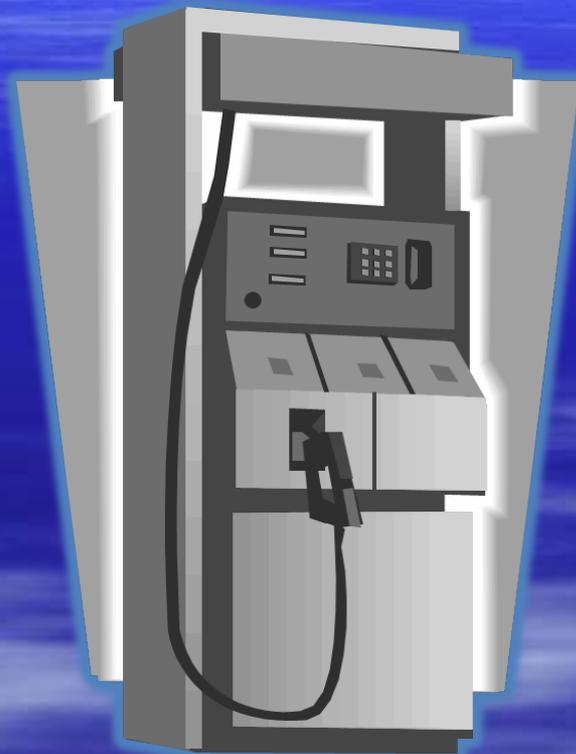


# Proposed Low Permeation Gasoline Dispensing Facility (GDF) Hose Standard



**Presented by:**  
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**California Air Resources Board (CARB)**  
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# Outline

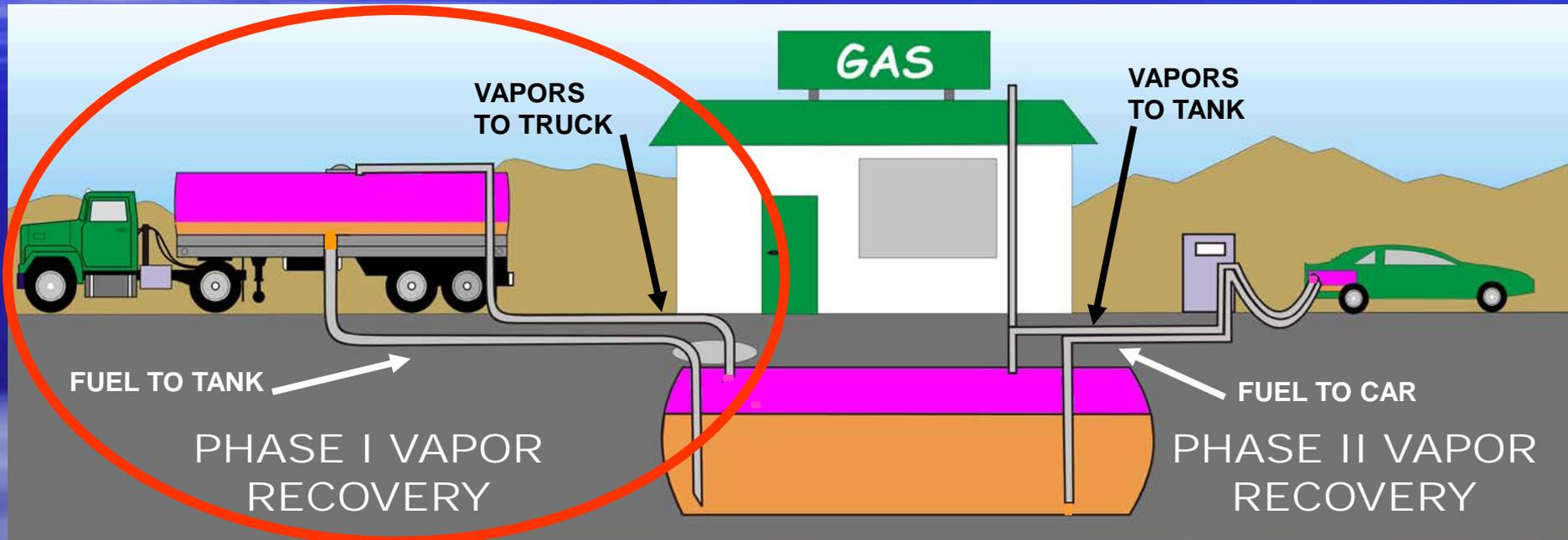
- CARB Background
- GDF Hose Background
- GDF Hose Permeation
- UL 330 Permeation Test Standard
- CARB Proposed Regulation
- Regulatory Timeline
- Contacts

