

## Air Modeling: Tips & Tricks

Air Technical Session (May 2, 2023)

> Presented by: Stephanie Taylor



#### 30<sup>th</sup> Annual Environmental Technical Conference

### Presentation Overview

- Background
- Why We Model
- Tips & Tricks
- Real Project Examples





# What is Air Dispersion Modeling?

- Simulation of how air pollution/odor released from a source impacts air quality
- Estimates peak and average pollutant concentrations
- Results are compared to regulatory thresholds

# Model Inputs

#### **Facility Information**

- Property Boundary
- Emission Sources
  - Stack/Release Parameters
  - Emission Rates
- On-Site Buildings

#### Model results are only as good as the data that goes into it

#### **Environmental Information**

- Meteorological Data
- Terrain Data
- Receptor Grid
- Interactive/Off-Site Sources





## Types of Analysis

#### National Ambient Air Quality Standards (NAAQS)

Prevention of Significant Deterioration (PSD) Increments

Air Toxics/Health Risk Assessment (HRA)

State Air Quality Standards

**Odor Assessment** 

We model to show compliance with air quality rules and regulations



#### When do We Need to Model?

- New construction
- Modification of an existing source
- Compliance Agreement
- Existing Source pulled in from someone else's modeling results
  - Your facility shows a significant impact as an interactive source in another facility's model
- Feasibility Study/Odor Evaluation

# Tips & Tricks

What do you do when the model doesn't pass?

#### What Impacts the Model?

Pollutants/Emission Rates

Distance

Meteorology

**Source Characteristics** 

How do we modify these to get a passing model?

#### Pollutants/Emission Rates

- Some pollutants are more difficult than others
  - Lower standards/thresholds
  - Different chemistry
  - Smaller averaging times



- Is there a way to reduce your emission rate?
  - Add a control device
  - Take a limit on how much material is used/processed

### Distance

- How close is the emission source to the property boundary/ambient air?
- New Sources:
  - Perform modeling to determine the best placement for new equipment
- Existing Sources:
  - More difficult to adjust permanent structures
  - Is it possible to move the location?

The closer to the property boundary, the more difficult passing the model can be

# Meteorology

- Calm/Stable Winds = Less Dispersion
  - Typically occur during late night and early morning
- When does the source need to operate?
  - Take specific hour limits to eliminate or reduce operation during calm/stable winds
- Seasonal Limitations
  - Is it an operation that operates more during a particular time of year?
  - Take limits during the off-season

## Source Characteristics

- Stack Height:
  - The taller the stack, the better dispersion
- Stack Diameter:
  - Smaller stack diameter results in faster flow
- Flow Rate:
  - •Get a bigger fan/blower
  - Faster flow = better dispersion
- Orientation:
  - Vertical, non-obstructed stack is best

Make sure to double check the other stack parameters in AERMOD if you change one!

# Real Project Examples

#### Fumigation Operation (New Construction)



## Grain Elevator (Existing Facility)



#### Animal Feed Mill (Modification)



### Landfill (Existing Facility)

Large Property but No Physical Barrier to Keep Public Out

Large Particulate Matter Sources Near Ambient Air Boundary Installed Barbwire Fence to Create Physical Boundary

#### Questions?

Thank you!

Stephanie Taylor SCS Engineers staylor@scsengineers.com



