Table 17.1: Guidelines for Risk Assessment

OCCUPANCY	REQUIRMENTS
5. **FIRE MODELS**	**4.d. CONTAM** i. CONTAM is a single-zone model originally designed to track the movement of nonfire contaminants through a building. ii. In includes extensive HVAC system model components and includes stack effect flows. Fire smoke sources can be modeled, though the temperatures in the building are set solely by the user, rather than being calculated as is done in most fire models. iii. This modeling approach has been applied to the tallest buildings in the world to evaluate the potential for smoke movement and to design smoke management systems. Calculations are quite rapid, even for the largest buildings. **4.e. FISSIM** i. FSSIM is a single-zone model originally designed for fire hazard analysis of ships. It includes most of the features of the popular two-zone models but within a single-zone fire environment description. ii. It includes extensive HVAC system model components, stack effect, prediction of compartment temperatures, smoke and gas concentrations, as well as compartment-to-compartment fire spread, detection, and suppression. iii. It has been applied to ships and buildings with several thousand compartments. iv. Calculations are slower than CONTAM but still much faster than two-zone models and CFD models. **5. COMPUTATIONAL FLUID DYNAMICS (CFD) MODELS** i. Computational fluid dynamics (CFD) models avoid the simplifications inherent in zone models. The physical aspects of any fluid flow are governed by three fundamental principles: 1. Mass is conserved; 2. Newton's second law [force = (mass) × (acceleration)]; and 3. Energy is conserved. ii. These fundamental principles can be expressed as generalized mathematical equations in the form of integral or partial differential equations and are generally referred to as the Navier-Stokes equations. iii. CFD is the technique of replacing the integrals and partial derivatives with discretized algebraic forms, which are solved to obtain numeric values at discrete points in time and/or space. iv. Using an appropriate solving technique, the CFD model solves the fundamental equations of mass, momentum, and energy at each grid point in the computational domain that has been divided into a number of grid points that produce small elements. v. Imagine an enclosure filled with a three-dimensional grid of tiny cubes. A CFD model will calculate the physical conditions in each cube as a function of time. vi. The CFD model program uses an iterative solver to calculate the physical changes in the cube at the current time step as a result of physical changes in the surrounding cubes from the previous time step. Depending on the size of the cubes, this model permits the user to determine the conditions (e.g., temperature, velocity, gas concentrations) at almost any point in the computational field.