Hazard Assessment

Predicting Potential Impacts to the Community

Photo courtesy of West Virginia State Fire Marshal

Offsite Consequences Analysis

Common Inspection Deficiencies Highlighted

- Agenda
  - Types of Scenarios
  - Definitions
  - Required Scenarios & Parameters
  - Release Mitigation
  - Modeling
  - Offsite Impacts Receptors
  - OCA Documentation

Types of Scenarios

- Worst-case release scenarios
  - Based on conservative assumptions
  - Represent a very severe accident that is unlikely to occur
- Alternative release scenarios
  - Based on more realistic assumptions
  - More likely to occur

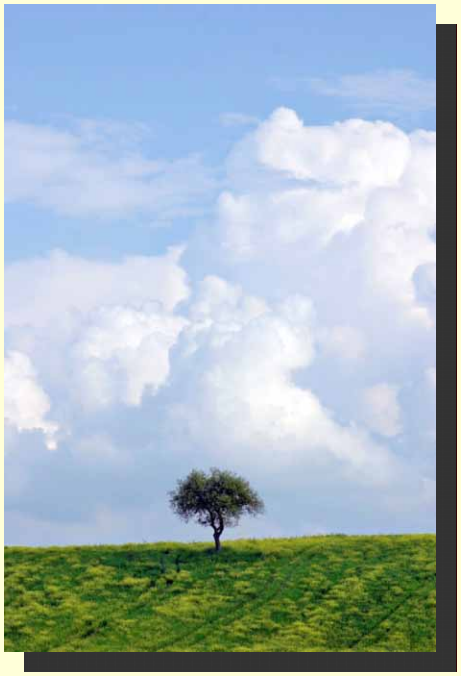
Definitions

- **Offsite**: Areas beyond the property boundary of the stationary source, and ***areas within the property boundary to which the public has routine and unrestricted access during or outside of business hours***
- **Worst-case Release Scenario**: The release of the **largest quantity** of a regulated substance **from a vessel or process line failure** that results in the greatest distance to an endpoint
  - Does not depend on Program Level
- **Alternative Release Scenario**: Scenarios that are more likely to occur than the worst case scenario **and** that **will reach an endpoint offsite**, unless no such scenario exists
  - ***Should consider*** the 5-year release history and failure scenarios identified in ***the PHA or Hazard Review***
- **Public Receptors**: Public Receptors: Offsite areas such as residences, schools, office buildings, and parks where members of the public could be exposed

Required OCA Scenarios

Common Deficiencies

- For Each Program 1 Process
  - One worst-case scenario for each Program 1 process
    - ***No public receptors in worst-case scenario zone*** and
    - No accidents with OFF-Site consequences in last five years
  - No alternative scenarios are required



Required OCA Scenarios (cont'd)

