

1. Background to reevaluations

- TEPCO received a request from MHLW to categorize internal exposure dose calculation processes by the evaluation method ((1) to (6))*¹ used for each standard method of internal exposure dose evaluation in order to evaluate exposure as part of epidemiological studies of the health effects on the thyroid gland being conducted by MHLW, to which TEPCO started classification work.
- TEPCO reported to MHLW on January 31 this year that it had identified nine employees that had conducted internal exposure dose evaluations that were not in accordance with standard evaluation methods. MHLW took this matter into their own hands.
- MHLW then provided instructions for confirmation work to recheck whether or not such incidents had occurred again. After the reconfirmation work was completed, 608*² TEPCO employees were identified as using methods for evaluation that were possibly not in accordance with standard evaluation methods.
- From the reevaluation results, there were 24 TEPCO employees with an internal exposure dose of 2mSv or more than the recorded level and with a fluctuation range of +1mSv or more that were required to revise their internal exposure dose.

*1: See sheet 5

*2: The majority of intake dates have been set individually with behavioral studies

2. State of reevaluations in July last year, and this additional reevaluation

- For the internal exposure dose of workers at cooperative companies, the results of evaluations conducted by TEPCO and evaluations conducted by cooperative companies were compared, and the MHLW reevaluation instruction applied to evaluation results of cooperative companies with evaluation results that were lower than TEPCO evaluations.
 - TEPCO conducted voluntary dose reevaluations of intake of 457 employees such as "women," "employees evaluated by JAEA" and "employees evaluated by KK" who had been evaluated on the central date during the work period based on the instructions provided to cooperative companies from MHLW.
 - On March 6 this year, MHLW provided instructions on complete standardization such as detailed measurement values, various coefficients and calculation processes for each type of nuclide.
- * According to the Ordinance on Prevention of Ionizing Radiation Hazards, internal exposure dose must be determined using a method stipulated by the Minister of Health, Labour and Welfare, and the method disclosed by the Ministerial bulletin only indicates the basic approach to be used. Details of methods to evaluate internal exposure dose are to be determined by each business operator.

3. Target and results of this reevaluation

- A detailed study was conducted on 1,845 employees (excluding 457 employees covered by the previous reevaluation) involved in emergency work within Fukushima Daiichi Nuclear Power Station during March and April, 2011.
- Reevaluations were conducted on 608 employees based on the current evaluation value and results of the detailed study (recalculation).
- As a result, 24 employees were required to have their exposure dose revised (according to the MHLW, internal exposure dose of 2mSv or more than the recorded level, and a fluctuation range of +1mSv or more).
- TEPCO employees that exceeded 100mSv increased by 1
Effective dose: 90.27mSv → 180.10mSv
(of this, dose from other power stations was 0.05mSv)
Internal exposure dose: 37.11mSv → 137.16mSv
External exposure dose: 53.21mSv → 42.99mSv
- Revised fluctuation ranges other than the above
+ 35.54mSv: 1 employee, + 19.39mSv: 1 employee, + 12.78 mSv:1 employee
+ 5mSv or more to +10mSv or less: 5 employees
+ 1mSv or more to +5mSv or less: 15 employees

4. Reason for revisions to employees exceeding 100mSv (maximum fluctuation range)

- Measurement values with WBC (Ge), which has a high measurement accuracy, have also measured high levels of Cs-137. When taking into consideration the fact that the ratio of I-131/Cs-137 in the environment is around 100, measurements with WBC (Ge) did not detect I-131, despite the fact that the residual amount of I-131 in the body on the measurement date was around 10 times that of the detection limit value, and even when taking into account the residual percentage through to the measurement date.
Accordingly, the result of a review of work conditions and behavioral studies of the relevant employees conducted by TEPCO indicated that iodine tablets taken by those employees did have a certain impact, and that estimates of I-131 as part of standard evaluation methods was not realistic.
With this in mind, estimates of I-131 were not deemed to be required when evaluations of internal exposure dose was conducted before these reviews were implemented.
- MHLW has instructed, based on the opinions of industry experts, that "while the possibility that I-131 cannot be completely ruled out and that excessive evaluations may indeed be possible, the committed dose of I-131 should be estimated and factored in after assuming that the I-131 detection limit value had been detected without taking into account the effects of iodine tablets." TEPCO has thus conducted reevaluations in accordance to these instructions for excessive evaluations.

