Strål
säkerhets
myndigheten
Swedish Radiation Safety Authority

Implementation of the Key Outcome From FASTNET Within the Swedish Radiation Safety Authority

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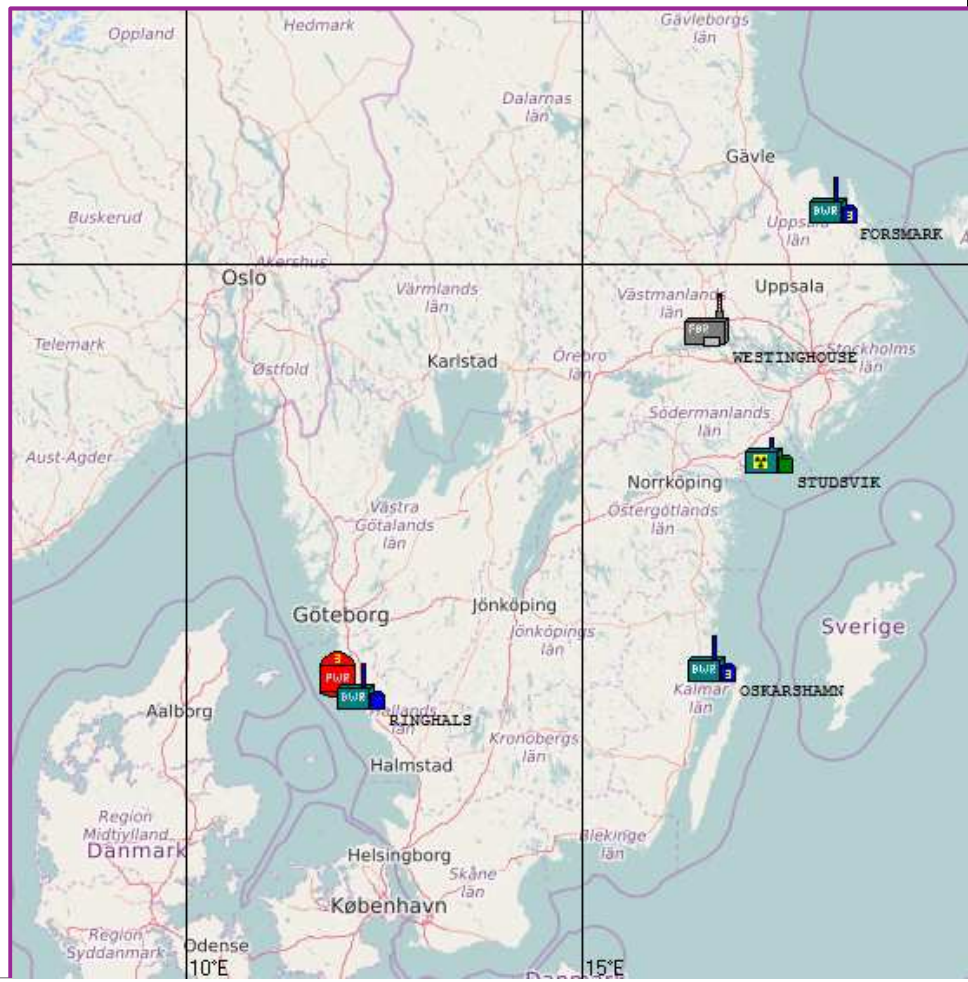
Outline

- Nuclear Power in Sweden
- SSM emergency response organisation
- Key outcome from FASTNET project
  - Methodology
  - Tools
  - Database
  - Exercises
- Conclusions

Nuclear Power in Sweden

- Forsmark (3 BWR)
- Ringhals (3 PWR, 1 BWR)
- Oskarshamn (1 BWR)



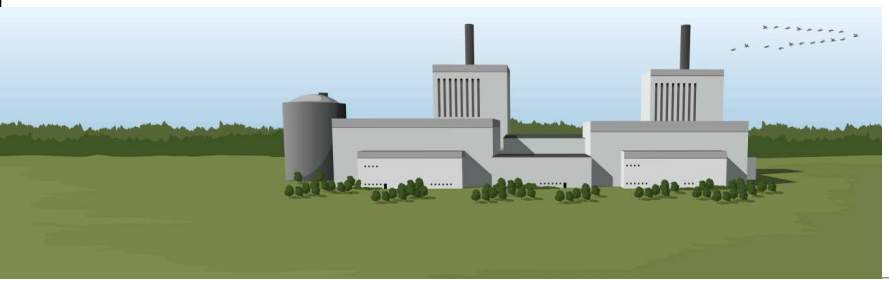
SSM Emergency Response Organisation

IAEA, EU, Nordic co-operation…

DG and Chief of Staff
Officers on duty, Communications, Logistics

Nuclear analysis team
- Contact NPP
- Plant Assessment
- Source term Est.

