

# Source Impact Analysis: Class 1 PSD Increment for $PM_{2.5}$

Thursday, October 3, 2019  
Final MERPs Guidance Webinar

# Applying the two-level assessment to an Example Source

## First Level Assessment

- ▶ Primary impacts at 50 km estimated using OCD.
- ▶ Secondary impacts at 50 km using representative MERPs modeling.

## Second Level Assessment

- ▶ Primary impacts at 300 km estimated using illustrative information from EPA's hypothetical source modeling.
- ▶ Secondary impacts at 300 km using representative MERPs modeling.

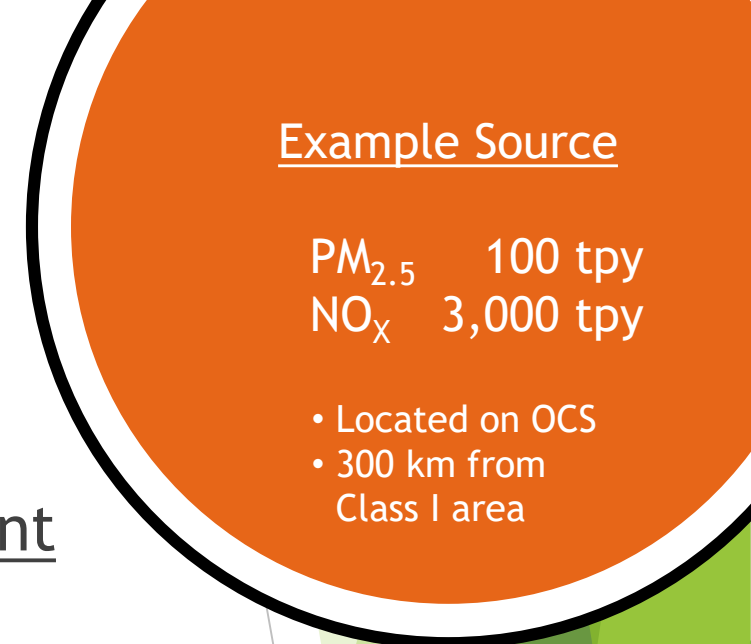
### Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy

- Located on OCS\*
- 300 km from Class I area

\* Unlike permitting a stationary source on land, OCS permitting regulations require that for the purpose of determining potential emissions, construction-based emissions as well as emissions from vessels servicing or associated with the OCS source when traveling within 25 miles en route to or from any part of the OCS source are considered direct emissions from the source.

# Applying the two-level assessment to an **Example Source**



## First Level Assessment

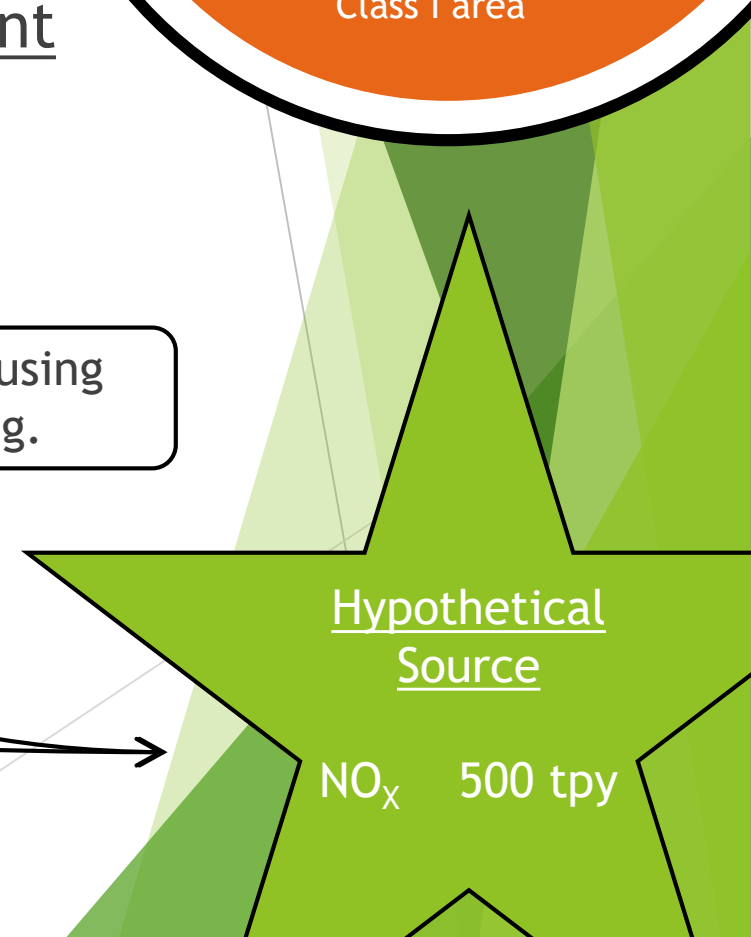
- ▶ Primary impacts at 50 km estimated using OCD.

- ▶ Secondary impacts at 50 km using representative MERPs modeling.

