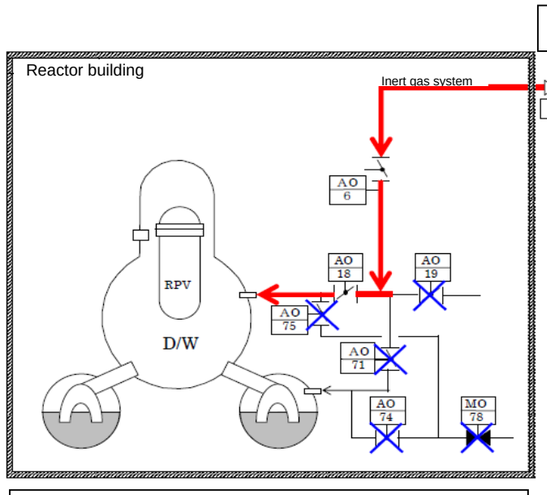
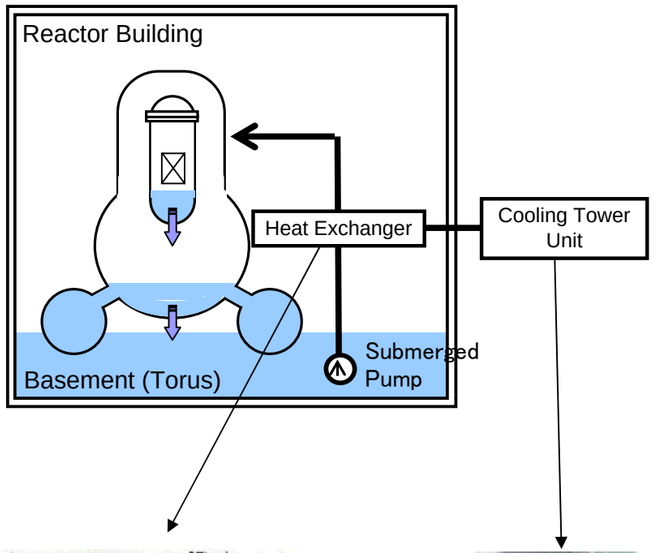
Reference 2

Progress Status Classified by Issues (Photos and Figures)

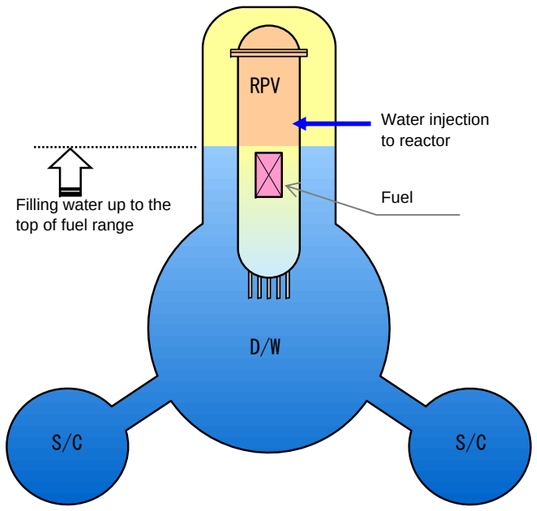
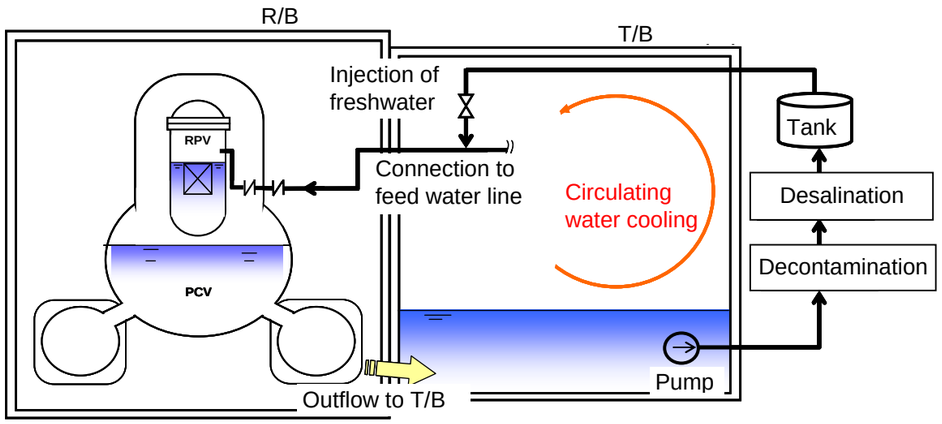
October 17, 2011
Tokyo Electric Power Company

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(1) Reactor	**[Unit 1]** **Improvement of working environment** Removal of debris, measurement of radiation dose, entrance into buildings (May 9) RPV water level gauge calibration (May 10) PCV pressure gauge calibration (May 11) Installation of water level gauge at basement of Reactor Building (May 27) Installation of temporary RPV pressure gauge (Jun. 3) **Nitrogen gas injection** Implementing from Apr. 6	 Checking the reactor buildings by Packbot  Measuring radiation dose inside the reactor buildings   Installing temporary RPV pressure gauge Nitrogen gas supply apparatus  System outline of nitrogen gas injection 

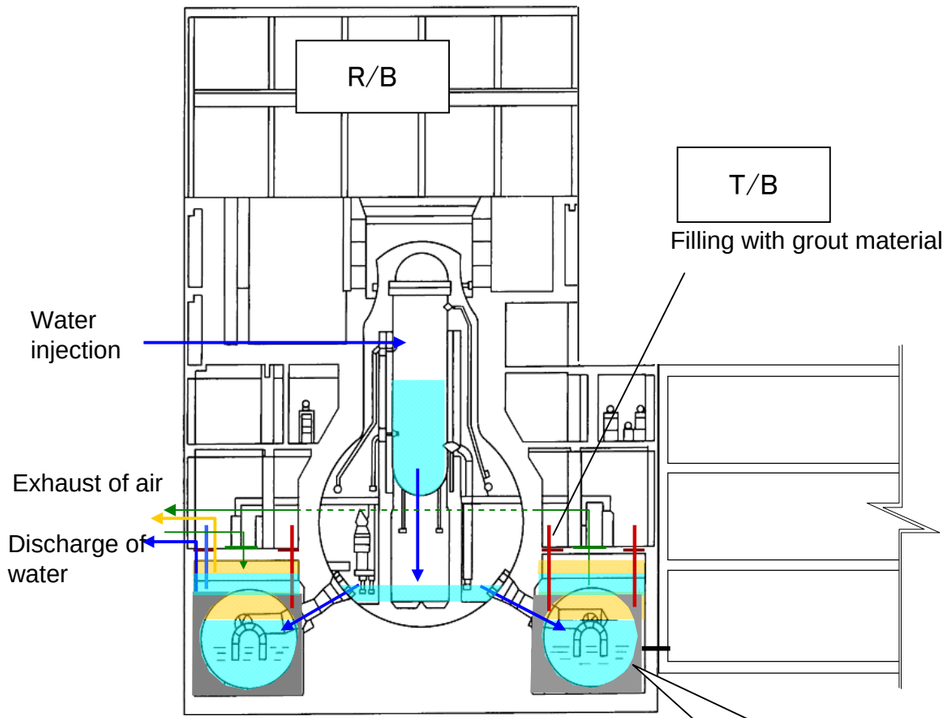
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(1) Reactor	**Secure heat exchange function** - Due to the leakage from the primary containment vessel (PCV), judged that it was difficult to secure water level of PCV. - Therefore, prioritize the achievement of circulation cooling of reactors by circulating water cooling. - For the reactor cooling facilities using heat exchanger, examining its implementation as mid to long term measures. (Work implemented) - Completed the assembly of cooling tower unit and shielding equipment to reduce exposure dose for outdoor work (from May 17 to Jun. 17)	[Under consideration] Outline of circulating cooling system within the reactor building  Demolished and removed debris at the truck bay door, which would have been obstacles for installation of alternative cooling facilities (from May 10 to May 15)  Inside reactor building of Unit 1 in front of the truck bay door  Plate-type heat exchanger  Cooling tower unit  Shielding equipment to reduce exposure dose for outdoor work Jun. 3, Completed assembly of cooling unit on the trailer

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(1) Reactor	**Cooling fuels at minimum water injection rate (Cooling by water injection)** - Implementing water injection toward achieving cold shutdown condition. **Sealing the leakage location Flooding the PCV** - Under examination on the implementation as mid to long term measures. **Consideration and preparation of reuse of accumulated water** - Work on injection line (from May 21) - Started circulating water cooling from Jun. 27 **Initiation and implementation of circulating water cooling** - Started circulating water cooling from Jun. 27	Image of flooding the PCV  Inspection of reactor water level gauge   System outline of water reuse as reactor coolant by processing accumulated water

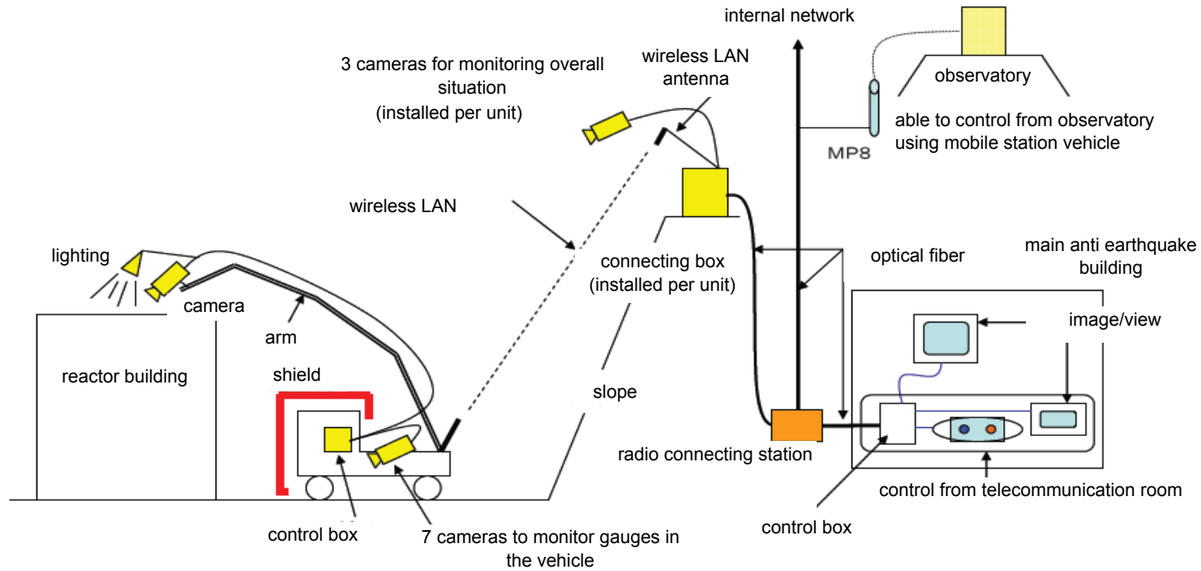
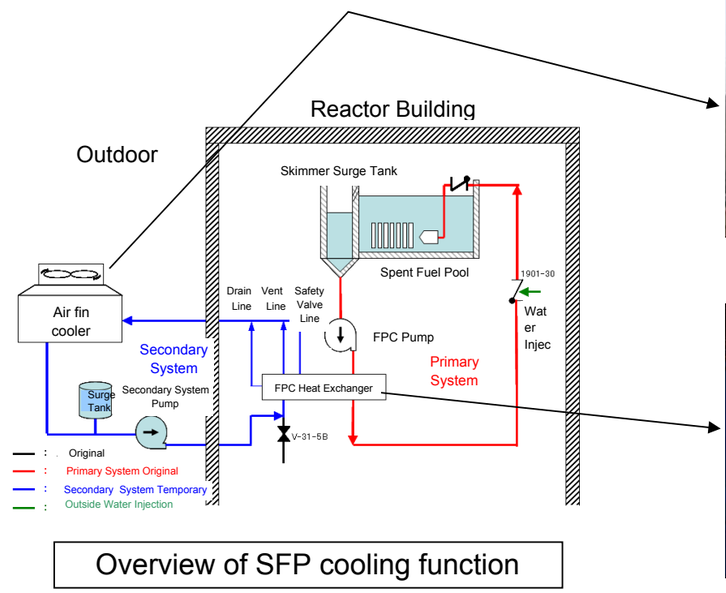
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(1) Reactor	**[Unit 2]** **Improvement of working environment** Check on radiation dose, entry into buildings. (May 18, May 26, Jun. 4, Jun. 11) Started local exhausters, purification operation (from Jun. 11 to Jun. 19). **Nitrogen gas injection** In operation from Jun. 28. **Secure heat exchange function** Prioritize the achievement of circulation cooling of reactors by circulating water cooling. For the reactor cooling facilities using heat exchanger, examining its implementation as mid to long term measures. **Study on sealing methodology of leakage location of Primary Containment Vessel.** - Conducted laboratory test on sealing methodology. **Sealing the leakage location** **Flooding the PCV** - Under examination on the implementation as mid to long term measures. **Cooling fuels at minimum water injection rate (cooling by water injection)** - Started operation of water injection through the core spray system from Sep. 14. - Implementing water injection toward achieving cold shutdown condition. **Consideration and preparation of reuse of accumulated water** - Construction of water injection line (from Apr. 9) - Started circulating water cooling from Jun. 27. **Initiation and implementation of circulating water cooling** - Started circulating water cooling from Jun. 27.	Image of the countermeasure: Sealing the damaged location of Primary Containment Vessel. 

