

Status of countermeasures for restoring from the accident at Fukushima Daiichi Unit 1 through 4. As of July 01st, 2011. (Estimated by JAIF)

| | | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Notes |
|---|--|---|---|---|--|--|
| Basic information | Type of plant | BWR-3 | BWR-4 | BWR-4 | BWR-4 | |
| | Electric / Thermal power output | 460/1380 | 784/2381 | 784/2381 | 784/2381 | |
| Plant status when hit by the earthquake | Operation status | In service → Shutdown | In service → Shutdown | In service → Shutdown | Outage | |
| | No. of nuclear fuels loaded in the reactor | 400 | 548 | 548 | 0 | |
| | No. of spent fuels stored in the SFP | 292 | 587 | 514 | 1331 | |
| | External power supply | Stopped due to the earthquake | | | | |
| | Emergency power supply | EDGs automatically started up when the external power was lost but stopped later when tsunami hit the plants. | | | | |
| Status | Core and fuel integrity | Damaged (core melt*1) | Damaged (core melt*1) | Damaged (core melt*1) | No fuels loaded | |
| | RPV structural integrity | Limited damage and leakage | Unknown | Unknown | No damage | |
| | PCV structural integrity | Damage and leakage suspected | Damage and leakage suspected | Damage and leakage suspected | No damage | |
| | Core cooling | Not functional | Not functional | Not functional | Not required | |
| | Goal of STEP 1 (April through July) | Stable cooling (circulating injection cooling reusing accumulated water) | | | | |
| | Cooling by minimum injection rate | Injecting freshwater into the reactor via feed water line at 3.7 m ³ /h[6/30] | Injecting freshwater into the reactor via feed water line at 3.8 m ³ /h [6/30] | Injecting freshwater into the reactor via feed water line at 9.0-9.1m ³ /h [6/30] | — | Decreasing the injection rate to prevent the overflow of the accumulated water in the facilities |
| Reactor cooling measures | Establishment of circulating injection cooling | Injection line established (Circulation started[6/27-] following the radioactive water process facility starts its operation) | | | — | |
| | Nitrogen gas injection into PCV | Injection continued [4/6-] | Injection continued [6/28-] | Work for injection line in progress [4/16-] | — | |
| | Flooding of PCV after sealing leaks | Studying | Studying | Studying | — | |
| | Securing heat exchange function | Work for secondary-loop piping in progress (5/13-) | Construction work to be started after improving the work environment | Construction work to be started after improving the work environment | — | |
| | Improving work environment | High radiation circumstance is hampering the work to restore reactor cooling. Preparation work such as removing radioactive debris, radiation monitoring is underway in each unit. Large-scale work inside the R/B started at unit-1 and 2 after radioactive substance and humidity in the air inside the R/B dropped. | | | | — |
| | Challenge | | | | | |
| SFP cooling | Fuel integrity in SFP | Unknown | Most spent fuels not damaged*2 | Unknown | Most spent fuels not damaged*2 | |
| | SFP cooling | Injection function recovered | Function recovered | Injection function recovered | Not functional | |
| | Goal of STEP 1 (April through July) | Stable cooling | | | | |
| | Reliability improvement in injection operation | Injecting freshwater via SFP coolant clean up line | Switching from freshwater injection via SFP coolant clean up line to circulation cooling | Injecting freshwater via SFP coolant clean up line. Bolic acid added to neutralize the alkalized pool water [6/26,27] | Injecting freshwater via alternative injection line. Preparing system for cooling in a stable manner | Injecting corrosion inhibitor, hydrazine (H2NNH2), with freshwater [5/9-] |
| measures | Circulation cooling with Hx | Planned | In operation | In trial operation | Planned | |
| | Challenge | | | | | |
| Accumulated water | Status | High level radioactive wastewater is accumulating in the R/B, T/B and RW/B of each unit. (about 91,800m ³ [5/31]) | | | | |
| | Goal of STEP 1 (April through July) | Securing storage place of high level radioactive wastewater | | | | |
| | Securing storage place | -Storage capacity of 14800m ³ (10,000m ³ + 4,800m ³) for highly radioactive wastewater are secured by using the Centralized Radiation Waste Treatment Facility as water storage place. -Underground tank for high level radioactive wastewater (storage capacity: approx. 10,000m ³) to be installed in the mid August -Storage tanks to receive processed, low to middle level radioactive wastewater with the capacity of approx. 13,000m ³ installed (-5/31). Additional capacity to be installed at 20,000m ³ /month from the end of June. | | | | PMB: Process Main Building MWRBTB: Miscellaneous Solid Waste Volume Reduction Treatment Building |
