# Montgomery County Resource Recovery Facility AERMOD Validation Study

March 9, 2021

Susan Barnes – Managing Consultant

Trinity Consultants

trinityconsultants.com

# Trinity Consultants

Started in 1974 by one consultant in Dallas, Texas serving clients' air quality regulatory compliance needs.

For more than 45 years, Trinity Consultants has performed air dispersion modeling for industrial facilities, utilities, and government agencies. Trinity is recognized nationally and internationally for our skills and advanced modeling software/ infrastructure, enabling Trinity to formulate and conduct dispersion modeling studies for numerous applications.

Trinity Consultants

# Background and Project Goals

- The County conducts regular environmental studies including a 2015 air dispersion modeling analysis of the MCRRF
- Between May 2018 and April 2019, Montgomery County collected $SO_2$ ambient monitoring from 3 monitoring stations near the MCRFF
- Trinity's project was to model $SO_2$ emissions from the MCRRF and Genon facilities and compare results to gathered ambient monitoring data
  - Goal – To validate the AERMOD model

Trinity Consultants

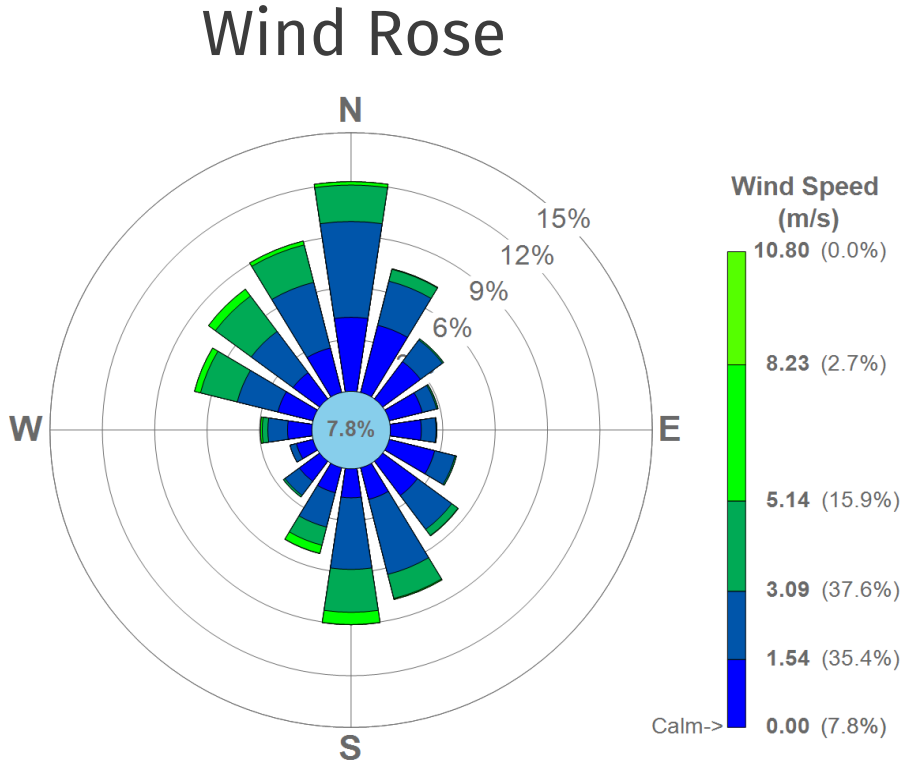
# Modeling Approach and Input

- EPA's AERMOD
- Building and stack parameters from MCRRF and Genon facilities
  - Hourly measured data between 5/1/2018 and 4/30/2019:
    - $SO_2$ emissions
    - Stack temperature
    - Stack flowrates
- Meteorological data from same period

