January 26, 2021 18th Nuclear Reform Monitoring Committee Meeting

Fukushima Daiichi Decontamination & Decommissioning Engineering Company Initiatives



- 1. Mid/Long-Term Decommissioning Action Plan 2020
- 2. Regional symbiosis initiatives
- 3. Project progress
- 4. Conditions after department reorganization

Tokyo Electric Power Company Holdings, Inc. Fukushima Daiichi Decontamination & Decommissioning Engineering Company



1. MID/LONG-TERM DECOMMISSIONING ACTION PLAN 2020

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Mid/Long-Term Decommissioning Action Plan 2020 TEPCO

- Officially announced in March 27, 2020, the Mid/Long-Term Decommissioning Action Plan 2020 provides detailed plans for achieving the objectives set forth in the Nuclear Regulatory Agency's Risk Map and the main target schedules of the Mid/Long-Term Roadmap
 - Long-term, consistent decommissioning plan that covers everything from current conditions through the short, mid, and long terms
 - Regularly revised in accordance with the progress and arising issues



[Excerpt]

Mid/Long-Term Decommissioning Action Plan: Pool Fuel Removal **TEPCO**



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2. REGIONAL SYMBIOSIS INITIATIVES

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Our promise to the people of Fukushima to balance recovery with decommissioning

On March 27, 2020 we officially announced our promise to the people of Fukushima to live in symbiosis with regional communities, accelerate recovery in Fukushima, and work together with local companies in regards to decommissioning



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Initiatives to promote participation in decommissioning by local companies



Explanation of mid/long-term contracting forecasts for decommissioning to local companies and regional chambers of commerce

 Explanations of our mid/long-term contract forecasts were given to the chambers of commerce of Oguma Town, Futaba Town and Namie Village. Approximately 20 companies attended.

Reaching out to local companies

- Business meetings between local companies and contractors [Matching meetings]
 - ✓ First decommissioning-related industry matching meeting held (October 30, 2020)
 - ✓ 21 companies from Fukushima Prefecture participated in individual business meetings about "machining large cans," a topic that was suggested by Hitachi GE Nuclear Energy and Hitachi Plant Construction, Ltd.

Individual visits to local companies interested in becoming involved in decommissioning

✓ 21 companies visited as of December 2020

Strengthening company resources Establishment of Hamadori Decommissioning Industry Project Office (officially announced on August 26, 2020, established on October 1)

✓ Established for creating a decommissioning-related industry in line with the Mid/Long-Term Decommissioning Action Plan, and formulating business strategies



Strategy for promoting participation by local companies

Coordination between the Fukushima Innovation Coast Framework Promotion Organization, the Fukushima Soma Recovery Promotion Organization and the Fukushima Daiichi Decontamination & Decommissioning Engineering Company



3. PROJECT PROGRESS

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- Moving forward while quickly reducing risk and prioritizing safety
- Adheres to the 30~40-year time period for completing decommissioning

1. Contaminated water countermeasures Suppressed to approximately 150m³/day During 2020 [Predicted achievement*] Amount of contaminated water generated Reduced to below 100m³/day During 2025 Completion of the treatment of United Water in buildings During 2020 [Achieved] Accumulated water treatment Reduce the amount of water accumulated in reactor buildings to FY2022~FY2024 approximately half what it was at the end of 2020 2. Removing fuel from the spent fuel pools During 2031 Complete fuel removal from Units 1-6 Complete construction of Unit 1 large cover Around FY2023 Begin fuel removal from Unit 1 FY2027~FY2028 Begin fuel removal from Unit 2 FY2024~FY2026 3. Fuel debris removal Commencement of the removal of fuel debris from the first unit (starting with Unit 2) During 2021 [Delayed] 4. Waste countermeasures Technical outlook for treatment/disposal plans, and the safety of such plans Around FY2021 Elimination of the temporary storage outside the rubble storage building During FY2028 ※ Under assessment ©Tokyo Electric Power Company Holdings, Inc. All Rights Reserved. 東京電力ホールディングス株式会社



- Amount of contaminated water generated
 Accumulated water treatment
- Reduced to approximately 150m³/day during 2020, and to below 100m³/day during 2025 Completion of the treatment of accumulated water in buildings during FY2020 Reduce the amount of water accumulated in reactor buildings to approximately half what it was at the end of 2020 between FY2022~FY2024
- Amount of contaminated water generated
 - "Approximately 150m³/day during 2020" expected to be achieved [Under assessment]
- Accumulated water treatment
 - Floors are being kept exposed in all buildings with the exception of the Unit 1~3 reactor buildings, process main building and high-temperature incinerator building [Achieved]
- ALPS-treated water secondary treatment performance tests
 - Tests to verify the effectiveness of secondary treatment in order to reduce concentrations of radioactive substances, with the exception of tritium, as much as possible have shown that, with the exception of tritium, the sum of the ratios of radioactive material concentrations allowed by law is being reduced to below 1 (in-house analysis)

