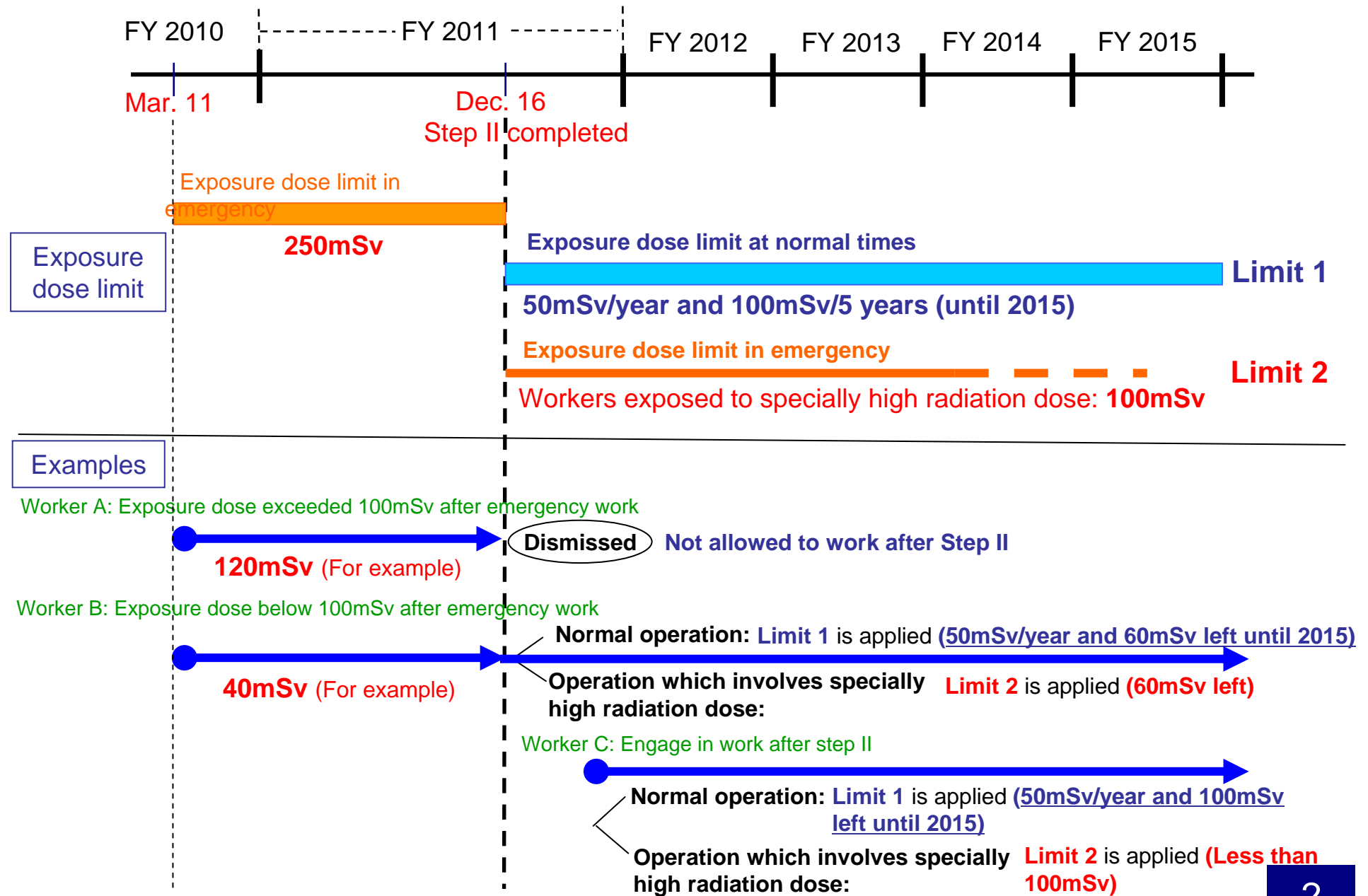


# **Overview of the Radiation Exposure Doses of the Workers at Fukushima Daiichi Nuclear Power Station**

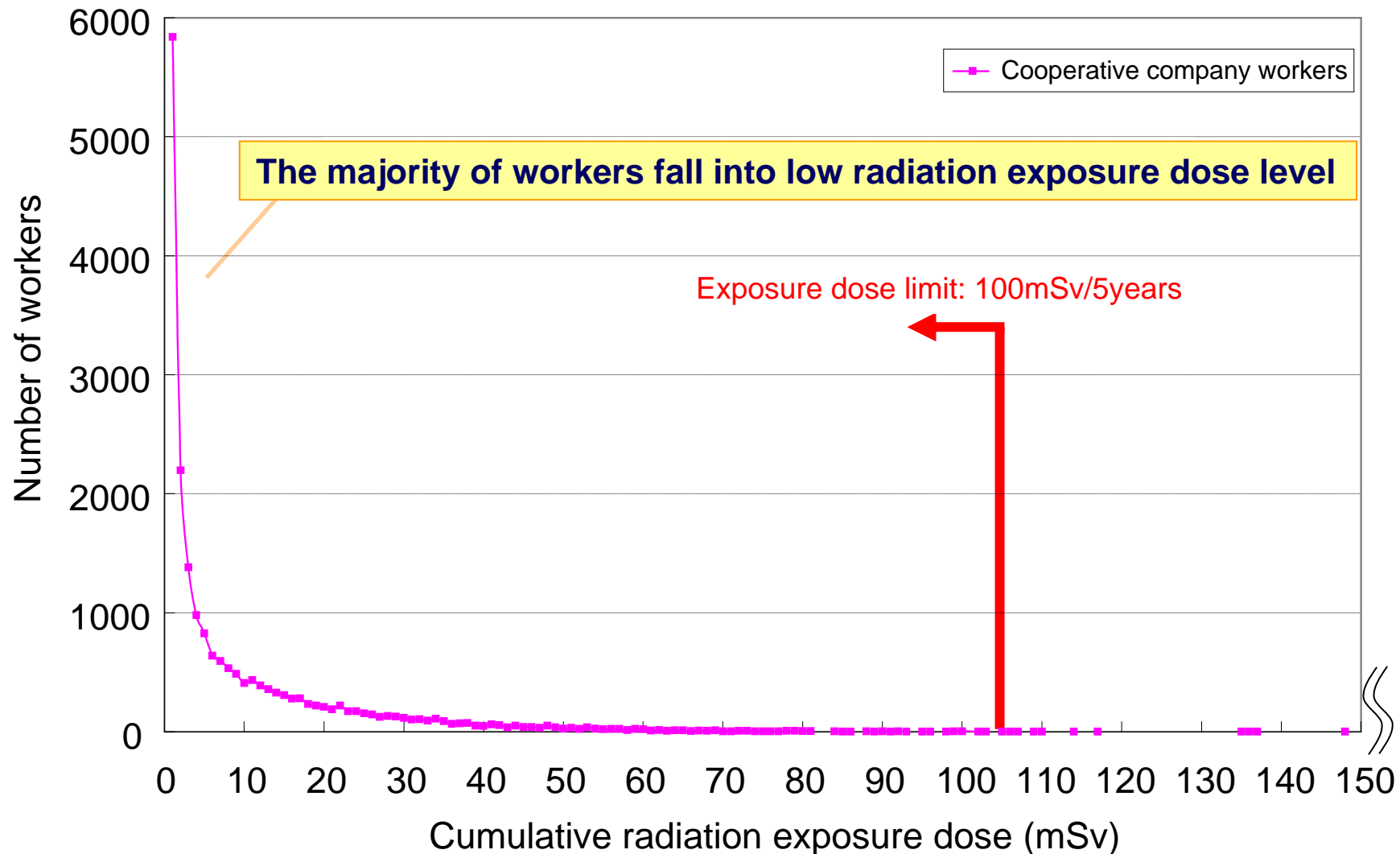
\* As of December 2012, the radiation exposure doses of all workers who engaged in work at Fukushima Daiichi Nuclear Power Station after the accident are still being examined. Thus, the data presented in this document is subject to change.

# (Reference) Radiation Exposure Dose Limit for the Workers



## 1-1 Cumulative Radiation Exposure Doses of Radiation Workers from Cooperative Companies (Cumulative Amount since March 11, 2011)

Time period: March 11, 2011 to August 31, 2012



\* The number of workers was counted in a unit of 1mSv (For example, approx. 2,200 workers fall into the range of 1mSv to 2mSv. Those with 0mSv are counted as 1mSv.)

# 1-1 Breakdown

Time period: March 11, 2011 to August 31, 2012

Classification (mSv)	Number of cooperative company workers
250 and up	0
200-250	2
150-200	2
100-150	17
50-100	425
20-50	2799
10-20	3038
5-10	2665
1-5	5386
1 and less	5837
Total (Number of workers)	20171
Max. (mSv)	238.42
Ave. (mSv)	9.57

**Exposure dose limit until the start of Step II: 250mSv**

↑ No worker falls into the range

**Exposure dose limit after Step II: 100mSv/5years**

↑ 21 workers who engaged in work right after the accident

Of the 20,171 workers who engaged in work during the period from March 11, 2011 to August 31, 2012,