Radiological analysis team
- Dispersion calc.
- Radiological assessment
- Radiation measurements

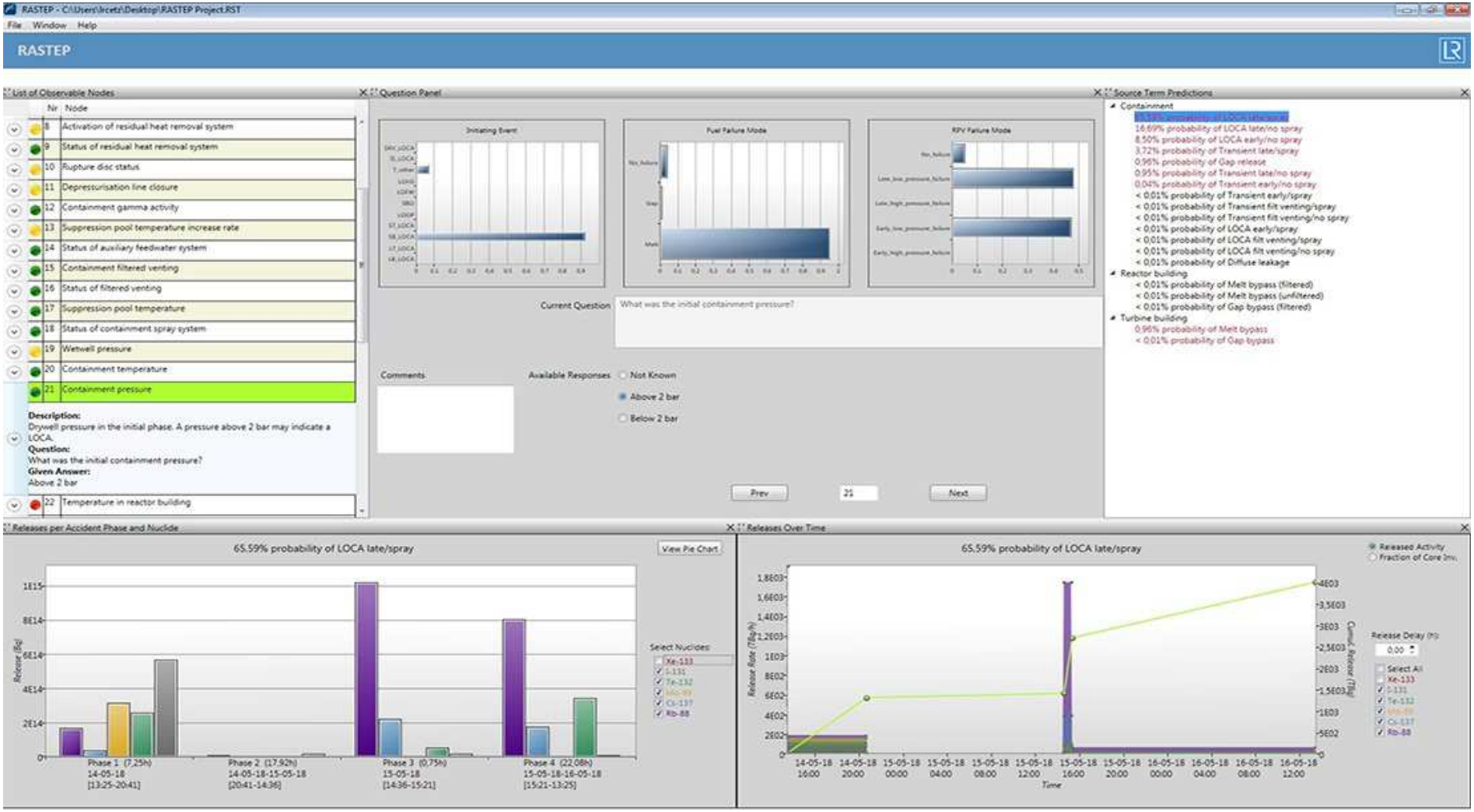


County Administrative Board etc

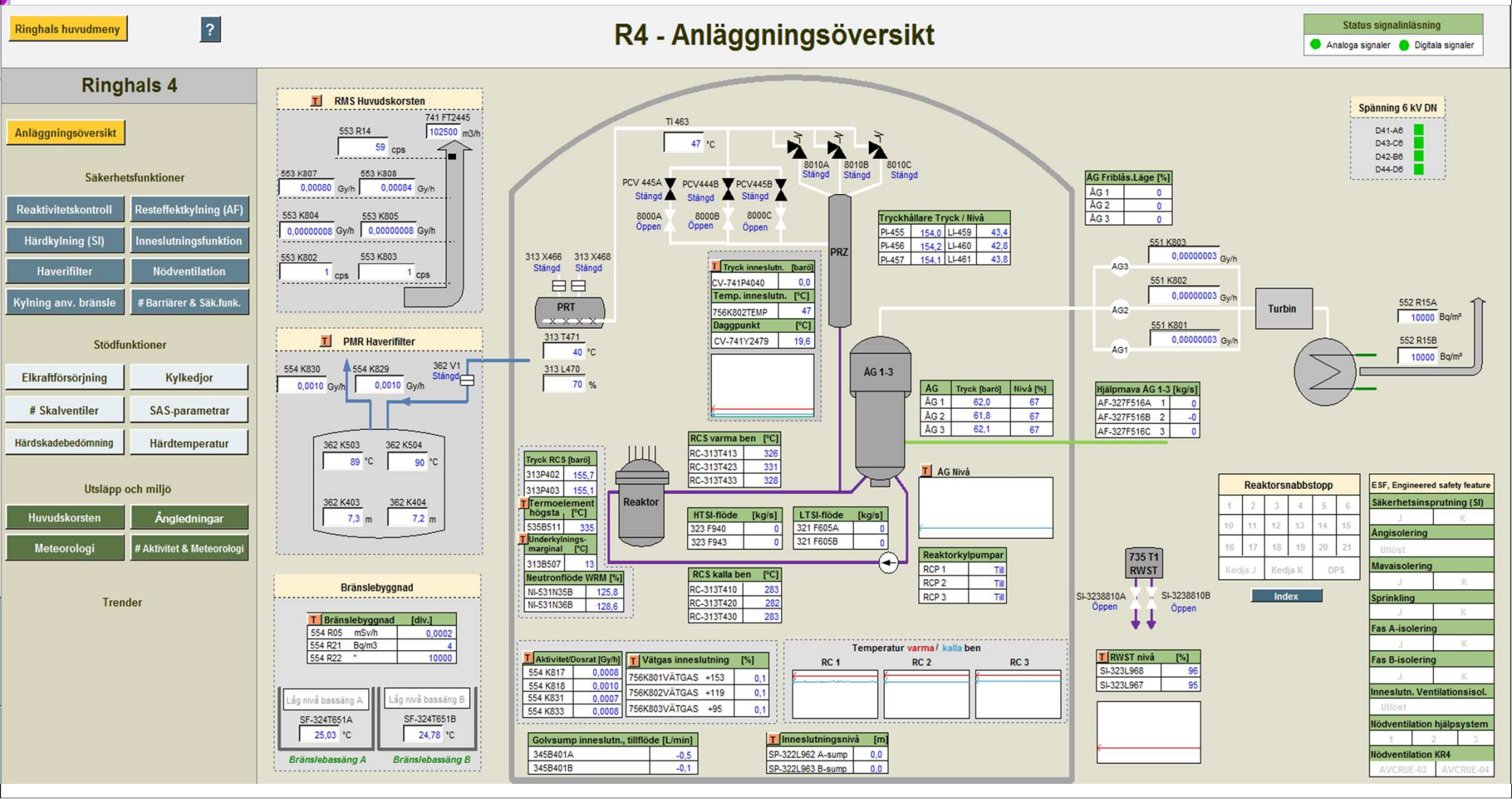
Key Outcome - Methodology

- Deterministic and probabilistic approach,
- Precalculated source terms and/or calculation during the emergency,
- Level of detail of the information at the emergency center, including timing (influencing the choice and applicability of tools),
- Autonomous analysis vs extensive interaction with plant at risk.

Key Outcome – Tools - RASTEP



Electronic Transmission of Process Parameters – ETAPP



Key Outcome - Database

- SSM together with LR contributed with a handfull of source terms representing Swedish design BWR reactors,
- The database provides SSM with a first approximation of a source term in case of an emergency in another country,
- Possibility to exercise other scenarios than typically used so far at SSM.

Key Outcome - Exercise

- Gained experience both using methods and tools,
- Learned from others,
- Possibility to benchmark exercise approaches with other countries and organisations,
- Gained an international overview on the chain of analysis in an emergency, from assessment of the accident to dose assessment to the public,
- IRIX – experience in producing a ST in IRIX format.

Conclusion on Key Outcome

- Possibility to discuss with other organisations and get insight in other countries working methods, challenges and thought about future development,
- Networking, facilitates dialogue between experts in both the preparedness and (if need be) the response phase,
- Deeper understanding of underlying priorities, assumptions and other prerequisites in methods and tools.

Thank you for your attention

Decision support

Objective: Identify the optimized protective action(s) for the public

- Reference levels
- Possible protection actions are primarily those prepared in advance.
  - Predefined EPZ
  - Prepared Actions: Evacuation, Sheltering, Iodine prophylaxis

Postulated Accident scenarios

- An event with functioning mitigation systems (FMS) – reference level 20 mSv
- An event without functioning mitigation systems – reference level 100 mSv

The initiating event for both cases is SBO.

