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Via e-mail: a-and-r-docket@epa.gov
EPA Docket Center (2822T)
40 CFR Part 63 Subpart BBBBBB and CCCCCC
Proposed Amendments
Docket ID No. EPA–HQ–OAR–2006–0406
1200 Pennsylvania Ave., NW
Washington, D.C. 20460

Ref.: Docket ID No. EPA-HQ-OAR-2006-0406; Comments on EPA's Proposed Amendments to "National Emission Standards for Hazardous Air Pollutants for Source Categories: Gasoline Distribution Bulk Terminals, Bulk Plants, Pipeline Facilities, and Gasoline Dispensing Facilities", 74 Federal Register 66470 (December 15, 2009)

Dear Sir/Madam:

The American Petroleum Institute (API) and the Independent Liquid Terminals Association (ILTA) appreciate the opportunity to comment on the Environmental Protection Agency's (EPA) proposed amendments to 40 CFR Part 63 Subpart BBBBBB published in the Federal Register on December 15, 2009. API is the primary trade association of America's oil and natural gas industry and represents more than 400 members involved in all aspects of the oil and natural gas business. ILTA is the nation's trade association representing the bulk liquid terminal industry and serves 80 member companies and over 500 facilities nationwide. Together, API and ILTA members are strongly interested in the potential impacts these rule amendments may have on their operations.

API appreciates EPA's granting of our petition for reconsideration, as well as EPA's response to the other issues that we raised. We agree that these issues pertain to provisions that were possibly confusing, and providing clarity will enhance owner/operator compliance with these rules.

API and ILTA are supportive of most of the clarifications made to the rules, but we have a few concerns – particularly with respect to the definition of a *gasoline storage tank or vessel* that has been added to the proposed amendments. Our specific comments are tabulated below.

Comments Related to the Definition of a Gasoline Storage Tank

1) Tanks with Infrequent Use – **Table 1**, item 1(ii). We support EPA's creation of a subcategory for tanks that have a capacity of less than 151 m^3 and a gasoline throughput of 480 gallons per day or less, as well as the control requirements specified for those tanks. We also appreciate that EPA has clearly specified the manner in which daily throughput is to be computed. We strongly endorse the procedure of summing

the current day's throughput with the throughput for the previous 364 days, and dividing that sum by 365.

2) Surge control tanks – **§63.11100** and **Table 1**, item 3. We support EPA's clarification of the requirements for surge control tanks. Surge control tanks are expressly defined as not being storage vessels in the 40 CFR Part 60 Subpart Kb regulation. The unique operational and safety requirements associated with surge control tanks merit separate consideration. We support the new definition of a *surge control tank or vessel* as well as the control requirements specified for these tanks.

3) Definition of *gasoline storage tank or vessel* – **§63.11100**. We object to the definition of gasoline storage tank that EPA is proposing to add to the rule, and we believe that it has potentially unintended implications. The definition has been taken from 40 CFR Part 60 Subpart Kb (Kb), but without the stipulation in Kb that a process tank is not a storage vessel. Kb and other EPA regulations have distinguished between vessels that serve a storage function and vessels that serve a process function, in that control measures which are specified for storage vessels are often unsuitable or unnecessary for process tanks. We have the following comments on this issue.

   a. Process tanks are not limited to the pressure vessels and drums associated with petroleum refining and chemical manufacturing, but also include tanks and vessels used for functions such as accumulation of drained materials prior to transfer to other equipment (sumps). Vessels that "collect material discharged from …equipment within the process before the material is transferred to ...a product or by-product storage vessel, or to a vessel used to store recovered solvent or raw material" [1] are deemed process vessels. Sumps that collect drained material such that it can be pumped to storage or otherwise reintroduced into the system therefore serve a process function, rather than a storage function. This distinction between process and storage functionality is present in other EPA regulations, including 40 CFR Part 63 Subpart R,[2] the MACT rule for gasoline distribution facilities. Imposing a different definition of storage tank in Subpart BBBBBB would cause unnecessary confusion and inconsistency between the rules. The definition from Kb should be retained in its entirety. If EPA wishes to impose controls for process tanks, such control requirements should be specified separately in Table 1 after an appropriate cost effectiveness evaluation has been made.

   b. Process tanks at pipeline facilities and bulk liquid terminals are typically of a capacity and throughput that, if they were serving the function of storing gasoline, would be subject to the requirements specified in Table 1, item 1. These tanks are typically flow-through type process tanks and are not used for storage of finished products. The control measure specified in Table 1, item 1, is to "maintain all openings in a closed position at all times when not in use." This effectively prohibits open vents, which has the benefit of slightly reducing breathing losses from these tanks.

   Breathing losses are those emissions that result from the pressure variations in a fixed-roof tank associated with the ambient diurnal temperature cycle. These losses are eliminated completely if a tank is insulated sufficiently to prevent the ambient diurnal temperature cycle from causing appreciable temperature swings in the vapor space of the tank.

[1] From the definition of a Process Tank, 40 CFR 60.111b, added to Subpart Kb Standards of Performance for Volatile Organic Liquid Storage Vessels with the October 15, 2003 rule amendments.

[2] U.S. Environmental Protection Agency, "National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)," 40 CFR Part 63, Subpart R.

Tanks that are located underground are deemed by EPA to be adequately insulated so as to eliminate breathing losses. EPA states, in AP-42 Chapter 7.1 at 7.1.1.1, "Losses due to changes in temperature or barometric pressure are minimal for underground tanks because the surrounding earth limits the diurnal temperature change, and changes in the barometric pressure result in only small losses." EPA further states, at 7.1.3.1.1 after Equation 1-14, "For underground horizontal tanks, assume that no breathing or standing storage losses occur (LS = 0) because the insulating nature of the earth limits the diurnal temperature change."

