April 30, 2024

Administrator Michael Regan
Environmental Protection Agency
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attention: Comments on Tanks 5.0 (Beta) and AP-42 Chapter 7
Submitted to the EPA CHIEF Portal (efcomments@epa.gov)

Re: **Comments on Release of TANKS 5.0 for beta testing and Draft Update to AP-42 Chapter 7, Section 1 – Organic Liquid Storage Tanks.**

Dear Administrator Regan,

The American Chemistry Council (ACC), the American Fuel & Petrochemical Manufacturers (AFPM), and the American Petroleum Institute (API (collectively The Associations) appreciate the opportunity to comment on the U.S. Environmental Protection Agency's (EPA or Agency) proposed updates to AP-42 Chapter 7 and Beta Version of Tanks 5.0 emission calculation software/tool.

ACC represents the leading companies engaged in the business of chemistry and energy. Its' members apply the science of chemistry to make innovative products and services that make people's lives better, healthier, and safer. ACC's members also engage in all aspects of the petroleum industry, including production, refining, transportation, and storage. We are committed to improved environmental, health and safety performance through Responsible Care®, common sense advocacy designed to address major public policy issues, and health and environmental research and product testing.

AFPM is a national trade association representing nearly all U.S. refining and petrochemical manufacturing capacity. AFPM members support more than three million quality jobs, contribute to our nation's economic and national security, and enable the production of thousands of vital products used by families and businesses throughout the United States. AFPM members are committed to filling these roles in a way that is responsible and sustainable for the long term.

API is the national trade association representing America's oil and natural gas industry. API's members are producers, refiners, suppliers, retailers, pipeline operators, and marine transporters, as well as service and supply companies, providing much of our nation's energy.

API was formed in 1919 as a standards-setting organization and is the global leader in convening subject matter experts across the industry to establish, maintain, and distribute consensus standards for the oil and natural gas industry. API has developed more than 800 standards to enhance operational safety, environmental protection, and sustainability in the industry.

The Associations appreciate EPA's effort to provide standard emission estimation tools and guidance for industry to ensure accurate and appropriate methodologies. There remain a few changes and edits needed to ensure the proposed changes to AP-42 are consistent with API Manual of Measurement Standards, Chapter 19.1-19.5. The detailed comments provided in this letter are based on the Associations' testing the software to validate emission estimate results and user features.

With respect to Tanks 5.0 Beta Version, there are several changes and improvements needed to make the tool produce accurate and reliable results and to make the tool more user-friendly. Without these changes, it is uncertain whether the broad use of this tool is viable. This is not to say that Tanks 5.0 is not needed. It most certainly is! However, it must be a tool that is accurate and meets industry needs.

COMMENTS

A.   Proposed Revisions to AP-42 Section 7.1

EPA proposed revisions to AP-42 Section 7.1, Organic Liquid Storage Tanks, that are primarily editorial in nature. The one non-editorial change is the addition of a method to calculate the effective diameter of a square or rectangular tank to use the loss equations for this geometry (e.g., sump or chest). Our comments on the proposed changes are:

- New equations 1-16 and 1-17 are incorrect. Equation 1-16 is to be used to calculate the effective diameter of a rectangular tank and Equation 1-17 is to be used to calculate the effective diameter of a square tank. However, the equations EPA is proposing calculates the hydraulic diameter, which is used to handle flow estimations in non-circular ducts. The correct equations are derived by setting the surface area of a circle equal to the surface area of a rectangle and then a square, as follows:

$$\text{Eq. 1-16: } \pi D^2/4 = L_1 \times L_2 \quad => \quad D = 2\sqrt{\left(\frac{L_1 L_2}{\pi}\right)}$$

$$\text{Eq. 1-17: } \pi D^2/4 = L^2 \quad => \quad D = 2L/\sqrt{\pi}$$

- Use of the hydraulic diameter underestimates the liquid surface area and will lead to underestimation of the vapor space volume. The equations suggested are consistent with the horizontal fixed roof tank calculation methodology.
- Table 7.1-6, Note 1, and footnote "a" are in error and require correction. The footnote "a" indicates the information in the table is from Reference 22, the 2017 version of API's Manual of Petroleum Measurement Standards (MPMS), Chapter 19.4, Evaporative Loss Reference Information and Speciation Methodology. However, this table in the MPMS has since been corrected (see Addendum 3 dated October 2023). The MPMS and AP-42 Section 7.1 originally had solar absorptance factors only for paint in "good" and "poor" condition. The "average" paint condition column that was later added does not represent values obtained from any study, but represents the mathematical average of the good and poor (now labeled as "aged") factors. The 2023 version of Chapter 19.4 labels the paint factors not as "new" and "aged" but as "good" and "aged." The following note appears in the MPMS, Chapter 19.4:

  "Good – for paint, paint is in good condition; i.e., the studies that the white factors were taken from clearly used a factor of 0.17 (83% reflectance) for tanks "in good condition" (and this was the condition of the majority of the tanks studied), and there is no evidence to support the idea that this factor only applies to paint that still "retains a fresh shine of having been recently applied." For mill-finish aluminum, surface is shiny. If specific information is not available, a white shell and roof, with the paint in good condition, can be assumed to represent the most common or typical tank surface in use.

