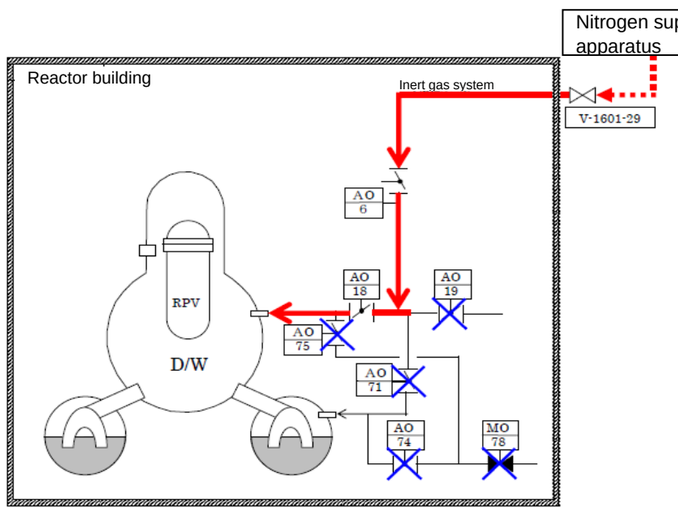
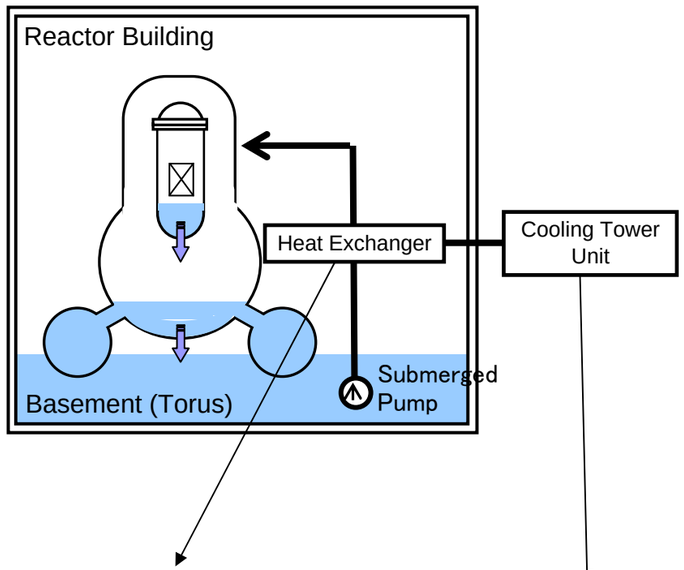
Reference 4

Jul. 19, 2011
Tokyo Electric Power Company

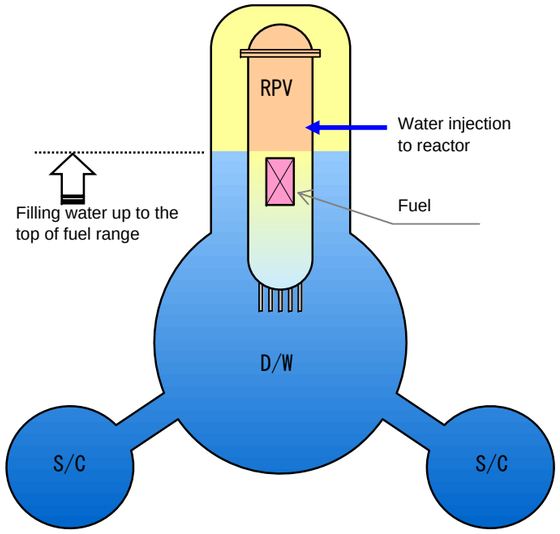
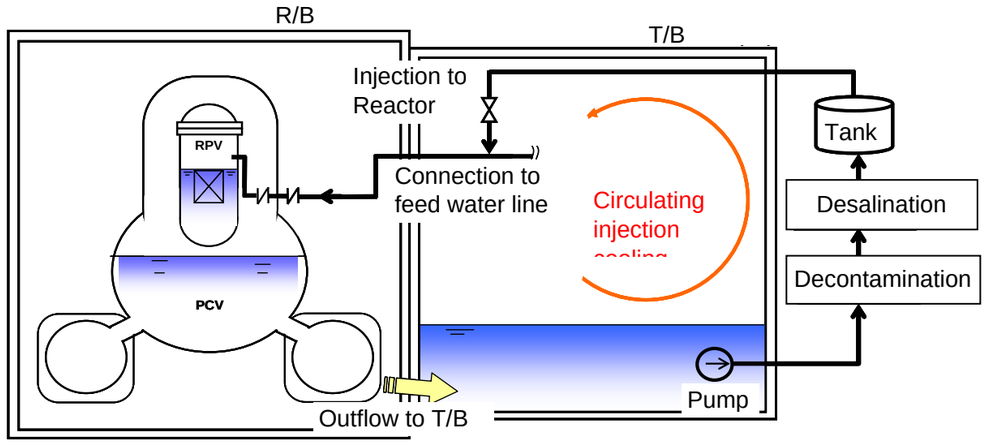
Progress Status Classified by Issues (Photos and Figures)

Issues			Countermeasures	Implementation Status	Reference (Photos and Figures)
I. Cooling	(1) Reactor	Unit 1	Countermeasure [76] Improvement of work environment	Removal of debris, Measurement of radiation dose, Entrance into the building (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 temporary RPV pressure gauge (Jun 3)	 Checking the reactor buildings by Packbot  Measuring radiation dose inside the reactor buildings   Installing temporary RPV pressure gauge
			Countermeasure [11] Nitrogen gas injection	Implementing from April 6	Nitrogen supply apparatus  System outline of nitrogen gas injection 

Progress Status Classified by Issues (Photos and Figures)

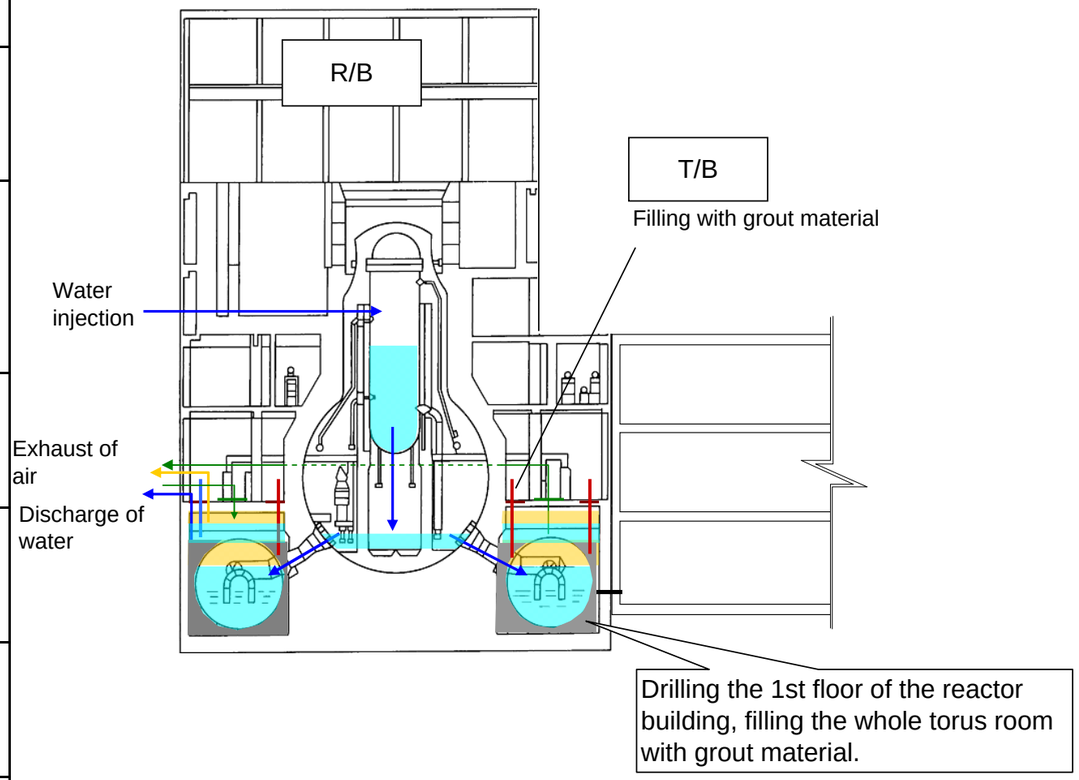
Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
I. Cooling	(1) Reactors	Unit 1	Countermeasure [13] Securing heat exchange function for the reactor	- Due to the leakage from the PCV, we judged that it was difficult to secure water level of PCV. - Therefore, we changed the plan to give priority to the establishment of circulating injection cooling for the reactor. - We are studying the reactor cooling system by using heat exchanger as a mid to long term solution. (work implemented) - Completed the assembly of cooling tower unit and shielding equipment to reduce exposure dose for outdoor work (May 17 to Jun 17)	[Under consideration] Outline of circulating cooling system within the reactor building   Plate-type heat exchanger  Cooling tower unit 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  Shielding equipment to reduce exposure dose for outdoor work June 3, Completion of build-up of cooling unit on the trailer

