or other pertinent application information) for used equipment that already has an ARB I.D. number.

d. Failure to apply or submittal of false information is a violation of state law subject to civil penalty.

e. On or before February 1, 2009, the Executive Officer shall begin issuing identification numbers to TRU and TRU gen set operators for each unit based in California for which a complete application has been filed. The number will include a 2-digit prefix for model year (e.g. 2001 model year would have a prefix 01); a 6-digit serial number; a check-digit, and a letter indicating compliance status with in-use performance standards (either "L" or "U"). In the event that an operator applies for an early compliance certificate in accordance with subsection (e)(1)(F), ARB will also issue a certificate which acknowledges early compliance per (e)(1)(F)3.

f. Within 30 days of receipt of the ARB-issued identification number, owner/operators shall permanently affix or paint the identification number on the TRU or TRU gen set chassis housing in clear view according to the following specification:

I. The ARB identification number shall be preceded by the letters "**ARB**".

II. Letters and numbers shall contrast sharply in color with the color of the background surface on which the letters are placed.

III. The location of the I.D. number shall be as follows:

i. Truck and trailer TRUs - both sides of TRU chassis housing.

ii. Rail car and shipping container TRUs– both sides of the TRU.

iii. TRU gen sets – both sides of gen set housing.

IV. Letters and numbers shall be readily legible during daylight hours, from a distance of 50 feet (15.24 meters) while unit is stationary.

V. Marking shall be kept maintained in a manner that retains the legibility required by the subparagraph immediately above.

2. Non-California-based TRUs and TRU Gen Sets:

a. Operators of non-California-based TRUs and TRU gen sets may voluntarily apply for ARB identification numbers for TRUs that are based outside of California but operate within California during the normal course of business. Non-California-based operators may voluntarily submit the same application information listed above in subparagraph (e)(1)(E)1.a., above, using the same methods of submittal listed in subparagraph (e)(1)(e)1.b., above. Upon application approval, ARB would issue identification numbers to the operator in accordance with subparagraph (e)(1)(E)1.e., above. The non-California-based operator would then permanently affix or paint the identification number on the TRU or TRU gen set chassis in clear view, in accordance with (e)(1)(E)1.f., above.

(F) **Early Compliance with LETRU In-Use Performance Standards**.

1. For 2002 and older MY TRU and TRU gen set engines, operators or owners that meet the LETRU in-use performance standard earlier than required in paragraph (e)(1)(B) may apply to the Executive Officer for a delay in the ULETRU in-use performance standard. Except as provided below, early compliance would be achieved through any of the options available in paragraph (e)(1)(A).
   a. This delay would not be available to the operator or owner if the engine manufacturer of the replacement engine is using the early compliance with engine emissions standards in U.S. EPA's Averaging, Banking, and Trading Program (or California's equivalent program).

   b. Early compliance is conditioned upon real emission reductions (refer to definition in sub section (d)) occurring earlier than the applicable compliance deadline.

   c. This delay may not be available to the operator or owner if public funds were used for early compliance. The applicant shall disclose whether public funds were used for any portion of early compliance and what program the funding came from.

2. Early LETRU compliance with real emission reductions would allow specific units to delay compliance with ULETRU in-use performance standards by up to three years, according to the rounding conventions and examples listed below.

a. Each year of early compliance with the LETRU in-use performance standards would be rewarded with 1 year delay in the ULETRU in-use performance standard.

I. One full year early compliance qualifies for one full year delay in meeting ULETRU compliance.

II. Two full years early compliance qualifies for two full years delay in meeting ULETRU compliance.

III. Three full years early compliance qualifies for three full years delay in meeting ULETRU compliance.

b. A partial year of early LETRU compliance would be rounded to the nearest full year for the delayed ULETRU requirements.

I. Early LETRU compliance of 183 days or more in a calendar year would count toward a one year ULETRU delay.

II. Early LETRU compliance of 182 days or less in a calendar year would not count toward a ULETRU delay.

3. Upon receipt of an application to delay ULETRU compliance, the Executive Officer shall determine if the application demonstrates early compliance with LETRU in-use performance standards in accordance with subsection (e)(1)(F)1., and if the application is approved, shall delay the in-use ULETRU compliance date for specific TRUs and TRU gen sets operating in California in accordance with subparagraph (e)(1)(F)2.

4. Upon approval of the application, ARB shall issue a certificate and ARB identification number in accordance with subsection (e)(1)(E)1.e. which acknowledges early compliance with LETRU requirements and discloses the number of years delay granted, and resulting ULETRU compliance date.

5. The operator shall maintain a legible copy of the certificate in a water-tight sleeve mounted inside the TRU or TRU gen set chassis housing. The operator shall paint the identification number in clear view in accordance with subsection (e)(1)(E)1.f. on the specific TRU or TRU gen set that was granted the compliance extension.

(2) **Fuel Requirements.**

(A) **Operators Choosing to Use Alternative Diesel Fuels.** Operators choosing to use alternative diesel fuels in compression ignition TRU and TRU gen set engines to meet the requirements of subsection (e)(1) shall:

1. Maintain records in accordance with subsection (f)(1)(B) of this regulation.

2. Use only fuel that is a VDECS alternative diesel fuel that contains no conventional diesel or CARB diesel fuel in TRUs or TRU gen sets operated in California.