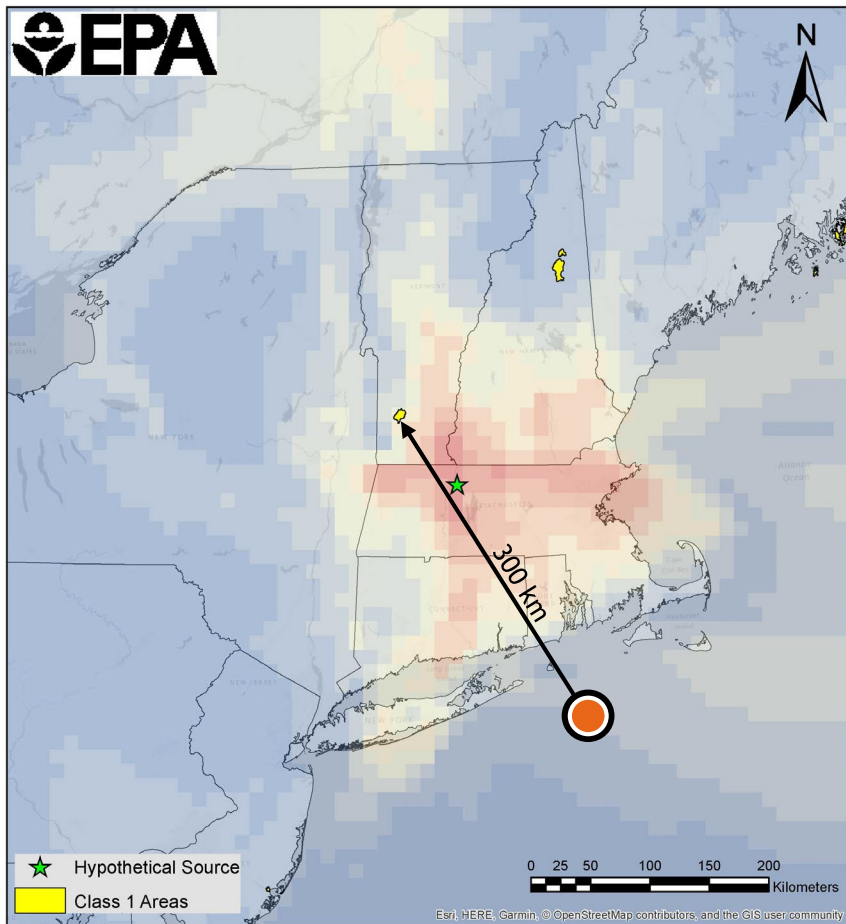
## Second Level Assessment

- ▶ Primary impacts at 300 km estimated using illustrative information from EPA's hypothetical source modeling.

- ▶ Secondary impacts at 300 km using representative MERPs modeling.



# Applying the two-level assessment to the Example Source



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4

## Example Source

|                   |           |
|-------------------|-----------|
| PM <sub>2.5</sub> | 100 tpy   |
| NO <sub>x</sub>   | 3,000 tpy |

