RADIATION DOSE OF WORKERS ENGAGED IN DECONTAMINATION OF ENVIRONMENT AFTER FUKUSHIMA-DAIICHI ACCIDENT

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The Great East Japan Earthquake and Tsunami on March 11, 2011 was followed by Fukushima-Daiichi Accident, which released Cs-134, Cs-137 and I-131 into the atmosphere resulting in contamination of environments including soil, woods, waters and houses. The government issued evacuation orders in the contaminated areas with estimated exposure doses to Fukushima residents above 20 mSv/y. In order to facilitate lifting the orders and promoting decontamination, the goverement enacted the Act on Special Measures Concerning the Handling of Radioactive Pollution, which was executed in January, 2012. The radiation doses of workers engaged in decontamination of environment were registered through the contractors in the radiation dose registration system at Radiation Dose Registration Center (RADREC) of Radiation Effects Association. The purpose of this study is to report radiation doses received by decontamination workers, with comparing doses received by workers in nuclear facilities including nuclear power plants in Japan.

As of May 31, 2018, 420 primary contractors joined the RADREC registration framework and radiation dose of 464,283 workers are accumulated in the RADREC database, allowing the use of statistics on dose distribution of decontamination workers. Transitions of radiation dose of decontamination workers, average radiation dose and maximum dose registered during 2012-2017 are given in Figure. The number of decontamination workers has increased from 2012 to 2015, then decreased from 2016 to 2017, because the operation in the special decontamination areas was mostly completed by the end of March 2017. Compared with the nuclear workers, the number of workers and the average radiation dose are low for decontamination workers.

The radiation dose registry system for decontamination workers has been successfully established and statistics are available.

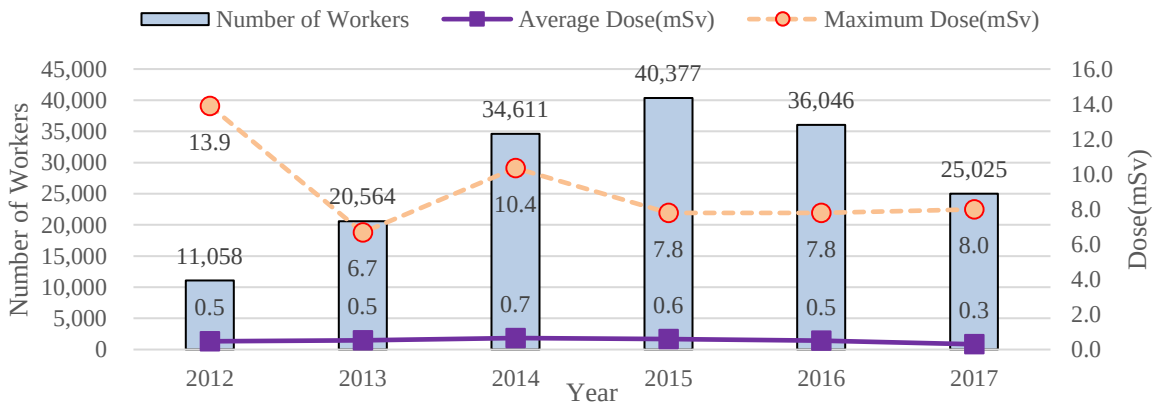

Fig. Transitions of number of decontaminatoin workers, average dose and maximum dose

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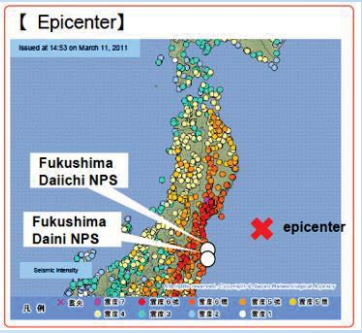
Background :

The Great East Japan Earthquake and Tsunami on March 11, 2011 was followed by Fukushima-Daiichi Accident, which released Cs-134, Cs-137 and I-131 into the atmosphere resulting in contamination of environments including soil, woods, waters and houses. The government issued evacuation orders in the contaminated areas with estimated exposure doses to Fukushima residents above 20 mSv/y.

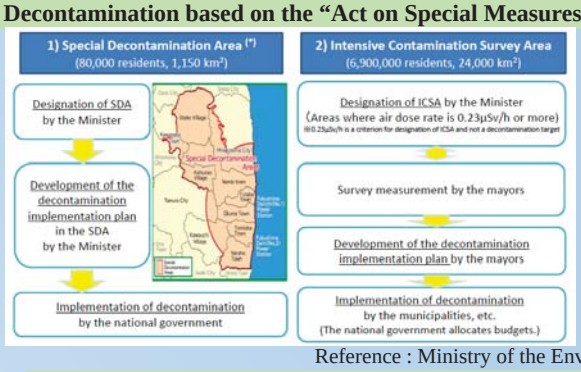
In order to facilitate lifting the orders and promoting decontamination, the goverement enacted the Act on Special Measures Concerning the Handling of Radioactive Pollution, which was executed in January, 2012. The decontamination based on the Act on Special Measures has completed as of March 2018, except for the "Areas where Returning is Difficult (ARD)". The construction of the Interim Storage Facility for removed soil and the reconstruction of the ARD are in progress.