3. Permanently affix a label in clear view near the fill spout that identifies the proper fuel that is required to be in compliance.

4. In the event that the operator decides to revert to using conventional diesel or CARB diesel fuel, the operator shall comply with the requirements of subsection (e)(1) within 10 days of discontinuation of alternative diesel fuel use. Within 10 days of discontinuation, the operator shall notify the Executive Officer in writing of this change in fuel use and shall include an update to any ARB I.D. number application or annual report submitted to comply with subsections (e)(1)(E), (e)(1)(F), or (f)(1).

(B) **Operators that Retrofit TRUs or TRU Gen Sets with a VDECS**. Operators that retrofit TRUs or TRU gen sets with a VDECS that requires certain fuel properties to be met in order to achieve the required PM reduction or PM emissions shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications when operating in the state of California. In addition, operators that choose a VDECS that requires certain fuel properties to be met in order to prevent damage to the VDECS or an increase in toxic air contaminants, other harmful compounds, or in the nature of the emitted PM shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications.

(f) **Monitoring, Recordkeeping, and Reporting Requirements.**

(1) **TRU and TRU Gen Set Operator Recordkeeping and Reporting**.

(A) **Operator Reporting**.

1. All operators subject to this regulation shall submit an Operator Report to ARB by January 31, 2009 that shall include the following information:

   a. Operator name, address, and contact information for the responsible official (phone number, email address, fax number).

   b. List of all terminals owned or leased by the operator located within California, with address, phone number, and terminal contact name.

c. TRU and TRU gen set inventory information for each TRU and TRU gen set based in California that is owned or leased by the operator:

I. TRU or gen set make, model, model year, and serial number.

II. TRU owner, and if other than operator, owner name, address, and contact.

III. Engine make, model, model year, and serial number.

IV. Terminal(s) that the TRU is assigned to.

V. ARB TRU or TRU gen set identification number, if already issued. If the ARB identification number has not been issued or there has been a change in the other identification numbers listed below since the prior annual report, then provide the following identification numbers (as applicable):

i. Vehicle Identification Number.

ii. Vehicle license number.

iii. Railcar recording mark and car number.

iv. Shipping container number (for TRU-equipped shipping containers only).

v. Company equipment number.

VI. Compliance status with paragraph (e)(1)(A) requirements.

2. The Operator Report shall be updated within 30 days when changes to any of the above operator information occur.

a. Operator Reports shall be submitted by one of the following methods:

I. Mail or deliver a physical report to ARB at the address listed immediately below:

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

II. Electronically submit through ARB's web site. The web address will be identified in an advisory.

3. Failure to report or submittal of false information is a violation of state law subject to civil penalty.

(B) **Alternative Diesel Fuel Use and Fuel Additive Recordkeeping and Reporting**.

1. Operators that choose a compliance pathway that involves the use of alternative diesel fuel in accordance with subparagraph (e)(1)(A)3.d. (e.g. B100 biodiesel fuel or ultra-low-aromatic synthetic diesel fuel) and/or a VDECS that includes the use of a fuel additive (e.g. fuel-borne catalyst) shall maintain records that document exclusive use of the chosen fuel or additive for each affected CI engine and hours of operation. Appropriate records would be copies of receipts or invoices of appropriate fuel and/or fuel additive and daily operating hour logs.

2. Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to the ARB upon request.

3. Failure to keep records or submittal of false information is a violation of state law subject to civil penalty.

(2) **Facility Monitoring, Recordkeeping, and Reporting**.

(A) **Facility Reporting**. All facilities subject to this subsection shall submit a Facility Report to ARB by January 31, 2006, containing the following information, as of December 31, 2005:

1. Contact information for the facility's responsible official.

2. Provide all North American Industrial Classification System codes (NAICS) applicable to the facility.

3. The number of loading dock doors serving refrigerated storage space.

4. The number of square feet of refrigerated storage space.

5. The number of TRUs or TRU gen sets under facility control by model year and horsepower category.

6. The number of refrigerated trucks, trailers, shipping containers, or railcars leased or rented.

7. The total annual TRU engine operating hours for all TRUs or TRU gen sets under facility control during 2005 (e.g. total TRU engine operating time for both on-road and off-road operations).

8. The average weekly number of inbound refrigerated trucks, trailers, shipping containers, and railcars delivering goods to the facility during 2005, calculated by dividing the annual total inbound refrigerated loads by 52.

9. The average weekly number of outbound refrigerated trucks, trailers, shipping containers and railcars delivering goods from the facility during 2005, calculated by dividing the annual total outbound refrigerated loads by 52.

10. The average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility during 2005. Average TRU or TRU gen set engine operating time at facility for outbound refrigerated loads may be used if the result is representative of the outbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for outbound loads based on recordkeeping, conducted in accordance with subparagraph (f)(2)(B)2., and applied to the total annual number of refrigerated outbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per outbound refrigerated load multiplied by the total annual number of outbound loads, divided by 52 weeks equals the average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility.

11. The average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility during 2005. Average TRU or TRU gen set engine operating time at facility for inbound refrigerated loads may be used if the result is representative of the inbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for inbound loads based on recordkeeping, conducted in accordance with subparagraph (f)(2)(B)2., and applied to the total annual number of refrigerated inbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per inbound refrigerated load multiplied by the total annual number of inbound loads, divided by 52 weeks equals the average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility.