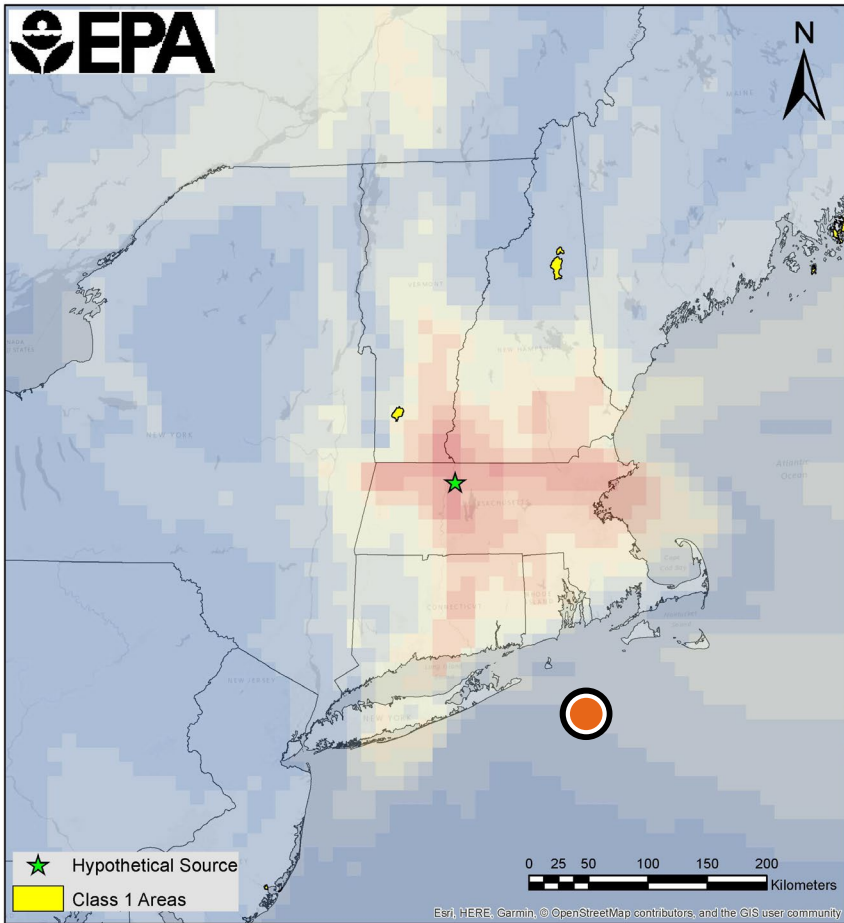
## Hypothetical Source

NO<sub>x</sub> 500 tpy

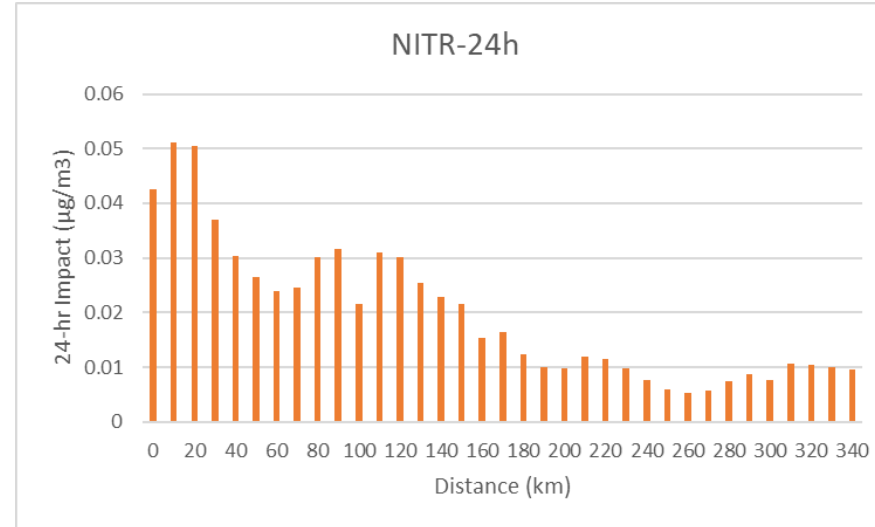
# Applying the two-level assessment to the Example Source

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by distance  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
level release, hypothetical source 4

| Impact    | Concentration (µg/m³) |
|-----------|-----------------------|
| Primary   |                       |
| Secondary |                       |
| Total     |                       |

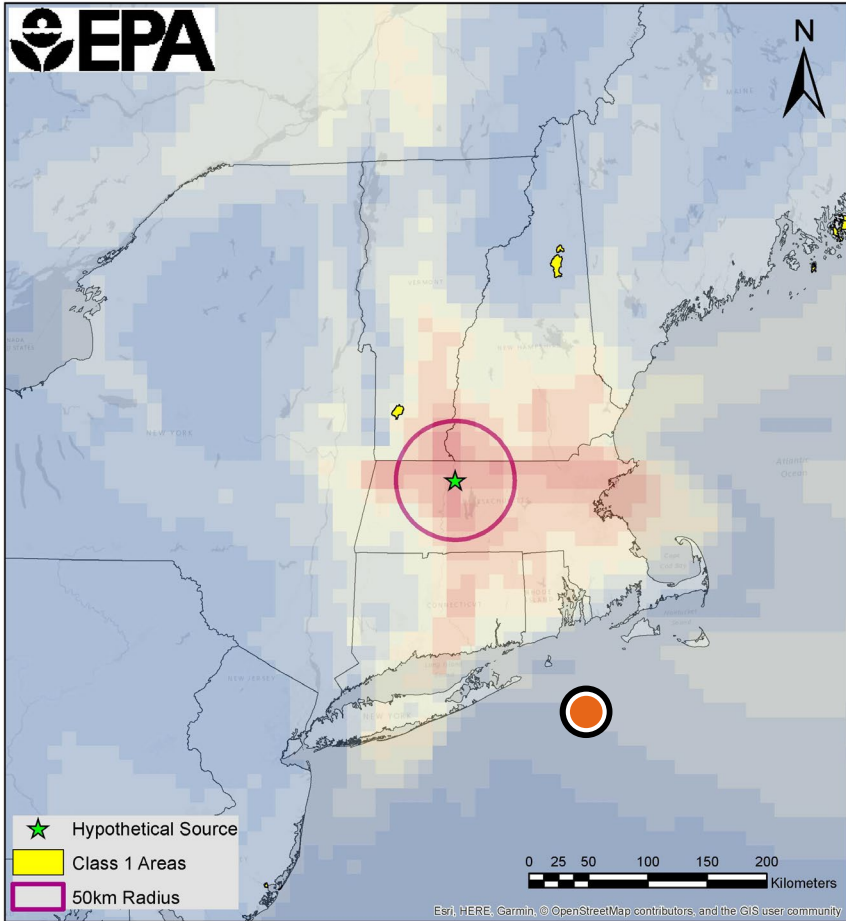
Hypothetical Source

NO<sub>x</sub> 500 tpy

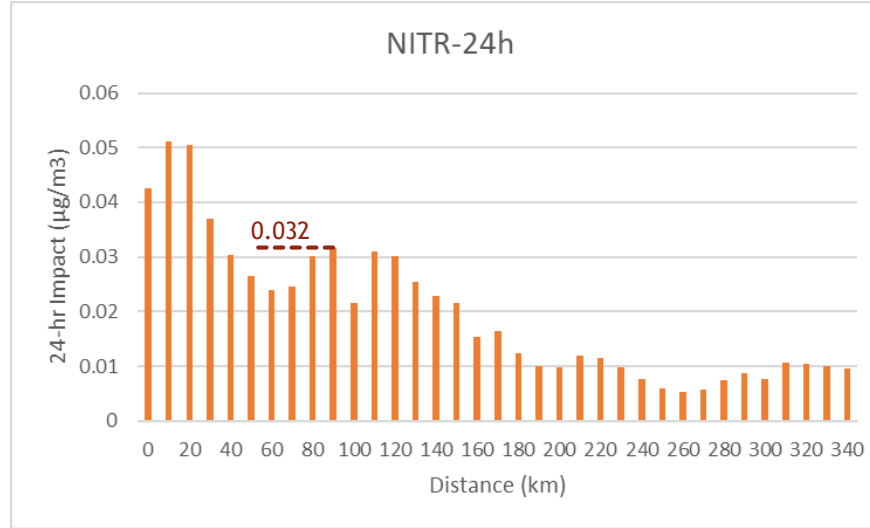
# Example Source: First-Level Assessment - Secondary

