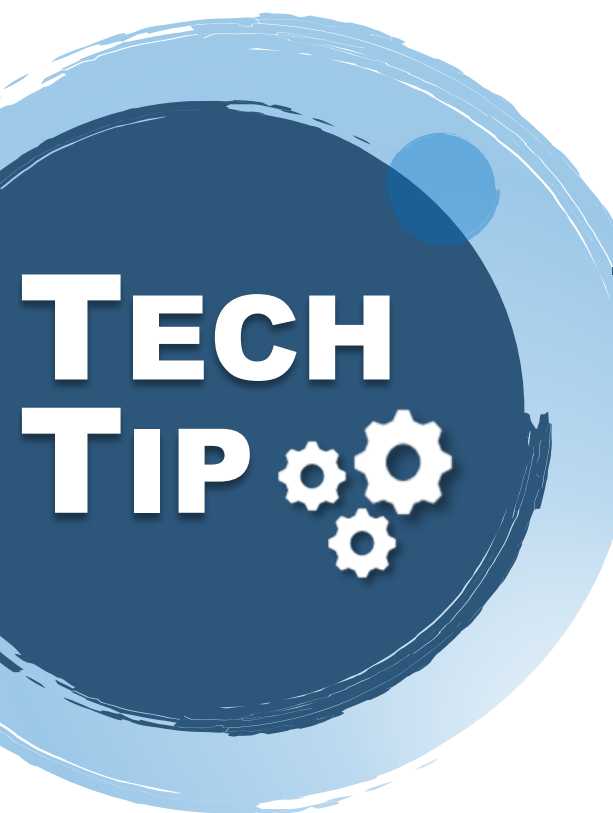




Modeling Methods for an Offsite Consequence Analysis

Why is accurate modeling of Offsite Consequence Analysis important? Offsite Consequence Analysis (OCA), synonymous with Hazard Assessment, is required under California Accidental Release Prevention (CalARP) and Risk Management Plan (RMP) rule. Completing an accurate OCA is an essential component of fulfilling the CalARP and RMP requirement. All facilities subject to CalARP and RMP require an OCA, regardless of program level. Additionally, OCA provides an estimate on the potential offsite consequence, such as population and environmental impact, calculated from the toxic endpoint of the worst-case release or alternative release scenario. This estimation can be THE determining factor in a facility's program level as well as guidance for emergency planning and response.

Modeling Scenarios + Modeling Methods

There are two scenarios modeled for an OCA, a worst-case release and alternative release case. The worst case assumes the entire contents of a single piece of equipment or piping, containing the largest volume of a hazardous chemical, releases. The alternative release case is determined using various considerations such as any previous incident history of the site, any potential failure identified during a facility's Hazard Review or Process Hazard Analysis, and any reasonable release scenario. All programs require analysis of the worst-case release, but program 1 facilities do not require analysis of an alternative release scenario. The following methods are acceptable for modeling an OCA:

- RMP*Comp / ALOHA (Areal Locations of Hazardous Atmospheres)
- Methodologies from the RMP Offsite Consequence Analysis Guidance
- Commercial/Public/Proprietary modeling techniques

RMP*Comp / ALOHA

RMP*Comp and ALOHA are simple computer models, developed by the EPA and NOAA, for modeling air dispersion. RMP*Comp the simpler of the two models, only requiring minor user input for select parameters and using accepted values specified in RMP Guidance for the other parameters. ALOHA increases in complexity with more user defined inputs so careless modeling may not meet program requirements; however, this allows for the consideration of site-specific factors in the modeling. A key component of both RMP*Comp and ALOHA is that both models require the total released quantity, or release rate and release duration to be known to utilize correctly since they only model air dispersion.

