

Outstanding Issues for Modeling Low-Level Emission Sources

11th Conference on air Quality Modeling

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on behalf of AF&PA and AWC

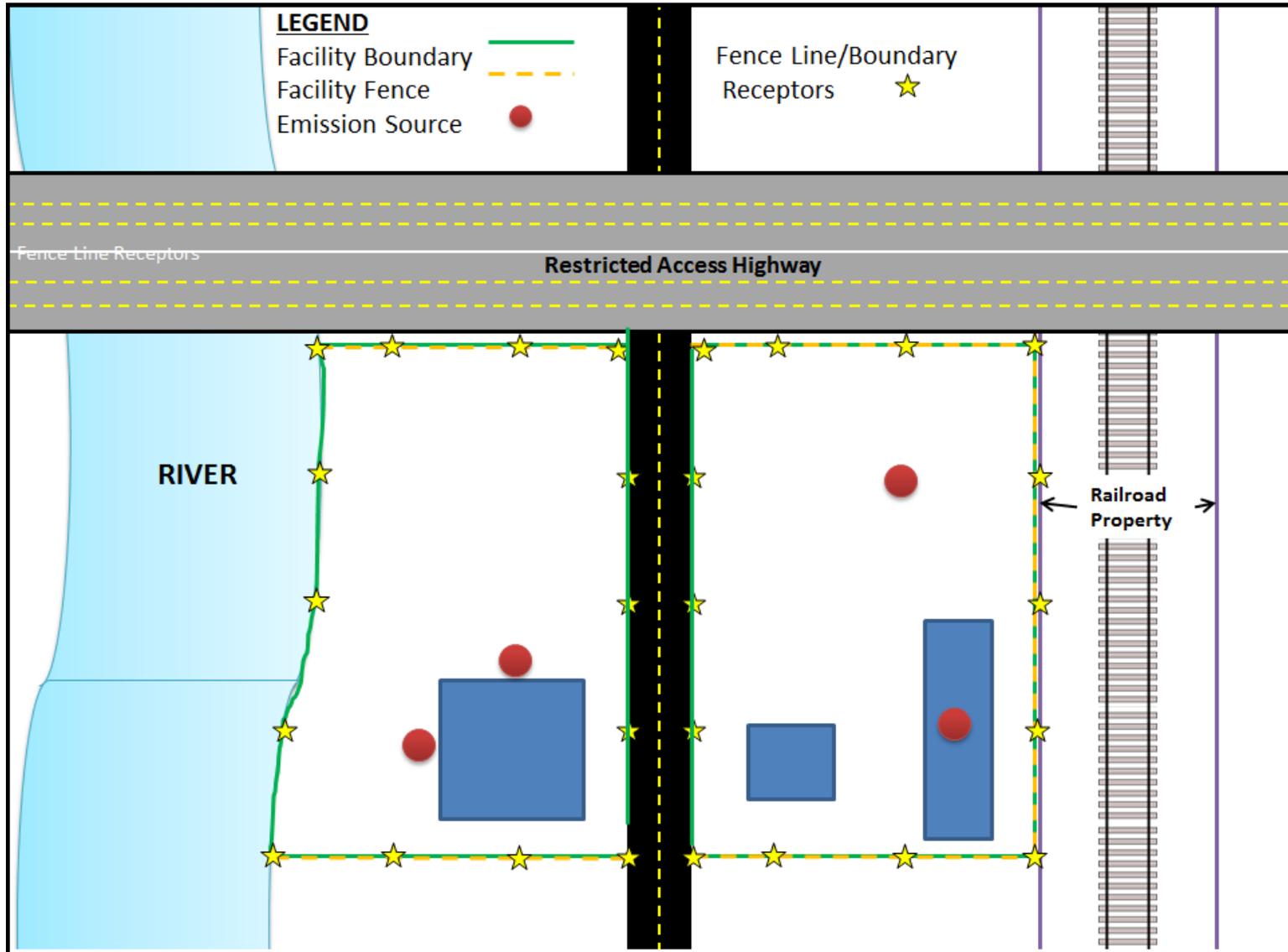
Characteristics of Low-Level Sources

- Types of Sources Affected
 - Fugitive dust from roadways and storage piles: line or area sources
 - Low-buoyancy process releases: point or area sources
- Location relative to off-site receptors
 - Close to property boundary or fence line
 - On or adjacent to buildings and other flow obstacles: tanks, piles, process structures, walls, berms
- Narrow Ambient Air Quality Modeling Compliance Margins
 - $PM_{2.5}$ 24-hour and especially the recently lowered annual average NAAQS
 - 1-hour SO_2 and NO_2 NAAQS for short-stack combustion sources
- ***Two issues that should be addressed in Appendix W***
 - *Fence line receptors that do not represent possible public exposure for the specified NAAQS frequency and averaging time*
 - *Fugitive dust generation that is subject to near-field effects that reduce potential off-site transport of $PM_{2.5}$ and PM_{10}*

