
Considering the Inhalation Pathway for Use of Spent Foundry Sand in Soil Blending

Beneficial Use of Industrial Materials Summit
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Purpose

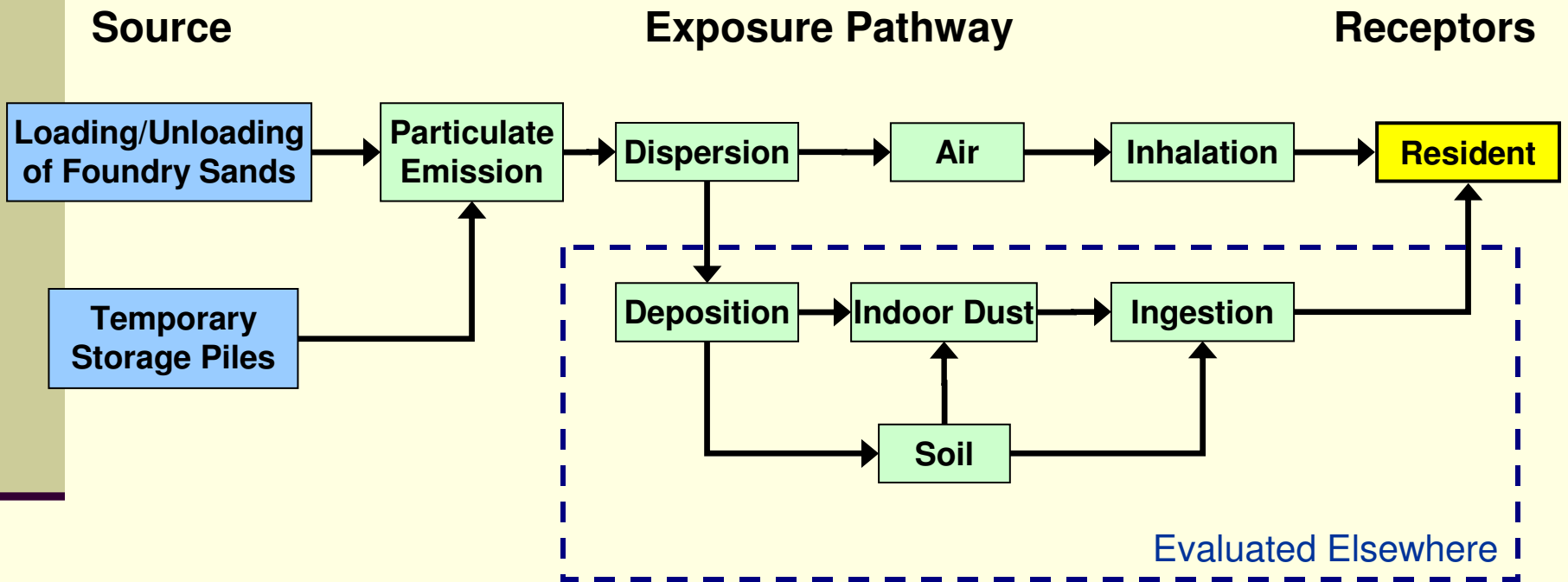
- The purpose of this presentation is to discuss the methodology used to consider the inhalation pathway for the use of spent foundry sand in blended soil for the draft Spent Foundry Sand Guidelines.

Planning and Scoping

- The purpose of the guidelines is to evaluate and consider the potential for release of contaminants as a result of the use of spent foundry sand in soil-based applications.
- Considered potential uses for spent foundry sand in soil-based applications, including
 - Bulking agent in blended (manufactured) soil
 - Soil blending operations
 - Use of blended soil on residential lands (gardening and landscaping)
 - Use of blended soil on commercial properties (landscaping for commercial buildings)

Planning and Scoping

- Identified potential release pathways for the likely use scenarios
- The most significant potential exposure to non-workers, due to inhalation, was most likely to occur in the area around the soil-blending site
 - Foundry sand could be stored in open piles, without cover, leading to windblown emissions
 - Additionally, the act of blending the soil is likely to stir up the foundry sand into the air



Methodology

- Foundry sand pile and soil blending site based on an actual site in Ohio
- Calculated emission factors
 - Loading and unloading sand from storage pile
 - *Compilation of Air Pollutant Emission Factors – “Aggregate Handling And Storage Piles”*
 - Windblown emissions
 - *Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants – “Continuous Fugitive/Windblown Dust Emissions”*
- Used SCREEN3 to model air dispersion of foundry sand due to soil blending operations

Methodology

- Model output was an estimate of the concentration of foundry sand in the air 500 m (~1/3 mile) from the center of the foundry sand storage pile.
- We used inhalation health benchmarks, such as the RfC from IRIS, to calculate conservative screening concentrations (mg/kg) that would be protective of human health based on the exposure route of inhalation.

$$\text{Screening conc. (mg/kg)} = \frac{\text{Health benchmark (mg/m}^3\text{)}}{\text{Estimated conc. foundry sand in air (kg/m}^3\text{)}}$$

Conservative Aspects of Assessment

- High end assumptions for emission factor
 - 0 days per year with > 1 inch of precip
 - Mean wind speed 12 mph
 - Wind speed exceeds 12 mph 20% of time
 - Low moisture content
- Conservative aspects SCREEN3 modeling
 - Model is based on *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources*
 - Rural surrounding area
 - Receptor located in direction of max wind speed
- RfCs and other health benchmarks are based on an exposure period of 24 hr/d, 365 d/yr

Conservative Aspects of Assessment

- By including these conservative aspects in the assessment, we can reasonably assume that the high-end risk associated with the use of foundry sand in blended soils was considered for the inhalation pathway

Contact Information

- Cathy Davis
USEPA, Office of Solid Waste
703-308-7271
davis.catherinem@epa.gov