The problem of heat transfer to walls from fire-plume-driven ceiling-jets during compartment fires is introduced.

Estimates are obtained for the mass, momentum, and enthalpy flux of the ceiling jet immediately upstream of the ceiling-wall junction. An analogy is drawn between the flow dynamics and heat transfer at ceiling-jet/wall impingement and at the line impingement of a wall and a two-dimensional, plane, free jet.

Using the analogy, results from the literature on plane, free-jet flows and corresponding wall-stagnation heat transfer rates are recast into a ceiling-jet/wall-impingement-problem formulation. This leads to a readily usable estimate for the heat transfer from the ceiling jet as it turns downward and begins its initial descent as a negatively buoyant flow along the compartment walls.

Available data from a reduced-scale experiment provide some limited verification of the heat transfer estimate. Depending on the proximity of a wall to the point of plume-ceiling impingement, the result indicates that for typical full-scale compartment fires with energy release rates in the range 200-2000 kW and fire-to-ceiling distances of 2-3 m, the rate of heat transfer to walls can be enhanced by a factor of 1.1-2.3 over the heat transfer to ceilings immediately upstream of ceiling-jet impingement.