12. The number of refrigerated trailers (as defined) that are used at the facility for cold storage, the total annual number of hours of TRU engine operation associated with these refrigerated trailers, and the total annual number of hours of operation using electric standby associated with these refrigerated trailers.

(B) **Recordkeeping.**

1. Recordkeeping that substantiates the information reported in the Facility Report shall be maintained and shall be compiled and made available to State inspectors upon request for a minimum of three (3) years.

2. The Executive Officer may approve alternative recordkeeping and calculation procedures for determining the average weekly hours of TRU engine operation at a facility for inbound and outbound refrigerated loads, provided the Executive Officer finds that the alternative procedures meet the intent of subparagraph (f)(2).

(C) **Facility Report Submittals**. Facility Reports shall be submitted by one of the following methods:

1. Mail or deliver a physical report to ARB at the address listed immediately below:

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

2. Electronically submit through ARB's web site. The web address will be identified in an advisory.

(D) **Failure to report or submittal of false information**. Failure to report or submittal of false information is a violation of state law subject to civil penalty.

(3) Original Equipment Manufacturer Reporting

(A) Current Production Reports: Beginning [30 days after the effective date of the amendment], and by January 1st and June 30th of each calendar year thereafter, TRU and TRU gen set original equipment manufacturers shall provide to ARB the information listed below for all TRUs and TRU gen sets that will be manufactured and marketed for sale in the following markets: California, United States, Canada, and Mexico. The following data shall be provided for TRUs and TRU gen sets that will be produced during the six-month period following the report due date for each market area:

1. TRU or TRU genset manufacturer and model name, as it appears on the unit label; and

2. The following engine information for each TRU or TRU gen set model:

a. Engine manufacturer;
b. Engine model, as it appears on the engine emissions label;
c. Engine model, as it appears on the serial number label, if different;
d. Engine Family;
e. Rated horsepower and rated speed;
f. Displacement (liters);
g. Exhaust Emissions Control System
h. Tier standard met
i. ARB's Executive Order that the engines are manufactured under

3. Current Production Reports shall be submitted by one of the following methods:

a. Mail or deliver a physical report in electronic format to ARB at the address listed immediately below:

California Air Resources Board
Stationary Source Division (TRU)
1001 I Street
Sacramento, CA 95814

b. Electronically submit to ARB's TRU Program via email at: tru@arb.ca.gov

4. Original equipment manufacturers that produce less than 100 TRUs or TRU gen sets per calendar year may submit Current Production Year Reports within ten days of installing the first engine in a production run of a new model.

(B) Prior Production Reports:

1. Prior unit and engine data. TRU and TRU gen set original equipment manufacturers shall:

a. By [30 days after the effective date of this amendment], provide a production report to ARB with the information listed below in subparagraph 3 for the previous five calendar years for each TRU or TRU gen set produced for sale in California, North America, Canada, and Mexico; or

b. If the TRU or TRU gen set original equipment manufacturer elects not to provide the information in subparagraph (f)(3)(B)1.a., then within 30 days of any request from ARB, the TRU or TRU gen set original equipment manufacturer shall provide a production report to ARB with the information listed below in subparagraph 3 for the unit and engine serial numbers provided in ARB's request.

2. Monthly production reports. TRU and TRU gen set original equipment manufacturers shall either:

a. Beginning [30 days after the effective date of this amendment], provide by the 15th of each calendar month, a monthly production report to ARB with the information listed below in subparagraph 3 for the previous calendar month for each TRU or TRU gen set produced for sale in California, North America, Canada, and Mexico; or

b. As an alternative, the TRU or TRU gen set original equipment manufacturer may request reporting that is equivalent to and at least as effective as subparagraph (f)(3)(B)2.a., immediately above, subject to Executive Officer approval.

3. Original equipment manufacturers shall provide the following information for each TRU and TRU gen set:
   a. TRU or TRU gen set model name, as it appears on the unit label
   b. TRU or TRU gen set serial number
   c. Engine manufacturer
   d. Engine model, as it appears on the engine emissions label
   e. Engine model, as it appears on the serial number label, if different;
   f. Engine Family
   g. Engine serial number
   h. Rated horsepower and rated speed
   i. Tier standard met

4. Prior Production Reports and Flexibility Engine Reports shall be submitted on CD or DVD to:

California Air Resources Board
Stationary Source Division (TRU)
1001 I Street
Sacramento, CA 95814

(C) Confidentiality of current and prior production reports. TRU and TRU gen set original equipment manufacturers may designate current and prior production report information as confidential or trade secret, and such information will be handled in accordance with title 17, CCR, section 91000.

(g) **Prohibitions.**

(1) No person who is engaged in this State in the business of selling to an ultimate purchaser, or renting or leasing new or used TRUs or TRU gen sets, including, but not limited to, manufacturers, distributors, and dealers, shall intentionally or negligently import, deliver, purchase, receive, or otherwise acquire a new or

used TRU or TRU gen set engine that does not meet the performance requirements or alternatives set forth in section (e)(1) above.

(2) No person who is engaged in this State in the business of selling to an ultimate purchaser new or used TRU or TRU gen set engines, including, but not limited to, manufacturers, distributors, and dealers, shall sell, or offer to sell, to an ultimate purchaser who is a resident of this State or a person that could reasonably be expected to do business in this State a new or used TRU or TRU gen set engine that does not meet the performance requirements or alternatives set forth in section (e)(1) above.