Location of a tank underground, then, is a more effective control measure than fitting the tank with a self-closing breather vent. See Attachment 1 for more documentation on this point. A reasonable criterion for defining "underground" may be if 75% or more of the volume of the tank or vessel is beneath the surface of the ground.

c. The gasoline distribution source category has not been understood as the aggregation of all emission points at a bulk terminal or pipeline breakout station, but rather has been specified as "gasoline storage tanks, gasoline loading racks, vapor collection-equipped gasoline cargo tanks, and equipment components in vapor or liquid gasoline service." [§63.11082(a)] Thus tanks that serve a process function, rather than being used for the storage of gasoline, have not been understood to be part of the affected source for the gasoline distribution source category.

d. Given that process tanks were not part of the original affected source for the gasoline distribution source category and, when these tanks are located underground, emissions are controlled more effectively than as specified in Table 1, item 1, of the rule, it is neither appropriate nor necessary to draw these underground flow-through process tanks into the purview of this rule. Furthermore, removal of the process tanks exclusion from the definition of storage tanks would have unintended consequences with respect to facility classification and reporting requirements (see discussion below on Definition of *pipeline pumping station*).

e. Additionally, the proposed definition of gasoline tanks fails to distinguish between gasoline storage tanks located at the terminal, and the tank trucks that are loaded at the terminal. However, Kb makes this distinction by exempting "Vessels permanently attached to mobile vehicles such as trucks, railcars, barges, or ships." A similar clarification should be made in this rule.

f. For the reasons noted above, we request that the proposed definition of *gasoline storage tank or vessel* be edited to read as follows:

"*Gasoline storage tank or vessel* means each tank, vessel, reservoir, or container used for the storage of gasoline, but does not include: (1) Frames, housing, auxiliary supports, or other components that are not directly involved in the containment of gasoline or gasoline vapors; ~~or~~ (2) subsurface caverns or porous rock reservoirs; (3) process tanks; or (4) tanks, vessels, reservoirs, or containers permanently attached to mobile vehicles such as trucks, railcars, barges, or ships."

g. If EPA will not return the process tank exclusion to the gasoline storage tank definition, the result would be to extend the applicability of the rule to a population of process tanks that were previously understood to not be subject to the rule. Given the fact that there had not been fair notice of this change, and the resulting requirement for many of these tanks to be equipped with controls, EPA should specify a separate compliance period for process tanks (such as flow-through sumps that accumulate gasoline) – allowing three years from the date of publication of the final amendments.

h. Furthermore, given the effectiveness of the insulating effect of the ground at eliminating breathing losses, we request that Table 1, item 1, include being located underground as a control option. That is, being located underground should be specified as an equivalent alternative to the requirement for all openings to be maintained in a closed position. This could be achieved by editing Table 1, item 1 to read as follows:

"Equip each gasoline storage tank with a fixed roof that is mounted to the storage tank in a stationary manner, and either maintain all openings in a closed position at all times when not in use or locate the tank underground."

4) Definition of *pipeline pumping station* – **§63.11100**. An unintended consequence of the gasoline storage tank definition as proposed is that it could be misconstrued in a manner that would result in pipeline pumping stations being deemed pipeline breakout stations. If a surge control tank or an underground sump at a pipeline pumping station were construed as being a storage vessel, then this facility would be rendered a pipeline breakout station under the present definition of a pipeline pumping station. In the preamble for the final rule issued on January 10, 2008,[3] EPA concluded that it is not necessary for pipeline pumping stations to submit semi-annual reports for periods in which no deviation occurred. Pipeline breakout stations, however, must submit semi-annual reports regardless of whether any deviations occurred. Misclassification of pipeline pumping stations as pipeline breakout stations would impose a significant burden on these facilities to submit reports that EPA has already concluded are unnecessary.

We request that the rule be clarified to avoid a misclassification of pumping stations as breakout stations. This might be achieved by editing the definition of *pipeline pumping station* to read as follows:

"*Pipeline pumping station* means a facility along a pipeline containing pumps to maintain the desired pressure and flow of product through the pipeline and not containing storage vessels that are subject to the requirements of Table 1, item 2."

Comments Related to the Definition of Gasoline

5) Transmix – change in guidance. In the December 19, 2007 memorandum, "Summary of Comments and Responses to Public Comments on November 9, 2006 Proposal for Gasoline Distribution Area Sources," Stephen A. Shedd to Kent C. Hustvedt (December 2007 EPA Memo), EPA stated,

"The determination of whether transmix would or would not meet the definition of gasoline would depend on the ratio of the individual products included in the mixture. According to industry sources (ILTA), transmix typically contains between 35 and 65 percent gasoline and has a vapor pressure of about 2.5. Thus, transmix would not typically meet the gasoline definition's vapor pressure criteria. However, because of the potential variability of the mixture, we cannot be sure that all transmix will be excluded by the vapor pressure criteria of the definition."

Given this guidance, owners/operators of gasoline distribution facilities believed in good faith that transmix tanks would be subject to the rule only if the vapor pressure of the mixture stored in the transmix tank exceeded the criterion specified in the definition of gasoline, which is a Reid vapor pressure of 27.6 kilopascals (4 psi). In the preamble to the proposed amendments, however, EPA stipulates,

"The transmix contains various concentrations of gasoline and other products to the degree that it

[3] 73 FR 1916, January 10, 2008; at 1929.

would not be feasible to specify in advance the percentage and concentration of gasoline in the mixture; thus, as discussed in the responses to comment for both standards, it should be stored and considered gasoline for the purposes of these regulations."

