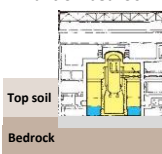







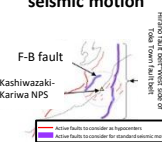

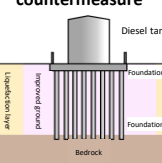




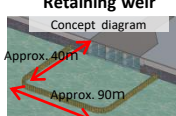



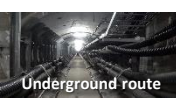












# Safety Measures at the Kashiwazaki-Kariwa Nuclear Power Station※

※ In the case of Units 6 and 7

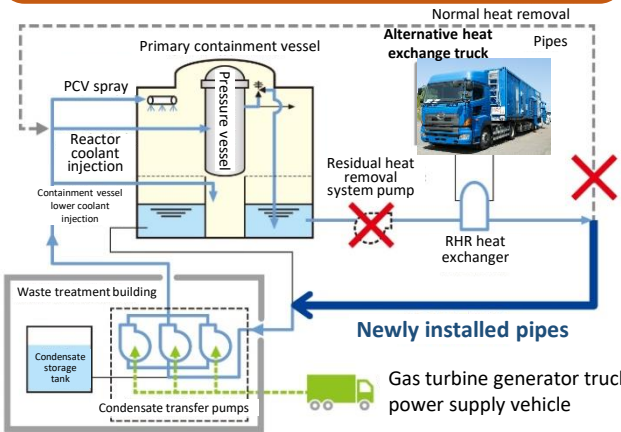
## 1. Examples of redundant and diversified safety measures (Before and after the accident)

|  | Measures to prevent accidents caused by natural disasters  |  |   | Measures to prevent escalation to a nuclear disaster   |  |   |
|--|--|--|---|--|--|---|
|  | Earthquake   | Tsunami  | Misc.   | Power  | Coolant injection/heat removal   | Misc.   |
| Primary measures before the Fukushima Daiichi Nuclear Power Station Accident (before the accident)                 | <p><b>Built on bedrock</b></p>  <p>Top soil<br/>Bedrock</p> <p><b>Exhaust stack reinforcement</b></p>  <p>Added pillars<br/>Original pillar</p>  | <p>Desing basis tsunami assessment when building was originally constructed (Tsunami height: Approx. 3m)</p>   | <p><b>Hydraulic control unit※2</b></p>  <p>※2 Device that instantly inserts control rods into the reactor in the event of a reactor scram</p>  | <p><b>Off-site power (five lines)</b></p>  <p><b>Emergency diesel generators※3</b></p>  <p>※3 Three generators installed for each unit. Power interchange between units possible</p>   | <p><b>Emergency Core Cooling System (coolant injection)</b></p>  <p><b>Residual Heat Removal System (heat removal)</b></p>   | <p><b>Flammability Control System Recombiner※5</b></p>  <p>※5 Suppresses the rise of hydrogen concentration/oxygen concentration inside the primary containment vessel</p> |
| Added/enhanced measures in light of the new regulatory requirements issued after the accident (after the accident) | <p><b>Revisions to standard seismic motion</b></p>  <p>F-B fault<br/>Kashiwazaki-Kariwa NPS<br/>Western edge of Noto Peninsula<br/>East coast of Honshu<br/>East coast of Hokkaido<br/>Kanto Plain<br/>Actual faults to consider for standard seismic motion</p> <p><b>Pipe supports added</b></p>  <p><b>Liquefaction countermeasure※1</b></p>  <p>Diesel tank<br/>Foundation plate<br/>Foundation piles<br/>Bedrock<br/>Improved ground<br/>Liquefaction layer<br/>※1 Unit 6 a diesel tank example</p> | <p><b>Tsunami reassessment (Tsunami height: Approx. 7~8 m)</b></p> <p><b>Seawall</b></p>  <p>15m above sea level</p> <p><b>Watertight door</b></p>  <p><b>Intake tank closure plate reinforcement</b></p>  <p><b>Waterproofing</b></p>  <p><b>Retaining weir</b></p> <p>Concept diagram</p>  <p>Approx. 40m<br/>Approx. 90m</p> | <p><b>Lashing equipment (tornado countermeasure)</b></p>  <p><b>Firebreak (forest fire countermeasure)</b></p>  <p><b>Power transmission routes</b></p>  <p>Aboveground route</p>  <p>Underground route</p> <p><b>Power supply vehicle</b></p>  <p><b>Additional DC power source※4</b></p>  <p>※4 Used to power monitoring instruments and control important equipment</p> | <p><b>Air-cooled gas turbine generator truck</b></p>  <p>Parked on Units ~7 side</p>  <p>Parked on Unit 1~4 side</p> <p><b>High Pressure Alternate Cooling System (coolant injection)</b></p>  <p><b>Fire truck (coolant injection)</b></p>  <p><b>Blowout panel closure device (release mitigation)※6</b></p>  <p>※6 Reduces the exposure of operators handling the accident</p> <p><b>Alternative heat exchanger truck (heat removal)</b></p>  <p><b>Filter vent (release mitigation)</b></p>  | <p><b>Hydrogen treatment equipment (hydrogen explosion prevention)</b></p>  <p><b>Removes 98% or more of radioactive iodine from gaseous radioactive substances (reduced to 1/50 or less)</b></p> <p><b>Enlargement of iodine filter</b></p>  <p>Vent gas inlet<br/>Adsorption tower<br/>Vent gas outlet</p> <p><b>Enlargement of filter equipment</b></p>  <p>Vent gas inlet<br/>Vent gas outlet</p> <p><b>Removes 99.9% or more of particulate radioactive substances by passing the gases through water and metal filters inside the equipment (reduced to 1/1000 or less)</b></p> |   |

