Implementation of FASTNET Tools in Norwegian Emergency Preparedness

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DSA

Direktoratet for strålevern og atomsikkerhet

Norwegian Radiation and Nuclear Safety Authority

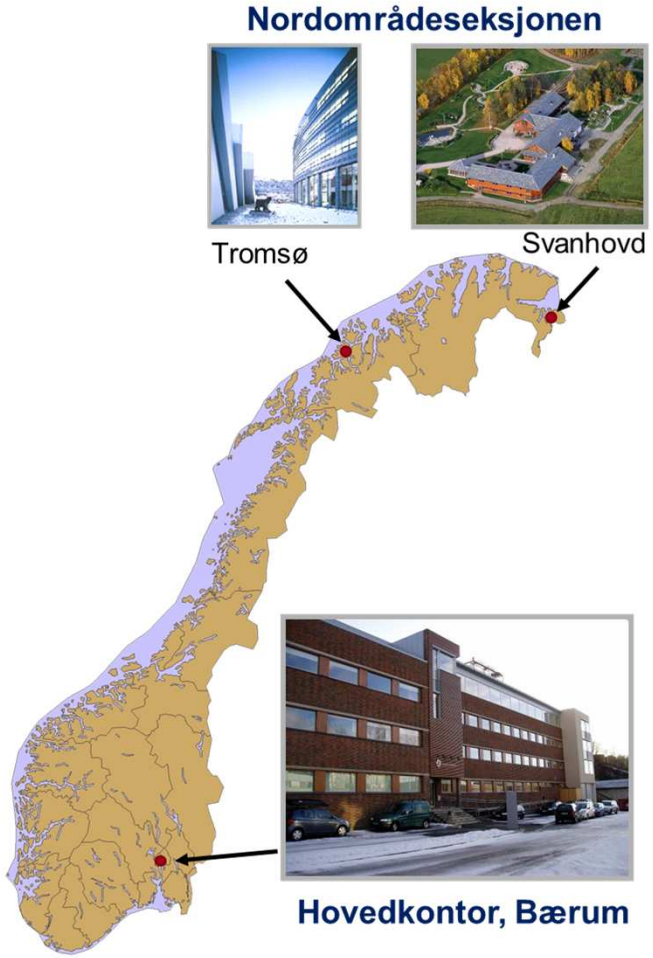
Outline

- Introduction of DSA and the Emergency preparedness organization
- Nuclear sites in Norway
- Nuclear power plants close to Norway
- Source terms – present practice
- Use of RASTEP

DSA - Intro

Norwegian Radiation and Nuclear Safety Authority (DSA) is the national authority and expert body in matters concerning nuclear safety, security, safeguards, radiation use, natural radiation and radioactive contamination in the environment.

DSA is a directorate for the Ministries of Health and Care Services, Climate and Environment, Foreign Affairs and Defence.



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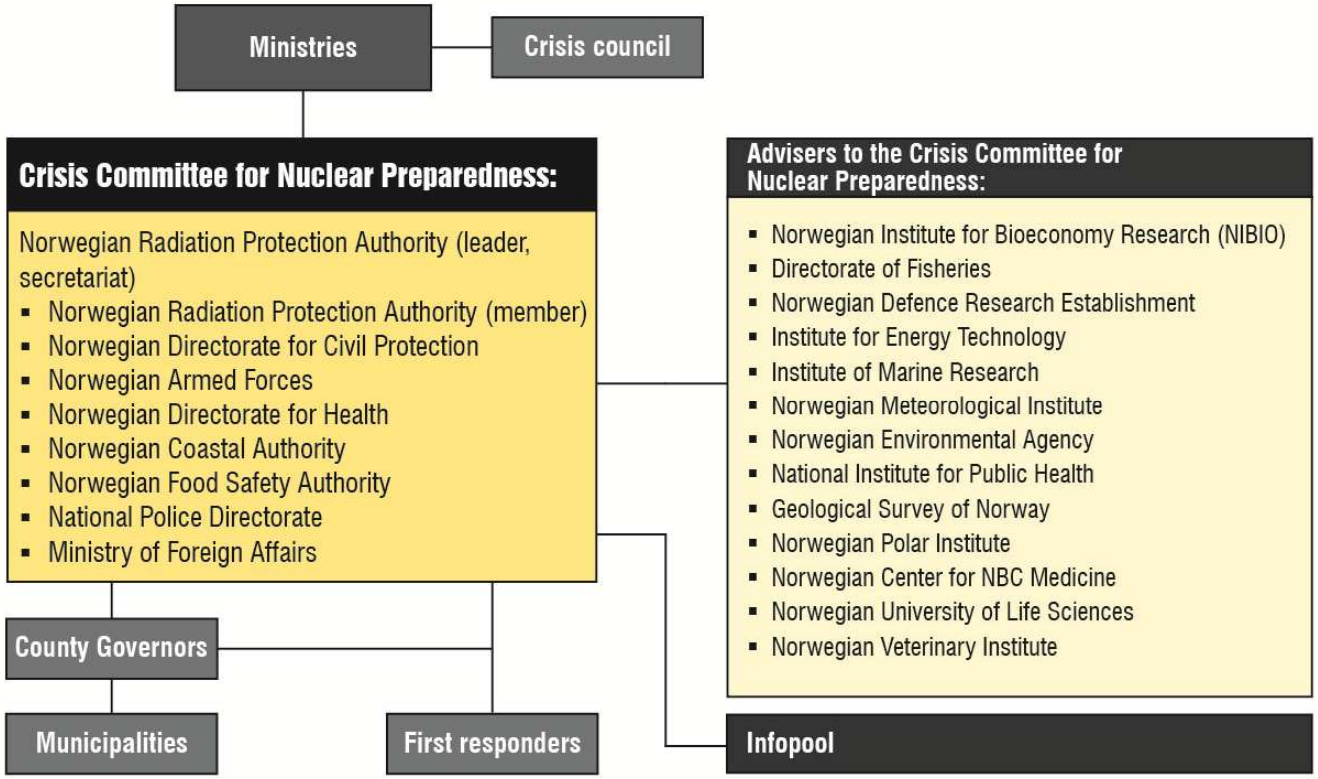
Crisis Committee for Emergency Preparedness



