**REGULATORY APPROACHES**
**TO REDUCE PARTICULATE MATTER EMISSIONS FROM**

# TRANSPORT REFRIGERATION UNITS

**March 6, 2003**

**California Environmental Protection Agency**
Air Resources Board

# Overview

- Update on TRU emissions inventory
- Action to-date
- Summary of last TRU ATCM proposal
- New TRU ATCM proposal
- Regulatory development schedule
- Contacts

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# Update
# TRU Emissions Inventory

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## TRU Emission Inventory

Revisions to the Diesel Transport
Refrigeration Unit (TRU)
Emissions Inventory

March 2003

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# TRU Emission Inventory

Transport refrigeration units (TRU) are diesel powered cooling and heating units that are installed on vehicles and trailers used to transport and preserve produce, meat, dairy products and other perishable goods.

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# TRU Emission Inventory

The inventory in tons per day is calculated using the following equation:

Inventory= Emission Rate* Population*
Activity* Avg. Horsepower*
Load Factor

Emission rate by pollutant in gms/hp-hr

Activity is in hrs/year or hrs/day of engine run time

Average horsepower is the average maximum rated horsepower within each horsepower group.

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# TRU Emission Inventory

Reasons for Revisions:

- Recently more up to date population and activity estimates were obtained from TRU Manufacturers.
- We thank Manufacturers for their valuable input.

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# Revisions are proposed for:

Useful life
Survival rates
Population
Horsepower
Load Factor
Activity

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# Statewide TRU Tons Per Day 2000

| | PM (tpd) Existing | PM (tpd) Proposed | NOx (tpd) Existing | NOx (tpd) Proposed |
|---|---|---|---|---|
| <15 hp | NA | 0.10 | NA | 1.38 |
| 15-25 hp | 0.02 | 0.07 | 0.20 | 0.79 |
| 25-50 hp Ca | 0.43 | 1.95 | 2.80 | 14.04 |
| 25-50 hp Out of State | NA | 0.64 | NA | 4.63 |
| 25-50 hp Rail | NA | 0.13 | NA | 0.95 |
| >50 hp | 2.17 | NA | 22.78 | NA |
| TOTALS | 2.62 | 2.89 | 25.78 | 21.79 |

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# Useful life

- Is defined as the age after which 50% of originally sold equipment population still exists, however, the remaining engines could last twice as long.
- Revised from 16 years to 10 years

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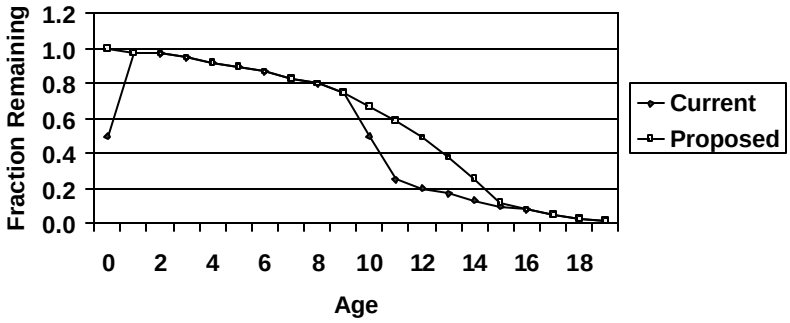
# Survival rate from original sales (%)

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# TRU Sales

- National Sales Data by hp group was provided by Manufacturers for 1991-2000
- Curve fit was used to estimate sales for the remaining ten years (1990-1981)
- U.S. Census Commodity Flow Survey showed 6.4% of truck ton-mile share for CA
- Survival rate applied to CA sales to obtain 2000 population of TRU installed on CA registered vehicles

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# Out of State TRU

- Per EMFAC 2002, 25% of HHDD population that travels on California roads is registered outside of California
- Using the same basis, additional out of state TRU population in 25-50 hp group operating in California was estimated.

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# Railcars TRU

- Staff used the American Association of Railroads - UMLER files
- TRU on railcars are in 25-50 hp group
- Commodity Flow Survey data indicated 19 % of the entire U.S. rail ton-miles for refrigerated goods are in CA

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# Out of state, railcars TRU

- Activity, age distribution and load factor are the same as for TRU installed on California vehicles.