Comparison of this guidance from the preamble to that quoted above from the December 2007 EPA Memo, however, shows that this conclusion is not consistent with the response to comment in the December 2007 EPA Memo, but rather directly contradicts it. That is, the December 2007 EPA Memo advised that transmix would not typically meet the definition of gasoline. Furthermore, in stating that they could not be sure that all transmix would be excluded, EPA implicitly acknowledged that most transmix would be excluded. The preamble to the proposed amendments, however, stipulates that all transmix should be considered gasoline for purposes of the rule.

Given that this change in guidance has the effect of extending the applicability of the rule to a population of transmix tanks that were previously understood to not be subject to the rule, the fact that there had not been fair notice of this change, and the resulting requirement for many of these tanks to be equipped with internal floating roofs, EPA should specify a separate compliance period for transmix tanks – allowing three years from the date of publication of the final amendments.

6) Denatured ethanol – request for comment. EPA requests comment on whether the applicability of the rule should be extended to tanks storing denatured ethanol, even if denatured ethanol does not meet the definition for gasoline. API and ILTA strongly oppose extension of the rule to denatured ethanol, and have the following comments:

   a. Denatured ethanol does not meet the definition of gasoline. Fuel grade ethanol generally has a Reid vapor pressure (RVP) of less than 3 psi, and thus it does not meet the Reid vapor pressure criterion of 4 psi in the definition of gasoline. See Attachment 2 for additional documentation on the properties of denatured ethanol. Furthermore, denatured ethanol does not meet the other criterion in the gasoline definition of being "used as a fuel for internal combustion engines." EPA has previously held that, "blend components that are stored separately from "gasoline" are not intended to be covered if they do not meet the criterion as a "fuel for internal combustion engines."'"[4] Furthermore, EPA has expressly identified ethanol as a "blending agent" for gasoline, rather than being gasoline itself.[5]

   b. It is not appropriate to regulate denatured ethanol under any National Emission Standard for Hazardous Air Pollutants (NESHAP) in that it contains only a *de minimis* concentration of hazardous air pollutants (HAP). Gasoline is commonly used as a denaturant for fuel grade ethanol, at a concentration of approximately 2 percent [see Attachment 2]. The default concentration of HAP compounds given for gasoline in EPA's TANKS software is 22.7%,[6] and thus the concentration of HAP in denatured ethanol is less than half of 1%.

   In that denatured ethanol is a non-gasoline liquid in the petroleum liquids distribution system, it would have been properly evaluated within the *Organic Liquids Distribution (non-gasoline)* source

[4] U.S. EPA, "Gasoline Distribution Industry (Stage I) – Background Information for Promulgated Standards," EPA-453/R-94-002b, November 1994; section 4.2.

[5] U.S. EPA, "Gasoline Distribution Industry (Stage I) – Background Information for Proposed Standards," EPA-453/R-94-002a, January 1994.

[6] U.S. Environmental Protection Agency, "TANKS Emissions Estimation Software," version 4.09, www.epa.gov/ttn/chief/software/tanks.

category. The concentration of HAP in denatured ethanol, however, falls well below the 5% threshold for regulation specified in the Organic Liquids Distribution (non-gasoline) NESHAP rule.[7] Thus regulation of denatured ethanol under the NESHAP provisions has already been effectively evaluated by EPA, with the conclusion that regulation is not warranted.

c. If there were a compelling reason to regulate emissions from the storage of denatured ethanol at gasoline distribution facilities, then such action should be pursued under separate rulemaking with its own proposal and comment process and, if finalized, its own associated compliance period. However, if EPA does extend the applicability of this rule to tanks storing denatured ethanol, then the required control measure should be the same as specified in the proposed item 3 to Table 1 for surge control tanks, in that the requirements of Table 1, item 2 would not be warranted for the *de minimis* level of HAP involved. Furthermore, EPA should specify a separate compliance period for tanks that would become subject to the rule solely by virtue of storing denatured ethanol – allowing three years from the date of publication of the final amendments.

d. For the reasons stated above, expanding the gasoline distribution source category from gasoline to non-gasoline sources would be arbitrary and capricious. As noted above, non-gasoline sources in the petroleum liquids distribution system have been previously evaluated by EPA in the organic liquids distribution (non-gasoline) source category, for which EPA determined that an area source rule was not warranted. It would be at best inappropriate for EPA to expand the applicability of the gasoline distribution source category to apply to emission sources in other source categories. These emission sources were not included among the emission sources for which the determination of a need for a gasoline distribution area source rule was based, nor were they included in the evaluation of control measures for this rule.

Other Comments

7) **§63.11092**(b). EPA has revised the monitoring requirements so as to require a continuous monitoring system (CMS) under §63.11092(b) regardless of the performance test option chosen under §63.11092(a). The original text had specified that §63.11092(b) applied "for each performance test conducted under paragraph (a)(1) of this section," thereby seemingly excluding those control devices for which the (a)(2) or (a)(3) options were selected for the performance test. The revised text, however, renders the CMS a universal requirement.

The time remaining prior to the compliance date for the rule is insufficient to develop, gain approval of, and implement a CMS plan. More time is needed to allow industry time to evaluate, budget, purchase, and install any additional equipment that may be required.

Given that this change in guidance has the effect of extending the CMS requirement to a population of control devices that were previously understood to not be subject to this requirement, and the fact that there had not been fair notice of this change, EPA should extend the compliance period for implementing continuous monitoring systems (CMS) at facilities that, in lieu of conducting a new initial performance test, utilize the provisions of §63.11092(a)(2) or (a)(3). EPA should allow three years from the date of publication of the final amendments for implementation of CMS for these facilities.