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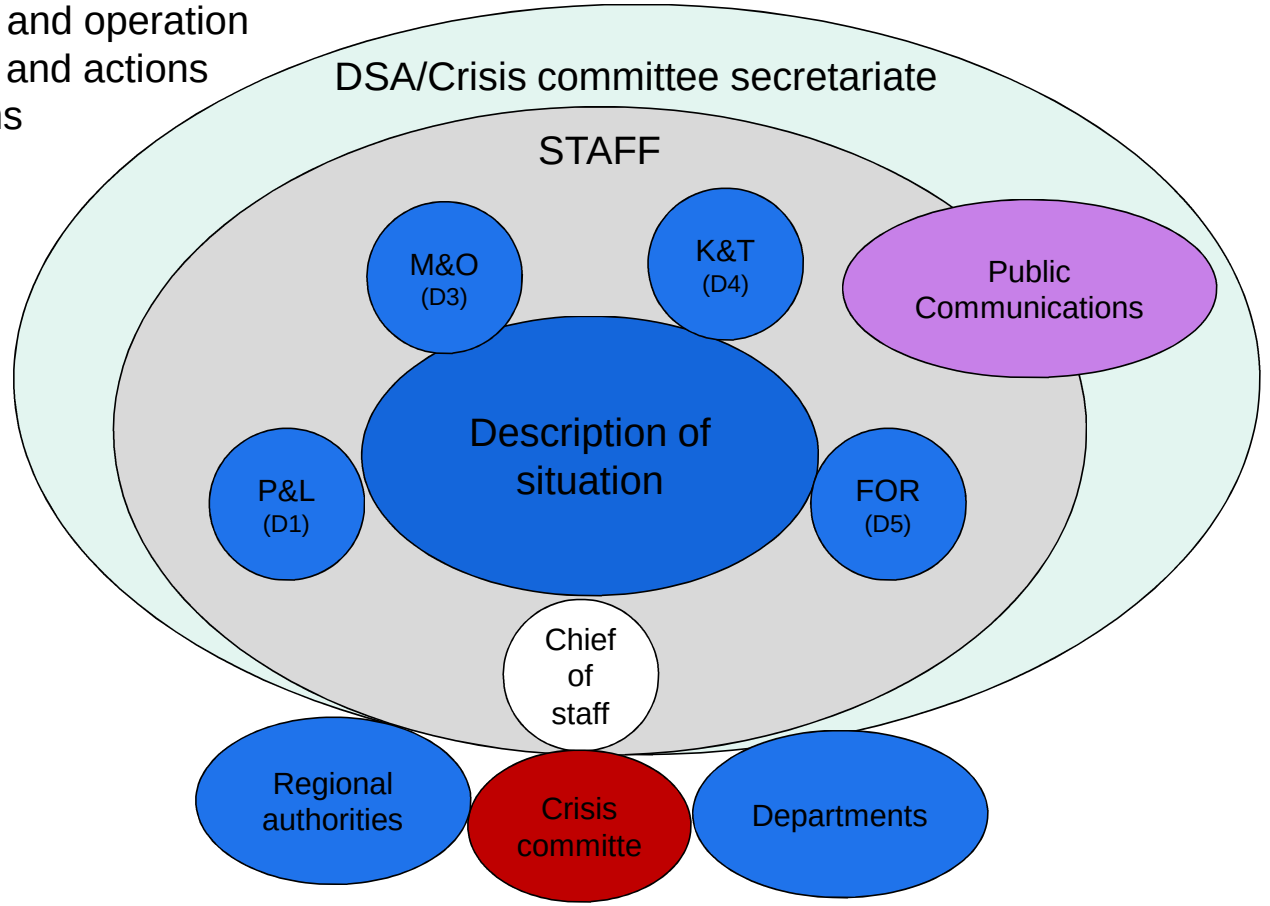
P&L – Personell and logistics
M&O – Measurements and operation
K&T – Consequenses and actions
FOR – Communications