Great East Japan Earthquake and Tsunami

- Time:
  - 2:46 pm on Fri, March 11, 2011.
- Place:
  - Offshore Sanriku coast (northern latitude of 38 degrees, east longitude of 142.9 degrees), 24km in depth, Magnitude 9.0
- Tsunami:
  - Earthquake generated a series of large tsunami waves that stuck the east coast of Japan, the highest being 38.9 m at Iwate pref.
  - Tsunami estimated at 14-15 m high stuck the Fukushima site



Decontamination based on the "Act on Special Measures"

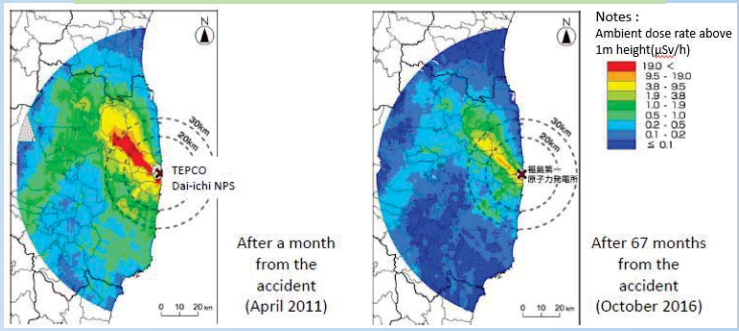


Reference : Ministry of the Environment

Materials and Methods :

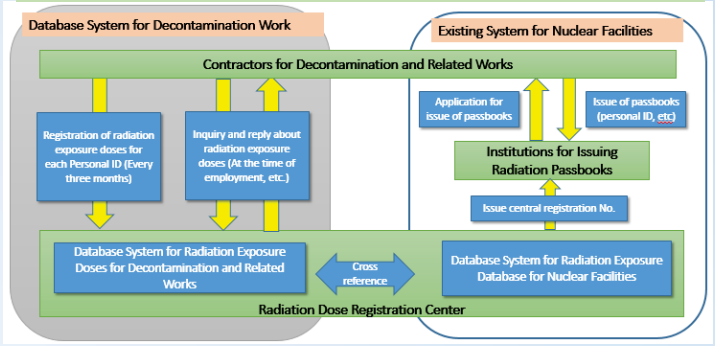
The radiation doses of workers engaged in decontamination of environment were registered through the contractors in the radiation dose registration system at Radiation Dose Registration Center (RADREC) of Radiation Effects Association. As of August 31, 2018, 422 primary contractors joined the RADREC registration framework and radiation dose of 478,770 workers are accumulated in the RADREC database, allowing the use of statistics on dose distribution of decontamination workers.

Transitions of ambient dose rate within 80 km radius

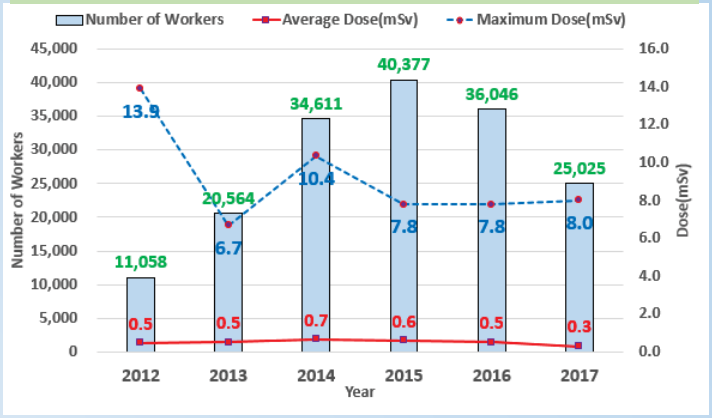


Reference : Ministry of the Environment

Radiation Dose Registration System for Decontamination Worker



Transitions of number of decontamination workers, average dose and maximum dose



Results :

- Transitions of radiation dose of decontamination workers, average radiation dose and maximum dose registered during 2012-2017 are given in right Figure. The number of decontamination workers has increased from 2012 to 2015, then decreased from 2016 to 2017, because the operation in the special decontamination areas was mostly completed by the end of March 2017.
- Compared with the nuclear workers, the number of workers and the average radiation dose are low for decontamination workers as given in right table.

Comparison of Doses for Decontamination and Nuclear Worker

	Decontamination Worker Jan.-Dec., 2017	Nuclear Worker Apr.,2009 – Mar.,2010
Number of Workers	25,025	75,988
Mean Dose (mSv)	0.3	1.1
Maximum Dose (mSv)	8.0	23
Collective Dose (man-mSv)	7,622.8	83,932

Conclusion :

- The radiation dose registry for decontamination workers has been successfully established.
- For preserving the proper implementation of radiation protection prescribed in the regulations, contractors need to monitor the trend of dose distribution and provide administrative measures, if necessary, for the safety of employees. The radiation dose registration system for decontamination workers operated by the RADREC provides essential information for radiation safety of workers, as well as for nuclear workers.