

Radiation exposure issues in the aftermath of the Fukushima Daiichi nuclear power plant accident and the role of occupational health



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At 2:46 p.m. on March 11, 2011, M9 great earthquake occurred in Tohoku district.



The subsequent accident at the Fukushima Daiichi nuclear power plant happened.



Huge tsunami followed.



The release of radioactive substances from the nuclear power plant has had far-reaching effects and has raised soil contamination and health concerns.



Crisis at Fukushima Daiichi nuclear power plant in March, 2011

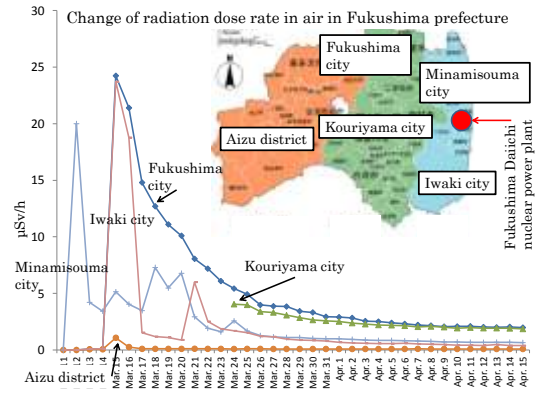
- Mar. 11 No. 1 to 3 nuclear reactor stopped automatically.
- Mar. 12 No. 1 reactor caused hydrogen explosion.
- Mar. 14 No. 3 reactor caused hydrogen explosion.
- Mar. 15 Some explosion occurred in No. 2 reactor, and hydrogen explosion and a fire broke out in No. 4 reactor.



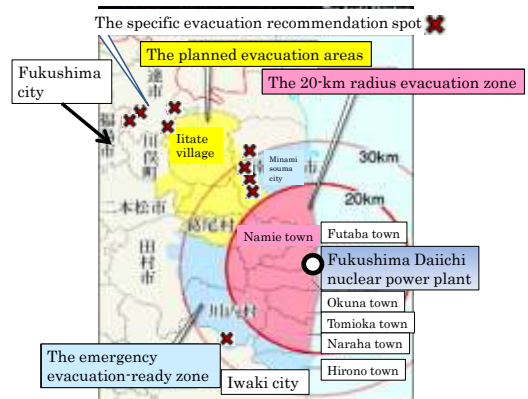
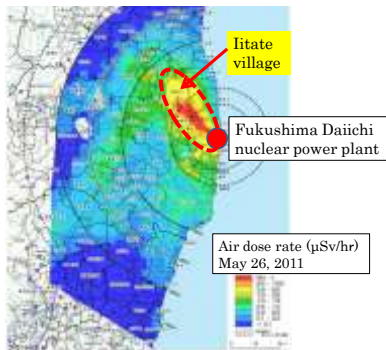
Photos released by Tokyo Electric Power Co., Inc.

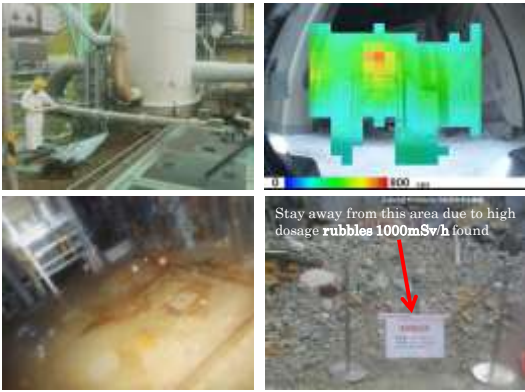


Nikkei shinbun



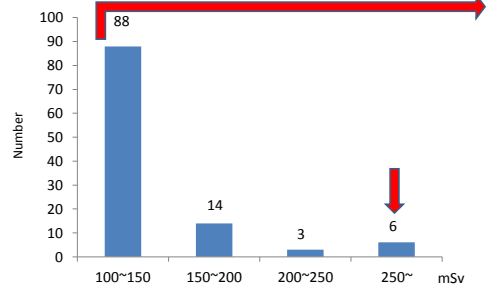
Air dose rate monitoring by Japanese Ministry of Education, Culture, Sports, Science and Technology & United States Department of Energy





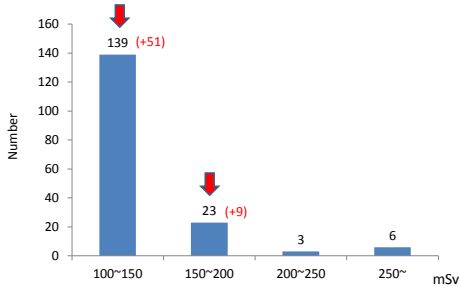
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The figures of total radiation exposure doses in workers at the power plant who were continuing efforts to control the situation on July 13, 2011



Total number of workers who have been examined total radiation doses precisely by July 13 was 6792, and the number of workers who have not been examined yet by July 13 was 1546. The missing persons were 118.

