Post-Fukushima
Stress tests peer review

Public Meeting

Stress Test Peer Review
Topic 2 Loss of Safety Systems

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17 January 2012

T2 - Technical scope

- Loss of electrical power, including Station Black – Out (SBO – full loss of power supply and back-up systems)
- Loss of Ultimate Heat Sink (UHS)
- Combination of both

- Important safety functions has been lost in Fukushima as consequences of the above occurrences.
- Considering issues highlighted by the accident.

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Damage of back-up power sources

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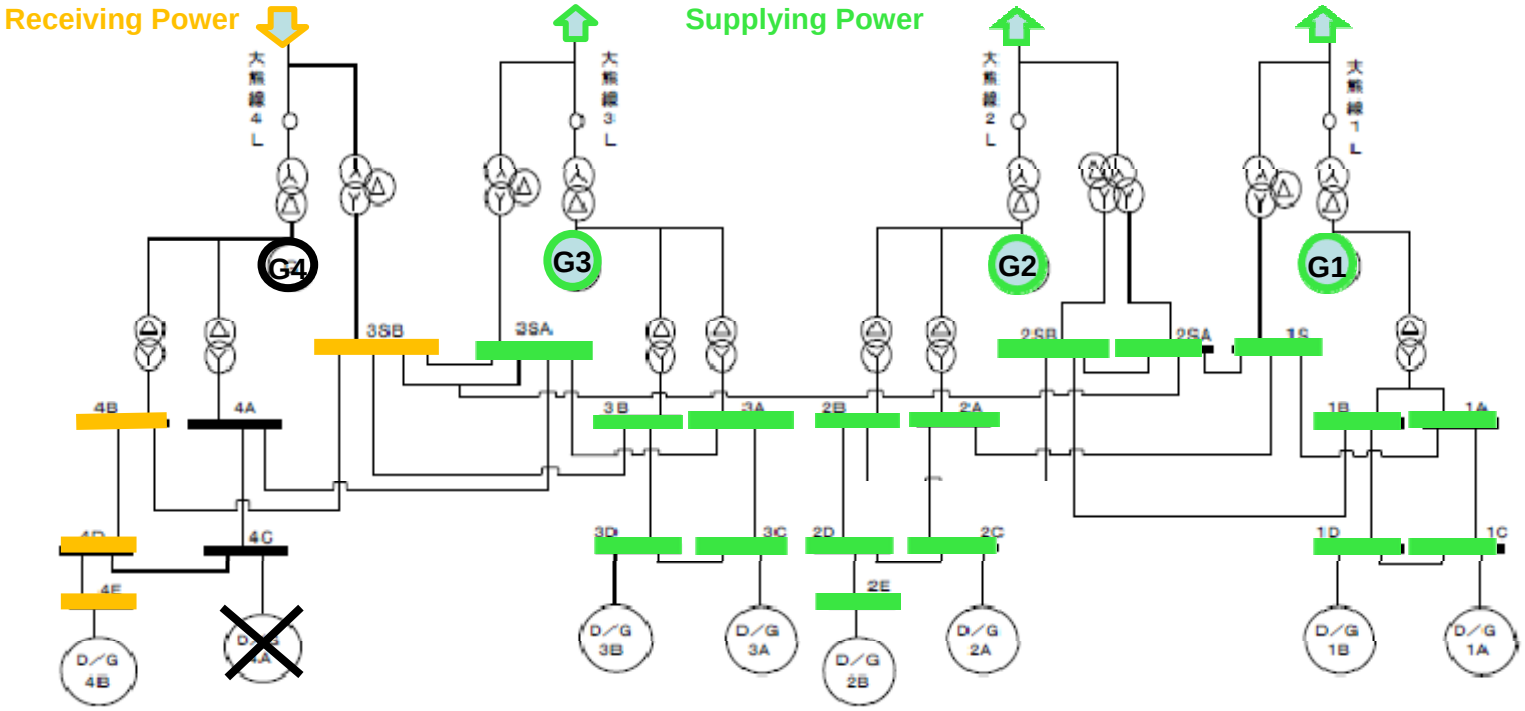
Power supply of Unit 1-4 before Earthquake



Unit 1-3 in operation, Unit 4 in annual outage

- Power supplied
- Off-site power supply
- Not powered (outage/maintenance)

