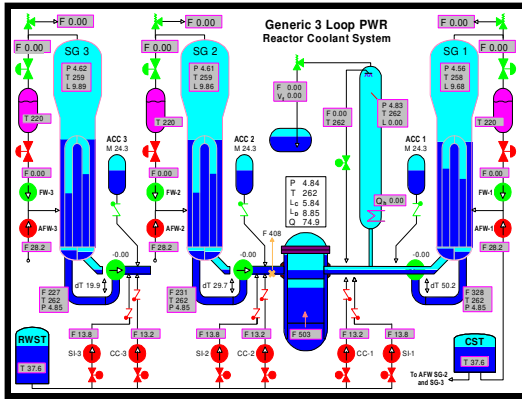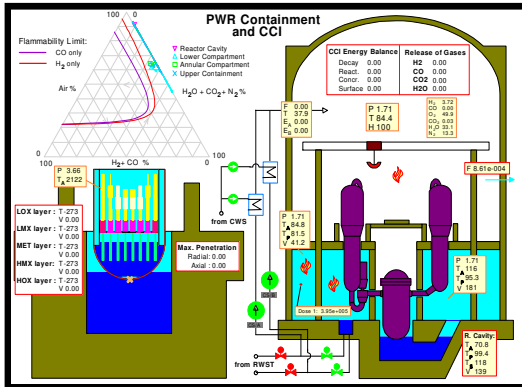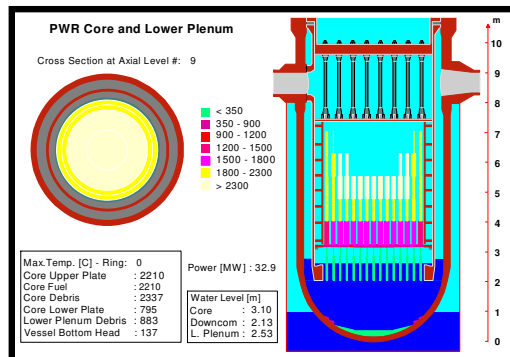**PWR SYSTEM SCREEN**

PWR CONTAINMENT SCREEN

VESSEL SCREEN

RASCAL: An Alternative to MACCS?

3-D Off-Site Consequence Modeling Coupled Dynamically to MELCOR or MAAP Source Terms
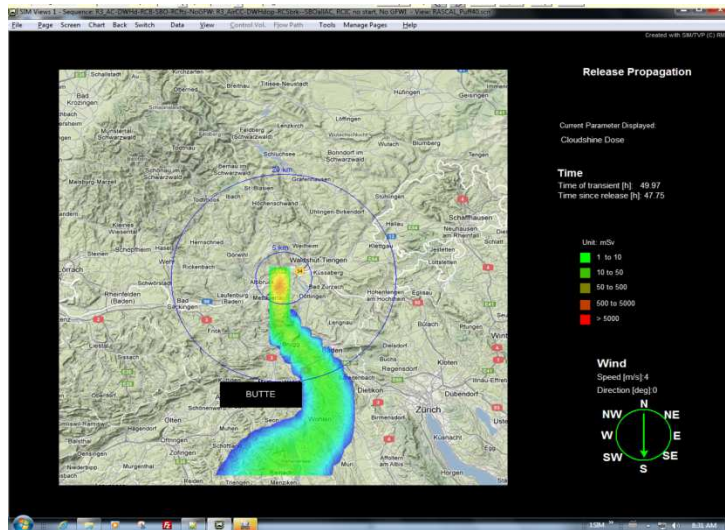
RISK MANAGEMENT ASSOCIATES, Inc.

Alfred Torri, President
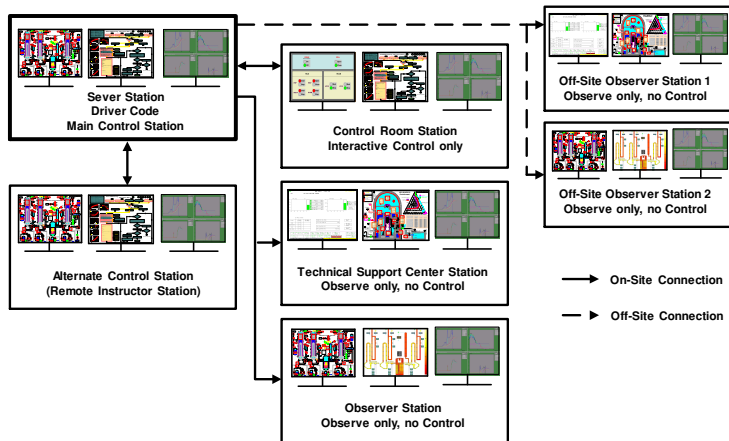Email: atorri@gorma.com

Website: www.gorma.com
San Diego, California
E-mail: info@gorma.com

RMA

MELSIM_RASCAL BUTTE SCREEN

SIM/TVP MULTI-STATION SYSTEM FOR EPG/SAMG TRAINING AND DRILLS

RASCAL Features

RASCAL is a 3-Dimensional offsite dose consequence code developed by the USNRC for emergency drills at US Nuclear Power Plants.

RASCAL Default Version is hard-wired to built-in source terms for emergency drills.