**Example Source**

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by distance  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
level release, hypothetical source 4

| Impact    | Concentration (µg/m <sup>3</sup> ) |
|-----------|------------------------------------|
| Primary   |                                    |
| Secondary | 0.192                              |
| Total     |                                    |

$$0.032 \times 3000 / 500$$

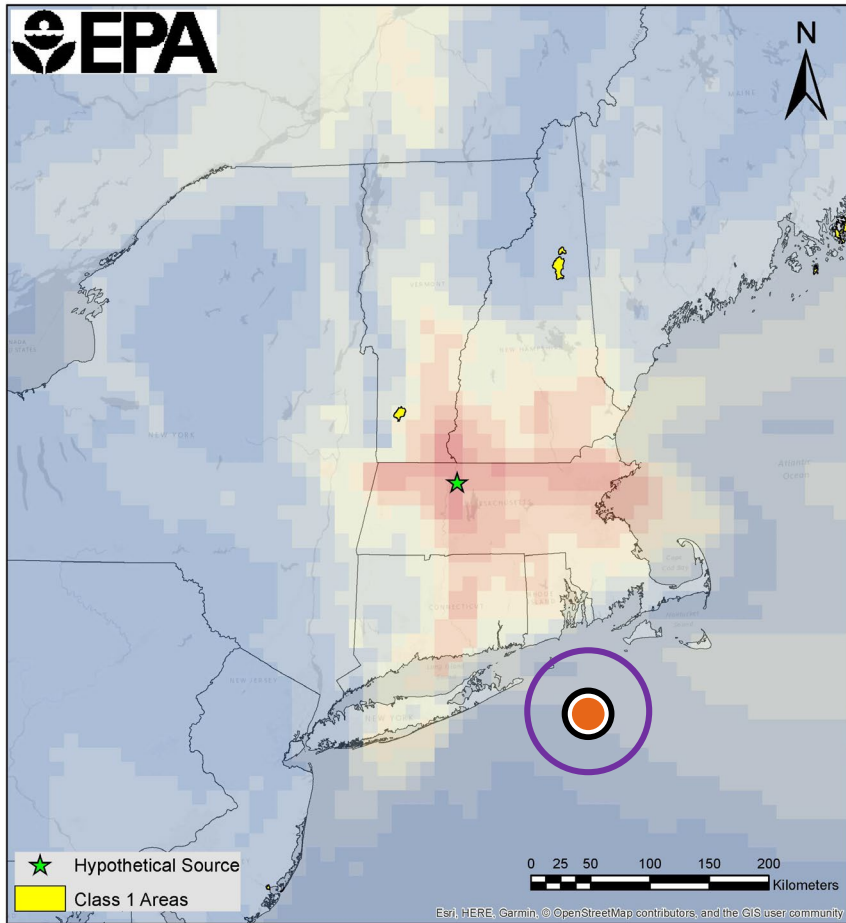
Hypothetical Source

NO<sub>x</sub> 500 tpy

# Example Source: First-Level Assessment - Primary

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4

| Impact    | Concentration (µg/m <sup>3</sup> ) |
|-----------|------------------------------------|
| Primary   | 0.20                               |
| Secondary | 0.192                              |
| Total     |                                    |

