Background for Vattenfall’s interest in MACCS

IMUG meeting, Bethesda

September 10-11, 2014
Confidentiality - None (C1)
Swedish NPPs

- 10 operating units:
  - 7 BWR (Asea Atom Swedish Design)
  - 3 PWR (Westinghouse 3 loop)
- 2 decommissioned units (BWR), by 1999 and 2003
Large efforts during the 80’s

- implementation of MAAP code
- ambitious research programs initiated
- development of emergency response guidelines
- development and implementation of filtered venting devices
The basic strategy in a severe accident

- Fill lower drywell with water (initiated 30 minutes after containment isolation)
The basic strategy in a severe accident

- Vent containment to protect its integrity
The basic strategy in a severe accident

- Fill containment with water for cooling of core debris in the vessel
Present SA analyses

• The licensees analyse severe accident progression using the MAAP code.
  - licensing purposes (deterministic studies)
  - PSA level 2 studies

• Source terms for radiological consequence analyses are calculated using Excel®.
  - assumptions and guidance are taken from NUREG-1465

• Dose response is calculated using Matlab® codes or LENA (tool developed by the Authority).
  - weather type, deposition velocities etc. are specified by the Authority in a separate decision paper
PSA level 3

• Studies are not done at present.

• Pilot study in early 2000 for Ringhals 4:
  - The objective was to calculate health effects only.
  - Input from MAAP calculations and PSA level 2.
  - No dedicated tool was used
  - Several parameters were highly simplified:
    • composition of source term
    • weather parameters simplified and constant in space and time
    • limited to an area of 50 km around the reactor
    • only limited uncertainty calculations done
  - No calculations of economic impact.

• Still a matter of debate within Vattenfall, but there is interest!
Economic consequence analyses

• Cost estimates have been done previously in order to conclude on insurance costs
  - limited to costs for the clean-up work of the reactor
  - only one accident sequence was evaluated (“mid-conservative”)
  - releases of activity to the environment were ignored
Emergency planning

Fast running tools

• The Authority requires the Licensees to provide fast estimates of the source term during a severe accident.

• At present no codes are used.

• Very simple tools in paper form have been developed
  - based on plant information, a limited set of realistic source terms can be given
Expectations on IMUG 2014

• Hear user experiences

• Be more familiar with the code and its abilities

• Understand if and how the code can be coupled to MAAP?

• How to implement local weather statistics in the code?

• How to implement local geography in the Network Evacuation Model?

• How can MAACS be used in emergency planning?

• Can MACCS be used as a “fast running tool”? 