<Reference>
July 31, 2012
Tokyo Electric Power Company

Evaluation results of the countermeasures for increasing APD visibility from the outside

<Background>

○ Improper covering of the APD* by a lead cover at Fukushima Daiichi Nuclear Power Station.

○ On July 24 2012, we received instructions from the Ministry of Health, Labor and Welfare to look into the implementation of countermeasures that would increase the visibility of the APD from the outside in order to prevent inappropriate radiation treatment.

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○ When working under high levels of radiation (Work is conducted under APD alarm settings of 3 mSv or more), workers will be required to wear “chest-transparent” protective clothing except in those cases when they are wearing radioactive protective clothing as a tungsten vest.

○ Today, we reported the above to the Ministry of Health, Labour and Welfare.

<Date of start>

○ October, 2012 (Planned)

END

<Attachment>

-Evaluating countermeasures for making the APD visible from the outside

* APD: Alarm Personal Dosimeter

A measuring instrument of radiation levels and working time in designated areas for each worker. The alarm goes off when the radiation level and the working time exceed a certain level.

Attachment

Evaluating countermeasures for making the APD visible from the outside

1. Introduction

The evaluation results of countermeasures to ensure the outside visibility of the APD in accordance with “Ensuring exposure protection at Fukushima Daiichi Nuclear Power Station” (July 24, 2012 MHLW No.1) are as follows.

2. Directives from the Ministry of Health, Labour and Welfare

Directives regarding preventive countermeasures from the ministry are as follows.

(1)Basic notion

In most of the cases, anyone involved in radiation work at the power station is required to wear protective clothing (tyvec). Therefore, it is not possible to visually confirm whether or not dosimeters such as an APD is being properly carried. We recognize this as an issue that needs addressing.

(2)What to consider

The protective clothing (tyvec) affords scarce gamma radioactive protection. During the work in high radiation areas, we will consider measures to ensure that the APD is visible from the outside such us having the workers carry an anti-contaminate APD outside of the protective clothing (tyvec) etc.

3. Condition

(1)Definition of work in a high radiation environment

In this recent event of the alleged usage of the APD that was covered by the lead cover, the APD alarm level was set at 3 mSv. Therefore, we have defined high radiation exposure as the “APD alarm level higher than 3 mSv during emergency work”. The value in this definition may be gradually adjusted downward in response to the actual radiation dose rate.

(2)Exception

When wearing radioactive protective clothing such as a tungusten vest (tungusten vest etc.), there may be cases of carrying the APD instead of a radiation measuring device outside of the tungusten vest

Figure 1 Tungusten vest

etc. in order to easily check the exposure dose. However, the APD used for measuring exposure will be carried inside the tungusten vest etc. As seen from figure 1, the APD inside the tungusten vest etc. can not be confirmed visually. Also, it is assumed that there will be no incentives to shield the APD with a lead cover when wearing the tungusten vest etc. Therefore, the wearing of a tungusten vest etc. will be excluded from this evaluation.

4. Evaluation Policy

In accordance with “Directives from the Ministry of Health, Labour and Welfare”, we decided to study measures on how to make the APD visible from the outside including issues concerning safety operations and radiation management. Also, during the process of fleshing out the issues, we sought the opinion of the radiation controller from the original contractors presently working at Fukushima Daiichi Nuclear Power Station.

5. Evaluation of Countermeasures

Evaluations have been conducted on the 3 countermeasures below.

(1)Countermeasure① （Attaching APD outside of protective clothing）

Put APD in a plastic bag, attach the APD outside tyvec using a tape with a strap around the neck (Figure 2). There are some concerns from a safety operation and radiation management perspective as follows;

a. Safety Operation

If the tape is removed, the APD may be caught in a rotating machine which could lead to a big accident involving human life.

b. Radiation Management

Attaching the APD outside the tyvec increases the possibility of losing it when undressing, which could lead to a loss of quality concerning exposure evaluation.

In addition, when the plastic bag is torn, the APD will be rendered contaminated and unusable.