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
I. Cooling	(1) Reactors	Unit 1	Countermeasure [14] Cooling by minimum water injection rate (Cooling by water injection)	- Implementing water injection at the rate of 3.5m^3/h from Jun. 22	Image of flooding the PCV  Inspection of water level gauge 
			Countermeasure [16] Sealing the leakage location	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [9] Flooding the PCV	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [12,45] Consideration and preparation of reuse of accumulated water	- Work on injection line (from May 21) - Started circulating injection cooling from Jun. 27	 System outline of water reuse as reactor coolant by processing accumulated water
			Countermeasure [12,14,45] Start and implementation of circulating injection cooling	- Started circulating injection cooling from Jun. 27	

Progress Status Classified by Issues (Photos and Figures)

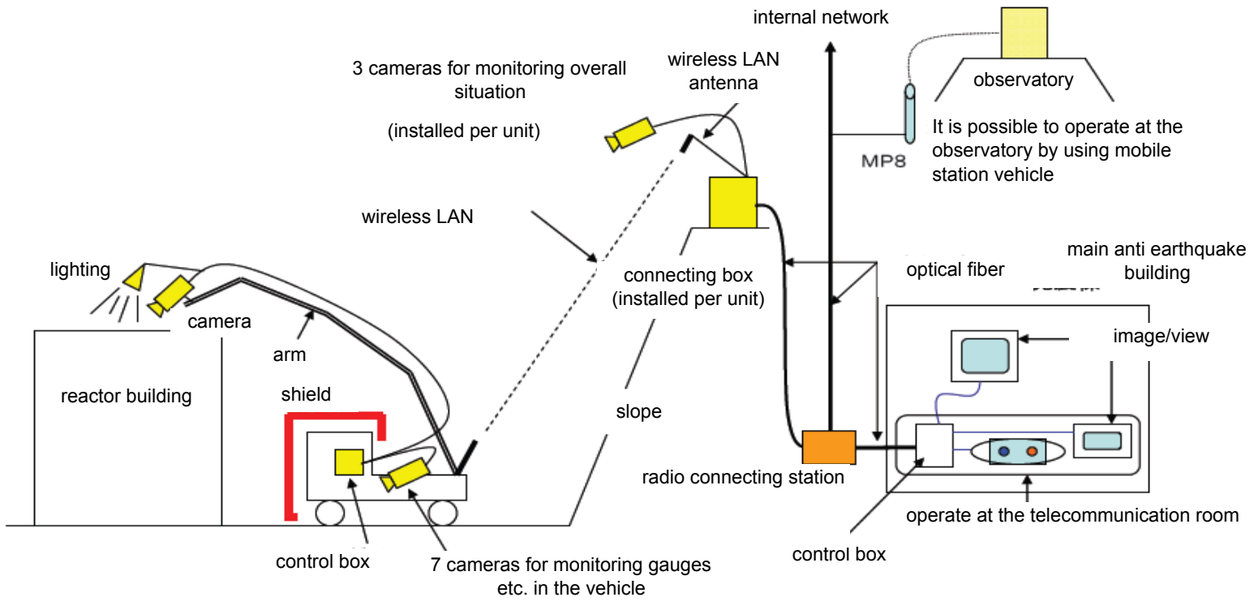
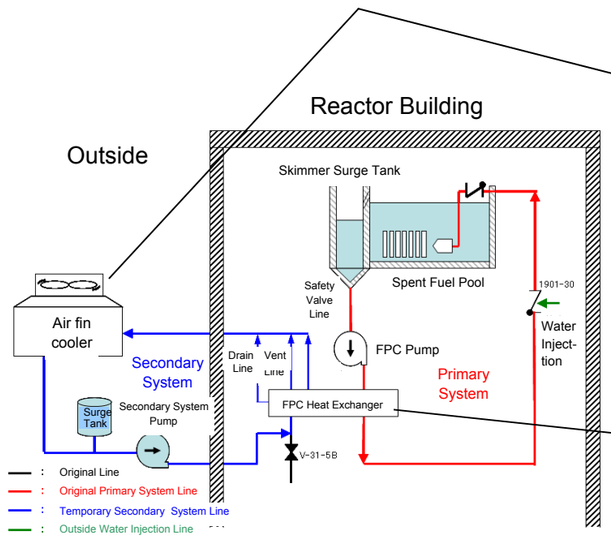
Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
I. Cooling	(1) Reactor	Unit 2	Countermeasure [76] Improvement of work environment	Measurement of radiation dose, entrance into buildings. (May 18, May 26, Jun. 4, Jun. 11) Started local exhausters, purification operation (Jun. 11 - 19)	Image of the countermeasure: Sealing the damaged location of Primary Containment Vessel.
			Countermeasure [11] Nitrogen gas injection	In operation since Jun. 28.	
			Countermeasure [13] Secure heat exchange function	- Prioritize the establishment of circulating injection cooling for the reactor and under consideration on the reactor cooling system by using heat exchanger as a mid to long term solution.	
			Countermeasure [6] Consideration of sealing the leakage location in the PCV	- Conducted laboratory test on sealing way.	
			Countermeasure [16] Sealing the leakage location	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [9] Flooding the PCV	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [14] Cooling at minimum water injection rate (cooling by water injection)	-Implementing water injection at the rate of 3.5m3/h from Jun. 22	
			Countermeasure [12, 45] Consideration and preparation of reuse of accumulate water	- Work on injection line (from Apr 9) - Started circulating injection cooling from Jun. 27	
			Countermeasure [12, 14, 45] Start and implementation of circulating injection cooling	- Started circulating injection cooling from Jun. 27.	



Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
I. Cooling	(1) Reactor	Unit 3	Countermeasure [76] Improvement of work environment	- Removal of debris, measurement of exposure dose, entrance into buildings. (May 18, Jun. 9) - Cleaning by using robots (Jul. 1) - Placement of steel boards at truck bay door (Jul. 4)	Demolished and removed debris at the truck bay door, which would have been obstacles for installation of alternative cooling facilities for Unit 3's reactor. Truck bay door/ collapsed outside pillars Truck bay door/ Inside Machine hatch space on the 1st floor of the reactor building  (After removal May 25) (After removal May 30) (After removal Jun. 4)
			Countermeasure [11] Nitrogen gas injection	In operation from Jul. 14.	
			Countermeasure [13] Secure heat exchange function	- Prioritize the establishment of circulating injection cooling for the reactor and under consideration on the reactor cooling system by using heat exchanger as a mid to long term solution	
			Countermeasure [16] Sealing the leakage location	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [9] Flooding the PCV	- Under examination on the implementation as mid to long term measures.	
			Countermeasure [14] Cooling at minimum water injection rate (cooling by water injection)	- Implementing water injection at the rate of 9m3/h from Jun. 24	
			Countermeasure [12, 45] Consideration and preparation of reuse of accumulate water	- Work on injection line (from Apr 16) - Started circulating injection cooling from Jun. 27	
			Countermeasure [12, 14, 45] Start and implementation of circulating injection cooling	- Started circulating injection cooling from Jun. 27.	The 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

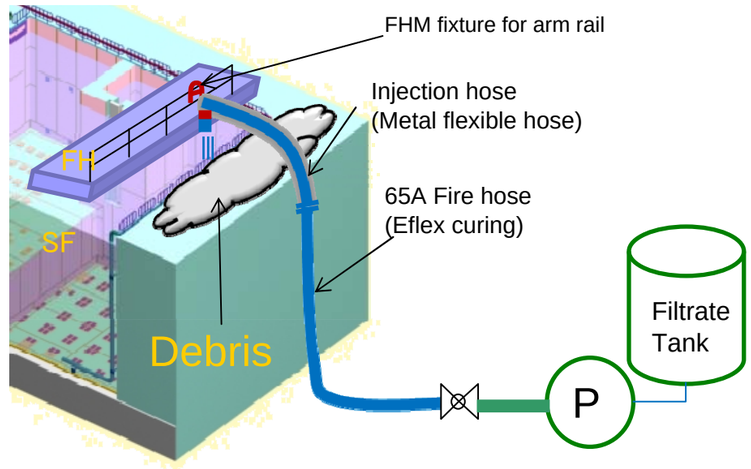
Progress Status Classified by Issues (Photos and Figures)