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(1) Reactor	**[Unit 3]** **Improvement of working environment** - Removal of debris, measurement of radiation dose, entrance into buildings. (May 18, Jun. 9) - Clearance work using robots (Jul. 1) - Placement of steal boards at truck bay door (Jul. 4) **Nitrogen gas injection** - In operation from Jul. 14. **Secure heat exchange function** - Prioritize the achievement of circulation cooling of reactors by circulating water cooling. For the reactor cooling facilities using heat exchanger, examining its implementation as mid to long term measures. **Sealing the leakage location** **Flooding the PCV** - Under examination on the implementation as mid to long term measures. **Cooling fuels at minimum water injection rate (cooling by water injection)** - Started operation of water injection through the core spray system from Sep. 1. - Implementing water injection toward achieving cold shutdown condition. **Consideration and preparation of reuse of accumulated water** - Construction of water injection line (from Apr. 16) - Started circulating water cooling from Jun. 27. **Initiation and implementation of circulating water cooling** - Started circulating water cooling from Jun. 27.	Demolished and removed debris at the truck bay door, which would have been obstacles for installation of alternative cooling facilities for Unit 3 reactor. Truck bay door/ Inside  (After removal May 30) Machine hatch space on the 1st floor of the reactor building  (After removal Jun. 4) Situation of demolishing and removing debris  Removal of outside pillars using wirelessly-controlled backhoe  Removal of debris using Brokk (wired remote control)  Container loading using shielded forklift

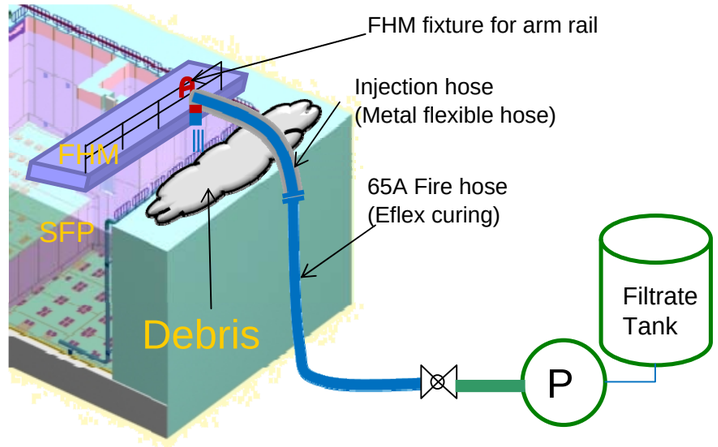
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	**[Unit 1]** **Continuation of water injection by "Giraffe", etc** - Standby as backup after restoration of normal cooling system - Reliability improvement: enhanced durability of hoses - Measures to reduce radiation dose: switch to remote-controlled operation (arm, water injection operation) **Restoration of normal cooling system** - Radiation measurement by γcamera and robot (from Apr. 30 to May 6) - Radiation reduction by flushing and shielding facility (from May 11 to May 15) - Water injection through normal cooling system (from May 29) **Installation of heat exchanger** - Installation work of heat exchanger completed. Circulating cooling system is under operation (from Aug. 10).	Image of remote control operation of concrete pumping vehicle   Overview of SFP cooling function  Air fin cooler  Existing heat exchanger

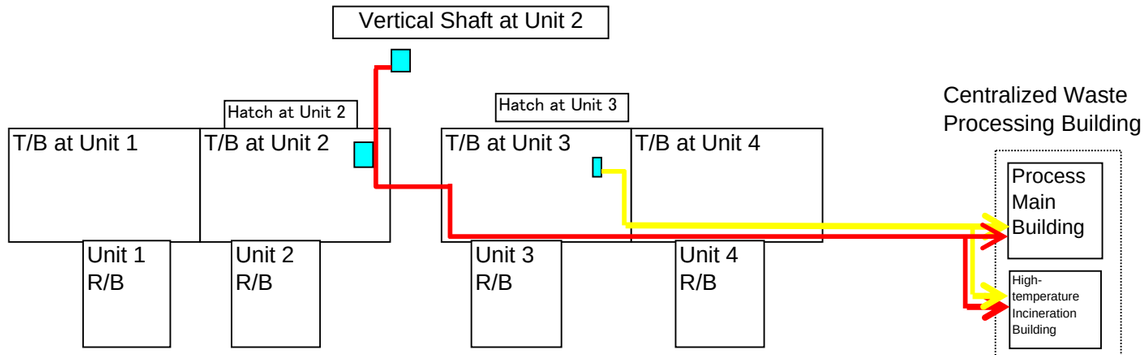
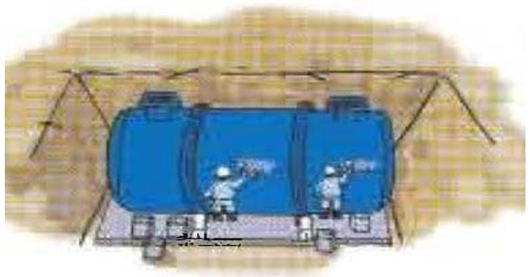
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	**[Unit 2]** **Restoration of normal cooling system** - In progress **Installation of heat exchanger** - Installation work of heat exchanger completed. Circulating cooling system is under operation (from May 31). **[Unit 3]** **Continuation of water injection by "Giraffe" etc** - Standby as backup after restoration of normal cooling system - Reliability improvement: enhanced durability of hoses - Measures to reduce radiation dose: switch to remote-controlled operation **Restoration of normal cooling system** - Confirmation of system integrity through water level measurement by "Giraffe," etc. (from May 8 to May 15) - Water injection through normal cooling system (from May 16 to Jun. 29) **Installation of heat exchanger** - Installation work of heat exchanger completed. Circulating cooling system is under operation (from Jun. 30).	 Debris in Unit 2 Waste Treatment Building  Unit 2 Heat Exchanger Unit  Unit 3 Spent Fuel Pool  Unit 3 Heat Exchanger Unit

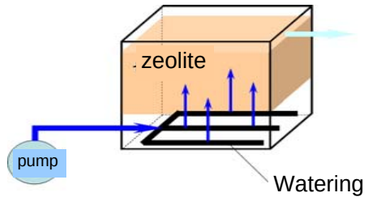
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	**[Unit 4]** **Continuation of water injection by "Giraffe" etc** - Reliability improvement: enhanced durability of hoses - Measures to reduce radiation dose: switch to remote-controlled operation - Installation of water level gauge (from Apr. 22) **Restoration of normal cooling system** - Water injection by installing alternative equipment to "Giraffe" (from Jun. 17) - Switch to water injection line of circulating cooling system (from Oct. 3) **Installation of heat exchanger** - Installation work of heat exchanger completed. Circulating cooling system is under operation (from Jul. 31).	   Water injection by "Giraffe" at Unit 4  Alternative equipment to "Giraffe" at Unit 4  Alternative equipment to "Giraffe" at Unit 4 (as of Jun.17)  Unit 4 Heat Exchanger Unit  Air Fin Cooler

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	**[High level]** **Securing sufficient places to store contaminated water** - Transferring to Centralized Waste Processing Building (Process Main Building and High-temperature Incineration Building) after checking non-existence of water leakage Process Main Building: After checking non existence of water leakage etc., resumed transferring accumulated water from Unit 2 Turbine Building. (Apr. 19) High-temperature Incineration Building: After checking non existence of water leakage etc., resumed transferring accumulated water from Unit 3 Turbine Building. (May 17)	**<Transferring into Centralized Waste Processing Building>**   **Tanks to receive processed water**  **Underground disaster prevention tanks to receive processed water (Image)**  **Tanks to receive processed water (H1 area)**  **Underground tanks for processed water (Highly contaminated water)**  **Underground disaster prevention tanks for processed water (Highly contaminated water)**  **Underground disaster prevention tanks for processed water (Highly contaminated water)**

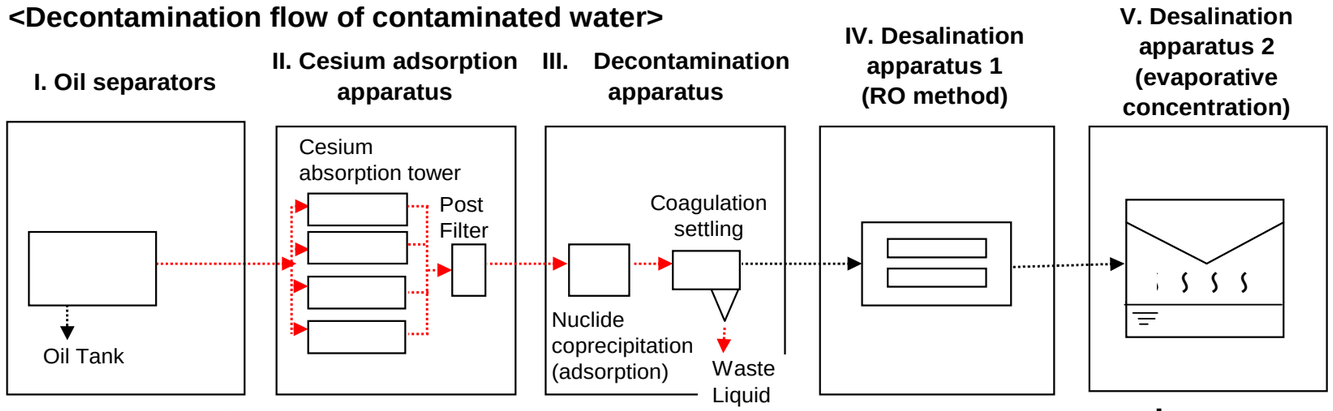
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	**[High level]** **Consideration of mitigation of contamination in the ocean** - Completed setting up silt fence (Apr. 14) - Preparation work for setting steel pipe sheet piles [Completed removing curtain wall] - Purification of sea water by circulating purification system (from Jun. 13) - Completed setting up sliding concrete wall at intake of Units 1 to 4 (Jun. 29) - Work of placing steel pipe sheet pile (from Aug. 17 to Sep. 28) (Implemented in order to block the damaged parts of permeation prevention structure due to tsunami at the south side of intake canal of Units 1 to 4)	 Decontamination agent (Zeolite) <Adsorption of cesium by zeolite>  <Appearance of the system>  Circulating purification system  Silt fence at intake (Unit 1 to 4)  Silt fence at intake (Unit 2)  Sliding concrete wall at intake (Before constructionl)  Sliding concrete wall at intake (Setting work)  Sliding concrete wall at intake (After construction)  Sliding concrete wall at intake (Unit 2)  Shipping steel pipe sheet pile  Placing steel pipe  After placing steel pipe sheet pile (1)  After placing steel pipe sheet pipe (2)