Trinity Consultants

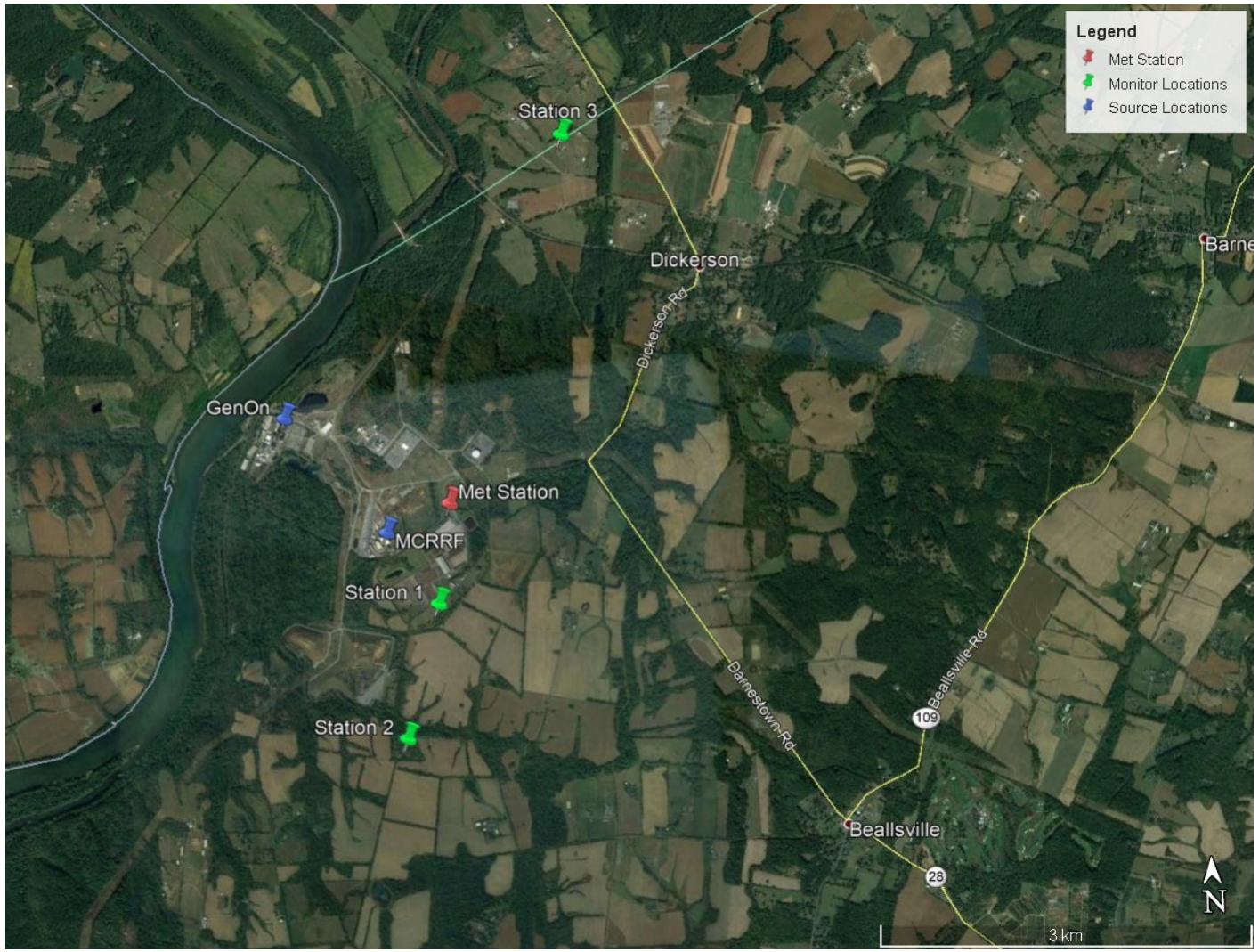
# Meteorological data

- Hourly meteorological data obtained from weather station included:
  - Wind speed and direction
  - Temperature
  - Vertical temperature difference
  - Dew point
  - Relative humidity
  - Solar radiation
  - Rainfall