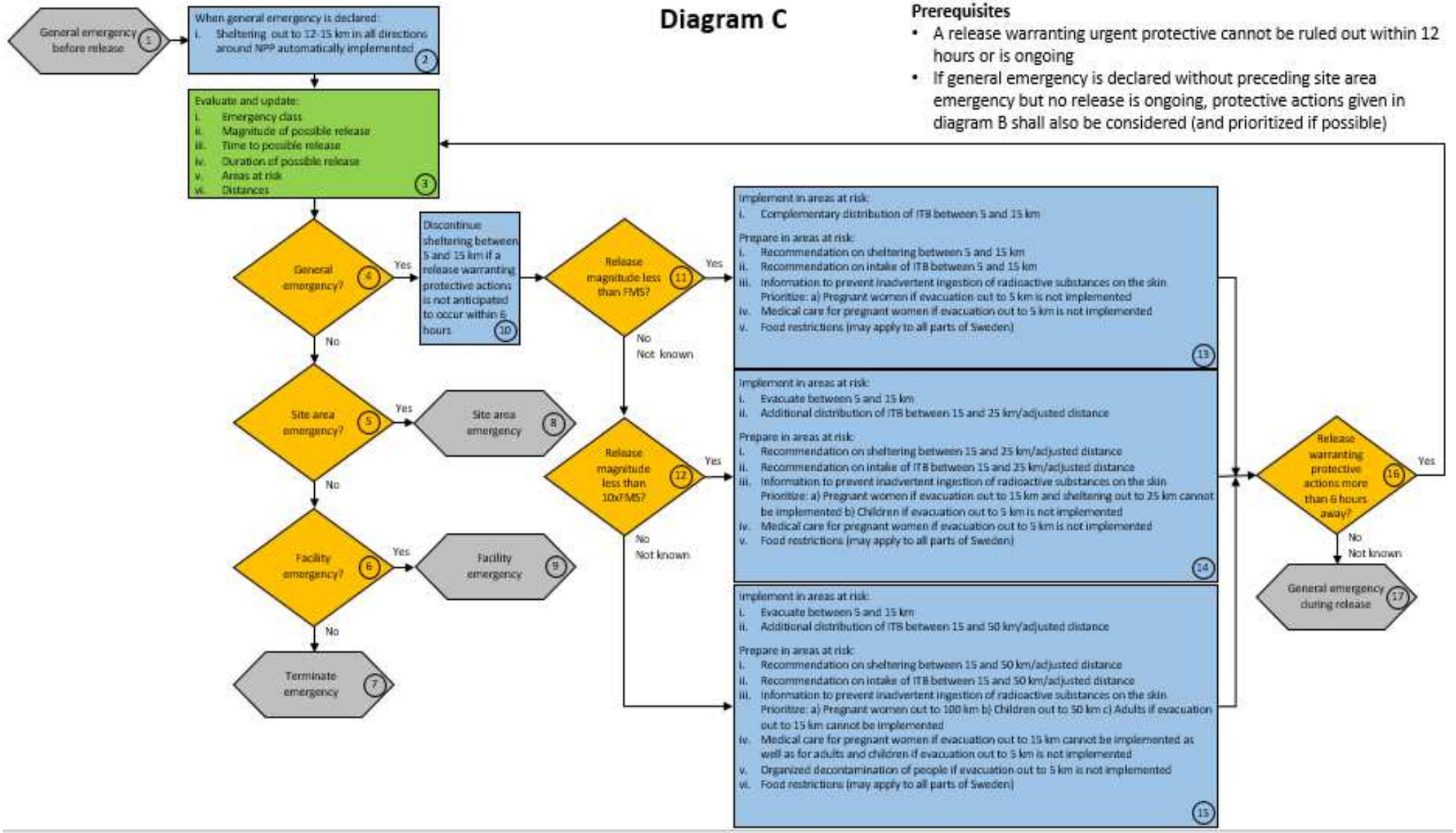
Decision support tool

- Depend on emergency class:
  - Facility emergency
  - Site area emergency
  - General emergency
- Magnitude of possible release
- Time to a possible release
- Duration of a possible release
- Area at risk
- Distances

Diagram C

Prerequisites

- A release warranting urgent protective cannot be ruled out within 12 hours or is ongoing
- If general emergency is declared without preceding site area emergency but no release is ongoing, protective actions given in diagram B shall also be considered (and prioritized if possible)

