News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 15, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 257th Release)

(As of 12:00 September 15, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

- ・ The adjustment of the water injection rate into the reactor of Unit 2 via the core spray line was started (at 14:59, September 14). Then, the rate was adjusted to 1.0m^3/h (at 15:25, September 14).
- ・ The accumulated water in the basement of the turbine building of Unit 3 was transferred to the building of the miscellaneous solid waste volume reduction facilities (from 10:00, September 11 to 09:44, September 15).
- ・ The accumulated water in the basement of the turbine building of Unit 3 was transferred to the radioactive waste treatment facilities (from 09:54, September 15).
- ・ The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporary tank (from 10:00, September 15).
- ・ Rubble (an amount equivalent to three containers) was removed with remote-controlled heavy machinery (from 08:45 to 15:30, September 14).
- ・ The cesium adsorption device and the decontamination device were suspended due to the maintenance work of the water treatment facility (at 03:58, September 13). Both devices were restarted up (at 18:16, September 14). Then, the rated flow was reached (at 19:20 of the same day).
- ・ The second cesium adsorption device was suspended in order to exchange the vessels (from 08:55, September 15).

・ Fukushima Dai-ni NPS (TEPCO)

· The pump for RHR (B) was suspended due to switching from RHR (B) to RHR (A) at Unit 4 (at 14:05, September 14). Then, the pump for RHR (A) was started (at 14:17 of the same day).

<Possibility of Exposure (exposure of employees and others)>

- At around 12:40 on September 14, when six subcontractor workers, who were engaged in the maintenance work of the water treatment facility at Fukushima Dai-ichi NPS, returned to the seismic isolation building from the working site and a contamination check for the full-face mask was conducted, it was confirmed that the inner surfaces of the filters which four workers put on were contaminated. Later, the measurement result by the whole body counter showed that all of the six workers did not take in radioactive materials.
- At around 16:00 on September 14, when one TEPCO employee, who was engaged in patrolling at the power facility (outdoors) of Units 1 to 4 at Fukushima Dai-ichi NPS, returned from the seismic isolation building to the visitors hall of Fukushima Dai-ni NPS and a contamination check was conducted, it was confirmed that the chin and the neck of the worker were contaminated. After decontamination was performed, the measurement result by the whole body counter showed that the worker did not take in radioactive materials.
- At around 08:18 on September 15, after one subcontractor worker entered the premises of Fukushima Dai-ichi NPS, it was identified that the worker did not wear a full-face mask with a charcoal filter. The worker will be examined later by the whole body counter to confirm if any radioactive materials are taken in.

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 16, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 258th Release)

(As of 14:00 September 16, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

- ・ The water injection rate into the reactor of Unit 2 via the core spray line was adjusted from 1.0m^3/h to 2.0m^3/h (at 15:45, September 15).
- ・ The water injection rate into the reactor of Unit 2 via the core spray line was adjusted to 2.0m^3/h due to decrease to 1.8m^3/h (at 09:11, September 16).
- ・ Rresh water (about 23tons) was injected into the spent fuel pool of Unit 4 using the temporary spraying facility (from 10:35 to 11:19, September 16).
- ・ The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporaty tank (from 10:00 to 16:00, September 15).
- ・ The pump of reactor sea water system (RSW) (A) at Unit 6 was recovered and started up (at 09:56, September 15). Then, the rate operation was started (at 10:08 of the same day).
- ・ Operation of the reactor building closed cooling water system (RCW) at Unit 6 was started (at 13:45, Septemenr 15).
- ・ Cooling of the spent fuel pool of Unit 6 by the cooling and clean-up system was started (at 14:33, September 15).
- ・ The second cesium adsorption device was suspended in order to exchange the vessels (from 08:55 to 14:10, September 15).
- ・ Rubble (an amount equivalent to three containers) was removed with remote-controlled heavy machinery (from 08:45 to 15:30, September 15).
- ・ Regarding the processing capacity of the water treatment facility (the cesium adsorption device and the decontamination device), it was confirmed

that sufficient processing capacity has not been attained. The water treatment facility was temporarily suspended in order to examine the cause (at 18:22, September 15). Then, the start-up operation of only the cesium adsorption device was started (at 18:42 on the same day), and the rated flow was reached (at 18:46 on the same day).

<Situation of residents' evacuation>

On September 16, the Local Nuclear Emergency Response Headquarters has decided to lower the screening reference value (100,000cpm), which had been applied since March 20, to 13,000cpm, and notified it to Fukushima Prefecture and relevant municipalities accordingly.

<Instructions regarding food and drink>

- Adding the restriction of intake
  - On September 15, mushroom gathered in Iwaki City and Tanagura Town in Fukushima Prefecture (limiting wild mushroom).

- Additing the suspension of shipment
  - On September 15, mushroom gathered in Fukushima City, Nihonmatsu City, Date City, Motomiya City, Koriyama City, Sugakawa City, Tamura City, Shirakawa City, Soma City, Minamisoma City, Iwaki City, Koori Town, Kunimi Town, Kawamata Town, Kagamiishi Town, Ishikawa Town, Asakawa Town, Furudono Town, Miharu Town, Ono Town, Yabuki Town, Tanagura Town, Yamatsuri Town, Hanawa Town, Inawashiro Town, Hirono Town, Naraha Town, Tomioka Town, Okuma Town, Futaba Town, Namie Town, Shinchi Town, Otama Village, Tenei Village, Tamakawa Village, Hirata Village, Nishigo Village, Izumizaki Village, Nakajima Village, Samegawa Village, Kawauchi Village, Katsurao Village, Iitate Village of Fukushima Prefecture (limiting wild mushroom)

For more information: NISA English Home Page
http://www.nisa.meti.co.jp/english/index.html

News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 20, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 259th Release)

(As of 12:00 September 20, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

- The accumulated water in the condenser of Unit 1 was transferred to the turbine building (from 09:53 September 14 to 14:35 September 16).
- The water injection rate into the reactor of Unit 1 was adjusted to 3.8m^3/h due to the decrease to 3.5m^3/h (at 15:41, September 16).
- The water injection rate into the reactor of Unit 2 via the core spray line was adjusted from 2.0m^3/h to 3.0m^3/h (at 15:35, September 16). Then, the rate was adjusted from 3.0m^3/h to 4.0m^3/h (at 15:16, September 19).
- Dust was sampled at the opening of the reactor building of Unit 2 (from 10:05 to 11:05, and from 14:43 to 15:43, September 17).
- Fresh water (approx. 8t) was injected into the spent fuel pool via the spent fuel pool cooling and clean-up line, in order to fill the skimmer surge tank of Unit 2 with water (from 13:55 to 14:34, September 17).
- Borated water was injected into the reactor of Unit 3 (from 10:16 to 14:15, September 16).
- The water injection rate into the reactor of Unit 3 via the core spray line was adjusted from 3.0m^3/h to 8.0m^3/h (at 15:05, September 16).
- Fresh water was injected into the spent fuel pool via the spent fuel pool cooling and clean-up line, in order to fill the skimmer surge tank of Unit 3 with water (from 10:54 to 11:31, September 18).
- Operation of the electrodialyzer was started in the desalination device for the spent fuel pool of Unit 4 (at 11:26, September 18).

- Fresh water (approx. 22t) was injected into the spent fuel pool via a temporary spraying facility at Unit 4 (from 16:18 to 17:02, September 18).
- The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporary tank (from 10:00, September 20).
- Cooling of the common spent fuel pool was suspended due to the replacement work of the power distribution panel (from 11:08 September 14 to 17:22 September 19).
- Accumulated water was found in a precoated tank on the first basement floor of the common spent fuel pool building (at around 06:40, September 16).
- Opening and closing of silt fences were performed due to the blocking work by steel plate to prevent contaminated water from diffusing at the north side of the intake of Units 1 to 4 (from 09:25 to 09:55, September 18).
- Rubble was removed with remote-controlled heavy machinery (an amount equivalent to four containers, from 08:45 to 15:30, September 16), (an amount equivalent to one container, from 08:45 to 15:30, September 17), and (not stored in container, from 08:45 to 15:30, September 18).
- The circulating seawater clean-up device was temporarily suspended due to maintenance (from 10:00, September 17).
- The second cesium adsorption device was suspended in order to exchange the vessels (from 09:08 to 12:57, September 19).
- The second cesium adsorption device was suspended due to the decrease in flow rate (at 10:54, September 16). The device was restarted after the control panel was replaced (at 14:50 of the same day). Then, the rated flow rate was reached (at 14:57 of the same day).
- The desalination devices 2 and 3 (a reverse osmosis membrane type) were suspended due to a water leakage identified at the joint of piping of the desalination devices. The desalination device 2 (a reverse osmosis membrane type) was restarted because no malfunctions were identified (at 14:50 of the same day).

<Possibility of Exposure >

2. Exposure of workers

- At around 08:18 on September 15, after one subcontractor worker entered the premise of Fukushima Dai-ichi NPS, it was identified that the worker did not wear a full-face mask with a charcoal filter. Later, the worker was examined by the whole body counter and evaluated that no radioactive materials were taken into the body.

<Temporary Access to Restricted Areas>

Residents were allowed temporary access in the following cities and villages:

1) First round (buses were used in all cases)
   Implemented
2) Second round (private vehicles were allowed)
   Kawauchi Village (September 19)
   Katsurao Village (September 20)
   Tamura City (September 20)

For more information: NISA English Home Page
http://www.nisa.meti.co.jp/english/index.html

News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 21, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 260th Release)

(As of 14:00 September 21, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

- ・ The water injection rate into the reactor of Unit 1 was adjusted to 3.8m^3/h due to the decrease to 3.7m^3/h (at 11:40, September 21).
- ・ The injection rate via the feedwater line was adjusted from 3.5m^3/h to 4.0m^3/h and the injection rate via the core spraying line was adjusted from 4.1m^3/h to 4.0m^3/h at Unit 2 (at 14:40, September 21).
- ・ The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporary tank (from 10:00 to 16:00, September 20 and from 10:00, September 21).
- ・ Accumulated water was found in the first basement floor of the common spent fuel pool building (at around 11:00, September 20).
- ・ Rubble was removed with remote-controlled heavy machinery (not stored in container, from 08:45 to 16:15, September 20).
- ・ The second cesium adsorption device was suspended and switched to another line because it was confirmed that the different type vessels was installed (at 21:47, September 21).
- ・ The desalination device 2 (a reverse osmosis membrane type) was suspended due to construction work on installing the remote monitoring system (from 08:10 to 09:55, September 21).

2. Actions taken by NISA and other organizations

The “Roadmap towards Restoration from the Accident at Fukushima Dai-ichi Nuclear Power Station, TEPCO” and “Roadmap for Immediate Actions for the Assistance of Residents Affected by the Nuclear Incident" were formulated as action plans for the immediate issues regarding responses to the residents and local governments affected by the nuclear accident.

On September 20, the Nuclear Emergency Response Headquarters announced the revised versions, explaining the progress status of the actions thus far.

<Possibility of Exposure (exposure of workers)>

At around 09:40 on September 20, one subcontractor worker, who was engaged in work on transferring the station service transformer (outdoors) at Unit 4 in Fukushima Dai-ichi NPS, touched the filter of his protective mask, and it was identified that the filter was temporarily taken off. Later, the worker was examined by the whole body counter and evaluated that no radioactive materials were taken into the body.

<Instructions regarding food and drink>

- Adding the restriction of intake
  - Mushroom gathered in the city of Minamisoma, Fukushima Prefecture (limiting wild mushroom) (September 20).

- Adding the suspension of shipment
  - Chestnut gathered in the city of Date and Minamisoma, Fukushima Prefecture (September 20).

For more information: NISA English Home Page
http://www.nisa.meti.co.jp/english/index.html

News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 22, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 261st Release)

(As of 12:00 September 22, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

- ・ Leaking of rain was found near the visitor's area of the main control room at Units 1 and 2 (September 21).
- ・ Leaking of rain was found at cracks of the roof of the turbine building at Unit 3 (September 21).
- ・ A slight leakage (a drop per ten minutes) was found in the hose of the primary system of alternative cooling system for the spent fuel pool at Unit 4 (at around 13:00, September 21). A kind of saucer was placed at the leaking spot and the status monitoring is going on.
- ・ The water inflow was found at the penetration part of pure water transfer piping in the basement of the turbine building at Unit 6 (at around 12:15, September 21).
- ・ The accumulated water in the basement of the turbine building at Unit 6 was transferred to a temporary tank (from 10:00 to 16:00, September 21 and from 10:00, September 22).
- ・ Rubble was removed with remote-controlled heavy machinery (not stored in container, from 08:45 to 15:30, September 20).
- ・ The desalination devices 2 and 3 (a reverse osmosis membrane type) were suspended due to the leakage at the joint part of the piping in the desalination device (at 14:16, September 19). The desalination device 2 (a reverse osmosis membrane type) was restarted because no malfunction was found (at 14:50 of the same day). The desalination device 3 (a reverse

osmosis membrane type) was restarted using one system which has no leakage out of the two systems (at 13:34, September 21).

- The desalination device 3 (a reverse osmosis membrane type) was suspended because rain water was flowed into the bellow house where the desalination device was installed (from 20:50, September 21).