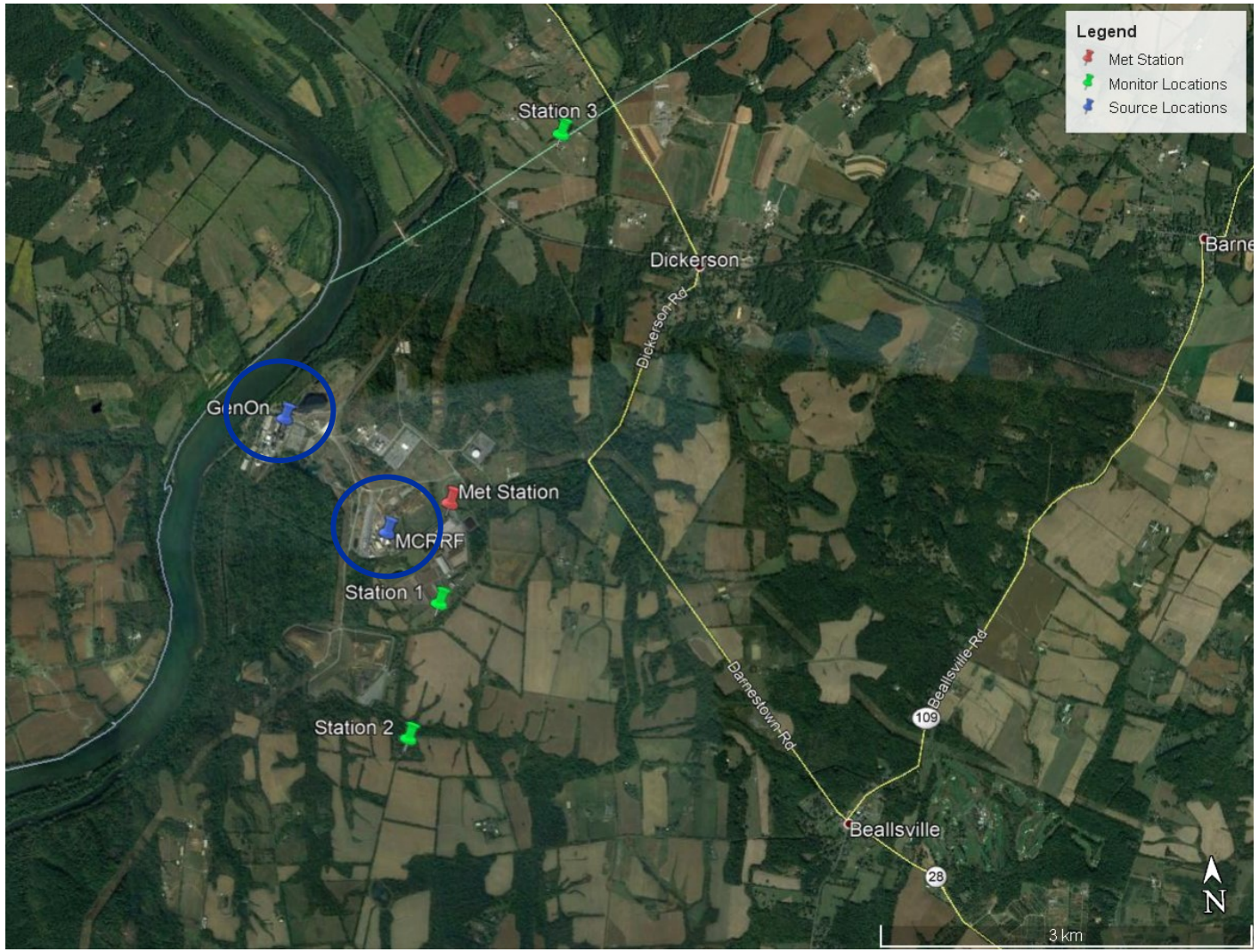



Trinity Consultants

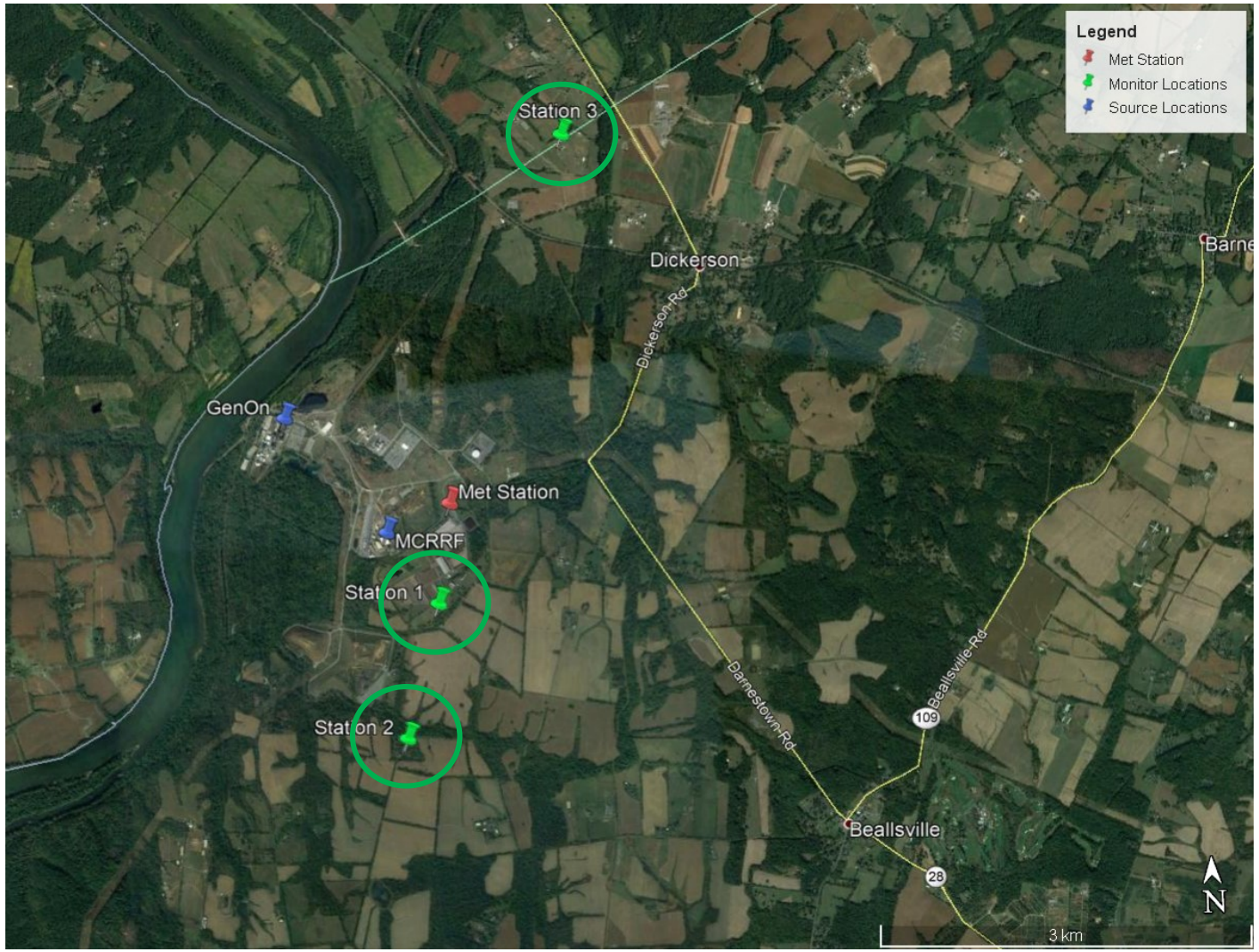
# Locations of Sources and Monitors



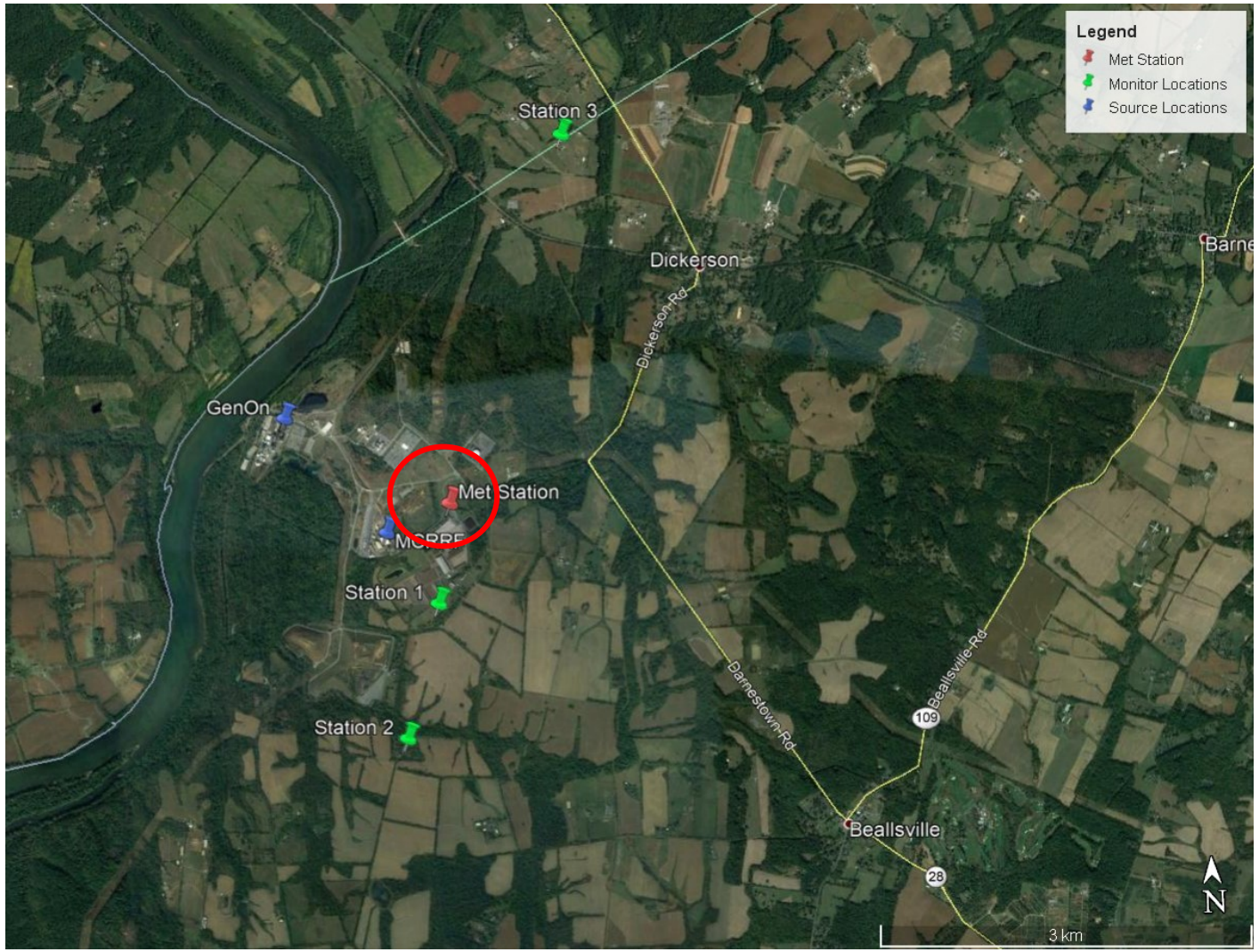
# Locations of Sources and Monitors



# Locations of Sources and Monitors



# Locations of Sources and Monitors



# Model to Monitor Concentration Comparison

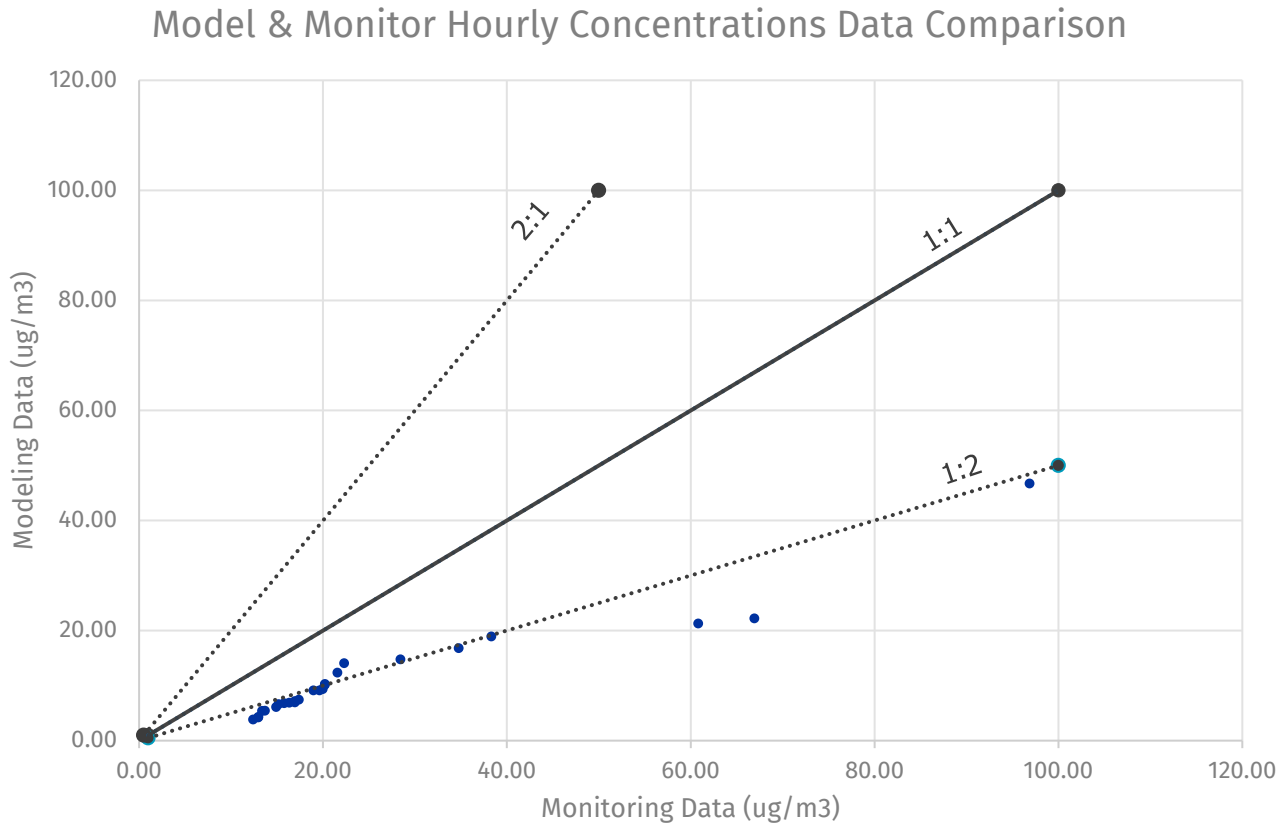
*Table of 25 Highest Values*

| Rank | 1-hour Maximum Monitor Concentration ($ug/m^3$) | 1-hour Maximum Modeled Concentration ($ug/m^3$) | Difference (%) |
|---|---|---|---|
| 1 | 96.86 | 46.71 | -69.9% |
| 2 | 66.93 | 22.22 | -100.3% |