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Sites in Norway

Institute of Energy Technology

→ Independent international research foundation
  → Staff ~ 550

→ 1959 – HBWR, 25 MW (Halden)
  → Operational license expires in December 2020
    → Permanently shutdown

→ 1966 – JEEP II, 2 MW (Kjeller)
  → Operational license expires in December 2025
    → Permanently shutdown

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Fuel storages at reactor sites

- → Fuel storages in Halden
  - → Wet fuel storage in reactor hall – 3 fuel pits
  - → Wet fuel storage pond outside reactor building
  - → Dry fuel storage

- → Fuel storages at Kjeller
  - → Wet fuel storage ponds inside reactor buidling
  - → Dry fuel storage from JEEP II
  - → Dry Fuel storage from JEEP I reactor

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Nuclear power plants close to Norway (within the scope of FASTNET project)

- → Olkiluoto (Finland) – 2 BWR units in operation
- → Forsmark (Sweden) – 3 BWR units in operation
- → Oskarshamn (Sweden) – 1 BWR unit in operation
- → Ringhals (Sweden) – 1 BWR and 3 PWR units in operation
- → Kola (Russia) – 4 VVER 440 units in operation

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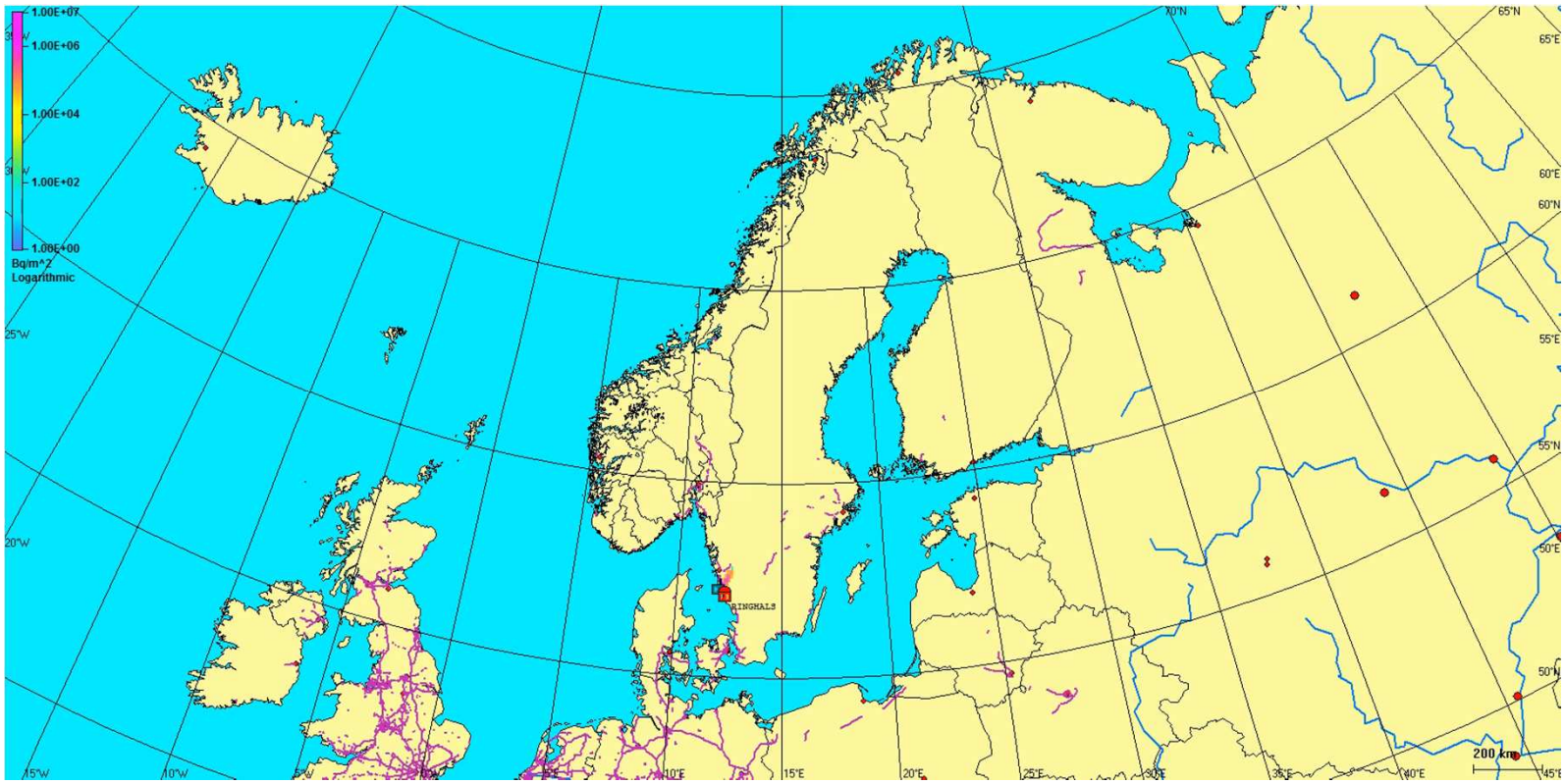
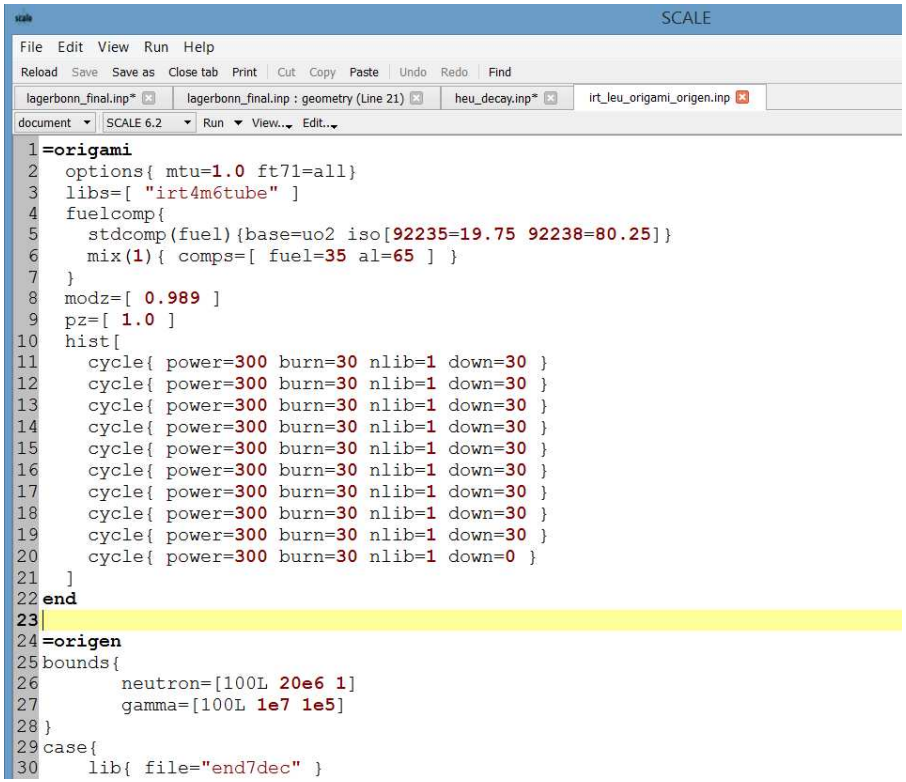
ARGOS – Radiation dispersion model



Estimation of Source term - Present practice

- → An important input parameter to ARGOS is source term
- → We use SCALE 6.2 for:
  - → reactor criticality safety