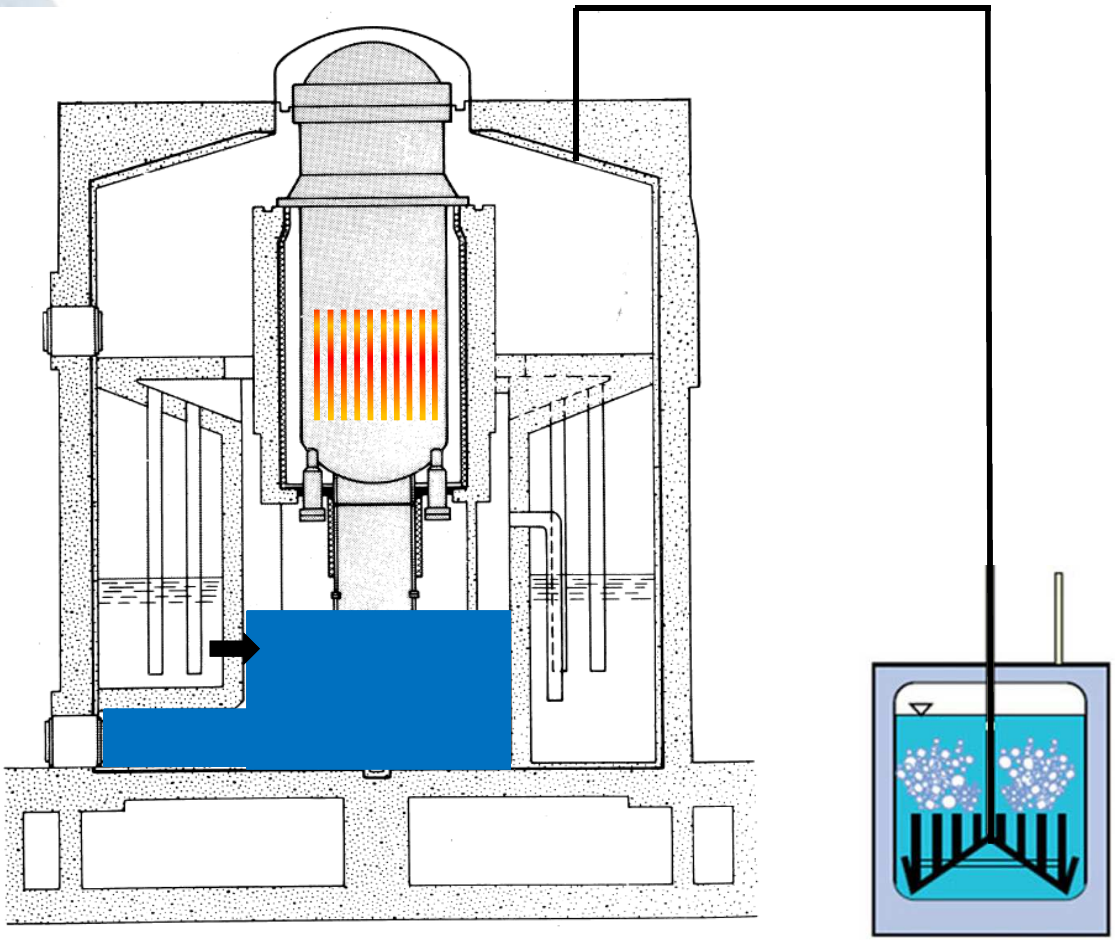


Decision support

- Magnitude of possible release
- Time to possible release
- Duration of possible release

Release magnitude	Xe-133	I-131	Cs-137
FMS	~5E+18 Bq	~1E+15 Bq	~1E+14 Bq
10xFMS	~5E+18 Bq	~1E+16 Bq	~1E+15 Bq
100xFMS	~5E+18 Bq	~1E+17 Bq	~1E+16 Bq

Mitigation Systems - FCVS



- Even if general emergency no other protective measures needed for the public than those already performed.

Nuclear Analysis team

Plant Assessment

- ETAPP – process parameters from NPP
- Information from NPP
- IAEA – RAT

”Predefined list of questions”

Source term Assessment

- RASTEP
- Database of scenarios and source terms
- Excel sheet for simple calculations
- Handbooks, reference material

Information from NPP

- Emergency classification
- Integrity of barriers
- Reactivitity Control
- Pressure relief of primary system
- ECCS emergency Core cooling system
- Residual Heat removal
- Containment Filtered Vent System
- Electrical power: external grid, diesel generators
- Information about; threats to barriers and safety functions, assessment of further development, measures taken or planned.
- Source term information, incl. prognosis