Common Deficiencies

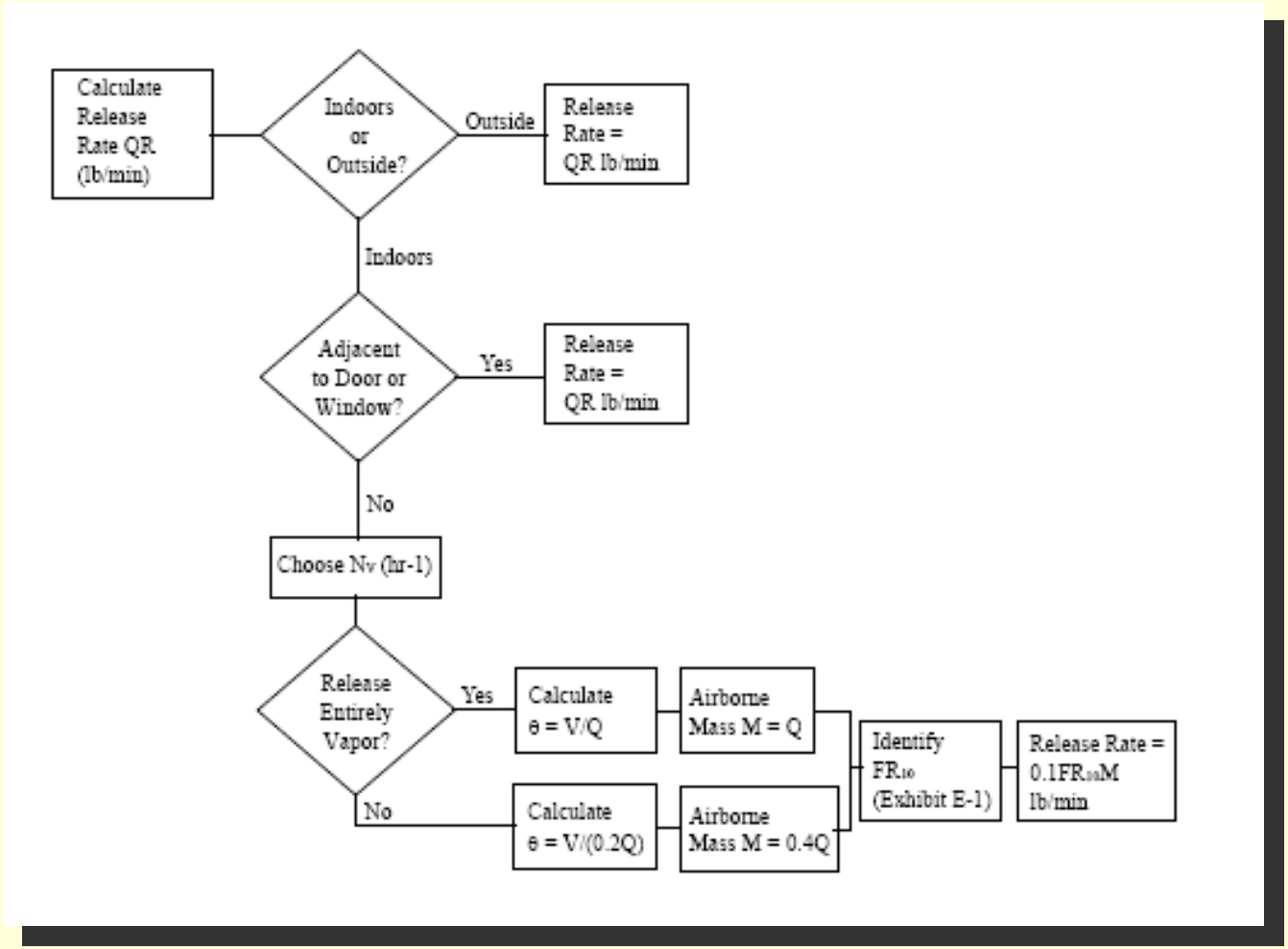
- For All Program 2 and 3 Processes
  - One worst-case scenario for all toxics
  - One worst-case scenario for all flammables
  - ***Additional worst-case scenarios if different public receptors could be affected***
    - Public Receptors: Offsite areas such as residences, schools, office buildings, and parks where members of the public could be exposed
  - At least one alternative scenario for each toxic
  - At least one alternative scenario for all flammables