Progress Status Classified by Issues (Photos and Figures)

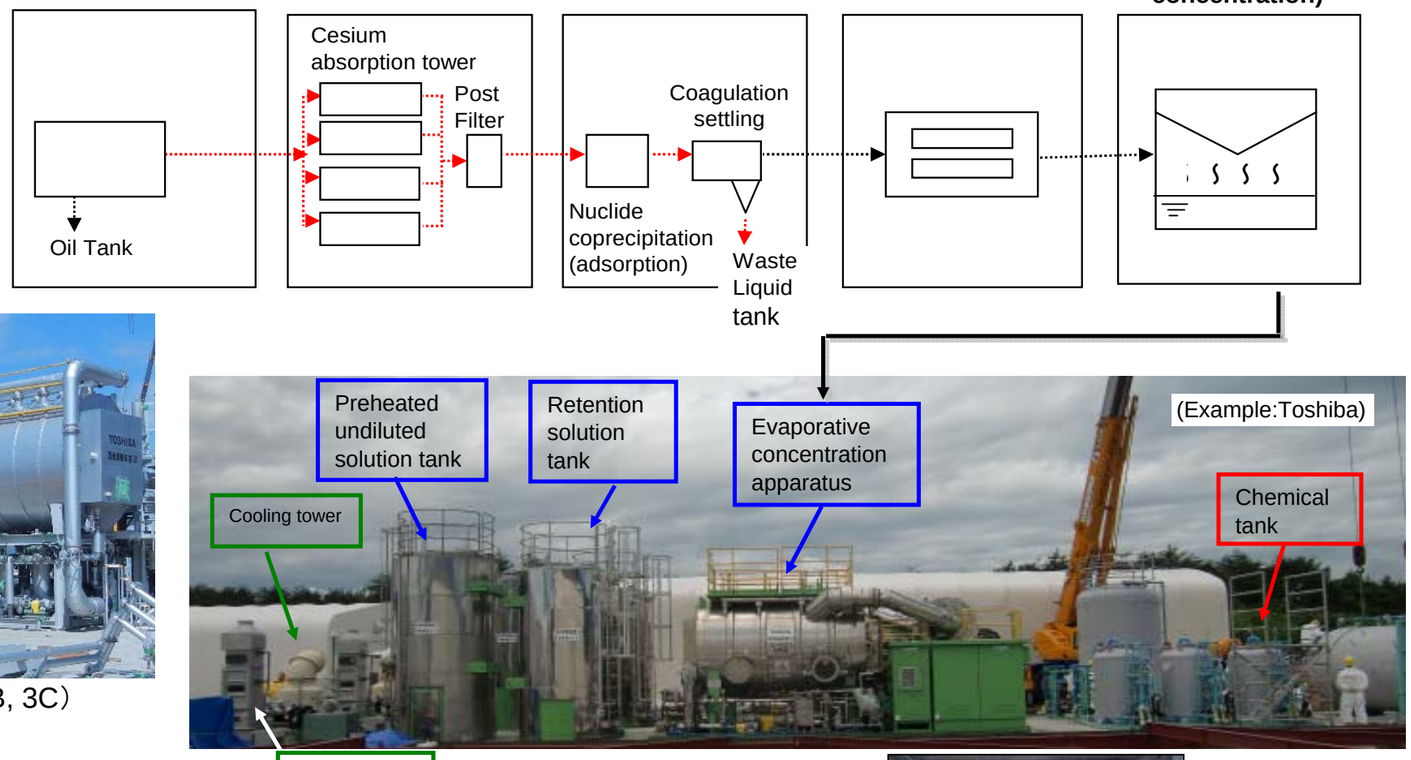
Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	**[High Level]** **Containment of high level radioactive water** - Closure of sea water piping vertical shaft Unit 2: completed on Jun. 2 Unit 3: completed on May 26 Unit 4: completed on Apr. 6 - Closure of pits, etc Unit 1: completed on May 17 Unit 2: completed on Jun. 9 Unit 3: completed on Jun. 10 Unit 4: completed on Jun. 10	  **Closure of sea water piping vertical shaft (left: before closure, right: after closure)**   **Closure of pit (left: before closure, right: after closure)**

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	**[High level]** **Installation of Treatment Facility/Continuance of Elimination and Treatment of Contaminated Water in the Building** [Decontamination of contaminated water] - Cesium adsorption instruments (Kurion) Processing started on Jun. 17 Decontamination apparatus (Areva) Processing started on Jun. 17 - 2nd Cesium adsorption apparatus (SARRY) Started on Aug. 18 [Desalting of contaminated water] - Desalination apparatus (RO method): Phase Ⅰ (RO1A, RO1B,RO2) processing started on Jun. 17 Phase Ⅱ (RO3) became available on Jul. 20 - Desalination apparatus (distillation appatatus): Toshiba appratus (2A, 2B) processing started on Aug. 7. Areva apparatus (1A, 1B, 1C) processing started on Aug. 31. Toshiba appratus (3A, 3B, 3C) became available on Oct. 10. [Storage of sludge waste] - Additional sludge waste storage tanks are under preparation - Storing sludge waste in the pellet storage tank	**<Decontamination flow of contaminated water>**  **Checking components by TEPCO supervisor (at KURION factory in US)**   **Scene of installing facilities at Fukushima Daiichi**      Processed water receiving tank

Progress Status Classified by Issues (Photos and Figures)

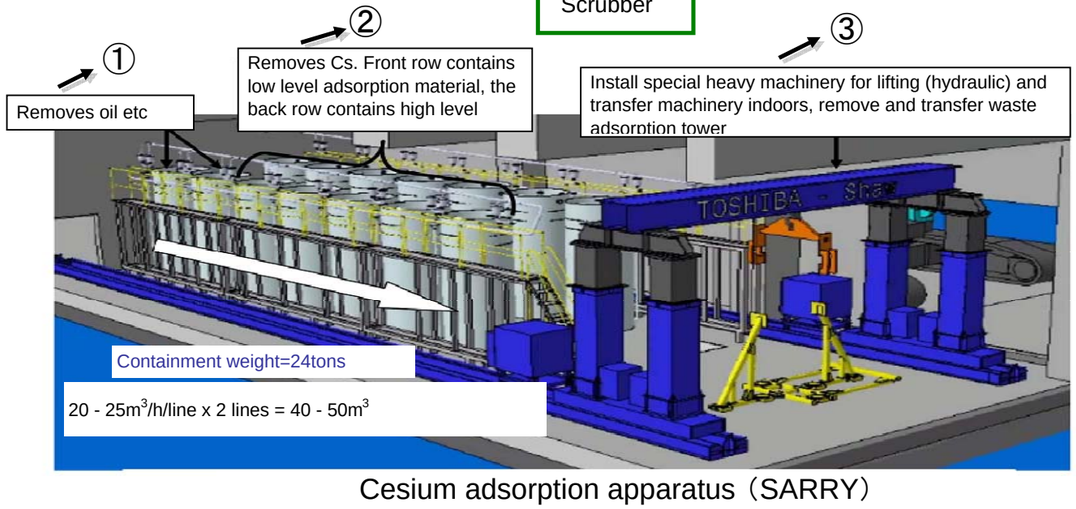
Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	[High level] Installation of Treatment Facility/Continuance of Elimination and Treatment of Contaminated Water in the Building	<Decontamination flow of contaminated water> I. Oil separators → II. Cesium adsorption apparatus → III. Decontamination apparatus → IV. Desalination apparatus 1 (RO method) → V. Desalination apparatus 2 (evaporative concentration)



Evaporative concentration apparatus（3A, 3B, 3C）

① Installation of cesium adsorption tower

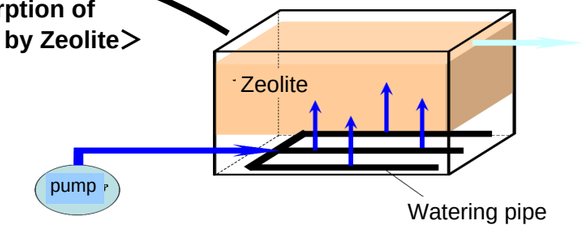
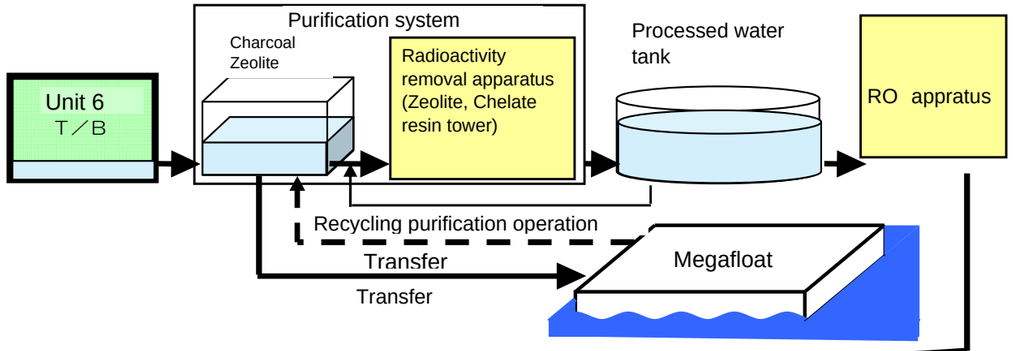
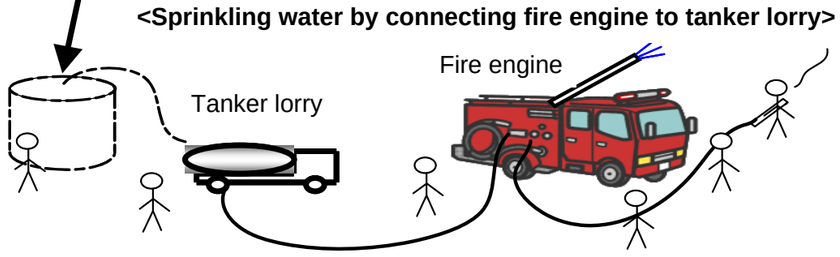
② Cesium adsorption towers



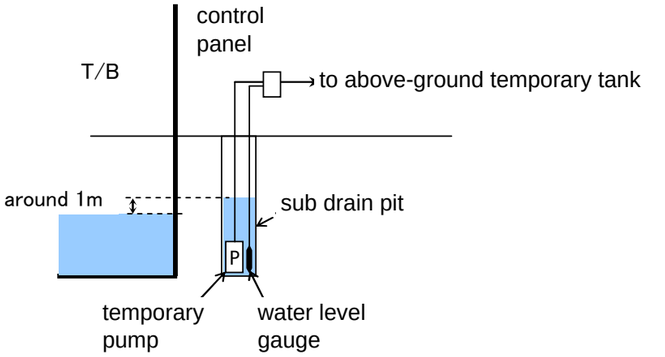
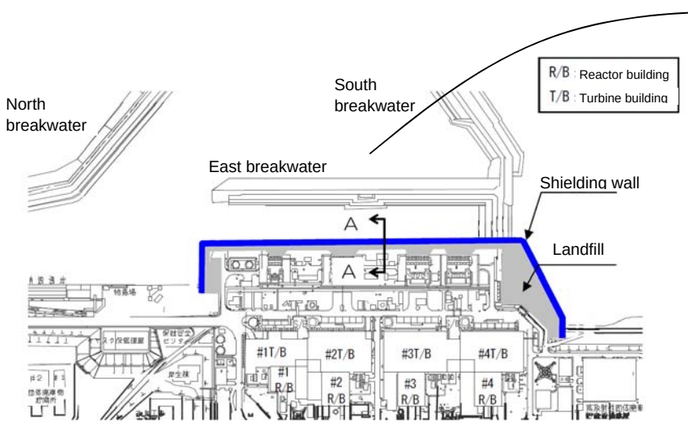
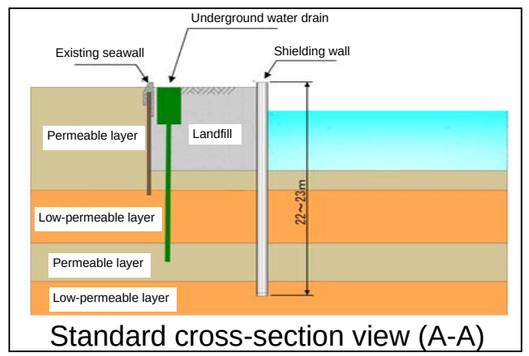
Cesium adsorption apparatus（SARRY）