Average – for mill-finish aluminum, surface is oxidized but still bright. The value given in each case is the average of the Good and Aged values for that case and does not represent new data.

Aged – for paint, paint is noticeably faded and dull; for mill-finish aluminum, surface is dull."

- We request that AP-42 Table 7.1-6 be revised to change "new" to "good" and to remove the language in Note 1 that indicates the "good" paint factors are relegated to paint that still retains the fresh shine of having been recently applied. There is no evidence to support such a statement. Note "a" should be updated to reference the 2023 version of Chapter 19.4 and state, "If specific information is not available, a white shell and roof, with the paint in good condition, can be assumed to represent the most common or typical tank surface in use."

- As mentioned below, several states require permitted facilities to estimate the maximum hourly emissions rate of a storage tank. States such as Texas provide guidance on how to make that estimation. EPA should include a methodology for estimating maximum hourly emissions rates from storage tanks in AP-42, even if it does not include the methodology in the TANKS 5.0 application.

B.   COMMENTS ON TANKS 5.0

- **Comment 1:** The customize feature allows the user to add a compound or petroleum liquid that is not listed in either Table 7.1.2 or Table 7.1.3. Specifically, molecular weights, densities, and vapor pressure data are included as possible inputs. However, the only option for the vapor pressures is to provide Antoine's coefficients. There are times when a user is working with compounds for which they have a Vapor Pressure / Temperature relationship that they would like to define or use Riedel's constants. TANKS 5.0 should allow for the user to define the vapor pressure in more than just one way. (See also Comment 10)

- **Comment 2:** When defining inputs for a specific tank, there are many inputs that are required. This is expected. However, when filling out the form, all required fields must be selected before a user can save the tank. This can lead to inefficiency of use, specifically if a user gets to a certain input such as contents and the specific custom mixture is not available/not yet added. If the user navigates away from a partially completed form, it erases all previous inputs. While it is possible to enter placeholder values, save, and revisit, it would be easier to use if there was a way to save a partially completed form and come back to it later. This is also true in other areas where changing a specific input (e.g., changing the number of days of forced ventilation), it resets the form.. Additionally, there are situations where multiple tanks have similar dimensions and store similar products but may be different types (i.e., internal floating roof vs. domed external floating roof)..

However, when using the "duplicate" feature to save time in setting up a tank from an existing tank's properties, all fields will be cleared when you change the tank type. The original data should be retained in the form regardless of the change made to a different field.

- **Comment 3:** The forms-based approach makes data entry extremely tedious. It would be far more user-friendly if data input was table based, which would facilitate compilation of the input data in a spreadsheet from which it could be copied and pasted into TANKS 5. A table approach using cut and paste should also be available for entering custom mixtures.

- **Comment 4:** A user's guide has been provided to aid in use of the tool. However, the content in the guide is very limited. There is a brief introduction on simple concepts followed by many pages of what the required inputs are for specific forms. Upon testing, we found the user's guide to be of little value. It could use more detailed information on how the tool works, including examples of certain situations that users may encounter and how to address them or frequently asked questions. If the opportunity for errors is going to be retained in the final version, It should also include guidance regarding which options could result in an error.

    One specific case that should be clarified in the user's guide is how to use the "Sum of Increases/Decreases in Liquid Level Method" option to account for constant level tanks. If the intent of this field is not to account for constant level tanks, then the capability to specify a constant level tank should be added elsewhere.

- **Comment 5:** There is a database of chemicals that is included based on the details in AP-42 Table 7.1.3. While helpful, this list of chemicals is very small. Given that there are several sources of data for obtaining the inputs needed to define a chemical, it is recommended that EPA include a larger list to ensure consistency in the inputs utilized by the regulated community. Additionally, there is no way to save or export mixtures and custom chemicals that have been created.