The figures of total radiation exposure doses in workers at the power plant who were continuing efforts to control the situation on Nov. 30, 2011

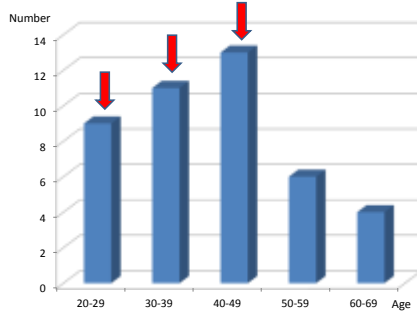


Total number of workers who have been examined total radiation doses precisely by Nov. 30 was 18,846.

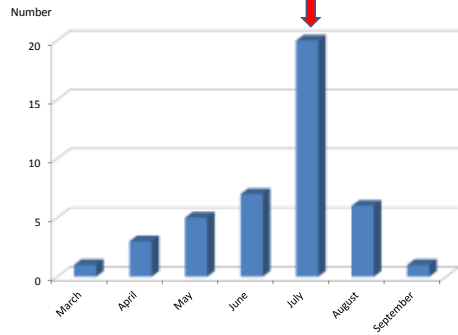


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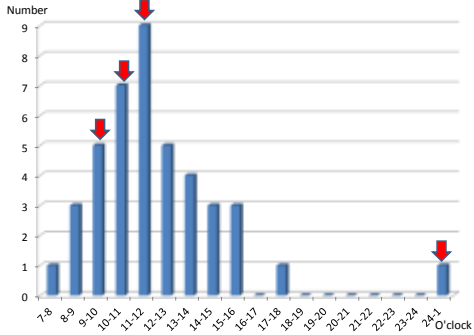
Number of heatstroke cases in Fukushima Daiichi nuclear power plant by age (March 11- September 16, 2011, Fukushima Department of Labor)



Number of heatstroke cases in Fukushima Daiichi nuclear power plant by month



Number of heatstroke cases in Fukushima Daiichi nuclear power plant by time



Radioactive substances protection



Heatstroke prevention



The workers' living condition of Fukushima Daiichi nuclear power plant in April, 2011

- Foods: biscuits, vegetable juice, magic rice, retort foods, instant noodles, sausage, bread and water
- Sleeping: On the floor with a sleeping-bag or a blanket
- Shower: unusable, wipe the body with wet paper towels

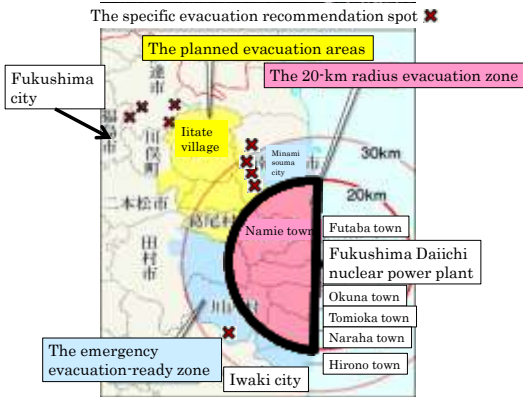


Yomiuri Online

Break rooms near the Fukushima Daiichi nuclear power plant



Photo released by Tokyo Electric Power Co., Inc. May 15, 2011



Fukushima Daiichi nuclear power plant.

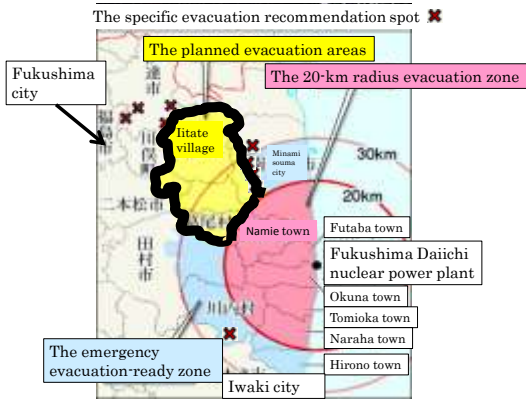
Asahi news paper



Fukushima minpo



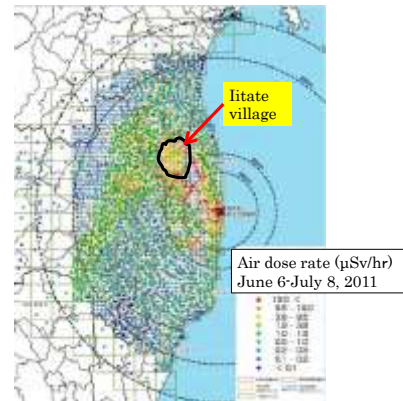
Firefighters were on standby near the power plant.