[7] U.S. Environmental Protection Agency, "National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)," 40 CFR Part 63, Subpart EEEE; at §63.2406, definition of *organic liquid*.

8) **§63.11092**(b)(1)(i)(B)(*2*)(*ii*) & (b)(1)(iii)(B)(*2*)(*ii*). We appreciate EPA's clarification that records of shutdown events may be either manual or electronic. We submit, however, that detailed requirements for the record of a shutdown event are specified in **§63.11092**(b)(1)(i)(B)(*2*)(*v*) & (b)(1)(iii)(B)(*2*)(*v*), and thus the phrase "start and end of a" is unnecessary and potentially confusing. We request that this phrase be deleted such that the sentence reads as follows:

"A manual or electronic record of the ~~start and end of a~~ shutdown event may be used."

9) **§63.11092**(b)(1)(i)(B)(*2*)(*ii*) & (b)(1)(iii)(B)(*2*)(*ii*). We support EPA's clarification of the requirements pertaining to both emergency shutdown systems and automated shutdown systems.

10) **§63.11092**(b)(1)(iii)(B). We support EPA's clarification that monitoring the pilot flame on a thermal oxidation system meets the requirements for a continuous monitoring system, with the presence of the pilot flame constituting the monitored operating parameter. We request, however, a clarification in the rule language. The requirement is for the monitoring system to "automatically prevent gasoline loading operations from beginning at any time that the pilot flame is absent." Thus the requirement is for the heat-sensing device to send a signal (or refrain from sending a signal) to allow loading to commence, rather than to visually display the parameter value (*i.e.*, on or off). This clarification might be achieved by the following edits to the rule language:

§63.11092(b)(1)(iii)(B)(*1*) The presence of a thermal oxidation system pilot flame shall be monitored using a heat-sensing device, such as an ultraviolet beam sensor or a thermocouple, installed in proximity of the pilot light to indicate the presence of a flame. The ~~monitor shall show~~heat-sensing device shall send a positive parameter value to indicate that the pilot flame is on, or a negative parameter value to indicate that the pilot flame is off.

11) **§63.11095**(a)(4). We support EPA's clarification of when Notification of Compliance Status (NOCS) reports are to be submitted for those emission points for which compliance does not become due until after the initial NOCS due date.

12) **Table 1**, item 2. We appreciate EPA's clarification, in the preamble of the proposed amendments, that the same rim seal requirements are intended regardless of whether the owner/operator opts to comply with 40 CFR Part 60 Subpart Kb or 40 CFR Part 63 Subpart WW. In either case, the secondary seal requirements are meant to not apply to internal floating-roof tanks that are subject only to 40 CFR Part 63 Subpart BBBBBB. However, EPA's attempt to make the necessary corrections in Table 1 failed to properly do so. In order to achieve the intended correction, Table 1 should be edited as follows:

If you own or operate . . .	Then you must . . .
1. A gasoline storage tank meeting either of the following conditions: (i) a capacity of less than 75 cubic meters (m_3); or (ii) a capacity of less than 151 m_3 and a gasoline throughput of 480 gallons per day or less. Gallons per day is calculated by summing the current day's throughput, plus the throughput for the previous 364 days, and then dividing that sum by 365.	Equip each gasoline storage tank with a fixed roof that is mounted to the storage tank in a stationary manner, and either maintain all openings in a closed position at all times when not in use or locate the tank underground.
2. A gasoline storage tank with a capacity of greater than or equal to 75 m_3 and not meeting any of the criteria specified in item 1. of this Table.	Do the following: (a) Reduce emissions of total organic HAP or TOC by 95 weight-percent with a closed vent system and control device as specified in §60.112b(a)(3) of this chapter; or (b) Equip each internal floating roof gasoline storage tank according to the requirements in §60.112b(a)(1) of this chapter, except for the secondary seal requirements under §60.112b(a)(1)(ii)(B)~~,~~ and the requirements in §60.112b(a)(1)(iv) through (ix)~~, and §63.1063(a)(1)(i)(C) and (D)~~ of this chapter; and (c) Equip each external floating roof gasoline storage tank according to the requirements in §60.112b(a)(2) of this chapter, except that the requirements of §60.112b(a)(2)(ii) of this chapter shall only be required if such storage tank does not currently meet the requirements of §60.112b(a)(2)(i) of this chapter; or (d) Equip and operate each internal and external floating roof gasoline storage tank according to the applicable requirements in §63.1063(a)(1) and (b) except for the secondary seal requirements under §63.1063(a)(1)(i)(C) and (D), and equip each external floating roof gasoline storage tank according to the requirements of §63.1063(a)(2) if such storage tank does not currently meet the requirements of §63.1063(a)(1).
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13) **§63.11081**(d) & (e). We support EPA's clarification of the limits of applicability with respect to marine loading and airport facilities.

14) **§63.11092** and **Table 2**, item 1. We support EPA's clarification of the manner in which daily throughput is to be computed (*i.e.*, summing the current day's throughput with the throughput for the previous 364 days, and dividing that sum by 365). This procedure is straightforward and consistent with the procedure specified in Table 1, item 1(ii). We also support EPA's clarification that the monitoring requirements do not apply to those terminals that are not required to route vapors from the loading rack to a control device.

