

Mutagenicity in *Salmonella* of a Simulated Urban-Smog Atmosphere Generated Using a Mobile Reaction Chamber

J. Zavala¹, J. Krug², S.H. Warren¹, N. Modak¹, Q.T. Krantz¹, C. King¹, L. Walsh¹, M. Lewandowski², W.A. Lonneman², T.E. Kleindienst², M. Higuchi¹, M.I. Gilmour¹, D.M. DeMarini¹

1. NHEERL, US EPA, Durham, NC

2. NERL, US EPA, Durham, NC

The EPA Mobile Reaction Chamber (MRC) is a 24-foot trailer containing a 14.3-m³ Teflon lined photochemical chamber used to generate simulated urban atmospheres. Photochemistry in the MRC is catalyzed by 120 fluorescent bulbs evenly mixed with black light bulbs and UV bulbs (300 – 400 nm) to simulate the presence of natural sunlight in urban atmospheres. For this pilot study, a mixture of 6 ppmC α -pinene, 24 ppmC gasoline and 500 ppb nitric oxide (NO) were continuously injected into the MRC to generate a stable simulated urban-smog atmosphere for a duration of up to two weeks. A seed solution of 10 mg/L ammonium sulfate in DIH₂O was nebulized to provide a nucleation base for reaction products during photochemistry. The unreacted or photo-oxidized contents of the MRC were drawn into a Billups-Rothenberg Modular Incubator Chamber (MIC) via a vacuum pump at a flow rate of 3.5 or 1.0 L per minute. The MIC contained plates of *Salmonella* TA100 \pm S9 spread in a top agar at the air-agar interface; exposures were for 6 and 14 h. The MIC was capable of holding 4 standard 100-mm glass Petri dishes per experiment. After exposure, the cultures were incubated for 72 h, and we counted the mutants (revertants) and calculated linear regressions to assess the mutagenic potency (revertants/h) of the smog atmosphere. The unreacted components injected into the MRC with the lights off were not mutagenic. However, once the lights were turned on and photochemical reactions were initiated to produce atmospheric transformation products, the atmosphere was mutagenic; producing a ~2.5-fold increase in mutagenicity relative to the control. The atmospheric transformation products were direct-acting mutagens requiring no metabolism to be mutagenic. Future studies will be conducted with different simulated atmospheres representing various metropolitan areas as well as incorporating *in vitro* exposures of human lung cells at the air-liquid interface. [Abstract does not necessarily reflect the views or policies of the U.S. EPA.]