IAEA Reactor Assessment tool

EMERGENCY CLASSIFICATION ASSESSMENT

KEY BARRIERS AND CRITICAL SAFETY FUNCTIONS

RELEASE

ELECTRICITY AND WATER SUPPLY

PRELIMINARY PROGNOSIS

IAEA Reactor Assessment tool

EMERGENCY CLASSIFICATION ASSESSMENT

KEY BARRIERS AND CRITICAL SAFETY FUNCTIONS

RELEASE

ELECTRICITY AND WATER SUPPLY

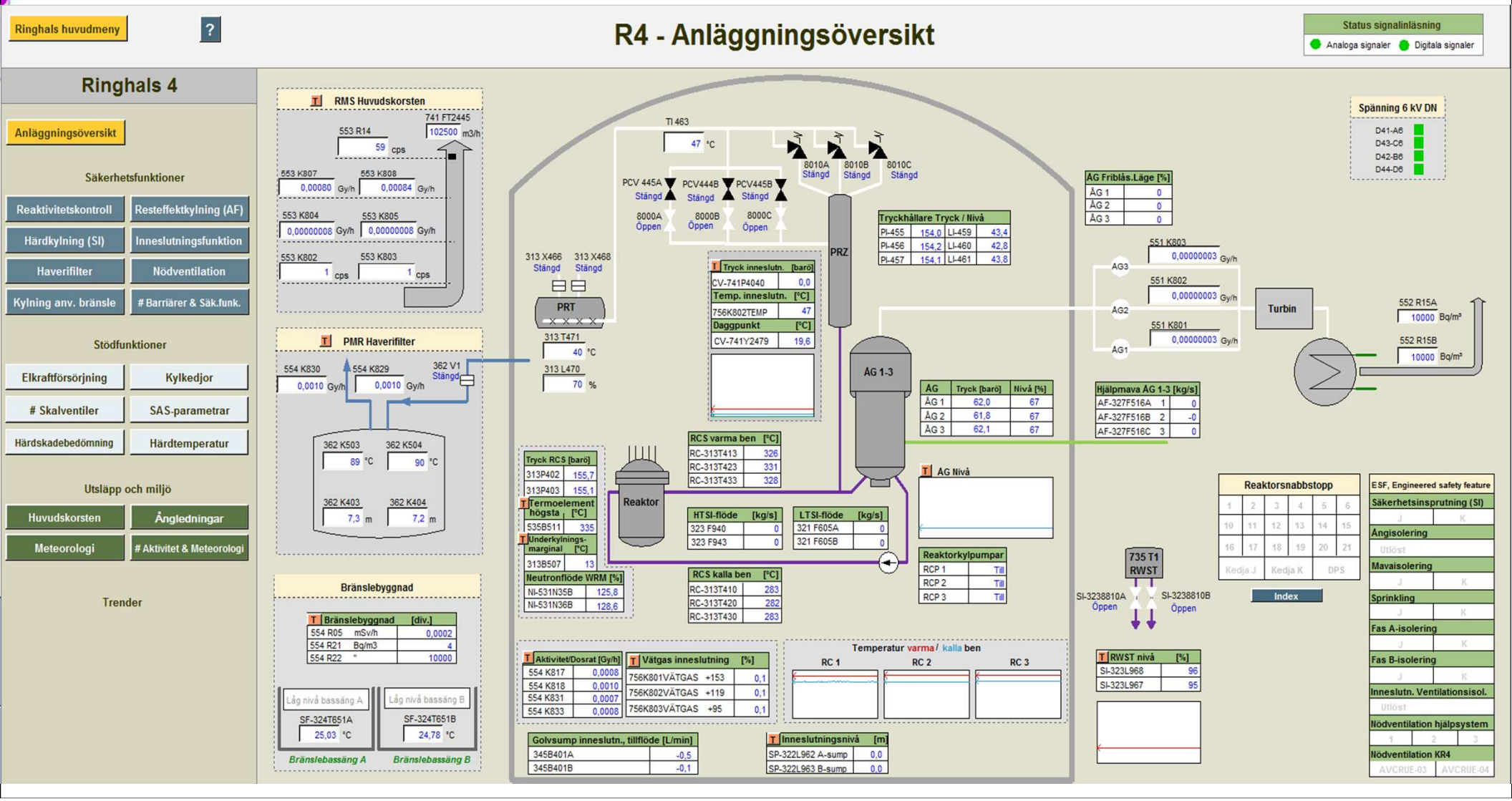
PRELIMINARY PROGNOSIS

- Magnitude of release – refer to need for public protective actions
- Release conditioning – filtered venting
- Prel. Prognosis – situation changes within next 12 – 48 h.