# CARB Background

- The California Air Resources Board (CARB) is the State government agency responsible for air quality and climate protection
- CARB's mission is to promote and 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

# CARB Background

- CARB has been certifying GDFs vapor recovery systems since 1975



- Current Enhanced Vapor Recovery (EVR) systems reduce emissions due to displacement during fueling by over 95%

# GDF Hose Background

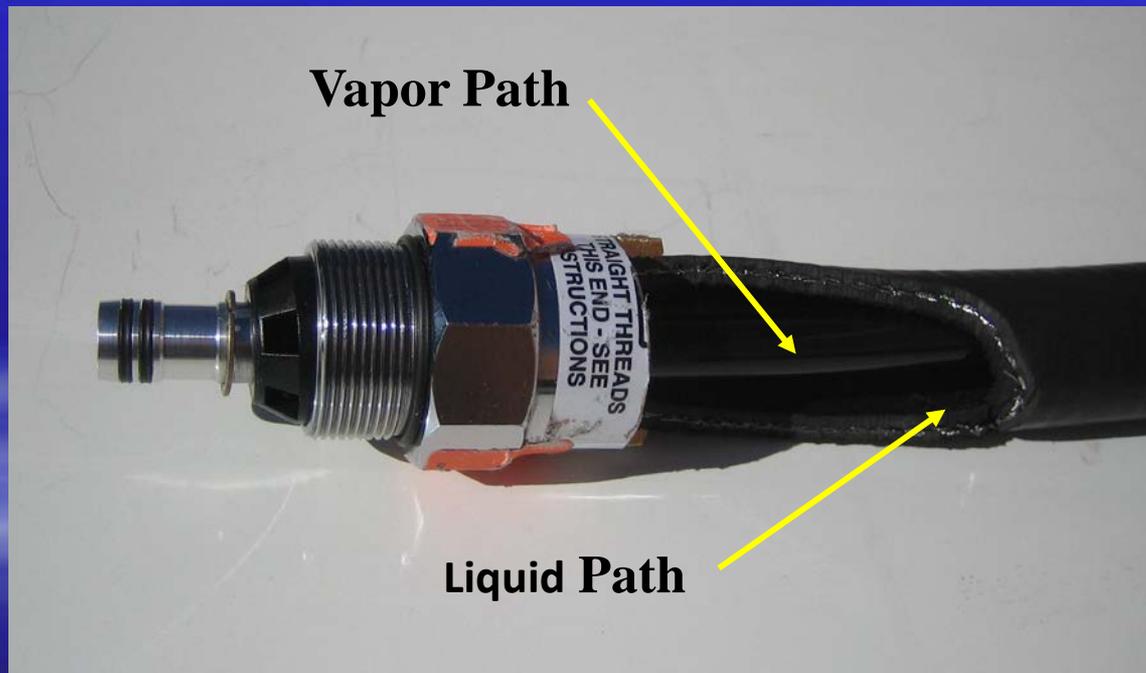
CARB certifies GDF hoses as part of a Phase II EVR system

- Phase II EVR systems require the use of vapor recovery hoses
- Currently, no standard exists for controlling permeation emissions from GDF hoses



# GDF Hose Background

GDF vapor recovery hoses differ from other types of conventional fuel hose in that they are co-axial