Secondary treatment results (Sum of the ratios of concentrations allowed by law for the 62 nuclides +carbon-14

	Prior to secondary treatment (ALPS inlet)	After secondary treatment (ALPS outlet)
1 st test (J1-C tank group)	2,406 ->	0.35
2 nd test (J1-G tank group)	387 →	0.22

[Reference] Deliberation of treated water disposal method proposals

We are examining two disposal methods that were deemed in the report by the Subcommittee on the Handling of ALPS-treated Water to be technically feasible and proven (steam discharge/ocean discharge)

Concept of ocean discharge equipment

(Officially announced on March 24, 2020)

Concept of steam discharge equipment



%1 Multi-nuclide removal equipment or reverse osmosis treatment equipment %2 To be checked in the sample tank, but monitors for detecting gamma rays will be installed just in case %3 Strontium (Sr)-treated water: Water for which the concentrations of cesium and strontium have been reduced

** Legally allowed concentrations: Standards for discharge of radioactive substances into the atmosphere as stipulated in public notice based on the Nuclear Reactor Regulation Law. If the aforementioned radioactive waste contains multiple radioactive substances, the sum of the ratios of the legally allowed concentrations for those nuclides in the

radioactive waste must be less than 1. ©Tokyo Electric Power Company Holdings, Inc. All Rights Reserved.

Fuel removal from pool



- Unit 1 Complete construction of Unit 1 large cover around FY2023, commence fuel removal between FY2027~FY2028
- Unit 2 Begin fuel removal from Unit 2 between FY2024~FY2026
- Unit 1-6 Complete fuel removal from Units 1~6 during 2031
 - Unit 1
 - Remove rubble from underneath large cover over the reactor building (to be completed around 2023)
 - Dismantling of the remaining parts of the building cover that will interfere with construction of the large cover began on December 19, 2020

Unit 2

- Construct a platform on the south side of the reactor building and start removing fuel through a small opening
 - % Change from the method that would employ dismantling the entire top of the building







<u>Concept drawing of large</u> <u>cover construction</u>

Concept drawing of fuel removal

- Unit 3
 - Fuel removal from pool underway (began on April 15, 2019)
 - Work was suspended on November 18, 2020 due to crane nonconformances, but recommenced on December 20
 - As of December 28, 2020, 455 out of the total 566 assemblies had been removed

Fuel debris removal

Target schedule put forth in the Mid/Long-Term Roadmap

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- Commencement of the removal of fuel debris from the first unit (starting with Unit 2) during 2021
- Unit 1
 - Preparations are being made for an internal investigation of the PCV
 - ✓ Cameras will be used to perform the investigation since we have confirmed that reactor recirculation system instrument piping has been laid below the area where obstructions have been cut away
 - ✓ As a result, we expect to commence the internal investigation of the PCV during FY2021



<u>Concept drawing of device used to lower camera used</u> <u>for obstruction investigation</u> Unit 2

- The development of trial removal equipment has been delayed
 - ✓ Development of trial removal equipment in the UK has been delayed as a result of the Covid-19 pandemic
 - ✓ Performance confirmation tests originally scheduled to be conducted in the UK will now be implemented in Japan to minimize the delay to approximately one year

2 Enclosure

3 Connection pipe



Concept drawing of trial removal equipment

[Reference] Required personal protective equipment at Fukushima Daiichi **TEPCO**

• The areas in which general work uniforms can be worn (G Zone) has been extended to approximately 96% of the entire site.





acquire personal protective equipment at the beginning of the Covid-19 pandemic, but at current time we have enough in stores to last approximately three months.