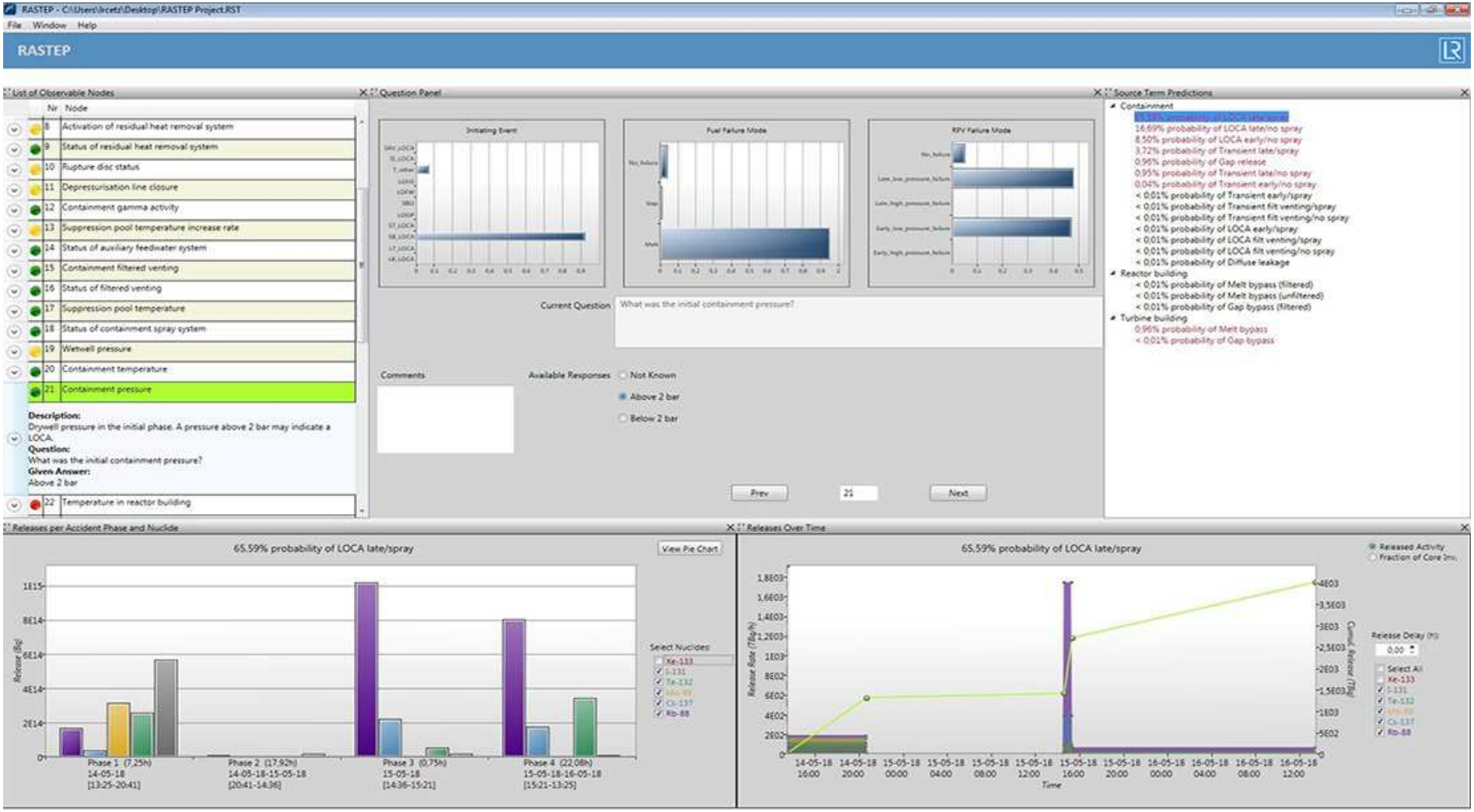
SSM Decision support

- Depend on emergency class:
  - Facility emergency
  - Site area emergency
  - General emergency
- Magnitude of release
- Time to release
- Duration of release

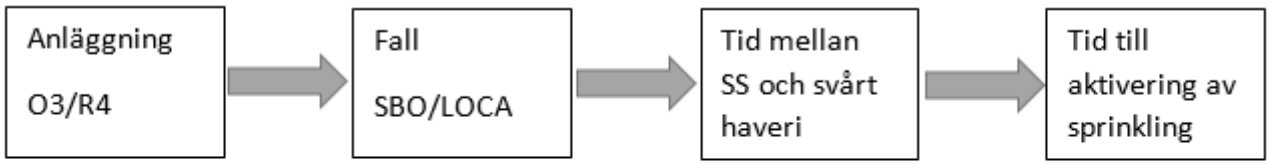
Electronic Transmission of Process Parameters – ETAPP