Issues			Countermeasures	Implementation status	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	Unit 1	Countermeasure [22] 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)	Image of remote-controlled operation of concrete pumping vehicle 
			Countermeasure [24] Restoration of normal cooling system	- Radiation measurement by γ-camera 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)	
			Countermeasure [25,27] Installation of heat exchanger	- Implementing installation (from Jul. 12) - Circulation cooling system is planned to be operated (Beginning of August)	 Overview of SFP cooling function  Air fin cooler  Existing heat exchanger

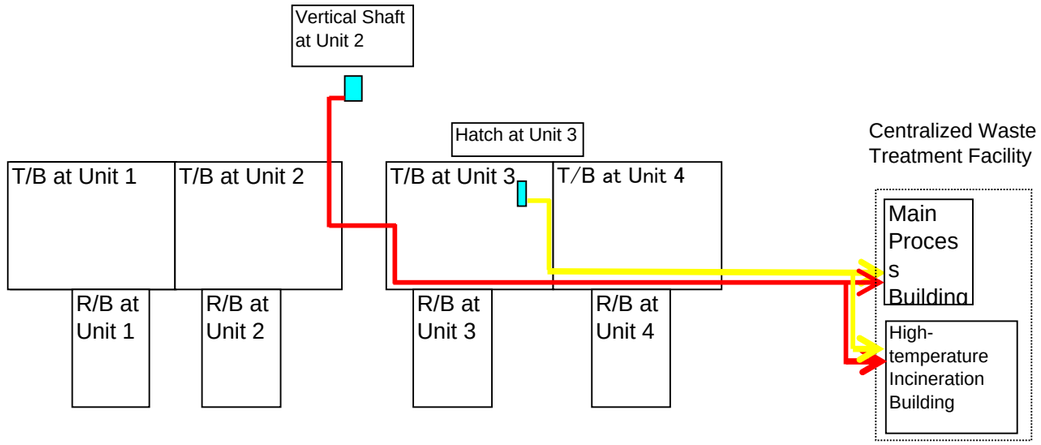
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	Unit 2	Countermeasure [23] Restoration of normal cooling system	- continuing	 Debris in Unit 2 Waste Treatment Building  Unit 2 Heat Exchanger Unit
			Countermeasure [25,27] Installation of heat exchanger	- Installed heat exchanger and operating circulating cooling system (from May 31)	
		Unit 3	Countermeasure [22] 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	Unit 3 Spent Fuel Pool  Unit 3 Heat Exchanger Unit 
			Countermeasure [24] Restoration of normal cooling system	- Confirmed 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)	
			Countermeasure [25,27] Installation of heat exchanger	- Installed heat exchanger and operating circulating cooling system (from Jun. 30)	

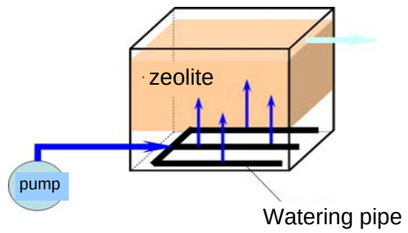
Progress Status Classified by Issues (Photos and Figures)

Issues			Countermeasures	Implementation status	Reference (Photos and Figures)
I. Cooling	(2) Spent Fuel Pool	Unit 4	Countermeasure [22] 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 April 22)	   Water injection by "Giraffe" at Unit 4
			Countermeasure [24] Restoration of normal cooling system	- Water injection by installing alternative equipment to "Giraffe" (from Jun. 17)	 Alternative equipment to "Giraffe" at Unit 4
			Countermeasure [25,27] Installation of heat exchanger	- Removing debris. Restoration work will be started after the removal. - Circulation cooling system is planned to be operated (by around July)	 Status of 5th floor in Unit 4  Condition inside the SFP

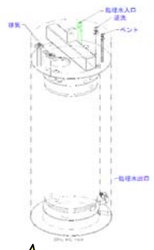
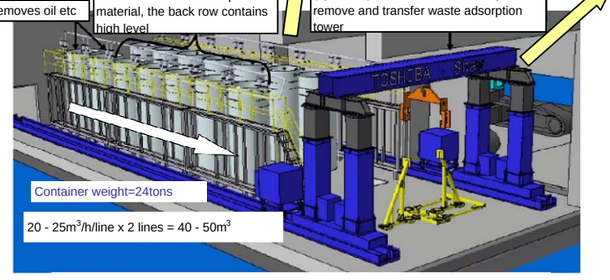
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures		Implementation Status	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	High level	Countermeasure [37, 39, 42] Secure sufficient places to store contaminated water	- Transfer to Centralized Waste Treatment Facility (Main Process Building and High-temperature Incineration Building) after checking no water leakage o Main Process Building: After checking no water leakage etc., transferred accumulated water from Unit 2 Turbine Building. (April 19) o High-temperature Incineration Building: After checking no water leakage etc., transferred accumulated water from Unit 3 Turbine Building. (May 17)	**<Transfer into Centralized Waste Treatment Facility>**   Tanks to receive processed water (H1 area)  Underground tanks for highly contaminated water

Progress Status Classified by Issues (Photo and Figures)

Issues			Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	High level	Countermeasure[64] Consideration of mitigation of contamination in the ocean	- Completed setting up silt fence - Preparation construction for setting steel pipe sheet piles ［Completed removal of curtain wall］ - Purification of sea water by circulating purification system （from Jun. 13） - Completed setting up sliding concrete wall at intake of Unit 1 to 4 <Implementation hereafter> - Planning for setting up steel pipe sheet piles	 Set up sliding concrete wall at intake (Unit 2)  Sliding concrete wall at intake (Setting work)  Sliding concrete wall at intake (before setting)  Sliding concrete wall at intake (after setting) <Adsorption of cesium by zeolite>  <Outside view of the system> 
			Countermeasure [65] Isolation 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 and others 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)

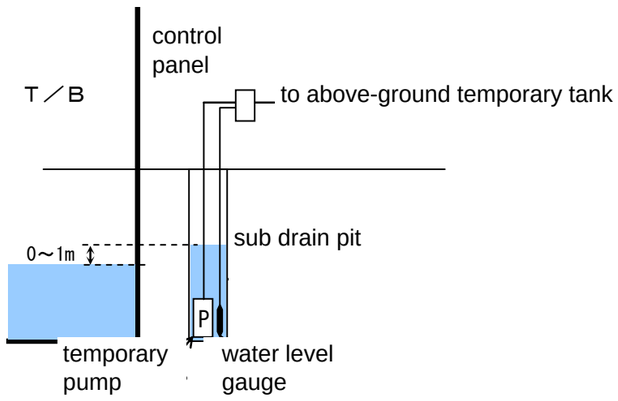
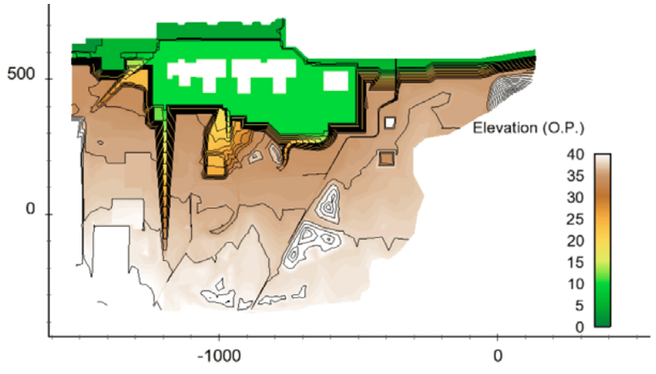
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water High level	Countermeasures [38, 43, 45] Installation of processing facility/Continuation of elimination and process of contaminated water in the building	[Decontamination of Contaminated Water] Started on Jun. 17 - Cesium adsorption Instruments (Kurion): - Radioactivity treatment instruments (Areva): - Cesium adsorption Instruments + Radioactivity treatment instruments: [Desalting of Contaminated Water] - Water Desalinations (RO method): Processing started on Jun. 17 Construction work will be completed later July - Water Desalinations (Distilling equipment): Under construction (as of Jul. 19) [Storage of sludge waste] - Sludge waste is stored in the pellet storage tank - Additional sludge waste storage tanks are under preparation	<Decontamination flow of contaminated water> I. Oil separators II. Cesium adsorption Instruments III. Decontamination apparatus IV. Desalination instrument 1 (Reserve osmosis) V. Desalination instrument 2 (distillation) Oil Tank II. Cesium adsorption Post Filter Coagulation settling Nuclide coprecipitation (adsorption) Waste Liquid Tanks procuring parts and manufacturing     receiver tanks for processed water  Expansion of Decontamination Capacity Kurion (USA) AREVA (France) SARRY (Japan / USA) Planned to Start in August   Installation status of lifter for exchanging containers Removes oil etc Removes Cs. Front row contains low level adsorption material, the back row contains high level Install special heavy machinery for lifting (hydraulic) and transfer machinery, remove and transfer waste adsorption tower  Container weight=24tons 20 - 25m³/h/line x 2 lines = 40 - 50m³