(3) No person who is engaged in this State in the business of renting or leasing new or used TRU or TRU gen set engines, including, but not limited to, manufacturers, distributors, and dealers, shall lease, offer to lease, rent, or offer to rent, in this state any new or used TRU or TRU gen set engine that does not meet the performance requirements or alternatives set forth in section (e)(1) above.

(4) Operators of affected facilities and operators of affected TRUs and TRU gen sets are prohibited from taking action to divert affected TRUs to alternative staging areas in order to circumvent the requirements of this section.

(h) **Penalties.**

(1) All persons, as defined in section 19 of the Health and Safety Code, found to be in violation of title 13, CCR, section 2477 may be cited and subject to the penalty provisions set forth in Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410.

NOTE: Authority cited: sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 39674, 39675, 42400 ~~et seq.,~~ 42400.1, 42400.2, 42400.3.5, 42402 ~~et seq.~~, 42402.2, 42410, 43013, 43018, California Health and Safety Code. Reference: sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, ~~et seq.~~ 42400.1, 42400.2, 42400.3.5, 42402 ~~et seq.~~, 42402.2, 42410, 40717.9, 43013, and 43018.

APPENDIX B

PROPOSED TRU ATCM 2010 AMENDMENTS IN-USE COMPLIANCE COST ESTIMATES

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Proposed TRU ATCM 2010 Amendments In-Use Compliance Cost Estimates

Matrix #1

8/25/2010

This Matrix calculates the incremental in-use cost of compliance for TRUs and TRU gen sets ("TRUs") for the proposed change from ULETRU to LETRU for 2003 MY and Affected 2004 MY engines.
It assumes 30% of the annual TRU population will retrofit and multiplies them by the capital and annual costs for the compliance technology shown.
The capital costs of retrofit with Level 2 VDECS are amortized over an assumed seven-year useful life, the capital costs of retrofit with Level 3 VDECS are amortized over an assumed ten-year life and all annual costs are converted to constant year (2010) dollars using standard present worth analysis techniques.
The proposed amendment for change from ULETRU to LETRU is shown below in two steps, the first which describes the incremental cost savings for LETRU expected in-use compliance costs for the surviving TRUs in 2010 and 2011, and the second which describes the capital cost for ULETRU application for the surviving TRUs in 2017 and 2018.
In each scenario, on a year-by-year basis, population figures for each engine category are multiplied by a compliance cost component (annualized capital or annual maintenance); these products are then summed to determine the compliance cost for a given year.
Maintenance costs are assumed to be unchanged from original economic analysis, therefore incremental costs are $0

Interest Rates Used for Present Worth Analysis

Capital Costs:	0.05	Real interest rate, which is a 7% nominal rate minus an assumed 2% inflation rate
Annual Costs:	0.05	Real interest rate, which is a 7% nominal rate minus an assumed 2% inflation rate

Assumptions:	7-year useful life for compliance technology; capital cost is amortized over a 7-year period	0.1728
	30% of survivng TRU population uses VDECS as a compliance scenario	0.3

Incremental-Cost Savings: Assume ULETRU Requirement is changed to LETRU for 2003 MY and Affected 2004 MY

In-Use Compliance Technology Used

	Inc. Cap. Cost	Inc Ann. Cost - TRUs	Inc. Ann. Cost - Gen Sets
Inc. LETRU vs ULETRU: Engine <25 Hp	$2,350	$0	$0
Inc. LETRU vs ULETRU: Engine > 25 Hp	$1,295	$0	$0

Engine Population Category <25 Hp

Engine Model Year	Calendar Year	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State	25-50 hp Gen Sets CA-based	25-50 hp Gen Sets Out-of-State	25-50 hp Reefer Railcar	Total 25-50 hp (Info Only)	Total (this year)	Annualized Incremental Capital Cost Savings[1]
2003	**2010**	121	45	0	0	0	0	0	0	166	$406
2004	**2011**	133	40	0	0	0	0	0	0	172	$406
									Total	338	

Capital Cost Subtotal	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State
2010	$49,095	**2010**	$18,152	**2010** $0
2011	$49,095	$53,846	**2011** $18,152	$16,081 **2011** $0
2012	$49,095	$53,846	**2012** $18,152	$16,081 **2012** $0
2013	$49,095	$53,846	**2013** $18,152	$16,081 **2013** $0
2014	$49,095	$53,846	**2014** $18,152	$16,081 **2014** $0
2015	$49,095	$53,846	**2015** $18,152	$16,081 **2015** $0
2016	$49,095	$53,846	**2016** $18,152	$16,081 **2016** $0
2017		$53,846	**2017**	$16,081

[1] This is the annualized capital cost savings of retrofitting with Level 2 instead of Level 3. The interest rate used is given at the top of this matrix.
[2] This is the annual cost of maintaining the iLevel 2 VDECS over and above that for Level 3 VDECS.

