

PO 109-3 Determinants of Lethal Carbon Monoxide Exposure Inside a Recreational Vehicle. S. Gaffney, D. Paustenbach, ChemRisk, LLC, San Francisco, CA; J. Sahmel, ChemRisk, LLC, Boulder, CO; J. Knutsen, Colorado School of Mines, Golden, CO

Introduction: Carbon monoxide (CO) is a known chemical asphyxiant, linked to over 2,000 deaths per year. Although many control and alarm measures have been installed to prevent CO exposure in recreational vehicles (RVs), a recent accident in such a vehicle led to two deaths associated with CO exposure, prompting an evaluation of RV safety.

Methods: Twelve simulation tests were performed in the same RV where the deaths occurred to recreate several possible exposure scenarios. Study variables included the condition of the generator exhaust pipe (attached/detached), the electrical load on the generator emitting CO (<1 to 20 amps), the position of ventilation hatches (open/closed), the parking location relative to a five foot high wall that was at least three times the length of the RV (adjacent/perpendicular), and weather conditions (windy/calm). Thirteen real-time CO monitors were placed in various locations both inside and outside the RV.

Results: All five variables were found to affect the CO levels detected within the RV, but the presence or absence of a generator exhaust pipe was found to have the most impact. Without the exhaust pipe, CO levels in most areas inside the RV increased to almost 600 ppm in just over an hour, and reached 1,000 ppm near a damaged area of the RV's undercarriage. Furthermore, this RV's factory-installed CO monitor had been disconnected, which, if properly connected, would have alerted the victims to the rising CO levels.

Conclusions: Overall, results from the study indicated that the RV had improperly repaired damage (caused by a collision with another vehicle) that likely caused the CO exposure. The study results also underscore the importance of maintaining a properly functioning CO alarm in any RV.