③ Installation of lifter for changing adsorption towers

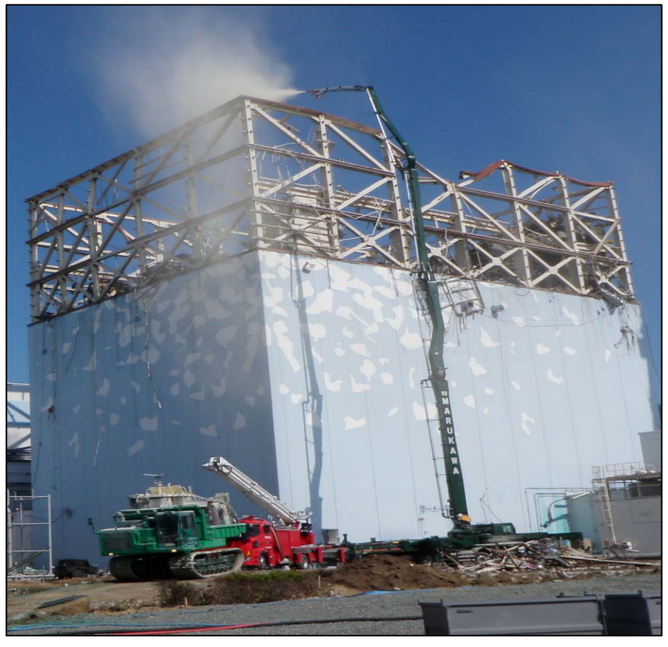
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	**[Low level]** **Increase of storage capacity and decontamination of contaminated water** - Installation of tanks for processed water: Waste liquid RO supply B Area 6,200t（May 31) RO processed water temporary storage tank D Area 5,000t（May 10) RO condensed water temporary storage tank E Area 8,000t（May 22) RO condensed water storage tank H Area 70,000t (Oct. 13) Evaporation treatment fresh water storage tank H Area 5,000t (Jul. 21) Evaporation waste liquid storage tank H Area 5,000t (Jul. 31) - Low level tank F Area 12,200t（May 31) - Megafloat 10,000t (May 21) Utilization of decontamination agent (zeolite) Setting in water, self-circulation and adsorption of Cesium by zeolite Full-scale decontamination in operation (from May 1), after transferring accumulated water in Unit 6 T/B to receiver tanks for low level water. Sprinkling purfied accumulated water in Unit 6 T/B (below bathing area guideline) within the site (from Oct. 7)	 ＜Megafloat＞  ＜F Area Tanks＞ ＜Square shape tanks＞  ＜Round shape tanks＞   Decontamination agent (zeolite) ＜Adsorption of Cesium by Zeolite＞     Sprinkling purfied accumulated water in Unit 6 T/B within the site

Progress Status Classified by Issues (Photos and Figures)

Issues	Progress etc.	Reference (Photos and Figures)
II. Mitigation (4) Groundwater	**Consideration of mitigation measures of groundwater contamination** - Closure of sea water piping vertical shaft Unit 2: Completed on Jun. 2 Unit 3: Completed on May 26 Unit 4: Completed on Apr. 6 - Closure of pits, etc. Unit 1: Completed on May 17 Unit 2: Completed on Jun. 9 Unit 3: Completed on Jun. 10 Unit 4: Completed on Jun. 10 - Restoration of sub drain pumps On T/B side Installation of pumps at sub drain pits. Completed at 7 points on Jul. 29 Completed laying the transfer piping arrangement on Aug. 31 On R/B side Considering locations to install the pumps - Restoration of sub drain along with expansion plan of storage/ processing facility. **Construction of shielding wall of groundwater** - Completed basic design of shielding wall on Aug. 31 - Under investigation of underground water level, water quality, etc. by boring. - Under study for sea side area in detail toward construction - Under investigation and study for landward area (~ step 2) <Next step> - Begin construction for sea side area around the end of Oct.	 Putting in crushed stones  Concrete placement  Mortar placement  Image of restoration of sub drain pump  Plain view  Standard cross-section view (A-A) Figure of basic plan of shielding wall

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**Dispersion of inhibitors** [Present Status] Completed dispersion of inhibitor -Record of dispersion: Approx. 560,000m2 <Inside power station (flat land and slope)>: Approx. 400,000m2 -Test dispersion (Apr. 1 to Apr. 25): Approx. 30,000m2 -Full dispersion (Apr. 26 to Jun. 28): Approx. 370,000m2 <Around buildings>: Approx. 160,000m2 -Dispersion by crawler dump truck (Apr. 26 to Jun. 27) Around buildings of Units 1 to 4, 5 and 6: Approx. 120,000m2 -Dispersion by bending spray tower vehicle (May 27 to Jun. 4, Jun. 10) Turbine building of Units 1 to 4, roof and wall of reactor building of Unit 2: Approx. 30,000m2 -Dispersion by concrete pumping vehicle (Zebra) (Jun. 8,9,18) Roof and wall of reactor building of Units 1,3,4:Approx. 10,000m2 We will keep monitoring status of solidification, etc. at dispersed areas.	 Dispersion of inhibitors in the Power Station (flat)  Dispersion of inhibitors around Buildings of Units 1 to 4  Dispersion of inhibitors in the Power Station (flat)  Dispersion of inhibitors by bending spray tower vehicle  Dispersion of inhibitors by bending spray tower vehicle

Progress Status Classified by Issues (Photos and Figures)

Issues	Progress etc.	Reference (Photos and Figures)

II. Mitigation

(5) Atmosphere / Soil

Dispersion of dust inhibitors

Dispersion of inhibitors
in the Power Station (flat)

Dispersion of inhibitors
in the Power Station (flat)

Dispersion of inhibitors
in the Power Station (slope)

Dispersion of inhibitors
in the Power Station (slope)

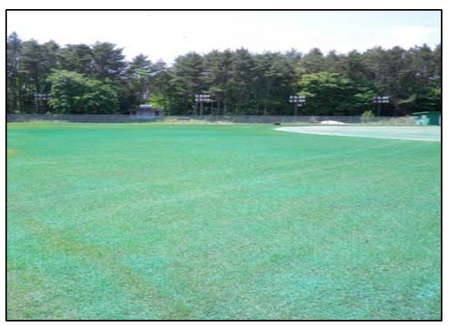
Dispersion of inhibitors
in the Power Station (slope)

After dispersion of inhibitors
in the Power Station (slope)

After dispersion of inhibitors
in the Power Station (slope)

After dispersion of inhibitors
in the Power Station (slope)

After dispersion of inhibitors
in the Power Station (flat)



After dispersion of inhibitors
in the Power Station (flat)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**Removal and storage of debris** <<Removal of debris>> - In order to mitigate exposure dose of the workers and improve work efficiency at the site, we have started removing the debris after storing them in the containers using remote-controlled heavy machinery (hydraulic shovel, crawler dump truck, bulldozer) (since Apr. 6). - The waste such as the removed debris and the trees cut down for site preparation are classified according to their kinds as well as the amount of radiation dose in the storage area and transported. - Almost all of the debris in highly-radioactive area outside the buildings of Units 1 to 4 (airborne radiation 10mSv/h or more) ware removed . Debris of roads, etc at the ocean side of the turbine buildings of Units 1 to 4 etc. was removed. <Record of removal of debris as of Oct. 17> - Approx. 900 containers of debris were collected. <Plan for further implementation> - We will continue removing outside debris, which hinders work. <<Management of debris>> <Management of the storage area> ・ The debris is stored in containers and buildings according to its amount of radiation dose etc., and workers are not able to approach to them easily. ・ The approach lane to the waste storage area is marked off and a sign has been installed that prohibits unnecessary entrance of unauthorized personnel. <Securing the storage area> ・Except for the accumulated water treatment facilities and the other areas under construction, the storage areas are kept by fully utilizing the land within the site.	 Removing debris by remote controled heavy machinery  (Example of container : 3.2×1.6×1.1m、approx. 4m^3)

Around reactor building of unit 1 (Jun. 9)

Containers storing debris (mid May)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**Removal /Storage of debris**	


Around reactor building of Unit 1

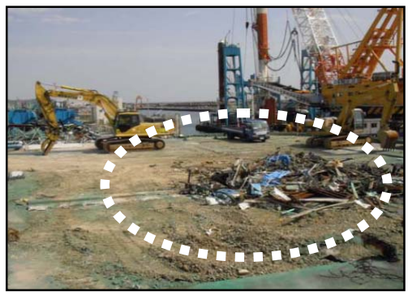

Around reactor building of Unit 1


Around Unit 1 turbine building, sea side


Unit 1 turbine building, sea side road


Between reactor buildings of Unit 2 and Unit


Centralized Waste Processing Facility,
bottom of south slope




Around Unit 4 turbine building, sea side road

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**Removal/Storage of debris**	

Storage container / Storage tent for debris (High radiation dose)

Storage container for debris

Container for small scale debris

Storage tent for debris (Low radiation dose)

Container for large scale debris

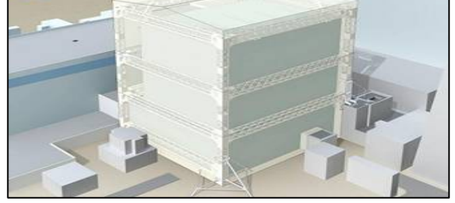
Inside the storage tent for debris

Storage yard in power station (1)

Storage yard in power station (2)

Storage yard in power station (3)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**[Unit 1]** **Installation of reactor building cover** ・ Started preparation work * (from May 13) ・ Maintenance of roads for a crane ・ Creation of slope for crane to crawl ・ Maintenance of shallow draft quay ・Started main structure construction work (from Jun. 28) ・Completion of steel-frame work of main structure（Aug.10-Sep. 9） ・Completion of installation of wall panels (Sep. 10-Oct. 10) ・Completion of installation of roof panel (Oct.8-Oct. 14) ・Started installation work of ancillary facilities such as exhauster and comprehensive test (from Oct. 14)	 Preparation work for setting reactor building cover  Preparation work for setting reactor building cover  ① Before construction  ② Spread crushed rock/level land  ③ Lay out steel plate  Image of setting reactor building cover  Model of constructing reactor building cover  ④ Preparation construction (Maintenance of shallow draft quay, Completed laying out steel plate (Jun. 11)）  ⑤ Preparation construction (Maintenance of road for crawler crane）  ⑤ Preparation construction (Maintenance of road for crawler crane）  Preparation construction (Shallow draft quay - Road for crawler crane）

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	[Unit 1] **Setting Reactor Building Cover**	

Temporary assembly of reactor building cover (at Onahama port)

Temporary assembly of reactor building cover (at Onahama port)

Beginning of main construction of reactor building cover

Main steel-frame work of main structure

Main steel-frame work of main structure

Start steel-frame work on Aug. 10

Completion of steel-frame work on Sep. 9 (Northwest side)

Setting wall panel as of Sep. 15 (Northwest side)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**[Unit 1]** **Setting reactor building cover**	