Engine Population Category >25 Hp

Engine Model Year	Calendar Year	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State	25-50 hp Gen Sets CA-based	25-50 hp Gen Sets Out-of-State	25-50 hp Reefer Railcar	Total 25-50 hp (Info Only)	Total (this year)	Annualized Incremental Capital Cost Savings[1]
2003	**2010**	0	0	611	202	88	0	45	946	946	$224

Capital Cost Subtotal	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State
2010	$0	**2010**	$0	**2010** $136,817 **2010** $45,113
2011	$0	**2011**	$0	**2011** $136,817 **2011** $45,113
2012	$0	**2012**	$0	**2012** $136,817 **2012** $45,113
2013	$0	**2013**	$0	**2013** $136,817 **2013** $45,113
2014	$0	**2014**	$0	**2014** $136,817 **2014** $45,113
2015	$0	**2015**	$0	**2015** $136,817 **2015** $45,113
2016	$0	**2016**	$0	**2016** $136,817 **2016** $45,113

[1] This is the annualized capital cost savings of retrofitting with Level 2 instead of Level 3. The interest rate used is given at the top of this matrix.
[2] This is the annual cost of maintaining the iLevel 2 VDECS over and above that for Level 3 VDECS.

Matrix #1

otal	Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal				Maintenance Cost Subtotal			Maintenance Cost Subtotal			Total
	25-50 hp Gen Sets CA-based		25-50 hp Gen Sets Out-of-State		25-50 hp Reefer Railcars		Incremental Capital Cost Savings Sub-Total	NPV Incremental Capital Cost Savings	Sub-Total (2010 $)	Annual Mtce Cost[2] < 25hp			Maint Cost Sub-Total	NPV Maintenance Cost Sub-Total (2010 $)	Total Incremental Annual In-Use Cost Savings	NPV Total Incremental Annual In-Use Cost Savings (2010 $)	
2010	$0	2010	$0	2010	$0	2010	$67,247	$67,247	$0	2010	$0	2010	$0	$0	$67,247	$67,247	
2011	$0	2011	$0	2011	$0	2011	$137,174	$130,642	$0	2011	$0	2011	$0	$0	$137,174	$130,642	
2012	$0	2012	$0	2012	$0	2012	$137,174	$124,421	$0	2012	$0	2012	$0	$0	$137,174	$124,421	
2013	$0	2013	$0	2013	$0	2013	$137,174	$118,496	$0	2013	$0	2013	$0	$0	$137,174	$118,496	
2014	$0	2014	$0	2014	$0	2014	$137,174	$112,853	$0	2014	$0	2014	$0	$0	$137,174	$112,853	
2015	$0	2015	$0	2015	$0	2015	$137,174	$107,479	$0	2015	$0	2015	$0	$0	$137,174	$107,479	
2016	$0	2016	$0	2016	$0	2016	$137,174	$102,361	$0	2016	$0	2016	$0	$0	$137,174	$102,361	
						2017	$69,927	$49,696	$0	2017	$0	2017	$0	$0	$69,927	$49,696	
								$813,195				Total Incremental Cost Savings for <25 Hp Engine				$813,195	

otal	Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal				Maintenance Cost Subtotal			Maintenance Cost Subtotal			Total
	25-50 hp Gen Sets CA-based		25-50 hp Gen Sets Out-of-State		25-50 hp Reefer Railcars		Incremental Capital Cost Savings Sub-Total	NPV Incremental Capital Cost Savings	Sub-Total (2010 $)	Annual Mtce Cost[2] > 25hp			Maint Cost Sub-Total	NPV Maintenance Cost Sub-Total (2010 $)	Total Incremental Annual In-Use Cost Savings	NPV Total Incremental Annual In-Use Cost Savings (2010 $)	
2010	$19,603	2010	$0	2010	$10,070	2010	$211,603	$211,603	$0	2010	$0	2010	$0	$0	$211,603	$211,603	
2011	$19,603	2011	$0	2011	$10,070	2011	$211,603	$201,526	$0	2011	$0	2011	$0	$0	$211,603	$201,526	
2012	$19,603	2012	$0	2012	$10,070	2012	$211,603	$191,930	$0	2012	$0	2012	$0	$0	$211,603	$191,930	
2013	$19,603	2013	$0	2013	$10,070	2013	$211,603	$182,790	$0	2013	$0	2013	$0	$0	$211,603	$182,790	
2014	$19,603	2014	$0	2014	$10,070	2014	$211,603	$174,086	$0	2014	$0	2014	$0	$0	$211,603	$174,086	
2015	$19,603	2015	$0	2015	$10,070	2015	$211,603	$165,796	$0	2015	$0	2015	$0	$0	$211,603	$165,796	
2016	$19,603	2016	$0	2016	$10,070	2016	$211,603	$157,901	$0	2016	$0	2016	$0	$0	$211,603	$157,901	
								$1,285,632				Total NPV Incremental Cost Savings for <25 Hp Engine				$1,285,632	
												Total NPV Incremental Cost Savings for LETRU vs ULETRU				$2,098,827	

Matrix #1

Cost: Apply ULETRU to Residual TRU population of 2003 MY and Affected 2004 MY in 2017 and 2018

Assumptions:	10-year useful life for compliance technology, capital cost is amortized over a 10-year per	0.1295
	30% of survivng TRU population uses VDECS as a compliance scenario	0.3

In-Use Compliance Technology Used

	Inc. Cap. Cost	Inc Ann. Cost - TRUs	Inc. Ann. Cost - Gen Sets
ULETRU: Engine <25 Hp	$6,000	$0	$0
ULETRU: Engine >25 Hp	$6,000	$0	$0

