

**Public Comments on Proposed Revisions
to the Control Cost Manual
Section 3.2
Chapter 1: Flares**

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List of Commenters

Document Control Number	Commenter Name	Commenter Affiliation
EPA-HQ-OAR-2015-0341-0049	Anonymous	
EPA-HQ-OAR-2015-0341-0050	Theodore Steichen, Senior Policy Advisor	American Petroleum Institute (API)
EPA-HQ-OAR-2015-0341-0051	Ryan Streams, Manager	Western Energy Alliance
EPA-HQ-OAR-2015-0341-0052	David Friedman, Vice President, Regulatory Affairs	American Fuel and Petrochemical Manufacturers (AFPM)
EPA-HQ-OAR-2015-0341-0053	Todd Mayer	Steffes LLC

1.1 Flare Type Description and Specifications

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: The commenter stated that the statement in Section 1.1.1 that “steam-assist flares have a lower capital cost and a wider operating range than air-assist flares” is incorrect. According to the commenter, steam assisted flares have higher capital costs than air assisted flares because they are much larger than air assisted flares, have much more complex tip assemblies, and typically have much larger vent collection systems. Because of their typically higher elevation, foundations and structural costs will also be higher. In addition, where incremental steam capacity is not available, the capital cost for incremental steam capacity for a steam assisted flare could be much more than the capital cost of the air blower associated with an air-assisted flare.

Response: The statement in the draft chapter was specific to flares of comparable size. We understand that larger flares have higher costs than smaller flares. We are clarifying the statement to indicate that the comparison of costs for air assist flares is for flares of the same diameter where assist steam is available.

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)

DCN: EPA-HQ-OAR-2015-0341-0052

Commenter: Steffes LLC

DCN: EPA-HQ-OAR-2015-0341-0053

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: Commenter 0052 stated that the Cost Manual does not provide information about multi-point flares or portable flares and recommended the Manual discuss these designs. Commenter 0053 recommended revisions to the current pressure-assisted flares description to indicate that multi-point flares can be either ground level or elevated. Commenter 0050 recommended that the description for pressure-assisted flares indicate that they are often used as secondary flares to steam-assisted flares.

Response: Multi-point flares are generally pressure-assisted flares and there is a discussion of multi-point flares within the description of pressure-assisted flares. We are revising this description of pressure-assisted flares to mention the fact that multi-point flares may be used in both ground and elevated flares and to discuss their common applications.

Commenter: Anonymous
DCN: EPA-HQ-OAR-2015-0341-0049

Comment: The commenter recommended revising the statement “Enclosed flares are commonly used at landfills” to add “wastewater treatment plants and other regulated facilities” to this list. The commenter also recommended that the Cost Manual address flare specifications for enclosed ground flares in the same manner as open flares.

Response: The requested addition appears to be very broad. We have added “anaerobic wastewater treatment plants and other remote facilities” in addition to landfills as examples of facilities that commonly use enclosed ground flares to respond to this comment without suggesting all regulated facilities, which would include all industrial plants, commonly use enclosed ground flares. We expanded the Flare Specifications (Section 1.1.3.2) to more fully consider other flare types, including a discussion of the application of these specifications to other flare designations, such as enclosed ground flares.

Commenter: Steffes LLC
DCN: EPA-HQ-OAR-2015-0341-0053

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: Commenter 0053 provided several recommendations for revising the description of air-assisted flares (as well as the design methods in Section 1.3) and provided a marked-up version of the chapter. Commenter 0050 similarly recommended text revisions, which they considered typographical issues.

Response: These comments were considered when revising the chapter, but the comments generally did not include rationale and support for the suggested changes. In some cases, the suggested revisions altered statements supported by references. In other cases, supporting references were needed to corroborate the statement that commenters recommending adding. We did look for additional references to support the statements provided in the recommended revisions; however, if supporting references were not found, the suggested revisions were not made. In one instance, the commenter suggested that the 300 Btu/scf limit in §60.18 and §63.11 is specific to waste gas. We disagree because waste gas with heat content less than 300 Btu/scf can be managed in a flare if sufficient auxiliary fuel is used to raise the vent gas heat content above 300 Btu/scf. Thus, these limits apply to the flare vent gas and not the waste gas only.

