Overview of PAC-30 Screening

Introduction

The DOE Order 151.1C, *Comprehensive Emergency Management System* (referred to as the Order), and the associated Contractor Requirements Document (CRD), requires contractors to establish a hazardous material screening process to identify specific hazardous materials and quantities that, if released, could produce impacts consistent with the definition of an Operational Emergency (OE) requiring classification (i.e., Alert, Site Area Emergency, General Emergency). Included in that process is a requirement to identify all hazardous materials in a facility/activity that require further analysis in an Emergency Planning Hazards Assessment (EPHA) as determined by the screening criteria put forth in the Order and CRD. Per the DOE Guide 151.1-2, *Technical Planning Basis Emergency Management Guide* (referred to as the Guide), these screening criteria are intended to exclude from further consideration those materials that have little to no potential to cause impacts consistent with the general definition of OEs and the specific OE definition for the airborne release of hazardous materials.

In accordance with the Order, if the quantitative analysis indicates that all events would be classified as less than an Alert, an EPHA is not required. An Alert must be declared when an event results in the radiation dose from any release to the environment of radioactive material or a concentration in air of other hazardous material exceeding the applicable protective action criterion (PAC) at or beyond 30 meters from the point of release to the environment. Since an Alert is the lowest classification of event, if PAC is not exceeded at 30 meters for a worst case release scenario for each hazardous material, the potential does not exist for a classifiable event and the facility is not required to be covered in the Hazardous Materials Program (i.e., an EPHA is not required).

Therefore, if a release of the hazardous material modeled under a conservative meteorological set, applying the appropriate transport and dispersion criteria (e.g., release fraction, release height), does not exceed PAC at 30 meters for the worst-case event, the material may be excluded from further analysis. This quantitative analysis is commonly referred to as "PAC-30" screening.

The PAC-30 screening concept can be equivalently applied if the site chooses to use a site-specific criterion corresponding to 10 percent of the applicable PAC at or beyond the facility boundary to determine if the event is classified as an Alert. In the same manner, if the release does not exceed 10% of PAC at the facility boundary, the material may be excluded from further analysis. For simplicity, the screening approach will be called "PAC-30" screening throughout this document, although it is recognized that it could similarly apply to 10% of PAC at the facility boundary.

Methodology

The ultimate purpose of the PAC-30 screening is to identify if the worst-case release for a material is capable of exceeding PAC at 30 meters, accounting for the material form and potential initiating events. The general method of employing the PAC-30 screening criterion is, for those materials that do not screen out per the standard screening criteria, to identify the worst-case release event and develop the source term using applicable parameters for the material and event type as well as the storage conditions (i.e., Airborne Release Fraction, Release Fraction, Damage Ratio, Leak Path Factor). Usually the worst-case release event will likely involve the release of the total inventory of the facility and conservative assumptions on the Damage Ratio and Leak Path Factor. However, any passive features that may reduce the source term should be accounted for and not arbitrarily ignored to create a more severe event than is plausible. In the same manner, the meteorological conditions and other dispersion parameters should be determined based on the material and release conditions. If the analyzed worst-case release does not result in consequences exceeding PAC at or beyond 30 meters, then there are no classifiable OEs for the facility and an EPHA is not required. All of the assumptions should be documented and the model results included in the Hazards Survey (i.e., as an attachment or by reference).

An additional step that may be used is to determine the amount of a material that would be required to reach PAC at 30 meters, referred to as PAC-30 Threshold. This may be used for situations where all of the dispersion parameters for the worst-case event would be identical (e.g., release duration, release height). The PAC-30 Threshold is typically determined by iterating the quantity of material released within the dispersion model, using the parameters discussed above, to determine the quantity which produces consequences equaling PAC at 30 meters. The source term for the material of concern will still be developed as discussed; however, instead of using that value in the dispersion model, the value is compared to the pre-determined PAC-30 Threshold for that material. If the ratio of the source term to the PAC-30 Threshold is less than one, all events would be classified as less than an Alert and an EPHA is not required. Using this method allows the analyst to perform one dispersion modeling run for each material, as opposed to having to run separate cases for each source term identified.

For chemical mixtures, an analysis could be performed using the Subcommittee on Consequence Assessment and Protective Actions (SCAPA) Chemical Mixtures Methodology to determine if a worst-case release event would be classified as less than Alert. This would indicate that EPHA analysis is not needed, much like a similar approach used for a single chemical. However, reversing the methodology to determine the PAC-30 Threshold value may be difficult for chemical mixture release scenarios, and it may be more cost-effective to perform the analysis separately for each facility.

The Order states that the results of the hazardous material screening process and the quantitative analysis may be incorporated directly into the Hazard Survey or may be incorporated by reference in the Hazards Survey. Therefore, documentation of this information, including details on source term and modeling assumptions, is presented in the Hazards Survey or supporting reference and is used as a discriminating factor to determine if an EPHA is required.

Exclusions/Limitations

The proposed "PAC-30" screening criterion does not in any way circumvent the established screening criteria, nor is it intended to identify "locally determined" values as an alternative to the screening values identified in the Guide for use as the quantities that can be "easily and safely manipulated by one person." Rather, it provides a methodology for determining if an EPHA is required through quantitative analysis documented in the Hazards Survey, as permitted by the Order and CRD.

The Frequently Asked Question (FAQ) titled *Screening Thresholds and Consequence-At-Distance* (dated 7/10/07) discourages the use of consequence-at-distance thresholds as initial criteria for the purpose of excluding materials from the screening criteria in the Order and the Guide. The "PAC-30" screening methodology should not be perceived as a consequence-at-distance threshold, as it is only used for materials which have already undergone screening and do not screen out per any of the screening criteria identified in the Order and the Guide. Furthermore, the "PAC-30" screening methodology does not present the potential for analyzing small quantities of materials that should be excluded, as discussed in the Guide and the FAQ.

Conclusion

The use of the PAC-30 methodology provides for additional detailed analysis in the Hazards Survey, as permitted by the Order. It is not intended to replace or augment any existing screening criteria; rather, it is a more in-depth look at materials that do not screen out per the standard screening criteria. This method allows costs to be avoided by identifying materials that would not generate a classifiable OE prior to the development of a detailed EPHA that would ultimately not be required.