

PACKAGE ID - 000442I037000 HAA3B

KWIC TITLE - Aerosol Behavior Log-Normal Model

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LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 01/01/1976 **PUBLICATION DATE** - 01/01/1976

DESCRIPTION - HAA3B was written to provide an engineering method for calculating heterogeneous aerosol behavior and transport following various hypothetical LMFBR accidents. HAA3B evaluates an approximation to the general integro-differential equation which describes aerosol behavior. The physical model includes particle generation, Brownian and gravitational agglomeration, settling, plating, and leakage for spherical particles. The approximation is the requirement that the size distribution function be lognormal.

PACKAGE CONTENTS - Software Abstract; Media Directory; AI-AEC-13038;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - HAA3B employs a time-dependent lognormal distribution when agglomeration is prevalent, then switches to a stirred-settling model. The time-dependent parameters which characterize the lognormal size-distribution function are obtained by numerical integration of three simultaneous differential equations for the zeroth through the second volume moments. The volume moments differential equations were obtained by analytic integration of the appropriate moments of the integro-differential equation. Additional differential equations for the plated, settled, and leaked functions are included in the simultaneous set; a mix of Adams-Moulton, Runge-Kutta, and Gaussian procedures are used to solve the system of simultaneous, first-order differential equations.

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COMPUTER - IBM370

OPERATING SYSTEMS - OS/370 Release 21.6

PROGRAMMING LANGUAGES - FORTRAN IV

SOFTWARE LIMITATIONS - Maxima of 1000 time-steps in lognormal model part, 42 discrete radii for leakage distribution calculations, 50 leak-rate input values, and 50 source-rate input values. Applicability has been verified for moderate concentrations in moderate-sized vessels, and for limited types of sources, only.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The program computes plated, settled, suspended, and leaked masses, distribution parameters, and effective radii. It prepares input cards, which describe leaked mass, for use in evaluating aerosol behavior in a second compartment, has a Klyachko correction calculation, and includes input parameters to characterize effective density and collision efficiency.

RELATED SOFTWARE - Leak rates may be obtained from the AI SOFIRE code. Fallout rate data may be used in COMRADEX4 (ESTSC 459).

HARDWARE REQS - A logical unit 5 for input, unit 6 for output, unit 16 for a scratch unit, and a card punch. SC-4020 CRT coding is included as comment cards. Storage allocation is less than 150K bytes.

TIME REQUIREMENTS - Approximately 15 seconds are required for execution on a Model 168.

REFERENCES - R.S. Hubner, E.U. Vaughn and L. Baumash, HAA-3B User Report, AI-AEC-13038, March 1973\ J.M. Otter, Understanding the HAA-3B Input Parameters Used to Characterize the Aerosol Particle Size Distribution, N707-TI-130-041, August 1975.

ABSTRACT STATUS - Abstract first distributed December 1970. IBM360 version of HAA3 submitted February 1970, replaced in April 1977 by IBM370 version of HAA3B submitted January 1976, sample problem executed by NESC March 1977 on an IBM370/195.

SUBJECT CLASS CODE - GRH

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
H CODES
LMFBR TYPE REACTORS
REACTOR ACCIDENTS
BROWNIAN MOVEMENT
RADIOACTIVE AEROSOLS

E S T S C
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SOFTWARE ABSTRACT

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ATOM TRANSPORT
AEROSOLS
AGGLOMERATION
LEAKS
PARTICLE SIZE

EDB SUBJECT CATEGORIES -

990200 220502 220900 540130

SPONSOR - DOE/NE

PACKAGE TYPE - TESTED