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: In response to the EPA’s question on flare VOC destruction efficiency, the commenter noted that Section 1.1.3.1 was not significantly revised and provides only general qualitative statements on flare destruction efficiency; therefore, it does not provide useful quantitative information on flare destruction efficiency.

Response: Section 1.1.3.1 was not intended to provide quantitative information on flare destruction efficiency. It provides some general consideration of factors that can influence flare destruction efficiency. These considerations remain pertinent, so we did not revise the existing text in Section 1.1.3.1.

Commenter: Anonymous
DCN: EPA-HQ-OAR-2015-0341-0049

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: Commenter 0050 noted that the statement in Section 1.1.3.2 regarding “differences in the requirements for steam-assisted, air-assisted, and non-assisted flares” should be qualified to apply only to §60.18 and §63.11 and indicated that there were no significant differences in the requirements for these flares in §63.670. Commenter 0049 recommended that flare specifications be provided for enclosed ground flares.

Response: There are some notable differences in the requirements in §63.670 for air-assisted flares, so the request to state that there are no significant differences in the flare specifications is not entirely accurate. To clarify the different specifications, we expanded the specifications discussion in Section 1.1.3.2 to describe the requirements for all flare types.

1.2 Flare Process Description

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: The commenter recommended broadening the discussion in Section 1.2.1 about Gas Transport Piping to discuss the complexity of an industrial flare application where numerous connections, safety relief valves, and other sources are routed to the flare rather than a single transport line from a source to the flare.

Response: In several instances, the “Flares” chapter of the Cost Manual notes that the costs are applicable to flares used as control devices rather than safety systems. While we recognize that flares are used for controlling emergency releases, the flare costs presented in the Cost Manual are specific to flares dedicated to controlling specific VOC streams, and we have revised the chapter to make this clear. We did revise the section to refer to “facility release point(s)” rather than to a single point.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted “gas transport piping” was also referred to as “collection header” or “flare collection system” in the document and recommended that consistent terminology be used.

Response: We have revised the chapter to use the term “gas transport piping” more consistently throughout the document. We also note in the chapter that “gas transport piping” is also commonly referred to as the gas collection header, particularly when more than one release point is directed to the flare.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter recommended that the line in Figure 1.1 labeled “Gas Line” should be re-labeled “Fuel Gas Line” to distinguish it from waste and purge gas.

Response: We have revised the label of this line to be “Fuel Gas Line.”

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that the statement in Section 1.2.6 appears to suggest purge gas flow rates are a function of flare gas velocity and recommended that this discussion be clarified.

Response: We have revised this write-up to clarify its meaning.

1.3 Flare Design Procedures

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter requested clarification of what is meant by the term “occupational concerns” in the introductory paragraph of Section 1.3.

Response: We have revised this write-up to clarify that flare design is influenced by occupational concerns regarding the level of ground-level thermal radiation intensity, luminosity, and noise.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that flares must be sized based on emergency release “hydraulic load” events rather than the 400 ft/sec limit, which generally does not apply to malfunction events.

Response: In several instances, the “Flares” chapter of the Cost Manual notes that the flare costs are applicable to flares used as control devices rather than safety systems. While we recognize that flares are used for controlling emergency releases, the flare costs presented in the Cost Manual are specific to flares dedicated to controlling specific VOC streams. We have expanded this discussion to further clarify this point and to note that the flare should be sized based on the maximum expected flow scenario required to meet the 400 ft/sec flare tip velocity limit.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that the maximum available steam rate should be used (rather than the minimum steam rate) in Equation 1.3 to determine the necessary auxiliary fuel flow rate. The commenter noted that, depending on the control method used to comply with §63.670 requirements, during large transitions in waste gas flow rates, steam may be needed to prevent smoking while significant auxiliary fuel may still be added. The commenter stated that the EPA should use a mass balance equation based on the maximum emergency release scenario with maximum steam and auxiliary fuel flow rates to size the flare. The commenter further stated that the discussion following Equation 1.2 should be moved to Section 1.5 since it is more pertinent to operating costs than flare design.

