Computer Models
For
Fire and Smoke

Model Name: HAZARD I

Version: 1.2

Classification: Zone model

Very Short Description: A methodology for modeling the effect of fire on humans
                           in buildings. It combines expert judgment, with computer-
                           based calculations and the physiological impact of fires and
                           smoke on humans to predict the possibility of and time to
                           escape from a burning building.

Modeler(s), Organization(s): R.D. Peacock, W.W. Jones, R.W. Bukowski, and C.L.
                           Forney, Building and Fire Research Laboratory, National
                           Institute of Standards and Technology.

User's Guide: National Institute of Standards and Technology Handbook
                           146-1, "HAZARD I Fire Assessment Method," June, 1991.

Technical References: See User's Guide

Validation References: -----

Availability: Limited availability from the National Fire Protection
                           Association, One-Stop-Data-Shop, Quincy, MA (U.S.A)
                           Information is available at the NIST web site
                           (http://fast.nist.gov/)

Price: -----

Necessary Hardware: IBM or compatible micro-computer, with a numeric co-
                           processor, graphics adaptor and graphics display.
                           Programs run from DOS or in DOS window under
                           WINDOWS 3.x, 95, 98, 2000 but not NT4.

Computer Language: FORTRAN/BASIC

Size: Requires about 512 kB of RAM, and 3 MB of disk space
                                   for installation.

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Detailed Description:

The HAZARD Methodology is a method for predicting the hazards to the occupants of a
building from a fire therein. Within prescribed limits HAZARD I allows the user to
predict the outcome of a fire in a building populated by a representative set of occupants
in terms of which persons successfully escape and which are killed, including the time,
location and likely cause of death for each. It consists of a two volume report and a set of
computer disks containing the software necessary to conduct hazard analyses of products
used in residential occupancies.

HAZARD I is a set of procedures combining expert judgment and calculations to
estimate the consequences of a specified fire. The fire model is FAST, version 18.5,
described elsewhere. The procedures involve four steps: first, defining the context;
second, defining the scenario; third, calculating the hazard; and fourth evaluating the
consequences. Steps one, two and four are largely judgmental and depend on the
expertise of the user. The third step, which involves extensive use of the HAZARD
software, requires considerable expertise in fire safety practice. The heart of HAZARD I
is a sequence of procedures implemented in computer software to calculate the
development of hazardous conditions over time, calculate the time needed by building
occupants to escape under those conditions, and estimate the resulting loss of life based
on assumed occupant behavior and tenability criteria. These calculations are performed
for a specified building and set of fire scenarios of concern.

Component programs are used sequentially to perform a fire hazard analysis. FASTin is
the data editor to create the FAST data file, FAST is the multi-compartment zone fire
model, FASTplot is an (engineering) graphing package for data from FAST, EXITT is an
evacuation model that includes behavioral routines for interactions among family
members, and TENAB performs toxicology evaluations from FAST data for room
environments and EXITT data for room locations over time.

FAST, along with its input editor and graphing package has been replaced by the CFAST
suite of programs.