

Countermeasures for Strengthening Radiation Management in Fukushima Daiichi Nuclear Power Station

Tokyo Electric Power Company

In order to strengthen radiation management at Fukushima Daiichi Nuclear Power Station, the following activities will be implemented in conjunction with main contractors.

1. Introduction

On July 19, 2012, at Fukushima Daiichi Nuclear Power Station, we received a report that workers dispatched from a partner company affiliated with the main contractor were suspected of working with a lead cover attached to the APD. After that, on August 8, we received a report confirming that they had used the APD improperly.

In addition, on August 3 and August 10, 2012, it was confirmed that someone accidentally forgot to wear the APD. On August 16, 2012, it was confirmed that someone accidentally lost the APD.

In such cases, the main contractor is responsible for the radiation measurements of the workers. However, preparations should be made so that radiation management procedures can be properly implemented (rental of APDs, measurements via whole body counters, etc.)

In order to properly conduct radiation management at Fukushima Daiichi Nuclear Power Station, we are planning to set up a Check-in & Check-out control facility in front of the main gate of the power station from 2013 FY. The construction of this facility will enable workers to change their clothes, confirm APD rentals and installations, and verify contamination all at the same facility. This would represent a drastic improvement of present radiation management measures at Fukushima Daiichi Nuclear Power Station. However, we are very concerned about the aforementioned mishaps mentioned above, and will conduct the following countermeasures together with the main contractors.

2. Countermeasures to ensure that workers carry the APD

(1) Identification of APD Carriers 【Conducted by TEPCO】

Currently, APDs are being distributed at two areas (J Village and the Seismic Isolated Building of Fukushima Daiichi Nuclear Power Station). To distinguish where an APD was distributed, workers who received an APD from J Village wear white Tyveks, and workers who received an APD at the Seismic Isolated Building wear normal working attire or a blue Tyvek when they enter Fukushima Daiichi Nuclear Power Station. Workers who are wearing normal working attire or blue Tyveks must get their APDs at the Seismic Isolated Building and change into a white Tyvek (under implementation).

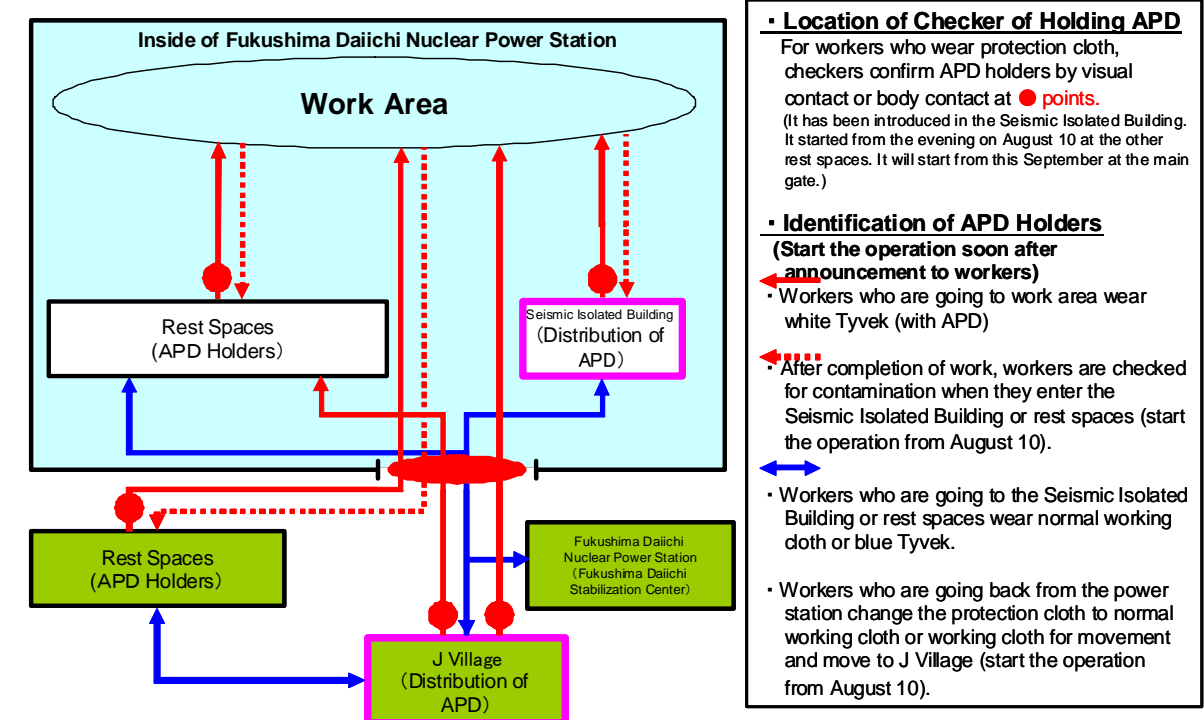


Fig. 1 Image of identification and confirmation of APD holders

(2) Confirmation of APD carriers for workers who wear white Tyveks 【Conducted by TEPCO】