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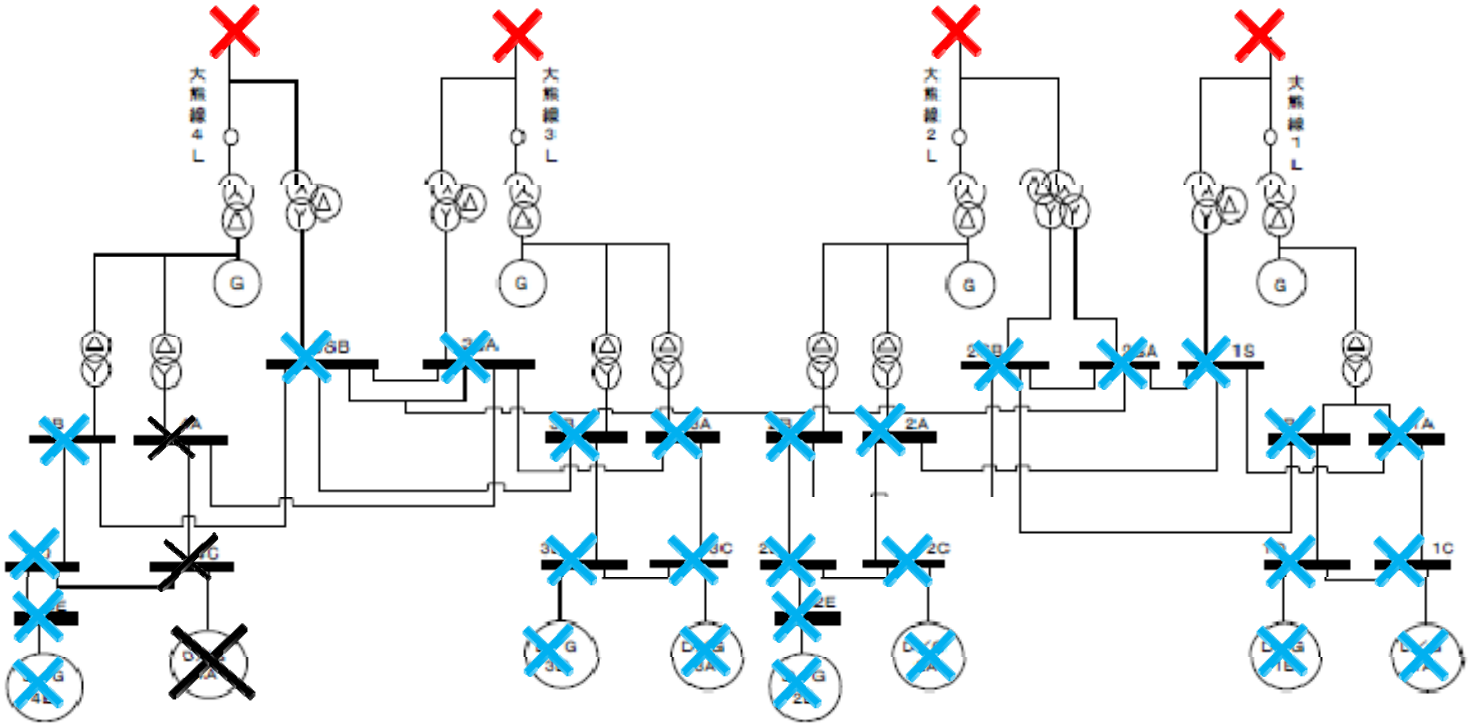
Power supply of Unit 1-4 after Tsunami



Shutdown by earthquake

Shutdown by Tsunami

Outage/maintenance

The EDGs lost the function due to either “loss of sea water system,” or “EDG main unit failure”.

