



UNSCEAR

United Nations Scientific Committee
on the Effects of Atomic Radiation

ASSESSMENT OF DOSES TO WORKERS

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**Implications of Information Published Since the UNSCEAR 2013 Report
9 March 2021 (Online launch)**



Main messages

- Doses to Fukushima Daiichi Nuclear Power Station (FDNPS) workers resulting from the accident
 - There were **24,832 on-site workers** during the period March 2011 – October 2012
 - Delays in commencing thyroid monitoring increased uncertainty in reported thyroid doses for a fraction of the workers
 - **Two re-evaluations** of reported doses have been performed since the UNSCEAR 2013 Report
 - BUT the **general findings of the 2013 Report remain valid**
 - More detail is provided in the next slide
- Doses to off-site environmental remediation workers
 - There were about **77,000 remediation workers** between 2012 and 2016
 - The average cumulative dose received was **1.0 milli-sieverts** (note 1)
 - The results confirm that doses to remediation workers were small

Note 1. Doses are effective doses, measured in units of **milli-sieverts (mSv)**, unless stated otherwise.

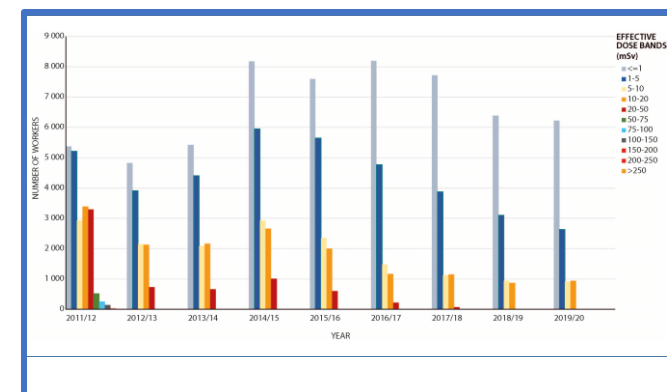


Dose distributions for FDNPS workers, 2011 - 2020

- March 2011 to the end of March 2012
 - average dose was about 13 mSv
 - maximum dose was 679 mSv
 - 36% of workers received total doses more than 10 mSv
 - 0.8% of workers received total doses more than 100 mSv
- April 2012 – March 2020

| Dose (milli-sieverts) | April 2012 - March 2013 | April 2019 - March 2020 |
|-----------------------|-------------------------|-------------------------|
| Average | 6 | 2.5 |
| Maximum | 54 | 20 |

More details are given in Figure XX and Table 14 in paragraph 192





Thyroid doses of FDNPS workers with the highest exposures to iodine-131

- Kunishima *et al.*, Health Phys 116(5): 647-656 (2019)
 - Thyroid volumes for six workers were determined by MRI and ultrasound
 - Thyroid doses were then re-evaluated
 - Re-evaluated doses are higher than reported values (with one exception), by up to a factor of three (notes 2,3)
 - The largest assessed thyroid dose has increased from 12 to 32 grays
 - For evaluations of thyroid dose made for the purpose of health risk assessment, UNSCEAR considers that it would be beneficial to use a measured thyroid volume for each worker rather than the reference value

Note 2. These doses are absorbed doses to the thyroid, measured in units of **grays (Gy)**.

Note 3. More details are given in Table 15 in paragraph 194



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Other issues addressed in the 2020 Report, Section VI

- Assessment of doses to the eye lens of FDNPS workers
- Doses from short-lived radionuclides (e.g. ^{132}Te , ^{132}I , ^{133}I)
- Comparison of biodosimetry and physical dosimetry assessments
- Doses assessed for US military personnel in Japan
- Doses for other types of workers



The future

- Research
 - The Nuclear Emergency Workers Study is being carried out in Japan. It will examine adverse health effects in over 20,000 FDNPS emergency workers. For this study, more sophisticated evaluations of individual doses are being carried out. **These evaluations will be invaluable.**
- Lessons learned for the response to a similar incident
 - In the event of an unavoidable delay in commencement of monitoring for the whole workforce, **monitoring** (e.g. whole body or thyroid measurements, personal dosimetry) **of representative groups of workers at the earliest opportunity** would greatly enhance the quality of the assessment of doses made for the purpose of **evaluating health risks to workers.**



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Thank you



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