Total 12 businesses including nursing homes were continuing operations within the planned evacuation areas.



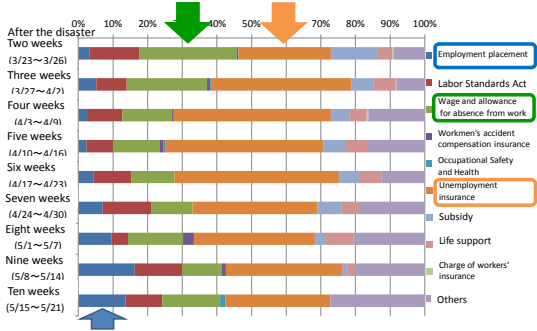
These commercial facilities were allowed to continue operating by, for example, letting workers commute from outside the planned evacuation areas.



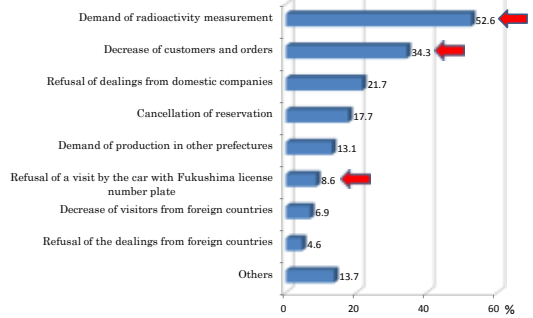
Influence on the companies in Fukushima Prefecture

- The 80,000-strong residents lived in the communities around the nuclear power plant.
- 7,000 businesses were inside the 20 km radius around the nuclear power plant.
- The number of companies which have the head office in the 20-km radius evacuation zone and the 20-30km planned evacuation areas around the power plant was 2207.
- The number of employees was 21,722 persons.

Change of matters consulted by disaster victims with Fukushima Department of Labor hotline

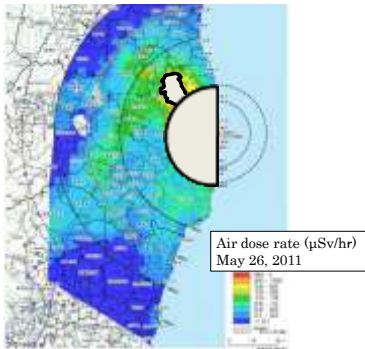


Blows to the companies in Fukushima Prefecture from unfounded rumors induced by the Fukushima nuclear disaster



Fukushima Economic Research Institute (369 companies which assign the head office in Fukushima Prefecture answered between July and August, 2011)

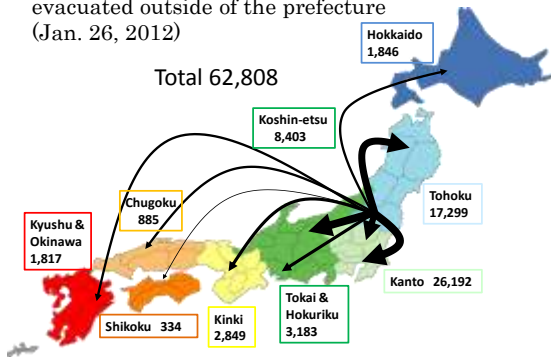
Air dose rate monitoring by Japanese Ministry of Education, Culture, Sports, Science and Technology & United States Department of Energy



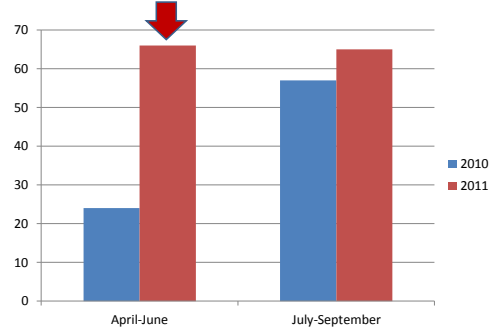
The children in Fukushima, whose outdoor activities have been restricted as a result of the effects of the Fukushima nuclear power accident.