Release Mitigation

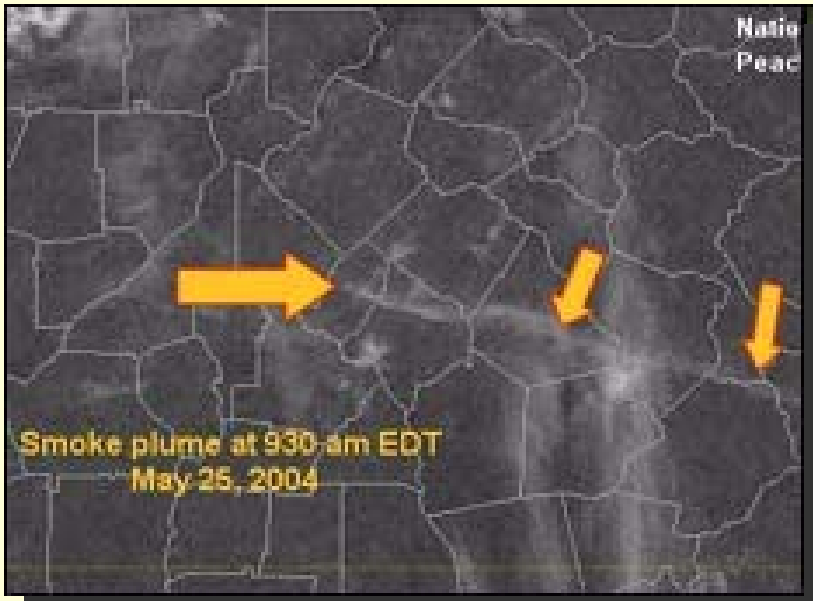
Common Deficiencies

- Activities or equipment designed to contain released substances to minimize exposure
- Passive mitigation
  - Function without human, mechanical, or other energy input
  - Can use in worst-case and alternative release scenario analyses ***if capable of withstanding release event***
  - Examples include ***building enclosures***, dikes, and blast walls
- Active mitigation
  - Need human, mechanical, or other energy input to function
  - Can be considered only in alternative release scenario analyses, ***must be capable of withstanding release event***
  - Examples include interlocks, shutdown systems, pressure relieving devices, flares, emergency isolation systems, etc.

Effectiveness of Building Mitigation for Alternative Release Scenarios



Modeling OCA Scenarios



- "Zones of concern"
  - Can be developed for a given facility based on specific hazardous substances
  - OCA can be used to aid in community planning

Calculating Release Scenarios

- **Methods to calculate release scenarios**:
  - **EPA**
    - **RMP *Comp** – Computer software, easy to use, need basic data parameters (volume, size of container)
    - **EPA tables** – EPA guidance documents
  - **Industry specific** guidance
    - **TFI** [myRMP]
  - **Other Models** – Such as *Areal Locations of Hazardous Atmospheres* (ALOHA®), DEGADIS

Offsite Consequence Parameters

Common Deficiencies

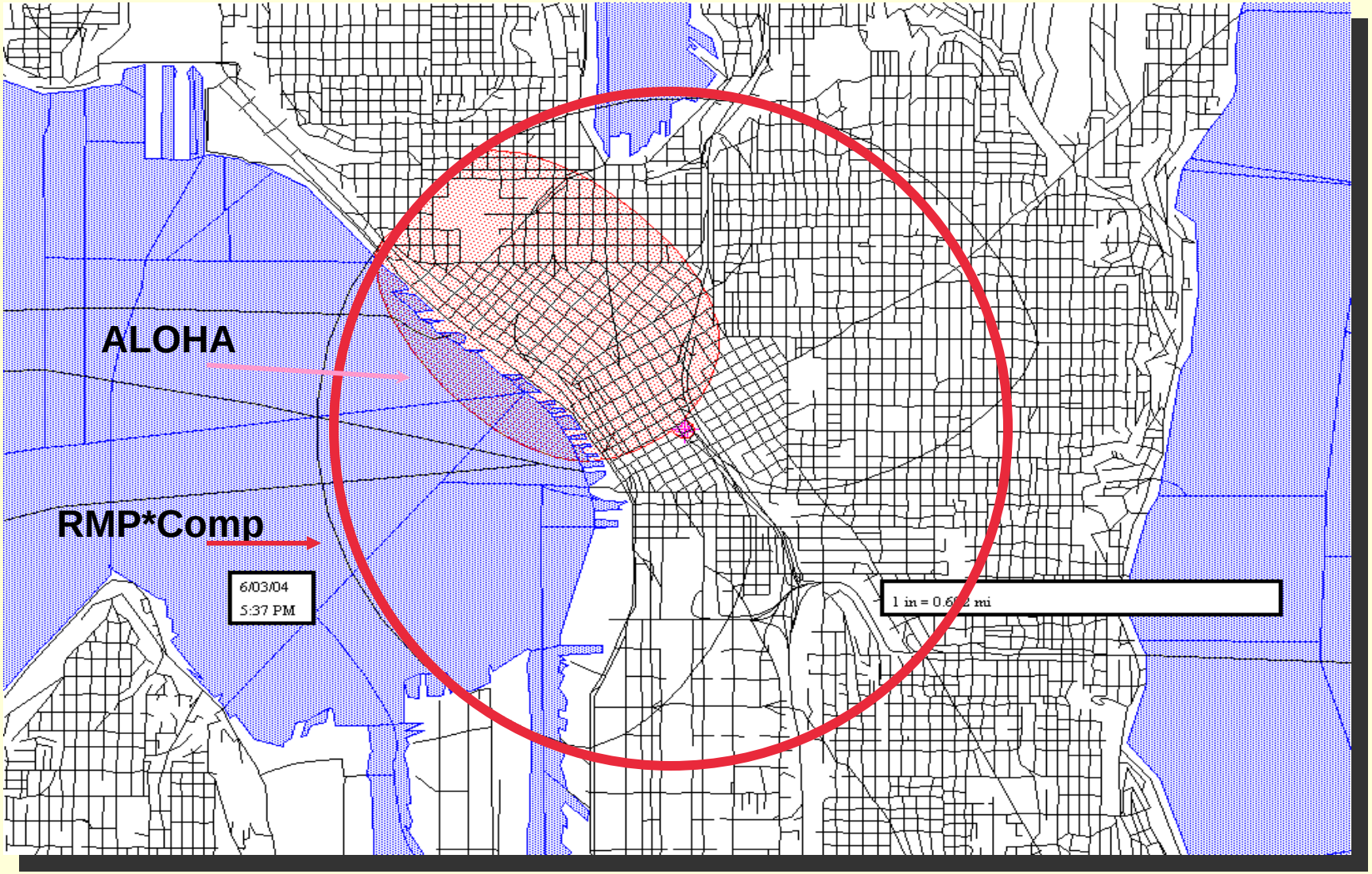
- **Offsite consequence analysis must include:**
  - Toxics
    - Toxic end points
  - Flammables
    - Overpressure, Radiant heat, Concentration – lower flammability limit
  - Must also consider:
    - Wind speed, stability class, ***ambient temperature***, height of release, and topography, Liquid or gas release