5. Overview of evaluation method

1. If I-131 is detected with WBC (Ge)

Measure with the JAEA and NIRS germanium semiconductor detection type whole body counter (WBC (Ge)), and if I-131 is detected, evaluate the committed dose of I-131 from the detected value.

2. If I-131 is detected with NaI survey meter

Measure the dose rate around the neck area with the NaI survey meter, and if a significant value is measured, apply the thyroid gland deposition coefficient to the measured value to evaluate the I-131 intake amount by the thyroid gland, and thus evaluate the committed dose of I-131.

3. If I-131 is detected with WBC (NaI)

Conduct measurements using the in-vehicle type sodium iodide scintillation detection type WBC (WBC (NaI)) borrowed from JAEA, and TEPCO's same type of WBC (NaI) purchased after the accident, and if whole body I-131 is detected, evaluate the committed dose of I-131 from the detected value.

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4. If I-131 is not detected with WBC (NaI)
If I-131 is not detected after conducting measurements with WBC (NaI), evaluate the committed dose of I-131 using methods a and b below, and use the lower value to estimate the committed dose of I-131.
 - a. Assume that the WBC (NaI) I-131 detection limit value is detected, and estimate the committed dose of I-131 from that value.
 - b. Apply the ratio of I-131/Cs-137 of the environment within Fukushima Daiichi Nuclear Power Station to the intake amount of determined from Cs-137 measured with WBC (NaI), and estimate the committed dose of I-131.
 5. If I-131 is not detected with WBC (PL)
If the type of nuclide cannot be identified, compare the value measured with the KK plastic scintillation detection type WBC (WBC (PL)) calibrated with Cs-137, and the significant value measured with the (2) NaI survey meter, define an approximate equation, and estimate the committed dose of I-131 from the measured WBC (PL) value and the approximate equation.
 6. If I-131 is not detected, and the I-131/Cs-137 ratio of similar workers was used
If the I-131/Cs-137 ratio of colleagues working at the same time on the same job is known, apply this ratio to the value of detected Cs-137 measured with WBC (NaI) and estimate the committed dose of I-131, instead of using methods 4 and 5.

6. Results of reevaluation for each evaluation method

1. If I-131 is detected with WBC (Ge)
Total 114 employees, reevaluated 47 employees, revised 2 employees
2. If I-131 is detected with NaI survey meter
Total 5 employees, reevaluated 2 employees, revised 0 employees
3. If I-131 is detected with WBC (NaI)
Total 238 employees, reevaluated 52 employees, revised 0 employees
4. If I-131 is not detected with WBC (NaI)
Total 1,284 employees, reevaluated 349 employees, revised 11 employees
5. If I-131 is not detected with WBC (PL)
Total 188 employees, reevaluated 148 employees, revised 6 employees
6. If I-131 is not detected, and the I-131/Cs-137 ratio of similar workers was used
Total 16 employees, reevaluated 10 employees, revised 5 employees

* (1) to (6) have been sorted using the method instructed by MHLW.

7. Details of instructions from MHLW in line with this reevaluation

- The Internal Auditing Department will conduct audits of the Personal Dose Control Department, check work flows and data management, and implement the required improvement measures
- When reporting and disclosing internal exposure dose publicly, data will be confirmed prior by Radiation Control experts in the Quality Control Department

TEPCO takes the details of instructions received from MHLW seriously, and cooperative companies will be requested to cooperate with evaluations as they did previously to further enhance radiation control conducted at Fukushima Daiichi Nuclear Power Station.