Offsite Consequences Analysis

Overview of hazard assessment for risk management program

Definitions

- **Offsite:** areas beyond property boundary of stationary source, and areas within property boundary to which public has routine and unrestricted access during or outside of business hours
- **Worst-case Release Scenario:** release of largest quantity of regulated substance from vessel or process line failure that results in greatest distance to endpoint
- **Alternative Release Scenario:** scenarios more likely to occur than worst-case scenario and that will reach endpoint offsite, unless no such scenario exists

Required OCA Scenarios

- For <u>each</u> Program 1 process
  - One worst-case scenario
  - No alternative scenarios required

Required OCA Scenarios

- 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 (more common for flammables)
    - **Public receptors:** offsite areas such as residences, schools, office buildings, and parks where members of public could be exposed
  - At least one alternative scenario for each toxic
  - At least one alternative scenario for all flammables

Mitigation Systems

- Activities or equipment designed to contain released substances to minimize exposure
- Passive mitigation
  - Function without human, mechanical, or other energy input
  - Examples: building enclosures, dikes, blast walls
- Active mitigation
  - Need human, mechanical, or other energy input to function
  - Examples: interlocks, shutdown systems, pressure relieving devices, flares, emergency isolation systems, water cannons

Scenario Selection Requirements

- Worst-case
  - Greatest amount held in single vessel or pipe, taking into account administrative controls that limit inventory and passive mitigation
  - Also must consider scenarios involving
    - Smaller quantities at higher process temperature or pressure
    - Proximity to stationary source boundary
  - **Must** be the scenario with greatest offsite distance to endpoint

Scenario Selection Requirements

- Alternative
  - Must reach offsite endpoint, unless no such scenario exists
  - Must be more likely than worst-case scenario
  - Can consider active mitigation
  - Should consider 5-year release history and failure scenarios identified in PHA or hazard review

Process Vs. Worst Case

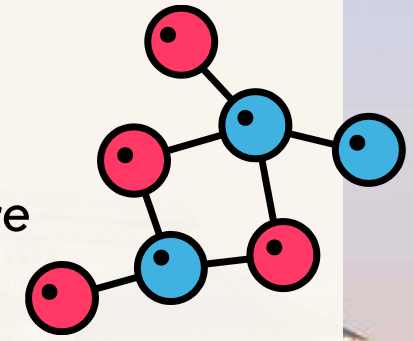
Process vs. Worst Case

Required OCA Endpoints

- Toxic substances
  - Must use those provided in Appendix A of rule
- Flammable substances
  - Explosions: 1 psi overpressure (endpoint required for worst-case scenario)
  - Flash fires: lower flammability limit (LFL)
  - Pool/jet fires and fireballs: 5 kW/m^2 for 40 seconds (or equivalent)

Potential Sources

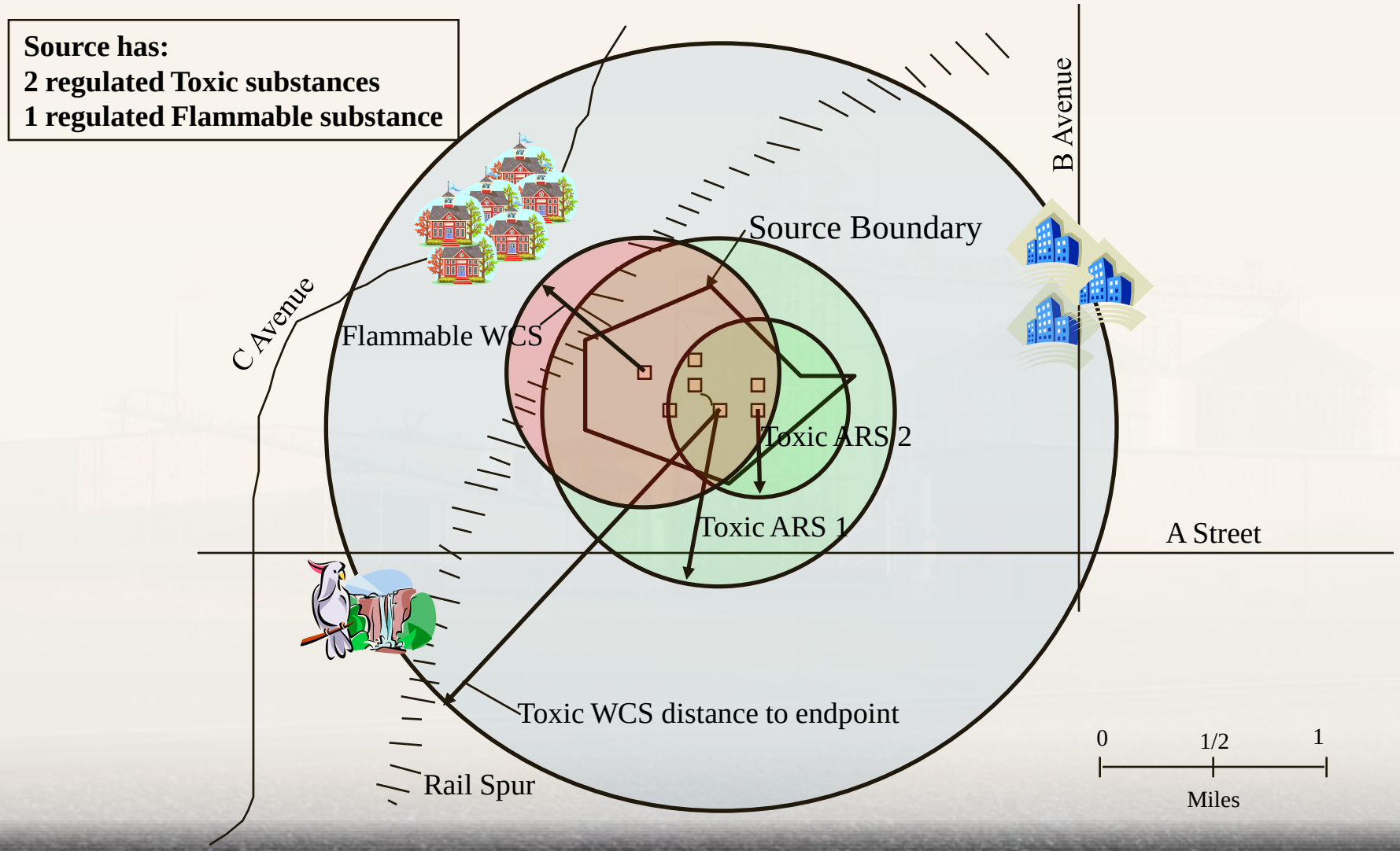
- OCA Guidance
- RMP*Comp™
  - NOAA & EPA developed software program
  - Performs calculations described in *OCA Guidance*
  - Simple generalized calculations
- ALOHA
  - Models key hazards related to chemical releases that result in toxic gas dispersions, fires and/or explosions
  - Greater user control of inputs, flexibility in scenario choice and choice of scenario outputs
  - Truncates endpoint distance