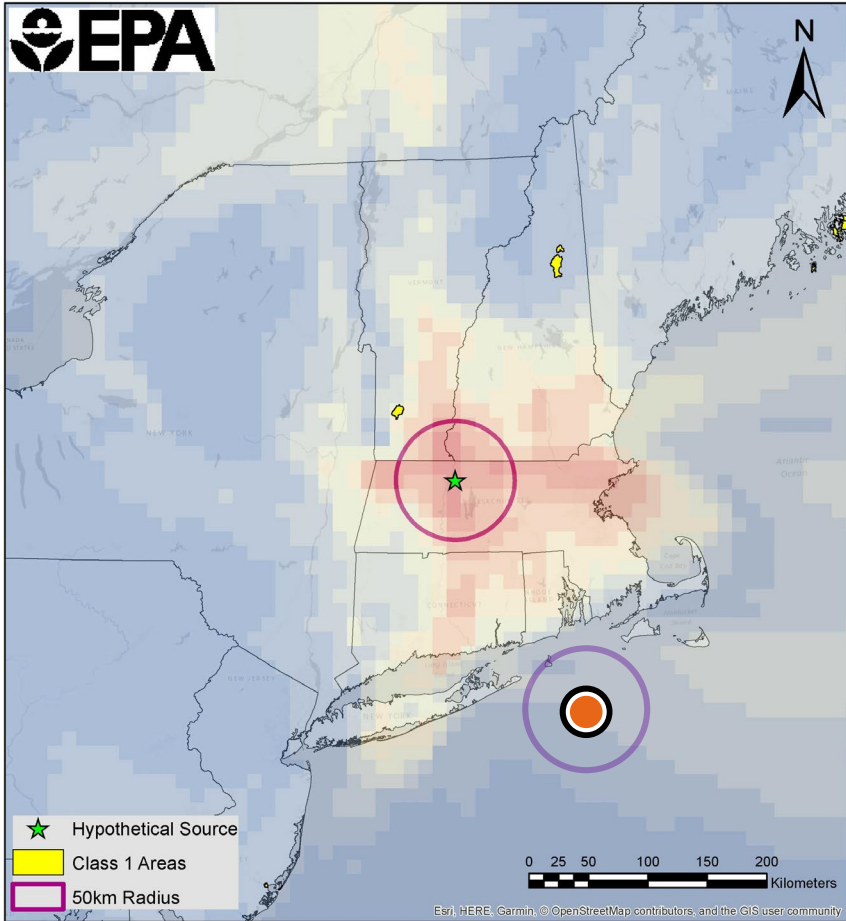
from OCD



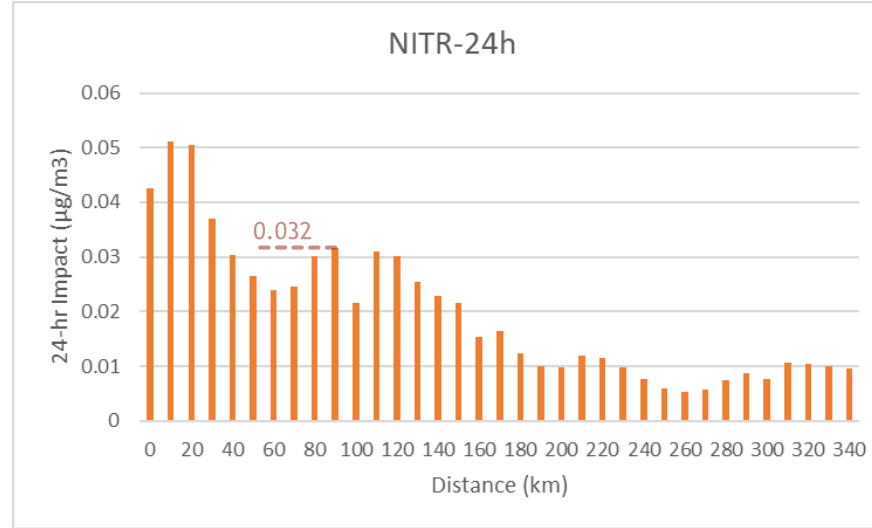
# Example Source: First-Level Assessment - Total

**Example Source**

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by distance  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
level release, hypothetical source 4

| Impact       | Concentration ( $\mu\text{g}/\text{m}^3$ ) |
|--------------|--|
| Primary      | 0.20                                       |
| Secondary    | 0.192                                      |
| <b>Total</b> | <b>0.392</b>                               |

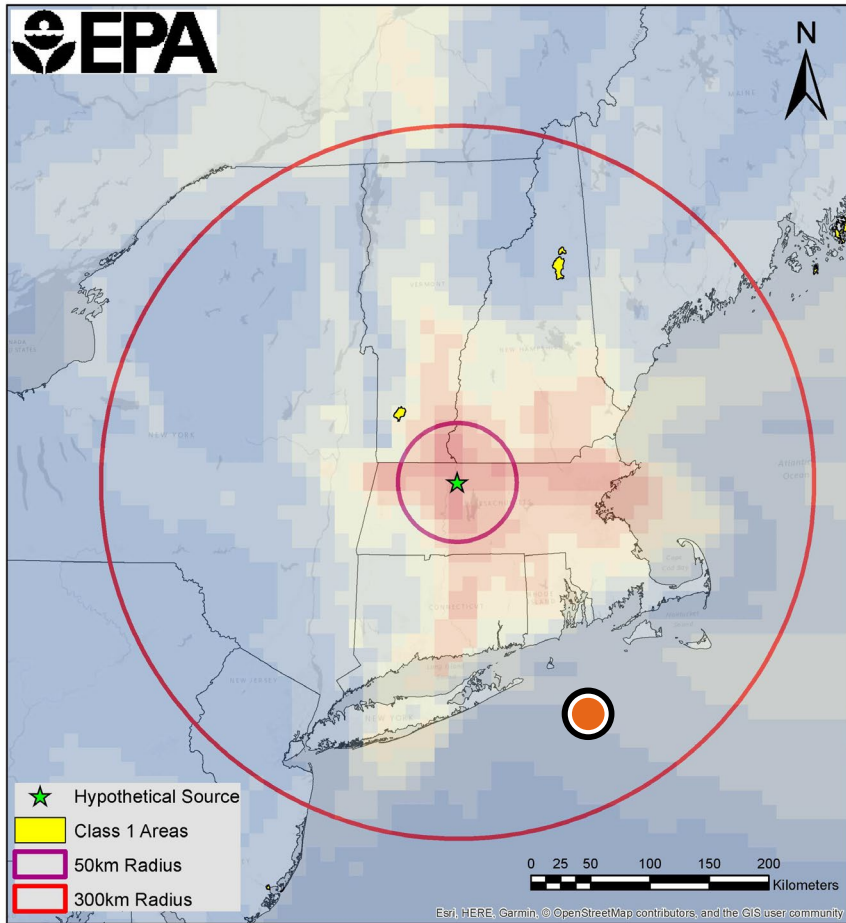
> 0.27  $\mu\text{g}/\text{m}^3$



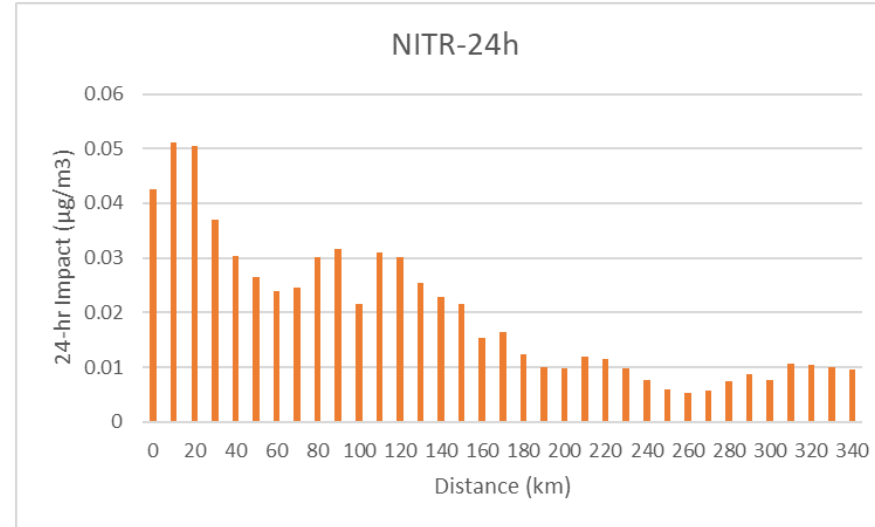
# Example Source: Second-Level Assessment