Setting roof panel on Oct. 8

Completion of setting wall panel on Oct. 10 (North side)

Setting roof panel on Oct. 14

Completion of setting roof panel on Oct. 14

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**[Unit 3]** **Removal of debris on top of the reactor buildings** • Commencement of preparation work from Jun. 20 • Commencement of main work from Sep. 10	

① Preparation work for reactor building cover

② Preparation of roadbed for large-crane

③ Preparation for iron-frame base yard

Status of demolition of pendant pillar at west side of the reactor building

④ Assembly of heavy machinery for dismantling debris around the building

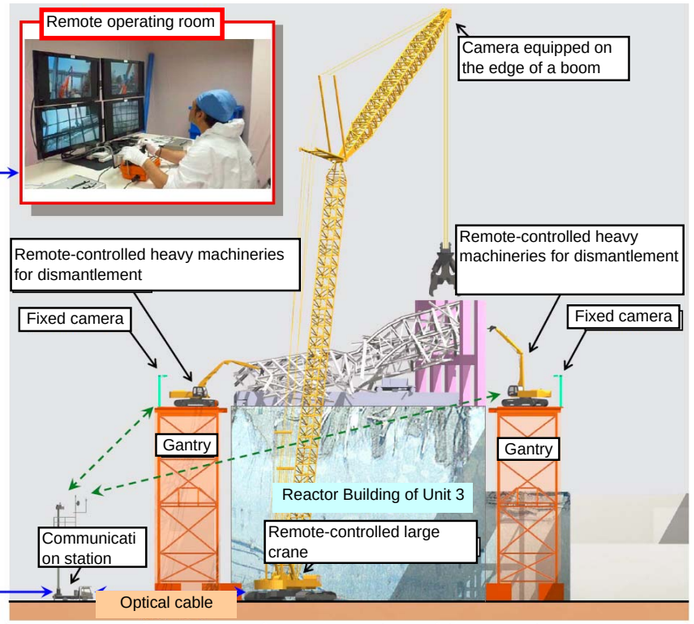
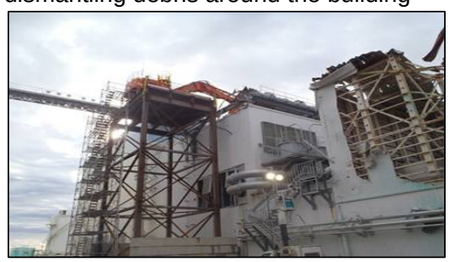


Image of removal of debris on top of the reactor building

Preparation status at south side



Status of demolition of the exhaust pipe at the top of the turbine building

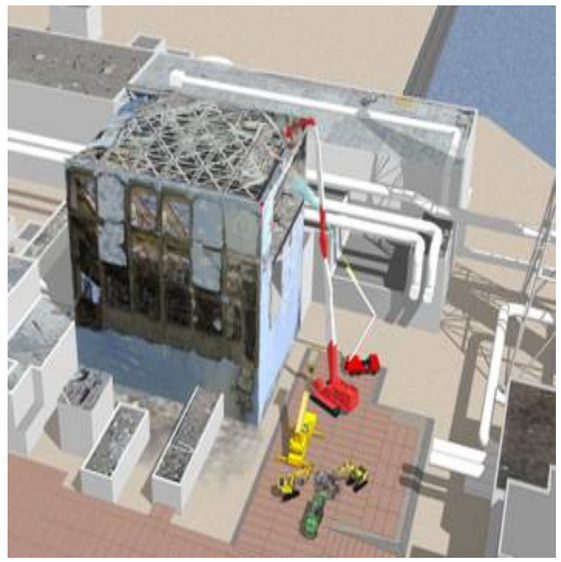
Clearance of fallen debris at the south side and around the building

Ground preparation status（Installation of pipe trench arrangement）

Removal of debris at upper part of building and preparation status at south side

Status of removal of debris on top of the reactor building (Demolition of pendant pillar at west side)

Progress Status Classified by Issues (Photos and Figures)

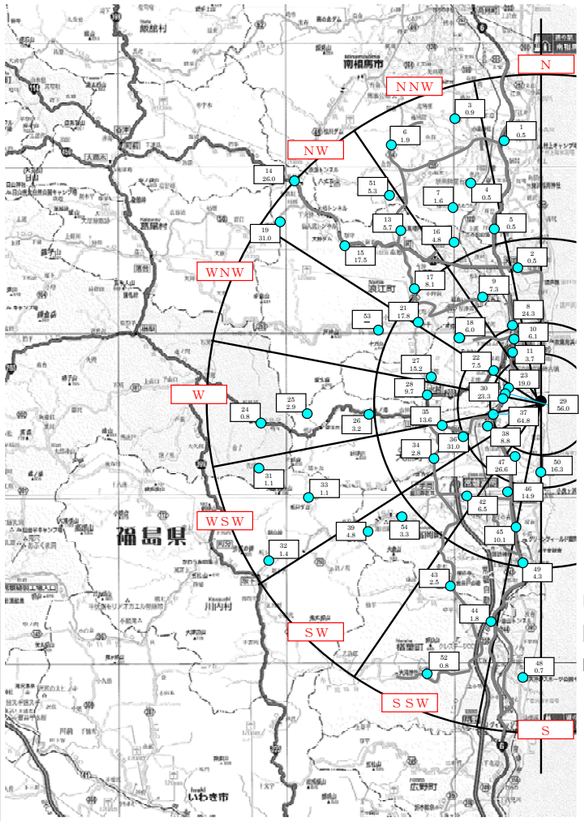
Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**[Unit 4]** **Removal of debris on top of the reactor buildings** ・Commencement of preparation work from Jun. 24 ・Commencement of main work from Sep. 21	 ① Preparation waork for reactor building cover  ② Preparation of roadbed at large-crane working area  ③ Removal of ground debris  Image of removal of debris on top of the reactor building  Demolition of obstacle at the work yard  ④ Assembly of heavy machinery for removing debris around the reactor building  Installation of rest stations  Preparation of roadbed at the work yard  Preparation of working environment on operating floor

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	**[Unit 4]** **Removal of debris on top of the reactor building**	 Retreat place and shield wall  Removal of debris around the reactor building  Curing for spent fuel pool(Oct. 14)  Removal of debris on upper part of operating floor  Removal of debris on upper part of operating floor

Progress Status Classified by Issues (Photos and Figures)

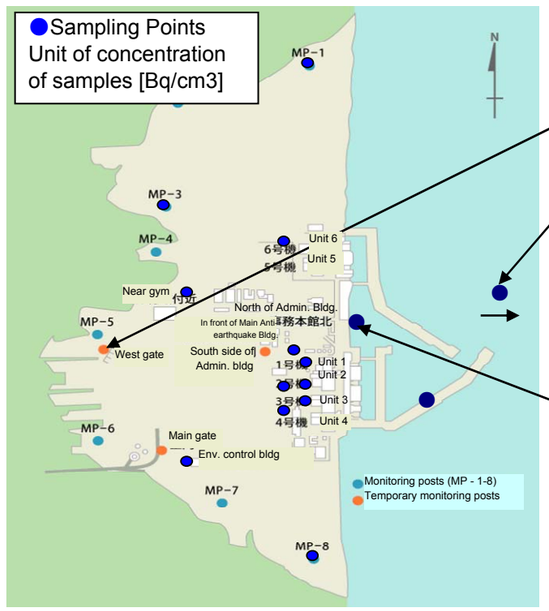
Issues		Progress etc.	Reference (Photos and Figures)
III. Monitoring/Decontamination	(6) Measurement, Reduction and Disclosure	Countermeasure [60,61] Expansion, enhancement and disclosure of monitoring	Continue monitoring in and out of the power station [Land area] <Monitoring within 20km radius of the periphery> ・Monitoring of airborne radiation dose rate at 50 points by Utility Support Team (once a week) ・Dust sampling at 5 points near 10 km radius of the periphery (once a month) <Monitoring within the site> ・Measurement of airborne radioactivity concentration near the West Gate (everyday) ・Measurement of airborne radioactivity concentration at the sea side (since Oct. 4) ・Measurement of concentration of radioactive materials at the upper part of reactor buildings using a crane etc. (once a month) Unit 1 (Oct. 3, 7, 12), Unit 2 (Sep. 17, Oct. 5, 13), Unit 3 (Oct. 6, 11, 12) ・Measurement of airborne radioactivity concentration at 12 points at the site (once a week, once a month) ・Measurement of radioactive material fallout in the air at 12 points outside of the site (once a month)

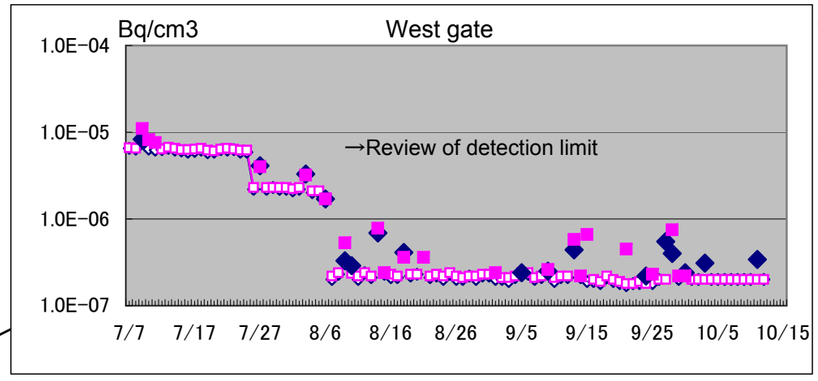


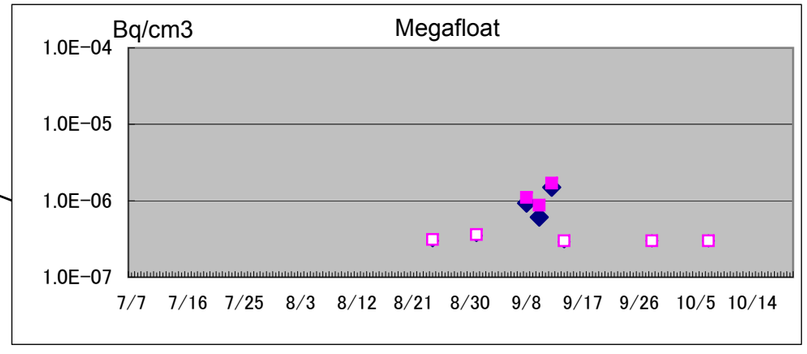
Upper: Point No.
Lower: Air dose rate（μSv/h）

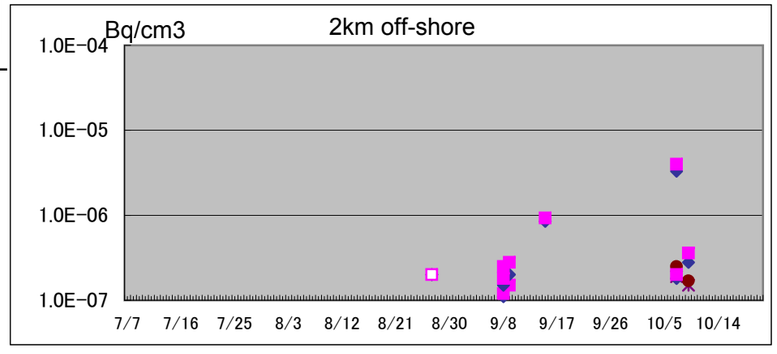
Measurement result of air dose rate of within 20 km radius (date: Oct. 11, 2011)

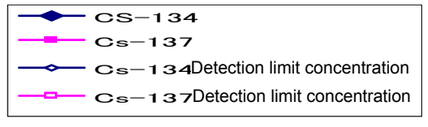
Fukushima Daiichi measuring points of airborne radioation concentration