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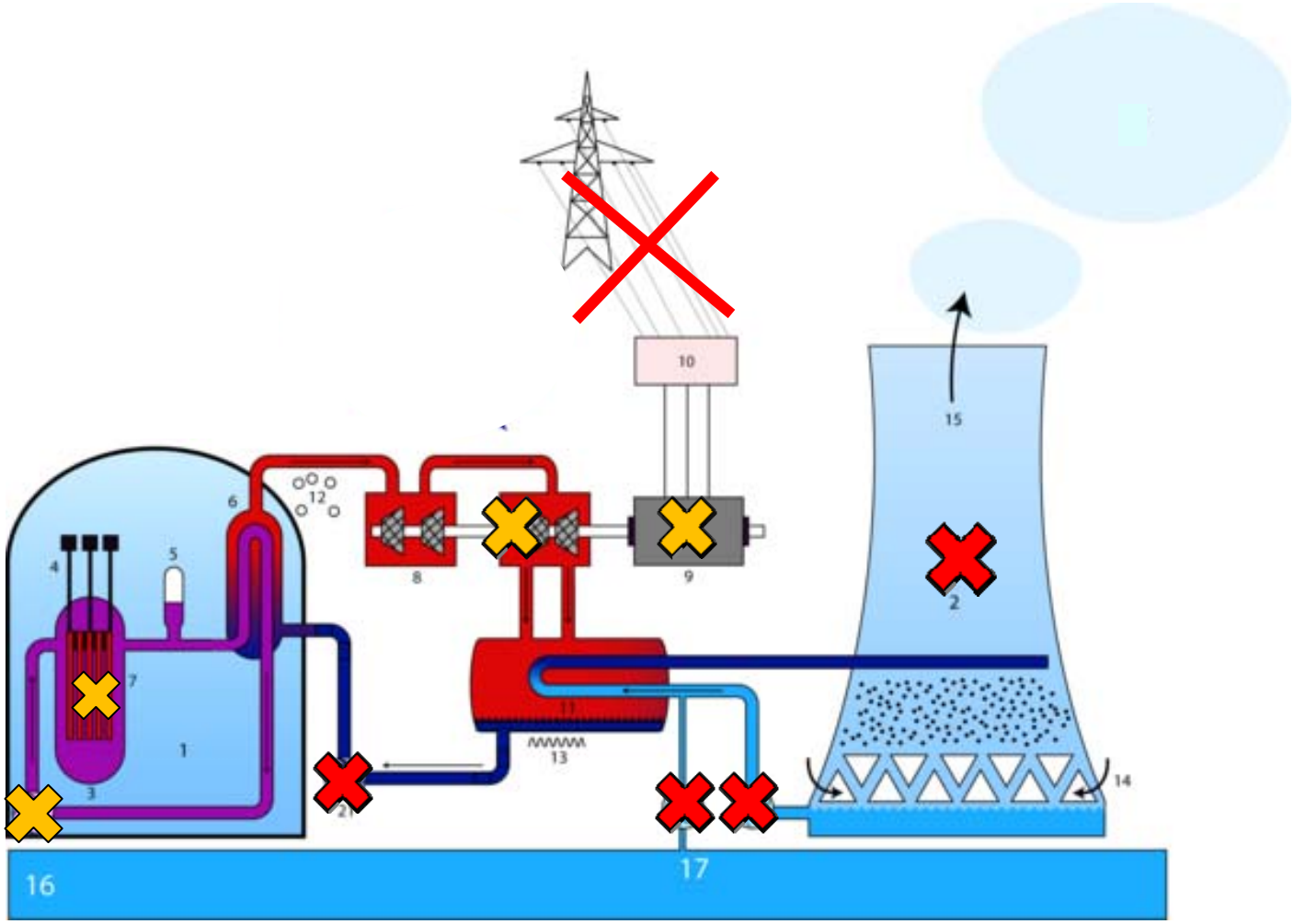

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T2 - Stress test conditions (1)

- Off- site power should be lost for several days
- Plant site isolated from delivery of heavy material for 72 hours
- Portable light equipment can arrive after the first 24 hours
- Assuming that all reactors on the same site have the same status

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T2 - Stress test conditions (2)

- **Loss of electrical power**
  - Loss of off-site power
  - Loss of off-site power and the ordinary back-up power source
  - Loss of off-site power, the ordinary back-up power sources and permanently installed diverse back-up sources

T2 - Stress test conditions (3)

- **Loss of the primary and alternate ultimate heat sink**
  - Loss of the primary ultimate heat sink
    - Loss of access to cooling water from river, lake, sea and cooling tower
  - Loss of off the primary and alternate ultimate heat sink

T2 - Stress test conditions (4)

- **Loss of the ultimate heat sink combined with station black-out (SBO)**
  - Time until loss of normal cooling conditions of reactor and spent fuel pool
  - Existing measures to prevent fuel degradation
    - Equipment already present on site, e.g. equipment from another reactor (reactors on the same site are equally damaged)

T2 – Expected Outcomes of Topical Review

Judgment of robustness of the design and the sites:

- Withstand loads as postulated in ENSREG specifications,
- Time limitations given by plant technical status and start point operational mode/ time available to recover the lost function fulfillment,
- Capacities and constrains given by availability of power supply and other means necessary for safety functions fulfillment,
- Measures to be taken to mitigate the consequences and to avoid severe fuel damages,
- Identification of possible weak points and cliff-edge effects and potential improvements,
- Recognition of design strong safety features and identification of feasible plant improvements.

Draw conclusions from National Reports from 17 states operating NPPs

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Thank You

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