Response: First, the Cost Manual considers the installation of a flare to control VOC emissions from a specific regulated source and does not consider the design of a general utility/safety flare. Second, we recognize that there are calculation alternatives within §63.670 and we elected to develop the design procedures using the direct calculation method rather than the feed-forward calculation method because it is more direct and applicable to methods required when 40 CFR 60.18 or 63.11 apply. If the high flow scenarios have high waste gas net heating values, then auxiliary fuel is not necessarily required to maintain the required vent gas net heating value target, and if the owner or operator elects to use the feed forward method, this flow change would only apply during the transition and not be at the maximum flow condition for the full release event. Thus, it would be highly unlikely and unusual for the waste gas and auxiliary fuel flow rate during this transition period to exceed the maximum waste gas flow rate when there is a sustained release. Therefore, we consider the design procedures presented in this chapter to be appropriate and the most applicable for potential users of the Cost Manual. Consequently, we consider the discussion following Equation 1.2 regarding reducing steam flow prior to calculating auxiliary fuel flow rates to be appropriate in this section.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that facilities must target an NHV slightly higher than the minimum limit to ensure continuous compliance with the limit and recommended NHV_{target} be 10 percent higher than the regulatory limit.

Response: We agree and have revised the write-up and example calculations to recommend the use a value for NHV_{target} 10 percent higher than the regulatory limit.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that Section 1.3.1 should be modified to indicate that the minimum auxiliary fuel use calculated in Equation 1.3 will not reflect the annual fuel use

requirements because there will be low flow events, occasional high flow events of low heating value waste gas, and other flow transitions that will require more auxiliary fuel than calculated using average flow conditions.

Response: We agree, which is why the example calculations consider multiple different flow scenarios. We have revised the discussion in Section 1.3.1 to recommend applying equation 1.3 to various flow scenarios expected to occur and to size the flare based on the flow scenario that yields the highest flare tip diameter. The annual fuel usage is estimated from auxiliary fuel usage for each scenario and the time for which that flow scenario is expected to occur.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that the term vent gas in the draft chapter is generally used to mean waste gas, which is inconsistent with the meaning of vent gas in 40 CFR part 63 subpart CC. The commenter also noted that Section 1.3.4 uses the term purge gas to refer to sweep gas (as described in Section 1.2.4). The commenter recommended that the terms be used consistently throughout the document and recommended that the terms used in the Cost Manual be consistent with the terms used in 40 CFR part 63 subpart CC.

Response: We agree and have added definitions in Section 1.1 of the final chapter for the terms used in the chapter. These terms and definitions are consistent with the terms used in 40 CFR part 63 subpart CC except that we retained the use of the term “auxiliary fuel” (the term widely used within the original chapter) rather than using the term “flare supplemental gas”, which is the corresponding term used in 40 CFR part 63 subpart CC. We revised the terms used throughout the chapter to be consistent with the definitions provided in Section 1.1 of the final chapter.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that the sentence regarding a “mover such as a fan or compressor” in Section 1.3.2 should be revised to clarify that movers can only be used for non-emergency flare systems.

Response: In general, this chapter considers the costs and design of non-emergency flare systems, but we agree that this clarification is appropriate and have revised this sentence accordingly.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that the existing discussion of flare height limitations should be expanded to indicate there may be a maximum allowable flare height based on aviation or high wind concerns and that the Manual should address the potential need to use two flares when a height restriction is encountered.

Response: We have included a discussion of potential flare height restrictions at the end of Section 1.3.3.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter thought that Manual users may misconstrue the “total time flare was in operation in the year” variable, t_{op} , in Equation 1.8 to be equivalent to the time waste gas is discharged to the flare. The commenter recommended clarifying this term to be the time the flare is capable of receiving waste gas because purge gas is required even when there is no waste gas flow.

Response: We agree that this term should include all time that the flare is capable of receiving waste gas, and we have noted in the final chapter that t_{op} is generally 8,760 hours.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that Section 1.3.6 should discuss the fact that the steam usage would not be proportional to vent gas flow rate when the flare is operated above its smokeless capacity, and assuming direct proportionality would overstate steam usage.

Response: Because our calculations in the chapter presume we are not sizing the flare for emergency cases and considering only the range of flow during normal operations, we present calculations for a flare to operate in a smokeless fashion over the range of normal operations so that the direct proportionality for estimating steam usage is appropriate.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that Section 1.3.7 should discuss the fact that multiple knock-out drums may be needed for large flare collection headers. The commenter also stated that flares are commonly used for emergency relief so the design of horizontal knock-out drums should also be included in this section. Finally, the commenter noted that knock-out drums also require additional equipment for liquids handling and this section should discuss these needs.

