

Covering the Unit 1 Spent Fuel Pool

July 25, 2019



Tokyo Electric Power Company Holdings, Inc.

1. Objectives

- We plan to remove the collapsed roof* above the spent fuel pool (hereinafter referred to as, "SFP") on the south side of the operating floor of the reactor building.
- During roof removal a pincher (cutting/grasping) and suction device (dust collection) will be used to cut off and remove roof steel and small rubble, etc., so there is a risk that steel and rubble may fall into the SFP and affect the integrity of fuel. We shall therefore cover the surface of the SFP in an effort to reduce this risk as much as possible.
- We have confirmed that the surrounding community would not be affected even if steel/small rubble were to fall into the SFP and damage all the fuel inside.

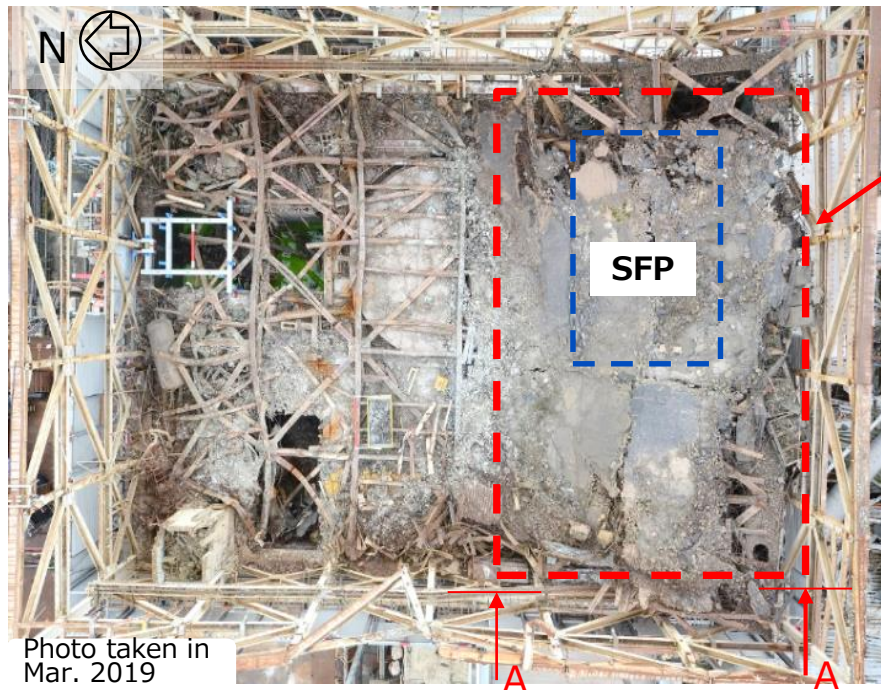
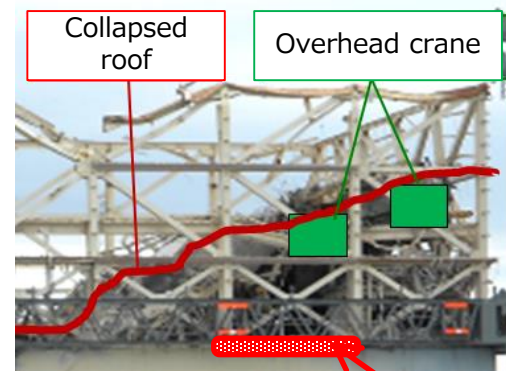
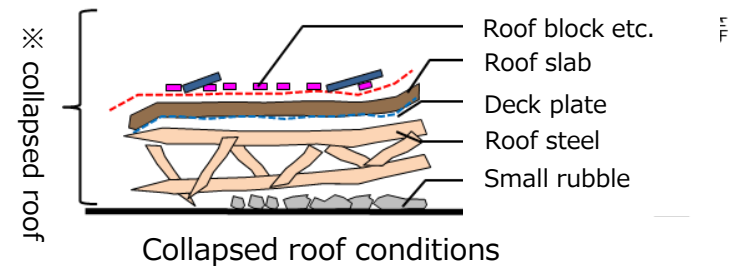