Moreover, a body contamination risk would increase since the

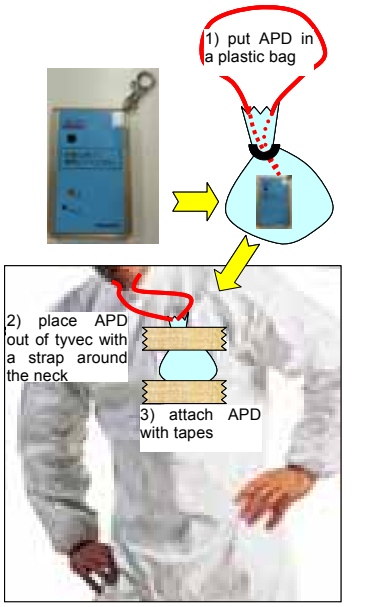

Figure 2 Countermeasure① image

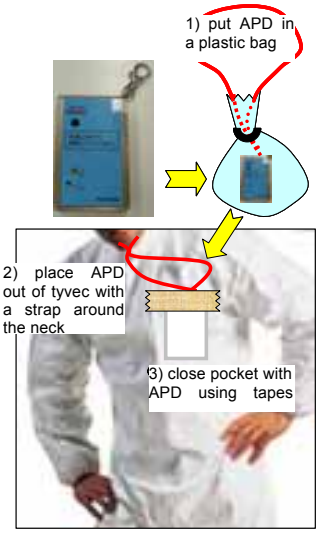

Figure 3 Countermeasure② image

removal of protective equipment will be cumbersome.

(2) Countermeasure ②（Putting APD in chest pocket outside of protective clothing）

Use protective clothing with chest pocket (figure 3). Wrap the APD in the plastic bag, then put it in the chest pocket with a strap around the wearer's neck. Seal the pocket with tape. There are some concerns from a safety operation and radiation management perspective as follows;

ａ. Safety Operations

No particular issues.

ｂ. Radiation Management

Same as countermeasure ①

(3) Countermeasure ③（Wear "chest-transparent" protective clothing）

Use "chest-transparent" protective clothing of which the chest part remains visible (figure 4). Put the APD in the transparent pocket of the vest so that the APD is visible. A visible type will also be used for anorack type protective clothing. There are no particular concerns from a safety operation and radiation management perspective. The "Chest-transparent" protective clothing is special made to order and as it does not satisfy the performance requirements under "JIS T8115：2010" and "JIS T8124-1：2010" at this stage, TEPCO will incorporate its own specifications for the time being, but, will replace the clothing once the products are released that satisfy the performance requirements under JIS in the mid to long term.

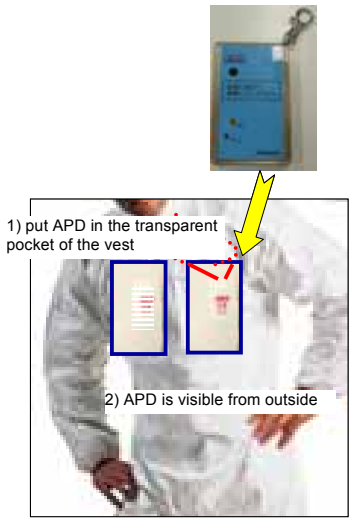

Figure 4 counter measure ③ image

6. Summary

Below is a summary of the above countermeasures Countermeasure ③ is considered to be the most effective.

Countermeasure	Scope	Safetiness of operation	Radiation management
① Attaching the APD outside of the protective clothing	Non-woven textile safety clothing	× Possibility of fatal accidents	× Poor radiation exposure evaluation quality, APD pollution, possibility of body

			contamination
② Placing the APD inside of a chest pocket located outside of the protective clothing	Non-woven textile safety clothing	○	× Poor radiation exposure evaluation quality, possibility of body contamination
③ Wear “chest-transparent” protective clothing	Non-woven textile safety clothing ＋ anorac type protective clothing	○	○

7． Conclusion

It has been concluded that the most effective way to make the APD visible from the outside is to wear “chest-transparent” protective clothing.

End