The objective of the program is to analyze mathematically, through the use of computer solutions, the complex interaction between water droplet sprays and the buoyancy-driven gas flows induced by a building fire.

The specific goal is to obtain scientific correlations relating spray penetration through the fire plume and cooling of the fire environment to a set of controlling parameters such as fire intensity, spray characteristics and geometric factors (i. e. compartment size or ceiling height). Such correlattions could then be used in current zone models of compartment fires.

Another goal is to provide a rugged code which could be routinely used by the personnel at CFR/NBS. Improvements to the present computer code at FMRC are necessary to provide more accuracy, numerical stability, and computational efficiency.

During the two years of the program, two separate tasks have been proceeding in parallel. Task 1 involves refinement of the existing spray computer code at FMRC and application of this code to axisymmetric spray-plume interaction problems. We are currently able to calculate over a wide range of fire and spray conditions both rates of droplet penetration through the hot gas fire-plume as well as rates of droplet penetration through the hot gas fire-plume as well as rates of water flow near the ceiling caused by small droplets being carried along in the plume ceiling jet flows.

In Task 2 we have undertaken to develop major improvements in the gas calculation algorithm of the spray code so that more accurate, transient flow solutions can be obtained reliably with the minimum usage of computer time.