For more information: NISA English Home Page
http://www.nisa.meti.co.jp/english/index.html

News Release

Extract

経済産業省 Ministry of Economy, Trade and Industry

September 26, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 262nd Release)

(As of 12:00 September 26, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai No.2 Power Station, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

○Fukushima Dai-ichi NPS (TEPCO)

- The water injection rate into the reactor of Unit 2 via the core spray line was adjusted from 4.0m^3/h to 5.0m^3/h (at 15:36, September 22).
- One pump was added to transfer the accumulated water in the trench of the turbine building of Unit 2 to the building of the miscellaneous solid waste volume reduction facilities (two pumps were already in operation) (from 17:12 on September 22 to 09:46 on September 25).
- The water injection rate into the reactor via the feedwater line of Unit 3 was adjusted from 3.8m^3/h to 3.0m^3/h, and the water injection rate into the reactor via the core spray line was adjusted from 8.1m^3/h to 8.0m^3/h, respectively (at 15:17, September 22).
- To repair the outlet valve of the residual heat removal seawater system pump (D) of Unit 5, the RHR (B) pump was suspended (at 09:45, September 26). Then, the RHR (A) pump was started (at 10:42 of the same day).
- The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporary tank (from 10:00 to 16:00 on September 22, from 10:00 to 16:00 on September 24, and from 10:00 on September 26).
- Opening and closing of the silt fence were performed at the north side of the intake channel of Units 1 to 4, due to the blocking work with steel plates to prevent the diffusion of contaminated water (from 11:35 to 12:05, September 24).
- Rubble was removed with remote-controlled heavy machinery (an amount

equivalent to two containers, from 08:45 to 16:00, September 22; an amount equivalent to three containers, from 08:45 to 16:15, September 23; an amount equivalent to ten containers, from 08:45 to 16:15, September 24).

- The desalination device 3 (a reverse osmosis membrane type) was suspended due to rain entering the device side of the bellow house where the desalination device (a reverse osmosis membrane type) was installed (at 20:50, September 21). The device was restarted after the inside of the building was dried (at 09:42, September 24).
- The cesium adsorption device was switched from three-line to two-line operation (from 09:47 to 15:49, September 23).
- The second cesium adsorption device was suspended in order to exchange the vessels (from 08:42 to 16:53, September 23).
- The second cesium adsorption device was switched from one-line to two-line operation (at 16:53, September 23).
- The second cesium adsorption device was suspended because the air compressor to supply air for actuating valves was stopped (at around 20:30, September 24). The second cesium adsorption device was restarted after the replacement of the air compressor (at 17:02, September 25). Then, the rated flow was reached (at 17:05 of the same day).

○Fukushima Dai-ni NPS (TEPCO)

- The RHR (B) pump was suspended in order to switch from RHR (B) to RHR (A) of Unit 2 (at 10:57, September 25). Then, the RHR (A) pump was started (at 11:11 of the same day).
- The RHR (B) of Unit 1 was suspended due to the work of laying power cables (at 06:25, September 26). The DG (B) of Unit 1 and RHR (B) of Unit 2 were placed in a not-standby status (RHR (B) at 06:31 and DG (B) at 06:12 of the same day, respectively).

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

News Release

Extract

経済産業省
Ministry of Economy, Trade and Industry

September 27, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 263rd Release)

(As of 14:00 September 27, 2011)

The Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa Nuclear Power Station (NPS), Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows:

1. Nuclear Power Stations (NPSs)

・ Fukushima Dai-ichi NPS (TEPCO)

・ In the plenary meeting of Government-TEPCO Integrated Response Office held at 18:00 on September 25, NISA orally gave the following instructions to TEPCO.

(1) For the CCS line, the overall work shall be carried out after the hydrogen concentration is measured and appropriate actions, such as discharge and replacement of hydrogen, are taken.

(2) For other lines, the hydrogen concentration shall be deliberately measured before starting the work, because a possibility of the accumulated hydrogen cannot be eliminated.

(3) Efforts shall be made to measure the hydrogen concentration in the PCV.

(4) Similar actions shall also be taken for Units 2 and 3.

・ The water injection rate into the reactor of Unit 2 via the core spray line was adjusted from 5.0m^3/h to 6.0m^3/h (at 15:05, September 26).

・ Hydrazine was injected into the spent fuel pool of Unit 4 via the alternative cooling system of the spent fuel pool (from 13:57, September 27).

・ On the second floor of the turbine building of Unit 5, while extracting the lubricant for the overhead travelling crane into a steel drum in order to inspect the crane, a TEPCO worker found a spillover from the steel drum on the floor (at around 11:05, September 27).

・ The accumulated water in the basement of the turbine building of Unit 6

was transferred to a temporary tank (from 10:00 to 16:00, September 26).

- Rubble was removed with remote-controlled heavy machinery (an amount equivalent to five containers, from 08:45 to 16:15, September 26).
- The circulating seawater decontamination device was temporarily suspended due to maintenance (from 10:00, September 17 to 12:00, September 26).
- The pumps in the one line of the cesium adsorption device were suspended (at 18:17, September 26).
- The cesium adsorption device was suspended due to the work for the monitoring system of the water treatment facility (from 08:27 to 11:20, September 27).

・ Fukushima Dai-ni NPS (TEPCO)

- RHR (B) of Unit 1 was suspended due to the work of laying power cables (from 06:25 to 16:15, September 26). DG (B) of Unit 1 and RHR (B) of Unit 2 were placed in a non-standby state (RHR (B): from 06:12 to 15:31, and DG (B): from 06:31 to 14:20 of the same day, respectively).

<Possibility of Exposure (exposure of workers and others)>

2. Exposure of employees

- At around 11:05 on September 26, one subcontractor worker injured the fourth finger of the left hand by catching it between steel plates while working on the NPS premises (outdoors). Although once having returned to the office outside the premises, the worker moved to the emergency medical office at Units 5 and 6 (on the premises) wearing a surgical mask. Since radioactive materials might have been taken into the body, the worker was examined by the whole-body counter, and consequently it was confirmed that no radioactive materials were taken in. Further, no contaminants were identified on the surgical mask and the body surface.

For more information: NISA English Home Page
http://www.nisa.meti.co.jp/english/index.html

Appendix 1

September 20, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

Summary of Progress Status of "Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO"

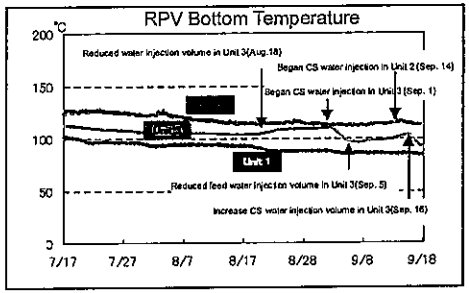
1. Basic policy (no change)

By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

2. Targets and achievement date, etc.

[Step2: Release of radioactive materials is under control and radiation dose is being significantly held down]

- There is no change in the target and achievement date. As for the [Issue (2) Spent fuel pools], the Step2 target has been achieved.
- The total volume of the accumulated water has decreased to a level that is able to withstand heavy rains and long-term processing facility outage. Currently, the circulating water cooling is ongoing and being enhanced.
- RPV bottom temperatures reached 84 ℃ of Unit 1, 113 ℃ of Unit 2 and 91 ℃ of Unit 3 (as of Sep. 19), and keeps below 100 ℃ at Unit 1. Hereafter implement effective water injection for Units 2 and 3 as well and control the release by monitoring RPV bottom temperatures, etc., thus aiming to achieve a "cold shutdown condition".
- After that, provide a final assessment of the amount of released radioactive materials from the monitoring results. In the meantime, until the final assessment, continuously assess the amount of released radioactive materials and announce the results.
- Will confirm the more stable cooling of reactors, etc. as well as controlling/mitigating the release of radioactive materials via such measures.



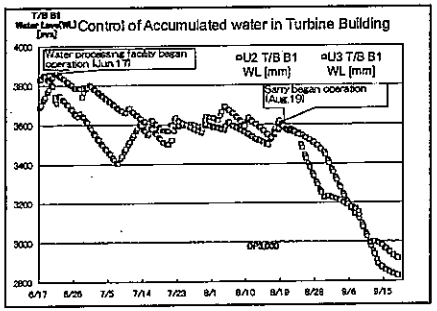
3. Summary of the last one month and future plans (major changes)

[Issue (1) Reactors]: Additional water injection line for more effective cooling

- In addition to the feed water line, water injection via the Core Spray (CS) has begun at Units 2 and 3 (Sep. 14 for Unit 2 and Sep.1 for Unit 3.)
- Water injection volume; Unit1-approx. 3.6m³/hr, Unit 2*-approx. 7.6m³/hr, Unit 3*-approx. 12m³ /hr. *Injecting water via feed water line and CS
- RPV bottom temperatures in Unit 1 keeps below 100 ℃. Aim for below 100 ℃ in Units 2 and 3 as well, determining the sufficient water injection volume to achieve a cold shutdown.

[Issue (3) Accumulated water]: The accumulated water level has reached the point where it is able to withstand heavy rains as well as long-term processing facility outages

- Regarding accumulated water processing performance, approx. 95,420 tons have been processed in total (as of Sep. 18) and the average availability factor for one week is 83% (as of Sep. 18.) The accumulated water level has reached the target level of O.P 3,000(as of Sep.11.)
- Installed cesium adsorption apparatus (SARRY) towards stable processing. Completed the augmentation of decontamination facility (Aug. 18.)
- Desalination processing facility utilizing the evaporation concentration apparatus is being reinforced (mid of Oct.)



[Issue (4) Groundwater]: Complete the basic design of the water shielding walls (Aug. 31)

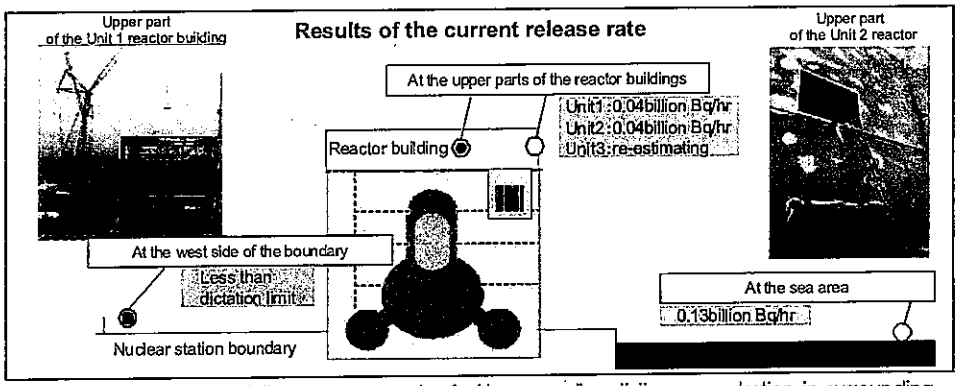
The design specifications for construction are under consideration.

[Issue (5) Atmosphere/Soil]: Began debris removal from the top of the Unit 3 reactor building

- Began debris removal from the top of the Unit 3 reactor building (Sep. 10), Unit 4 soon to follow after.
- Organize and store the removed debris etc., at designated storage areas.
- Began manufacturing of the PCV gas control system (Aug. 18.)

[Issue (6) Measurement, Reduction and Disclosure]: Evaluate the amount of radioactive materials currently released

- The individual current release rate from Units 1 to 3 has been evaluated utilizing the airborne radioactivity concentration (dust concentration) in surrounding area (land and sea) and at the upper parts of the reactor buildings.
  - The current total release rate is assessed at 0.2 billion Bq/hr, which is 1/4,000,000 of that at the time of the accident*. *Decrease than previous version because the decrease of maximum release rate at the time of the accident in NSC reassessment (Aug. 22).
  - The radiation exposure per year at the site boundaries is assessed at 0.4 mSv / year provisionally (excluding the effect of the radioactive materials already released up until now.)



- Continuously implement the measurements of airborne radioactivity concentration in surrounding area (land and sea) and at the upper parts of the reactor buildings, thus grasping the reduction tendency of the reduced amount from mitigation countermeasures. More accurate assessment is planned to be implemented in the future.
- "Basic Concept for Pushing Ahead with Decontamination Works" and "Basic Policy for Emergency Response on Decontamination Work", etc. have been established (Aug. 26.) From the end of August, the implementation of decontamination operations has begun in Date City and Minamisoma City.

[Issue (7) Tsunami, Reinforcement, etc.]: Completed seismic resistance evaluation for each Unit (Aug. 26)

[Issue (8) Living/working environment]: Completed construction of temporary dormitory able to accommodate scheduled 1,600 persons (Aug. 31)

[Issue (9) Radiation control/medical care]: Improved Health Care for workers

- Changed Units 5/6's emergency medical room's period of operations from summer-only to all year round. Began deployment of nurses and radiation specialists.

[Issue (10) Staff training/personnel allocation]: Continuously implement radiation staff training

Appendix 2

"Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO"

September 20th, 2011

Nuclear Emergency Response Headquarters

Government-TEPCO Integrated Response Office

I. Cooling

(1) Reactor

1. Target for Step 2 "Cold Shutdown Condition"

- Circulating water cooling will be continued and enforced, thus bringing the reactors to a "Cold Shutdown Condition" monitoring the RPV temperatures, etc.
- Maintain stable operation of accumulated water processing facility. (Implementation items are stated in II. (3))
- NISA to continue confirming operating status and related matters.