| 3 | 60.83 | 21.29 | -96.3% |
| 4 | 38.32 | 18.94 | -67.7% |
| 5 | 34.77 | 16.80 | -69.7% |
| 6 | 28.44 | 14.77 | -63.2% |
| 7 | 22.32 | 14.06 | -45.4% |
| 8 | 21.58 | 12.37 | -54.3% |
| 9 | 20.22 | 10.29 | -65.1% |
| 10 | 20.21 | 10.12 | -66.5% |
| 11 | 19.99 | 9.37 | -72.3% |
| 12 | 19.63 | 9.14 | -73.0% |
| 13 | 18.97 | 9.13 | -70.0% |
| 14 | 17.38 | 7.45 | -80.0% |
| 15 | 16.95 | 7.17 | -81.1% |
| 16 | 16.95 | 6.93 | -83.9% |
| 17 | 16.34 | 6.89 | -81.3% |
| 18 | 15.78 | 6.80 | -79.5% |
| 19 | 15.18 | 6.61 | -78.6% |
| 20 | 14.92 | 6.10 | -83.9% |
| 21 | 13.69 | 5.45 | -86.2% |
| 22 | 13.39 | 5.41 | -84.9% |
| 23 | 12.98 | 4.30 | -100.5% |
| 24 | 12.96 | 4.22 | -101.7% |
| 25 | 12.41 | 3.83 | -105.7% |

Trinity Consultants

# Model to Monitor Concentration Comparison

*Plot of 25 Highest Values*



# Background Concentrations

- Difference between modeled and monitored concentration due to other $SO_2$ sources
  - Smaller industrial sources, cars, $SO_2$ transported from other regions
- To allow true comparison between modeling and monitoring, background concentrations were added to modeling results
  - Used County monitoring data, adjusted for wind directions to avoid double-counting