**Example Source**

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4



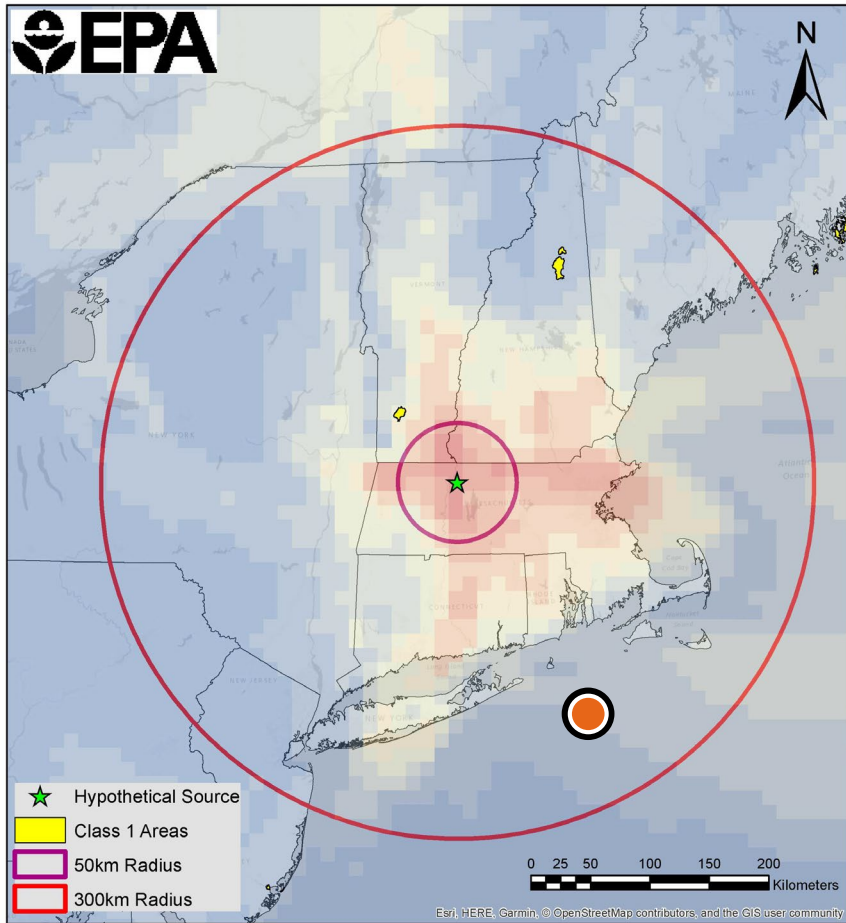
Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by distance  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
level release, hypothetical source 4

| Impact    | Concentration (µg/m³) |
|-----------|-----------------------|
| Primary   |                       |
| Secondary |                       |
| Total     |                       |

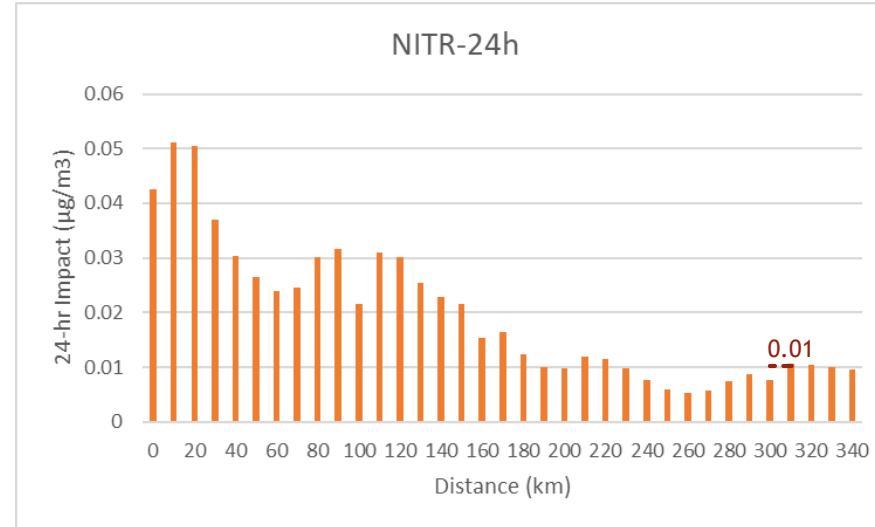
# Example Source: Second-Level Assessment - Secondary

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by distance  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
level release, hypothetical source 4

| Impact    | Concentration (µg/m³) |
|-----------|-----------------------|
| Primary   |                       |
| Secondary | 0.06                  |
| Total     |                       |