Definition of "Cold Shutdown Condition"

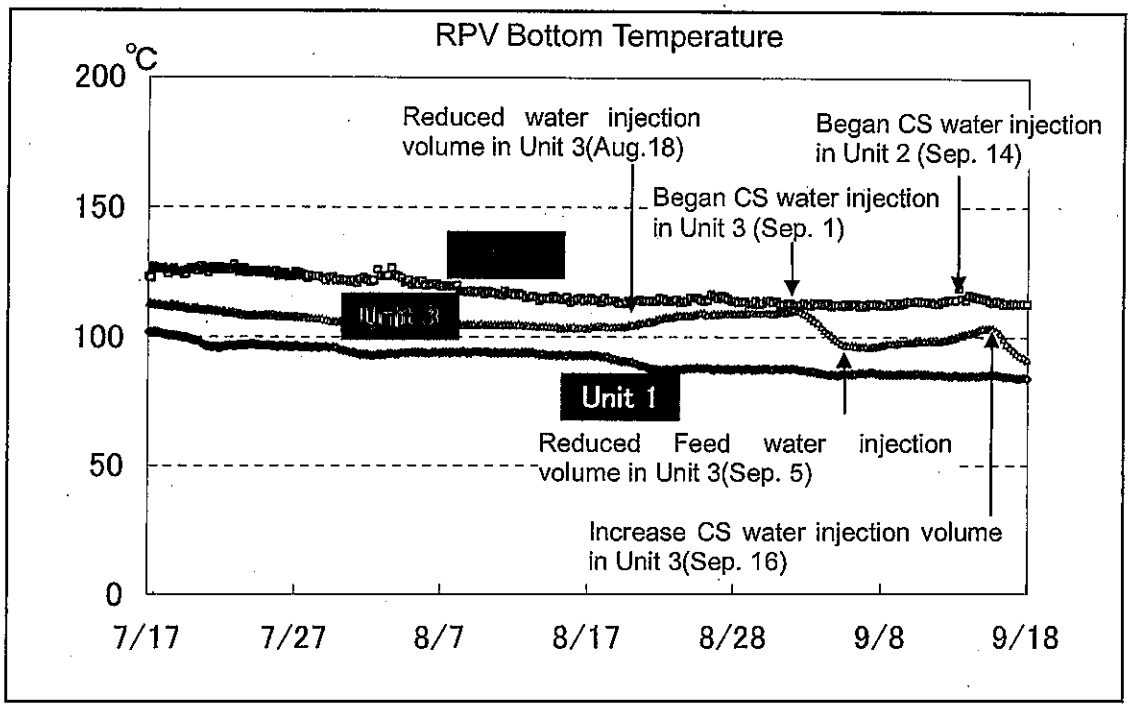
- Temperature of RPV bottom is, in general, below 100 degrees Celsius.
- Release of radioactive materials from PCV is under control and public radiation exposure by additional release is being significantly held down.

In order to keep satisfying the above two conditions, secure mid-term safety of the circulating water cooling system (reliability of parts and materials, redundancy and independency, assessment of slack time for emergency, detection of failure and trouble, confirmation of restoration measures and recovery time, etc.)

2. Current status and measures implemented

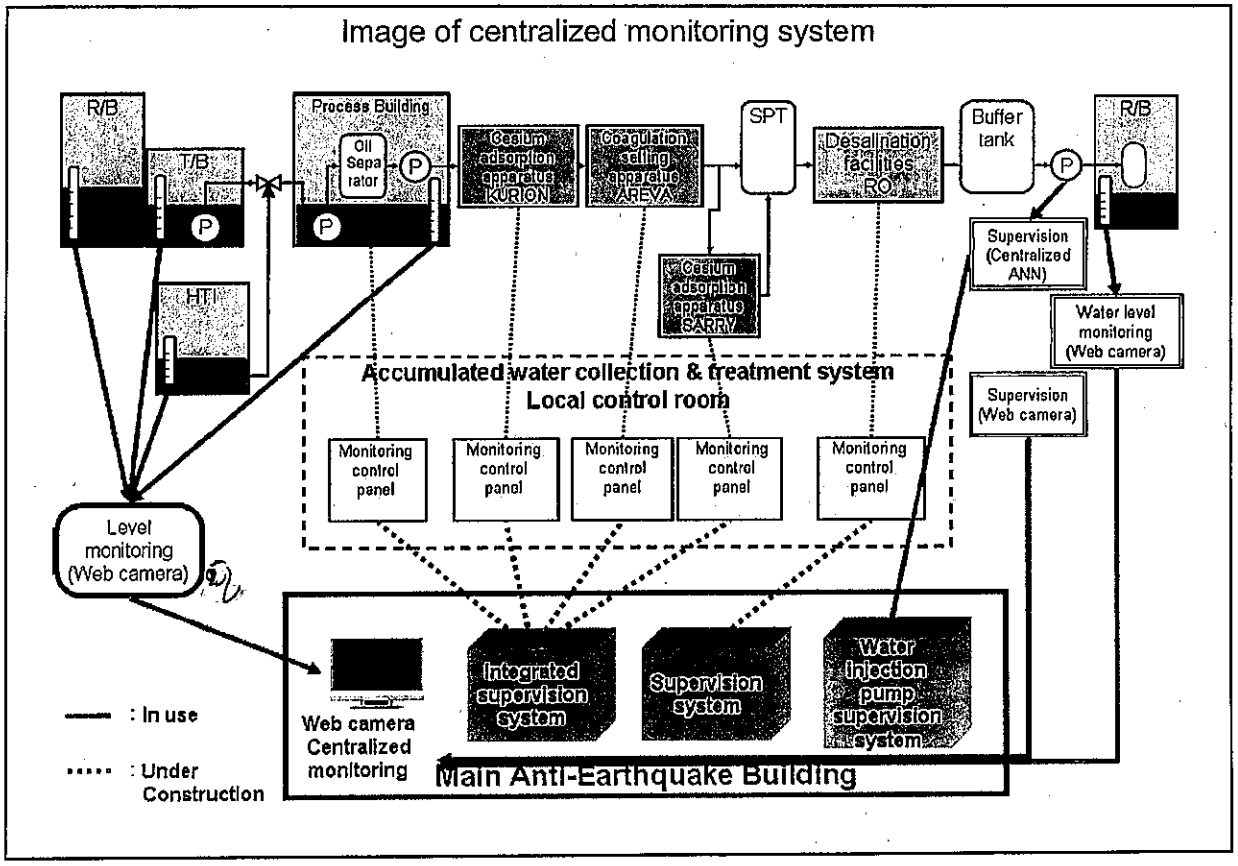
① Additional water injection line for more effective cooling [Countermeasures 12, 14, 45]

- In addition to the feed water line, water injection via the Core Spray (CS) has begun at Units 2 and 3 (Sep. 14 for Unit 2, Sep. 1 for Unit 3.)
- Water injection volume is approx. 3.6 m^3/h for Unit 1, approx. 7.6 m^3/h for Unit 2 and approx. 12 m^3/h for Unit 3.
- RPV bottom temperatures in Units 1 and 3 have decreased below 100 degrees Celsius. Aim for below 100 degrees Celsius in Unit 2 as well, determining the sufficient water injection volume to achieve Cold Shutdown Condition.



② Installation of centralized monitoring system in the Main Anti-Earthquake Building [Countermeasures 12,14,45]

- Installing a system that enables the monitoring of various parameters such as the water injection volume, injection pressure, buffer tank water level, etc., from monitors installed in the Main Anti-Earthquake building.



(2) Spent Fuel Pool

1. Target for Step 2 "More stable cooling"

- "More stable cooling" (target for Step 2) for Units 2 and 3 was achieved by the end of Step 1 by having installed heat exchangers and maintaining pool water level.
- Circulating cooling systems for Units 1 and 4 have been installed, thus the target for Step 2 was achieved in all Units. (Aug. 10.)

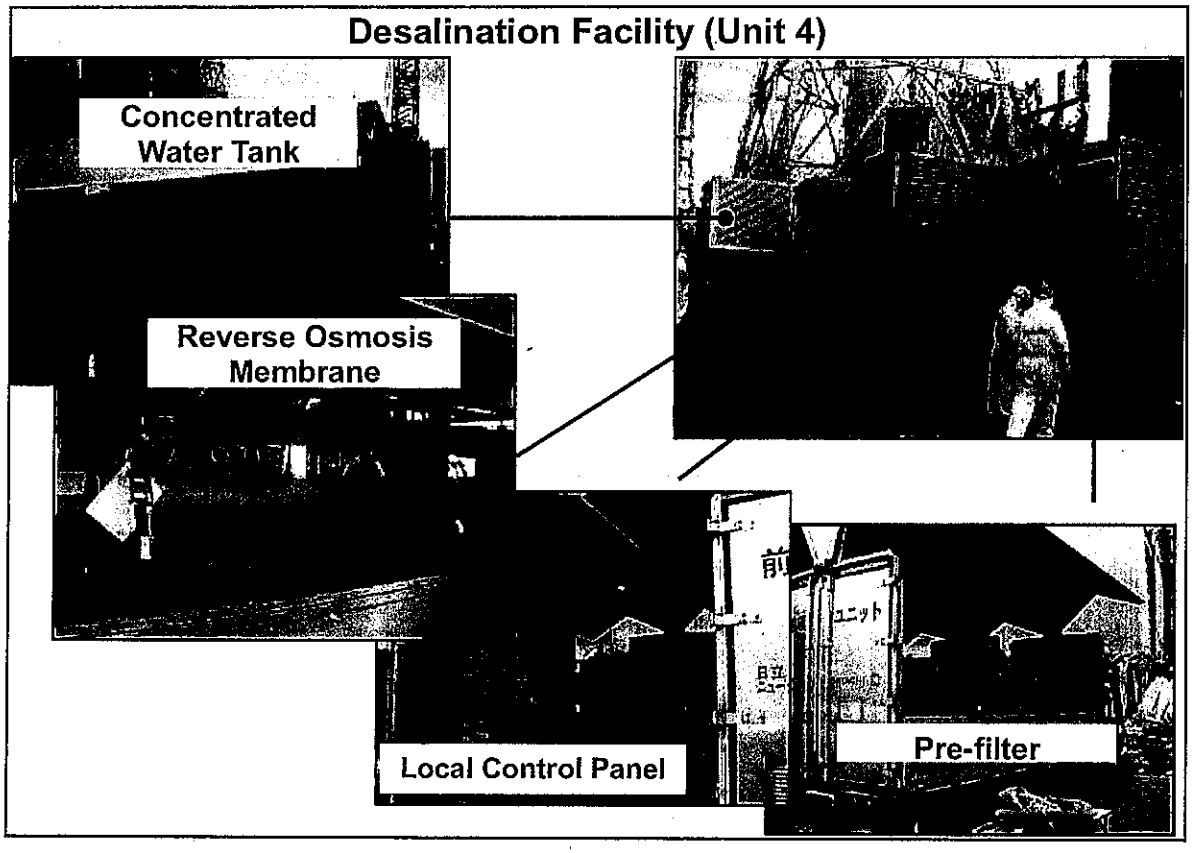
2. Current status and measures implemented

① Current status of Spent Fuel Pool

- Unit 1: 31 degrees Celsius, Unit 2: 34 degrees Celsius, Unit 3: 33 degrees Celsius and Unit 4: 40 degrees Celsius (as of Sep. 19.)

② Operation of Unit 4 desalination facility (Aug. 20) [Countermeasures 25, 27]

- In order to prevent corrosion of spent fuel pools, the desalination facility has begun operation (Aug. 20.)
- The salt concentration of water (chloride ion concentration) in spent fuel pool of Unit 4 before the operation of the desalination facility was 1,944 ppm (Aug. 20), while its concentration after the operation was 770 ppm (Sep. 7).
- The desalination facilities for Units 2 and 3, in which sea water injections were carried out, are planned to be installed in turn.



II. Mitigation

(3) Accumulated Water

1. Target for Step 2 "Reducing the total amount of accumulated water"

- Reduction of the total amount of accumulated water by processing the accumulated water in the buildings via the stable operation of processing facility.
- Augmentation of reuse by expansion of high-level contaminated water processing facility, steady operation and desalination of decontaminated water.
- Begin consideration of full-scale water processing facilities for high-level contaminated water.
- Storage/management of sludge waste generated from high-level contaminated water processing facility.
- Implement installation work for steel pipe sheet pile at the port to mitigate contamination to the ocean.

2. Current status and measures implemented

① Status of the accumulated water processing

- Regarding accumulated water processing performance, approx. 95,420 tons have been processed in total (as of Sep. 18) and the average availability factor for one week is 83% (as of Sep. 18.)
- The accumulated water level reached the target level (O.P. 3,000.) In other words, the total amount of accumulated water has reached the point where it is able to withstand heavy rains as well as long-term processing facility outage (Sep. 11).
- Decontamination factor* of the processing facility for cesium is 10^6 in the apparatus of Kurion – Areva (as of Aug. 9) and 10^5 in SARRY (as of Sep. 1.)

*Decontamination factor = cesium concentration of a sample before processing / cesium concentration of a sample after processing

② Implemented reliability enhancement countermeasures towards stable processing [Countermeasure 43]

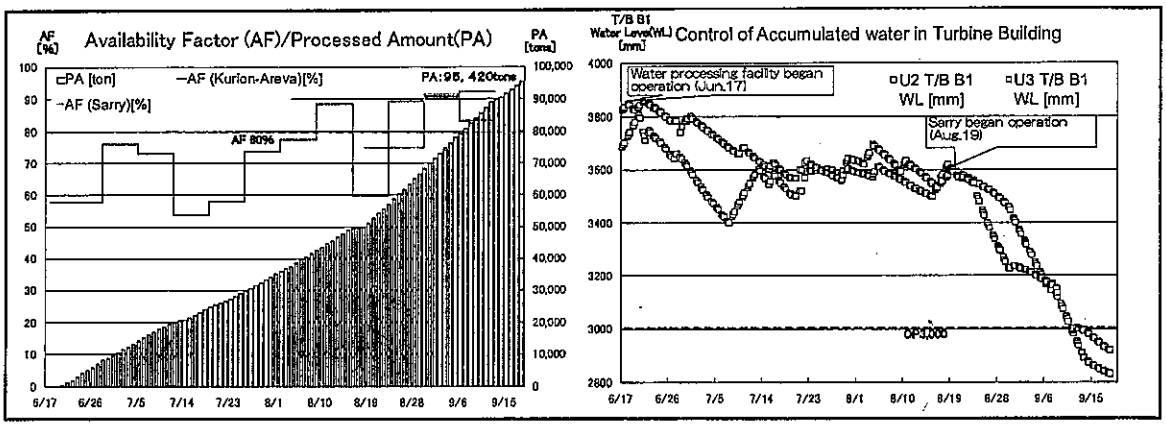
- Installed cesium adsorption apparatus (SARRY) and completed the augmentation of decontamination facility (Aug. 18.)

③ Augmenting desalination processing facility [Countermeasure 43]

- Installed the evaporative concentration apparatus (two lines, Aug. 7 and 31) in addition to the reverse osmosis membrane method (Jun. 17.)
- Confirmed that chlorine concentration had been decreased from 6,000 ppm to approx. 20ppm by the reverse osmosis equipment (per the Aug. 9 results) and that had been decreased from 12,000 ppm to less than 1 ppm by the

evaporative concentration apparatus (per the Aug. 16 results).