Trinity Consultants

# Background Concentration Exclusion Zone

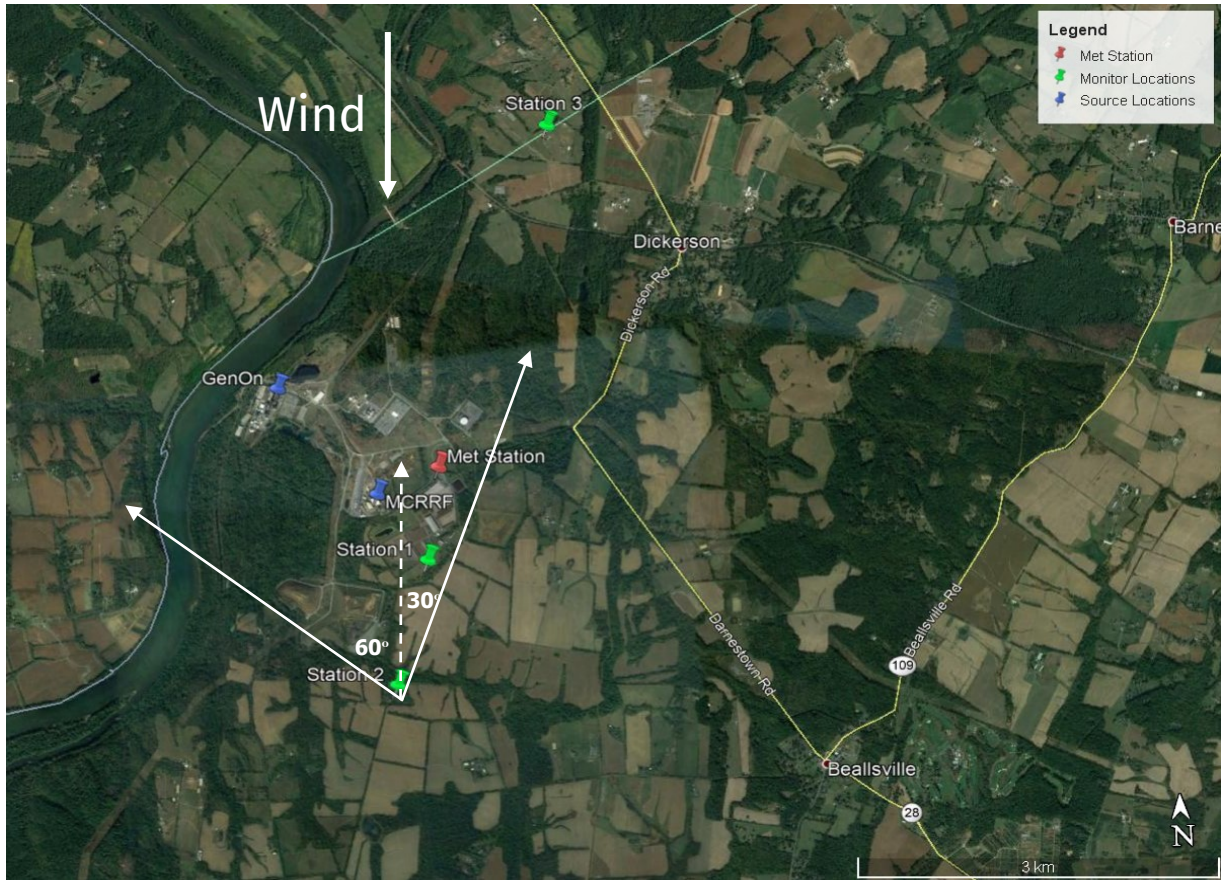
*Monitoring Station 2*

Representation of Exclusion Zone for Monitoring Station 2

# Background Concentration Exclusion Zone

*Monitoring Station 2*

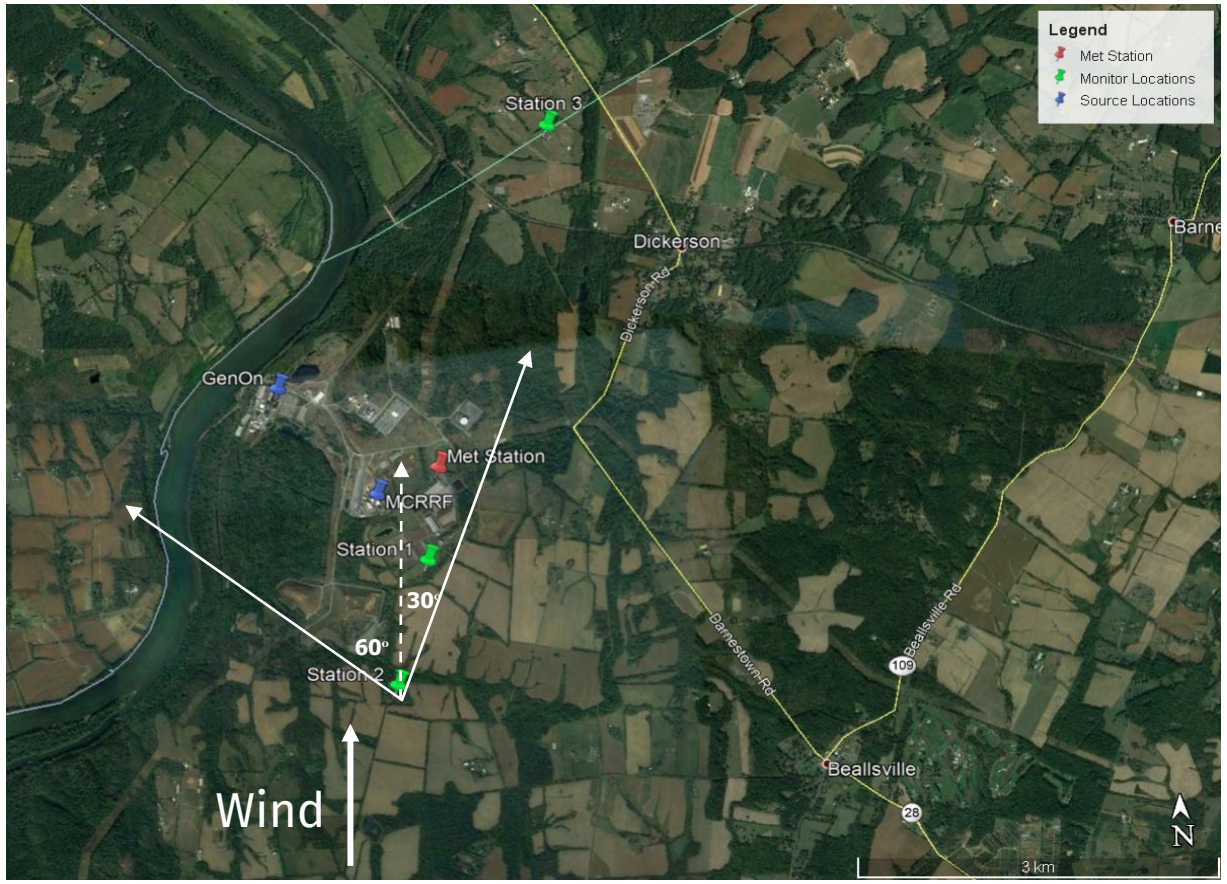
Representation of Exclusion Zone for Monitoring Station 2



