

California Environmental Protection Agency  
AIR RESOURCES BOARD  
Monitoring and Laboratory Division

**GDF Curb Pump Hose Emissions Study Results**

The California Air Resources Board (ARB) conducted a study to measure evaporative emissions from gasoline dispenser facility (GDF) curb pump hoses. Its purpose was to determine the evaporative emission factors from vapor recovery hoses and to evaluate the necessity for emission control measures. An outline of the study is posted on ARB's web site at <http://www.arb.ca.gov/vapor/vapor.htm>.

Study Description

ARB conducted in-house gravimetric testing of six new and twelve used vapor recovery gasoline dispenser facility (GDF) hoses under non-controlled ambient conditions. A contractor acquired twelve in-use GDF hoses that ranged in ages from 1 – 3.5 years old. All hoses were in serviceable condition. After the contractor removed the hoses from service, the product hose was immediately refilled with gasoline to a 75 percent fill level, and capped within 15 minutes of removal. The used GDF hoses were of the following types and manufacturer:

- Two Goodyear and two Dayco balance hoses;
- Two Goodyear and two Dayco balance hoses with liquid removal devices;  
and
- Two Goodyear and two Dayco vacuum assist hoses.

One new hose of each type and manufacturer (6 total) was purchased and used as blanks for test purposes. The blank (empty) hoses were used to monitor moisture effects on the weight.

Once ARB received the used GDF hoses from the contractor, the hoses were emptied and refueled to 75 percent of capacity with summertime commercial pump fuel. The used hoses were refueled within 15 minutes of emptying. The fueled hoses were then leak tested in a warm water bath and hung outside along with the blank hoses (used for gravimetric adjustment due to humidity) in a configuration similar to their normal hanging position. Figure 1 shows the blank and used hoses hung outside under an overhang. The hoses were initially weighed 24 hours after the initial hanging and routinely re-weighed at 24-hour intervals (2 PM local time) on work days from September 17 to October 15, 2004. Figure 2 shows the weigh

fixture and scale. Ambient temperature, barometric pressure, and relative humidity were recorded in the data logger at 1-minute intervals throughout the test period.

Study Results

Results of the study are shown below. The average daily weight loss was determined over the test period from September 17, 2004 to October 15, 2004, a total of 28 days.

**Study Results Summary**

Hose Types	Average Daily Weight Loss (grams/10' hose /day) <sup>1</sup>	Average Daily Weight Loss (grams/meter <sup>2</sup> /day) <sup>2</sup>	Average Daily Diurnal Temperature (°F)
Vacuum Assist	6.5	23.5	57.7 - 87.6
Balance with Liquid Removal	4.2	10.7	
Balance without Liquid Removal	4.4	11.2	

<sup>1</sup> GDF hoses tested varied in length from 4 foot to 8½ foot. For the purpose of comparison, weight loss was calculated based on a ten foot hose.

<sup>2</sup> Assume all emissions are from permeation through the hose and no connector losses. Average external surface area of a 10-foot vacuum assist hose is .2772 m<sup>2</sup>. Average external surface area of a 10-foot balance hose is .3933 m<sup>2</sup>.

ARB staff is currently evaluating the results to determine the necessity for emission control measures. As part of this evaluation, ARB intends to contact GDF hose manufacturers for cost information.

ARB Staff Contacts

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Figure 1

The picture at the right shows the hoses hung outside on a mobile cart and positioned under an overhang. Each day (except on weekends), the hoses were wheeled to an adjacent building, weighed, and immediately returned to this location until the next weighing. A data logger (white box) was attached to the mobile cart to monitor ambient temperature, barometric pressure, and relative humidity throughout the test period.

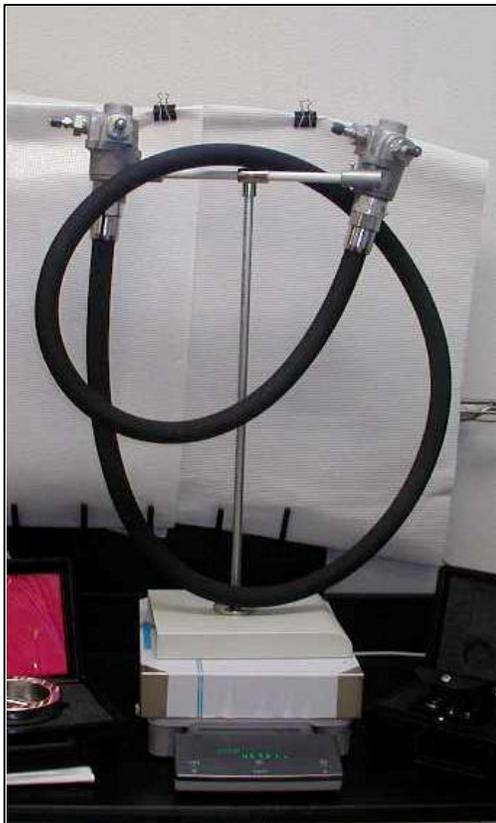


Figure 2

The picture at the left shows the capped hoses, weigh stand, and scale.