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[Reference] Changes in dose distribution around Units 1~4

 Compared with measurements taken during the second half of FY2019, dose rates have dropped approximately 40-50% at the 2.5m foundation, and approximately 15-30% at the 8.5m foundation

<u>Average dose</u>	<u>e rate</u>		Units: [µSv/h]	Doca distribution (30m grid: chast baight)
2.5m foundation	Chest height ^{%1}	Ground surface ^{**2} (Collimated)	Primary renovations that contribute to reducing doses	Dose distribution (Sonn grid: chest height) Dose rate
FY2017 (Feb 2018)	20	4.5	• Asphalt paving (FY2015~)	2.5m foundation
FY2018 (Feb 2019)	17	3.6	• Removal of debris from around pump (FY2015~FY2019)	20 ~ 50 5 ~ 20 0 ~ 5
FY2019 (Dec 2019)	15	3.0		
FY2020 (Aug 2020)	9	1.4	• Removal of debris from top of Unit 3 T/B (FY2019~FY2020)	Onit 1 Onit 2 Onit 3 Onit 4
			Units: [µSv/h]	
8.5m foundation	Chest height ^{%1}	Ground surface ^{×2} (Collimated)	Primary renovations that contribute to reducing doses	8.5m foundation
FY2017 (Feb 2018)	140	61	 Paving of the area around the Units 1~4 reversible valve pit (from FY2018) 	Source: Japan Space Imaging (C)DigitalGlobe
FY2018 (Feb 2019)	122	41	 Paving done as part of seawall construction (from FY2019) Paving around the Unit 1 north side freqhyster tank (FY2010) X1 Chest height : 1m from the ground surface 	×1 Chest height : 1m from the ground surface
FY2019 (Dec 2019)	110	36	 Paving of road between Unit 2~Unit 3 (from FY2019) Paving of the area around the process main 	 %1 Chest height : In nom the ground surface %2 Ground surface (Collimated) : In locations that are affected by scattered radiation from the plant, dose reduction affects are confirmed by measuring after
FY2020 (Aug 2020)	94	26	 building (from FY2020) Removal of debris from tops of Unit 3 T/B and RW/B (FY2019~FY2020) 	collimating rays from the ground surface (approx. 1cm from the ground surface) レディングス株式会社



4. CONDITIONS AFTER DEPARTMENT REORGANIZATION

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Prior to department reorganization





After department reorganization





After department reorganization

Post-reorganization issues (1)

New initiatives have begun in order to reduce nonconformities, but the number of high-grade nonconformities has not decreased. A new analysis of nonconformities has revealed weaknesses with thoroughly implementing recurrence prevention measures and identifying risks in advance.

- Safety/quality management initiatives
 - The number of times managers are going to the field has increased from 491/month (March)→2,375/month (September), and the number of CR created has increased from approximately 50/month (October 2019)
 →Approx. 200/month (June 2020)
 - Since the first half of FY2020, we have established special teams for supervising and providing support for initiatives that focus on the field (three field aspects teams), train personnel to be management observation (MO) leaders, and established working groups aimed at optimizing temporarily stored/temporarily accumulated equipment/materials.
- Weaknesses of the Fukushima Decontamination & Decommissioning Engineering Company that were revealed through an analysis of nonconformities
 - Whereas the number of nonconformities has shown a decreasing trend this fiscal year compared to last year, the number of high-grade nonconformities has not decreased.
 - In light of the continued occurrence of nonconformities, such as the recent PCV gas pipe LCO deviation, we conducted an investigation into nonconformities with recurrence prevention and risk management preparations. The investigation revealed insufficiencies with, in particular, compliance with radiation control rules and identifying risks in advance.



Initiatives to strengthen the skills of departments and individuals to thoroughly implement recurrence prevention measures and identify risks in advance are being strengthened. In conjunction with this, we shall investigate the root causes of nonconformities and formulate countermeasures that pertain not only to rules and education, but also equipment. In addition, we shall also investigate common underlying causes and structural problems.

Initiatives to overcome weaknesses

Thorough implementation of recurrence prevention measures	 Provide "behavior education" pertaining to radiation protection for all station personnel Data entry of data to be publicly disclosed is gradually being automated and we are examining equipment-related countermeasures, such as physical countermeasures for preventing personnel from forgetting APD's and performing operation errors.
Improving the ability to identify risks in advance	 Reeducation on management observation (MO) that focus is on safety, quality and radiation control will be provided to all group managers
	 Advice shall be provided through joint MO with contractors, and support shall be provided for MO and RCA training conducted at contracting companies
	 The Decommissioning Safety and Quality Office shall confirm efforts to identify risks during pre-work safety meetings and the implementation of such meetings in the field

· A contractor version of the Fundamentals shall be created and provided to





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Conclusion

- At Fukushima Daiichi environmental improvements have progressed at approximately 96% of the site, which has been widely contaminated after the accident, can now be accessed wearing only general work uniforms
- Going forward we will commence fuel debris removal, which is the core of the decommissioning process
- We will continue to steadily move forward with decommissioning while reducing risks and balancing Fukushima recovery with decommissioning