

Ten large scale single compartment fire tests were performed using two poly-urethane foams and a cotton upholstery fabric. Animals were exposed to the products of decomposition of cushion assemblies burned under three different combustion modes:

1. smoldering combustion initiated by a cigarette;
2. flaming combustion initiated by a small natural gas diffusion burner;
3. smoldering to flaming transition combustion initiated by a cigarette and forced into flaming combustion after a prolonged period of smoldering by a small natural gas diffusion burner.

Comparison of gas yields (CO, "CO₂" and HCN) between these tests and prior large- and smallscale tests showed that the CO and "CO₂" yields agreed within a factor of 3, while the NBS Toxicity Protocol produced 10 times more HCN in the flaming mode and ramped heating mode than the largescale tests.

Qualitatively, animal deaths were limited to within exposure plus 24 hrs for the largescale tests, while smallscale animal deaths occurred primarily postexposure. Within the errors of the NBS Toxicity Protocol (plus/minus 5-10 mg/l), "LC₅₀" determinations in the largescale tests were comparable to the smallscale tests, except for the smallscale ramped two phase heating and large-scale smoldering to flaming NFR tests.

The N-gas model for 30 minutes exposures was expanded to include 4 gases, CO, "CO₂", HCN and Reduced "O₂". Model calculation showed that within exposure animal deaths in small- and large-scale tests correlated with model values greater than 0.7. Burn room animal deaths could not be explained in terms of the four gases used in the N-gas model.