Photo taken in Mar. 2019

Operating floor plan



View on A-A

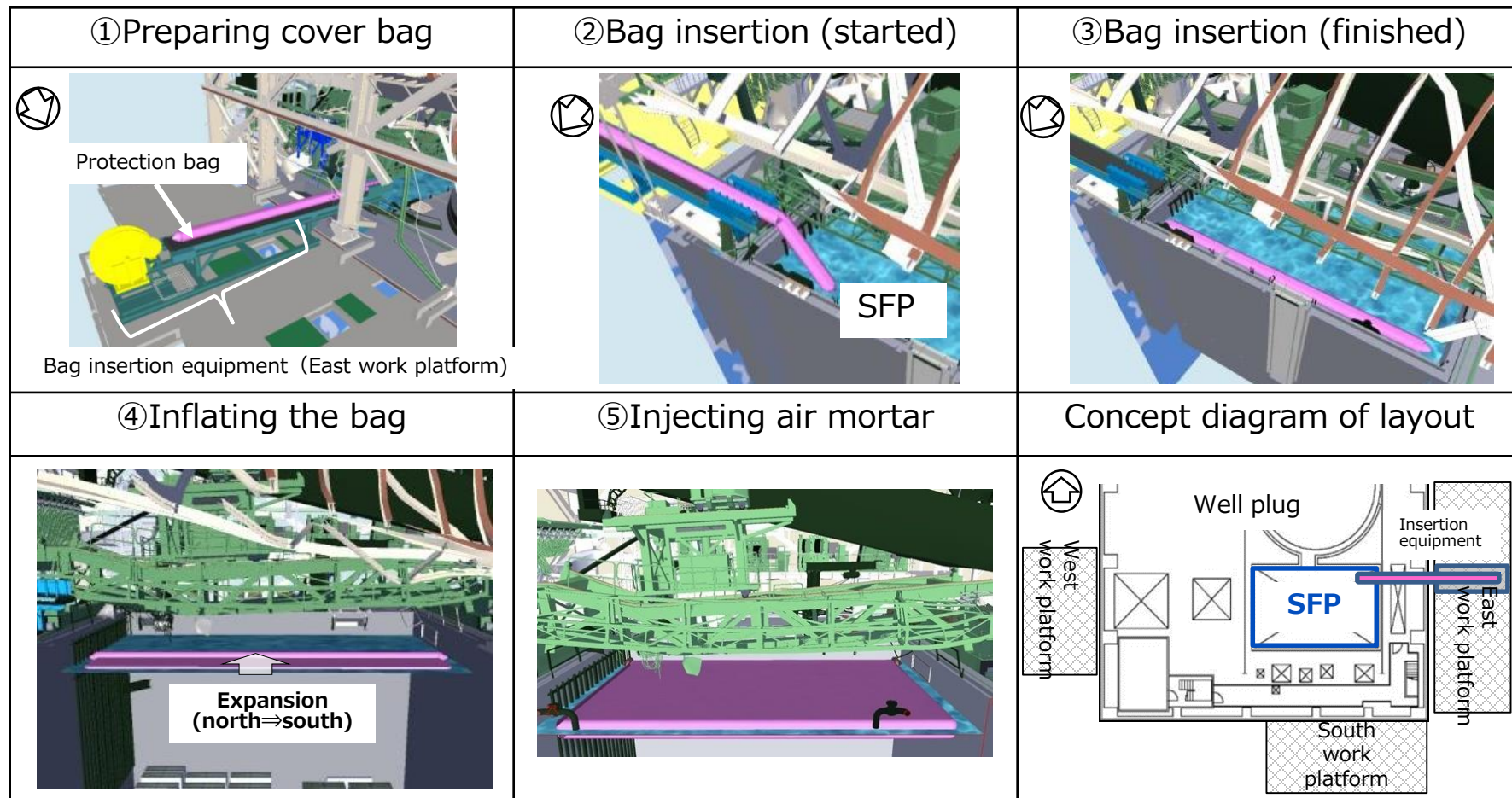
SFP protection



Pincher (for cutoff/grasp)