$0.01 \times 3000/500$

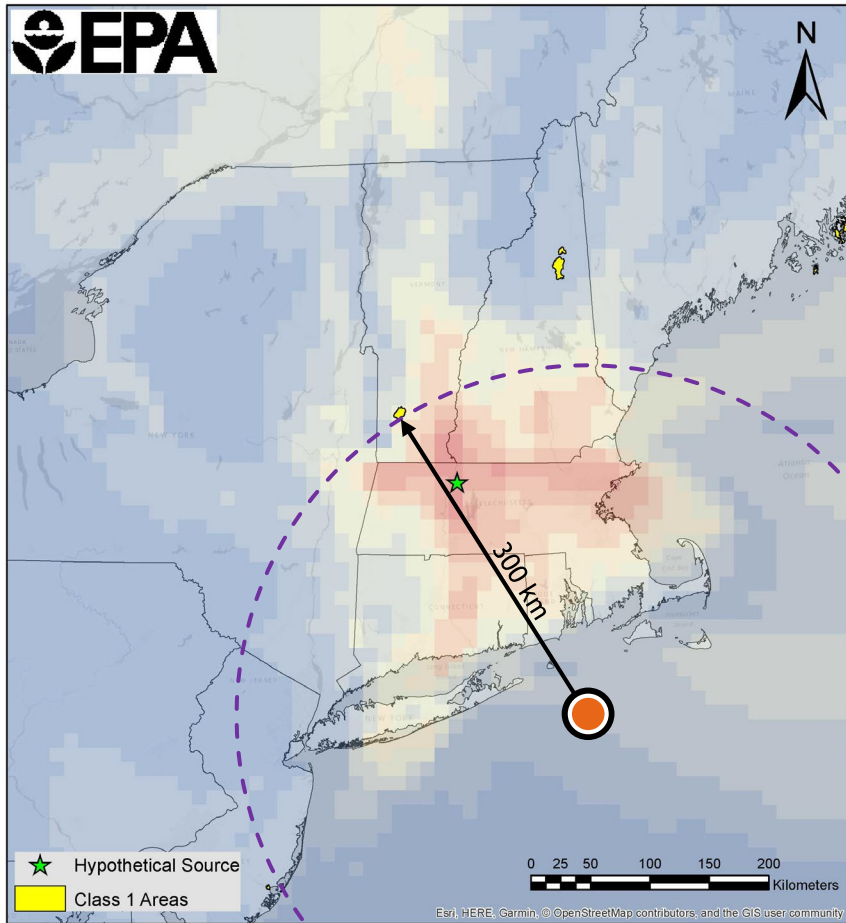
Hypothetical Source

NO<sub>x</sub> 500 tpy

# Example Source: Second-Level Assessment - Primary

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
maximum daily nitrate concentration, by location  
Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
low-level release, hypothetical source 4

| Impact    | Concentration (µg/m <sup>3</sup> ) |
|-----------|------------------------------------|
| Primary   | ?                                  |
| Secondary | 0.06                               |
| Total     |                                    |

# Example Source: Second-Level Assessment - Primary

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy

**Table 4-2.** Maximum daily average and maximum annual average primary PM<sub>2.5</sub> impacts at 100, 200, and 300 km from modeled hypothetical source.

| Emission Rate (tpy) | Distance from source (km) | Highest Daily Average                           | Highest Daily Average                                | Highest Annual Average                          | Highest Annual Average                               |
|---------------------|---------------------------|---|--|---|--|
|                     |                           | Concentration (µg/m <sup>3</sup> ) - tall stack | Concentration (µg/m <sup>3</sup> ) - surface release | Concentration (µg/m <sup>3</sup> ) - tall stack | Concentration (µg/m <sup>3</sup> ) - surface release |
| 100                 | 300                       | 0.0117  | 0.0123   | 0.0008  | 0.0009   |
| 100                 | 200                       | 0.0223  | 0.0212   | 0.0016  | 0.0015   |
| 100                 | 100                       | 0.0537  | 0.0445   | 0.0070  | 0.0049   |
| 150                 | 300                       | 0.0180  | 0.0184   | 0.0012  | 0.0013   |
| 150                 | 200                       | 0.0328  | 0.0311   | 0.0024  | 0.0022   |
| 150                 | 100                       | 0.0807  | 0.0632   | 0.0102  | 0.0073   |
| 500                 | 300                       | 0.0610  | 0.0625   | 0.0044  | 0.0045   |
| 500                 | 200                       | 0.1167  | 0.1095   | 0.0087  | 0.0078   |
| 500                 | 100                       | 0.2717  | 0.2536   | 0.0379  | 0.0238   |
| 1000                | 300                       | 0.1186  | 0.1217   | 0.0087  | 0.0089   |
| 1000                | 200                       | 0.2300  | 0.2161   | 0.0175  | 0.0157   |
| 1000                | 100                       | 0.5445  | 0.5009   | 0.0731  | 0.0477   |

Reference: Final MERPs Guidance

| Impact    | Concentration (µg/m <sup>3</sup> ) |
|-----------|------------------------------------|
| Primary   | ?                                  |
| Secondary | 0.06                               |
| Total     |                                    |

# Example Source: Second-Level Assessment - Primary

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy

**Table 4-2.** Maximum daily average and maximum annual average primary PM<sub>2.5</sub> impacts at 100, 200, and 300 km from modeled hypothetical source.

| Emission Rate (tpy) | Distance from source (km) | Highest Daily Average Concentration (µg/m <sup>3</sup> ) - tall stack | Highest Daily Average Concentration (µg/m <sup>3</sup> ) - surface release | Highest Annual Average Concentration (µg/m <sup>3</sup> ) - tall stack | Highest Annual Average Concentration (µg/m <sup>3</sup> ) - surface release |
|---------------------|---------------------------|---|--|--|---|
| 100                 | 300                       | 0.0117  | <b>0.0123</b>  | 0.0008   | 0.0009  |
| 100                 | 200                       | 0.0223  | 0.0212   | 0.0016   | 0.0015  |
| 100                 | 100                       | 0.0537  | 0.0445   | 0.0070   | 0.0049  |
| 150                 | 300                       | 0.0180  | 0.0184   | 0.0012   | 0.0013  |
| 150                 | 200                       | 0.0328  | 0.0311   | 0.0024   | 0.0022  |
| 150                 | 100                       | 0.0807  | 0.0632   | 0.0102   | 0.0073  |
| 500                 | 300                       | 0.0610  | 0.0625   | 0.0044   | 0.0045  |
| 500                 | 200                       | 0.1167  | 0.1095   | 0.0087   | 0.0078  |
| 500                 | 100                       | 0.2717  | 0.2536   | 0.0379   | 0.0238  |
| 1000                | 300                       | 0.1186  | 0.1217   | 0.0087   | 0.0089  |
| 1000                | 200                       | 0.2300  | 0.2161   | 0.0175   | 0.0157  |
| 1000                | 100                       | 0.5445  | 0.5009   | 0.0731   | 0.0477  |