  - → estimation of radionuclide inventory in nuclear fuel
- → ORIGEN is used for calculation of source term.



Use of RASTEP as emergency preparedness tool

- → Provides support for independent evaluation of severe accident progression and possible off-site consequences.
- → Interface with off-site consequence analysis tools, e.g., ARGOS
- → DSA initially planned to use RASTEP for the Halden reactor and the onsite spent fuel ponds.
  - → RASTEP project started in 2017/2018
    - → Discussed both generic models and a model for the wet storage in Halden.
  - → Halden reactor decided to permanently shut down in June 2018
    - → Reactor not operated after February 2018
  - → Discussions with Lloyds concerning the use of RASTEP for Halden.
- → Consider to use RASTEP for generic models.

RASTEP – generic models

→ From the generic models under FASTNET project DSA will be implementing the following:

Reactor Type	Plant	DSA implementation plan
PWR	Generic Type	✓
BWR	Generic Type	✓
CANDU	Generic single-unit CANDU6	✗
VVER	Generic VVER 440/213	✓ ◆
other	Generic spent fuel pool	✓ ◆

- The direct use of source term from the FASTNET database is other option

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Summary

- → We plan to use source terms from FASTNET
  - → For all recator types and spent fuel ponds
  - → In RASTEP for generic models – BWR and PWR
- → The outcome will be fed into ARGOS for dispersion models
- → This will enhance the emergency preparedness in Norway

Thank you for your attention