| | Transfer of radioactive waste water | Highly radioactive wastewater in Unit 2 and unit 3 has been translated the Centralized Radiation Waste Treatment Facility since April 19. | | | | |
| | Installation of water process facility | -Highly radioactive wastewater treatment system for recycling water that has processing capacity of 1,200m ³ /day is working on a trial basis. Reuse of the processed water, which was decontaminated and desalinated through the system, started for reactor cooling [6/27-]. | | | | |
| | Preventing contamination of the sea, etc. | -Silt fences installed. -Seawater circulatory purification system goes into full-scale operation. [6/13] -Blocking the concrete tunnels outside the T/Bs completed [6/10], etc. | | | | |
| Challenge | Preventing overflow of high level radioactive waste water | Highly radioactive wastewater treatment system should be operated in stable and effective manner to prevent wastewater accumulated in unit-2 and 3 overflowing. | | | | |
| | Goal of STEP 1 (April through July) | Storing and processing low level radioactive wastewater | | | | |
| measures | Increasing storage capacity | 18,400 tons(2,200 + 6,200 + 10,000) of tanks installed. 12,000 tons of receiving capacity to be secured by the end of June. | | | | |
| | Challenge | | | | | |
| Underground water | Status | Radioactive iodine, I-131, cesium, Cs-134, 137, and Sr-89, 90 were detected from the subdrain, underground water collected and controlled in the facility, and the well water in the Fukushima Daiichi site. [4/7-] | | | | |
| | Goal of STEP 1 (April through July) | Preventing contaminated underground water from spreading to the sea | | | | |
| measures | Mitigation of groundwater contamination | Pumps for correcting underground water called "subdrain" is to be restored in the middle of June. Subdrain is to be treated in accordance with the contaminated water management plan. Construction of wall for underground water isolation is under consideration. | | | | |
| | Challenge | | | | | |
| Radioactive materials in the atmosphere / soil | Status | Radioactive materials and radioactively contaminated debris scattered due to the hydrogen explosion at Unit 1 and 3 R/Bs and other events. | | | | Survey map on the site: http://www.tepco.co.jp/en/nu/fukushima-np/f1/index3-e.html |
| | R/B integrity | Severely damaged | Partly opened | Severely damaged | Severely damaged | |
| | Goal of STEP 1 (April through July) | Preventing scattering of radioactive materials in the facilities and the site | | | | |
| | Dispersion of inhibitor | Dispersion to the outside of buildings in progress [full operation from 4/26-] Dispersion to the R/Bs and T/Bs [5/27-] | | | | |
| measures | Removal of debris | Removal of debris using remote-controlled heavy machine in progress [4/10-] | | | | |
| | Installing R/B cover | Preparation work in progress [5/13-] | — | Designing | Planning | |
| | Installation work of the cover started [6/29] | | | | | |
| Tsunami, reinforcement, etc. | Goal of STEP 1 (April through July) | Enhancement of countermeasures against aftershocks, etc. | | | | |
| | Countermeasures against tsunami | -Transferring emergency power sources to the upland [4/15] -Addition of redundant water injection line [-4/15] -Setting fire trucks etc. to the upland [-4/18] -Planning to install a temporary tide barriers [by the end of June] | | | | |
| | Planning and implementation of reinforcement work of each unit | -Work for installing supporting structure under the bottom of the Unit 4 SFP in progress. Steel pillars installed [6/7-6/20]. Work to be completed by filling concrete and grout by the end of July. -Soundness of structure analysis and evaluation for each unit in progress. Seismic safety confirmed for Unit 1 and 4 [5/28] | | | | |
| Reactor | Various radiation shielding | Pipe work completed, pumping vehicle set [5/17] | | | | |
| | Reactor water level (mm) [6/30 11:00] | A: Below the lower end of gauge, B: -1600**, Reading mostly steady | A: -1850, B: -2150 Reading mostly steady** | A: -1800, B: -2150 Reading mostly steady** | — | ■ "A", "B" shows the group of the redundant instruments |
| | Reactor pressure (MPa) [6/30 11:00] | A: 0.033, B: -, Measured with temporary pressure indicator [6/4-] | A: 0.028, B: - Reading mostly steady** | A: -0.164, B: -0.102 Reading mostly steady** | — | ■ Reactor water level monitors to be calibrated. Unit 1 Ch.A done.[5/11] Unit 2 Ch.A now being calibrated.[6/22-] |
