MOVES 2013 Proposed Evaporative Emissions Updates

FACA MOVES Review Workgroup

January 28, 2013

Outline for Evap presentations

- Review of Evap presentations November 27, 2012
- Summary of updates proposed for MOVES2013
- Presentations on proposed updates:
  - DELTA: A Multiple-day Cold Soak Emissions Calculator for MOVES
  - Modeling Vapor Leak Frequency
  - Modeling Vapor Emissions during Hot Soak Operation from Leaking Vehicles
  - Temperature and RVP Adjustments for Evaporative Running Losses
  - Altitude Algorithm Update
- Summary of proposed evap emissions updates in MOVES2013

November 27, 2012 Meeting

- Review of what is currently in MOVES2010b
  - Data used for MOVES2010b was limited
- Multi-year research effort, millions of dollars from EPA and partners
  - Coordinating Research Council (CRC), DOE/NREL, Colorado Department of Public Health and Environment (CDPHE)

Real World Evap Emissions Study	What we learned
CRC E-77 Test Programs	Aging enhanced evap emissions vehicle data, fuel effects, leak effects
High Evap Field Studies in Denver	Frequency and magnitude of leaking vehicles in the real world
Multi-day Diurnal Testing	14 day diurnal data separating the evaporative emission mechanisms

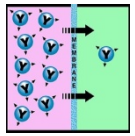
- Running Loss Testing (current program)
- Slides posted on MOVES website:
  - http://www.epa.gov/otaq/models/moves/faca.htm#nov2012

Vehicle Evaporative HC Sources

- Vapor – generated by fuel tank heating, due to increasing ambient temps and/or vehicle operation

  - **Breakthrough** – carbon canister cannot contain all of the generated vapor; can result in large increase in HC emissions
    - "Enhanced Evap" rule required canisters sized for 3 days at 9 RVP, 72-96 degrees, 40% fill level
    - Breakthrough happens with higher temperatures, higher RVP, less fuel in tank, and/or > 3 days

  - **Vapor Leaks** - e.g., gas caps, compromised vent lines, connections, fittings
- Permeation - emissions through polymer walls, worsened by ethanol and controlled by changing fuel system materials



- Refueling – Except for HDGVs, Onboard Refueling Vapor Recovery (ORVR) now drives canister size
- Liquid leaks - fuel tank/fuel line holes

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Planned Evaporative Emissions Updates for MOVES2013

- Explicit modeling of vapor leak prevalence rates
- Updating Hot Soak emission rates with new data
- Updating Cold Soak (diurnal) emission rates
  - New emissions data
  - New activity data
  - Algorithm that better accounts for multi-day effects
- Adding fuel volatility and ambient temperature effects for Running Loss.
- Adding fuel volatility effect for Hot Soak
- Improving altitude effect algorithm

Review Process

- Peer reviewed analyses reports
  - "Estimated Summer Hot-Soak Distributions for Denver's Ken Caryl IM Station Fleet"
    - Leak prevalence rates
  - "DELTA Model: Improved Evaporative Emissions Modeling for EPA MOVES"
    - Vapor venting, multiday diurnals
  - "Evaluation of the Effectiveness of On-Board Diagnostics (OBD) Systems in Identifying Fuel Vapor Losses from Light Duty Vehicles"
- Will be peer reviewing modeling application
- Feedback from FACA process