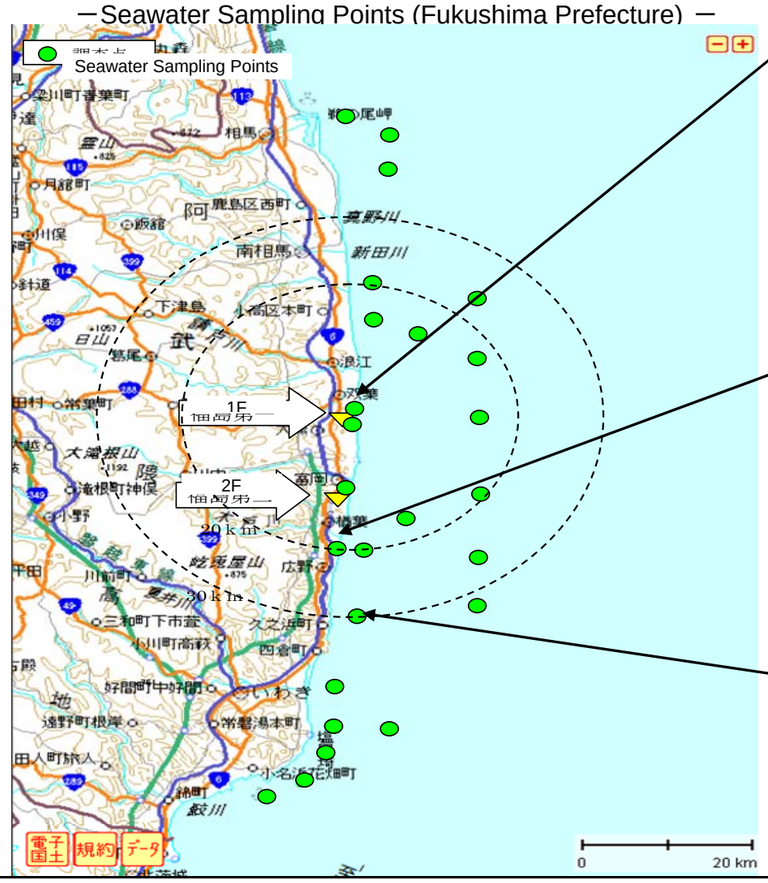


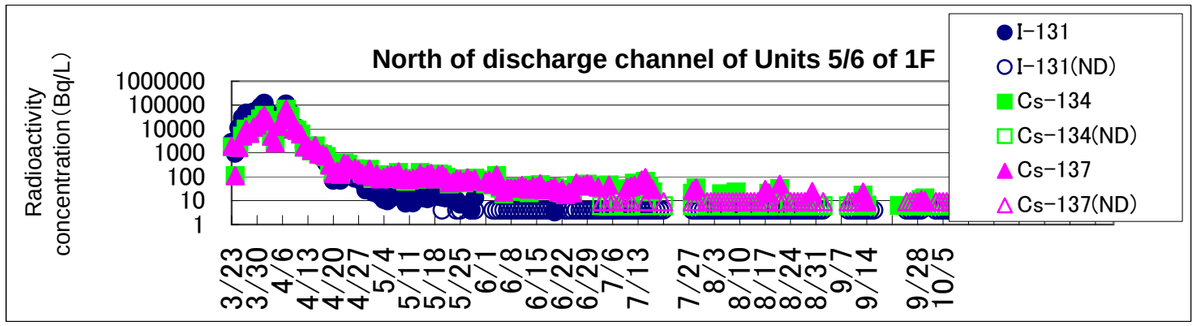


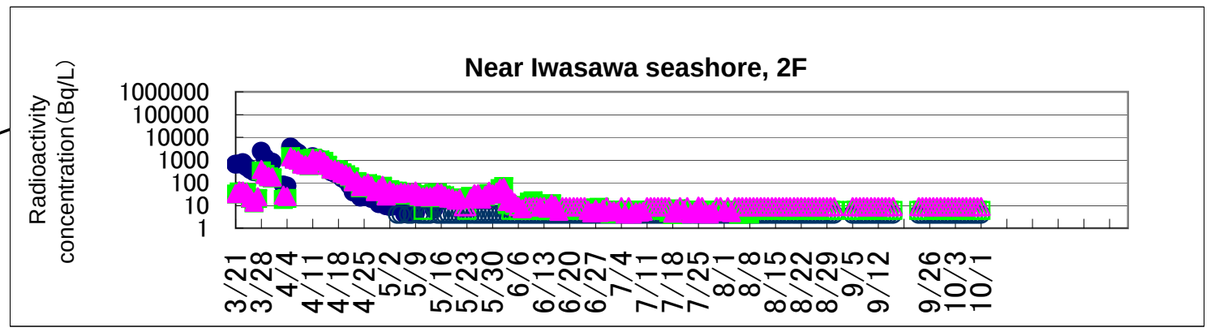
Progress Status Classified by Issues (Photos and Figures)

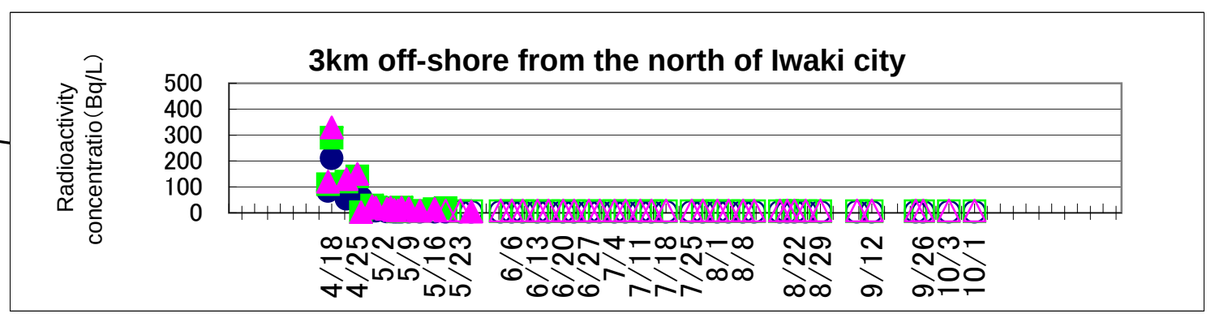
Issues		Progress etc.	Reference (Photos and Figures)
III. Monitoring/Decontamination	(6) Measurement, Reduction and Disclosure	Countermeasure [60,61] Expansion, enhancement and disclosure of monitoring	[Ocean Area] <Fukushima Prefecture> ・Seawater 16 points (from Apr.17) ↓ ・Seawater 22 points (from May 5), Seabed soil 2 points (from Apr.29) ↓ ・Outside 30km radius, 7 points (succession from MEXT); within 30 km radius, at the lower layer additional 11 points; sampling frequency review (from Jun. 4) ・Expansion of seabed soil sampling (2 points → 25 points, from Jul.12) ・Stop sampling at 4 points outside 30km radius (from Sep. 1), Regular sampling of seabed soil of 25 points (once a month) ・Supplementary sampling of seabed soil, 16 points (Sep. 26 - 28) <Ibaraki Prefecture> ・Seawater 5 points (from Apr.29: once a week) ↓ from Jun. 7: twice a week ↓ from Sep. 1: once a week <Miyagi Prefecture> ・Seawater 6 points (from Jun. 21: twice a month)

－Seawater Sampling Points (Fukushima Prefecture) －



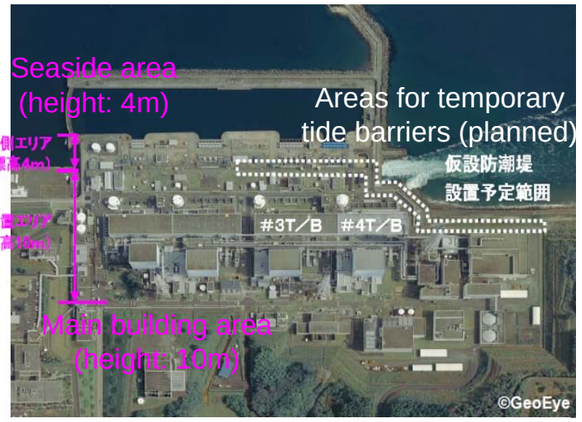




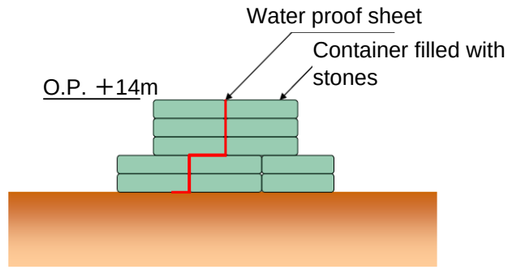


Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	**Expansion of countermeasures against Tsunami** - Temporary EDGs were moved to the upland (Apr. 15) - Securing redundancy of water injection lines (by Apr. 15) - Setting fire engines on the upland (by Apr. 18) - Started installation of temporary tide barriers on May 18 and completed on Jun. 30	



Planned temporary tide barrier
(white dotted line)



Cross-section of temporary tide barrier (image)

Fire engine deployed on the hill


Temporary tide barrier (1)


Temporary tide barrier (2)


Temporary tide barrier (3)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	**Expansion of countermeasures against Tsunami**	

Temporary tide barrier (4)

Temporary tide barrier (5)

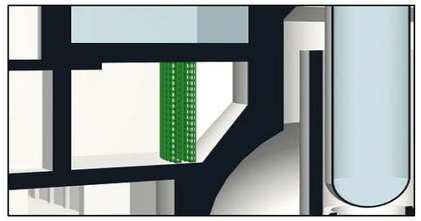
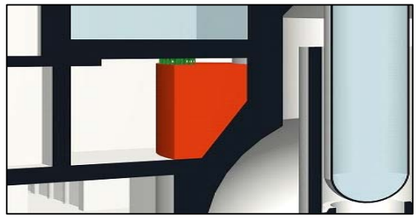
Temporary tide barrier (6)

Tide barrier of Unit 5/6 (construction work)

Tide barrier of Unit 5/6 (1)

Tide barrier of Unit 5/6 (2)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	**Installation of supporting structure under the bottom of spent fuel pool** ・Soundness of structure was analyzed and evaluated. ・Securing the route to the area to install supporting structure（removing debris, assembling a scaffolding at hatch, removing shield blocks） ・Removing obstacles at the area and installing shielding ・Completion of installing steel pillars（Jun. 20） ・Completion of concrete placement（Jul. 26) ・Completion of pouring grout (completion of construction work)（Jul. 30）	Outline of supporting structure  Steel pillar installation  Concrete wall installation Removing debris   Removing debris at truck-bay door Securing route   Assembling a scaffolding at hatch

Installation of supporting structure under the bottom of spent fuel pool


Before work


Removing obstacles and installing shielding


Installing steel pillar (Jun. 15)


Steel pillar installation completed (Jun. 20)


Installation of frame for concrete placement


Concrete placement


Installation of wire mesh reinforcement


Grout pouring completed (Jul. 30)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	**Preparation of various countermeasures for radiation shielding** ＜Utilization of Slurry＞ ・Slurry production facility, transfer pipes and concrete pumping vehicles have been installed. (May 17) ・Continue maintenance of equipment ・Implemented water injection training of connecting the slurry production facility and concrete pumping vehicle "Elephant-3" (Jun. 16 and 17) ・Developed procedure documents and confirmed organizational structure (Jun. 30)	**Preparation for installation of equipment at Fukushima Daiichi Nuclear Power Station**  Overview of the facility  Slurry production facility   Installation of pipes   Installation of pipes   Installation of slurry plant at Fukushima Daiichi **Placement of equipments at Fukushima Daiichi Nuclear Power Station**  Preparation of equipment (sand)  ”Elephant-3”  High pressure concrete pumping vehicle

Progress Status Classified by Issues（Photos and Figures）

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Continuing and enhancement of improvement of workers' living/working environment**	

Double-deck beds (full-view)

Double-deck bed

Shower room

Drinks

Gymnasium of Fukushima Daini

Full view (1)

Full view (2)

Full view (3)