15) **Table 2**, item 1.(c). We request that the language of item 1.(c) in Table 2 be edited to clarify the intent. A similar provision in the Marine Loading MACT rule[8] specifies that the vapor collection system shall be designed to "prevent HAP vapors collected at one loading berth from passing **through** another loading berth **to the atmosphere**" [emphasis added]. Similar clarity could be brought to this rule by editing this item to read as follows:

"Design and operate the vapor collection system to prevent any TOC vapors collected at one loading rack or lane from passing ~~to~~ through another loading rack or lane to the atmosphere;"

16) **§63.11092**(f). We request clarification of the requirements for vapor-tightness testing of gasoline cargo tanks. The annual vapor-tightness test specified in Subpart BBBBBB is nominally the same as that specified in 40 CFR Part 60 Subpart XX (NSPS XX). Each of these rules is understood to require

[8] U. S. Environmental Protection Agency, "National Emission Standards for Marine Vessel Loading Operations," 40 CFR Part 63, Subpart Y.

pressurizing the tank to 18 inches of water column, and each rule requires that the pressure drop in 5 minutes shall not exceed 3 inches or water column. However, in NSPS XX the 18 inch water column pressure is approximated as 450 mm of water, but in Subpart BBBBBB it is approximated as 460 mm of water. Furthermore, NSPS XX specifies the limit on pressure drop as 75 mm of water, whereas Subpart BBBBBB specifies 3 inches of water. The preamble to the proposed amendments characterize the Subpart BBBBBB vapor-tightness test requirements as being different than the requirements specified in NSPS XX,[9] and the proposed amendments change the cited requirements in the definition of a *vapor-tight gasoline cargo tank* from those in §60.501 to those in §63.11092(f). Many facilities, however, will be subject to both regulations. There is no apparent benefit to testing a gasoline cargo tank twice to essentially the same criteria.

The pressure decay test requirements for Subpart BBBBBB and NSPS XX are summarized in the table below. The requirements in the GD MACT rule[10] and the OLD MACT rule[11] are also presented for comparison, although these rules impose a more restrictive limit on the allowable pressure drop.

Rule	**Initial Pressure**	**Limit on Pressure Drop**
GD GACT: §63.11092(f)(1)	460 mm water (18 in. water)	3 in. water
NSPS XX: §60.501; definition of *vapor-tight gasoline tank truck*	450 mm water	75 mm water
GD MACT: §63.425(e)(1); cargo tanks larger than 2,500 gallons	460 mm water (18 in. water)	25 mm water (1 in. water)
The 'any time' limit for cargo tanks 1,500 – 2,499 gallons		76 mm water (3 in. water)
OLD MACT: §63.2406; definition of *vapor-tight transport vehicle*	4,500 pascals (18 in. water)	250 pascals (1 in. water)

We request that EPA stipulate in Subpart BBBBBB that compliance with the annual vapor-tightness testing specified in Subpart BBBBBB satisfies the annual vapor-tightness testing requirement of NSPS XX.

Again, we appreciate the opportunity to submit these comments. If you have any questions, please contact me at 202-682-8319 or ToddM@api.org.

Sincerely,

Matthew Todd

9 74 FR 66470, December 15, 2009; at 66486.

10 U.S. Environmental Protection Agency, "National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)," 40 CFR Part 63, Subpart R.

11 U. S. Environmental Protection Agency, "National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)," 40 CFR Part 63, Subpart EEEE.

Attachment 1 – Control Equivalency for Locating a Tank Underground

Background on Fixed-Roof Tank Emission Mechanisms

As explained in EPA's AP-42 document, chapter 7.1 at section 7.1.3.1, routine emissions from fixed-roof tanks consist of standing storage loss and working loss. Standing storage loss for a fixed-roof tank refers to the expulsion of vapors from a tank due to breathing, which is the regular expansion and contraction of vapors in the headspace of the tank in response to the ambient diurnal temperature cycle. Nighttime cooling causes a contraction of the vapors, and thus a drop in pressure. This pressure drop draws fresh outside air into the tank. The fresh air then becomes laden with vapors due to additional evaporation of the liquid in the tank. Daytime warming subsequently causes an expansion of the vapors in the tank, and thus an increase in pressure. If the pressure increase exceeds the setting of the pressure vent on the tank, then vapors will be expelled to the atmosphere. Thus the higher the vent setting, the lower the standing storage loss.

Working loss for a fixed-roof tank refers to the expulsion of vapors from the tank due to filling. As the tank fills, the rising liquid level compresses the air/vapor mixture in the headspace, causing an increase in pressure. If the tank is equipped with a pressure vent, then some condensation may occur as the pressure increases, thus returning some of the vapors to the liquid prior to the vent opening to allow vapors to be released to the atmosphere.

Effect of Vent Settings

While pressure vents can reduce both standing storage and working loss from fixed-roof tanks, the amount of emission reductions is a function of the vent settings. However, existing tanks that were designed as atmospheric storage tanks, rather than as pressure vessels, are not structurally adequate to sustain elevated internal pressures. There is, then, a practical limit on the pressure setting that can be specified for tanks that were not designed for internal pressure. This limit is often approximately 0.5 inches of water (0.02 psi).

Standing Storage Loss. EPA's AP-42, chapter 7.1, shows the estimation of standing storage loss in equation 1-2, in which standing storage loss is a direct function of the vapor space expansion factor, K_E. Equation 1-7 of AP-42, chapter 7.1, presents K_E as a function of the breather vent setting range, ΔP_B:

$$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}} \geq 0$$

where:

ΔT_V is the daily temperature range in the vapor space (^{o}R),

T_{LA} is the daily average liquid surface temperature (^{o}R),

ΔP_V, the daily stock vapor pressure range (psia), may be determined as follows:

$\Delta P_V = P_{VX} - P_{VN}$

P_{VN} = stock true vapor pressure (psia) at the daily minimum liquid surface temperature T_{LN}

$T_{LN} = T_{LA} - 0.25\Delta T_V$

P_{VX} = stock true vapor pressure (psia) at the daily maximum liquid surface temperature T_{LX}

$T_{LX} = T_{LA} + 0.25\Delta T_V$

ΔP_B is the breather vent setting range (psi),

P_A is the atmospheric pressure (psia), and

P_{VA} is the vapor pressure of the stock at the daily average liquid surface temperature (psia).