- Further more, the exaporative concentration apparatus is being reinforced (mid of Oct.).



④ Storage/management of sludge waste, etc. [Countermeasure 81]

- Sludge waste with high radioactive concentration generated by processing the high-level contaminated water is properly being secured and managed in the Centralized Waste Processing Building.
- Implementing preparation work to install storage facility for sludge waste in order to expand storage capacity for sludge waste.

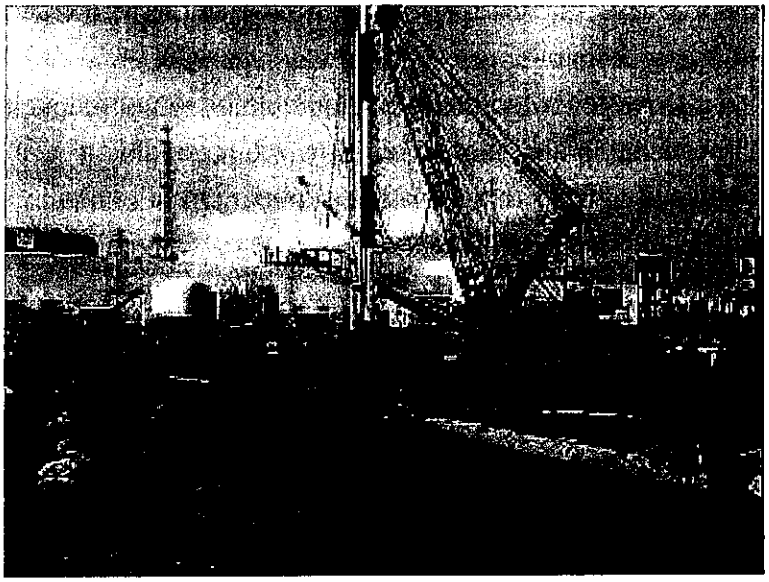
⑤ Securing storage [Countermeasure 42]

- Implemented construction work to install tanks for high level contaminated water in order to expand storage facility for high level contaminated water (Sep.17).

⑥ Prevent contamination in the ocean [Countermeasure 64]

- Plan to complete the placement of the steel pipe sheet pile in order to block the damaged parts of permeation prevention structure due to the tsunami at the south side of the intake canal of Units 1 to 4 as a countermeasure to mitigate contamination in the ocean (end of Sep.)

Status of placing steel pipe sheet pile



(4)Groundwater

1. Target for Step2 "Mitigating contamination in the ocean"

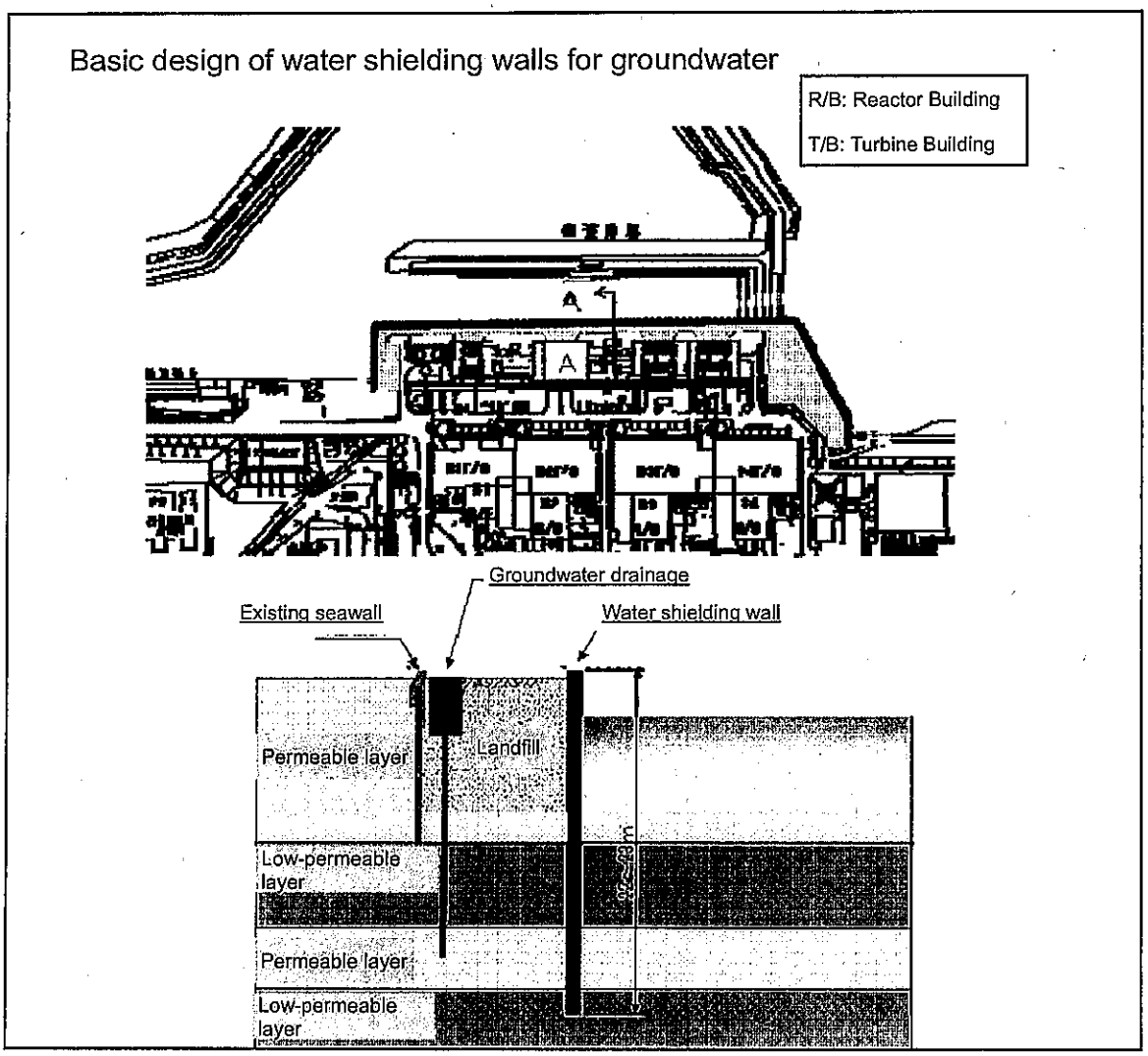
- Mitigate contamination in groundwater as well as contamination to the ocean via groundwater by controlling accumulated water inflow into groundwater.
- Commencing installation work for water shielding wall in front of existing seawalls of Units 1 to 4, with the expectation of mitigating contamination in the ocean via groundwater.

2. Current status and measures implemented

①Consideration of water shielding wall [Countermeasure 68]

- In order to further ensure the mitigatation of contamination in the ocean, the basic design for installing the water-proof steel pipe sheet piles in front of the existing seawalls of Units 1 to 4 has been completed (Aug. 31.)
- Currently the design specificaitons for construction are under consideration.

Basic design of water shielding walls for groundwater



② Implementing prevention against expansion of contamination of groundwater [Countermeasure 67]

- Installed pumps at sub-drainage pit on the turbine building side at seven places (Jul. 29.)

(5)Atmosphere/Soil

1. Target for Step 2 "Mitigating dispersion of radioactive materials"

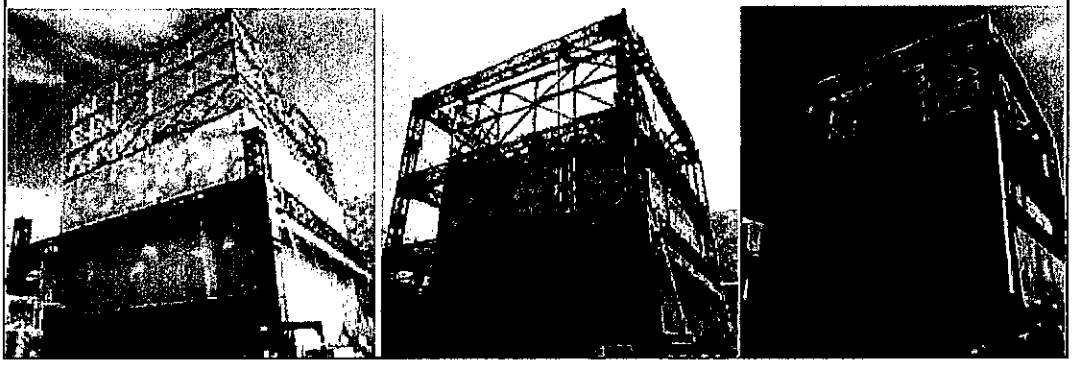
- Reduce dispersion of radioactive materials deposited in the site.
- Continue dust inhibitor spraying as well as removal of debris.
- Installation of the reactor building cover (Unit 1)
- Commencing removal of debris on top of the reactor buildings (Units 3 and 4.)
- Consideration of containers for the reactor buildings.

2. Current status and work implemented

①Installation measures for the Unit 1 reactor building cover [Countermeasures 54, 55]

- Steel frames has been installed (Sep. 9.)
- Panels, which are to be the cover, are being installed.

Installation work of the cover

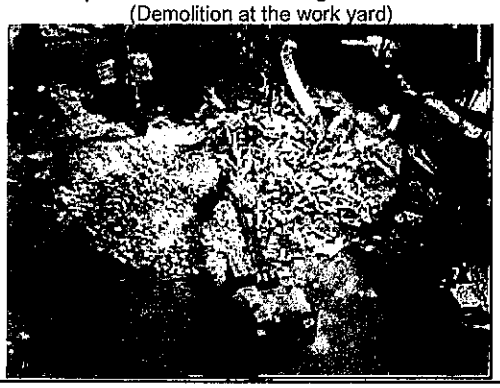


②Removal of debris at the upper part of the reactor buildings (Units 3 and 4) [Countermeasure 84]

- Began removing the debris at the upper part of the reactor building of Unit 3 (Sep. 10.)
- Preparation work is under way at Unit 4.

Removing debris at Unit 3

Preparation work for removing debris at Unit 4 (Demolition at the work yard)



③ Removal and management of debris [Countermeasures 53, 84, 87]

- The volume of approx. 800 containers of debris has been removed (as of Sep. 20.) [Countermeasures 53, 84]
- 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 and managed in the storage area.

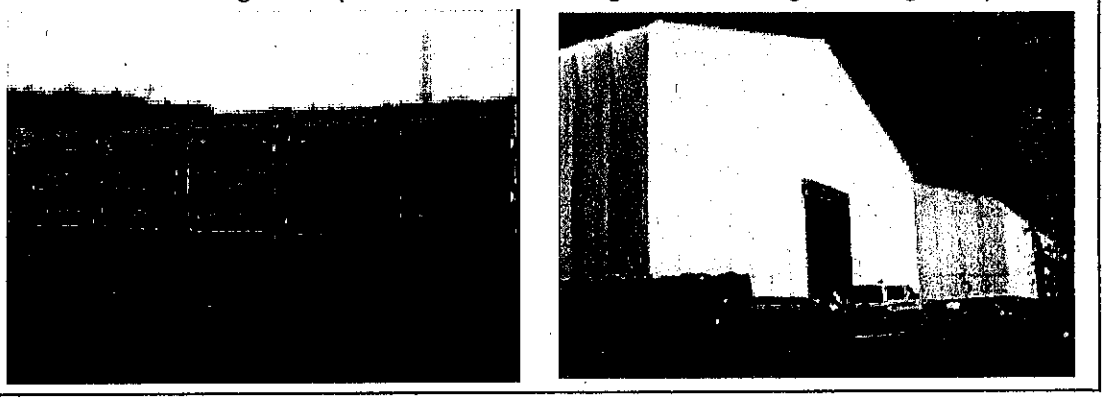
<Management in the storage area>

- Debris are stored in the containers and reserved in the buildings according to the amount of radiation dose.
- The approach lane to the waste storage area is marked off and a No Entry sign was posted to prevent entrance of unauthorized personnel.

<Securing the storage area>

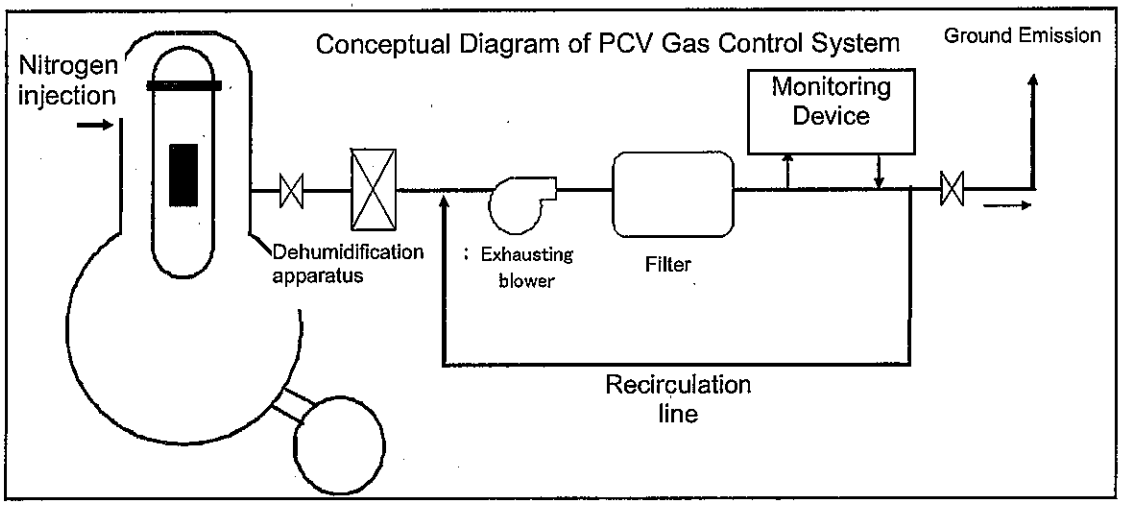
- Except for the radioactive accumulated water treatment facilities and the other areas under construction, the storage areas are secured, fully utilizing the land within the site.