- **Comment 6:** When calculating routine emissions, the only available output/report is a spreadsheet that includes a pollutant on each row with the total emissions and the standing and working losses. There are also columns for each month of the year to accommodate monthly emissions. While this simple report is suitable for displaying the total emissions, it is not going to be sufficient for permitting and compliance purposes. The state air agencies require detailed inputs and intermediate values that are used to calculate emissions from storage tanks. Based on the report format that has been

developed, there is no way for a user to review and validate the output of the tool. This creates two issues: (1) when we get numbers that do not match historical examples based on spreadsheets or other tools, we have no way to figure out the basis for the discrepancy and provide proper feedback to EPA on the cause of the problem; and (2) states will not accept this information as supporting documentation for permit applications and emissions inventories. Specifically, item number 2 will prevent a lot of the community from using TANKS 5.0. Finally, for floating roof tanks, the report only displays total standing and total working losses. The standing losses are comprised of three individual loss mechanisms: (1) deck fitting losses; (2) deck seam losses; and (3) rim seal losses. The report generated should separate the contributions of each loss mechanism and then total the loss

- **Comment 7:** The tool should include a calculation for maximum hourly emissions. The correct equation for estimating hourly emissions is not based on a simple conversion of the annual emissions rates estimated from AP-42 Chapter 7.1. At least one state, Texas[1], developed a formula for calculating the worst-case hourly emissions rates from storage tanks. Without incorporating this approach, the regulated community will need to maintain calculations both in a spreadsheet and TANKS 5.0.

- **Comment 8:** When estimating emissions from roof landings, the American Petroleum Institute (API) equations and AP-42 address a difference in emissions when you fill the tank with a material that has different properties than what was initially stored in the tank. However, the current version of Tanks 5.0 provides only one option in the drop down for what material is stored in the tank before and after a tank landing. This can be an issue when changing crude types, doing seasonal gasoline changes, and any time a change of service is made.

- **Comment 9:** There is also a need for speciated emissions from tank landings and cleanings. . When testing the landing and cleaning feature, no speciated emissions are reported. Instead, the application reports the total emissions associated with the activity. Similar to the concern around data reporting identified in Comment 5, this output will not be acceptable by regulatory agencies as supporting documentation and can make it difficult to troubleshoot why there may be differences between TANKS 5.0 and legacy tools.

- **Comment 10:** The customize feature allows the user to define mixtures. However, the menu requires the liquid mole fraction as an input. The menu should allow the user to

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[1] https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/emissrates-tanks6250.pdf

specify either a liquid mole fraction or a liquid weight fraction. Additionally, the field limits the user to specify data above one-thousandth (0.001). This minimum value for composition is limiting. There are many mixtures with constituents present on the order of parts per million (ppm) and TANKS 5.0 should be set up to accommodate those scenarios. In addition, one API member reported entering a custom mixture where the user thought the mole fractions added up to 100% but the mixture would not save, and the program did not explain what prevented the save. It would be helpful if the application had descriptive error messages that allow the user to determine what entry error should be corrected such that the mixture will save. It would also be helpful if the application showed the total mole or weight fraction that had been entered for the mixture.

- **Comment 11:** When establishing custom petroleum liquids, TANKS 5.0 requires the user to define A and B constants for any material to estimate vapor pressures. However, there are other methods for calculating vapor pressures petroleum liquids, as referenced in Figures 7.1-13b, 7.1-14b, and 7.1-15 of AP-42. Crude Oil and gasoline vapor pressure, in particular, can be calculated utilizing the RVP and the slope of the distillation curve along with temperature. At a minimum, these options should be included in the tool. Ideally, the tool should contain other variations of refined petroleum stocks, gasoline, and crude oil as standard options based on these formulas rather than requiring the user to create a custom product profile each time.

- **Comment 12:** . The current form needs to allow the user to input a tank specific value because AP-42 specifically indicates to input the tank specific value, unless unknown. For internal floating roof tanks, there is a drop-down menu with two options for specifying the tank specific effective column diameter. .

- **Comment 13:** The ability to use partial speciation is critical for materials like crude oil and gasoline which have many components, but only a few of those components are of specific interest. The tool has an option to partially or fully speciate, with the ability to select which compounds to speciate. However, when partial speciation is selected, the functionality does not work as intended because speciated results are populated for all compounds.. For months where "none" is selected, only total emissions is displayed and no speciation is included in the output.

In addition, if only a few months are filled out for a mixture that the user wants to partially speciate (e.g., if the mixture is only in the tank from January through March), selecting an annual emissions report does not result in any speciated emissions; only selecting a monthly report provides speciated emissions results.

Finally, when calculating emissions on a monthly basis, the tool requires the user to specify the level of speciation (partial, full, none) for each month. There should be an option added that allows the user to request that all months be speciated.

- **Comment 14:** There is no way to save the inputs that are used for a specific calculation for tank landings and cleanings. Every time the user executes those calculations, they must fill in all required fields. This makes the tool undesirable for calculating emissions from routine tank landings and cleanings.

- **Comment 15:** The name for tank landings and cleanings should be changed from "Emission Events" to "Maintenance Activities". The term "Emission Events" has a specific meaning in some states (i.e., -Texas) and can imply that the emissions associated with that activity are unauthorized. Changing to "Maintenance Activities" will prevent confusion for some in the regulated community..

