

Decommissioning

Decommissioning Fukushima Daiichi is our responsibility and we are giving it our all

A precondition for recovery in Fukushima is the decommissioning of Fukushima Daiichi, and our mission is to reduce risks associated with the plant as quickly as possible by moving forward with the decommissioning process in a safe, steady and quick manner. After the disaster Fukushima Daiichi received much cooperation from parties both within and outside of the company in terms of both technical support and actual manpower, and as a result the conditions have greatly improved and we are no longer in a state of crisis. This has enabled us to look further down the road and formulate strategic steps for decommissioning.

Going forward we will be removing spent fuel and fuel debris at Fukushima Daiichi, tasks that are the core of the decommissioning process. Investigations and research have provided us with various types of information about the conditions inside reactors. However, there still remain many locations where radiation levels are quite high, such as inside the reactor buildings, and the work environment continues to be extremely harsh. The information we have obtained about conditions inside the reactor and fuel debris is still limited, and there are many issues to address, but with the help of experts from both within and outside of Japan we will cut a new path and meet these challenges head-on. The decommissioning process will take 30 to 40 years. We will continue to improve the work environment and proactively engage in research and development on new types of robots and remotely operated equipment. And, with your cooperation and understanding, we will move forward safely, steadily and quickly with the lengthy decommissioning process.

Chief Decommissioning Officer
President of Fukushima Daiichi Decontamination and
Decommissioning Engineering Company
Tokyo Electric Power Company Holdings, Inc.

Akira Ono



Number of workers

4,300^{*1}
(as of July 2018)



Number of visitors attending for inspection and observation

12,500 /year^{*2}
(FY2017)



Radiation dose of workers (mean value)

0.28 mSv
/month^{*3}
(as of June 2018)



Regular uniform area

96%



Time required for decommissioning

30 to 40
years



Published radiation data

100,000
pieces/year

*1 Immediately after the disaster: about 3,200 people; At peak: about 7,400 people; rate of employment of local people: about 55%.

*2 Of the about 10,000 visitors, those from outside Japan account for about 10%.

*3 Relevant laws and regulations stipulate that the effective radiation dose limits per radiation worker are 100 mSv for five years and 50 mSv for one year.

History of the Fukushima Daiichi since the Accident

It has been seven years since the Fukushima Daiichi Nuclear Power Station accident. During this time various initiatives have been implemented on-site and decommissioning is steadily progressing.

The following is a chronology of the major events that have happened at the Fukushima Daiichi.



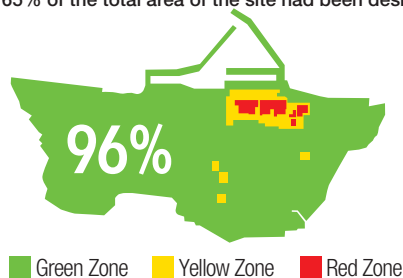


October 2016

Completion of a new main administration building

The new main administration building has been equipped with an emergency response center with the aim of not only improving the efficiency of decommissioning but also our emergency response.

As a result of such measures as the removal of rubble from the site, the decontamination of contaminated soil and ground paving, etc., since November 2011 the Green Zone in which normal work uniforms can be worn has gradually expanded. As of January 2015, 65% of the total area of the site had been designated a Green Zone, and by May 2018 this percentage had risen to 96%.



“Red Zone” equipment

- Full face masks
- Two layers of protective clothing, or water proof clothing on top of protective clothing
- Work boots (Dedicated for Red Zone use)
- Helmet (Dedicated for Red Zone use)
- Cotton gloves
- Two layers of rubber gloves



“Green Zone” equipment

- Disposable dust mask
- Normal work uniform
- Work boots (Dedicated for Green Zone use)
- Helmet (Dedicated for Green Zone use)
- Cotton gloves
- Rubber or cotton work gloves

October 2015

Completion of sea side impermeable wall



In April 2012, construction began in order to stop ground water from flowing from the Unit 1~4 area into the port and prevent ocean contamination. The sea side impermeable wall was completed in October 2015.