The number of Fukushima Prefecture residents evacuated outside of the prefecture (Jan. 26, 2012)



The consultation number of cases of mental health in Fukushima Mental Health Support Center for Workers



Occupational health issues in Fukushima Prefecture

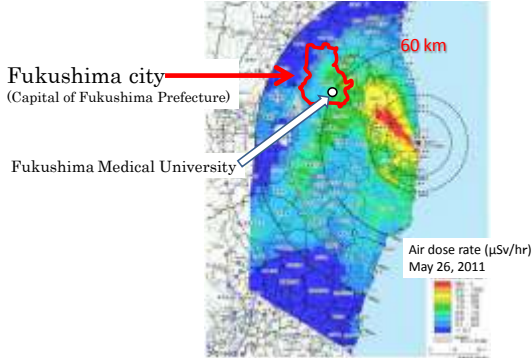
- Exposure to radiation in Fukushima nuclear power plant and in the planned or the 20-km radius evacuation areas
- Exposure hazardous chemicals such as asbestos which exist in debris
- Mental health problems
 - by the death of relatives or acquaintances
 - by remorse whose search of missing persons was not completed by the evacuation order
 - uneasiness and fear for invisible radioactive substances
 - worrying about their future life
- Decrease of sleep and leisure time because of commuting time extension by the evacuation
- Aggravation of diabetes, hypertension etc. by the stress and change of the lifestyle
- Many jobless people whose restoring is not in prospect



Individual dosimeter



Air dose rate monitoring by Japanese Ministry of Education, Culture, Sports, Science and Technology & United States Department of Energy



Detailed report of air radiation dose rate and share of the information



Radiation dose rate in air in Fukushima Medical University (April 11, 2011)		NaI scintillation counter, 100cm over the ground (μSv/h)		
		Maximum	Minimum	Average
Outdoor	Track field	3.2	2.7	3.0
	Inner courtyard	2.9	1.3	1.8
	Baseball field	2.7	1.7	2.3
	Tennis courts	2.4	2.1	2.2
	Parkine lot 1	1.7	0.9	1.3
	Parking lot 2	1.5	1.1	1.4
Indoor	Parking lot 3	1.2	0.8	1.0
	Entrance hall	0.4	0.3	0.3
	Gymnasium	0.2	0.2	0.2
	Student cafeteria	0.2	0.1	0.1
	Second floor hall	0.1	0.1	0.1
	Nursing sch. training room A	0.2	0.1	0.2
	Nursing sch. training room B	0.1	0.1	0.1
	Nursing sch. Training room C	0.1	0.1	0.1
	Nursing sch. lect. room S101	0.1	0.1	0.1
	Master's course Lect. room	0.2	0.1	0.1
	Tutorial room	0.1	0.1	0.1
	No. 1 lecture room	0.1	0.1	0.1
	No. 3 lecture room	0.1	0.1	0.1
	Third floor training room	0.1	0.1	0.1
	Forth floor training room	0.1	0.1	0.1
Fifth floor training room	0.1	0.1	0.1	
No. 1 clinical lect. room	0.1	0.1	0.1	
No. 2 clinical lect. room	0.1	0.1	0.1	

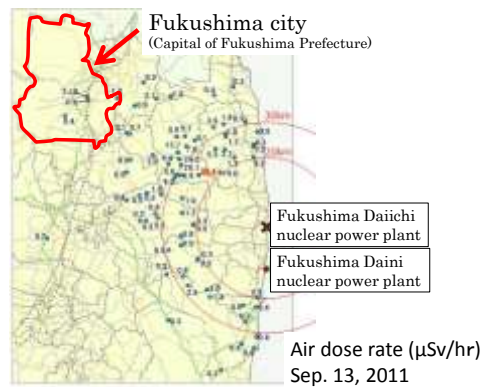
To address the concerns and fears

The residents/workers → Act autonomously to reduce risks

The local government → Support the residents'/workers' action
The companies

The central government → Quick decisions with accurate information





The situation of employment of Fukushima
Prefecture (Fukushima Department of Labor)

- The number of persons lost job by suffering the calamity and in job-hunting was 10,230 (June 19, 2011).
→ It increased 20.8% from the statistics on May 20.
- The grant number of cases of unemployment insurance from the occurrence of the earthquake disaster by June 26, 2011 was 46,017.
→ 2.5 times higher than that of last year
- The job offer for the high school students who graduate this spring decreased 40 percent from last year.
- The ratio of openings to job applications in last May was 0.50. Most of job offers were temporary demand, such as disaster restoration work.