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures		Implementation status	Reference (Photos and Figures)
II. Mitigation	(3) Accumulated Water	Low level	Countermeasure [40, 41] Increase storage capacity / decontamination	Increase of storage capacity and continuation of decontamination of contaminated water - Installation of Tanks: Waste liquid RO Supply B Area 6,200t（May 31) RO processed water temporary tank D Area 5,000t（May 10) RO condensed water storage tank E Area 8,000t（May 22) RO condensed water storage tank H Area 20,000t (Jul. 14) Low level F Area 12,200t（May 31) - Megafloat 10,000t (May 21)	<Megafloat>  <F Area Tanks> <Square shape tanks>  <Round shape tanks> 
				Utilization of decontaminant (zeolite) setting in water, self-circulation and adsorption of Cesium by zeolite decontamination of accumulated water in Unit 6 T/B after transferring to receiver tanks for low level water Full-scale operation from May 1	 Decontaminant (zeolite)

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation status	Reference (Photos and Figures)
II. Mitigation	(4) Groundwater	Countermeasure [66] Consideration of mitigation measures of groundwater contamination	- Closing of vertical shaft of sea water pipe Unit 2: Completed on Jun. 2 Unit 3: Completed on May 26 Unit 4: Completed on Apr. 6 - Closure of pits, etc. Unit 1: To be completed on May 17 Unit 2: Completed on Jun. 9 Unit 3: Completed on Jun. 10 Unit 4: Completed on Jun. 10	 Putting in crushed stone  Concrete placement  Mortar placement
		Countermeasure [67] Implementation of mitigation measures of groundwater contamination	- Restoration of sub drain pump Implementing the installation of the temporary pump in the sub drain pit on T/B side. Laying the transfer piping arrangement Considering the point to install the pump on R/B side - Sub drain management along with expansion plan of storage/processing facility.	 Image of sub drain pump controlling
		Countermeasure [68] Examination of shielding wall of groundwater	- Considering underground water flow based on seepage analysis <next step> -Implement investigation of underground water level, water quality, etc. by drilling. -Implement most appropriate method to shield underground water by evaluating water shield effect, earthquake resistance, durability, etc. -Implement study for optimization of shielding section, installation plan and construction schedule.	 Example of seepage analysis model

Progress Status Classified by Issues (Photos and Figures)

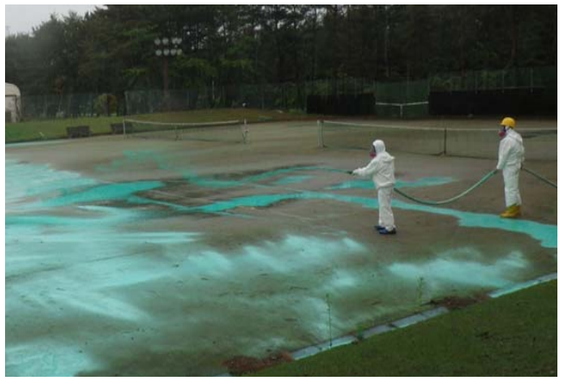
Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	Countermeasure [52] Dispersion of inhibitors	[Present Status] Completed dispersion of inhibitor -Record of dispersion: Approx. 560,000m^2 <Inside power station (flat land and slope)> : Approx. 400,000m^2 -Test dispersion (Apr. 1 to Apr. 25) : Approx. 30,000m^2 -Full dispersion (Apr. 26 to Jun. 28) : Approx. 370,000m^2 <Around building>: Approx. 160,000m^2 -Dispersion using crawler dump truck (Apr. 26 to Jun. 27) Around building of Unit 1 to 4, 5 and 6 : Approx. 120,000m^2 -Dispersion by bending spray tower vehicle (May 27 to Jun. 4, Jun 10) Turbine building of Unit 1 to 4, roof and wall of reactor building of Unit 2: Approx. 30,000m^2 -Dispersion by concrete pumping vehicle (Zebra) (Jun. 8,9,18) Roof and wall of reactor building of Unit 1,3,4: Approx. 10,000m^2 Hereafter, we keep monitoring status of solidification and others at dispersed area.	 Dispersion of inhibitors in the Power Station (slope)  Dispersion of inhibitors around buildings of Unit 1 to 4 by crawler dump    Dispersion of inhibitors by bending spray tower vehicle

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	Countermeasure [52] Dispersion of inhibitors		

Dispersion of inhibitors in the Power Station (slope)

Dispersion of inhibitors in the Power Station (slope)

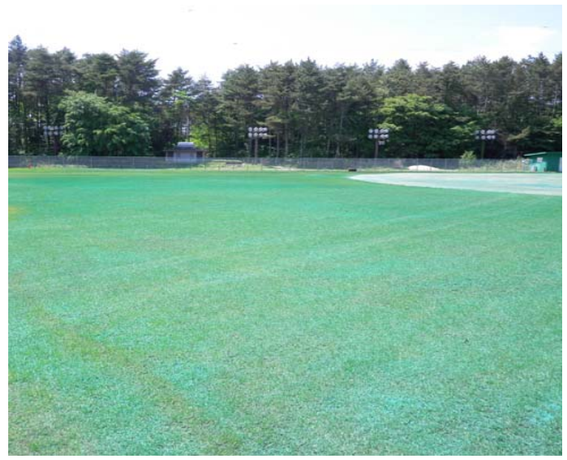


Dispersion of inhibitors in the Power Station (flat surface)

After dispersion of inhibitors in the Power Station (slope)

After dispersion of inhibitors in the Power Station (flat surface)

After dispersion of inhibitors in the Power Station (slope)



After dispersion of inhibitors in the Power Station (flat surface)

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	Countermeasure [53] 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, bulldozer). (from Apr. 6) - Almost all of the debris in highly-radioactive area, outside the buildings of Unit 1 to 4 (dose rate of 10mSv/h or higher) are removed . <Record of removing debris as of Jul. 14> - Approx. 500 containers* of debris are removed. <Plan for further implementation> - We will continue removing the outside debris which hinder work.	 Removing debris with remote-controlled heavy machinery  (Container: 3.2*1.6*1.1m, Approx. 4m^3)  Around reactor building of Unit 1 (Jun. 9)  Around reactor building of Unit 1  The space between reactor buildings Unit 2 and Unit 3  Road at the ocean-side of Unit 1 Turbine Building  Bottom of the slope at the south side of Centralized RW Treatment Facility

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	Countermeasure [54] Installation of reactor building cover	《Unit 1》 - Start of preparation construction work * (from May 13) - Maintenance of road for crane - Creation of slope for moving of crane - Maintenance of shallow draft quay - Start of main structure construction work （from Jun. 28）	《Unit 1 progress status》

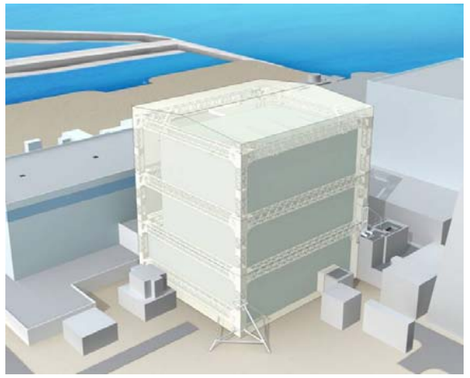


Image after installation of reactor building cover for Unit 1

Installation model of reactor building cover for Unit 1

Before

Laying pavement and leveling

Laying steel plates

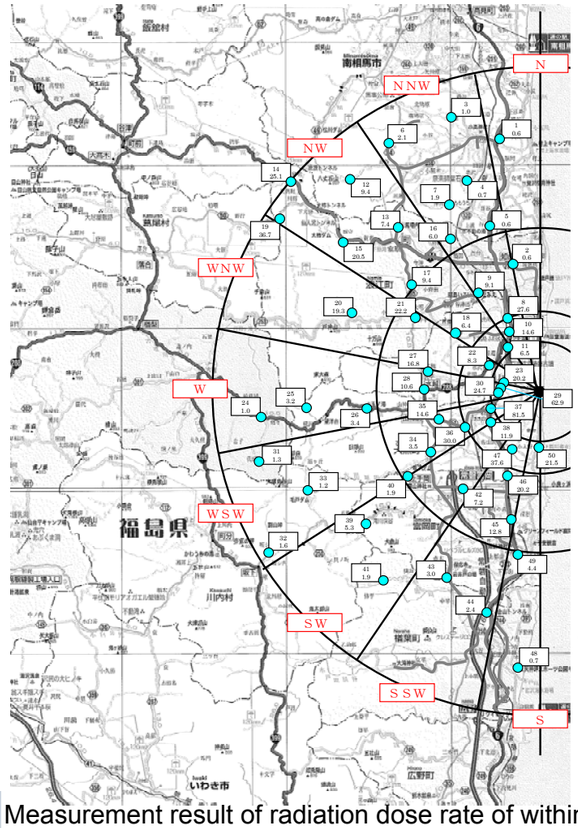
Preparation Work (Improvement of condition of shallow draft quay, completion of laying steel plates (finished on June 11))