The impact of the breather vent setting range on standing storage loss may be evaluated for a gasoline storage tank by considering the following example:

Stock = Gasoline
Reid vapor pressure = 10 psi
ΔT_V = 20°F
T_{LA} = 60°F (520°R)
T_{LN} = 55°F (515°R)
T_{LX} = 65°F (525°R)
P_{VA} = 5.19 psia
P_{VN} = 4.70 psia
P_{VX} = 5.71 psia
P_A = 14.7 psia

Vent settings	ΔP_B	K_E	Breathing Loss Reduction
Open vent	0	0.145	0%
+/– 0.5 inch water	0.04 psi	0.140	3%
+10 inch water, – 1 inch water	0.40 psi	0.103	29%

Working Loss. EPA's AP-42, chapter 7.1, shows the estimation of working loss in equation 1-35, in which working loss is a direct function of the vent setting correction factor, K_B. Equation 1-37 of AP-42, chapter 7.1, presents K_B as a function of the breather vent settings, P_{BX} and P_{BN}:

$$K_B = \frac{\dfrac{P_O + P_A}{K_N} - P_{VA}}{P_{BX} + P_A - P_{VA}}$$

where:

P_O is the normal operating pressure (psig)

$P_O = (P_{BX} + P_{BN})/2$

P_{BX} is the breather vent maximum pressure setting (psi)

P_{BN} is the breather vent minimum pressure setting (psi)

P_A is the atmospheric pressure (psia)

K_N is the working loss turnover (saturation) factor (dimensionless), and

P_{VA} is the vapor pressure of the stock at the daily average liquid surface temperature (psia).

AP-42, chapter 7.1, indicates at equation 1-35 that K_N is to be taken as 1 for 36 or fewer turnovers per year. For more than 36 turnovers per year:

$$K_N = (180 + N)/(6N)$$

where:

N is the number of turnovers per year.

The impact of the breather vent setting range on working loss may be evaluated for a gasoline storage tank by considering the same example as outlined previously for standing storage loss, with the additional assumption:

K_N = 1 (*i.e.*, 36 or fewer turnovers per year).

Vent settings	K_B	Working Loss Reduction
Open vent	1	0%
+/– 0.5 inch water	1	0%
+10 inch water, – 1 inch water	0.98	2%

Total Effect of Vent Settings. The examples above show that a pressure/vacuum vent, with settings of +/– 0.5 inch water, would be expected to achieve a reduction of approximately 3% on the standing storage loss, and no reduction on the working loss, for a fixed-roof storage tank.

Effect of Underground Location

As noted above, standing storage (breathing) loss occurs as a result of the pressure variations in a fixed-roof tank associated with the ambient diurnal temperature cycle. The temperature variation determines the value of ΔT_V, the daily temperature range in the vapor space, and ΔP_V, the daily vapor pressure range, in equation 1-7 of AP-42, chapter 7.1:

$$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}} \geq 0$$

It is evident that if ΔT_V and ΔP_V are both equal to 0, then the value of K_E cannot exceed 0, and no standing storage loss would occur. Thus a tank that is adequately insulated against ambient temperature variations would not experience breathing loss.

Tanks that are located underground are deemed by EPA to be sufficiently insulated so as to eliminate breathing loss. EPA states, in AP-42 Chapter 7.1 at 7.1.1.1, "Losses due to changes in temperature or barometric pressure are minimal for underground tanks because the surrounding earth limits the diurnal temperature change, and changes in the barometric pressure result in only small losses." EPA further states, at 7.1.3.1.1 after Equation 1-14, "For underground horizontal tanks, assume that no breathing or standing storage losses occur (LS = 0) because the insulating nature of the earth limits the diurnal temperature change."

Even if the extent to which a tank is located underground does not sufficiently insulate the tank so as to eliminate breathing loss, it can be shown that a partial reduction in the daily temperature variation in the vapor space can achieve emission reductions equivalent to those achieved by a pressure/vacuum vent. This may be evaluated by considering the example outlined earlier, and estimating the breathing loss associated with partial reduction in the vapor space temperature range.

Stock = Gasoline

Reid vapor pressure = 10 psi

ΔP_B = 0 psi (open vent)

T_{LA} = 60°F (520°R)

P_{VA} = 5.19 psia

P_A = 14.7 psia

ΔT_V	T_{LN}	T_{LX}	P_{VN}	P_{VX}	K_E	Breathing Loss Reduction
20°F	55°F	65°F	4.70 psia	5.71 psia	0.145	0%
18°F	55.5°F	64.5°F	4.75 psia	5.65 psia	0.129	11%
10°F	57.5°F	62.5°F	4.94 psia	5.44 psia	0.072	50%
0°F	60°F	60°F	5.19 psia	5.19 psia	0.0	100%

This evaluation shows that the reduction in breathing loss is roughly proportional to the reduction in the daily temperature range in the vapor space. Thus a 10% reduction in the temperature range (from 20°F to 18°F) results in an 11% reduction in the estimated breathing loss from a fixed-roof tank with open vents, which is substantially more reduction than the 3% achieved by a pressure/vacuum vent with settings of +/– 0.5 inch water.

