The purpose of this document is to outline ongoing research being conducted by US EPA Office of Research & Development in the Center for Environmental Measurement and Modeling that is considered relevant for better characterizing and modeling elevated ozone (O3) in the Lake Michigan region. In summary, this includes advancing meteorological models, building more accurate emission inventories, evaluating photochemical models with detailed observations from field campaigns, and using the results of the model evaluation and recent scientific advancements to improve the processes in the photochemical models. Specific activities are listed below.

Efforts focused on hemispheric to regional scale model application and evaluation

* Ongoing project examining trends in emissions, ambient (in-situ) measurements, and remotely sensed pollutants (O3, NOX, VOC) in the Lake Michigan region.
* Ongoing effort to improve representation of complex meteorology in the Lake Michigan region predicted by the Weather Research & Forecasting (WRF) model: updated sea surface temperature approach for Lake Michigan and testing different cloud physics options
* New hemispheric and continental scale CMAQ simulations with aerosol nitrate photolysis which can act as a hemispheric scale source of regional O3 during the spring and early summer
* EPA has been making special oxidized nitrogen gas measurements at a CASTNET monitor location upwind of Chicago during 2023 and 2024 to better understand O3 and precursor inflow into the Chicago area (and provide additional opportunities for photochemical model performance evaluation)
* Plan to evaluate CMAQ predicted O3 flux using field study measurements at Bondville, Illinois in 2023 and 2024

Efforts focused on local/urban scale model application and evaluation

* Engaging in a collaborative effort with academic groups and LADCO on fine scale (~1 km and finer) modeling for Chicago
* Plan to use detailed meteorology and chemistry measurements from 2023 AGES+ measurement campaigns to evaluate modeling system
* Plan to use measurements made at enhanced PAMS monitoring (Wisconsin DNR) at Chiwaukee Prairie site and ship-based O3 measurements made during 2023 for model performance evaluation
* Early engagement to consider opportunities for new measurements at a downwind site along the eastern shore of Lake Michigan in collaboration with Michigan EGLE, NOAA Great Lakes Research Center, EPA, and other groups (e.g., NASA)