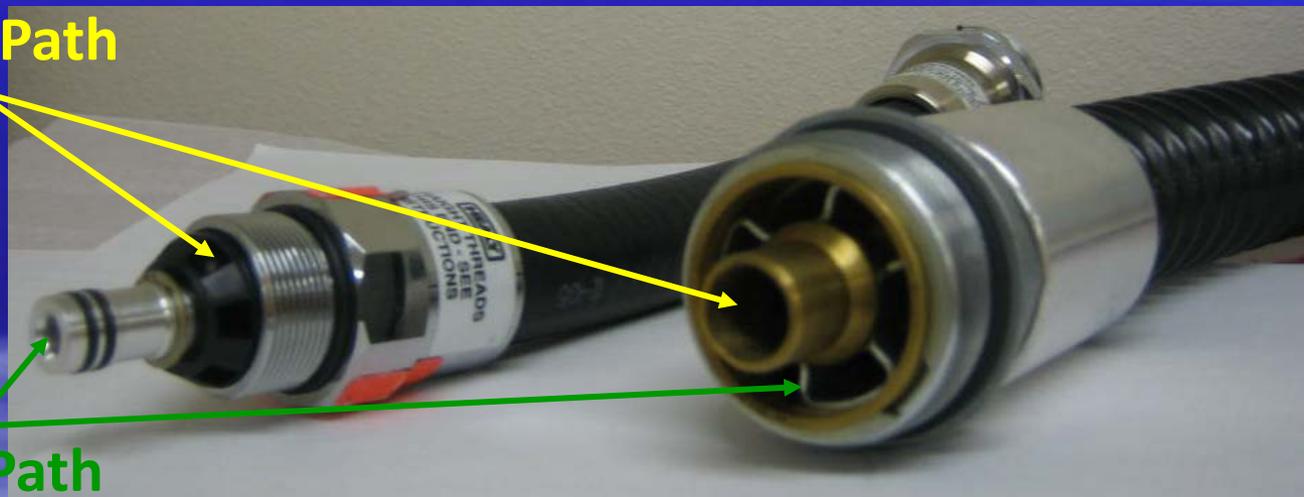


# GDF Hose Background

There are two configuration types of GDF vapor recovery hose

Liquid Path

Vapor Path



Vacuum Assist  
Hose

Balance  
Hose

# GDF Hose Permeation

- Permeation is the diffusion of a permeate through a solid
  - In the case of GDF hoses, the permeate is the fuel and the solid is the hose wall
- There are many factors that effect hose permeation rates:
  - Temperature
  - Hose material
  - Fuel type
  - Fuel degradation (weathering)
  - Concentration gradient of the permeate across the barrier

# GDF Hose Permeation

- Current fuel hose permeation standards include SAE J30, SAE J1737, and UL 330
  - Only UL 330 is applicable to GDF hoses
  - SAE standards are applicable to vehicle fuel hose
- Hoses rated under these standards encompass a wide range of permeation rates and testing conditions
  - UL 330 requires the hose to permeate at no more than 10.0 g/m<sup>2</sup>/day at 38°C with test fuel C(E10)
  - A hose rated SAE 30R6 may permeate at a rate of up to 600 g/m<sup>2</sup>/day at 23°C with test fuel C

# GDF Hose Permeation

In 2004, 2008, and 2009, CARB staff conducted testing to determine permeation rates of vapor recovery hoses



# GDF Hose Permeation

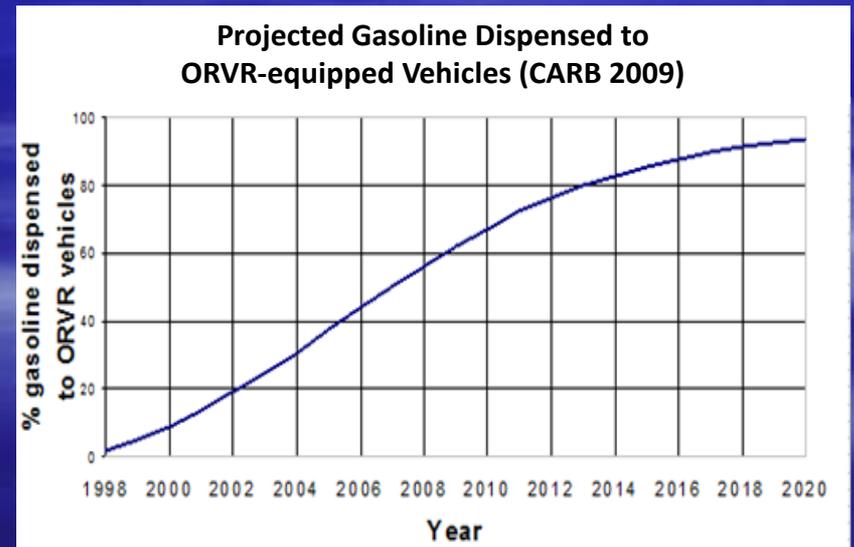
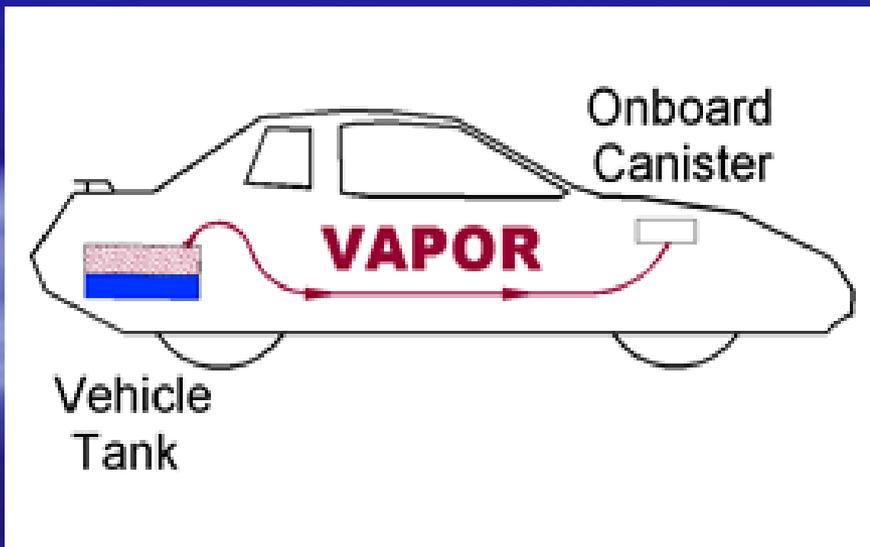
CARB estimates current GDF hose permeation rates (given an average temperature of 71°F and using CaRFG 3 fuel with 6% ethanol) of:

- Vacuum assist hose: 75 g/m<sup>2</sup>/day
- Balance hose\*: 105 g/m<sup>2</sup>/day

*\*Assumes saturated vapor in vapor path.*

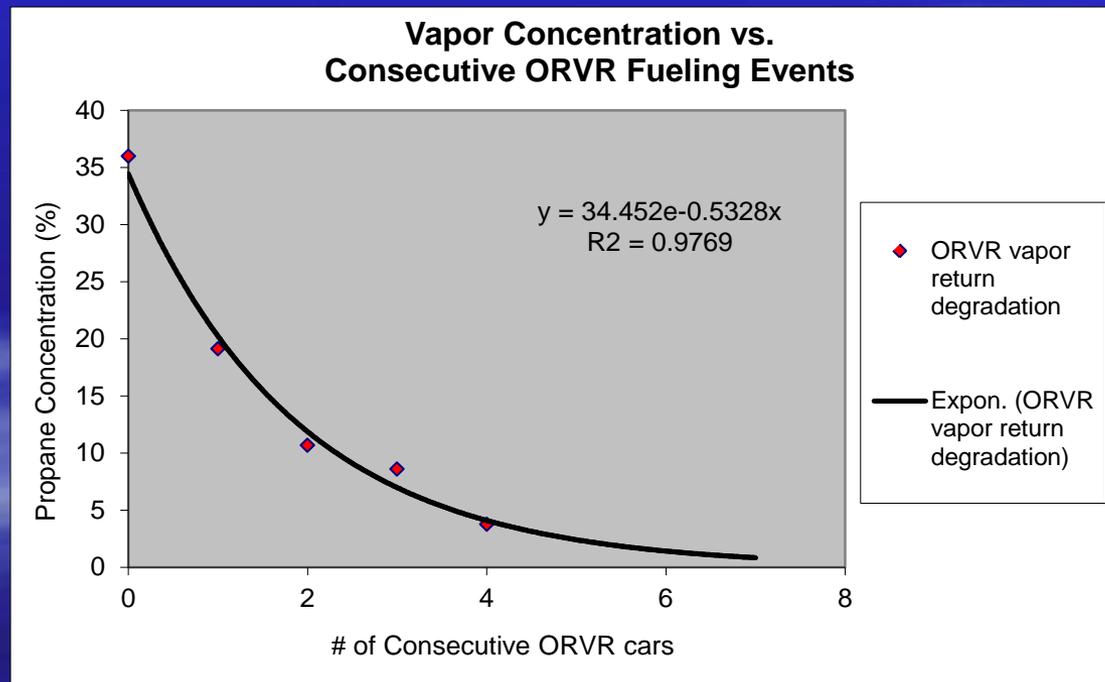
# GDF Hose Permeation

- Gasoline vapor concentration is an important factor when considering permeation from balance hoses
- Fueling of vehicles with On-board Refueling Vapor Recovery (ORVR) reduces the vapor concentration in the vapor path of a balance hose