## 2. PCV cooling

Preparing for increases in PCV temperature and pressure

### Alternative coolant circulation system



The release (venting) of radioactive substances can be avoided for approximately

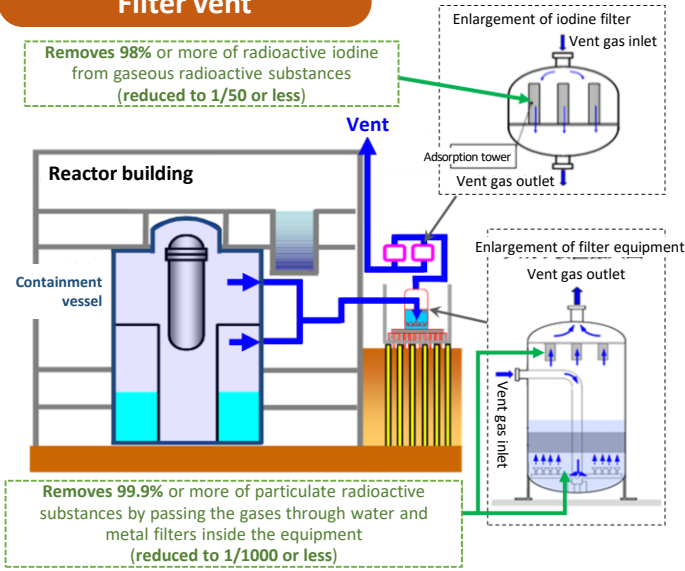
**10 days**

- Short-period external release of radioactive substances and PCV rupture can be avoided
- Repairs can be made in the interim

## 3. Mitigating the release of radioactive substances

Preparing for increases in the concentration of flammable gases (hydrogen, oxygen) inside the primary containment vessel if all else fails

### Filter vent



**Maximum amount**  
of radioactive substances removed  
mitigating release  
into the atmosphere

- Removes **99.9%** or more of particulate radioactive substances (Reduced to **1/1000** or less)
- Removes **98%** or more of gaseous radioactive iodine (Reduced to **1/50** or less)

Preparing for leaks of radioactive substances from buildings

### Large capacity water discharge equipment



Use large amounts of water to force radioactive substances to the ground