OCA Release Calculations

Common Deficiencies

- Determine Distance to Endpoint (DTEP)
  - Air dispersion models
    - ***Based on*** Human Health Impacts within the ***area of a circle*** (of radius DTEP)
  - Common Models
    - RMP*COMP (EPA)
    - ***ALOHA***
    - DEGADIS (TFI)
- Define Off-Site Impacts
  - Public Receptors
    - Residential Population Estimate (Number)
    - Institutions, . . . major commercial, office . . . buildings (Presence)
    - Most recent Census data (LandView/Marplot) or "other updated information"
  - Environment
    - National/State Parks etc.
    - Local U.S.G.S maps and/or Landview

Distance To End Points



Common Deficiencies

- ***Wrong modeling input for endpoint calculations***
  - Incorrect use of Passive Mitigation
  - Incorrect use of “Rural” vs. “Urban” topography
  - Hazard review information not considered for the alternative release scenario
- ***Defining off site impacts on population***
  - Did not use or misused the “circle” map when defining the off-site impacts
- ***Did not use most recent census data or provide “other updated information”***
  - Did not identify environmental receptors within the circle
  - Did not use USGS data to identify environmental receptors
- ***Used old data for the update***
  - Incorrect quantities, physical locations etc.
- ***Did not maintain the documentation for all of the calculations, estimates, etc****.*
  - Dated, detailed documentation

The Most Common Deficiency

- ***Documentation Missing***
  - Worst-case scenario § 68.39(a)
    - Description of the vessel or pipeline and substance selected as worst case, assumptions and parameters used, and the rationale for selection; assumptions shall include use of any administrative controls and any passive mitigation that were assumed to limit the quantity that could be released. Documentation shall include the anticipated effect of the controls and mitigation on the release quantity and rate.
  - Alternative scenario § 68.39(b)

Review and Documentation

Common Deficiencies

- **Offsite consequence analysis**
  - ***review and update*** the offsite consequence analyses ***at least once every 5 years***, or
  - Within 6 months of any process change that could increase or decrease the DTEP 2X

Five-year accident history

Common Deficiencies

- An Accident is Reportable . . . if the release:
  - **Onsite** Deaths, injuries or property damage.
  - [Known] **Offsite** Deaths, injuries, property damage, or environmental damage, evacuations, or sheltering-in-place.
- ***Requires corrections to the RMP within 6 months***. {§ 68.195 *Required Corrections*}
  - Includes data required under §§ 68.168, 68.170(j) [Prgm 2], and 68.175(l) [Prgm 3]

Software Demonstrations

- Models
  - RMP Comp
  - ALOHA
  - DEGADIS
- Population Estimates & Mapping
  - Landview/Marplot