Preparation work (road for crawler crane)

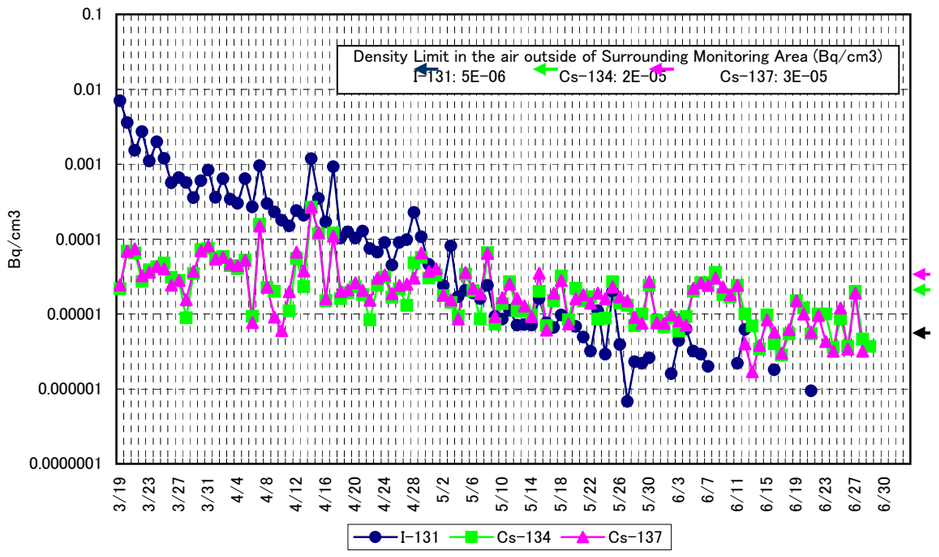
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
II. Mitigation	(5) Atmosphere / Soil	Countermeasure [54] Installation of reactor building cover	《Unit 3 and 4》 - Start of preparation construction work Unit 3; Jun. 20-, Unit 4; Jun. 24-	 Status of preparation work (shallow draft quay-road for crawler crane)  Temporary assembly of reactor building cover for Unit 1 (at Onahama Port)  Start of main construction of reactor building cover for Unit 1  Preparation work for reactor building cover for Unit 3  Preparation work for reactor building cover for Unit 4

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
III. Decontamination/Monitoring	(6) Measurement, Reduction and Announcement	Countermeasure [60,61] Expansion, enhancement and announcment of monitoring	Continue monitoring in and out of the power station [Land Area] ＜Monitoring within 20km radius of the periphery＞ ・Monitoring of radiation dose rate at 50 points by Utility Support Team (once a week) ・Land sampling at 50 points and additional points (approx. 50 points) by Utility Support Team (once in 2 months) ・Monitoring at the time of nitrogen injection to the PCV of Unit 2（Jun.28～Jul.12) ・Monitoring at the time of nitrogen injection to the PCV of Unit 3（Jul.13～Jul.29) ＜Monitoring within the site＞ ・Monitoring of radiation dose rate around the West Gate (everyday) ・Monitoring of radiation dose rate at the upper part of reactor buildings with a concrete pumper, etc.(every 1 month)： Unit 1（May 22)，Unit 4（May 23, Jun.18)，Unit 3（Jun.13, Jul.13)，Unit 2（after Jul.14） ・Monitoring of radiation dose rate at the west part of the hill located in the north side of the reactor building（once a week） ・Monitoring of radiation dose rate at the monitoring posts, etc. (once a week) ・Mitigation measures on backgrounds of monitoring posts (mitigation from the impact of land)：MP8(May 20)，MP3(May 23)，MP2(after July)	 Upper: Point No. Lower: radiation dose rate（μSv/h） Measurement result of radiation dose rate of within 20 km radius (date: Jun.30, 2011)

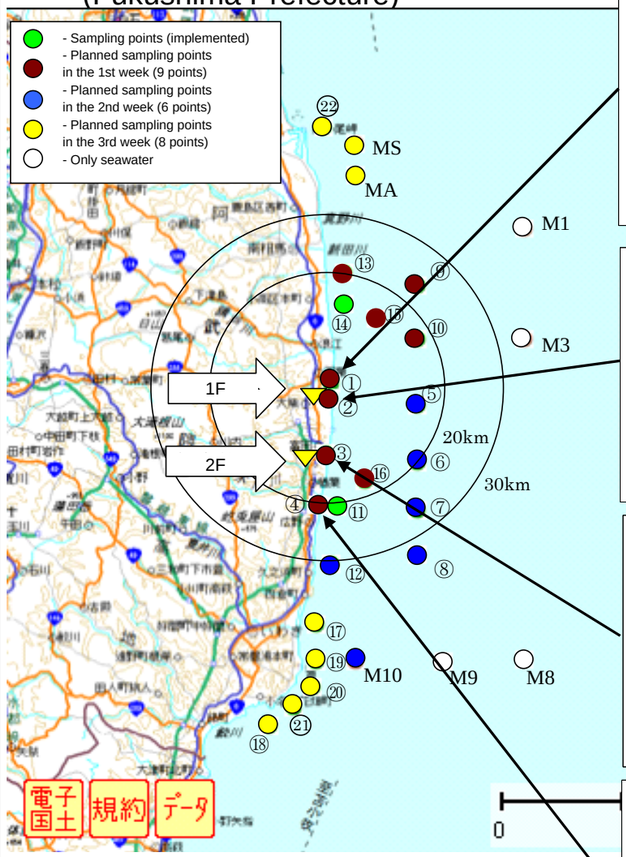
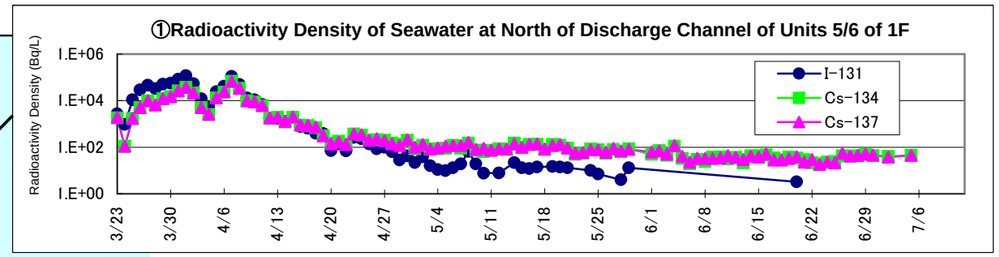
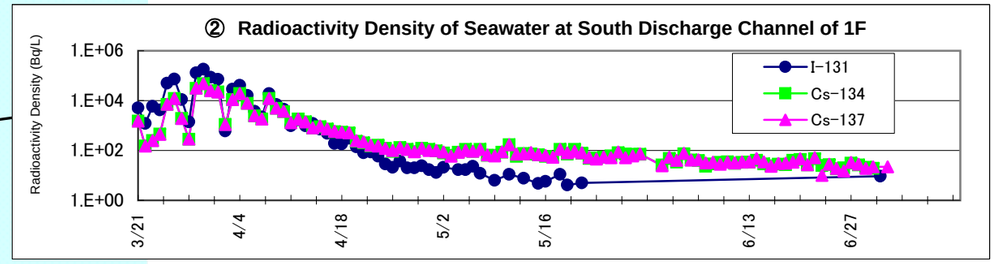
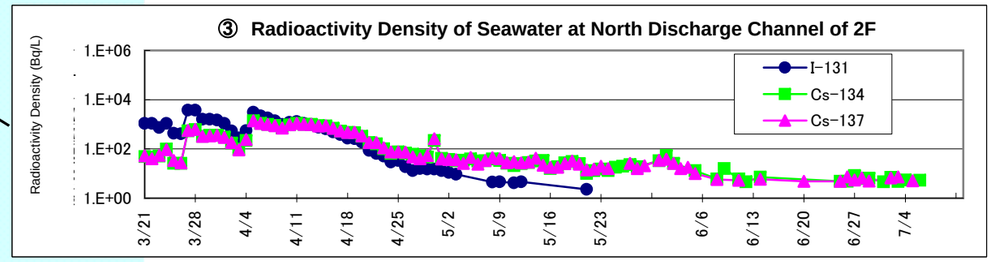
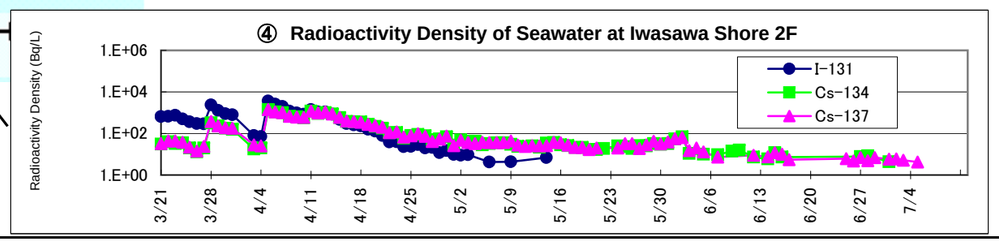
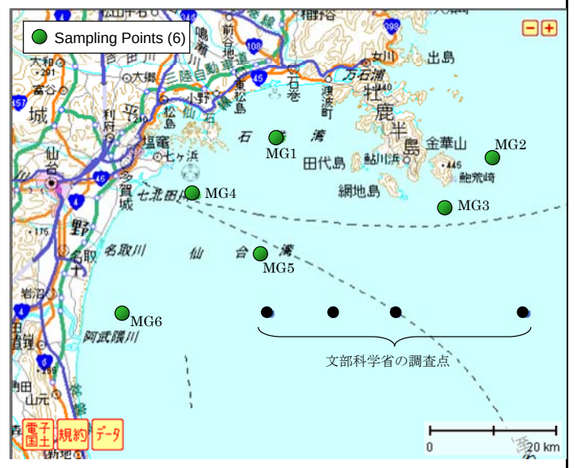
Trend of density of radioactive materials in the air at Fukushima