March 2016

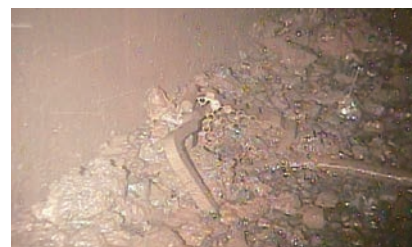
Commencement of freezing of land side impermeable wall



In order to reduce the amount of groundwater flowing into the reactor buildings and control increases in contaminated water, preparations to construct a land side impermeable wall that would cut off groundwater by freezing the soil began in November 2013. Freezing of the soil commenced in March 2016.

January 2018

Deposits thought to be fuel debris had been seen inside the Unit 2 primary containment vessel.



During the internal investigations of the Unit 1~3 primary containment vessels, deposits thought to be fuel debris were seen in Unit 2.

February 2018

Completion of the Unit 3 fuel removal cover

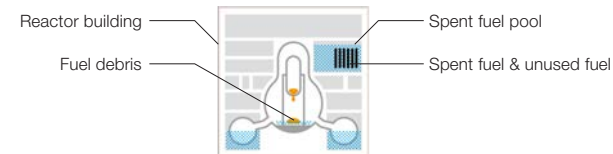


In order to install a crane and prevent radioactive substances from dispersing, a cover had been constructed for removing the fuel from the spent fuel pool.

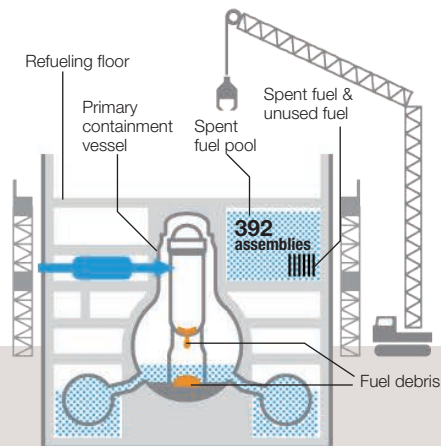
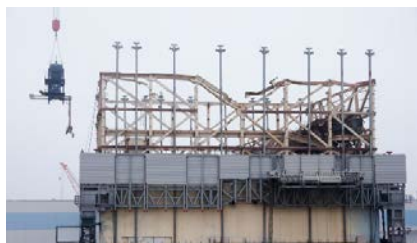
Conditions at the Fukushima Daiichi

(as of September, 2018)

Fuel and fuel debris removal conditions

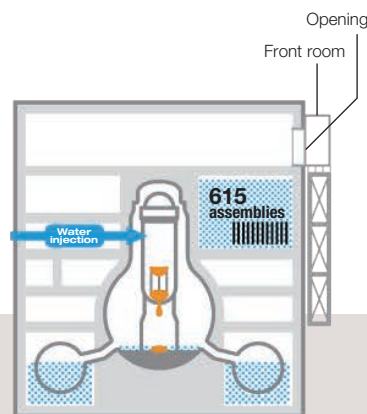


Unit:1



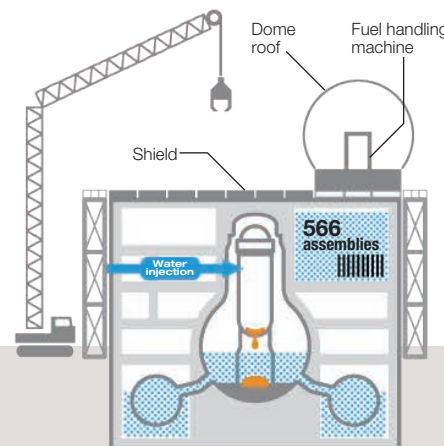
Rubble is being removed from the operating floor in preparation for the removal of fuel from the spent fuel pool. Furthermore, in preparation for fuel debris removal, additional primary containment vessel internal investigations and analysis are being conducted.

