U.S. Environmental Protection Agency
Office of Mobile Sources

Clean Screening I/M Credits

FACA Meeting

May 19, 1998

revisions

May 28, 1998

Clean Screening Methodologies

- Remote sensing devices (RSD)
- Low emitter profiling (LEP)
- Model year exemptions
- Due to some high emitting vehicles being excused from I/M testing, some I/M credit lost

Information Available

- Two draft EPA reports
  - Description and Documentation for Interim Vehicle Clean Screening Credit Utility
  - Program User Guide for Interim Vehicle Clean Screening Credit Utility
- Information on web at: http://www.epa.gov/omswww/rsd.htm
- 60 day comment period through July 11th

Prior Work: RSD - High Emitters

- Earlier EPA guidance for RSD 9-96
- Find high emitter vehicles for early or more rigorous I/M test
- Adds extra I/M credit
- Based on CARB and EPA programs comparing RSD and FTP/IM240 emissions
- Uses only CO RSD readings
- Did not include AZ RSD data
- Guidance underwent FACA review

RSD Clean Screening

- Vehicle needs to pass the 2 most recent RSD tests within certain time period before scheduled I/M test
- Vehicles passing would be excused from next scheduled I/M test

RSD Clean Screening

- Credits based on 2 studies
- Denver work - CDH (quantitative)
  - IM240 and RSD on a random set of vehicles
  - Used to quantify false RSD passes
- Greeley pilot study - CDH (qualitative check)
- Waiting for final LBL analysis of Arizona data

RSD Clean Screening - CDH Work

- Remote Sensing Technologies, Inc. was contractor with Applied Analysis as subcontractor
- Obtained IM240 values and two RSD readings
- HC - 200 ppm; CO - 0.5%
- NOx - no cutpoint, 1,000, 1,500, or 2,000 ppm
- 594 vehicles

RSD Clean Screening - CDH Work

- Excess emissions
  - those over IM240 phase-in cutpoints
  - those over IM240 final cutpoints
  - percent retained on IM240 assumed to be the same as percent retained on the FTP
- Model year groupings
  - 1982-85
  - 1986-89
  - 1990+

Fleet Fraction Exempted versus NOx Cutpoint

- Current in-use fleet, 100% coverage
- HC 200 ppm; CO 0.5%
- NOx (if no NOx, assume fail)
  - no cutpoint 51%
  - 2,000 ppm 40%
  - 1,500 ppm 37%
  - 1,000 ppm 29%

Emission Credits Retained - Phase-in IM 240 Standards

- HC 200 ppm; CO 0.5%
- no NOx cutpoint
  - 98% HC, 93% CO, 77% NOx
- 2,000 ppm NOx cutpoint
  - 98% HC, 93% CO, 88% NOx
- 1,500 ppm NOx cutpoint
  - 99% HC, 100% CO, 89% NOx
- 1,000 ppm NOx cutpoint
  - 99% HC, 100% CO, 93% NOx

Emission Credits Retained - Final IM 240 Standards

- HC 200 ppm; CO 0.5%
- no NOx cutpoint
  - 91% HC, 93% CO, 72% NOx
- 2,000 ppm NOx cutpoint
  - 94% HC, 95% CO, 85% NOx
- 1,500 ppm NOx cutpoint
  - 95% HC, 99% CO, 88% NOx
- 1,000 ppm NOx cutpoint
  - 96% HC, 99% CO, 93% NOx

Model Year Dependence of RSD Clean Screening

- Values change with differing NOx cutpoints
- 1500 ppm RSD NOx cutpoint/final IM 240 standard example
- 1982-85
  - 97% HC, 100% CO, 86% NOx
- 1986-89
  - 95% HC, 100% CO, 92% NOx
- 1990+
  - 90% HC, 94% CO, 84% NOx

Evaporative Emissions

- Vehicles exempted may have high evaporative emissions
- Evaporative emission credits depend on model year and vehicle age
- Utility reduces evaporative emission credit on model year/age basis for vehicles exempted
- Not all states have evaporative emission tests
- Credit loss depends on evaporative emissions program, fuel RVP, etc.
- Typical # for credit loss is about 5% of total HC I/M credit

RSD Failure Rates for Evaporative Emissions Modeling

- Within a model year, assume that clean screening operates randomly with respect to evaporative emissions
- For example, if 50% of vehicles of a given age pass clean screening, 50% of evap benefit for that age is lost

Greeley RSD Data

- Fleet coverage: 72% 1 RSD reading; 45% 2 RSD readings
- IM240 test run at AIMS Community College
  - conditions may not be the same as in a true IM240 program
  - 3 volunteer samples: random, low RSD readings, high RSD readings
  - Volunteer random IM240 vehicles had cleaner RSD readings than Greeley sample as a whole

Arizona RSD Data

- Interagency agreement with DOE/Lawrence Berkeley Laboratories
- Collect and compare RSD and IM240 data
- Provides check on CDH studies
- Status report to be available soon

Vehicle Emitter Profiling

- High emitter profiling
  - pinpoints “families” with high emitting vehicles
  - triggers more rigorous and/or early I/M test
  - no EPA guidance presently
- Low emitter profiling
  - pinpoints “families” with mostly low emitting vehicles
  - excuses them from scheduled I/M test