Cost-Effectiveness of P/V Vents for Underground Tanks

There would be absolutely no benefit to equipping an underground tank with a pressure/vacuum vent if the underground location eliminated standing storage loss, as suggested by EPA in AP-42. A cost-effectiveness may be calculated, however, if an assumption is made of less than complete reduction of the breathing loss. In order to calculate the cost-effectiveness of equipping an underground tank with a pressure/vacuum vent, consider the example used above:

Stock = Gasoline

Reid vapor pressure = 10 psi

T_{LA} = 60°F (520°R)

P_{VA} = 5.19 psia

P_A = 14.7 psia

Further assume that the effect of the underground location is to reduce the vapor space temperature range ΔT_V by only 10%, from 20°F to 18°F, and thus:

ΔT_V = 18°F

T_{LN} = 55.5°F (515.5°R)

T_{LX} = 64.5°F (524.5°R)

P_{VN} = 4.75 psia

P_{VX} = 5.65 psia

The vapor space expansion factor K_E can then be calculated for an underground tank with an open vent and with a pressure/vacuum vent.

For an open vent:

ΔP_B = 0

K_E = 0.129

For a pressure/vacuum vent with settings of +/– 0.5 inch water:

ΔP_B = 0.04 psi

K_E = 0.125

The total standing storage loss can be calculated from AP-42 chapter 7.1, equation 1-2:

$$L_S = 365\ V_V\ W_V\ K_E\ K_S$$

where:

L_S is the total standing storage loss (lb/year),

V_V is the vapor space volume (ft^3),

W_V is the stock vapor density (lb/ft^3),

$W_V = (M_V\ P_{VA}) / (R\ T_{LA})$

M_V is the vapor molecular weight (lb/lb-mole),

P_{VA} is the vapor pressure of the stock at the daily average liquid surface temperature (psia),

R is the ideal gas constant, 10.731 psia ft^3/lb-mole ^oR, and

T_{LA} is the daily average liquid surface temperature (^oR).

K_E is the vapor space expansion factor (dimensionless),

K_S is the vented vapor saturation factor (dimensionless), and

365 is the number of days in a year ($year^{-1}$).

Consider a 10,000 gallon underground tank which, on average, is half full. The vapor space volume, then, is 5,000 gallons, or 668 ft^3. Assuming a vapor molecular weight M_V of 66 lb/lb-mole for RVP 10 gasoline, per AP-42 Table 7.1-2, the stock vapor density W_V would then be 0.0614 lb/ft^3 for this example.

Conservatively assuming a fully saturated vapor space (K_S = 1), estimated standing storage losses for the example would then be as follows:

For an open vent:

L_S = 1,930 lb/yr

For a pressure/vacuum vent with settings of +/– 0.5 inch water:

L_S = 1,870 lb/yr

Given a capital cost for installing a pressure/vacuum vent of $2,000 and a service life of 10 years, and assuming that HAP compounds constitute 4.8% of the total VOC emissions, the cost-effectiveness may then be calculated as follows:

Tank Size	Scenario	Open Vent	P/V vent +/- 0.5 in. water	lbs VOC reduction	Annual Cost	Recovery Credit	Net Annual Cost	HAP CE, $/ton
		VOC emissions, lbs/yr						
10,000 gal	**underground**	1,930	1,870	60	$ 285	$ 18	$ 267	$ 185,000

It is clear that, when emissions have been reduced even slightly by locating a tank underground, the marginal additional benefit of equipping the tank with a pressure/vacuum vent has an associated cost that does not warrant the additional control measure.

Conclusion

EPA, in AP-42 chapter 7.1, concludes that the location of a tank underground sufficiently insulates the tank from ambient temperature variations such that the daily vapor space temperature range approaches 0, and thus the breathing loss may be assumed to be 0. The evaluation presented herein shows that even a 10% reduction in the daily vapor space temperature range would reduce breathing loss more effectively than is achieved by equipping an aboveground fixed-roof tank with a pressure/vacuum vent with settings of +/– 0.5 inch water. Given that only a marginal insulating value achieves equivalency with the pressure/vacuum vent requirement of the rule, it would be reasonable to consider tanks that are located 75% or more below grade to represent an equivalent level of control to the standard specified in Table 1, item 1.

Attachment 2 – Reid Vapor Pressure (RVP) of Denatured Ethanol

Concentration of Denaturant in Fuel Grade Ethanol

In order to discourage consumption of fuel grade ethanol as beverage alcohol, pure ethanol is mixed with additives to poison it prior to distribution. This poisoned state is referred to as denatured. Fuel grade ethanol (*i.e.*, denatured ethanol suitable for use as an additive for automotive fuel), is typically denatured by the addition of gasoline at a concentration of approximately 2% by volume.

The Alcohol and Tobacco Tax and Trade Bureau (TTB) of the Department of the Treasury specifies, at 27 CFR §19.1005(c)(1)(i), that fuel grade alcohol must contain at least 2 gallons of gasoline per 100 gallons of alcohol (1.96% by volume) in order to render the alcohol unfit for beverage use and eligible for fuel use.

Effective January 1, 2009, under the Food, Conservation and Energy Act of 2008 (Pub. L. 110-234) (2008 Farm Bill), the U. S. Congress reduced the maximum denaturant content allowed for purposes of claiming the federal tax incentives from 5% to 2% by volume for fuel grade alcohol. The Internal Revenue Service (IRS) subsequently issued Notice 2009-06 titled "Calculation of Volume of Alcohol for Fuel Credits; Denaturants," which states that the IRS will not challenge a claim to a credit or payment with respect to the volume of denaturant in the alcohol/fuel mixture as long as there is no clear evidence establishing that added denaturants are more than 2.5% of the volume of the denatured alcohol (including added denaturants).

Given the upper limit of 2.5% stipulated by the IRS, and the lower limit of 1.96% specified by TTB, the nominal volume concentration of denaturant in fuel grade ethanol is 2%.