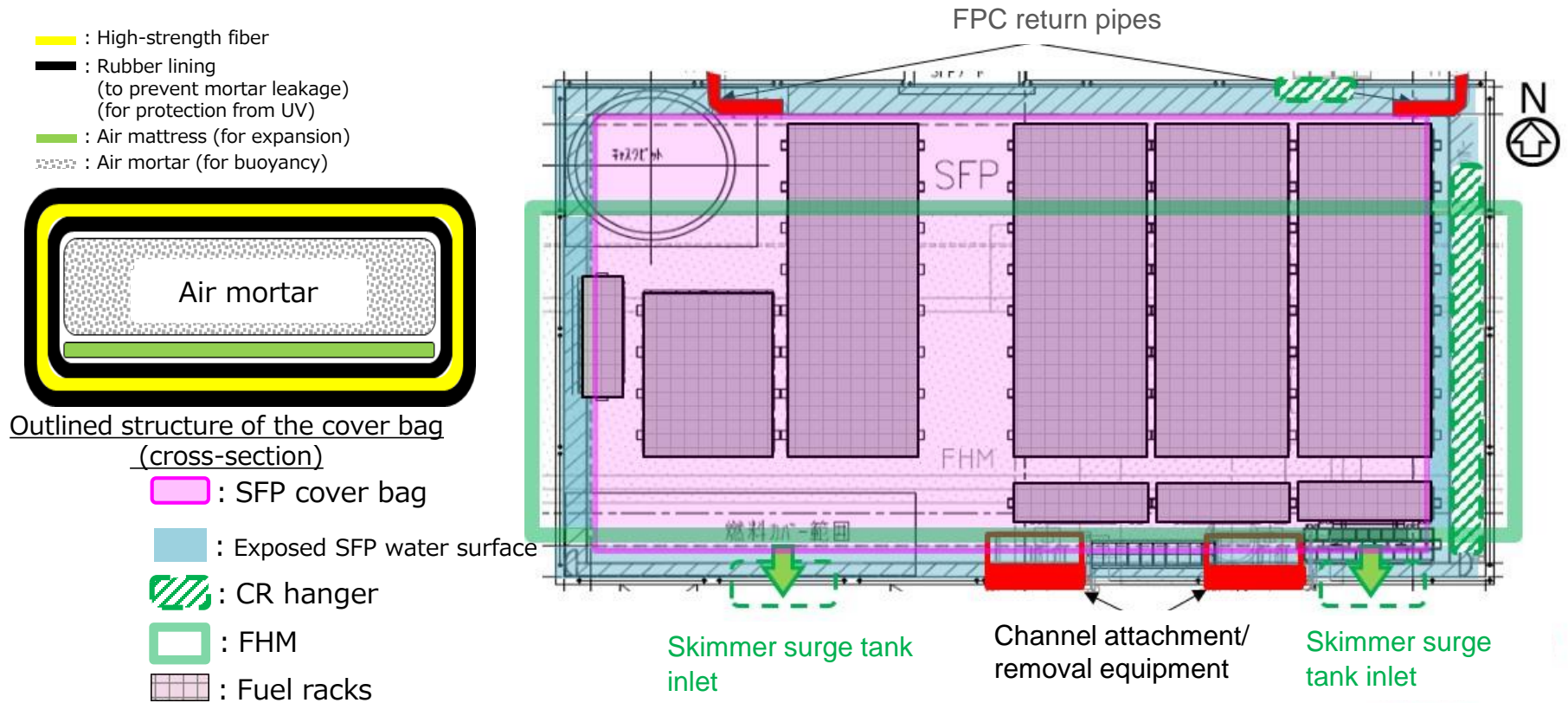
2. Concept diagram of SFP cover installation

- We will set up equipment for inserting a cover bag on the work platform built on the east side of the reactor building. This will be used to insert a rolled up cover bag into the SFP (①~③) which will be inflated with air (④). The inflated bag will then be filled with air mortar (⑤).



3. Scope of SFP coverage

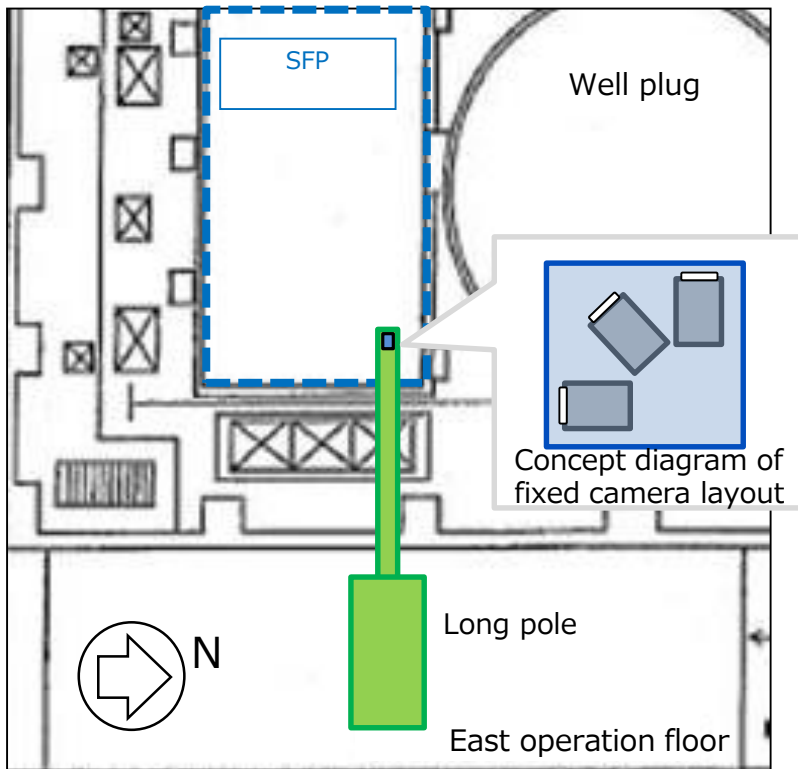
- The SFP will be covered as illustrated in the figure below in consideration of the structures that extend into the pool, the ease of bag insertion/inflation, and the necessity to maintain the integrity of fuel.
- The cover bag will not block either of the two skimmer surge tank inlets located on the south side, nor will it hinder SFP cooling function.



