#### Widespread Use Assessment for On-Board Refueling Vapor Recovery

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# **Clean Air Act Provisions**

CAA §182(b)(3) – Gasoline Vapor Recovery

- Requirement of State Implementation Plans for Ozone Nonattainment Areas
- Stage II Systems Required at Gasoline Dispensing Facilities
- Two Year Phase In Following 1990 CAA Amendments
- 10K/50K Gallon Per Month Threshold



## Stage II Vapor Recovery



Source: EPA Stage II Technical Guidance (1991)



# **Clean Air Act Provisions**

CAA §202(a)(6) – Onboard Vapor Recovery

- EPA Required to Promulgate ORVR Standards
- New Light-Duty Vehicles Only
- Minimum Capture Efficiency of 95%
- Stage II Waived for Moderate Ozone NAAs Upon Standards Promulgation
- Stage II Waived for More Severe Ozone NAAs When ORVR in Widespread Use



## **ORVR** System



Source: ASE 2006



# **ORVR** Phase-In Schedule

Percentage	<b>Applicable Model Years</b>					
of Vehicles Sold	LD PVs	LD Trucks 0–6.0K lb	HLD Trucks 6–8.5K lb	MLD PVs 8.5–10K lb	Complete HDVs 8.5 – 10K lb	
40%	1998	2001	2004	2004	2004	
80%	1999	2002	2005	2005	2005	
100%	2000+	2003+	2006+	2006+	2006+	

Source: API/Haskew



# Stage II In-Use Efficiency

Affected By Various Factors Including...

- Rule Penetration
- Rule Effectiveness
- System Integrity (i.e., Vapor Tightness)
- System Type
  - Vapor Balance System
  - Vacuum Assist System



#### Stage II In-Use Efficiency Factors

Inspection Frequency	Minimal	Annual	Semiannual	Certification
Exemption Level (gal/mo)				
None	62	86	92	95
2000	61	84	90	93
10,000	60	84	89	92
10,000 & 50,000	56	77	83	86

Source: EPA Stage II Guidance (1975)



# **ORVR** Penetration Rate

Affected By Various Factors Including...

- Motor Vehicle Fleet Turnover Rate
- Mix of Vehicle Types in the Fleet
- Fuel Efficiency of Vehicles in the Fleet
- Fleetwide Vehicle Miles Traveled (VMT)



## **ORVR** Durability Testing



#### Data Source: EPA 2006



# Stage II/ORVR Incompatibility

- Problem with ORVR Equipped Vehicles Refueling with Vacuum Assisted Stage II
- Excess Fresh Air Drawn into Stage II System
- Slight Positive Pressure Build-Up
- Potential for Pressure-Induced Vapor Leaks or Pressure Vacuum Valve Venting
- Gasoline Moves from Liquid Phase to Vapor Phase to Re-establish Equilibrium
- ORVR Compatible Systems (California)



#### Widespread Use (WSU) Definitions

**Definition (c) - ORVR WSU achieved when VOC** emissions (T/Day) under an ORVR-only scenario equal VOC emissions under a Stage II-only scenario. **Definition** (c2) – ORVR WSU achieved when VOC emissions (T/Day) under prospective ORVR-only scenario equal VOC emissions under combination scenario of: (1) Stage II controls in place, (2) ORVR & non-ORVR vehicles fueling at Stage II stations, & (3) fueling of ORVR vehicles causes incompatibility excess emissions between the two systems.



# WSU Definition (c) Problems

- Stage II-Only Scenario Doesn't Exist
- ORVR-Only Scenario Doesn't Exist Until Stage II is Removed
- Removing Stage II According to Definition (c) Causes VOC Emissions Increase



#### Definition (c) Typical Example





#### Definition (c) WSU Emissions Increase

State	Def (c2) Date	Def (c) Date	Def (c) Excess Emissions (T/day)	
California (South Coast)	N/A	2012	7.28	
Delaware	2013	2011	0.17	
Georgia (Metro Atlanta)	2012	2010	1.32	
Massachusetts	2013	2010	1.96	
New Hampshire	2013	2008	0.97	
Pennsylvania (Philadelphia)	2013	2009	1.57	
Vermont	2015	2008	0.64	



### WSU Alternate Metrics

**Definition (a)** ORVR WSU achieved when percentage of in-use LDV fleet equipped with ORVR. (Examples: 80%, 85%, 90%, 95%)

- **Definition (b)** ORVR WSU achieved when percentage of VMT by in-use LDV fleet attributable to ORVR equipped vehicles. (Examples: 90%, 95%)
- **Definition (d)** ORVR WSU achieved when percentage of the gasoline throughput is attributable to ORVR equipped vehicles. (Examples: 85%, 90%, 95%)



Definition	Description	MA Effective Date	NH Effective Date	VT Effective Date
(c)		2010	2008	2008
(c2)		2013	2013	2015
(a)	80% of fleet with ORVR			2013
	85% of fleet with ORVR			2015
	90% of fleet with ORVR			2017
	95% of fleet with ORVR			2023
(b)	85% of VMT ORVR	2011	2012	2013
	90% of VMT ORVR	2012	2013	2015
	95% of VMT ORVR	2015	2016	2019
( <b>d</b> )	85% of gasoline to ORVR	2011	2012	2013
	90% of gasoline to ORVR	2013	2014	2016
	95% of gasoline to ORVR	2016	2018	2021



Definition	Description	CA Effective Date	DE Effective Date	GA Effective Date	PA Effective Date
(c)		2012	2011	2010	2009
(c2)		N/A	2013	2012	2013
(a)	80% of fleet ORVR	2014	2012	2012	2012
	85% of fleet ORVR	2015	2014	2013	2013
	90% of fleet ORVR	2018	2016	2015	2015
	95% of fleet ORVR	2022	2019	2018	2018
(b)	85% of VMT ORVR	2014	2012	2011	2012
	90% of VMT ORVR	2016	2013	2013	2014
	95% of VMT ORVR	2022	2016	2016	2017
(d)	85% of gasoline ORVR	2014	2012	2012	2013
	90% of gasoline ORVR	2017	2014	2013	2015
	95% of gasoline ORVR	2021	2018	2017	2018

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#### PA (Philadelphia) Emissions & ORVR Percentage





#### CA (South Coast) Emissions & ORVR Percentage





#### **Options - WSU Determinations**

- Individual Definition (c2) Analyses by State
- Require ORVR-Compatible Systems & Extend WSU Dates to ~2025
- Establish One National WSU Date (2013)
- Use ORVR Fleet Penetration Metric (85%)
- Use ORVR VMT Penetration Metric (90%)
- Use ORVR Gasoline Throughput Metric (85% to 90%)



## Widespread Use Assessment

#### Questions/Comments?