Engine Population Category <25 Hp

Engine Model Year	Calendar Year	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State	25-50 hp Gen Sets CA-based	25-50 hp Gen Sets Out-of-State	25-50 hp Reefer Railcar	Total 25-50 hp (Info Only)	Total (this year)	Annualized Capital Cost[1]
2003	2017	38	14	0	0	0	0	0	0	52	$777
2004	2018	40	14	0	0	0	0	0	0	54	$777
									Total	106	

Capital Cost Subtotal

< 15hp			15-25 hp			25-50 hp CA-based			25-50 hp Out-of-State		
2017	$29,371		2017	$10,956		2017	$0		2017	$0	
2018	$29,371	$30,769	2018	$10,956	$11,189	2018	$0		2018	$0	
2019	$29,371	$30,769	2019	$10,956	$11,189	2019	$0		2019	$0	
2020	$29,371	$30,769	2020	$10,956	$11,189	2020	$0		2020	$0	
2021	$29,371	$30,769	2021	$10,956	$11,189	2021	$0		2021	$0	
2022	$29,371	$30,769	2022	$10,956	$11,189	2022	$0		2022	$0	
2023	$29,371	$30,769	2023	$10,956	$11,189	2023	$0		2023	$0	
2024	$29,371	$30,769	2024	$10,956	$11,189	2024	$0		2024	$0	
2025	$29,371	$30,769	2025	$10,956	$11,189	2025	$0		2025	$0	
2026	$29,371	$30,769	2026	$10,956	$11,189	2026	$0		2026	$0	
2027		$30,769	2027		$11,189	2027	$0		2027	$0	

Engine Population Category >25 Hp

Engine Model Year	Calendar Year	< 15hp	15-25 hp	25-50 hp CA-based	25-50 hp Out-of-State	25-50 hp Gen Sets CA-based	25-50 hp Gen Sets Out-of-State	25-50 hp Reefer Railcar	Total 25-50 hp (Info Only)	Total (this year)	Annualized Capital Cost[1]
2003	2017	0	0	191	63	28	0	14	296	296	$777

Capital Cost Subtotal

< 15hp		15-25 hp		25-50 hp CA-based		25-50 hp Out-of-State	
2017	$0	2017	$0	2017	$148,718	2017	$49,184
2018	$0	2018	$0	2018	$148,718	2018	$49,184
2019	$0	2019	$0	2019	$148,718	2019	$49,184
2020	$0	2020	$0	2020	$148,718	2020	$49,184
2021	$0	2021	$0	2021	$148,718	2021	$49,184
2022	$0	2022	$0	2022	$148,718	2022	$49,184
2023	$0	2023	$0	2023	$148,718	2023	$49,184
2024	$0	2024	$0	2024	$148,718	2024	$49,184
2025	$0	2025	$0	2025	$148,718	2025	$49,184
2026	$0	2026	$0	2026	$148,718	2026	$49,184

[1] This is the annualized capital costs of retrofitting with Level 3 VDECS. The interest rate used is given at the top of this matrix.

[2] This is the annual cost of maintaining the Level 3 VDECS.