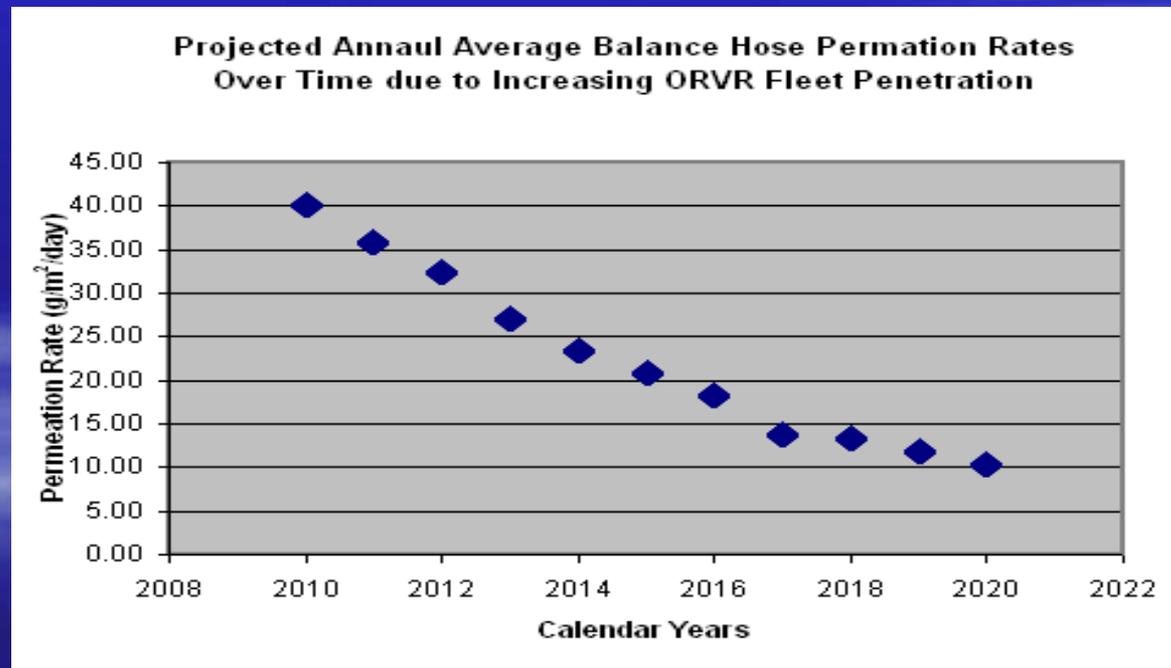
# GDF Hose Permeation

Consecutive fuelings of ORVR equipped vehicles will decrease gasoline vapor concentration in balance style GDF hoses



# GDF Hose Permeation

From the projected increase in ORVR equipped vehicles, CARB predicts a trend of decreasing emissions from uncontrolled balance GDF hoses



# UL 330 Permeation Test Standard

CARB has been working with Underwriter's Laboratory to develop a hose permeation test procedure since early 2007

- Other participants in this process include hose manufacturers, material manufactures and US EPA



# UL 330 Permeation Test Standard

- The working group conducted multiple test trials and held over 20 meetings to develop the test procedure
- The new procedure certifies hoses that permeate at a rate no greater than 10.0 g/m<sup>2</sup>/day
- The permeation test procedure has been included in the 7<sup>th</sup> edition of UL 330
  - UL 330 is Underwriters Laboratories' Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids
  - The permeation test procedure is not required for normal UL 330 certification

# CARB Proposed Regulation

“All hoses which carry liquid fuel against the outermost hose wall shall permeate at a rate of no more than 10.0 grams per square meters per day ( $\text{g}/\text{m}^2/\text{day}$ ) as determined by UL 330 (Seventh Edition) - Underwriters Laboratories’ Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids.”

# CARB Proposed Regulation

- Would increase hose cost by approximately \$1 per linear foot
  - Based CARB survey of hose manufacturers
- Would reduce statewide emissions by approximately 1 ton per day of reactive organic gases
- Would save approximately 1.7 gallons of gasoline per hose per year
  - Assumes a 10 foot hose with California pump fuel and annual average temperatures

# Regulatory Timeline

- September 22
  - Public Board Hearing to consider the proposal
    - <http://www.arb.ca.gov/regact/2011/evr11/evr11.htm>
- 2013
  - Estimated date that the proposal will become law
    - Also the date when the first hoses may be CARB certified
      - This will be the date when new and replacement hoses at affected GDFs must meet the new permeation standard
- 2017
  - Estimated year when all affected GDFs must have hoses that meet the new permeation standard

# Contact Information

- For questions concerning CARB's Low permeation GDF hose proposal:
  - Jason McPhee, P.E.
  - (916) 322-8116, [jmcphee@arb.ca.gov](mailto:jmcphee@arb.ca.gov)
- For general questions on CARB's Enhanced Vapor Recovery (EVR) rulemaking:
  - Scott Bacon
  - (916) 322-8949, [sbacon@arb.ca.gov](mailto:sbacon@arb.ca.gov)
- For general questions on EVR certification:
  - Pat Bennett, P.E.
  - (916) 322-8959, [pbennett@arb.ca.gov](mailto:pbennett@arb.ca.gov)

# Web Site

<http://www.arb.ca.gov/vapor/gdfhe/gdfhe.htm>

# Questions & Comments