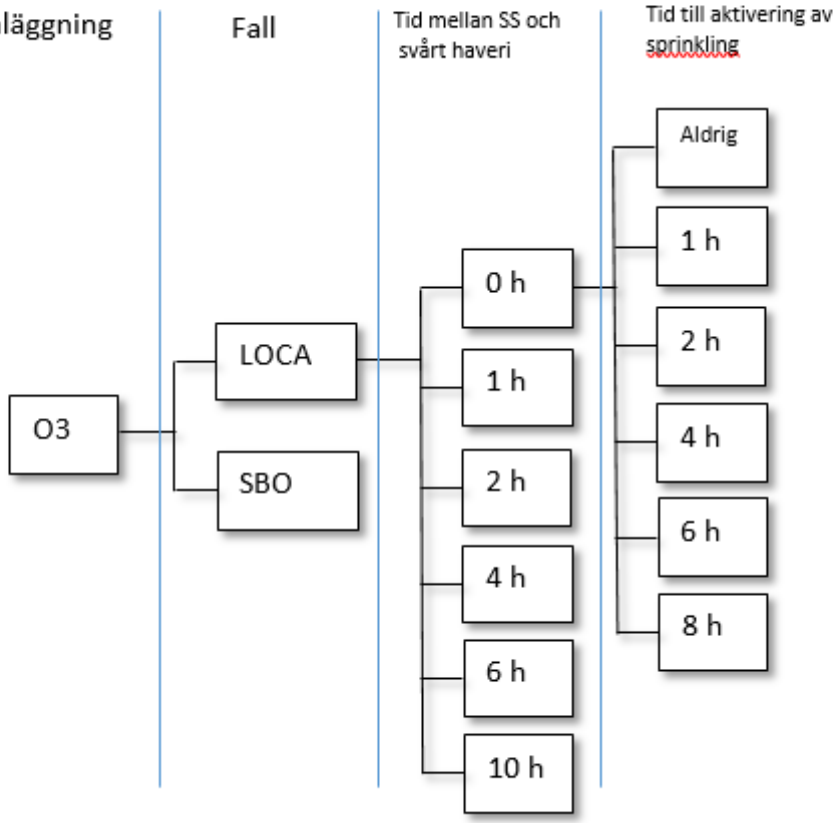


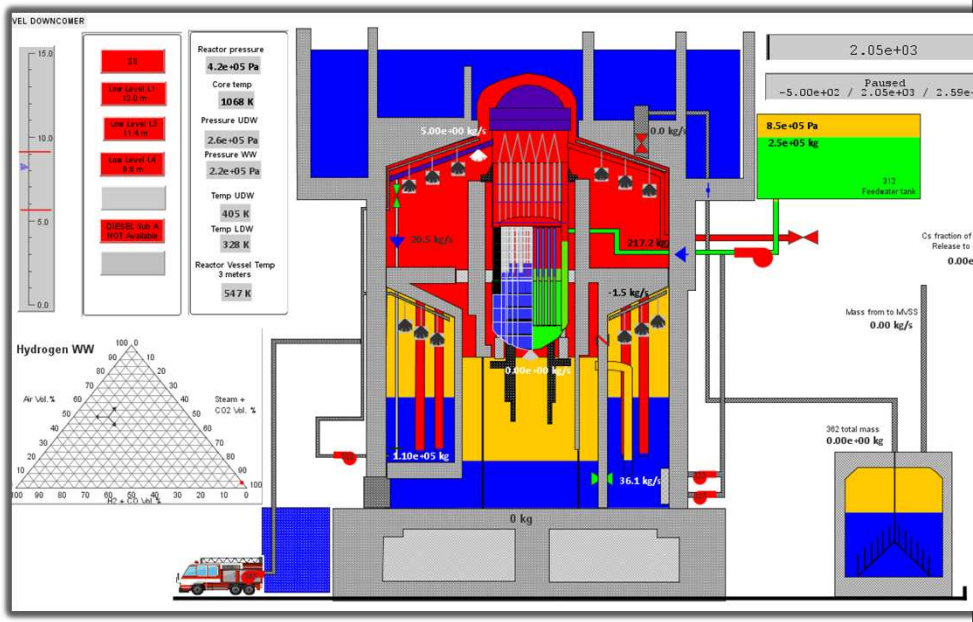
RASTEP
Rapid Source Term Prediction

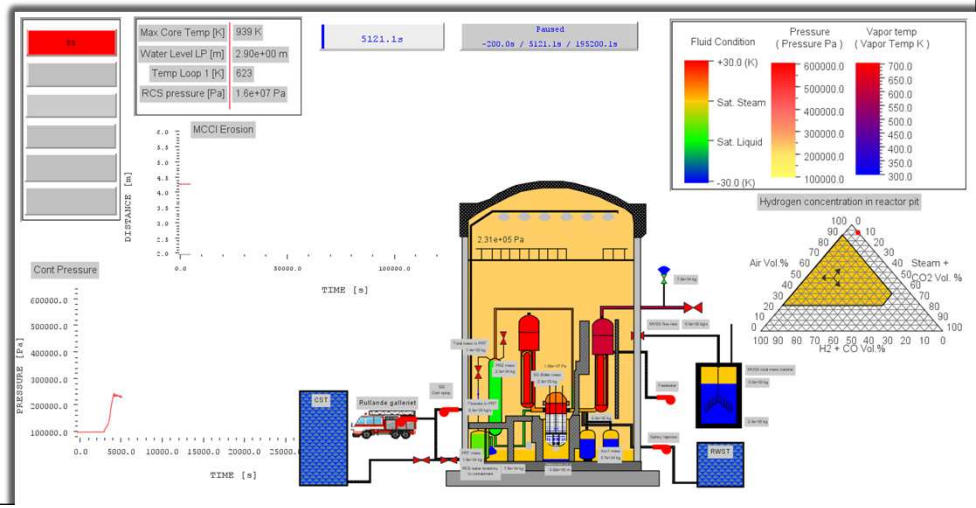


Source Term Database









Exercise

- 2-3 april 2019
- Initiating event: security event, sabotage
- Plant Assessment:
  - ETAPP
  - Information from NPP (telephone, fax)
  - Used RAT to visualize the plant status
- Source term Assessment:
  - Precalculated scenarios, handbooks, reference litt., discussions with NPP
- Challenges: documentation, information, timing

Thank you for your attention