Response: We did revise the introduction to refer to knock-out drums (plural rather than singular), but the focus of this chapter is the use of flares for VOC control for a limited number of sources where only one vertical knock-out drum would be required. The current discussion also notes that vendor quotes should be used if a horizontal knock-out drum is required. We do not have appropriate vendor quotes from which to develop cost algorithms for horizontal knock-out drums. We do agree that additional discussion of equipment that may be necessary for knock-out drums is appropriate and we have added this discussion at the end of Section 1.3.7.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that many flares use a seal drum (liquid seal as described in Section 1.2.3) to isolate the collection header from the flare when waste gas is not flowing and recommended the design of seal drums also be included in Section 1.3.7.

Response: Costs for liquid seals are included in the equipment costs for the flare, so specific design requirements for liquid seals are not needed. Furthermore, for flares used specifically for VOC control systems, a seal drum may not be required, but rather a flame arrestor is needed. We have added a discussion of liquid seals and flame arrestors in a new Section 1.3.8.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter recommended that the first sentence of Section 1.3.8 of the draft chapter (Section 1.3.9 of the final chapter) be clarified to say that the system pressure drop is a function of the assist gas flow and auxiliary fuel flow, as well as the flare gas flow and equipment design.

Response: We have added the recommended clarification.

1.4 Flare Total Capital Cost Estimation

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: Several commenters stated that the major equipment costs for flares are based on out-of-date information from the 1980s and more recent equipment costs should be collected and used in the Cost Manual's flares chapter. Commenter 0050 noted that wind load design and flare tip designs have changed since the 1980's and the equipment cost should reflect these developments. Commenter 0052 noted that the Agency's own advice in Section 1, Chapter 2, Subsection 2.4.4 recommends limiting cost escalation to 5 years, so escalating the 1990 costs to 2014 dollars is not appropriate. Also, since the final Flares chapter won't be published until 2018, users of the manual will have only a year or two of use given the 2014 dollars and recommended that the EPA provide costs in 2017 or 2018 dollars to maximize the utility of the costs presented in the Cost Manual.

Response: We did not receive more recent cost estimates for flares in response to our Notice of Data Availability, so it was necessary to resort to escalating the costs from the previous chapter to a more current year. The Chemical Engineering Plant Cost Index (CEPCI) has been finalized for 2017, so we have escalated all equipment costs to 2017 dollars.

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: One commenter stated that the auxiliary equipment costs (piping, knock-out drum, and monitoring equipment) all have different base years and that the different base year costs adversely impact the accuracy of the flare system costs.

Response: While they have different base years, we escalated each of these costs to 2017 dollars. Thus, the costs presented in the *Control Cost Manual* are presented in consistent year dollars.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that there may be significant costs for associated facilities (e.g., steam, electrical) and the discussion of these costs should be expanded to provide more detail to the users. The commenter recommended adding a term for these costs in Equation 1.24 in the draft chapter (Equation 1.28 in the final chapter) and note that these costs need to be evaluated on a case-by-case basis.

Response: These costs are considered to be part of the site preparation costs. We added the site preparation and building terms specifically to Equation 1.30 in the final chapter so it more directly matches the equation in Table 1.11 of the final chapter and we added a brief discussion at the end of Section 1.4.2 regarding assessment of these site-specific costs.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: Commenter 0050 stated that new flares at petroleum refineries must comply with Refinery NSPS Ja (40 CFR part 60 subpart Ja) and that the Cost Manual should specifically discuss the need to consider these costs, where applicable. Commenter 0052 stated that the auxiliary equipment costs should include costs for flare gas recovery systems.

Response: We do not typically evaluate or summarize detailed rule requirements in the Cost Manual. We understand that the Refinery NSPS Ja requires a flare management plan, but the costs of preparing this plan is beyond the scope of the Cost Manual. Refinery NSPS Ja also includes requirements for flow monitoring systems and a total sulfur analyzer. We did not provide detail of these requirements, but we did revise Section 1.4.1 *Equipment Costs* to add discussion that additional monitoring equipment may be required under certain applications. While the Refinery NSPS Ja does not specifically require flare gas recovery systems, we agree

that these systems should be discussed and costs for these systems are now presented in Section 1.7 *Example Problem 2 (Flare with Flare Gas Recovery)* of the chapter.

