General Characteristics		
1	**Abstract of Model Capabilities**	MELCOR is a fully integrated code that models the progression of severe accidents in light-water nuclear power plants. An entire spectrum of severe accident phenomena is modeled in MELCOR. Characteristics of severe accident progression that can be treated with MELCOR include the thermal hydraulic response in the reactor coolant system and all other related features.
2	**Sponsor and/or Developing Organization**	Nuclear Regulatory Commission (NRC)
3	**Last Custodian/ Point of Contact**	Mr. K.D. Bergeron Organization 6421; MS-0739 P.O. Box 5800 Sandia National Laboratories (SNL) Albuquerque, NM 87185-0739 PHN: 505/844-2507
4	**Life-Cycle**	MELCOR has been developed by SNL for NRC for the analysis of severe core damage accidents in a nuclear reactor system and containment building. MELCOR has been developed as the successor to the Source Term Code Package. Maintenance on MELCOR and development are continuing.
5	**Model Description Summary**	MELCOR is a fully integrated, relatively fast-running code that models the progression of severe accidents in light-water nuclear power plants. An entire spectrum of severe accident phenomena is modeled in MELCOR. Characteristics of severe accident progression that can be treated with MELCOR include the thermal hydraulic response in the reactor coolant system, reactor cavity, containment, and confinement buildings; core heatup and degradation; radionuclide release and transport; hydrogen production, transport, and combustion; core-concrete attack; heat structure response; and the impact of engineering safety features on thermal hydraulic and radionuclide behavior.
6	**Application Limitation**	See weaknesses.
7	**Strengths/ Limitations**	**Strengths:** fast running because of the control volume approach; No limit on the number of flow path connections to a single control volume; Spray models are available if sprays are important to the analysis; Two-phase flow can be modeled if multi-phase flow is important to the analysis;The code is versatile; and, Aerosol model is based on MAEROS model, which is a detailed mechanistic model. **Limitations:** There is limited no multi-dimensional capability; Memory overhead is associated with multi-phase flow and reactor models; Ventilation system components must be built by user input (no specific component models exist); and, Momentum balance ignores spatial acceleration term.
8	**Model References**	! R.M. Summers et al, “MELCOR 1.8.0: A Computer Code for Severe Nuclear Reactor Accident Source Term and Risk Assessment Analysis”, SNL Report SAND90-0364, NUREG/CR-5531, January, 1991
9	**Input Data/Parameter Requirements**	Two input files are required to run MELCOR. The first input file is for the MELGEN program, which generates a restart file for the MELCOR code. The second input file is for the execution of the MELCOR code and is essentially timestep control information. Various models/modules are activated via the input (i.e., Control Function, Flow Path, Heat Structure, Noncondensible Gas, and Control Volume packages). Input is free format and requires an identifier field for each line of input. Data and input parameter and boundary condition requirements: ! Default gas properties are available for the following gas species: hydrogen, oxygen, carbon dioxide, carbon monoxide, nitrogen, methane, helium, and argon; ! Deuterium ventilation system components can be built by user input for user-defined control functions and flow paths; and, ! Time-dependent user-specified boundary conditions for pressure, temperature, and velocity can be specified.
10	**Output Summary**	Both MELGEN and MELCOR generate printed output. In addition, selected information is written also to the diagnostic, message, and terminal files. A plot file is also written, which can be read by the HISPLT program for post-processing and will generate a graphics metafile containing plots requested by the HISPLT User Input File.

11	**Applications**	Applicable to any facility (i.e., buildings, tanks, single rooms, etc.) with and without ventilation systems. Applicable to multi-species gas mixing/transport problems, as well as aerosol transport problems.
12	**User-Friendliness**	MELCOR performs user input error checking before creation of the MELCOR restart file. Interactive execution options allow the user to stop, continue, change timestep control, and change boundary conditions during the execution.
13	**Hardware-Software Interface Constraints/ Requirements**	Machine/operating system requirements: IBM, VAX/VMS, SUN, PC, CRAY, and MS-DOS PC versions are available. Memory requirement is 5 megabytes.
14	**Operational Parameters**	Dependent on the computer platform that is utilized. Knowledgeable user was able, within a week, to put together a moderately complicated test problem and obtain results.
15	**Surety Considerations**	**Quality Assurance**: Software development plan and requirements. **Error handling/Reporting:** Yes **Benchmarking and V&V:** C.D. Leigh et al, "MELCOR Validation and Verification 1986 Papers", 14th Water Reactor Safety Information Meeting, Gaithersburg, Maryland, SNL Report SAND86-2689, NUREG/CR-4830, October, 1986.
16	**Runtime Characteristics**	The execution time depends on the machine, detail of the model, and the length of the transient. Runtimes on the CRAY vary form 0.1 second to approximately 1 hour. The ratio of real time to runtime can vary from 0.5 to 100, depending on the nodalization.

Specific Characteristics

Part A: Source Term Submodel Type

A1	**Source Term Algorithm?**	✔ YES __ NO
A3	**For Radiological Consequence Assessment Models**	**Gaseous releases: ✔ noble gases ✔ iodines ✔ other non-reactive gases** **Aerosol releases: Yes** **Chemistry ✔ Isotopic exchange ✔ Physical properties capability**

Part B: Dispersion Submodel Type (Not Applicable)

Part C: Transport Submodel Type (Not Applicable)

Part D: Fire Submodel Type (Not Applicable)

Part E: Energetic Events Submodel Type (Not Applicable)

Part F: Health Consequence Submodel Type (No Information Provided.)

Part G: Effects and Countermeasures Submodel Type (No Information Provided.)

Part H: Physical Features of Model (No Information Provided.)

Part I: Model Input Requirements (See Item 9.)

Part J: Model Output Capabilities (See Item 10.)

Part K: Model Usage Considerations (See Items 5 - 7.)