In the Seismic Isolated Building, rest spaces, the main gate and J Village, TEPCO staff will conduct a visual confirmation to ensure that white Tyvek workers are wearing APDs by having them physically show that they have an APD strapped around their neck by opening up the zipper of their white Tyveks. If a visual confirmation is difficult, TEPCO staff will conduct a physical body search to verify whether the APD is on their person or not (these verification methods will be implemented at the main gate from this September, and at other areas where operations have already begun).



Fig. 2 Check of APD Holders for White Tyvek Workers

(3) Mutual APD verification between workers and implementation of countermeasures to prevent forgetfulness in carrying the APD 【Conducted by main contractors】

Before starting work, the workers will conduct a mutual visual confirmation to verify that the APD is being worn. (under implementation).

In addition, each work supervisor will be proactive in setting up countermeasures to ensure that workers do not forget to put on the APD. Implementation plans are to be reported to TEPCO (under implementation).



Fig. 3 Image of Mutual Check of Holding APD

(4) Non-physical APD verification methods **【Conducted by TEPCO】**

Workers donning Tyveks are subject to body searches. However, to reduce the burden due to being subjected to such physical checks, non-tactile countermeasures are being considered. Via such countermeasures, upon checking into a work area, it will help if the worker carries the APD outside of his person. (an implementable measure will be quickly considered by this November).

3. Preventive countermeasures against improper APD Usage

(1) Introduction of the Tyvek transparent chest part

【Conducted by TEPCO】

For work in a high radiation environment (*), a transparent chest part on the Tyvek has been adopted. In addition, the APD is placed inside a vest pocket, so that a visual confirmation can easily be conducted. In the same manner, we will adopt transparent parts for anorak type protective clothing (to be implemented from this October).

(*) Work circumstances where the preset alarm of the APD is set above 3 mSV. While confirming the results of considerations to adopt a non-tactile APD verification method and manufacturer production capacity, the expansion of the scope of work that would require the APD to be carried will be considered. (to be continuously reviewed).



Figure 4 Image of Transparent Chest Part in Tyvek

(2) Unannounced APD Inspections **【Conducted by TEPCO】**
【Conducted by main contractor】

TEPCO's supervisor or the person in charge from the main contractor will conduct unannounced inspections to determine whether or not the APD is being worn properly when visiting the site. (under operation)

In addition, we will further consider the appropriate timing and frequency of site visits, taking into account exposure dose levels. (To be further considered)



Fig.5 Unannounced inspection

(3) Comparison of exposure dose data between APD and the glass badge **【Conducted by TEPCO】**
【Conducted by main contractor】

In regard to workers who are exposed to over 5mSv per month, TEPCO will compare the APD value with the evaluation results of the glass badge sent from the main contractor, and in case the APD value is 20% or more less than the value of the glass badge, we will conduct a separate survey. (under implementation)

The main contractor will examine and report to TEPCO whether there is any peculiar data of the

comparison of the workers' duties and exposure dose levels. (under implementation) As for the group of workers that are exposed to over 5mSv per month, TEPCO will divide that group of workers based on their work duties, and if a variation of over -50% is detected, we will conduct a separate survey. (under operation)

In order to deal with the possibility of both APD and the glass badge being treated improperly, or to deal with systematic irregularities, we will conduct an unannounced APD inspection, and implement strict and appropriate measures in case irregularity is detected as a result of the survey conducted to determine if there has been any inappropriate actions. (To be further considered)

(4) Daily examination of APD data **【Conducted by main contractor】**

The main contractor shall examine the ADP data sent from TEPCO daily, particularly to determine whether there any workers who have been on duty but lack APD data, or those whose measurement values are significantly lower compared to workers engaged in similar work. (under implementation)