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# Population - CY 2000

| | Population Existing | Population Proposed |
|---|---|---|
| <15 hp | 0 | 7682 |
| 15-25 hp | 1517 | 3497 |
| 25-50 hp Ca | 8412 | 24925 |
| 25-50 hp Out of State | 0 | 8225 |
| 25-50 hp Rail | 0 | 1678 |
| >50 hp | 30902 | 0 |
| TOTALS | 40831 | 46007 |

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# TRU Input Factors

| hp groups | <15 hp | 15-25 hp | 25-50 hp | > 50 hp |
|---|---|---|---|---|
| **Average hp** | | | | |
| Existing | NA | 17 | 39 | 56 |
| Proposed | 10 | 17 | 34 | NA |
| **Activity (hrs/yr)** | | | | |
| Existing | NA | 750 | 1341 | 1341 |
| Proposed | 1038 | 1038 | 1465 | NA |
| **Load Factor** | | | | |
| Existing | NA | 0.50 | 0.28 | 0.28 |
| Proposed | 0.64 | 0.64 | 0.53 | NA |
| **Population** | | | | |
| Existing | 0 | 1517 | 8412 | 30902 |
| Proposed | 7682 | 3497 | 34828 | NA |

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# TRU Input Factors

| hp groups | <15 hp | 15-25 hp | 25-50 hp | > 50 hp |
|---|---|---|---|---|
| **Useful life** | | | | |
| Existing | NA | 6 | 16 | 16 |
| Proposed | 10 | 10 | 10 | NA |
| **Average Nox gms/hp-hr** | | | | |
| Existing | NA | 6.82 | 7.53 | 11.61 |
| Proposed | 8.93 | 6.62 | 7.07 | NA |
| **Average PM gms/hp-hr** | | | | |
| Existing | NA | 0.60 | 1.15 | 1.10 |
| Proposed | 0.64 | 0.56 | 0.98 | NA |

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# TRU ATCM Action To-Date

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- 7th TRU Workgroup meeting
- Four Special TRU Electrification Workgroup meetings
- 3 Public Workshops
- Established Control Technology Matrix
- Provided draft TRU regulation language
- Completed information gathering
  - TRU and TRU generator set manufacturers
  - TRU engine manufacturers
  - Emission control system manufacturers
- Completed 24 facility visits
- Collected preliminary cost data for alternative technologies

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- Gathered information on gen sets
- Learned about intermodal facilities
- Working on demos
- Evaluating test-cycle issue
- Researching e-technologies for recordkeeping and reporting
- Investigating Ag TRU operation
- Working with DHS and DF&A on facility databases

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# November 19th TRU ATCM Concept Summary

- New TRU s - Engine Manufacturers
  - Special TRU and gen set emission standards
- In-Use TRUs - Owner/Operator reqmts
  - Retrofit in-use TRUs and gen sets with verified diesel emission control strategy - highest classification level verified
  - Employ “Alternative Technologies”
  - Replace old engine with new certified engine
- Facility requirements
  - Increase number of “low emission” TRUs and TRU gen sets operating at facility over 9-year schedule

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# New TRU ATCM Concepts

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# March 6th TRU ATCM Concept Summary

- New TRUs
  - Look at emission standard options for
    - Engine manufacturers
    - TRU manufacturers
- In-Use TRUs - Owner/Operator reqmts
  - Same as November
  - Consider different phase-in schedules
- Facility requirements
  - Look at options for facilities with control over TRUs and TRU gen sets

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# New TRUs

- New PM Emission Standards
  - Option #1 - Harmonize with U.S. EPA's pending Offroad CI Engine Standards
    - EPA notice - April 2003
  - Issues:
    - Too much time to reduce diesel PM emissions
    - <25 hp engines on separate track
    - <25 hp engines allowed to be dirty into foreseeable future

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# New TRUs (cont'd)

- New PM Emission Standards (cont'd)
  - Option #2 - Special TRU engine standards included in ATCM for new TRUs sold for use in California
    - 0.30 g/bhp-hr by 2005 or earlier
    - 0.10 g/bhp-hr by 2010 or earlier
    - 0.01 g/bhp-hr by 2015 or earlier
  - Issues
    - Not harmonized with U.S. EPA
    - Apply to engines offered for sale or for use in California
    - Need special TRU test cycle

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# New TRUs (cont'd)

- New PM Emission Standards (cont'd)
  - Option #3 - New TRU system standards included in ATCM for new TRUs sold for use in California
    - 0.30 g/bhp-hr by 2005 or earlier
    - 0.10 g/bhp-hr by 2010 or earlier
    - 0.01 g/bhp-hr by 2015 or earlier
  - Issues
    - Apply to TRUs offered for sale or use in California
    - Need special TRU test cycle

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# New TRUs (cont'd)

- New PM Emission Standards (cont'd)
  - Options #2 and #3
    - Technology reviews
      - 2009 - prior to 0.10 g/bhp-hr standard
      - 2014 - prior to 0.01 g/bhp-hr standard