Matrix #1

otal	Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal		Capital Cost Subtotal			Maintenance Cost Subtotal			Maintenance Cost Subtotal			
	25-50 hp Gen Sets CA-based		25-50 hp Gen Sets Out-of-State		25-50 hp Reefer Railcars		Capital Cost Sub-Total	NPV Capital Cost Sub-Total (2010 $)	Annual Mtce Cost[2]				Maint Cost Sub-Total	NPV Maintenance Cost Sub-Total (2010 $)	Total Annual In-Use Cost	NPV Total Annual In-Use Cost (2010 $)
2017	$0	2017	$0	2017	$0	2017	$40,326	$28,659	$0	2017	$0		2017	$0	$0	$40,326	$28,659
2018	$0	2018	$0	2018	$0	2018	$82,284	$55,693	$0	2018	$0		2018	$0	$0	$82,284	$55,693
2019	$0	2019	$0	2019	$0	2019	$82,284	$53,041	$0	2019	$0		2019	$0	$0	$82,284	$53,041
2020	$0	2020	$0	2020	$0	2020	$82,284	$50,515	$0	2020	$0		2020	$0	$0	$82,284	$50,515
2021	$0	2021	$0	2021	$0	2021	$82,284	$48,110	$0	2021	$0		2021	$0	$0	$82,284	$48,110
2022	$0	2022	$0	2022	$0	2022	$82,284	$45,819	$0	2022	$0		2022	$0	$0	$82,284	$45,819
2023	$0	2023	$0	2023	$0	2023	$82,284	$43,637	$0	2023	$0		2023	$0	$0	$82,284	$43,637
2024	$0	2024	$0	2024	$0	2024	$82,284	$41,559	$0	2024	$0		2024	$0	$0	$82,284	$41,559
2025	$0	2025	$0	2025	$0	2025	$82,284	$39,580	$0	2025	$0		2025	$0	$0	$82,284	$39,580
2026	$0	2026	$0	2026	$0	2026	$82,284	$37,695	$0	2026	$0		2026	$0	$0	$82,284	$37,695
2027	$0	2027	$0	2027	$0	2027	$41,958	$18,306	$0	2027	$0		2027	$0	$0	$41,958	$18,306
								$462,616					Total NPV Capital Costs for <25 Hp Engine ($2010)			$462,616
	25-50 hp Gen Sets CA-based		25-50 hp Gen Sets Out-of-State		25-50 hp Reefer Railcars		Capital Cost Sub-Total	NPV Capital Cost Sub-Total (2010 $)	Annual Mtce Cost[2]				Maint Cost Sub-Total	NPV Maintenance Cost Sub-Total (2010 $)	Total Annual In-Use Cost	NPV Total Annual In-Use Cost (2010 $)
2017	$21,445	2017	$0	2017	$10,956		$230,303	$163,672	$0	2017	$0		2017	$0	$0	$230,303	$163,672
2018	$21,445	2018	$0	2018	$10,956		$230,303	$155,878	$0	2018	$0		2018	$0	$0	$230,303	$155,878
2019	$21,445	2019	$0	2019	$10,956		$230,303	$148,455	$0	2019	$0		2019	$0	$0	$230,303	$148,455
2020	$21,445	2020	$0	2020	$10,956		$230,303	$141,386	$0	2020	$0		2020	$0	$0	$230,303	$141,386
2021	$21,445	2021	$0	2021	$10,956		$230,303	$134,653	$0	2021	$0		2021	$0	$0	$230,303	$134,653
2022	$21,445	2022	$0	2022	$10,956		$230,303	$128,241	$0	2022	$0		2022	$0	$0	$230,303	$128,241
2023	$21,445	2023	$0	2023	$10,956		$230,303	$122,134	$0	2023	$0		2023	$0	$0	$230,303	$122,134
2024	$21,445	2024	$0	2024	$10,956		$230,303	$116,319	$0	2024	$0		2024	$0	$0	$230,303	$116,319
2025	$21,445	2025	$0	2025	$10,956		$230,303	$110,780	$0	2025	$0		2025	$0	$0	$230,303	$110,780
2026	$21,445	2026	$0	2026	$10,956		$230,303	$105,504	$0	2026	$0		2026	$0	$0	$230,303	$105,504
								$1,327,023					Total NPV Capital Costs for >25 Hp Engine ($2010)			$1,327,023
													Total NPV Capital Costs for ULETRU Compliance ($201			$1,789,638
												Total NPV Incremental Cost Savings less Capital Costs for ULETRU Compliance ($2010)				$309,188

Matrix #1

Cost: OEM Reporting Costs

8/31/2010

Cost of OEM reporting for flexibility engines

Assumptions:

1. One-time report.
2. Tasks include pulling data out of existing databases, compiling, conducting QA/QC checks, management review, and submittal on CD or by email.
3. Cost based on Thermo King's (TK) Paul Barbaro's statement that they had 3 people working for a week and a half to put the records together and QA/QC them.
4. Carrier Transicold (CT) would have a similar cost per unit, applied to their flexibility engine use.
5. Fully burdened labor rate of $100 per hour includes wages, benefits, IT support, and management review and approval.

	3	people
	1.5	weeks
	40	hour/week
$	100	per hour labor rate
$	18,000	TK Cost
	36000	Number of TK flex engines
$	0.50	cost per unit
	1000	Number of CT flex engines
$	500	CT cost
$	18,500	Total cost for TK and CT flex engine reporting

Cost of OEM Reporting: Current Production Report

Assumptions:

1. On-going semi-annual report.
2. Work tasks include pulling up unit and engine information, entering data it into a spreadsheet, management check/review, electronic submittal on CD or by email.
3. TK has about 5 models to compile data on.
4. CT has about 10 models to compile data on.
5. Zanotti Transblock (ZT) has about 2 models to compile data on.
6. No other companies will report.
7. It takes about one hour per model to complete all tasks.
8. Fully burdened labor rate of $100 per hour includes wages, benefits, IT support, and management review and approval.

	2	Number of reports per year
	17	total number of TRU & TRU genset models
	1	hour per model
$	100	per hour labor rate
$	3,400	Annual cost for TK, CT, & ZT

Cost of reporting: Prior Production Report

Assumptions:

1. Initial report for prior years is a one-time report that covers the prior 5 years.
2. Ongoing monthly Prior Production Reports cover only the past production period since prior report, but costs for all reports during a year are lumped together for cost estimate.
3. Cost per unit is initially similar to that for flexibility engine reporting (similar tasks).
4. Annual TRU and TRU gen set production averages about 10,000 units.
5. Reporting will become more automated over time, so cost per unit will decline significantly, offsetting growth in the number of units and the requirement to submit multiple reports per year.

Initial Prior Production Report

	5	years of prior production
	10,000	units per year average for all TRU and TRU generator set manufacturers
$	0.50	Cost per unit
$	25,000	Total cost for initial Prior Production Years Report

Ongoing monthly Prior Production Reports

	10,000	units per year average for all TRU and TRU generator set manufacturers
$	0.50	Cost per unit
$	5,000	Annual total cost for periodic Prior Production Reports

Matrix #2

Incremental Annual Cost Savings (regulation, PM only) 8/25/2010

Proposed Amendments:

Assume ULETRU Requirement is changed to LETRU for 2003 MY and Affected 2004 MY

Apply ULETRU to Residual TRU population of 2003 MY and Affected 2004 MY in 2017 and 2018