Unit:2



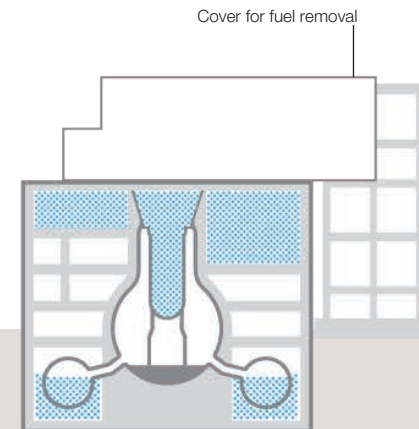
An opening had been made in the west wall of the reactor building in preparation for the removal of fuel from the spent fuel pool. Investigations of the operating floor have begun. Also, in preparation for fuel debris removal, additional primary containment vessel internal investigations and analysis are being conducted.

Unit:3



The installation of equipment for removing fuel from the spent fuel pool, such as the fuel handling machine, had been completed. And, whether or not additional primary containment vessel internal investigations are required in preparation for fuel debris removal is being deliberated.

Unit:4



The removal of fuel from the spent fuel pool was completed in December 2014 thereby eliminating risks associated with the nuclear fuel.

Work environment conditions

Number of workers

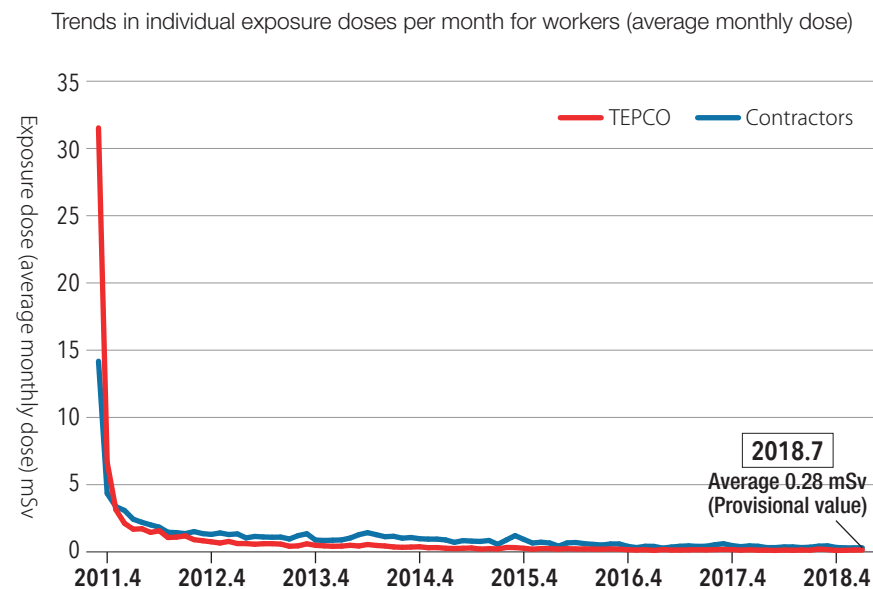
As of July 2018, approximately 4,300 workers (contractors and TEPCO employees) engage in work at the power station daily. As of June, approximately 60% of these people have been hired from within Fukushima prefecture.



Exposure management conditions

Since FY2015, the average monthly dose of workers has remained steady at below 1mSv, and situation where the exposure doses of most workers are far below dose limits has been maintained.

(Legal dose limit: 50mSv/year or 100mSv/ 5years)



Contaminated water countermeasures

Preventative and multilayered contaminated water countermeasures have been implemented based upon the three basic policies.