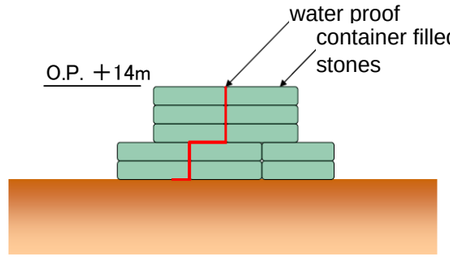
Sampling by concrete pumping vehicle

Soil sampling by the power support team (Within 20 km radius)

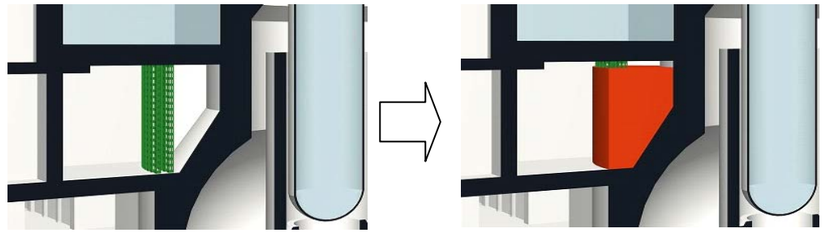
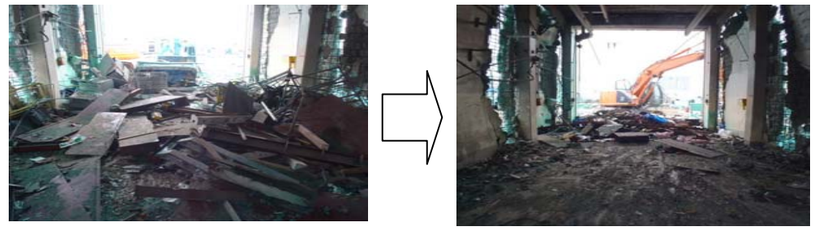
Progress Status Classified by Issues (Photos and Figures)

Issues	Countermeasures	Implementation Status	Reference (Photos and Figures)
III. Decontamination/Monitoring (6) Measurement, Reduction and Announcement	Countermeasure [60,61] Expansion, enhancement and announcement of monitoring	【Ocean Area】 ＜Fukushima Prefecture＞ ・Seawater 16 points（Apr.17～） ↓ ・Seawater 22 points（May 5～）, Marine soil 2 points（Apr.29～） ↓ ・Outside 30km radius, 7 points (succession from MEXT), Within 30 km radius, at the lower layer additional 11 points, Sampling frequency change (Jun.4～) ・Expansion of marine soil sampling（2 points → 23 points, Jul.12～） ＜Ibaraki Prefecture＞ ・Seawater 5 points（Apr.29～every 1 week) ↓ Jun. 7～ twice in a week ＜Miyagi Prefecture＞ ・Seawater 6 points（Jun.21～ twice in a month）	－Seawater Sampling Points － (Fukushima Prefecture)  ①Radioactivity Density of Seawater at North of Discharge Channel of Units 5/6 of 1F  ② Radioactivity Density of Seawater at South Discharge Channel of 1F  ③ Radioactivity Density of Seawater at North Discharge Channel of 2F  ④ Radioactivity Density of Seawater at Iwasawa Shore 2F 	－Seawater Sampling Points － (Miyagi Prefecture)  －Seawater Sampling Points － (Ibaraki Prefecture) 

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	Countermeasure [69] Countermeasures against tsunami Countermeasure [70] Enhancement of countermeasures against tsunami	-Temporary DG was moved to the upland (Apr. 15) -Securing redundancy of water injection line (by Apr. 15) -Setting fire engines in the upland (by Apr. 18) -Started installation of temporary tide barrier from May 18 and completed by the end of June	 Planned temporary tide barrier (white dotted line)  Cross-section of temporary tide barrier (image)  Temporary tide barrier (1)  Temporary tide barrier (2)  Temporary tide barrier (3)  Temporary tide barrier (4)

Progress Status Classified by Issues (Photos and Figures)

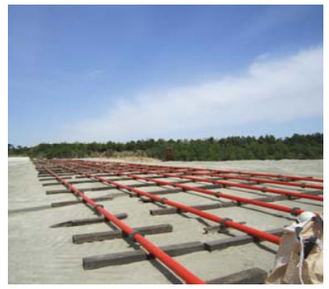
Issues			Countermeasures	Implementation Status	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	Unit 4	Countermeasure [26] Installation of supporting structure under the bottom of spent fuel pool	- Soundness of structure was analyzed and evaluated - Securing the route to the area to install supporting structure (removing debris, establishing a foothold at hatch, removing shield blocks) - Removing obstacles at the area and installing shielding - Completion of installing steel pillars (Jun. 20) - Concrete placement (75% completion) ＜Next Step＞ - Pouring concrete and grout (until the end of July)	Outline of supporting structure installation  Steel pillar installation　Concrete wall installation Removing debris  Removing debris at truck-bay door Securing route  Establishing a foothold at hatch Installation of supporting structure under the bottom of spent fuel pool  Before work　Removing obstacles and installing shielding　Completion of steel pillar installation (Jun. 20)　Installation of concrete shuttering　Concrete placement

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
IV. Countermeasures against aftershocks, etc.	(7) Tsunami, reinforcement, etc.	Countermeasure [72] Preparation of various countermeasures for radiation shielding	<Utilization of Slurry> - Slurry production facility, transfer pipe, concrete pumping vehicles have been installed (May 17)	**Installation of equipment at Fukushima Daini Nuclear Power Station**
			- Maintenance of equipment - Implementing water injection training by connecting slurry production facility and concrete pumping vehicle "Elephant-3" (Jun. 16 and 17) - Making procedure documents and confirming organizational structure (Jun. 30)	**Placement of equipment at Fukushima Daiichi Nuclear Power Station**

Overview of the facility

Slurry production facility



Installation of slurry plant at Fukushima Daiichi

”Elephant-3”

High pressure concrete pumping vehicle

Transfer pipe

Preparation of equipment (sand)

Progress Status Classified by Issues（Photos and Figures）

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
V. Environment Improvement	(8) Life/work environment	Countermeasure [74] Improvement of workers' like/work environment	- Improvement of meals, upgrade of lodging facility - Securing water for daily use	
		Countermeasure [75] Continuing and enhancement of improvement of workers' life/work environment	- Expansion of temporary dormitory - Increasing available amount of water for daily use	

Full view

Outside (1)

Outside (2)

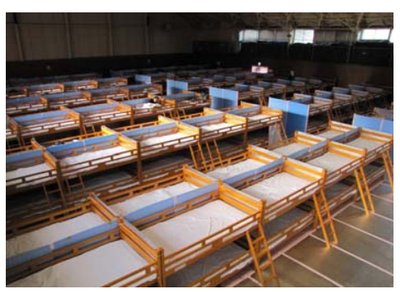
Inside (1)

Inside (2)

Interior (3)

small refrigerator

Dormitory



Bunk bed (whole)

Bunk bed

Shower room

Drinking water

Fukushima Daini Gym

Progress Status Classified by Issues (Photos and Figures)