Entrance

Room (1)

Room (2)

Room (3)

Room (4)

Floor

Shin Hirono Domitory

Progress Status Classified by Issues（Photos and Figures）

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Continuing and enhancement of improvement of workers' living/working environment**	

Shin Hirono Domitory


Toilet/Shower house (full-view)


Inside of Toilet/Shower House (1)


Inside of Toilet/Shower House (2)


Outside Toilet


Laundry house (full-view)


Inside of laundry house (1)


Dining house (A area)


Inside of dining house (1)


Inside of dining house (2)


Inside of dining house (3)


Inside of dining house (4): Kitchen - 1


Inside of dining house (5): Kitchen - 2


Dining house (B area)


Inside of dining house (1)


Inside of dining house (2)


Inside of dining house (3)


Inside of dining house (4): Kitchen - 1


Inside of dining house (5): Kitchen - 2

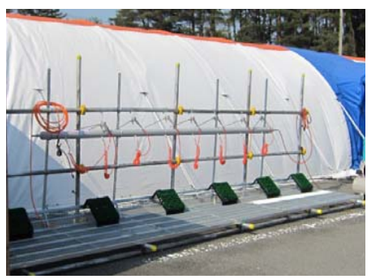
Progress Status Classified by Issues（Photos and Figures）

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Continuing and enhancement of improvement of workers' living/working environment**	<< Breakfast >>   Shin Hirono Domitory/Dining House << Lunch >>  Office in Main Anti-earthquake Building, 2F << Dinner >>   Shin Hirono Domitory/Dining House  Administration Office  Shop Shin Hirono Domitory

Progress Status Classified by Issues（Photos and Figures）

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Continuing and enhancement of improvement of workers' living/working environment**	 Outside of Dining Room  Inside of Dining Room (1)  Inside of Dining Room (2)  Shop  Inside of Shop Inside of J Village

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Improvement of workers' living/working environment** ・Installation of on-site rest rooms ・Enhancement of on-site rest rooms and restoration of existing facilities	 Entrance of Main Anti-earthquake Building (Unit house for access control)  Entrance of Main Anti-earthquake Building (from the inside)  Radioactivity measurement in Main Anti-earthquake Building  Rest rooms (in front of Main Anti-earthquake Building)  Inside of rest room (1)  Drink server  Inside of rest room (2) Rest room in front of Anti-earthquake Building  Rest rooms  Foot shower  Drink servers  Inside of rest room Rest room of a partner company (Toshiba)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(8) Living/working environment	**Improvement of workers' living/working environment**	

Outside

Entrance

Inside

Rest room in Office of Main Anti-earthquake Building (second phase)

Rest room for workers for covering reactor buildings

Installation of rest rooms

Outside of rest room (1)

Outside of rest room (2)

Outside of rest room

Inside (1): Drink server

Inside (2)

Rest room near heliport

Outside

Survey

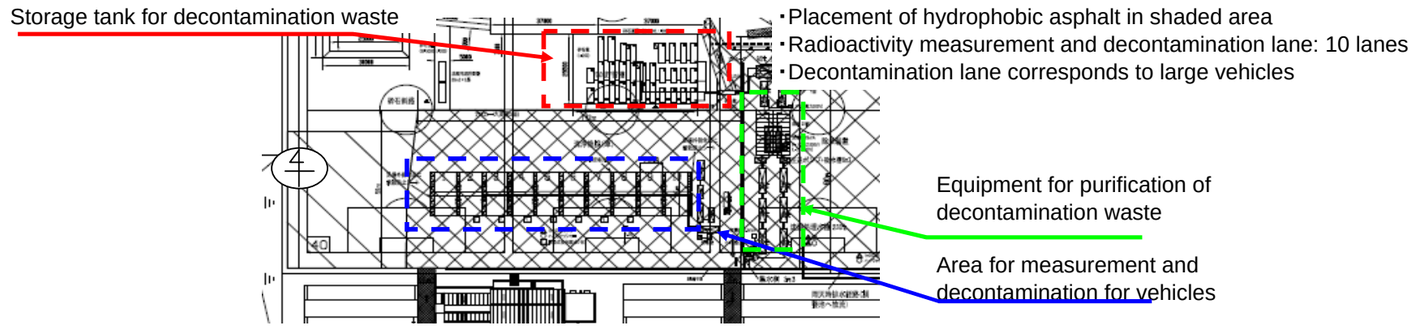
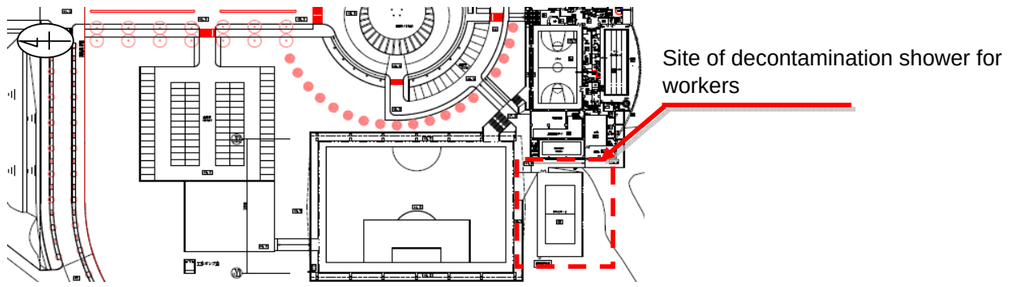
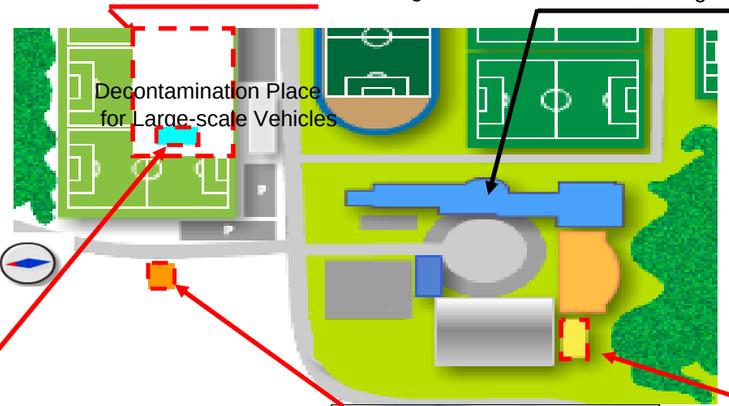
Inside

Rest room of a partner company (Hitachi GE)

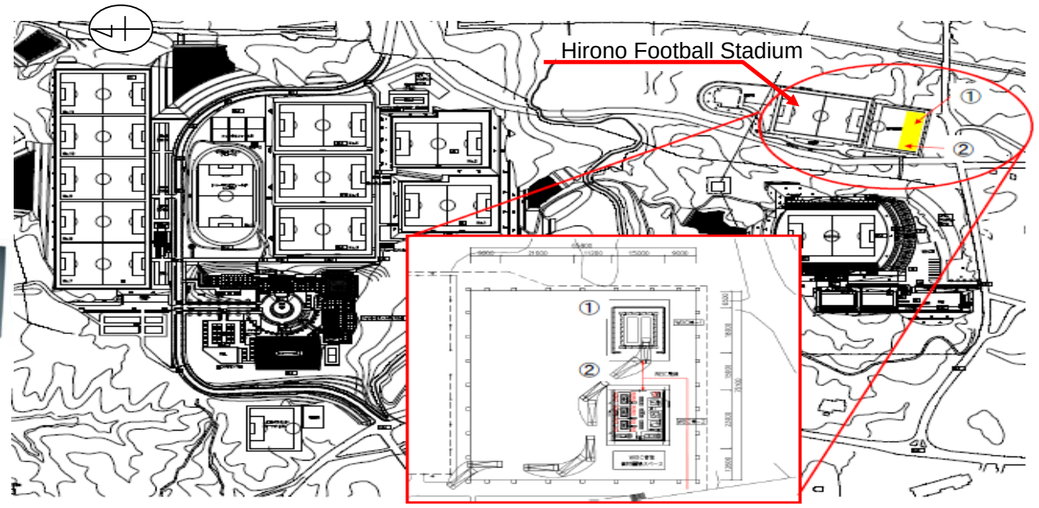
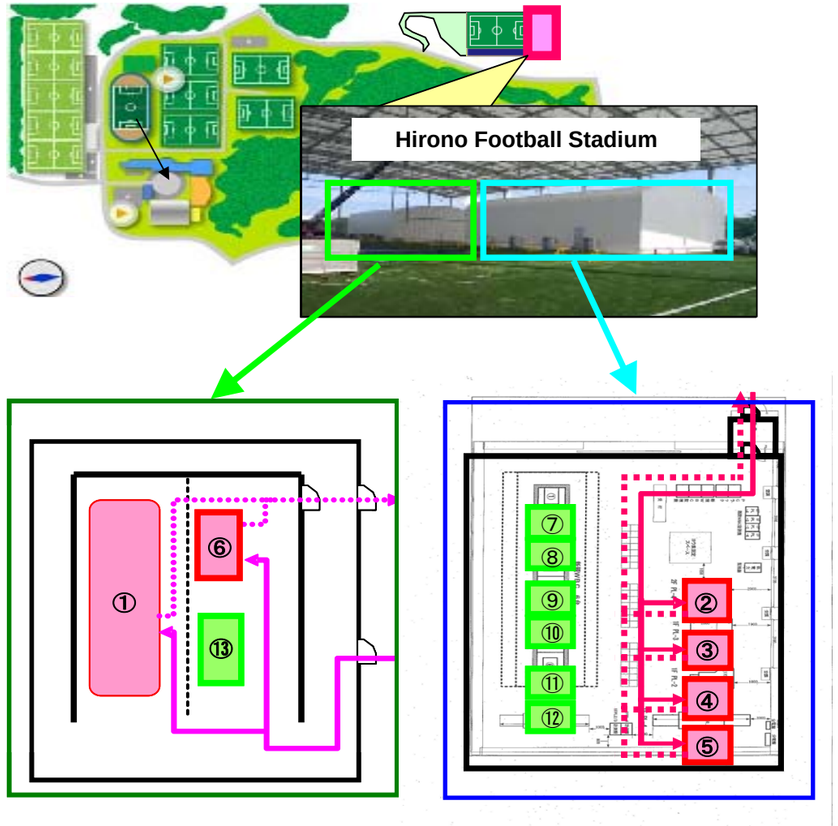
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	**Enhancement of Radiation Control** ・Improvement of protective equipment Protective equipment appropriate to work environment is provided in order to secure safety during radiation work.	 Special protective gear: Protective suit which can be expected to shield beta ray and low-energy gamma ray *Source: vendor catalogue  *Source: vendor catalogue Closed-circuit oxygen breathing apparatus: It can realize a long 120-minute usage, circulating aspirated air with oxygen inside the cylinder. It is suitable for usage in oxygen-less hazardous area.    *Source: vendor catalogue Half-faced mask: In case that radioactivity density is low and stable, workers put on half-face masks, not full-face, (with goggles), which enables to lighten the workload of workers.   *Source: vendor catalogue Respiratory protective device with electric fan: The mask can blow in cleaned air which is filtered with electric fan. Internal pressure is kept higher than environmental pressure in order to reduce the risk of inhaling particulate. Also, it realizes to breathe freely and lighten loss of bodily strength.  *Source: vendor catalogue Hood mask; Keeping the inner pressure positive, the mask prevents influx of outer air. Continuous ventilation helps exhausting the inner humidity and prevents heat injuries.