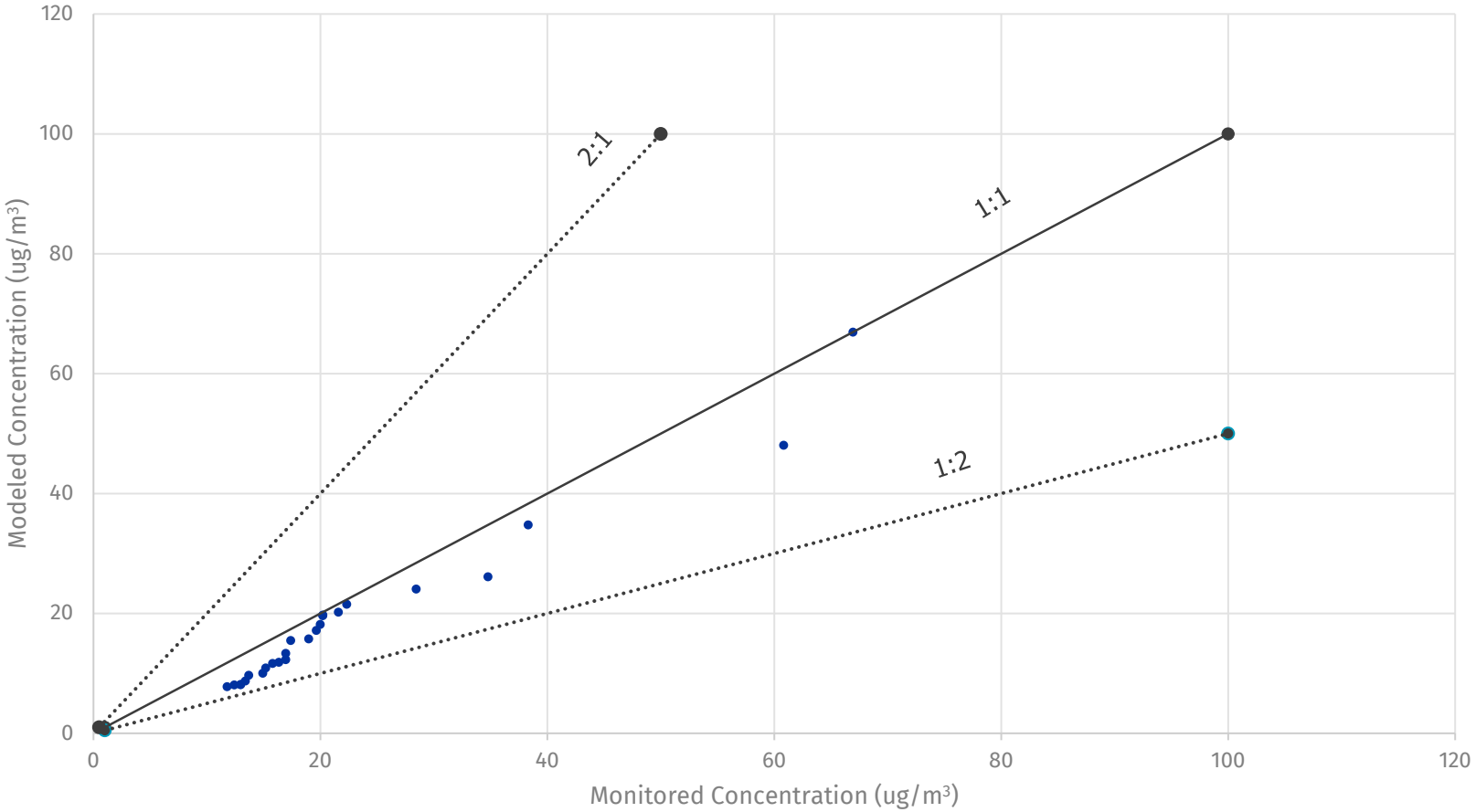
# Background Concentration Exclusion Zone