- ※FPC return pipes: SFP cooling system pipes that return cooling water into the pool
- ※Channel attachment/removal equipment: Equipment to attach and remove channel boxes (metallic square tube covers attached to fuel assemblies) to/from the fuel in the SFP, and to perform visual inspections of the fuel
- ※Skimmer surge tank inlet: Supernatant water from the fuel pool pours into the inlets to cool and purify the fuel pool water.

4. Preparation for SFP cover installation (identifying obstructions in the SFP)

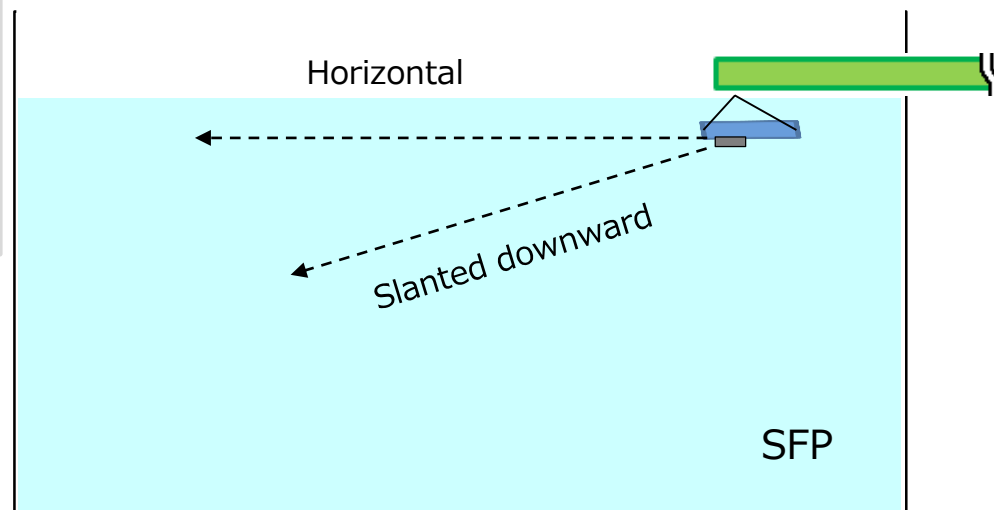
- Since the cover bag is designed to float on the SFP surface, we will look for any obstructions that may hinder bag inflation.
 - Survey 1: To measure the transparency of the pool water (underwater visibility)
 - Survey 2: To identify obstructions at the top of the pool water in light of the results of Survey 1



Concept diagram of obstruction survey in the SFP (Layout)