Policy 1 Remove contamination sources

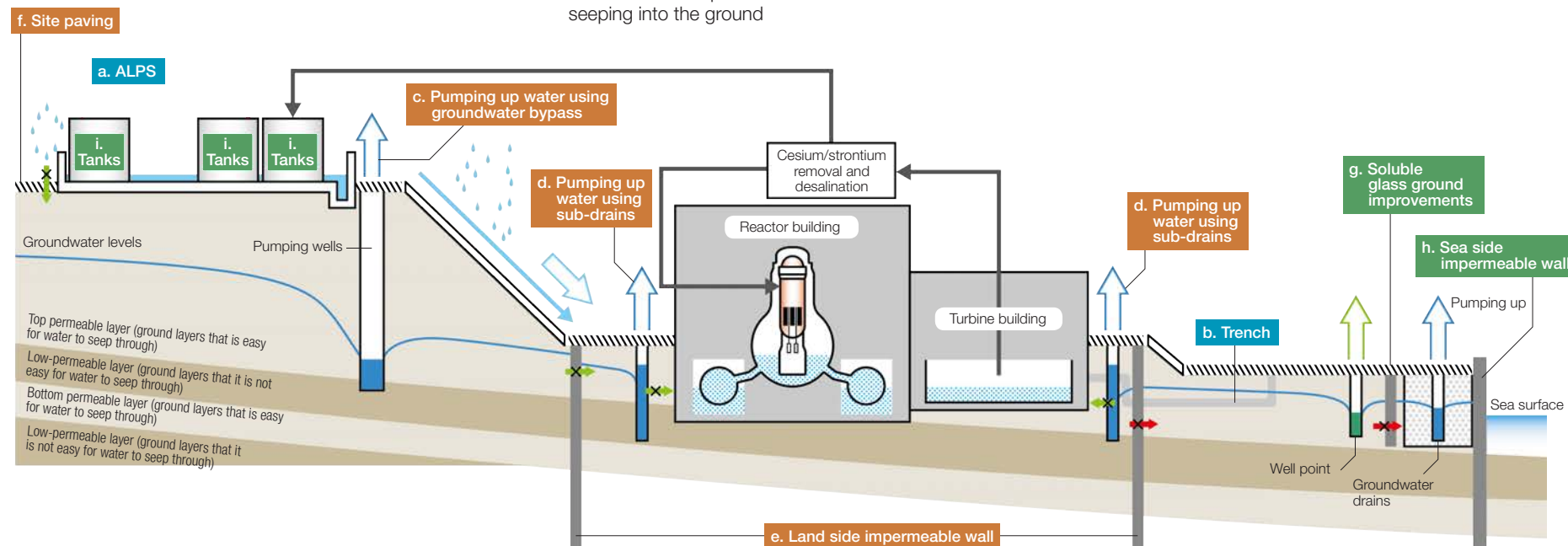
- a. Purify contaminated water using ALPS, etc.
- b. Remove contaminated water from trenches (underground tunnels used for pipes, etc.)

Policy 2 Isolating groundwater away from the contamination sources

- c. Pumping up of groundwater using the groundwater bypass
- d. Pumping up water from wells (sub-drains) around buildings
- e. Construct an impermeable wall on the land side by freezing soil
- f. Pave the sites to prevent rainwater from seeping into the ground

Policy 3 Prevent contaminated water from leaking

- g. Use soluble glass to make ground improvements
- h. Build an impermeable wall on the sea side
- i. Install additional tanks (replace tanks with welded tanks, etc.)



Water countermeasures and treatment of water that has accumulated in buildings are being engaged in in a planned manner based upon set deadlines.

Policy 1 Remove contamination sources

Additional effective doses at site borders has been reduced to 1mSv/year.
 Target deadline: FY2015
 Achievement status: Achieved (March 2016)

Commencement of preparations aimed at deciding on how water treated with ALPS is to be handled over the long term
 Target deadline: First half of FY2016
 Achievement status: Achieved (September 2016)

<Primary countermeasures>
 ■ Operation of ALPS and the tank storage/management of treated water

Policy 2 Isolating groundwater away from the contamination sources

Decrease the amount of contaminated water generated to approximately 150m³/day
 Target deadline: During 2020
 Achievement status: Achieved during the dry season (December 2017)

<Primary countermeasures>
 ■ Trenches have been filled in and drainage channels have been equipped with backflow prevention valves in preparation for large rainfall, such as during typhoons
 ■ Water treatment equipment, such as sub-drains, etc., has been enhanced