*Monitoring Station 2*

Representation of Exclusion Zone for Monitoring Station 2

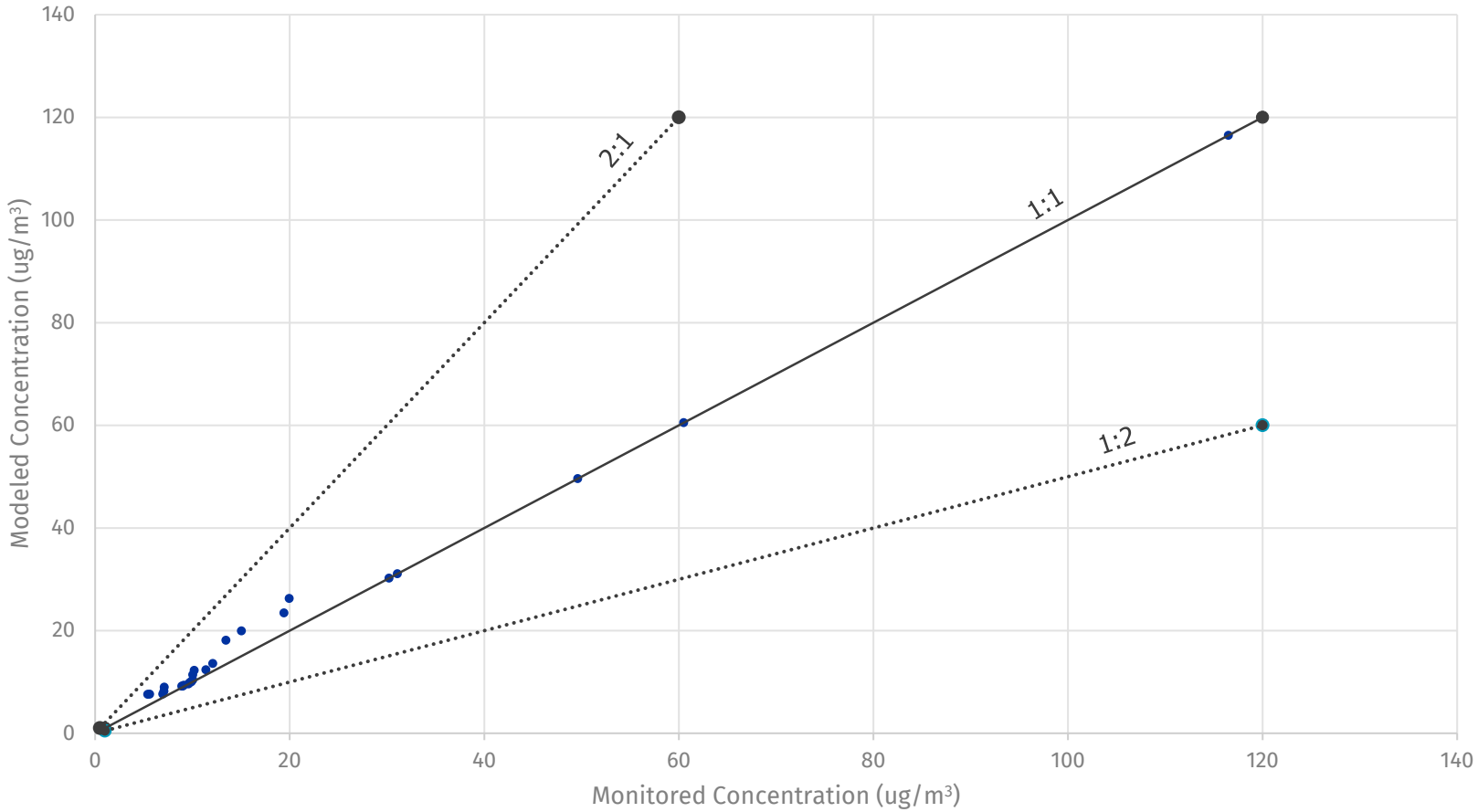


# Station 1 Results Comparison with Background



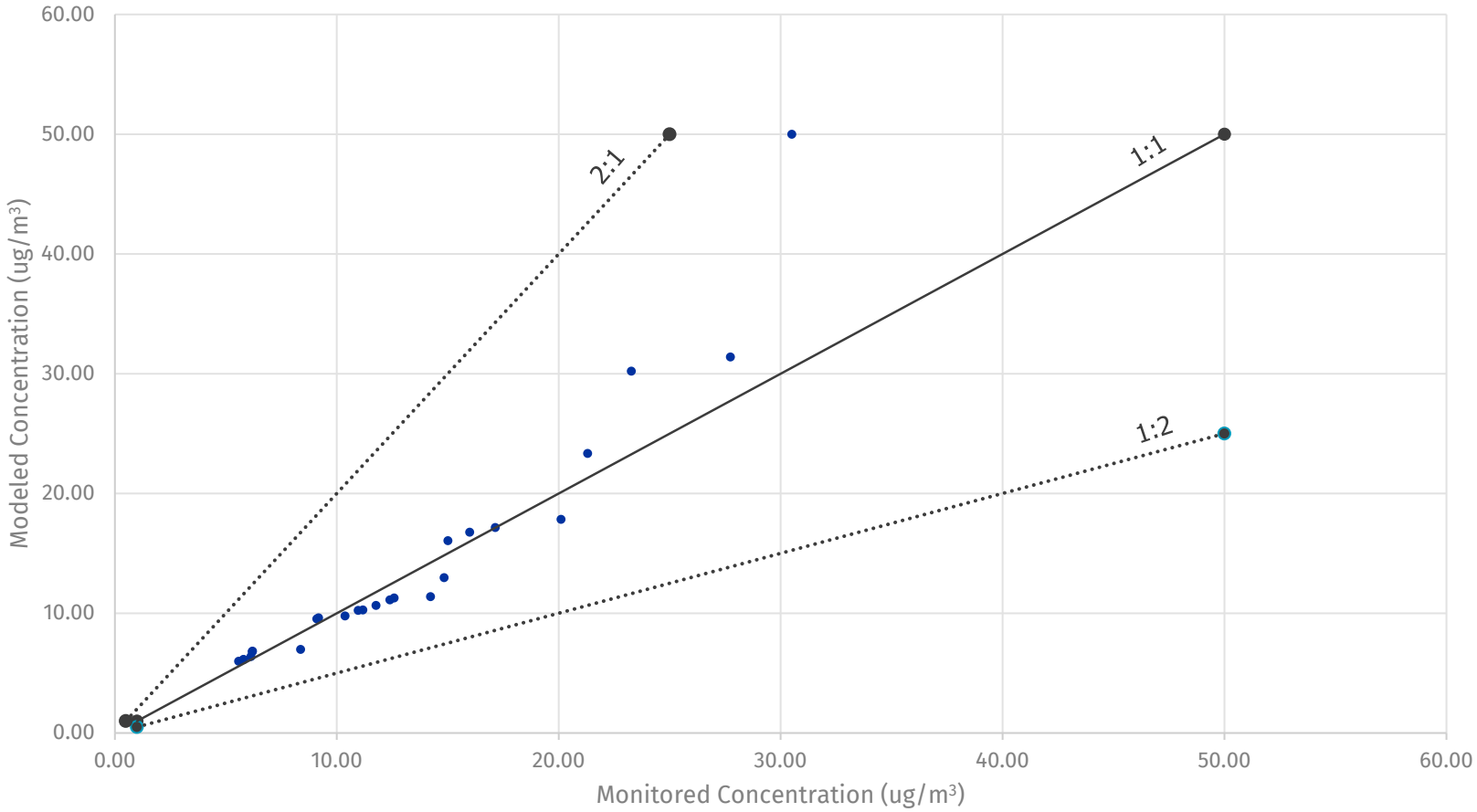

Trinity Consultants

# Station 2 Results Comparison with Background




Trinity Consultants

# Station 3 Results Comparison with Background




Trinity Consultants

# Conclusion

- Strong correlation between AERMOD and monitor concentrations was achieved
- AERMOD is validated as a tool for determining expected ambient air concentrations

Trinity Consultants

# Questions?