Vehicle Emitter Profiling

- Radian International LLC/de la Torre Klausmeier
- Ranking of vehicles
  - model year, make, engine size, fuel metering system etc.
  - based on IM240 scores
- Need large data base of IM records (Radian estimates 1,000,000-2,000,000 vehicles to assure adequate representation of low selling model categories)
- RSD can supplement profiling

Vehicle Emitter Profiling

- AZ/CO IM240 data used
  - 1982-85 73,052 vehicles
  - 1986-89 132,359 vehicles
  - 1990+ 190,007 vehicles
- Current AZ fleet used to develop profile
- Profile should be updated periodically with new data
- AZ I/M program history impacts profile and its applicability to areas without similar programs
- Profile works well on Colorado fleet

Low Emitter Profiling

- Cleanest 50% of fleet has less than 10% of IM240 failures
- Excusing 50% of fleet from I/M testing causes I/M exhaust credit losses of:
  - 5.5% HC
  - 5.7% CO
  - 6.8% NOx
- Estimates based on current fleet; not sure what will happen for future years

Low Emitter Profiling

- Used 1990+, 1986-89, 1982-85 model year groupings
- Examined # of vehicles exempted by model year groupings in 10% increments of fleet exemptions
- Examined # of very high HC/CO emitters and high NOx emitters by model year groupings in 10% increments of overall fleet exemption

Low Emitter Profiling

- **HC/CO**
- normal <2x HC or 3x CO FTP standards
- high between 2-4x HC or CO standards
- very high >4x HC or CO standards
- super >10 g/mile HC or 150 g/mile CO
- **NOx**
- normal < 2 g/mile NOx
- high > 2 g/mile NOx

Low Emitter Profiling

- Most vehicles exempted are 1990+
- Some very high HC/CO and high NOx 1990+ emitters are exempted
- Some 1986-89 vehicles are exempted
- Few 1982-85 vehicles are exempted

Low Emitter Profiling

- Assume I/M exhaust credit lost for model year grouping is in direct proportion to number of very high HC/CO and high NOx vehicles in exempted fraction
- Does not presently consider high and super HC/CO emitters
- Does not consider actual emissions
- Model year groupings are too broad, especially the 1990+ group
- EPA plans to address these limitations

Low Emitter Profiling

- Can also examine % of model year groupings exempted for 10% increments of overall fleet exemption
- Can also examine % of I/M exhaust emission credits retained for differing percentages within model year groupings
  - model year groupings are more similar when compared at equal exemption rate
  - 1990+ group shows more effectiveness than earlier groups
  - breaking 1990+ into 2 or more groups may show even more effectiveness

Putting It Together for Exhaust Emissions

- User must specify exemption rate for each model year group adding up to fleet exemption rate
- Not a unique “solution”
- Credit loss is determined for each model year using its group’s effectiveness rate
- MOBILE5b estimates of I/M credit by model year affects how this adds up to an overall fleet effect
- Need to switch to individual model years or smaller groups
- Future year projections more uncertain

Low Emitter Profiling - Evaporative Emissions

- Credit losses similar to those in RSD clean screening
- User can specify exemption rate by individual model year for this purpose (even though individual model years are not presently treated separately for exhaust emissions)

Using Low Emitter Profiling

- Picking exemption rates for each model year group
  - Do the model-year specific exemption rates associated with one overall fleet exemption rate result in meeting exemption volume target?
  - If exemption volume is too high, state can possibly set exemption rate for pre-1986 vehicles to zero and de-exempt two 1990+ vehicles for each 1986-89 de-exempt vehicle
  - Additional older 1990+ vehicles can be de-exempted as needed
- Guidance suggests experimentation to find approach with the least credit loss

Model Year Exemptions

- Can be run with MOBILE5
- Simplest of clean screening options
- Many states now wait until vehicles are 4-5 years old before requiring I/M tests with minimal loss of credit

Major Issues

- How to estimate credit loss for future years when 1990+ vehicles have aged and are large part of fleet
- Recent change in EPA useful life may affect profiling opportunity
- Present data shows credit losses for RSD and low emitter profiling increase for future years
- Need to better estimate credit impacts of profiling considering actual excess emissions
- Need for states to update information, especially for profiling!!! What is practical and effective?

What Does a State Need to Do?

- Compensate as needed for lost I/M credit especially in future years when the percent credit loss increases
- If using RSD, use good engineering practice in setting up RSD sites and assure adequate RSD coverage is obtained
- Obtain random sample of vehicles not subject to clean screening for evaluating and helping update clean screening credits

Guidance Completion and Review Plan

- FACA review and comments by late June
- Review with STAPPA/ALAPCO and obtain comments
- Public comments due July 11th
- Update credit loss estimates for low emitter profiling
  - better consider excess emissions
  - have specific model year #s
- Revise guidance as needed
- Final guidance planned for release late fall 1998

Comments and Additional Ideas So Far

- How effective would it be to use relatively small, continuous RSD sample to help develop engine family profile?
- Equity and equal protection concerns
- Should explore how much coincidence there is between tailpipe and evaporative emissions - AZ IM240 sample has evaporative check failures