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# In-Use TRUs & TRU Gen Sets

- Applies to TRUs used in California
- Owner chooses compliance option:
  - Retrofit with verified diesel emission control technology
  - Use a qualified alternative technology
  - Replace in-use engine with new certified engine
- Exception - "low use" TRUs
  - Infrequent out-of-state carriers (<**X** loads/year)
  - Seasonal (<**XX** hours/year)

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# In-Use TRUs & TRU Gen Sets (cont'd)

- Verification classification levels for diesel PM emission control strategies (retrofit)
  - Level 1 - ≥25% reduction
  - Level 2 - ≥50% reduction
  - Level 3 - ≥85% reduction or 0.01 g/bhp-hr

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# In-Use TRUs & TRU Gen Sets (cont'd)

- Alternative technologies:
  - Electric standby,
  - Cryogenic temperature control (or hybrid),
  - Alternative-fueled engines,
  - Alternative-diesel-fueled engines,
  - Fuel cells, or
  - Any other system approved by EO not to emit diesel PM while at affected facility.

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# In-Use TRUs & TRU Gen Sets (cont'd)

- Compliance dates
  - 1995 and previous model years by December 31, 20XX
  - 1996 and subsequent model years by end of Xth year following its model year
    - At the end of one useful life
    - **X** years
  - Technology reviews in 2005 & 2007

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# In-Use TRUs & TRU Gen Sets (cont'd)

- Labeling
  - Quick & easy means of identifying
    - Equipment that is in compliance with retrofit/replace/alternative technology requirements
    - "Low Use" TRUs and gen sets
  - Visual indication, bar code, or other technology

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# In-Use TRUs & TRU Gen Sets (cont'd)

- Compliance extensions
  - No verified emission control strategy
  - Financial hardships
  - Supplier unable to deliver within compliance deadlines
  - Discontinuation of fuel verified as diesel emission control strategy
  - Case-by-case approval or disapproval

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# Facilities

- General Requirements
  - Apply to facilities with control over TRUs
  - Option #1 - Reduce emissions sooner
  - Option #2
    - Recordkeeping and reporting first
    - Reduce emissions in later phase
  - Phase in requirements over time
    - Address larger facilities first
    - Medium and small facilities later (2006)

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# Facilities (cont'd)

- Option #1: What should be required to reduce TRU PM emissions sooner?
  - Probably require "low" emission technology - something that reduced or eliminated TRU diesel engine operation while at a facility.
  - Asking for comments on this.
  - What is a large facility? Medium? Small?

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# Facilities (cont'd)

- Option #2:
  - Require recordkeeping and reporting first
    - Information necessary to
      - Evaluate risk near facilities
      - Evaluate appropriate next steps to reduce risk near facilities
  - Follow-on ATCM in 2006
    - Implement strategies to reduce near-source risk sooner
  - Large facilities first (what is large?)
  - Medium and Small facilities later

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# Facilities (cont'd)

- Require new facilities to provide infrastructure to support cleanest technology available from onset of operations
  - Units under facility control would not be operated under diesel engine power while at the facility

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# Fuel Requirements

- TRUs/TRU gen sets shall use fuel that is lawful for use or sale in California as vehicular fuel (CARB diesel).
- Fleet operators opting to use alternative diesel fuel -
  - Recordkeeping and reporting to show exclusive use of alternative-diesel fuel.
- Fuel tank labeling requirements
  - Prevent miss-fueling

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# Monitoring, Recordkeeping & Reporting

- Fleet owner/operators
  - Initial report due June 30, 20XX:
    - Contact information
    - List all California terminals
    - Basic TRU/TRU gen set fleet inventory information
  - Annual reporting due January 31st each year (starting 1/31/XX):
    - Update contact information
    - Update basic TRU/TRU gen set fleet inventory info.
    - Report compliance status

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# Monitoring, Recordkeeping & Reporting (cont'd)

- Facilities - Option #2
  - Report due January 1, 20XX
    - Contact information
    - Number of loading dock doors serving refrigerated areas
    - Total annual engine operating hours for all TRUs and gen sets under facility control
    - Estimate of TRU and gen set engine hours while at facility
    - Hours of the day when TRUs are operated at facility
    - Other facility-specific information

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# Summary

- Requirements for
  - New TRUs and TRU Gen Sets
  - In-Use TRUs and TRU Gen Sets
  - Facilities
  - Fuels
  - Monitoring, Recordkeeping, & Reporting

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# Schedule

- Next Public Workshop:  Late April
- Tentative Board Hearing:  October 2003

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