Trends in the amount of contaminated water generated

Policy 3 Prevent contaminated water from leaking

Store all water that has been purified with purification equipment in welded tanks
 Target deadline: FY2018

<Primary countermeasures>
 ■ Replacing tanks

Flange tanks

Welded tanks

Treating accumulated water

Cutoff connections between Units 1 and 2, and Units 3 and 4
 Target deadline: FY2018

Reduce the amount of radioactive substances in water that has accumulated in buildings to approximately 1/10 what was at the end of FY2014
 Target deadline: FY2018

Complete treatment of accumulative water buildings
 Target deadline: During 2020

<Primary countermeasures>
 ■ Remove radioactive substances from accumulated water in buildings
 ■ Reduce the amount of accumulated water being stored

Accumulated water in buildings

<Water treated with ALPS>
 Water treated with ALPS is currently being stored in tanks, but going forward, TEPCO must not only think about scientific and technical aspects, but also fully consider putting society at ease and promoting recovery in Fukushima. It is TEPCO's understanding that the government will stipulate a direction in which to head based upon discussions held by government committees and based on that decision, TEPCO will handle the situation appropriately and carefully while respecting the opinions of stakeholders, such as the local community.

Communicating information on decommissioning

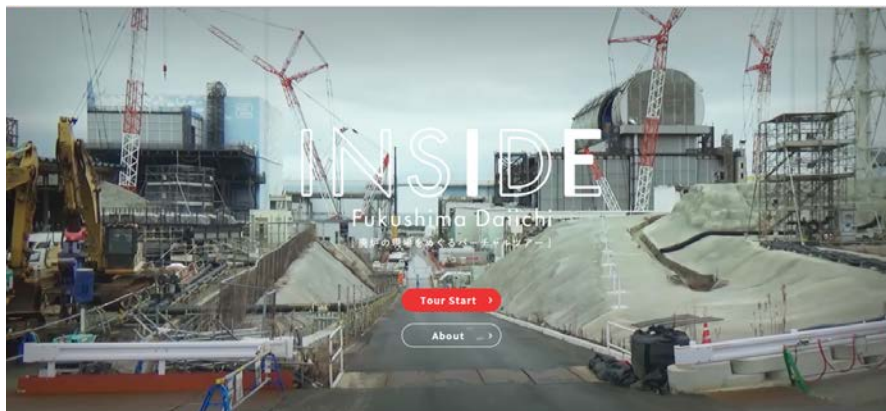
All radiation analysis data and dose rate measurements taken at the Fukushima Daiichi have been posted on the TEPCO website since August 2015. Approximately 100,000 pieces of data are posted to the website annually. TEPCO also uses various mediums to convey information about the decommissioning process and is engaged in initiatives to deepen understanding about decommissioning by providing tours of Fukushima Daiichi.

INSIDE FUKUSHIMA DAIICHI ~A virtual tour of the decommissioning site~

In order to enable as many people as possible to learn what it is like on the site of decommissioning, TEPCO has developed web content that utilizes vivid video to enable users to virtually visit the site of decommissioning and see the reactor buildings, contaminated water treatment equipment and other equipment being used for decommissioning. This content won the Best Campaign Award at Code Awards 2018*.

*A continuation of the Mobile Advertisements Awards sponsored by D2C, Inc. This year was the fifth time the awards have been held.

<http://www.codeaward.jp>



WEB INSIDE FUKUSHIMA DAIICHI ~A virtual tour of the decommissioning site~
<http://www.tepco.co.jp/insidefukushimadaichi/index-j.html>

Information on tours of the Fukushima Daiichi

TEPCO is striving to deepen understanding about the decommissioning process by having visitors see with their own eyes the progress at the power station. In FY2017, 12,500 people visited the site, bringing the grand total for the number of visitors to the site since FY2011 to 44,000. Approximately 10% of these visitors were from overseas. TEPCO aims to increase the number of visitors so that approximately 20,000 people are visiting annually by FY2020.



Participants in the International High School Radiation Protection Workshop (August 2018)

Trends in the number of visitors to the Fukushima Daiichi