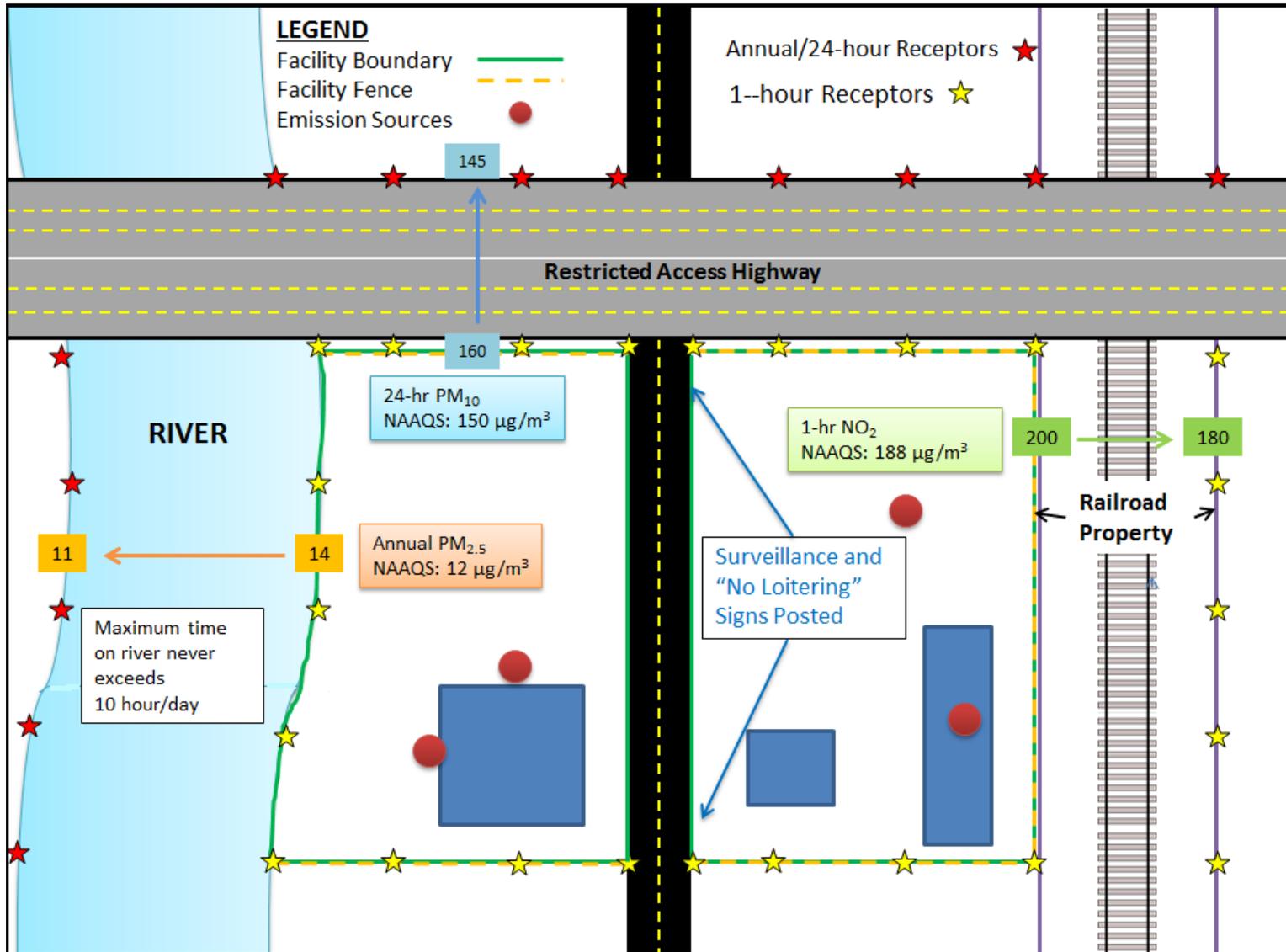
Placement of Near-field Modeling Receptors

- Consistent with 2014 EPA risk assessment guidance, the placement of nearby receptor locations consider potential for the public to be present :
 - For the NAAQS averaging period or
 - For the frequency specified in the NAAQS.
- Examples affecting receptor placement based on public accessibility laws/regulations and physical/geographical barriers
 - Railway right-of-ways
 - Controlled access highways
 - Public roadways intersecting or bordering a site
 - Inaccessible terrain
 - Fast flowing rivers
- A case-by-case is determination is required to evaluate the factors that limit or prevent members of the public to be present. An illustration follows:

Fence Line/Boundary Receptors



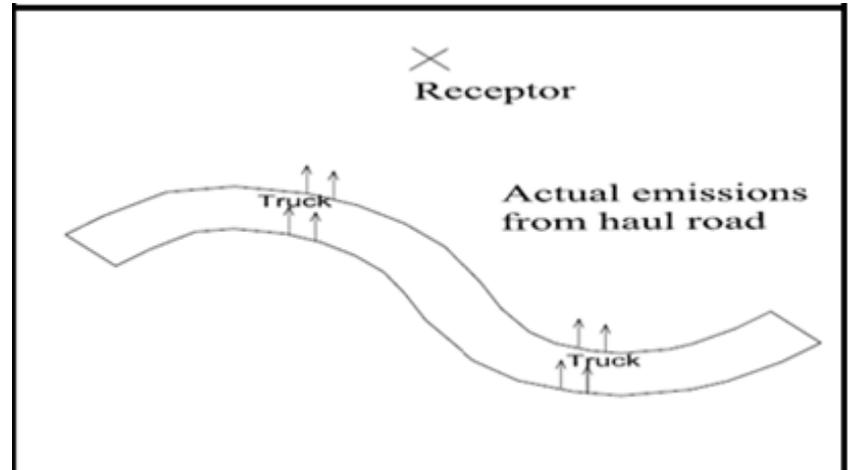
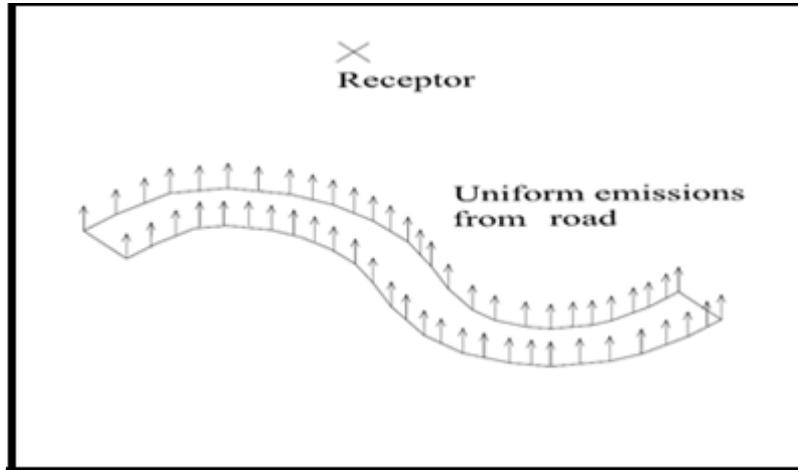
Receptors Reflecting Public Accessibility



Near Field Effects that Reduce Off-Site Transport of Fugitive PM_{2.5}

- Fugitive dust studies have shown reductions in downwind particulate concentrations due to mechanisms not presently accounted for in modeling
- Previously presented by Dr. Chatten Cowherd at EPA's 10th Modeling Conference
 - Roadway dust from intermittent traffic is a transient rather than continuous line source
 - Agglomeration of fine particles causes shift to larger particle sizes, shifting PM_{2.5} to PM₁₀
 - Adjacent buildings, barriers and vegetation scavenge PM_{2.5} and PM₁₀ emissions

Intermittency of Industrial Road Emissions



Illustrations of Roadway Dust Intercepted by Vegetation



What Has Happened Since the 10th Modeling Conference

- AISI/Cowherd presented concepts to OAQPS
- Further discussions with EPA at annual workshops
- EPA indicates a preference that refinements be addressed through emissions characterization rather than changing AERMOD
- Industry group presently investigating the feasibility of incorporating concepts into refined modeling procedures for of fugitive dust sources

Ongoing Investigation of Near-field Dust Reduction Effects

- Current activities
 - Review of published field and theoretical studies
 - Characterization of fugitive dust emission reduction factors
 - Conceptual feasibility to implement as an AERMOD pre- or post-processor
- Possible future activities, carried out with EPA advice and collaboration
 - Design and implementation of algorithms
 - Identify existing field studies to test algorithms
 - If deemed necessary, design and implementation of future field studies for further testing and refinement

Appendix W Recommendations

- Appendix W discussion regarding receptor siting should allow model users and regulatory authorities to consider the potential for public presence in the context of the NAAQS averaging time and frequency.
 - At a minimum, Appendix W should provide assurances that regulatory agencies may apply innovative health protective concepts in their guidance to applicants in the placement of closest model receptors.
- Appendix W discussion of fugitive dust emissions modeling should acknowledge the ongoing development of methods to more accurately characterize effective emissions, accounting for physical phenomena, such as, traffic intermittency, agglomeration and vegetative scavenging, to reduce noted overestimation tendencies of fugitive PM_{2.5} and PM₁₀ model estimates under certain circumstances.