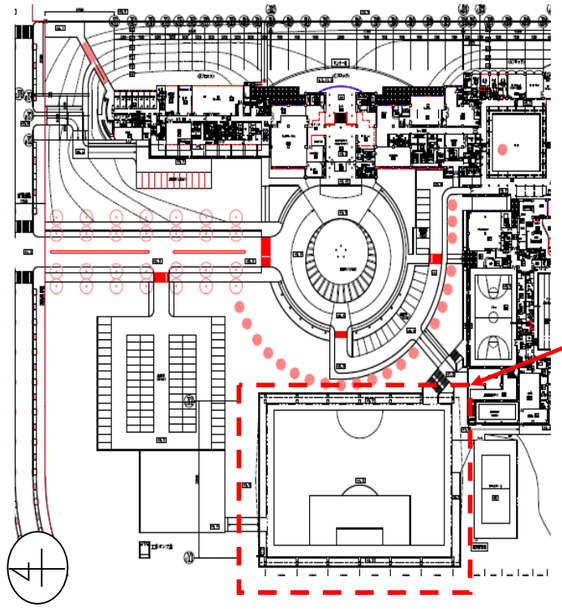
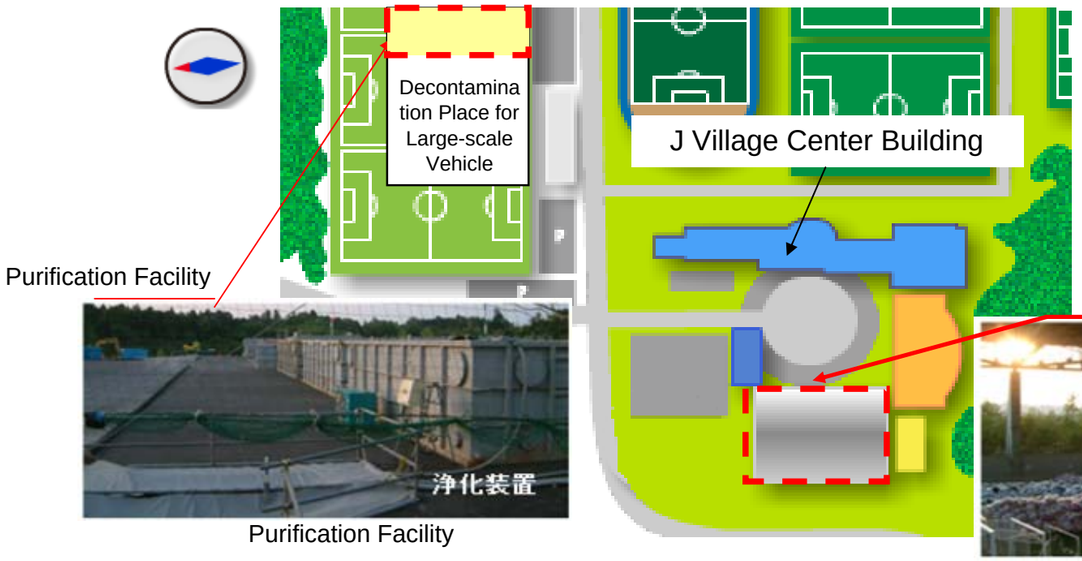
Progress Status Classified by Issues（Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	**Continuing Enhancement of Radiation Control** - Setting up Decontamination Place at J Village [Screening Control] Implementation of decontamination for persons who exceed the pre-set screening value for protection against contamination diffusion Change of the screening value to unify with the related authorities and local governments (from 6,000cpm to 100,000cpm) *Setting up a self-standard value (13,000cpm) [Decontamination Facility] As a result of radiation measurement at J Village, a decontamination place for workers and vehicles which exceed the screening value was set up. -Decontamination Shower for Workers: Borrowing and operating 2 sets of Fire and Disaster Management Agency, and 1 set of Japanese Red Cross Society -Decontamination Place for Large-scale Vehicles: In operation since Apr. 4 A simple decontamination place was used by Apr. 3. Waste water of decontamination is stocked in a storage tank through a treatment facility. -Setting up a measurement place for rainy days: In operation since Jul. 15. -Setting up oil cleaning/cleanser decontamination place: In operation since Jul. 31. [Certificate of Contamination Survey] Since setting the No-go Zone, certificates of contamination survey have been issued at J-Village, Fukushima Daini Nuclear Power Station and Shin Fukushima Substation (since May 7).	 No.8-No.9 Ground of J-Village  West side of J-Village Center building    Decontamination Place for Large-scale Vehicles  Measurement place for rainy days  Oil cleaning/cleanser decontamination place  Decontamination shower for workers

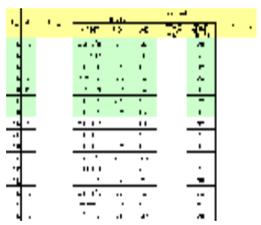
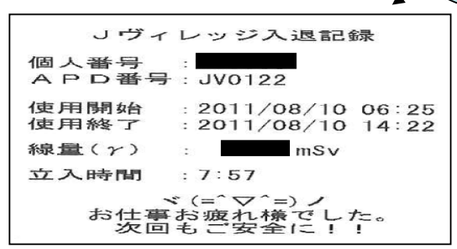
Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation Control/ Medical Care	**Continuing enhancement of radiation control (WBC)** - Preparation of Measurement Infrastructure for Internal Radiation by Expansion of Whole Body Counter (WBC) In order to evaluate internal exposure for workers, etc., 13 WBCs are prepared with a building for WBC in Hirono Football Stadium. [Location] 1. WBC Center (Hirono Football Stadium next to the stadium building; training facility on rainy days) 2. Metropolitan Area: Tokyo Branch [Number of Unit] 1. 13 sets: 1 set (in-vehicle type borrowed from JAEA-1), 12 sets (stationary type)* 2. 1 set: 1 set (in-vehicle type borrowed from JAEA-2) * Under arrangement (4 sets transferred from 1F/2F, 7 sets newly purchased and 1set borrowed from another company) [Operation Schedule] 1. WBC Center (Hirono Football Stadium next to the stadium building; training facility on rainy days) In operation: 1 set (in-vehicle type borrowed from JAEA-1), and 11 sets (stationary type) Under arrangement: 1 set borrowed from another company (stationary type) 2. Metropolitan Area: Tokyo Branch In operation: 1 set (in-vehicle type borrowed from JAEA)	  ①In-vehicle type WBC building ②Stationary type WBC building   Operation Schedule of Whole Body Counters ① Operation since Jul. 11 — In-vehicle type borrowed from JAEA ② Operation since Jul. 13 — Stationary type transferred from 2F ③ Operation since Aug. 5 ④ Operation since Aug. 6 ⑤ Operation since Aug. 12 — Stationary type transferred from 1F ⑥ Operation since Jul. 25 ⑦ Operation since Sep. 22 ⑧ Operation since Sep. 22 ⑨ Operation since Sep. 30 ⑩ Operation since Sep. 30 ⑪ Operation since Oct. 3 ⑫ Operation since Oct. 3 — Newly purchased ⑬ Schedule being coodinated — Borrowed from another company

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation Control/ Medical Care	**Continuing enhancement of radiation control (WBC)** - Proper Treatment of Radioactive Waste [Liquid Waste (Decontamination Liquid Waste)] Decontamination liquid waste is collected in J Village and purified by a purification facility. The purified liquid waste is planned to be used for decontamination water after confirmation of contamination density. * Installation and operation of the purification facility: From Apr. 4 Reuse: Within October (planned) [Solid Waste] Waste of protection clothes, etc. used in J Village and other screening sites in Fukushima Prefecture, etc. are kept in J Village. The wastes are distinguished to combustible, fire-retardant and non-combustible type, and kept in special metal containers.	Purification Facility   Separation and Storage of Solid Waste   Purification Facility  Separation and Storage of Solid Waste

Progress Status Classified by Issues (Photos and Figures)

Issues	Progress etc.	Reference (Photos and Figures)
V. Environment Improvement (9) Radiation control / Medical care	**Continuing enhancement of radiation control** - Reinforced radiation controlling Alarm Pocket Dosimeters had been lent through signing in a recording book and entered the data manually into database, but worker identification cards with barcodes have been provided since Jun. 8 so that it becomes possible to enter the data directly into the database with barcode readers. From Aug. 16, radiation exposure data are printed out in receipts. We are planning to introduce a system which can automatically acquire individual radiation exposure data of workers at J-village.	【Immediately after the Earthquake (previously)】 1. Lending Alarm Pocket Dosimeter and signing in a recording book  - Lending pocket dosimeter and signing the names, time, etc. in a recording book to manage personal in-and-out. 2. Working, carrying pocket dosimeter and measuring  - Measurement with pocket dosimeter for each time 3. Entering measurement results in the book and PC  - Entering data of time, radiation exposure, etc. in the book or PC when leaving the area 【After Improvement (corrent condition)】 Main Anti-Earthquake Building Control workers in-and-out of the site Measure personal radiation dose - Lending pocket dosimeter - Record Signing (until Apr. 13) Barcodes (since Apr. 14)  J-Village Working Area Control workers in-and-out of the site Measure personal radiation dose - Lending pocket dosimeter - Record: Signing Since Jun. 8 ~ Barcodes - Notification of radiation exposure data Since Aug. 16~ Receipts  福島第一原子力発電所　作業者証 個人番号：[redacted] 所属：１Ｆ　第一運転管理部　放射線・化学管理Ｇ 氏名　：[redacted]  Ｊヴィレッジ入退記録 個人番号　：[redacted] ＡＰＤ番号：JV0122 使用開始　：2011/08/10 06:25 使用終了　：2011/08/10 14:22 線量（γ）：[redacted] mSv 立入時間　：7:57 ヾ(=^▽^=)ノ お仕事お疲れ様でした。 次回もご安全に！！

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	**Continuing improvement of medical system** - ER for Unit 5/6 established for the temporary use during the summer only is now used as a permanent facility, staffed by emergency specialists continuously after September. - Nurse(s) and radiation technologist(s) have also been allocated, though on irregular basis for the time being. - Enhancement of medical facilities and reinforcement of decontamination facilities have met the conditions to transport patients promptly; it enabled us to transport seriously ill patients who are not contaminated to hospitals directly. Ambulance cars have been prepared at 1F (Sep. 16) *Three (3) carriers in total Prevention of influenza infection and spreading at 1F (Starting vaccination for influenza, etc. from Nov. 1.) - Countermeasures against heatstroke Notice board Cool vest Mask with floor Cool scurf	  Medical Space at Main Anti-Earthquake Building   Cool Vest  Mask with blower  Cool Scurf  Wearing Cool Scurf  Wearing Cool Pack for Neck (Freezed type)  Cool Pack for Neck （Freezed type） ※Photos are from manufacturers' brochures. There are cases diferent from actual use.

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	Continuing improvement of medical system	

Emergency Room (ER) for Unit 5/6

Operation check of medical devices (doctor and nurse)

Inventory check of medial drugs (doctor and nurse)

Radiation dose measurement in the room (radiation technologist)

ER for Unit 5/6 (medical space)

Training of screening and decontamination of a patient (in front of the entrance of the service bldg of Unit 5/6)

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	**Continuing improvement of medical system**	

JV Clinic External Appearance

Operation Room in JV Clinic

Consultation Room in JV Clinic

Waiting Room in JV Clinic

Deployed Ambulance

Ambulance and Patient Carrier

Progress Status Classified by Issues (Photos and Figures)

Issues		Progress etc.	Reference (Photos and Figures)
V. Environment Improvement	(10) Staffing Plan	**Systematic staff training and personnel allocation** -Conducting training for staff engaged in radiation related work, who will be in great demand. -Has been conducting "Radiation survey staff training" targeted for TEPCO's and TEPCO group companies' employees and has already trained approx. 2,500 of personnel. -The national government has been conducting "Radiation survey staff development trainings" (five times for approx. 140 people in total up to Sep. 9) and "Radiation protection staff development trainings" (for approx. 10 people from Aug. 8 to 12). It will train 250 of personnel. -Launched a new framework of looking for workers widely through Japan Atomic Industrial Forum (JAIF), according to affiliated companies needs.	  Radiation survey staff training course (at training center, TEPCO)   Radiation survey staff training course (at J Village)    Radiation protection staff training course (at JAEA)