Issues

V. Environment Improvement

(8) Life/work environment

Countermeasure

Countermeasure [74]
Improvement workers' life/work environment
Countermeasure [75]
Continuing and enhancement of improvement of workers' life/work environment

Implementation Status

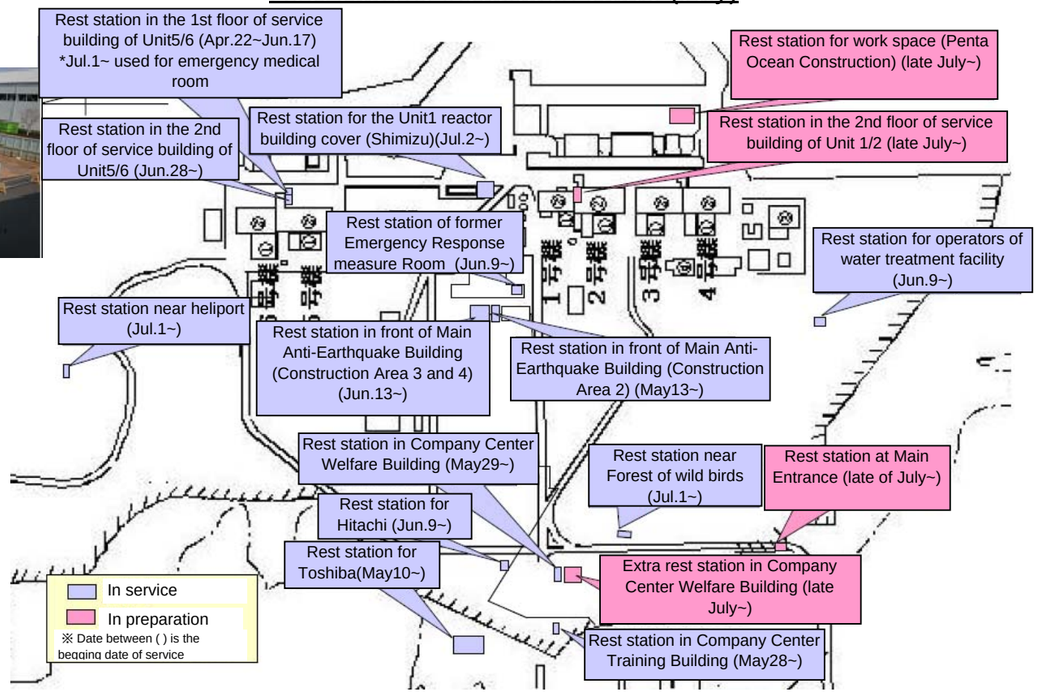
- Installation of rest stations at the site
- Expansion of rest stations at the site and restoration of original rest stations

Rest station installation status at Fukushima Daiichi

Date	Place	Space	Spec	Remark
Apr.22	1st floor of service building of Unit 5/6	120m^2	—	Jul.1~ as Medical room
May10	Rest station for Toshiba	400m^2	260	
May13	Rest station in front of Main Anti-Earthquake building	340m^2	110	
May28	Rest station in Company Center Training Building	190m^2	60	
May29	Extra rest station in Company Center Weldore Building	180m^2	60	
Jun.9	Rest station of former Emergency Response measure Room	560m^2	180	
Jun.9	Rest station for Operators of Water treatment facility	180m^2	12	
Jun.9	Rest station for Hitachi	180m^2	120	
Jun.28	2nd floor of service building of Unit5/6	280m^2	90	
Jul.1	Rest station near heliport	90m^2	20	
Jul.1	Rest station near Forest of wild birds	90m^2	20	
Jul.2	Rest station for the Unit1 reactor building cover	140m^2	100	
Late July	Extra rest station in Company Center Weldore Building	550m^2	180	
Late July	2nd floor of service building of Unit1/2	220m^2	60	
Late July	Rest station at Main Entrance	20m^2	6	
Late July	Rest station for work space	240m^2	30	

Rest stations in front of Main Anti-Earthquake Building

Rest stations installation status (July)



Inside the rest station (1)

Drinking water

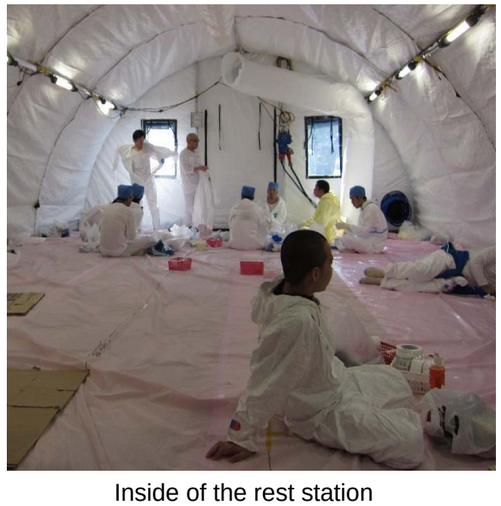
Inside the rest station (2)

Rest station in front of Main Anti-Earthquake Building

Foot-wash station

Drinking water

Outside of the rest station



Inside of the rest station

Rest station for a cooperative firm (Toshiba)

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasure	Implementation Status	Photos and figures
V. Environment Improvement	(8) Life/work environment	Countermeasure [74] Improvement workers' life/work environment Countermeasure [75] Continuing and enhancement of improvement of workers' life/work environment		

Outside of the rest station

Inside (1) Drinking water

Inside (2)

Rest station near the heliport

Entrance of rest stations in front of Main Anti-Earthquake Building

Inside of rest stations in front of Main Anti-Earthquake Building

Attach and detach of protective equipment

Survey

Outside of rest station in front of Main Anti-Earthquake Building

Outside

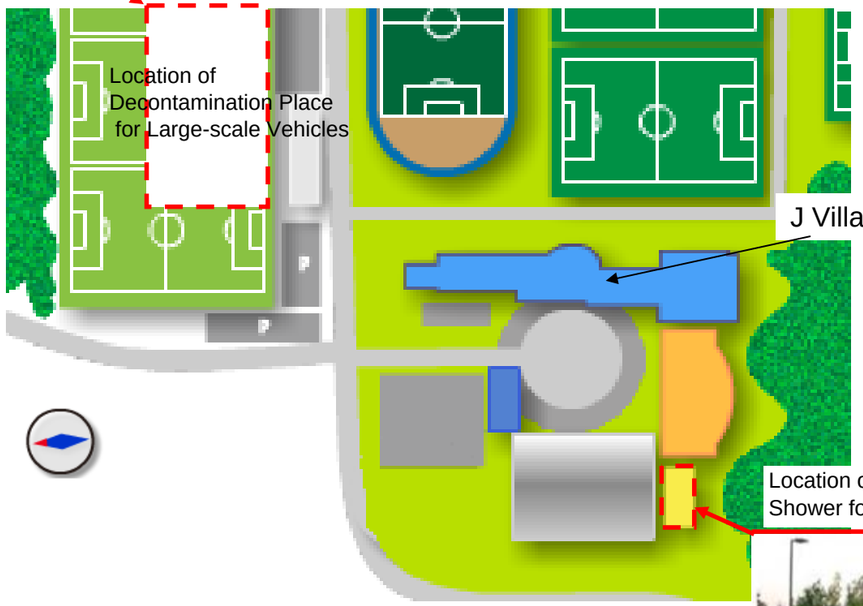
Inside

Rest station for a cooperative firm (Hitachi)