RMP Offsite Consequence Analysis Guidance

The RMP Offsite Consequence Analysis Guidance is a document produced by the EPA that provides guidance

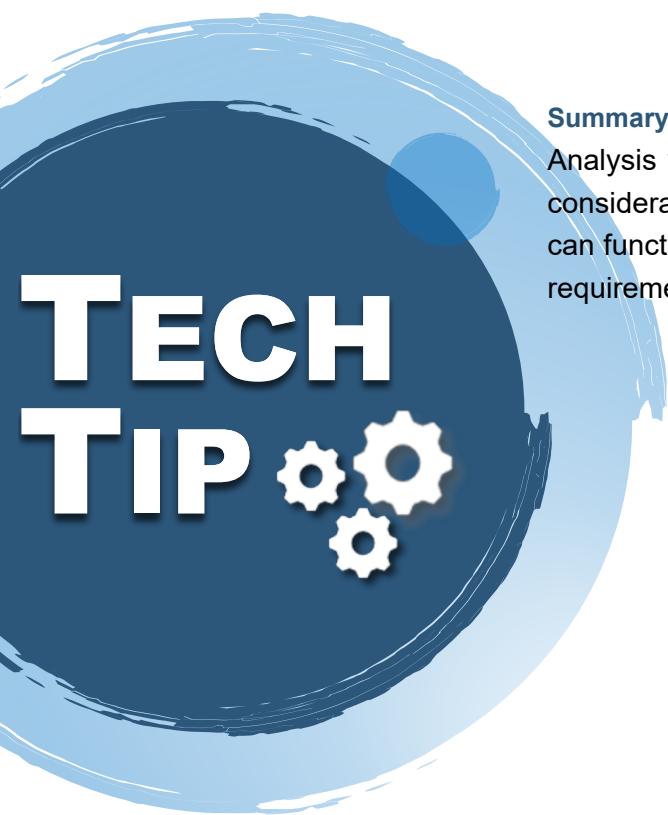
on modeling releases of toxic and flammable chemicals. The guidance includes equations for different releases and varying conditions for both worst case releases and alternative release cases. Each modeling method has a corresponding reference table that correlates different release rates to toxic endpoints. The downside of using the RMP Guidance is that there is little flexibility in deviating from the scenarios modeled so site-specific factors may go unaccounted for.

Commercial/Public/Proprietary Modeling

The EPA allows the use of commercial, public, or proprietary models; however, there are considerations for the models. The dispersion modeling must be able to account for the modeling conditions, recognized and utilized by industry as part of current practice. There is an additional caveat for proprietary models: Implementing agency must have access to the model, and emergency planners must receive an explanation of the model's features and its differences from publicly available models upon request.

Table 1: Considerations for Choosing a Modeling Method

Approach	Examples	Advantages	Disadvantages
Simple guidance	EPA's <i>Offsite Consequence Analysis Guidance</i>	• Free • No computer requirements • Simple to use • Provides all data needed • Provides tables of distances • Eases compliance with rule	• Conservative results • Few site-specific factors considered • Little flexibility in scenario development
Simple computer models	EPA models, such as RMP*Comp or ALOHA	• No/low cost • May be simple to use • Can consider some site-specific factors	• Some may not be simple to use • Likely to give conservative results • May not accept all of EPA's required assumptions • May not include chemical-specific data • May not address all consequences
Complex computer models	Commercially available models	• May address a variety of scenarios • May consider many site-specific factors	• May be costly • May require high level of expertise



Summary: The different modeling methods for an Offsite Consequence Analysis vary in complexity, ease of use, and carry with them different considerations (summarized in Table 1). The best model is the one that can function as bridge for a facility's specific conditions and meet all the requirements set by CalARP and RMP rule.

Resources

[RMP*Comp](#) | response.restoration.noaa.gov

[ALOHA](#) | response.restoration.noaa.gov

[Ask Dr. ALOHA: Using CAMEO Tools for RMP and EPCRA Hazard Analyses](#) | response.restoration.noaa.gov

[eCFR :: 40 CFR Part 68 -- Chemical Accident Prevention Provisions](#)

[Risk Management Program Guidance for Offsite Consequence Analysis \(March 2009\)](#)



www.rmppcorp.com

949/282-0123

Find us on [LinkedIn](#)

About the Author:

Mr. Armenta is a Project Engineer and has been involved in a variety of activities associated with the California Accidental Release Prevention Program (CalARP), Environmental Protection Agency's Risk Management Plan (RMP) and Occupational Safety and Health Administration's Process Safety Management (PSM) Program. He specializes in facilitating Process Hazard Analysis (PHA) studies using the Hazard and Operability (HAZOP).