<Survey method>

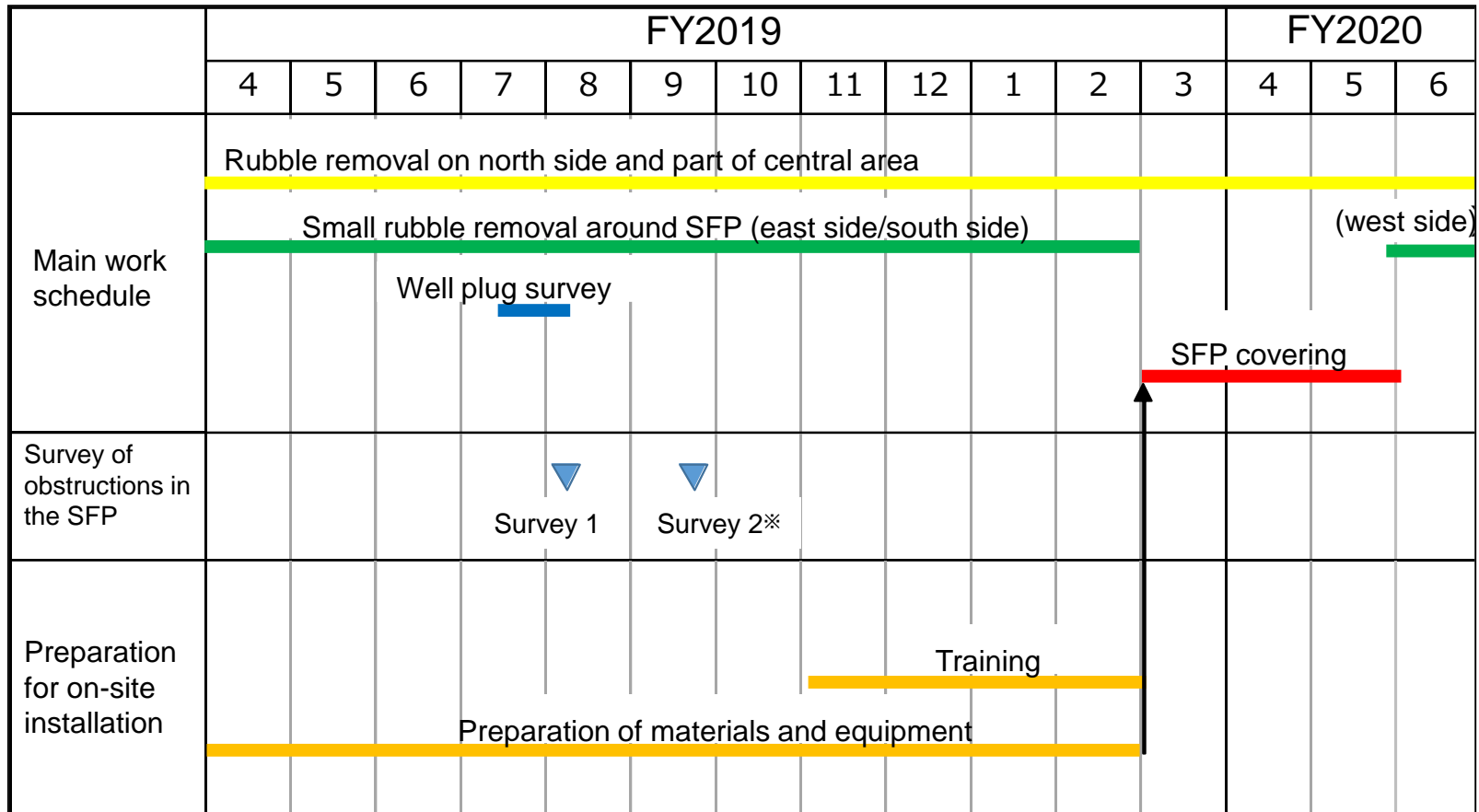
An underwater camera hung from the end of the long pole used when monitoring rubble removal work will be lowered to a depth of approximately 50cm into the water on the northeast corner of the SFP.



Concept diagram of obstruction survey in the SFP (Transparency survey)

5. Schedule

- We plan to install the SFP cover in March, 2020 as soon as the required work space has been secured by removing small rubble from around the SFP (east side/south side), which is now underway.
- We will conduct training in advance and ensure that we are well-prepared so that the SFP cover can be installed smoothly while prioritizing safety.



※Whether or not this survey is necessary shall be determined based on the results of Survey 1.

【Reference】 Mock-up tests of SFP cover installation

- Ease of insertion test: Inserting the cover bag into the mock-up pool using the insertion equipment (①~③)
- Inflation test: Inflating the cover bag with air after inserting it into the mock-up pool (④,⑤)
- Mortar injection test: Injecting air mortar into the inflated cover bag (⑥)

①Inserting the cover bag



②Bag landing on the water



③Inserting the bag (finished)



④Inflating with air (started)



⑤Inflation finished



⑥After injecting air mortar



【Reference】 Assessment of the impact on the surrounding community if all fuel were to be damaged

- An assessment of the impact on the surrounding community if rubble were to fall onto fuel during the removal of the collapsed roof yielded the estimated effective off-site dose rates shown in the table below. Based on these results we have concluded that the risk of exposing the surrounding community to radiation during SFP cover installation is low.

Table : Effective dose rates if rubble were to fall into the SFP※

	Effective dose rates (child) [mSv]	Effective dose rates (adult) [mSv]	Assessment Conditions
Unit 1	Approx. 4.8×10^{-2}	Approx. 4.8×10^{-2}	Damage to all fuel (392 assemblies) stored in the SFP.
Unit 3 (Reference)	Approx. 1.5×10^{-1}	Approx. 1.5×10^{-1}	Damage to all fuel (566 assemblies) stored in the SFP.

※Effective dose rates estimated using discharged volumes of noble gasses and iodine.