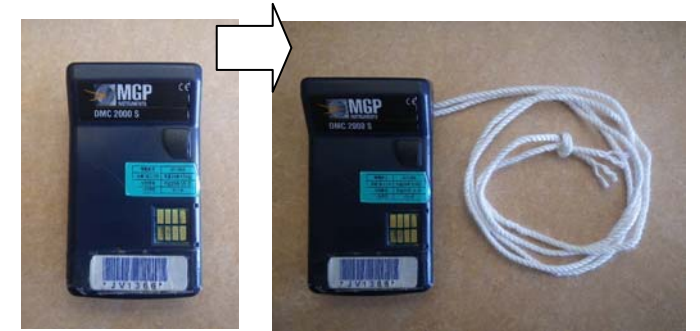


Fig. 6 Replacement of clip-type ADPs at J Village.

4. Measures to avoid losing the APD

(1) Abolishment of clip-type APD **【Conducted by TEPCO】**

In regard to APDs at J Village, we will replace all clip-on type APDs to neck-strap types. (under implementation)

5. Measures to increase awareness in regards to radiation management

(1) Enhancement of instruction regarding radiation protection and notification to workers thereto **【Conducted by TEPCO】**
【Conducted by main contractor】

We will thoroughly instruct newly appointed radiation workers that the appropriate wearing of APDs and the measurements with this device are essential in order to comprehend one's exposure dose. In addition, we will conduct a comprehension test to examine the results of the instructions. (under operation)

As for radiation workers currently on duty, we have introduced case examples of irregular use of APDs and urged strict compliance with radiation management rules.

(2) Survey of irregular cases **【Conducted by TEPCO】**

By conducting a survey of TEPCO's employees and the main contractors (over 1,000 workers), we examined whether any improper actions were witnessed, proposed or directed for the purpose of causing individual dosimeters to render improper measurements. The results revealed no actions of impropriety, however, to maintain the ability to detect any future impropriety, we will set up an inquiry counter to handle actions of impropriety related to APD usage and continuously receive information. (under implementation)

In addition, we will add question items regarding actions of impropriety related to APD usage to

the periodic anonymous survey (twice a year) intended for every worker. In case any impropriety is discovered, we will take strict and appropriate measures.

location of the vehicle and take necessary measures.

(end)

(3) Promoting the Importance of APD Compliance **【Conducted by TEPCO】**

Displaying posters (under implementation), conducting campaigns urging compliance in wearing APDs (under implementation), frequent playing of recorded reminders (under implementation), distribution of drinks with stickers (done).

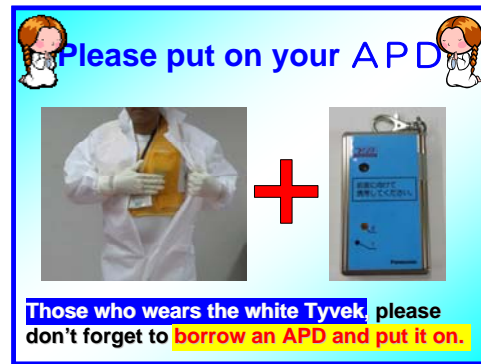


Fig. 7 Poster



Fig. 8 Campaign



Fig. 9 Distribution of drinks

(4) Information on harsher punishments for APD impropriety **【Conducted by TEPCO】**

Those who intentionally fail to comply with APD regulation, will be severely disciplined (cancellation of worker registration). In addition to informing the main contractor of the disciplinary measures that will be leveled, the same will be specified in the radiation management specifications. (to be implemented from September 1st)

Also, to prevent workers from forgetting or losing their APDs, various measures on the appropriate use of APD will be implemented. However, if unintentional breaches occur, we will issue out a warning but will not view it as a case requiring strict treatment, since we are able to evaluate the level of exposure dose based on their declaration.

6. Other measures

(1) Measures enforcing check-in/check out procedures at J Village **【Conducted by TEPCO】**

When leaving Fukushima Daiichi Nuclear Power Plant, in addition to checking contamination levels, we will examine the surface of the vehicle for contamination and issue out a "Contamination Survey Confirmation" certifying that the values are below the standard. This certifies that the screening requirements for exiting the no-go zone have been met. When a vehicle containing a Contamination Survey Confirmation arrives, we can be assured that they have properly passed through J Village. In the case of vehicles that have not properly passed through J Village, we will ask the owner or main contractor the

