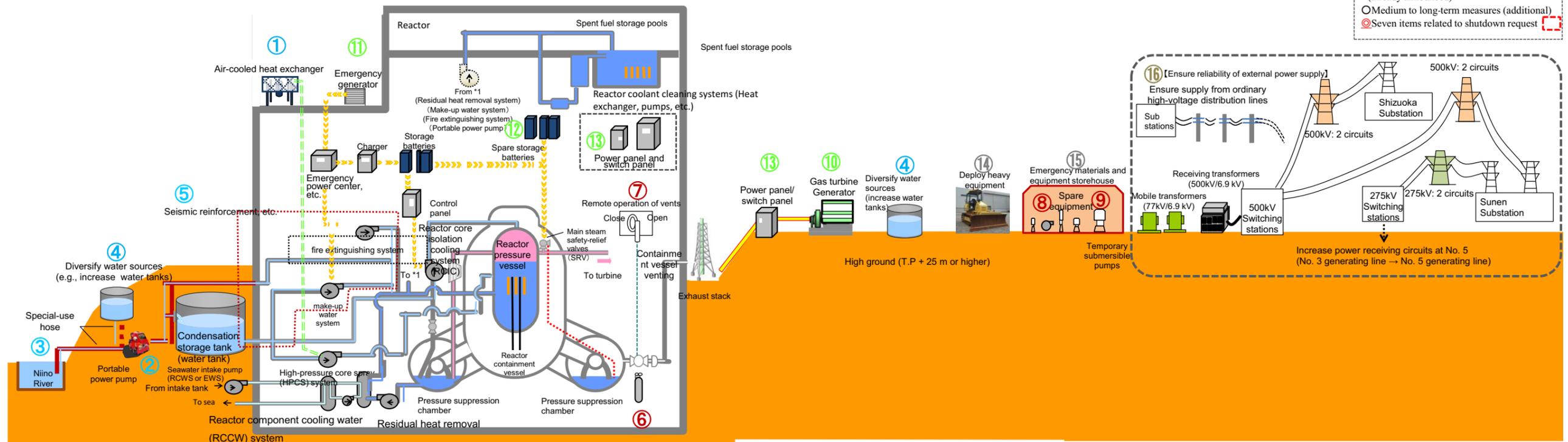


## Strengthening Emergency Countermeasures and Ensuring Reliability of External Power Supply

### [Ensure cooling function]

As further measures, we will provide multiple and diverse alternative means of ensuring **water spraying**, **heat removal** and **power supply** so that reactors can maintain a stable hot shutdown state and subsequently be reliably and safely brought to cold shutdown even in the event of complete loss of AC power and loss of seawater cooling function, problems that occurred at the Fukushima Daiichi Nuclear

- Emergency Safety Measures (already announced)
- ◎ Medium to long-term measures (already announced)
- Medium to long-term measures (additional)
- ⑧ Seven items related to shutdown request



### Water spraying equipment measures

"Diversify high-pressure core spray function"

- ① ○ Ensure equipment cooling alternatives so that high-pressure core spray (HPCS) system is operable
  - Use seawater to cool HPCS system equipment, and ensure air-cooled heat exchangers as alternative cooling means in case of loss of function (power supplied by gas turbine generator)

"Diversify water sources and supply methods, and enhance seismic reliability of supply lines"

- ② ● Ensure portable power pumps
  - Ensure portable power pumps to ensure final water spraying function in case of emergency
- ③ ◎ Diversify water intake sources (intake water from Niino River)
  - Using a special-use hose, take fresh water from the Niino River, next to power station
- ④ ○ Diversify water sources (e.g., increase water tanks)
  - Increase water tanks to diversify water sources
- ⑤ ○ Seismically reinforce make-up water system, etc., add water spray pipes
  - Increase seismic durability to ensure alternative water spray lines

### Heat removal equipment measures

"Strengthen containment vessel venting system"

- ⑥ ● Install nitrogen tanks to operate containment vessel venting valves
  - Install nitrogen tanks to operate reactor containment vessel vents promptly even if all AC power is lost
- ⑦ ○ Remote operation of containment vessel vents
  - Enable vents to be remotely operated from central control room to ensure prompt and dependable vent operation

"Ensure spare equipment for emergency core cooling system, etc."

- ⑧ ◎ Ensure spare equipment for reactor cooling water system (RCWS), reactor component cooling water (RCCW) system, residual heat removal (RHR) pumps and motors
  - In case of breakdown of equipment needed for cold shutdown of reactor, ensure the necessary spare equipment and restore heat removal function
- ⑨ ◎ Ensure temporary submersible pumps
  - Ensure submersible pumps to be temporarily placed in intake tanks as alternative to reactor cooling water system (RCWS) pump

[⑧ and ⑨ together are one item related to shutdown request]

### Power source equipment measures

"Diversify power sources and increase their reliability"

- ⑩ ◎ Put emergency AC power equipment (gas turbine generators) on high ground

(supplying high pressure core spray (HPCS) system, reactor core isolation cooling (RCIC) system, main steam safety relief valve (SRV), storage batteries, make-up water pump, fire extinguishing pump, containment vessel venting valve, emergency water intake system (EWS), reactor cooling water system (RCWS), reactor component cooling water (RCCW) system, residual heat removal (RHR), etc.)

  - To diversify emergency power supply, put one gas turbine generator on high ground of T.P. + 25 m or higher, for each of Nos. 3-5
- ⑪ ● Add emergency generators to building rooftops
 

(supplying reactor core isolation cooling (RCIC) system, main steam safety relief valve (SRV), storage batteries, make-up water pump)

  - On reactor building rooftops, ensure power supply for such purposes as operating reactor core isolation cooling (RCIC) system and make-up water pump to spray water, and operating main steam safety relief valve (SRV) to remove heat
- ⑫ ◎ Ensure spare storage batteries

(supplying reactor core isolation cooling (RCIC) system, main steam safety relief valve (SRV))

  - Ensure spare storage batteries to diversify DC power supply
- ⑬ ○ Place power panels and switch panels on upper floors or high ground
  - Elevate the power panels and switch panels that supply power to various equipment needed to cool reactors and fuel pools

### <Other>

- ⑭ ● Deploy heavy equipment such as bulldozers
  - Deploy rubble-removal heavy equipment so that if tsunami flotsam, etc., is spread across roads, it does not interfere with the transportation of spare equipment
- ⑮ ◎ Put emergency materials and equipment storehouse on high ground
  - Put supplies warehouse on high ground of T.P. + 25 m or higher

### ⑮ [Ensure reliability of external power supply]

It is assumed that external power supply will be lost immediately following an earthquake and will not subsequently be restored. Because of the importance of the power supply, take measures to restore it promptly.

<Increase reliability of external power supply>

- ◎ Increase power receiving circuits at No. 5 (No. 3 generating line → No. 5 generating line)
  - In addition to four 500 kV circuits, install circuits in No. 5 enabling it to receive power from two 275 kV circuits (increase power receiving circuits at No. 5 so it, like Nos. 3 and 4, can receive power from three systems (six circuits))

<Flooding countermeasures (after restoration of external power supply)>

- ◎ Set receiving transformers on high ground (set 500 kV/6.9 kV transformers on high ground)
  - In case of flooding of outdoor transformers by tsunami, etc., install receiving transformers to supply large volumes of power needed to cool reactor core for long periods
- Ensure supply from ordinary high-voltage distribution lines
  - Install distribution lines to supply power from ordinary high-voltage distribution lines off the power station grounds to emergency generating lines
- Set mobile transformers on high ground (set 77 kV/6.9 kV transformers on high ground)