U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

RIC 2014

Office of Nuclear Regulatory Research

MACCS (MELCOR Accident Consequence Code System)

Source Term File
- Plume start times and durations
- Release fractions
- Release heights
- Heat content
- Aerosol size distribution

Weather File
- Wind speed & direction
- Precipitation
- Stability class
- Mixing layer heights

ATMOS Module
- Atmospheric transport using Gaussian plume segment model
- Plume depletion
- Dry and wet deposition
- Radioactive decay
- Ground contamination
- Weather sampling

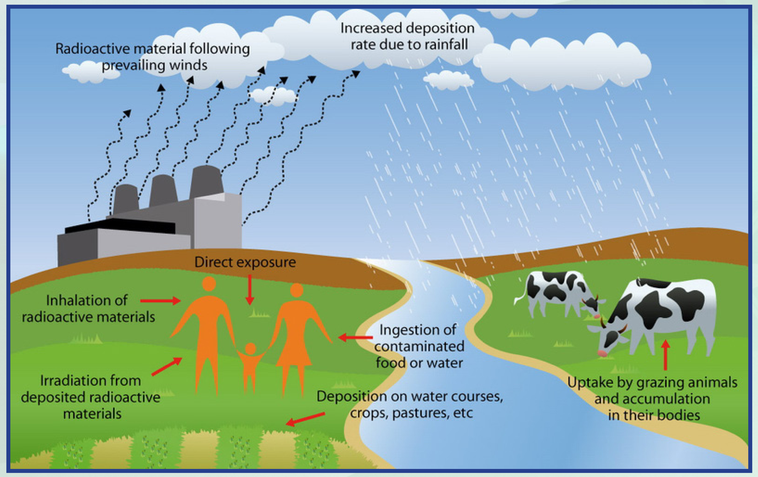
EARLY Module

	Emergency Phase
Duration	~ 1 week
Protective Actions	• Sheltering • Evacuation • Relocation
Exposure Pathways	• Cloudshine • Groundshine • Inhalation • Skin Deposition

CHRONC Module

	Intermediate Phase	Long-Term Phase
Duration	0-1 year	30-50 years
Protective Actions	• Relocation • Interdiction	• Interdiction • Decontamination • Condemnation
Exposure Pathways	• Groundshine • Inhalation of resuspended materials	• Groundshine • Inhalation of resuspended materials • Food and water ingestion

Outputs
- Health Effects
- Economic Costs
- Land Contamination



Site File
- Population
- Land/Water fraction
- Farm/Non-farm fraction
- Economic values

Dose Conversion Factor File
- Dose conversion factors for each pathway, organ, and radionuclide (Sv/Bq-s/m^3, Sv/Bq-s/m^2, Sv/Bq)

Food Chain File
- Radionuclide concentrations in nine foodstuff types for different seasons of the year
- Food category consumption rates for an average adult

Key Applications of MACCS:
- State-of-the-Art Reactor Consequence Analyses (SOARCA) – NUREG-1935, NUREG/CR-7110 and NUREG/BR-0359 (ML12332A057, ML12332A058, ML13150A053, ML13240A242, ML12347A049)
- SECY-13-0112, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor" (ML13256A334)
- SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," Enclosure 5B (ML12345A030)

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