汚染検査申請書				
検査日時	年	月	日	時分
検査所名称 (印刷)				
氏名				
車両番号	いわき・福島	()	()	—
備考				

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備考				

fig. 10 Contamination Survey Confirmation

Principle of Response for APD Issue and Implementation Schedule

	Principle of Response	Prevention against Forgetting	Prevention against Improperly Use	Schedule							2013 FY ~	
				First Half of 2012 FY	Second Half of 2012 FY							
				August	September	October	November	December	January	February		March
First Step (Transition period to total inspection at the main gate)	[Countermeasures to ensure that workers are carrying an APD and prevent Improper usage]											
	Before Starting Work											
	• [TEPCO] Identification of APD Holders (APD Holders: Workers who wear white Tyveks, workers en route: blue Tyvek or normal working)					8/27 Start of full scale operation						
	• [TEPCO] Checking Workers Wearing White Tyveks (Visual confirmations or body searches conducted at the entrance of the Seismic Isolated Building, rest spaces and J Village)					8/10 ~ Start of operation (Start of operation at the main gate from September)						
	• [TEPCO] Consideration of Non-tactile Measures to verify that workers are carrying the APD (Reduce worker burden due to being subjected to physical body searches)					Continuously reviewing (Plan to start the operation from November)						
	Under Working											
	• [Partner Companies] Mutual APD Presence Verification between workers and Implementation of Countermeasures to ensure that workers do not forget to carry an APD (Mutual APD presence verification between workers, each work supervisor will be proactive in implementing countermeasures to ensure that workers are carrying an APD on their person)					8/15 ~ Mutual check, 8/27 ~ Implementation of countermeasure against forgetting to take APD						
	• [TEPCO] Introduction of Transparent Chest Part of Tyvek (Wearing the transparent chest part of the Tyvek for work in a high radiation environment where the preset alarm of the APD is set above 3 mSV, Consider expanding the scope of work that would require wearing the transparent chest part of Tyvek)					Middle of October ~ Start of operation						
	• [TEPCO·Partner Companies] No-notice inspection of APD (TEPCO's supervisor or Partner Company will conduct inspections when visiting the site)	-				8/16 ~ Start of operation after prior notice						
	After Working											
	• [TEPCO·Partner Companies] Comparison of exposure dose data between APD and glass badge (TEPCO: Comparison of APD values with the evaluation results of the glass badge, evaluation of varying data, Partner Companies: Checking peculiar data)	-				Continuous operation after July						
	• [Partner Companies] Daily examination of APD data (Verifying actual engagement in work duties, comparison with workers engaged in similar work)					8/22 ~ Start of operation						
	[Measures to avoid loss of APD]											
• [TEPCO] Abolishment of clip-type APD (replace all clip-type APDs that are easily lost, to neck-strap type)	-	-			8/23 ~ Start of operation							
[Measures to increase awareness]												
• [TEPCO] Expanding instructions regarding radiation protection (Appropriate wearing of APDs and measurements with this device is essential to determining one's exposure dose levels)					8/6 ~ Start of operation							
• [TEPCO] Survey of irregular cases (In addition to the survey we are now collecting, we will continuously provide consultation desk service and conduct survey to all workers)	-				Survey of irregular cases (8/27 finish summarizing), Establish consultation desk (as soon as practicable), Survey to all workers							
• [TEPCO] Promoting the Importance of Wearing APD (Displaying posters, having managers conduct campaigns, playing reminder voice recordings, distribution of drinks with stickers)					Posters (under operation), Reminding by manager (8/20-8/31), Voice recorder (under operation), Drinks with stickers (8/20-8/22)							
• [TEPCO] Information on harsher punishments for APD related impropriety (Making it clear that the misuse of APDs will be strictly punished, for instance, by cancelling a worker's registration, to also be included in the radiation management specifications)	-				8/23 Prior notice, 9/1 Enforcement of Radiation Management Specification							
Second Step (Total inspection at the main gate)	[Measures to prevent losing the APD and improper use of APD]											
	Before Starting Work											
	• [TEPCO] Changing the distribution point of APDs to the 1F main entrance access control section (newly established) (Changing the distribution point of APDs to the main entrance Transition over to having the administrator conduct visual confirmations at the access control section)											
	• [TEPCO] Checking APD at Seismic Isolated Building and rest spaces (Conduct visual confirmations, physical body searches or utilizing a mechanical detection device to determine the presence of the APD on the worker's person at the Seismic Isolated Building, rest spaces and JV entrance)											
	During/ after work											
• - will be continued												
[Measures to increase awareness]												
• - will be continued												

