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Category: 25 – Gasoline Tank Trucks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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SUBJECT: Cost Effectiveness of Gasoline Tank Truck Certification Program

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TO: Chief, Air Programs Branch, Regions I-X

The following analyses on the cost effectiveness of gasoline tank truck certification regulations are provided for your information.

For illustration, a 5,000-gallon tank truck carrying an average number of loads per year is considered. Also, it is assumed that the tank truck utilizes submerged loading and is in vapor balance service. The tank truck should not sustain a pressure change of more than three inches of water in a five-minute period when pressurized to eighteen inches of water or evacuated to six inches of water. This is the criteria recommended in the gasoline tank truck control technique guideline (CTG) document.

Assumptions:

A. Loading emission factor = 8 lbs VOC/(10)(10)(10) gallons transfer (Ref. AP-42).

B. 5,000-gallon tank truck loaded.

C. An average of 30 percent of VOC vapors lost during loading without tank truck certification program (Ref. EPA-450/3-80-038a).

D. An average of 10 percent of VOC vapors lost during loading with implementation of tank truck certification program (Ref. EPA-450/3-8-038a)

E. Estimated average cost to meet 3-inch water pressure drop annual certification requirement - $250.[1]

F. Truck makes 500 round trips/year delivering gasoline to vapor balance service stations. (Ref. California Air Resources Board, staff Report 77-5-1, dated March 15, 1977.)

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[1]This cost ranges from $130 to $500 in the literature; however, the most recent data relate to the lower value.

1. Estimated potential loss when loading 5,000 gallons of gasoline. (uncontrolled balanced service)

$$5{,}000 \text{ gal} \times \left(\frac{8 \text{ lbs VOC}}{10 \times 10 \times 10 \text{ gal}} \right) = 40 \text{ lbs VOC}$$

2. Estimated average loss during loading without a tank truck certification program.

$$40 \text{ lbs VOC} \times 0.30 = 12 \text{ lbs VOC}$$

3. Estimated average loss during loading with a tank truck certification program.

$$40 \text{ lbs VOC} \times 0.10 = 4 \text{ lbs VOC}$$

4. Estimated tank truck VOC transit loss (2-hour round trip) without tank truck certification program (Ref. California Air Resources Board, Staff report 77-5-1, dated March 15, 1977).

   Loss during transport of gasoline (liquid state) is 2.07 lbs VOC

   Loss during transport of gasoline (vapor state) is 2.17 lbs VOC [2]

5. Estimated tank truck VOC transit loss (2-hour round trip) with tank truck certification program (Ref. California Air Resources Board, Staff Report 77-5-1, dated March 15, 1977).

   Loss during transport of gasoline (liquid state) is 2.07 lbs VOC [3]

   Loss during transport of gasoline (vapor state) is 1.59 lbs VOC

6. Estimated total VOC loss from tank truck without certification. (Loading and with a 1-hour delivery to and a 1-hour delivery from a vapor balanced service station.)

$$TLo = 12 + 2.07 + 2.17 = 16.24 \text{ lbs VOC}$$

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[2]This value could be greater with large leak in tank truck.

[3]It has been calculated that pressure in ullage area would normalize to atmospheric pressure during the one-hour trip to service station when tank truck just meets three-inch certification requirement. Unless the tank truck is more leak-tight, as required in California, these emissions would be the same with or without the certification program.

7. Estimated total VOC loss from tank truck with certification. (Loading and with a 1-hour delivery to and a 1-hour delivery from a vapor balanced service station.)

$$TLc = 4 + 2.07 + 1.59 = 7.66 \text{ lbs VOC}$$

8. Estimated VOC prevented from venting to the atmosphere with a tank truck certification program.

$$16.24 - 7.66 = \frac{8.58 \text{ lbs VOC}}{5{,}000 \text{ gal gasoline loaded \& delivered}}$$

9. Estimated cost per ton for controlling VOC if tank truck certification program is required for the example 5,000-gallon tank truck using 8.58 lbs VOC recovered per round trip.

$$8.58 \text{ lbs VOC} \times 500 \text{ round trips/yr} = 4290 \text{ lbs} = 2.145 \text{ tons/yr}$$

$$\frac{\$250/\text{yr}}{2.145 \text{ tons/yr}} = \$117/\text{ton cost of VOC control}$$

10. Estimated value of returned vapors recoverable by tank truck which is company-owned.

Assumptions:

A. Estimated value of VOC recovered — $0.15/lb.

B. 90 percent recovery of vapors.

$$4290 \text{ lbs VOC/yr} \times \$0.15/\text{lb} \times 0.90 = \$579.15/\text{yr}$$

11. Estimated recovered value for a 5,000-gallon tank truck if tank truck annual certification required

$$\$579.15/\text{yr} - \$250.00/\text{yr} = \$329.15/\text{yr savings}$$

It is hoped that this analysis will alleviate concerns that have been expressed regarding the cost effectiveness of tank truck certifi- cation programs. However, as can be seen, the cost considerations of a tank truck program depend on a number of factors. As the cost of maintenance and replacement parts, the value of recovered product, gasoline throughput, and

even the stringency of the program change, there can be either a cost or savings of varying degrees per tank truck when implementing a tank truck certification program. Should you have any questions, please contact the Technical Guidance Section (Brock Nicholson or Bill Polglase, FTS 629-5516).