Reference: Final MERPs Guidance

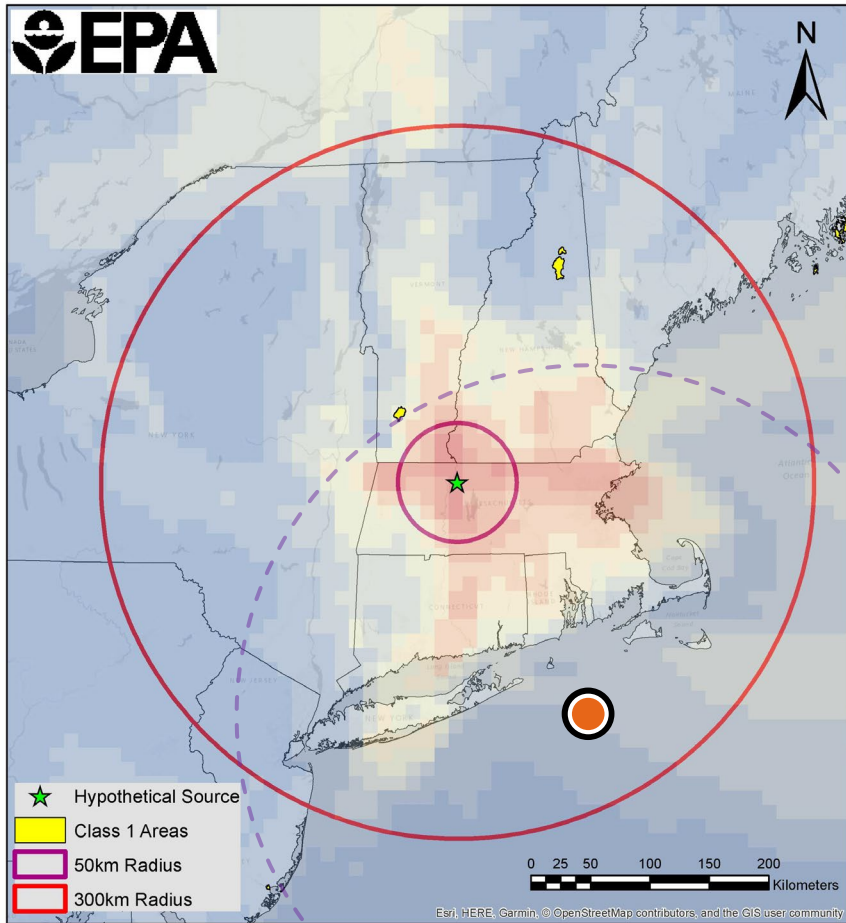
| Impact    | Concentration (µg/m <sup>3</sup> ) |
|-----------|------------------------------------|
| Primary   | <b>0.0123</b>                      |
| Secondary | <b>0.06</b>                        |
| Total     |                                    |



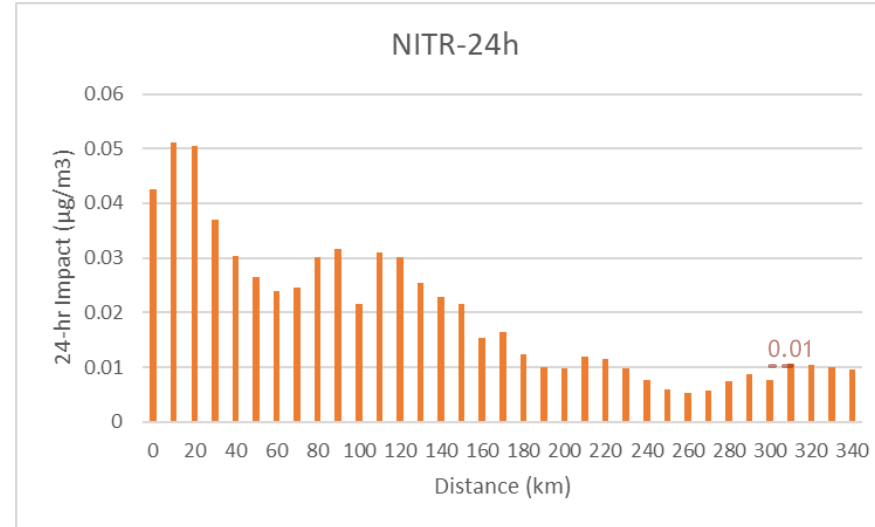
# Example Source: Second-Level Assessment - Total

Example Source

PM<sub>2.5</sub> 100 tpy  
NO<sub>x</sub> 3,000 tpy



Hypothetical source secondary formation modeling results:  
 maximum daily nitrate concentration, by location  
 Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy,  
 low-level release, hypothetical source 4



Hypothetical source secondary formation modeling results:  
 maximum daily nitrate concentration, by distance  
 Reference: Final MERPs Guidance, Eastern U.S. domain, 500 tpy, low-  
 level release, hypothetical source 4

| Impact    | Concentration ( $\mu\text{g}/\text{m}^3$ ) |
|-----------|--|
| Primary   | 0.0123                                     |
| Secondary | 0.06                                       |
| Total     | 0.0723                                     |

< 0.27  $\mu\text{g}/\text{m}^3$