Debris storage area (Left: Containers storing the debris, Right: Storage tent)



④Installation of PCV gas control system [Countermeasure 86]

- In order to reduce the release of radioactive materials from PCV, systems which extract the almost same amount of gas as the nitrogen fill ration in the PCV and keep the pressure of PCV to the almost same level as the atmosphere are planned to be installed in Units 1 to 3 after temperature of RPV bottom is below 100 degrees Celsius.
- Extracted gas is to be filtered and emitted after monitoring.
- As the temperature in the reactor declines, the emission of radioactive materials from PCV should decreases. In addition, the emission of radioactive materials from PCV can be further mitigated by this system.



III. Monitoring and decontamination

(6) Measurement, reduction, disclosure

1. Target for Step 2 "Sufficient reduction of radiation dose"

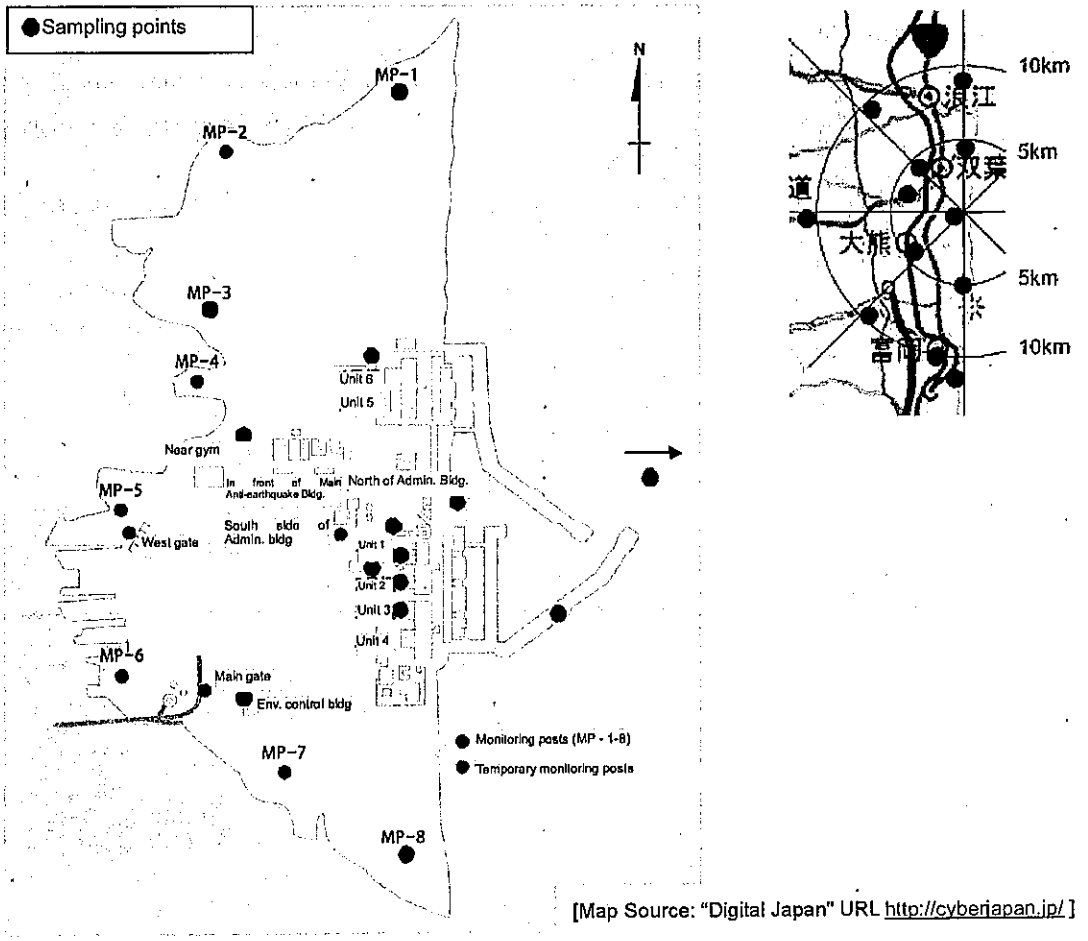
- Expansion and enhancement of monitoring, and continuation of disclosure.
- Monitoring by government, prefectures, municipalities and operators.
- Commencement of full-scale decontamination.

2. Current status and measures implemented

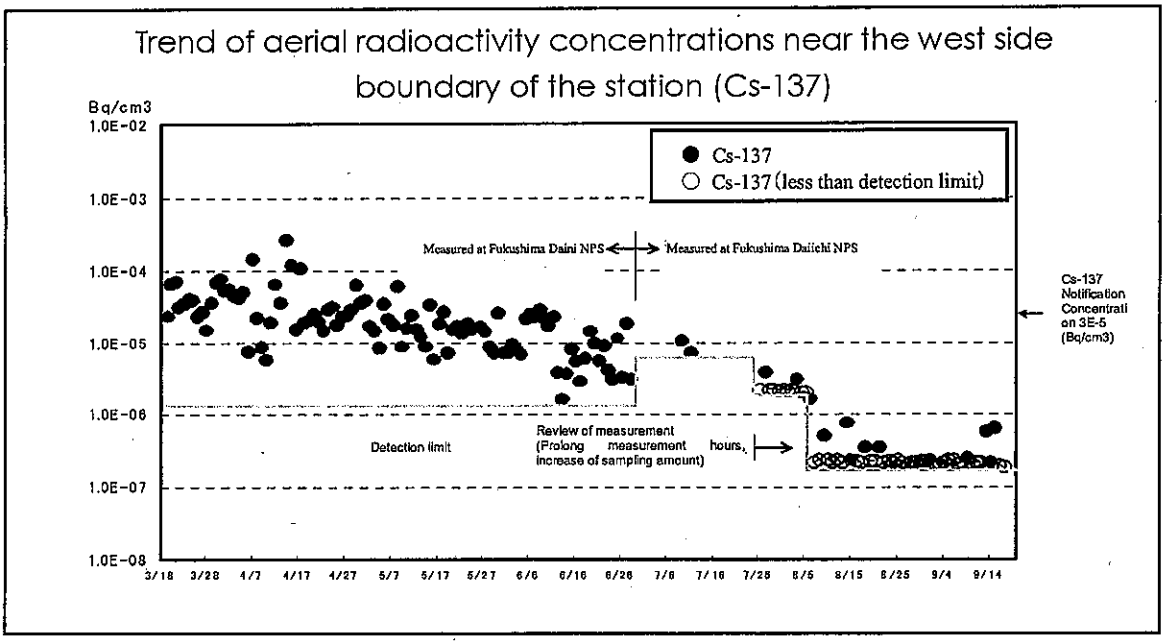
①Evaluate the amount of radioactive materials currently released [Countermeasures 60, 61]

- In order to evaluate the individual current release rate from Units 1 to 3, implement sampling and measurement the airborne radioactivity concentration at the upper part of the reactor buildings and at land and sea, as showing following figures.

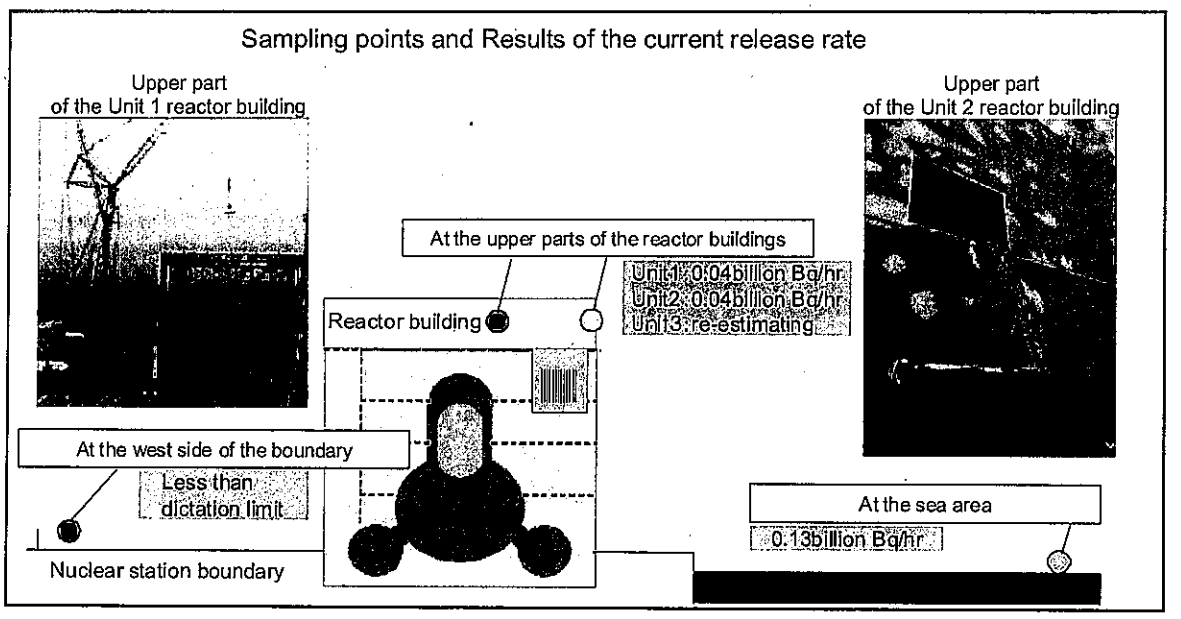
Monitoring points of airborne radioactivity concentration (left) and sampling points of radioactive fallout (right)



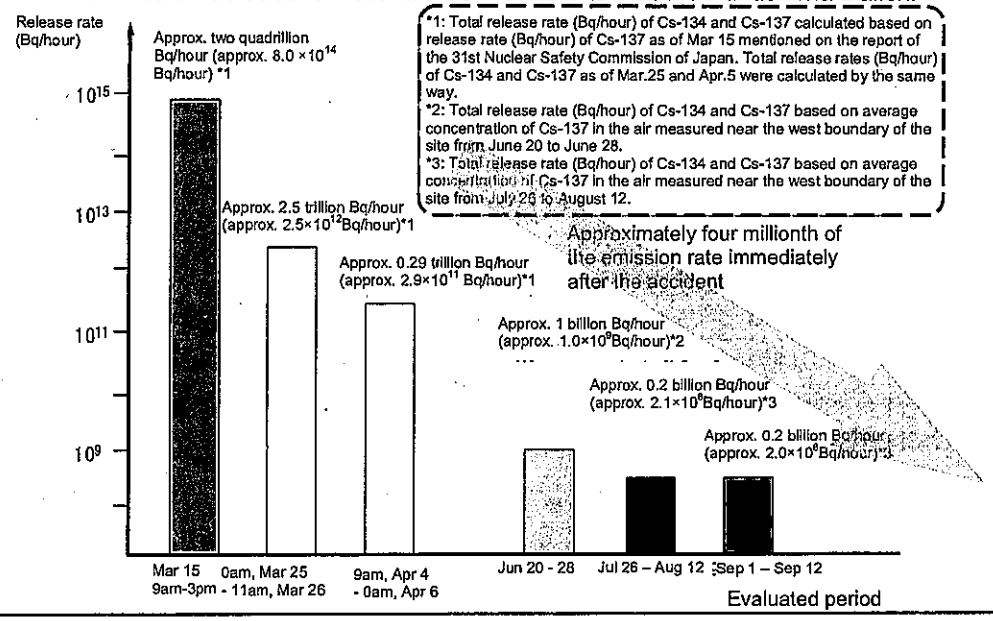
[Map Source: "Digital Japan" URL http://cyberjapan.jp/]



- The current release rate from Units 1 to 3 has been evaluated utilizing the airborne radioactivity concentration (dust concentration) in surrounding area (land and sea) and at the upper parts of the reactor buildings.
- The current release rate for both Unit 1 and 2 is estimated at approx. 0.04 billion Bq/h using dust concentration at the upper parts of the reactor buildings. The rate for Unit3 is now being re-estimated.
- The current total release rate is estimated at approx. 0.13 billion Bq/h using dust concentration at the sea area, and there might be little effect of radioactive materials that released previously.
- Therefore, the current total release rate is assessed at 0.2 billion Bq/h, which is 1/4,000,000 of that at the time of the accident.
- The radiation exposure per year at the site boundaries is assessed at 0.4 mSv / year provisionally (excluding the effect of the radioactive materials already released up until now.)



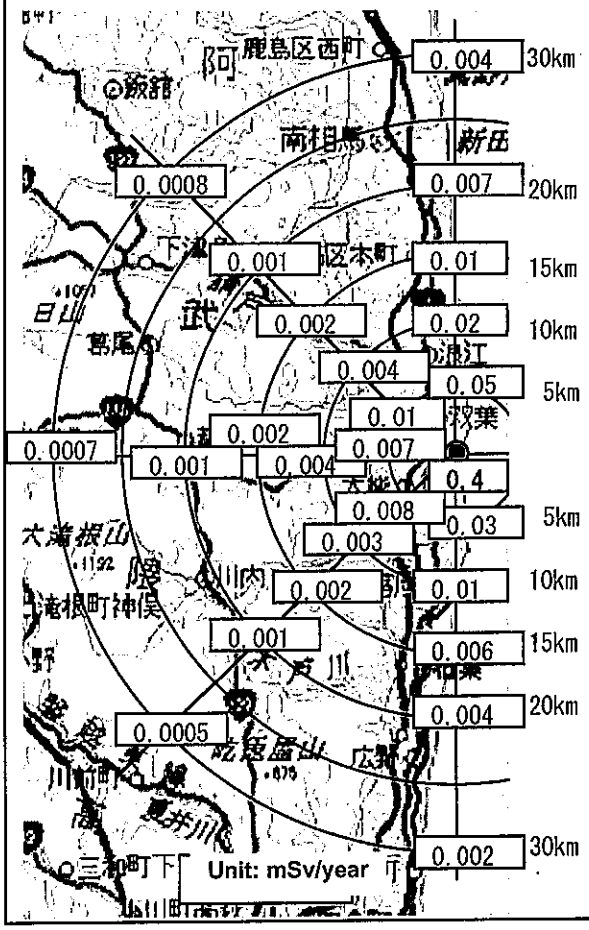
Release rates of radioactive materials from Units 1 to 3 at the Fukushima Daiichi



Exposure doses in case that the current release rate from the power station Units 1 to 3 continues for one year (mSv/year)

(Excluding the effect of already released radioactive materials)

[Map Source: "Digital Japan" URL http://cyberjapan.jp/]



(Overview of the evaluated figures)

Site boundary: Less than or equal to approx. 0.4 mSv/year

5km radius : Less than or equal to approx. 0.05 mSv/year

10km radius : Less than or equal to approx. 0.02 mSv/year

20 km radius : Less than or equal to approx. 0.007 mSv/year

As a reference, the dose limit by reactor facilities at an outside of a nuclear power station is 1 mSv/year.