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: One commenter noted that the EPA added Section 1.4.3 to provide an example total capital cost estimate for an enclosed ground flare to control vented emissions from storage tanks. However, the example does not provide information on size, heat release or other design parameters. Also, as all other costs presented are for elevated flares, this example cannot be used to support the costs presented in the Flares chapter.

Response: We agree with the commenter and have removed this example from the Flares chapter.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that the EPA is now requiring pressure release devices to be controlled. As such, the capital costs should consider the need for a flare seal drum and be designed for emergency relief.

Response: The requirements for pressure relief devices (PRD) do not specifically require that each PRD be vented to a flare or other control device. There are alternatives in the rule to requiring a control device, such as implementing redundant prevention measures. We agree that, if a PRD is vented to a flare, that the flare must be appropriately sized for the release event flow. However, as stated in the Cost Manual and in other responses in this document, the Cost Manual is intended for control of general emission sources and does not consider design of flares for emergency release events.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted an inconsistency between two paragraphs in Section 1.4, one stating that monitoring costs are not included and one stating that monitoring for the presence of a flame is generally included in the flare equipment costs. The commenter recommended that the statements need to be revised to be consistent and requested that the chapter specifically state that costs for all required monitoring equipment be included in the cost estimate. The commenter noted that, in addition to the flow monitor and calorimeter, costs should be provided for pilot gas monitoring systems, video monitoring equipment (for visible emissions monitoring), steam flow monitors and controls, a hydrogen analyzer (to augment the net heating value), and H₂S monitors.

Response: The sentence stating that monitoring costs for the presence of a flame is included in the flare equipment costs has been removed from the final chapter. We have also added monitoring equipment costs developed for the refinery flare rule to the final chapter. However,

we included a sentence in the draft chapter that suggests that the applicable regulations for a given application should be reviewed prior to estimating the flare monitoring equipment costs. We have revised this language in the final chapter to more clearly state that all monitoring systems required for a given flare application should be included in the flare monitoring equipment cost term.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)

DCN: EPA-HQ-OAR-2015-0341-0052

Comment: Two commenters stated that the EPA should use the flare monitoring costs developed to support recent EPA regulations regarding flares. The commenters noted that the summarized monitoring costs in the background memo (see <https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0682-0209>) supporting the regulations are much higher than those presented in the Cost Manual.

Response: We did use the costs collected during these EPA rulemaking efforts. However, the costs presented in the background memo are fully installed capital equipment costs. The direct equipment costs for these monitoring systems from the data collected were used to develop the equipment costs (part of “A”, the purchased equipment costs). The total capital investment costs using the Cost Manual’s suggested factors would be 2.27 (1.18×1.92) times the equipment costs, but these do not include site preparation and building costs. Monitoring building costs were included in the installed total capital investment costs developed for the cost analysis of the flare regulatory requirements and this cost should be estimated separately under the “Buildings” item (in Table 1.11 of the Cost Manual).

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that there are significant costs associated with the knock-out drum that are not accounted for within the Flares chapter. These include a safety release valve, a pump, and liquid piping costs. The commenter also noted that costs for seal drum should be included.

Response: We reviewed the bases of the knock-out drum costs and agree that these costs do not appear to include costs for pumps and additional liquid piping. The EPA is working on cost estimation procedures for these types of ancillary equipment and will include these costs in the Cost Manual during the revisions of the generic equipment chapter as part of later chapter updates.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that flare transport piping is based on straight pipe and that flare transport piping is seldom straight. To minimize pressure drop and low spots in the

transport line, the commenter recommended that the piping costs be based mostly on costs for sweeping elbows rather than straight pipe.

Response: We do not have costs for “sweeping elbows.” We retained our proposed cost equation for piping (but revised to 2017\$).

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Commenter: Western Energy Alliance

DCN: EPA-HQ-OAR-2015-0341-0051

Comment: Several commenters stated that the cost of flares at remote locations will incur additional costs (in site preparation, delivery costs, and utilities). The commenters suggested that the EPA specifically state that the Cost Manual does not address flare costs at upstream or midstream oil and gas facilities or other similar remote locations.