Adjustment to Compliance Year for Flexibility Engines

OEM Reporting

Interest rate for 2010 Cost Pmt. Adj.: 0.05

Year	ULETRU to LETRU Incremental Emission Increases (tpy)	Flex Engine Adj Incremental Emission Increases (tpy)	Total Incremental Emission Increases (tpy)	<25 Hp Engine Incremental Annual In-Use Equipment Cost Savings (2010 $)	>25 Hp Engine Incremental Annual In-Use Equipment Cost Savings (2010 $)	<25 Hp Engine ULETRU Annual In-Use Equipment Cost (2010 $)	>25 Hp Engine Incremental Annual In-Use Equipment Cost (2010 $)	Incremental Annual Operating Cost (2010 $)	Net NPV In-Use & Operating Costs = Total Ann. Operating Cost Reduction (2010 $)	Flexibility Adjustment In-Use Cost (2010 $)	Annual OEM Reporting Cost ($)	NPV Annual OEM Reporting Cost (2010 $)	2010 TRU ATCM Amendments Cost Reductions (2010 $)
2010	4.513	9.127	13.640	$67,247	$211,603	$0	$0	$0	$278,849	$18,500	$33,400	**$33,400**	**$226,949**
2011	4.348	8.745	13.093	$130,642	$201,526	$0	$0	$0	$332,168	$0	$8,400	**$8,000**	**$324,168**
2012	4.081	3.550	7.631	$124,421	$191,930	$0	$0	$0	$316,350	$0	$8,400	**$7,619**	**$308,731**
2013	3.654	1.202	4.856	$118,496	$182,790	$0	$0	$0	$301,286	$0	$8,400	**$7,256**	**$294,030**
2014	3.220	1.082	4.302	$112,853	$174,086	$0	$0	$0	$286,939	$0	$8,400	**$6,911**	**$280,029**
2015	2.681	0.958	3.639	$107,479	$165,796	$0	$0	$0	$273,275	$0	$8,400	**$6,582**	**$266,694**
2016	2.086	0.812	2.898	$102,361	$157,901	$0	$0	$0	$260,262	$0	$8,400	**$6,268**	**$253,994**
2017	1.437	0.646	2.082	$49,696	$0	$28,659	$163,672	$0	-$142,635	$0	$8,400	**$5,970**	**-$148,605**
2018	0.054	0.464	0.517	$0	$0	$55,693	$155,878	$0	-$211,571	$0	$8,400	**$5,685**	**-$217,257**
2019	0.000	0.255	0.255	$0	$0	$53,041	$148,455	$0	-$201,496	$0	$8,400	**$5,415**	**-$206,911**
2020	0.000	0.144	0.144	$0	$0	$50,515	$141,386	$0	-$191,901	$0	$8,400	**$5,157**	**-$197,058**
2021	0.000	0.093	0.093	$0	$0	$48,110	$134,653	$0	-$182,763	$0	$8,400	**$4,911**	**-$187,675**
2022	0.000	0.057	0.057	$0	$0	$45,819	$128,241	$0	-$174,060	$0	$8,400	**$4,677**	**-$178,738**
2023	0.000	0.036	0.036	$0	$0	$43,637	$122,134	$0	-$165,772	$0	$8,400	**$4,455**	**-$170,226**
2024	0.000	0.010	0.010	$0	$0	$41,559	$116,319	$0	-$157,878	$0	$8,400	**$4,243**	**-$162,120**
2025	0.000	0.000	0.000	$0	$0	$39,580	$110,780	$0	-$150,360	$0	$8,400	**$4,041**	**-$154,400**
2026	0.000	0.000	0.000	$0	$0	$37,695	$105,504	$0	-$143,200	$0	$8,400	**$3,848**	**-$147,048**
2027	0.000	0.000	0.000	$0	$0	$18,306	$0	$0	-$18,306	$0	$8,400	**$3,665**	**-$21,971**
	26.073	**27.181**	**53.254**	$813,195	$1,285,632	$462,616	$1,327,023	$0	$309,188	$18,500		$128,102	$162,586

APPENDIX C

ACRONYMS

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Appendix C

LIST OF ACRONYMS AND ABBREVIATIONS

$/lb	Dollars per pound
AB	Assembly bill
ARB, or the Board	Air Resources Board
ATCM	Airborne Toxic Control Measure
CCR	California Code of Regulations
DECS	Diesel Emission Control System or Strategy
DPF	Diesel particulate filter
DRRP, or Plan	Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles Risk Reduction Plan
ED	Enforcement Division of ARB
EO	Executive Officer of the Air Resource Board
E/S	Electric standby
g/hp-hr	Grams per horsepower-hour
>	Greater than
≥	Greater than or equal to
H&SC	Health and Safety Code
<	Less than
≤	Less than or equal to
LETRU	Low Emissions Transport Refrigeration Unit
MY	Model year
NMHC	Non-methane hydrocarbons
NO_x	Oxides of nitrogen
O & M	Operation and maintenance
PM	Particulate matter
PTSD	Planning and Technical Support Division of ARB
SSD	Stationary Source Division of ARB
TAC	Toxic air contaminant
tpd	Tons per day
TRU	Transport Refrigeration Unit
TRU OEM	Transport Refrigeration Unit Original Equipment Manufacturer
ULETRU	Ultra-Low Emission Transport Refrigeration Unit
U. S. EPA	United States Environmental Protection Agency
VDECS	Verified Diesel Emission Control Strategy