② Joint monitoring by the central government, prefectures, municipalities and the operator【Countermeasure 62】

- Implementing/will implement sampling and measurement at land and sea as below:

[Land]
<Monitoring within 20km radius>

- Measurement of airborne radioactivity concentration by the support team from other electricity utility companies at 50 points (once a week)
- Soil sampling of the same 50 points and additional points (approx. 50) by the same team (every two months)

【Sea】
< Fukushima Prefecture>

- Seawater at 11 points within the site bay (once a day)
- Seawater at 4 points along the coast (once a day)
- Seawater at 8 points within 20 km radius (every two days)
- Seawater at 3 points within 30 km radius (once a week)
- Seawater at 10 points outside of 30 km radius (once a week)
- Seabed soil survey at 25 points (once a month)

<Ibaraki Prefecture>

- Seawater at 5 points (once a week)

<Miyagi Prefecture>

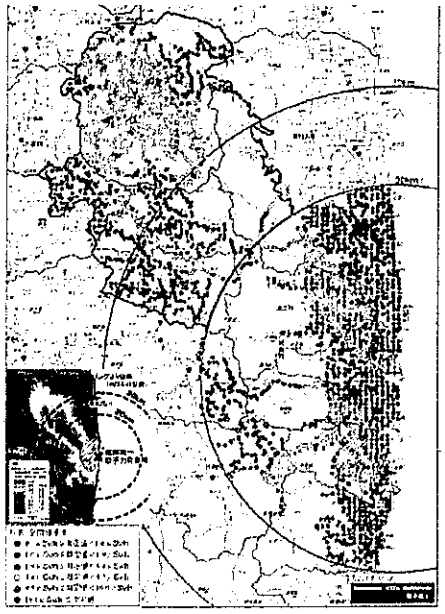
- Seawater at 6 points (every two weeks)

- Unmanned survey boat will be installed. After a test-run within the site bay, sampling of seawater as well as seabed soil, etc. will be implemented at a few kilometers offshore in front of the power station.

- The cabinet and The Ministry of Education, Culture, Sports, Science and Technology announced the implementation of "Wide Area Monitoring" at restricted areas and deliberate evacuation areas (Sep. 1). The operator drew up a plan and conducted monitoring (approx. 800 persons in total).
- Divide the target areas by 2km x 2km meshes, choose approx. 20 points from each mesh based on the basic data collection results* and monitor the airborne radioactivity concentration (from Jul. 4 to Aug. 20).
  *Various places such as 16 points by dividing each mesh 500m x 500m as well as crowded places (schools, public facilities, parks, shopping malls, supermarkets, shrines and temples, etc.) were selected.
- Based on the Wide Area Monitoring results, in order to collect the basic data for planning measures to improve the environment in these areas, detailed investigations on homes, roads, schoolyard, etc., "Individual Detailed

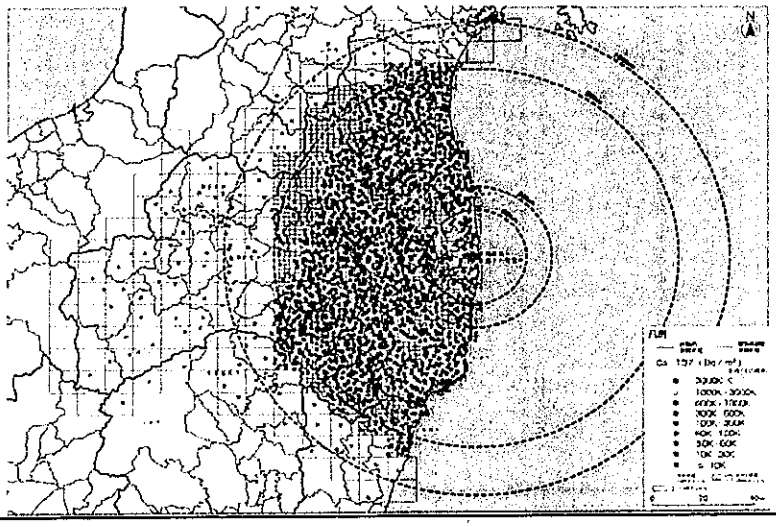
Monitoring", are being implemented (from mid June to the end of October.)

Wide Area Monitoring results map (height: 1m) and measurement work



- The Ministry of Education, Culture, Sports, Science and Technology announced the implementation of "Map of radioactive contamination"(Aug. 30). Electric power companies team has supported.

Cesium contamination map



③ Consideration and commencement of full-scale decontamination 【Countermeasure 63】

- "Basic Concept for Pushing Ahead with Decontamination Works" and "Basic Policy for Emergency Response on Decontamination Work" which sets forth the target and stance for two years onwards have been established (Aug. 26.)
- Concurrently, presented "Guidelines for Municipal Decontamination Work" in

order to facilitate decontamination work by each municipality (Aug.26.)

- In order to urgently implement the decontamination work, based on "Basic Policy for Emergency Response on Decontamination Work", the cabinet decided to spend approx. 220 billion JPY from the Great East Japan Earthquake Recovery and Reconstruction Reserve Fund (Sep. 9.)
- From late August, the decontamination work at broader areas including residences, roads and vegetation began in Date City and Minamisoma City. From now on, the decontamination work will be broadened and implemented at 12 municipalities which are located in restricted areas and deliberate evacuation areas.
- Promulgated the "Act on special measures in relation to measures for environmental pollution by radioactive materials released due to the accident at the nuclear power stations in connection with Tohoku-Chihou-Taiheiyo-Oki Earthquake on March 11, 2011" (Aug. 30.)
- The operator will collect information for effective decontamination through individual detailed monitoring currently in process. With these results, the operator will support decontamination work by the government and municipalities.
- Also, the operator will cooperate with Fukushima Prefecture on the model project for reduction of radiation at general residential areas.

IV. Countermeasures against aftershocks, etc.

(7) Tsunami and reinforcement, etc.

1. Target for Step 2 "Mitigation of further disasters"

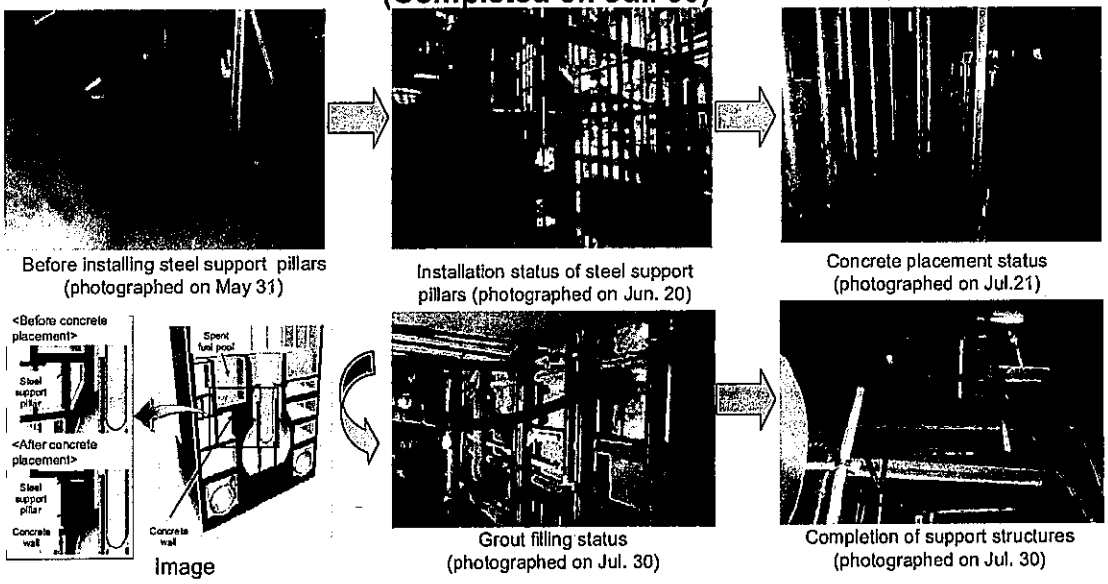
- Prevent situation from deterioration by mitigating disasters with countermeasures against emergencies (earthquakes and tsunami, etc.)
- Consideration of reinforcement work of each unit as necessary.
- Continue implementing various radiation shielding measures.

2. Current status and work implemented

① Implementation of seismic resistance evaluation for each unit [Countermeasure 71]

- Consideration of current seismic resistance and reinforcement, etc. for reactor buildings of Unit 2, Unit 5 and Unit 6 was implemented and evaluated by Aug. 26 (Unit 1 and Unit 4 were completed by May. 28 and Unit 3 was completed by Jul. 13.)
- As a result of the analysis, it was confirmed that seismic resistance can be secured without any reinforcement.
- A survey inside the buildings will be conducted after implementation of measures to reduce radiation dose.

Installation status of support structures in Unit 4 (Completed on Jul. 30)



Before installing steel support pillars (photographed on May 31)

Installation status of steel support pillars (photographed on Jun. 20)

Concrete placement status (photographed on Jul.21)

Image

Grout filling status (photographed on Jul. 30)

Completion of support structures (photographed on Jul. 30)

V. Environment improvement

(8) Living/ working environment

1. Target for Step 2 "Enhancement of Environment Improvement"

- Improve workers' living/working environment that had been harsh during the initial phase of the accident, thus leading to maintaining workers' motivation
- Expansion of temporary dormitories and on-site rest stations
- Improvement of environment such as meals, bath, laundry, etc.

2. Current status and work implemented

① Expansion status of temporary dormitories [Countermeasure 75]

- Completed construction of temporary dormitory able to accommodate 1,600 persons (Aug. 31). Approx. 1,100 persons have already moved in (as of Sep. 11.)

② Establishment status of on-site rest stations [Countermeasure 75]

- Seventeen on-site rest station have been established (approx. 3,400m^2 in size with a capacity to accommodate approx. 1,200 persons) (as of Sep. 9)

Exterior (left) and interior (right) appearances of on-site rest stations

Inside of on-site rest stations (from left: drinking water, etc., restroom and air shower)

(9)Radiation Control/Medical Care

1. Target for Step 2 "Enhancement of Healthcare"

- Thorough radiation exposure control and countermeasures against heat stroke.
- Reinforcement of radiation control by NISA.
- Increase in the number of whole body counters, monthly measurement of internal exposure.
- Automated recording of personal radiation dose, report of personal exposure dose in writing, introduction of workers' certificates with photos.
- Consideration of a long-term healthcare such as enhancement of workers' safety training and establishment of a database.

2. Current status and work implemented

① Expansion of whole body counters (WBC) [Countermeasure 78]

- Increased WBCs as planned (6 units have already been added as of Aug. 11.)
- Started measuring internal exposure once a month from September.
- Plan to increase WBCs step by step from late September.

② Written notification of exposure dose etc. [Countermeasure 78]

- Provided recording format of personal exposure in every entry (Aug. 16.) Started to use workers' certificates with photos step by step (July 29.) Automated recording of personal exposure is under preparation. (Exposure data are currently manually secured in preparation for the use in future.)

③ Consideration for long-term healthcare such as establishing database [Countermeasure 78]

- Announced the creation of database as well as a framework of comprehensive long-term health care as a "Grand Design" (Aug. 3) and will finalize within September.

④ Continuous reinforcement of medical system [Countermeasure 80]

- Changed Units 5/6's emergency medical room's period of operations from summer-only to all year round and emergency doctors, etc. have continuously been in place after September (Jul. 1.)
- Nurses (since Aug. 29) and radiation specialists (since Aug. 31) have been and will be in place (not regular basis in the meantime.)
- Reinforcement of medical facility and decontamination facility to enable the speedy transportation of patients and also the direct transportation of non-contaminated severely ill or injured patients to hospitals.
- Doctors have been in place at J-Village for workers' healthcare management.

Training of screening and decontamination for ill or injured patients
(In front of Units 5/6 service building entrance)

(10) Staff training/personnel allocation

1. Target for Step 2 "Systematic staff training and personnel allocation"
   - Promotion of staff training in conjunction with the Government and utility operators, etc.

2. Current status and work implemented

   ① Promote staff training, etc. in conjunction with the government and utility operators in order to train and allocate staffs systematically. [Countermeasure 85]

   - Conducting training for staffs engaged in radiation related work, who will be in great demand.
   - TEPCO has been conducting "radiation survey staff training" targeted for employees and TEPCO group companies' employees and has already trained approx. 2,500 personnel.
   - The government has been conducting "radiation survey staff training" (5 times till Sep. 9 and approx. 140 personnel were trained.), "radiation protection staff training" (approx. 10 personnel were trained from Aug. 8 to 12) and will continue these trainings.
   - According to affiliated companies needs, launched a new framework of looking for workers widely through Japan Atomic Industrial Forum (JAIF).

Radiation survey staff training

VI. Countermeasures against midterm issues

1. Target for Step 2

- Mid-term safety securement policy to be drafted by the government.
- Plant operation plans to be developed by the operator based on the above policy.