RMA Version of Rascal (SIM-ED) is coupled dynamically to MELCOR (MELSIM-R) or to MAAP (MAAPSIM-R) under SIM.

SIM-ED is driven by the running code source term or by pre-calculated source terms not by the hard-wired Rascal Emergency Planning source terms.

RASCAL recognizes terrain features (plume follows the valley), can be driven by preprogrammed or recorded weather scenarios and calculates all standard dose consequence parameters.

RASCAL is not a probabilistic code (8760 hourly weather scenario execution could be programmed in RMA Version) and it does not calculate economic impacts.

Multi-Station Training Setup Distributed customized stations for instructor, control room, TSC, Government Emergency teams, off-site technical support teams and other Observers.

SIM-ED with Multi-Station Training Setup allows training drills with all onsite and offsite participants (active or observers) including Government Emergency teams in their actual locations testing their team work as well as their communicationl.

RASCAL is running fast enough to make real time drills and limited statistical analysis practical (subject to driver code limitations)

RASCAL Trojan Site Screen


RASCAL Near Field Model
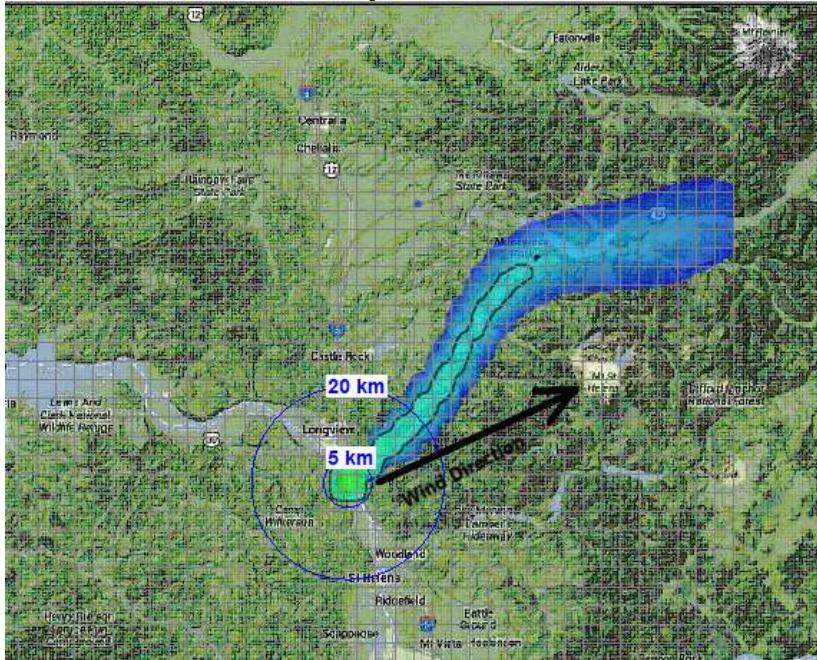
OBSERVATIONS

- Plume navigates around Butte
- Plume follows valleys and terrain features
- Population is concentrated in valleys

CLOSING THOUGHTS

- Is multi-dimensional off-site modeling and terrain modeling required for realistic off-site consequence modeling to population?

- Should Vertical Evacuation be considered? Simplify coordination with flood emergencies?

- Does the coincidence for plumes to follow valleys and populations being concentrated along waterways have to be considered?

- Are there two types of sites? (1) valley and hill sites that may require RASCAL type plume modeling and (2) level terrain sites that may not?

- In the US the preponderance of sites might be the level terrain type. In Europe most sites might be the hills & river type and exhibit higher close-in population densities.

RMA
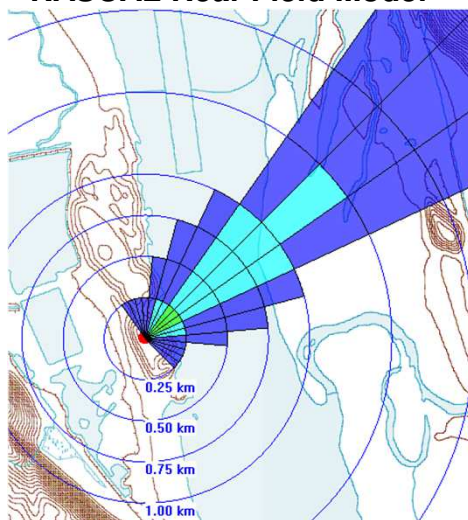
In a MELSIM_ED simulation ED receives the source term and calculates:
- the 3D dispersion in the environment,
- the resulting doses to individuals
- the land contamination
- the longterm dose commitments
- based on weather type, wind direction wind speed and terrain.
- ED models actual terrain via topo maps, can be linked to weather data from weather stations.

ED can be executed:
- Manually anytime during a MELSIM simulation after a source term has been recorded
- Automatically at user defined intervals during the accident progression
- Automatically at the end of the accident progression calculation
- Manually at the end of the accident progression calculation

The original RASCAL sees a source term when the first radionuclide is released from the plant/containment.
Unrealistically early for containment leakage models based on data from ILRT or on Tech Spec limits
ED has user-defined Start of Release criterion (Xe-135 > 2E14 BQ or Leak Rate > TSL)

Demonstration of MELSIM_ED features and capabilities:
- Trojan site Demonstration model: SBO with unisolated Drainlines
- Pasquill type A weather from the SE to NW at 4 m/s, No Rain