Response: We have included statements to this effect in several places within the Flares chapter to clarify that the applicability of the costing procedures is focused on elevated steam-assisted flares at an industrial facility and may not provide accurate estimates for other types of flares.

Commenter: American Petroleum Institute (API)

DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that the installation and indirect expense factors are unrealistic and should be increased. The commenter cited the Lang factor of 4.74 for fluid processing industries, which is more than double the factors presented in the Flares chapter. The commenter continued with specific factor comments.

1. The 1 percent factor for electrical costs for flares is not sufficient to provide power to motors needed for the water seal and knock-out drum. The commenter recommended that the cost manual specifically note that additional electrical costs may be required and these should be estimated based on the number and size of motors required.
2. Engineering cost factor of 40 percent should be used flares.
3. Project management costs of 40 percent should be used for flares.
4. Profit of 10 percent is reasonable, but it should be determined based on total installed costs rather than purchased equipment costs.
5. The flare startup cost factor should be increased to account for extensive pressure testing and air-freeing procedures required for flare startup.
6. A flat cost of \$50,000 to \$100,000 should be provided for flare testing.
7. The contingency factor of 30 percent should be used for screening cost estimates such as those presented in the Cost Manual.

Response: We appreciate the comments, but we had developed these cost factors based on the best information available at the time. The bases for some of the recommended changes are not clearly apparent. It appears that the 40 percent engineering factor may be appropriate for

designing an emergency flare system, but as stated previously, that is not the intent of this chapter. Also, we do not know what “flare testing” would be required (perhaps Method 22 visible emissions monitoring?) or why such testing would cost \$50,000 to \$100,000. We note that the screening costs developed using the cost algorithms in the Cost Manual are generally accurate within ± 30 percent; however, that is not sufficient reason to add a 30 percent contingency factor. Based on our review of the suggested edits, we decided not to revise any of the capital cost factors presented in Table 1.11 of the final flares chapter.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter noted that Section 1.4 indicates that the flare costs are based on new plant installation and that no retrofit costs were considered. The commenter noted that retrofit costs may be significant and that it is appropriate to apply retrofit factors to projects (or portions of projects) impacted by existing facilities.

Response: We agree that retrofit costs may be significant, but these costs are highly variable to site-specific conditions. Therefore, we cannot recommend a set range for retrofit factors, but we have clarified in the discussion that appropriately documented site-specific retrofit factors can be applied to estimate costs impacted by existing facilities.

1.5 Flare Total Annual Cost Estimation

Commenter: American Fuel and Petrochemical Manufacturers (AFPM)
DCN: EPA-HQ-OAR-2015-0341-0052

Comment: One commenter stated that the equipment life of 15 years is not necessarily appropriate, noting that flare tips often need to be replaced much more frequently while the flare transport piping and stack may have useful life of over 30 years. The commenter recommended that more detailed information on equipment life for flares be collected and used to support equipment life for flare tips separately from other flare equipment.

Response: We do not have separate cost estimates for the flare tip as a component of the overall flare costs, so it is not possible to segregate the flare tip costs and provide a separate equipment life for the flare tip. We agree that many components of the flare system may have a useful life of 30 years, while the flare tip may have a useful life of 5 or 10 years. The assumed 15-year equipment life is expected to provide a reasonably accurate estimate of the average capital recovery factor of the flare system understanding that some portions of the flare system will have a useful life of less than 15 years while other portions of the system will have a useful life of greater than 15 years.

Commenter: American Petroleum Institute (API)
DCN: EPA-HQ-OAR-2015-0341-0050

Comment: One commenter stated that cost estimates should be escalated to reflect that regulatory compliance costs are typically incurred several years after the promulgation date. This would make them more consistent with the estimate of benefits, which do not occur until the compliance date. The commenter also stated that expedited fabrication and delivery is often required to meet regulatory compliance dates and these costs must be considered (e.g., by increasing the installation cost factor).

Response: It is good practice to report the year for which cost estimates are developed. Provided that the compliance costs and benefits are estimated using consistent year dollars, the impacts can be compared. As it is not possible to project the future year costs, it is preferable to use costs escalated to the most recent year or other period for which cost escalation data are available. The need for expedited fabrication and delivery costs should be evaluated on a project-specific basis. While there may be times where these additional costs may be incurred, it is not appropriate to revise the cost factors presented in the Cost Manual to assume all projects will incur expedited surcharges.