| | RPV temperature at feedwater nozzle (°C) [6/30 11:00] | 117.4 Reading mostly steady | 112.6 Reading mostly steady | 154.5 Slightly increased | — | |
| | RPV temperature at the bottom of the vessel (°C) [6/30 11:00] | 102.0 Reading mostly steady | 128.2 Reading mostly steady | 126.7 Slightly fluctuate | — | |
| | Pressure of drywell (MPa) [6/30 11:00] | 0.1406 Reading mostly steady | 0.020 Decreasing** | 0.0994 Reading mostly steady | — | ■ Primary parameters' trend is available at JANTI's HP: http://www.gengikyo.jp/english/shokai/special_4.html . **Continuously monitoring the status |
| PCV | Pressure of suppression pool (MPa) [6/30 11:00] | 0.120 Reading mostly steady | Below the lower end of gauge Instrument failure | 0.1829 Reading mostly steady | — | |
| | Pool | Water temperature of SFP | Instrument failure | 34°C [6/30 11:00] | 62°C [5/8] | 87-88°C [6/29 16:00] |
| Accumulated water | R/B basement | Volume*3 | 3,900m ³ [5/31] | 6,000m ³ [5/31] | 6,400m ³ [5/31] | 6,500m ³ [5/31] |
| | | Radioactivity | 4.0E+5Bq/cm ³ [3/26] | 1.9E+7Bq/cm ³ [3/27] | 3.8E+6Bq/cm ³ [4/22] | 2.0E+4Bq/cm ³ [4/21] |
| | T/B basement | Volume*3 | 8,400m ³ [5/31] | 11,400m ³ [5/31] | 13,600m ³ [5/31] | 11,800m ³ [5/31] |
| | | Radioactivity (Dose at water surface) | 4.0E+5Bq/cm ³ [3/26] (60mSv/h[4/28]) | 1.9E+7Bq/cm ³ [3/27] (1,000mSv/h以上[3/28]) | 3.8E+6Bq/cm ³ [4/22] (120~750mSv/h[3/24,4/22]) | 2.0E+4Bq/cm ³ [4/21] (4.5mSv/h[4/21]) |
| | RW/B basement | Volume*3 | 1,100m ³ [5/31] | 2,400m ³ [5/31] | 2,300m ³ [5/31] | 3,700m ³ [5/31] |
| | | Radioactivity | 4.0E+5Bq/cm ³ [3/26] | 1.9E+7Bq/cm ³ [3/27] | 3.8E+6Bq/cm ³ [4/22] | 2.0E+4Bq/cm ³ [4/21] |
| Concrete tunnel outside of T/B | Volume*3 | 2,800m ³ [5/31] | 4,800m ³ [5/31] | 5,800m ³ [5/31] | 900m ³ [5/31] | |
| Radioactivity (Dose at water surface) | 6.9Bq/cm ³ [3/29] (0.4mSv/h[3/27]) | 1.1E+7Bq/cm ³ [3/30] (1,000mSv/h以上[3/27]) | 2.4E+2Bq/cm ³ [3/30] | 2.0E+4Bq/cm ³ [4/21] | | |
| Total volume | | 91,800m ³ (Approx. 105,000m ³ including the wastewater transferred to the Centralized Radiation Waste Treatment Facility) | | | | |
| Environmental effect in the vicinity of the station | | -Air dose rate: 5-115 μSv/h at the NPS border (Monitoring Post), 334 μSv/h at the south side of the office building, 35 μSv/h at the main gate, 13 μSv/h at the wet gate [6/30 21:00] -Some radioactive materials (I, Cs, Pu, Am Cm and Sr) has been detected in the soil sampled at the site. Radioactive materials have been detected in samples collected from underground water and also seawater at or near the site. Environmental monitoring has been enhanced [4/16-]. Sr-89, 90 exceeding the regulatory limit have been detected from the seawater sampled on 5/16 near the seawater intake. | | | | |
| Radiation exposure of the workers | | TEPCO is examining some 3,700 workers who have worked at the plant since March 11th for exposure to radiation. Of that number, 3,514 have undergone medical checkups. It revealed that 124 received radiation doses above 100 mSv. (100-200mSv: 107 workers, 200-250mSv: 8 workers, 250mSv<: 9 workers) Amount of doses that the 2 workers who received most are 643mSv and 678mSv.[6/20] Out of some 4,300 workers, who worked in April, excluding those who had worked in March, 2,342 workers have undergone medical checkups. It turned out that one worker had received radiation dose above 100mSv. *The allowable emergency limit for radiation doses: 250 millisieverts | | | | |

*1 TEPCO's analysis [announced on 5/15]

*2 TEPCO judged that most spent fuels were not damaged in the Unit 2 and 4 SFPs based on the detailed analysis of the radioactive materials in the pool water. [5/31]

*3 Rough estimate by TEPCO [announced on 5/31]

[Source]

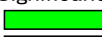
Government Nuclear Emergency Response Headquarters: News Release,

Press conference


NISA: News Release, Press conference

TEPCO: Press Release, Press Conference

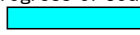
[Significance judged by JAIF]

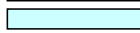
 :Low


 :High

 :Severe (Need immediate action)

[Progress of countermeasures]

 :Completed

 :Under construction

 :To be done (including studying and manufacturing)

[Abbreviations]

SFP: Spent Fuel Storage Pool

EDG: Emergency Diesel Generator

RPV: Reactor Pressure Vessel

PCV: Primary Containment Vessel

R/B: Reactor Building

T/B: Turbine Building

RW/B: Radioactive Waste Disposal Building

RHR: Residual Heat Removal system

GST: Condensate water Storage Tank

Hx: Heat exchanger

NPS: Nuclear power station