

SCICHEM AIR QUALITY MODEL

Ramboll Environ co-developed an advanced reactive puff model that estimates emission source impacts on pollutants.

ABOUT SCICHEM

The Second-Order Closure Integrated Puff Model with Chemistry (SCICHEM) is a state-of-the-science reactive puff model that can be used to model the impact of single or multiple emission sources on primary and secondary pollutants. The Electric Power Research Institute (EPRI) funded the development of SCICHEM, and USEPA names it in guidance on models suitable for assessing single-source impacts to ozone and PM_{2.5}¹.

OUR SERVICES

Ramboll Environ develops and maintains all of the photochemistry in SCICHEM, which enables the evaluation of secondary pollutant impacts.

The atmospheric chemistry modules in SCICHEM include

gas-phase reactions, aerosol transformations and aqueous-phase chemistry for a multitude of chemical compounds, including ozone, NO, NO₂, HNO₃ and other oxidized nitrogen compounds, VOCs, SO₂, PM_{2.5} and components, NH₃, mercury, arsenic, selenium and chromium²⁻¹⁰.

Ramboll Environ scientists have implemented SCICHEM in USEPA's photochemical grid model CMAQ as a "plume-in-grid" method for ozone, PM and mercury¹¹⁻²⁰. Additional SCICHEM development and application studies we have conducted include the following:

- Testing for single-source secondary impacts⁴. Click [here](#) to view.
- Modeling of highly reactive VOC emissions from a ship channel⁵. Click [here](#) to view.

- Application for near- and far-field single-source impacts⁶. Click [here](#) to view.
- Application for 1-Hour NO₂ concentration assessments⁷. Click [here](#) to view.
- Investigation of NO_x reactions and transport in night-time plumes, as well as impacts on next-day ozone⁸. Click [here](#) to view.
- Evaluation using aircraft-based plume measurements⁹. Click [here](#) to view.
- Development of a multimedia model for assessing human health impacts of arsenic, cadmium, chromium, lead, mercury and selenium from power plant stacks (involves ongoing research).

CONTACT

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* See page two for all references.



$$c(x) = \frac{Q}{(2\pi)^{3/2}(\text{Det}(\sigma))^{1/2}} \exp \left[-\frac{1}{2} \sigma_y^{-1} (x_i - x_j)(x_j - x_i) \right]$$

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