# VAPORIZATION OF JP8 JET FUEL IN A SIMULATED AIRCRAFT FUEL TANK UNDER VARYING AMBIENT CONDITIONS

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## ABSTRACT

This study has been performed to aid in the effort to minimize the possibility of a fuel tank explosion in a commercial aircraft. An understanding of the mechanisms behind fuel vaporization processes in an aircraft fuel tank is essential to developing accident prevention techniques. An experiment was designed to measure the conditions existing within a heated aluminum fuel tank, partially filled with JP-8 jet fuel and under varying ambient conditions similar to those encountered by an in-flight aircraft. Comprehensive fuel tank data, including temperature, pressure, and ullage hydrocarbon concentration, were obtained during testing and are available for use to validate heat and mass transfer calculations. An existing engineering model was employed in this work to calculate ullage temperature and ullage fuel vapor concentration in the tank and to compare with measured values; to explain the transport processes occurring in the tank during testing; and to estimate the flammability of the ullage vapors existing within the tank. The calculations made by the model were in good agreement with the measured data. The model also gave a good indication of the temporal mass transport processes occurring in the tank and gave a reasonable assessment of the ullage vapor flammability in the tank.