Potential Sources

- Publicly available or proprietary models
  - May account for more factors
  - May provide more accurate estimates
  - May require greater user knowledge and experience
- If using a source other than OCA Guidance or RMP*Comp™, make sure the model inputs follow the specified requirements (i.e., facility-specific meteorological conditions)
- Be able to provide a copy of the model and documentation upon request

Simplified Illustration of Fictional Worst-Case and Alternative Release Scenarios on a Local Map



Offsite Impacts/Receptors

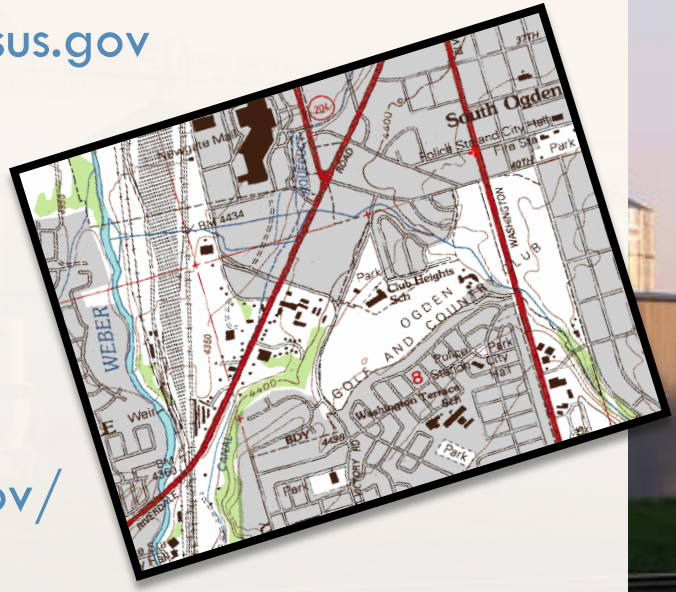
- Residential populations (the public)
  - Based on latest census data or other updated information
- Other public receptors
  - Institutions (schools, hospitals, prisons)
  - Local parks and recreation areas
  - Commercial, office, and industrial buildings

Offsite Impacts/Receptors

- Environmental receptors or natural areas, such as national or state parks, forests, or monuments that can be identified on local USGS maps, including
  - Wildlife preserves
  - Federal and state parks
  - Wilderness areas

Obtaining Receptor Data

- Census
  - Publications of the Bureau of the Census including *County and City Data Book*
  - Bureau of the Census website www.census.gov
- LandView
  - http://www.census.gov/geo/landview
- USGS maps
  - Online ordering site http://store.usgs.gov/
  - Additional info http://ask.usgs.gov
  - 1-800-USA-MAPS



Review and Update

- Reevaluate if the worst-case vessel conditions change
  - If the distance to endpoint increases/decreases by a factor of 2 or more, update the RMP within 6 months
- Review and update all OCA elements every 5 years
  - Ensure process conditions have not changed
  - Ensure public and environmental receptors have not changed
  - Update population numbers based on most recent census
- Make sure to document that the review occurred
  - If no changes, at minimum have a signed "memo to file" indicating what information was reviewed

Common Errors and "Red Flags"

- Wrong release quantity
- Inconsistencies between release quantity and endpoint distance (e.g., very large release quantity with very short endpoint distance)
- No documentation corresponding to information provided in RMP
- No documentation that information is reviewed every five years
- Worst Case Vessel
  - Rationale for selection not documented
  - Wrong vessel identified

Questions?