2. Current status and work implemented

①"Mid-term safety securement policy" is under consideration by NISA

END

Appendix 3

Current Status of "Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO" (Revised edition)

September 20, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

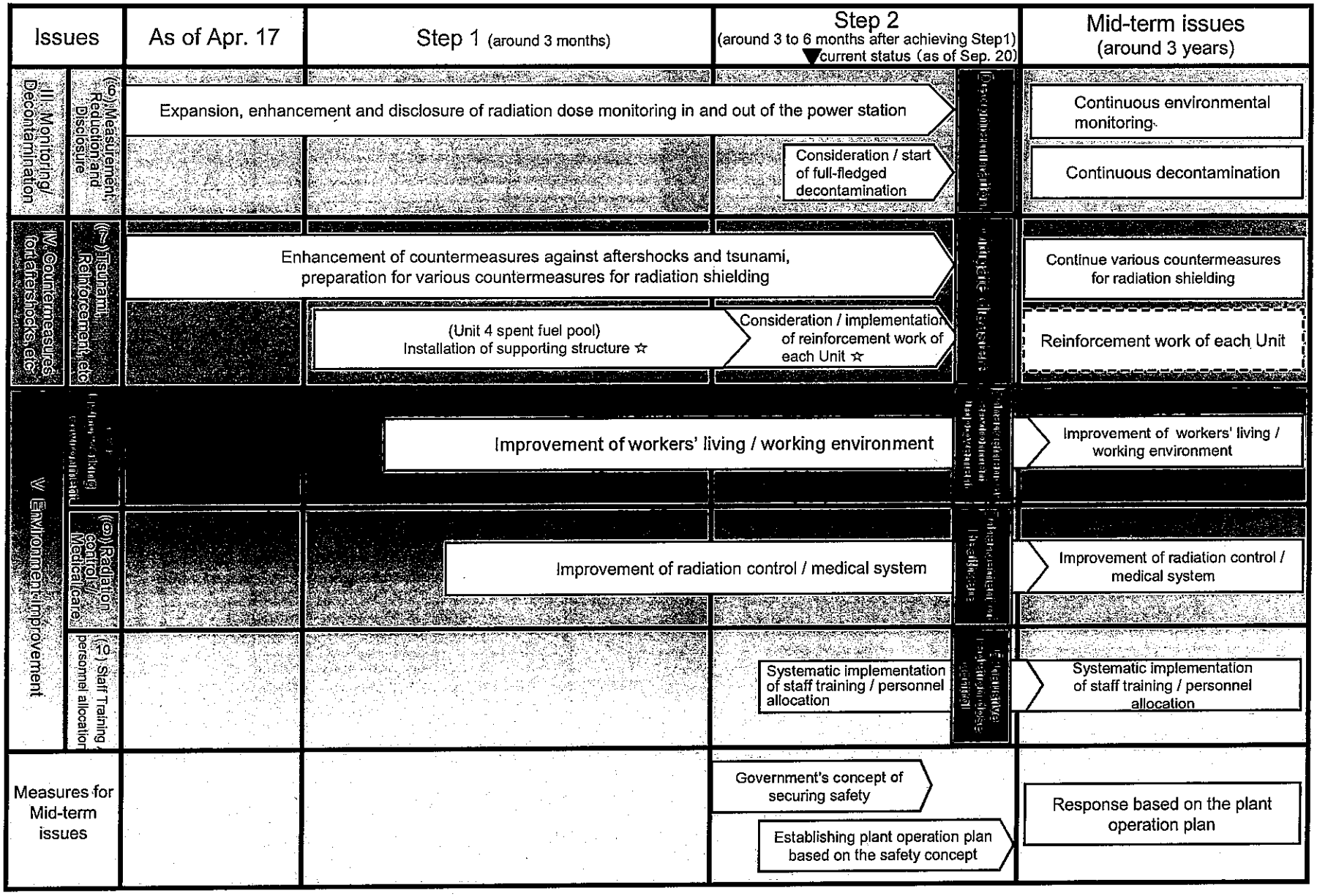
Red colored letter: newly added to the previous version, ☆: already reported to the government, Green colored shading: achieved target

Issues		As of Apr. 17	Step 1 (around 3 months)	Step 2 (around 3 to 6 months after achieving Step1) ▼current status (as of Sep. 20	Mid-term issues (around 3 years)
I. Cooling	(1) Reactor	Fresh water Injection	Cooling by minimum injection rate (injection cooling)	Circulating water cooling (continued)	Continuous cold shutdown condition
			Consideration and preparation of reuse of accumulated water		
			Circulating water cooling (start) ☆		
			Nitrogen gas injection ☆	Nitrogen gas injection (continued)	Protection against corrosion cracking of structural materials* *partially ahead of schedule
			Improvement of work environment ☆		
	(2) Spent Fuel Pool	Fresh water injection	Reliability improvement in injection operation / remote-control operation *ahead of schedule	Remote-controlled injection operation	Start of removal work of fuels
			Circulation cooling system (installation of heat exchanger)☆ *partially ahead of schedule	Consideration / installation of heat exchanging function	
II. Mitigation	(3) Accumulated Water	Transferring water with high radiation level	Installation of storage / processing facilities ☆	Expansion ☆ / consideration of full-fledged processing facilities	Installation of full-fledged water processing facilities
				Decontamination ☆ / desalt processing (reuse), etc	Continuous processing of accumulated water
				Storage / management of sludge waste etc. ☆	Storage / management of sludge waste etc.
		Storing water with low radiation level	Installation of storage facilities / decontamination processing		Research of processing of sludge waste etc.
				Mitigation of contamination in the ocean	Mitigation of contamination in the ocean
	(4) Ground water		Mitigation of contamination of groundwater	(Restoration of sub-drainage pumps with expansion of storage / processing facilities)	Mitigation of contamination of groundwater
			Consideration of method of impermeable wall against groundwater	Design / implementation of impermeable wall against groundwater	Establishment of impermeable wall against groundwater
	(5) Atmosphere / Soil	Dispersion of inhibitor		Dispersion of inhibitor (continued)	Dispersion of inhibitor
		Removal / management of debris		Removal / management of debris (continued)	Removal / management of debris
				Installation of reactor building cover (Unit 1) ☆	
				Removal of debris (top of Unit 3&4 R/B)	Removal of debris / installation of reactor building cover (Unit 3&4)
				Consideration of reactor building container	Start of installation work of reactor building container
				Installation of PCV gas control system	Installation of PCV gas control system

Current Status of "Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO" (Revised edition)

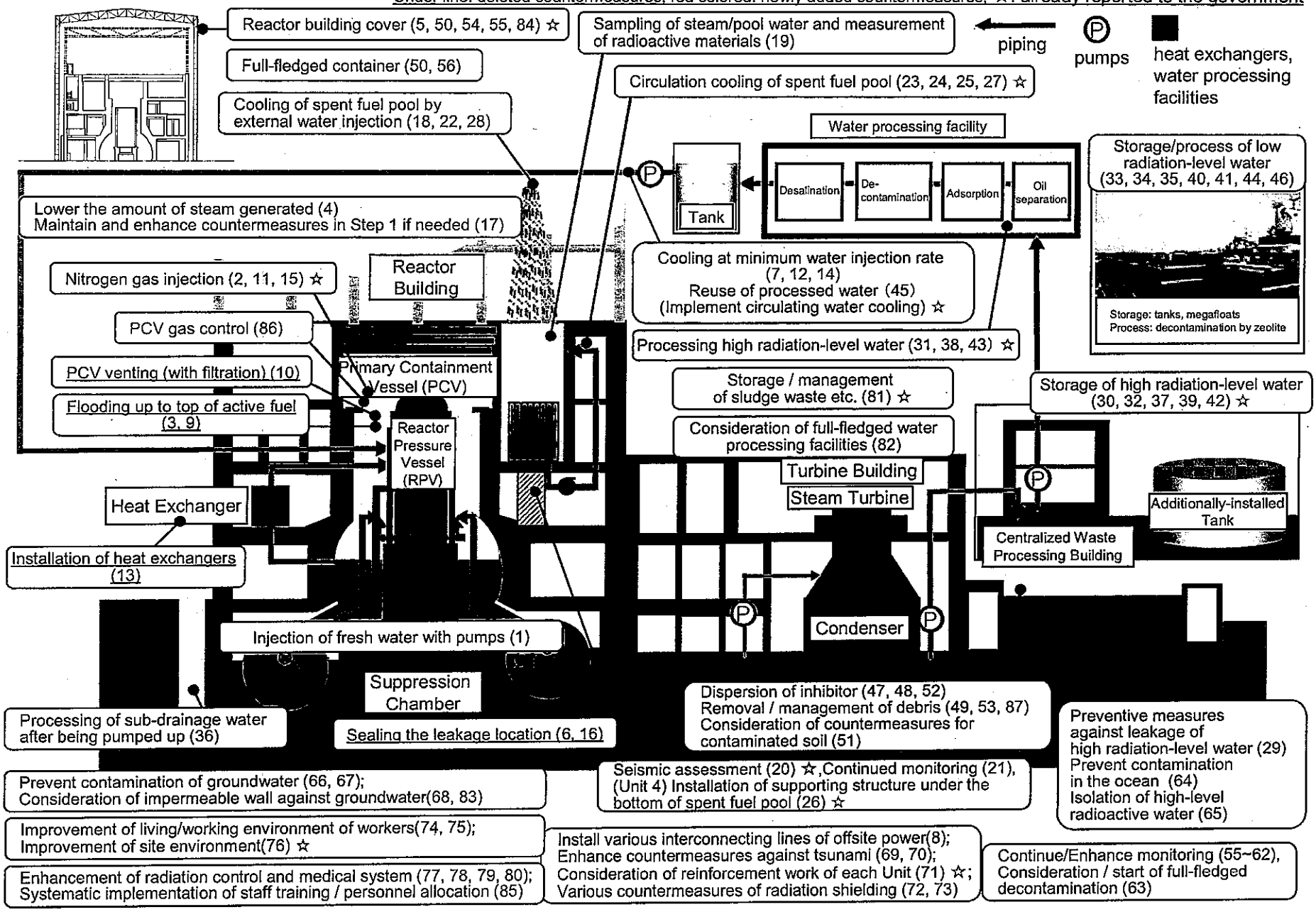
September 20, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

Red colored letter: newly added to the previous version, ☆: already reported to the government, Green colored shading: achieved object



Overview of Major Countermeasures in the Power Station as of September 20

Under line: deleted countermeasures, red colored: newly added countermeasures, ☆: already reported to the government



Current Status of Countermeasures (1)

Red frame: progressed countermeasures from the previous version, ☆: already reported to the government

Issues: I. Cooling > (1) Reactor

Unit

<Step 2 (around 3 to 6 months after achieving Step1)>: Release of radioactive materials is under control and radiation dose is being significantly held down

Start of Step 2 (Jul. 17) ▼ Current status (as of Sep. 20)

Term to keep the amount of accumulated water and to improve reliability | Term to complete measures to improve reliability and reduce the amount of accumulated water | Term to inject enough water for cold shutdown condition without increasing the amount of accumulated water

1

Implementation of circulating water cooling [Countermeasures 12,14,45]

Construction of centralized monitoring system in the main anti-earthquake building

Injection of water required to achieve "stable cooling"

Nitrogen gas injection [Countermeasure 11]

2

Implementation of circulating water cooling [Countermeasures 12,14,45]

Construction of centralized monitoring system in the main anti-earthquake building

Injection of water required to achieve "stable cooling" (Inject water through core spray line in addition to feed water line (Sep. 15))

Nitrogen gas injection [Countermeasure 11]

3

Implementation of circulating water cooling [Countermeasures 12,14,45]

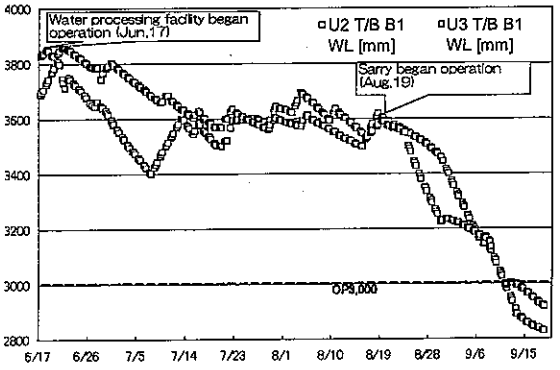
Construction of centralized monitoring system in the main anti-earthquake building

Injection of water required to achieve "stable cooling" (Inject water through core spray line in addition to feed water line (Sep. 1))

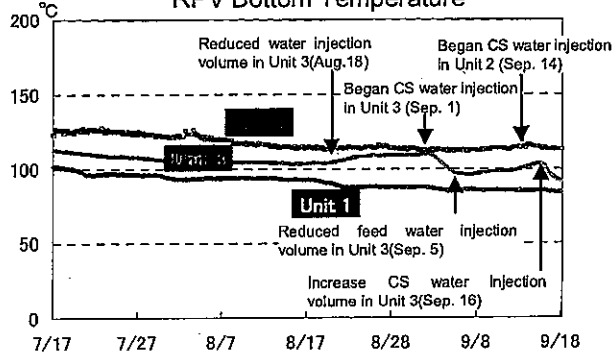
Change injection flow rate experimentally, and confirm transition of reactor temperatures

Nitrogen gas injection [Countermeasure 11]