Non-Ideal Behavior of Ethanol

Pure, or neat, ethanol has a Reid vapor pressure (RVP) of just over 2 psi. Gasoline that is added as a denaturant typically has an RVP in the range of 7-13 psi. Given an assumption of ideal behavior, the RVP of a gasoline-ethanol mixture could be predicted by Raoult's Law. Ethanol and other alcohols, however, do not conform to ideal behavior.

The non-ideal behavior of ethanol occurs because alcohol molecules have fairly strong polarity, resulting in an attraction between alcohol molecules that impedes their evaporation. This disinclination of alcohol molecules to evaporate causes them to have a lower vapor pressure than would be expected from their molecular weight. When another substance is mixed in alcohol, however, the molecules of the other substance get in between the alcohol molecules. Once the alcohol molecules are physically separated from one another, they conform more closely to ideal behavior (*i.e.*, evaporating at a rate more in keeping with their molecular weight). Thus the blending of an alcohol, such as ethanol, with compounds that do not exhibit molecular polarity, such as hydrocarbons, results in a mixture with a higher vapor pressure than would be predicted from the separate vapor pressures of the individual compounds. This phenomenon is discussed in more detail in API Publication 4261, *Alcohols and Ethers*,[12] as well as at a Kennesaw State University website.[13]

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[12] American Petroleum Institute, *Alcohols and Ethers – A Technical Assessment of their Application as Fuels and Fuel Components*, API Publication 4261, Third Edition, June 2001.

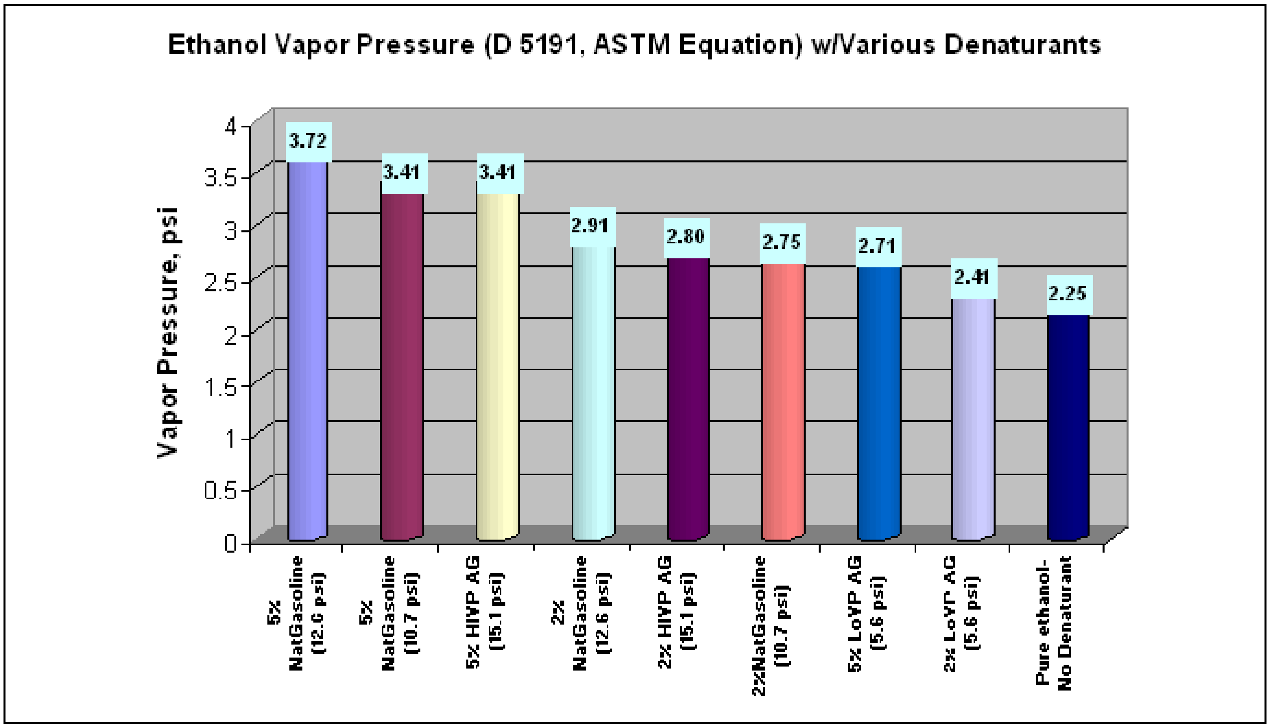
[13] http://www.chemcases.com/converter/converter-24.htm

energy API

<u>RVP of Denatured Ethanol</u>

The RVP of denatured ethanol is a function of the RVP and the concentration of the denaturant. Fuel grade ethanol is typically denatured with gasoline, at a concentration of approximately 2%. The RVP of the resulting mixture may be tested using one of the standard ASTM tests for RVP.[14,15]

Numerous websites present papers on the properties of ethanol/gasoline mixtures. These sites typically show the RVP of the mixture dropping below 4 psi when the concentration of gasoline falls below 10%.[16,17] The 5% concentration of denaturant that was common prior to January 1, 2009 resulted in RVP levels as high as 3.7 psi. At a concentration of 2%, however, RVP levels are generally below 3 psi. RVP levels associated with different concentrations and RVP of denaturant are shown in the following graph:



Source: oil company test data.

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[14] ASTM, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*, ASTM Standard D 323.

[15] ASTM, *Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)*, ASTM Standard D 5191.

[16] http://www.txideafarm.com/ethanol_fuel_properties_and_data.pdf

[17] http://www.tpub.com/content/altfuels08/5366/53660071.htm