- **Comment 16:** To test TANKS 5.0, the following cases were evaluated:
    o *Case 1- Standard Chemical Mixture (non-customized compounds) in a Vertical Fixed Roof Tank
    o *Case 2 – Standard Chemical Mixture (non-customized compounds) in a Horizontal Tank
    o *Case 3 – Standard Chemical Mixture (non-customized compounds) in an External Floating Roof Tank
    o *Case 4 - Gasoline in an Internal Floating Roof Tank
    o *Case 5 - Floating Roof Landing Loss for an External Floating Roof Tank
    o *Case 6 - Cleaning Loss for an External Floating Roof Tank
    o *Case 7 - Standard Single Component Stock (non-customized) Vertical Fixed Roof Tank, No Insulation, Not Heated
    o *Case 8 –Custom Mixture in a Vertical Fixed Roof Tank
    o *Case 9 - Diesel in a Horizontal Fixed Roof Tank
    o *Case 10 – Custom Single Component Stock Horizontal Fixed Roof Tank.
    o *Case 11 – Custom Single Component Stock Vertical Fixed Roof Tank
    o *Case 12 – Standard Single Component Stock (non-customized) Vertical Fixed Roof Tank, Fully Insulated, Not Heated
    o *Case 13 – Standard Single Component Stock (non-customized) Vertical Fixed Roof Tank, Partially Insulated, Not Heated
    o *Case 14 – Standard Single Component Stock (non-customized) Vertical Fixed Roof Tank, Fully Insulated, Heated
    o *Case 15 – Standard Chemical Mixture (non-customized compounds) in a Domed External Floating Roof Tank

None of the cases produced an exact match between emissions calculations from TANKS 5.0 and spreadsheet calculations. Three cases (1-3) were approximately correct (accurate to less than 5%). The remaining cases deviated from our calculations by between approximately 20-60%. One of the highest deviations was associated with a custom compound, such as Case 11. Because there is no detailed report option, we cannot determine the cause the emissions differences.

- **Comment 17:** When setting up the "contents" for calculating the working loss turnover factor of any individual tank, the user has the option of selecting either a value of 1 or "AP-42 Calculation". When selecting the value of 1, the report produces an error if there is any throughput reported in the form. For ease of use and to minimize confusion, EPA should adjust the tool so that the output will not be an error even if there is data in the throughput field.

- **Comment 18:** Per our comment below on paint solar absorptance factors, please change the "new" factors to "good."

- **Comment 19:** When calculating emissions associated with tank landings and tank cleanings, the saturation factor varies depending on whether the tank is drain-dry, has a partial liquid heel, or has a full liquid heel. There are three fields in TANKS 5.0 that request information on the heel: (1) the Tank Data tab, under "Tank Characteristics", there is a field titled Liquid Heel Type at Tank Minimum; (2) the Emission Events tab, under "Floating Roof Landings" there is a field titled Type of Liquid Heel Present during Roof Landing; and (3) the Emission Events tab, under "Tank Cleaning, there is a field titled Type of Liquid Heel Present at the Start of Cleaning. In all three fields, there are only two options: (1) Full Liquid Heel; and (2) No Liquid Heel. None of the fields have an no option for Partial Liquid Heel. The option to select Partial Liquid Heel should be made available as the emissions are different for a partial liquid heel.

- **Comment 20:** When creating a custom product profile, TANKS 5.0 allows the user to start from a "template chemical." This is a helpful feature as it makes the creation of chemicals and petroleum liquids more efficient. However, for the creation of custom petroleum liquids, there is a check box at the bottom of the form for the user to indicate whether it is a crude oil. If the selected "template chemical" is crude oil, the tool should automatically assume that the new custom profile will be a type of crude oil.

- **Comment 21:** The current version of TANKS 5.0 is limited to accepting throughput data in units of "gallons." The tool should be revised to allow the user to specify throughputs in other

units such as "barrels" or "cubic meters." This would give users the flexibility to enter the throughput data in the units to which they are accustomed.

- **Comment 22:** Many states require regulated entities to track emissions on a 12-month rolling basis. Currently, TANKS 5.0 only allows the user to input on a discrete calendar year period and calculate emissions for the months in that period. Functionality should be added to save throughputs for a combination of month and year and the ability of the user to calculate emissions on a 12-month rolling basis.

- **Comment 23:** The current version of TANKS 5.0 includes a reference to the default value (e.g., AP-42) for some fields but the user still must enter data manually. Functionality should be added that allows the user to select "default" as an option and have them auto populated.

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Thank you for the opportunity to submit these comments. We look forward to working with the Agency to finalize changes to AP-42 and develop Tanks 5.0. Please do not hesitate to contact Derek Reese at ReeseD@api.org if you have questions or need more information.

Respectfully submitted,

The American Chemistry Council
American Fuel & Petrochemical Manufacturers
American Petroleum Institute