Control of Accumulated water in Turbine Building



RPV Bottom Temperature

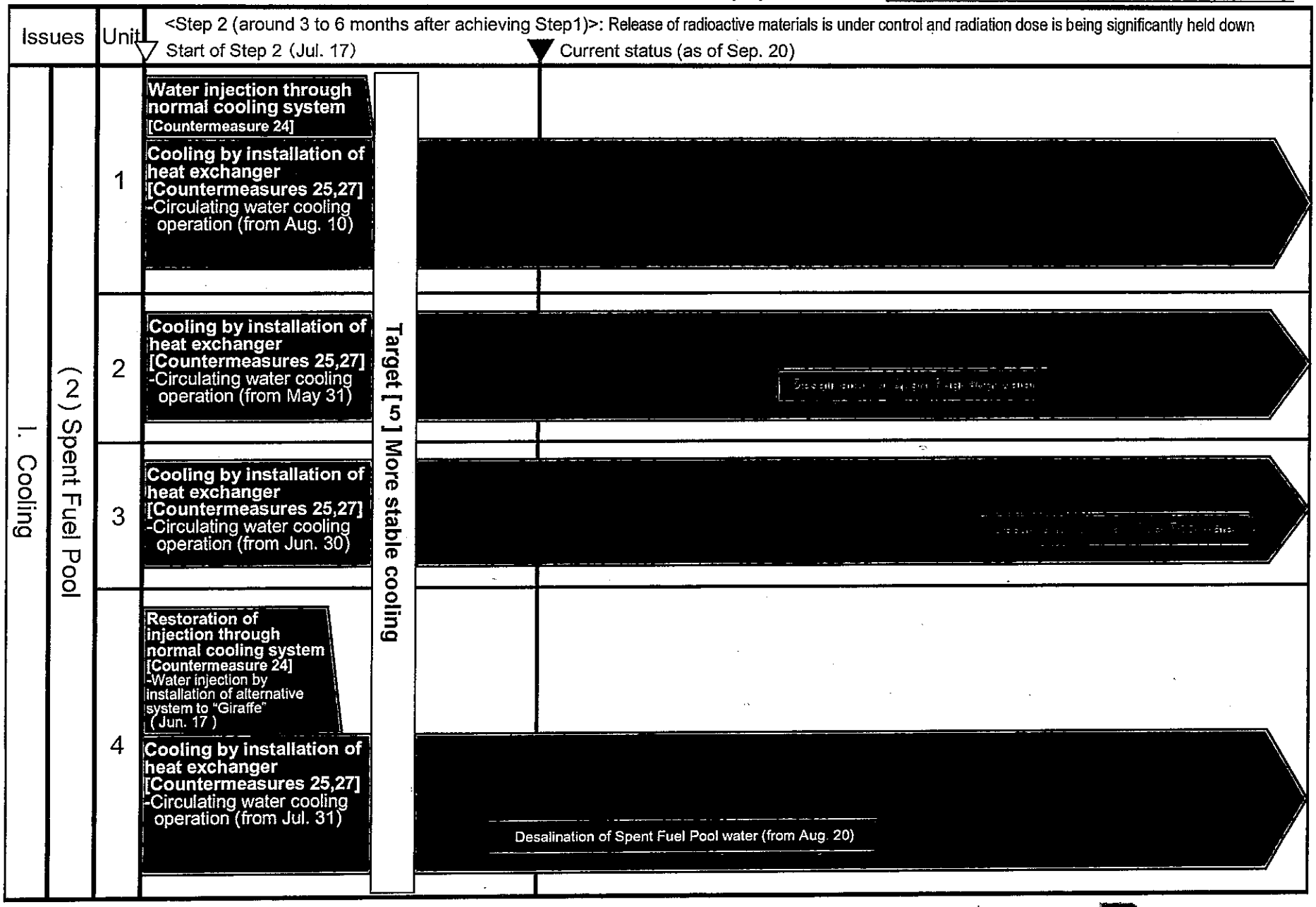


Target [ ] Cold shutdown condition

Legend: : Implemented (monitored by government as necessary) ☆: Safety check by government (report) : Under construction : Field work started : Field work not started yet

Current Status of Countermeasure (2)

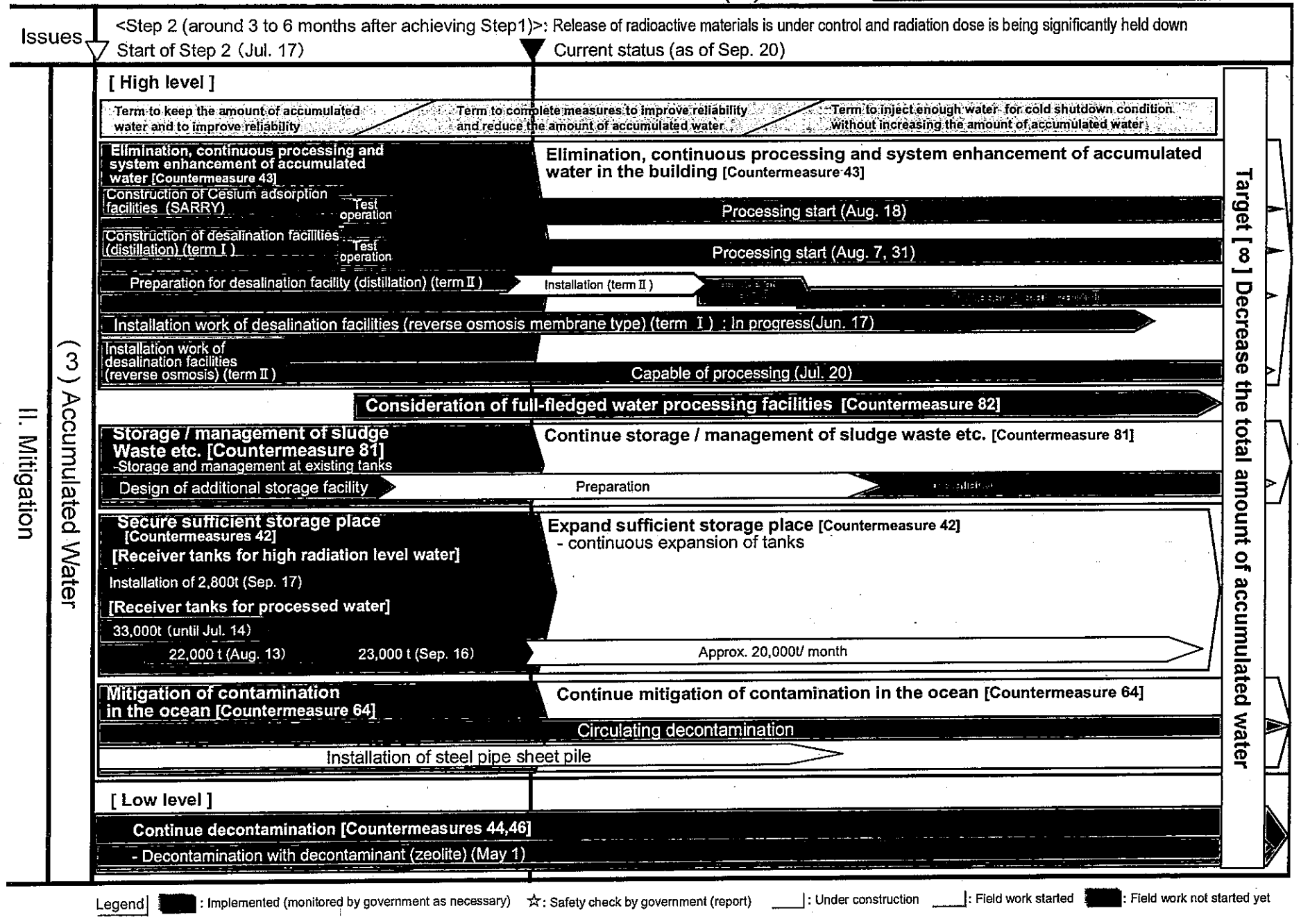
Red frame: progressed countermeasures from the previous version, ☆: already reported to the government V



Legend: : Implemented (monitored by government as necessary) ☆: Safety check by government (report) : Under construction : Field work started : Field work not started yet

Current Status of Countermeasures (3)

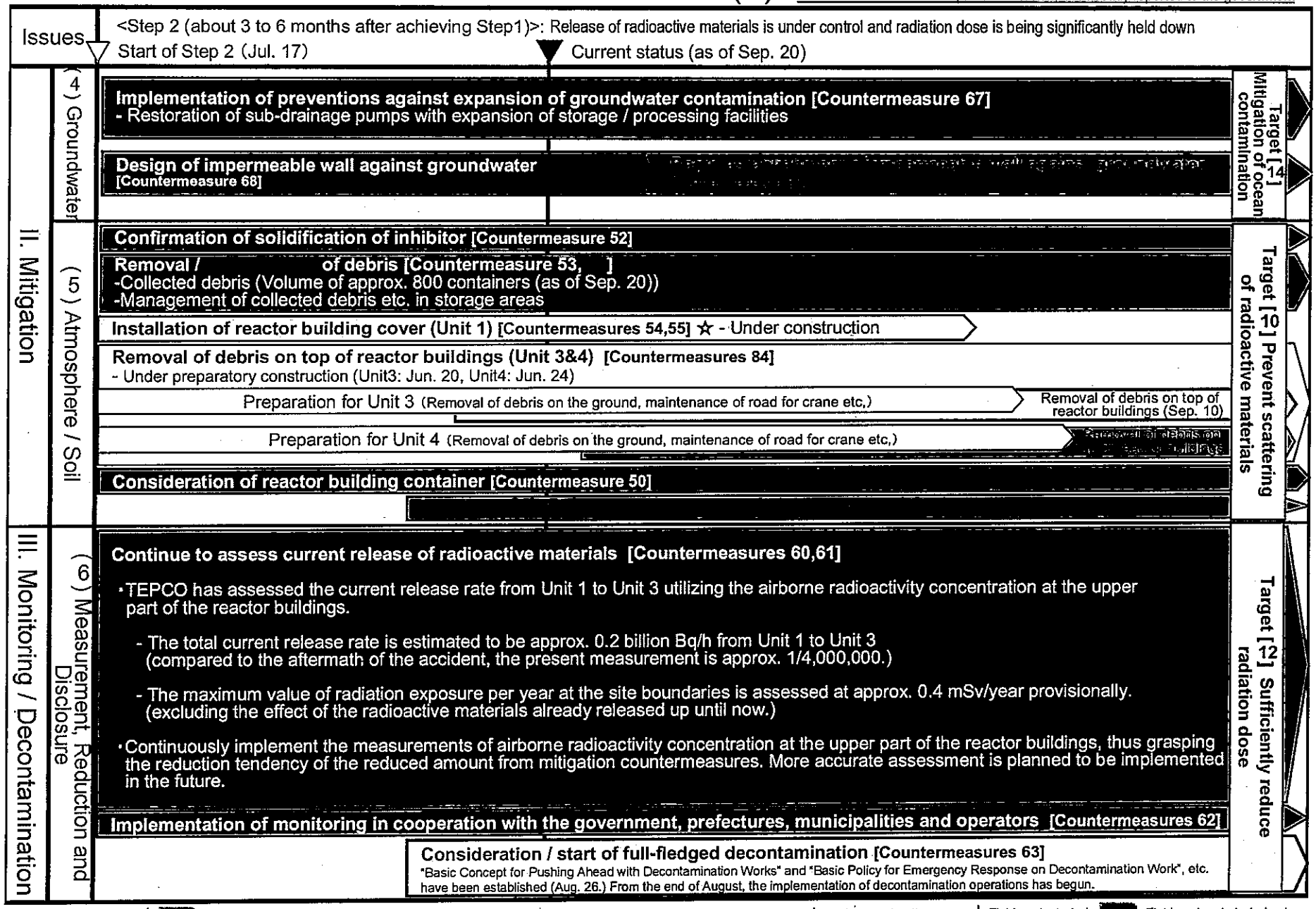
Red frame: progressed countermeasures from the previous version, ☆: already reported to the government



Legend: ■: Implemented (monitored by government as necessary) ☆: Safety check by government (report) ▭: Under construction ▭: Field work started ■: Field work not started yet

Current Status of Countermeasures (4)

Red colored letter: newly added countermeasures, Red frame: progressed countermeasures from the previous version, ☆: already reported to the government



Current Status of Countermeasures (5)

Red colored letter: newly added countermeasures, Red frame: progressed countermeasures from the previous version, ☆: already reported to the government

Issues: <Step 2 (around 3 to 6 months after achieving Step1)>: Release of radioactive materials is under control and radiation dose is being significantly held down

Start of Step 2 (Jul. 17) ▼ Current status (as of Sep. 20)

IV. Countermeasures against aftershocks, etc

(7) Tsunami, reinforcement, etc

(Unit 4) Installation of supporting structure under the bottom of the fuel pool [Countermeasure 26] (Jul. 30)

Consideration and implementation of reinforcement work of each Unit [Countermeasure 71]
- Evaluation of seismic resistance has been completed (Aug.26) ☆
- Investigation inside the building is planned after countermeasures to reduce radiation dose achieved

Continue various countermeasures for radiation shielding [Countermeasure 73]

Target [(9) (10) (11)] Mitigation of disasters

V. Environment improvement

(8) Living / working Environment

Continuation and enhancement of improvement of workers' living / working environment [Countermeasure 75]
- Accommodations for approx. 1,600 people have been prepared. Approx. 1,100 people have already moved in (as of Sep. 11)
- Seventeen on-site rest station have been established (approx. 3,400m^2 in size with a capacity to accommodate approx. 1,200 people) (as of Sep. 9)

Target [(8) (11)] Enhancement of environment improvement

(9) Radiation control /Medical care

Continuous improvement of radiation control [Countermeasure 78]
- Reinforcement of radiation control by NISA
- Expansion of whole-body counters, implementation of monthly internal exposure measurement
- Automated recording of personal radiation dose, written notification of exposure dose , introduction of workers' certificates with photos
- Consideration of long-term healthcare such as enhancement of safety training for workers and establishing database etc.

Continuous reinforcement of medical system [Countermeasure 80]
- Install new emergency medical facility, establish organization with resident specialists (on call 24 hours a day), speedy transportation of patients
- Intensive preventive measures against heat stroke (trainings for new workers), countermeasures for mental health and conducting medical examination
- Establish industrial hygiene system such as preventive healthcare

Target [(8) (9)] Enhancement of healthcare

(10) Staff Training / personnel allocation

Systematic staff training and personnel allocation [Countermeasure 85]
- Promote human resources training in cooperation with the government and operators

Target [(7)] Exhaustive radiation dose control

Legend: ■: Implemented (monitored by government as necessary) ☆: Safety check by government (report) ▭: Under construction ▭: Field work started ■: Field work not started yet