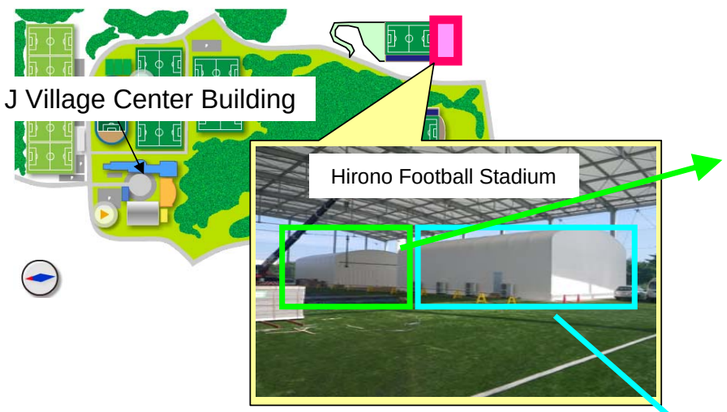
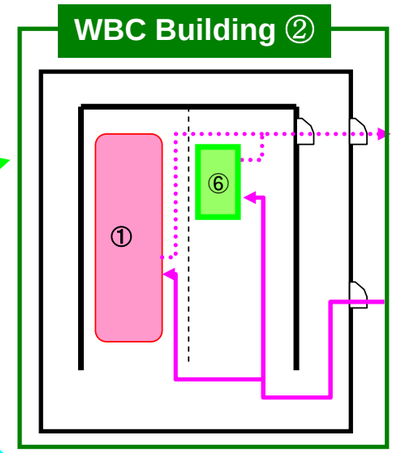
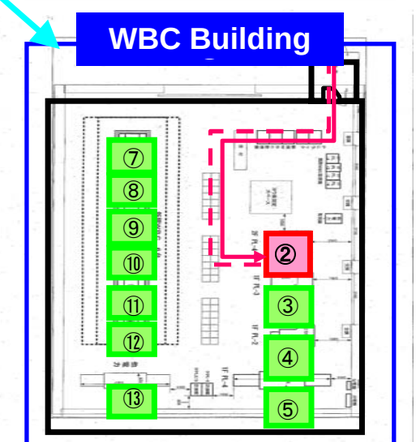
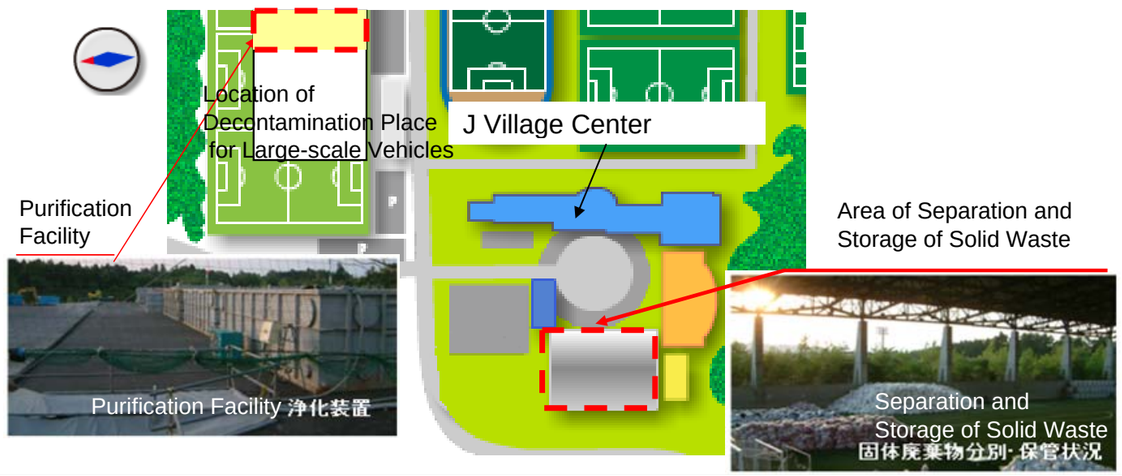
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasure	Implementation Status	Reference (Photos and figures)
V. Environment Improvement	(9) Radiation control / Medical care	Countermeasure [77] Improvement of radiation control Countermeasure [78] Continuing improvement 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's 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.**

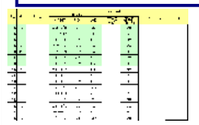
Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation status	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation Control/Medical Care	Countermeasure [77] Enhancement of Radiation Control Countermeasure [78] 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 of contamination diffusion Change of the screening value to unify with the national government and local governments（6,000cpm⇒100,000cpm） *Setting up a self-standard value (13,000cpm) 【Decontamination Facility】 As a result that radiation measurement was made 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：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 in a rainy day：Operation since Jul.9. ・Setting up oil cleaning/cleanser decontamination place：Operation in July (planned) 【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.	  Decontamination Place for Large-scale Vehicles Location of Decontamination Place for Large-scale Vehicles  Decontamination Shower for Workers 

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation Control/Medical Care	Countermeasure [77] Enhancement of Radiation Control Countermeasure [78] Continuing Enhancement of Radiation Control	○Preparation of Measurement Infrastructure for Internal Radiation by Expansion of Whole Body Counter (WBC) In oreder to implement evaluation of internal exposure for workers, etc., 13 WBCs are prepared with a building for WBC in J Village. 【Location】1. Hirono Football Stadium (next to the stadium building) （Training facility for rainy days） 2. Metropolitan Area 【Number of Unit】1. 13 sets：1 set (in-vehicle type borrowed from JAEA①), 12 sets (stationary type)* 2. 1 set：1 set (in-vehicle type borrowed from JAEA②) * 4 sets trasferred from 1F/2F, 7 sets newly purchased and 1 set borrowed from other company 【Operation Schedule】 [1. Hirono Football Stadium (next to the stadium building)] ・By Jul.17 (actual achievement) Under operation: 1 set (in-vehicle type borrowed from JAEA①), and 1 set (stationary type transferred from 2F) ・By the beginning of August Transfer of 3 sets (stationary type) from 1F and purchase/installation of 1 set (stationay type) , and start operation （Total 5 sets (stationary type) and 1 set (in-vehicle type) ・By the beginning of October Newly purchase of 6 sets (stationary type) and borrowing of 1 set (stationary type) borrowed from other company, and start operation [2. Metropolitan Area] Under operation: 1 set (in-vehicle type borrowed from JAEA) (It was planned to be operated by the end of July. However, continuous use is considered at this moment)	  Operation Schedule of Whole Body Counters ① Operation since Jul. 11 — In-vehicle type borrowed from JAEA① ② Operation since Jul. 13 — Stationary type transferred from 2F ③④⑤ Will be operated by the Beginning of August — Stationary type transferred from 1F ⑥ — Newly purchase ⑦⑧⑨⑩⑪⑫⑬ Will be operated by the Beginning of October — Newly purchase ⑬ — Borrowing from other companies 
			○ Proper Treatment of Radioactive Waste 【Liquid Waste (Decontamination Liquid Waste)】 Decontamination liquid waste was collected in J Village and purified by a purification facility The liquid waste after the purification is planned to be used for decontamination water after confirmation of contamination density. * Installation and operation of the purification facility：Apr. 4～, Reuse：Late July ～(planned) 【Solid Waste】 Waste of protection cloths, etc. used in J Village and other screening sites in Fukushima Prefecture, etc. are kept in J Village. The waste was distinguished to combustible, fire-retardant and non-combustible type, and kept in special metal containers.	

Progress Status Classified by Issues (Photos and Figures)

Issues		Countermeasures	Implementation status	Reference (Photos and Figures)
V. Environment Improvement	(9) Radiation control / Medical care	Countermeasure [77] Enhancement of radiation control Countermeasure [78] Continuing enhancement of radiation control	- Reinforced radiation controlling Pocket dosimeters had been lent through signing in a recording book of entering the data manually into database, but workers identification cards with barcodes were provided since Jun. 8 so that it became possible to enter the data directly into the database with barcode readers. We are planning to introduce a system which can automatically acquire the radiation exposure data of workers hereafter. (Workers identification card system is in operation and personal radiation exposure data have been automatically acquired at Main Anti-Earthquake Building of Fukushima Daiichi, but not in operation at J-Village due to lack of equipment.)	Aftermath of 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 every work 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 (from June) Main Anti-Earthquake Building Manage personal in-and-out of the site Measure personal radiation dose  - Lending pocket dosimeter - Record manual data entry (until Apr. 13) →Barcodes (from Apr. 14) Working Area  J-Village Manage personal in-and-out Measure personal radiation dose - Lending pocket dosimeter - Record: manual data entry →Barcodes (from Jun. 8)

Progress Status Classified by Issues（Photos and Figures）

Issues		Countermeasures	Implementation Status	Reference (Photos and Figures)
V. Environment Improvement	(9)Radiation control/medical care	Countermeasure [79] Improvement of medical system Countermeasure [80] Continuing improvement of medical system	Regarding medical care at Fukushima Daiichi, since May 29, University of Occupational and Environmental Health, Japan and Japan Rosai Hospitals dispatch doctors and as a result, at least one doctor stays in Main Anti-Earthquake Building 24 hours. Also, cooperation management with off-site centers and J Village has been arranged and transportation arrangement with medical organizations that give further treatment has been established. - In addition, since Jul.1, in the service building of Unit5/6 doctors who have expertise in emergency exposure treatment etc. have been on call 24 hours a day and an emergency medical treatment facility has been established. New emergency medical clinic deals with patients who are suffering from heat stroke or broken bones and the doctors in the Main-Anti Earthquake Building deal with patients who are slightly in bad condition (catching a cold or having a stomachache, etc) and in charge of workers health control. That is how the medical roles are allocated based on the medical specialty of each doctor and how doctors help each other at the emergency. And, on Jul.3, one transportation vehicle was newly added. Now the total number of the vehicle is 2. ・Preventive against heat stroke Cool vest Mask with blower Cool scarf	 Consultation room in Main Anti-Earthquake Building   Emergency medical treatment facility in Unit5/6     Cool vest   Mask with blower  Cool scarf  Example : wearing Cool scarf  Example : Ice pack for neck  Ice pack for neck *Source: vendor catalogue. Some are different from the real ones.