20,150 workers (99.9%): 100mSv or less

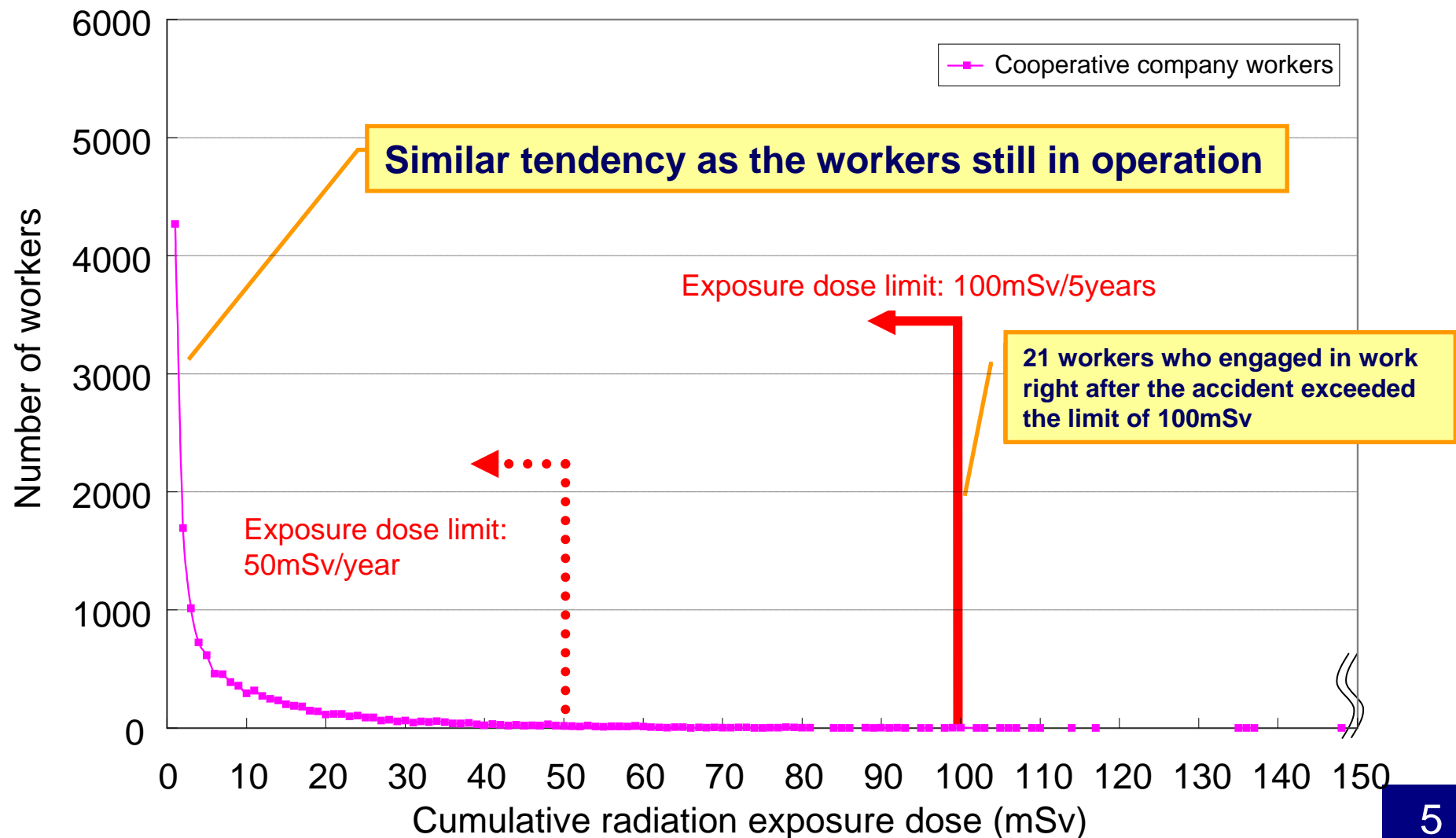
19,725 workers (97.8%): 50mSv or less

(Cumulative)

## 1-2 Radiation Exposure Dose Distribution among Workers Dismissed from Radiation Work (Cumulative Dose since March 11, 2011)

The exposure dose distribution among the workers dismissed from Fukushima Daiichi Nuclear Power Station is provided below.

**Workers dismissed during the period from March 11, 2011 to August 31, 2012**



# 1-2 Breakdown

Workers dismissed during the period from March 11, 2011 to August 31, 2012

Classification (mSv)	Number of cooperative company workers
250 and up	0
200-250	2
150-200	2
100-150	17
50-100	260
20-50	1555
10-20	2045
5-10	1958
1-5	4051
1 and less	4268
Total (Number of workers)	14158
Max. (mSv)	238.42
Ave. (mSv)	8.59

↑ Exposure dose limit until the start of Step II: 250mSv

↑ Exposure dose limit after Step II: 100mSv/5years

Similarly to the overall results, the majority of the dismissed workers fall into low exposure dose level.

Of the 14,158 workers who engaged in work during the period from March 11, 2011 to August 31, 2012,

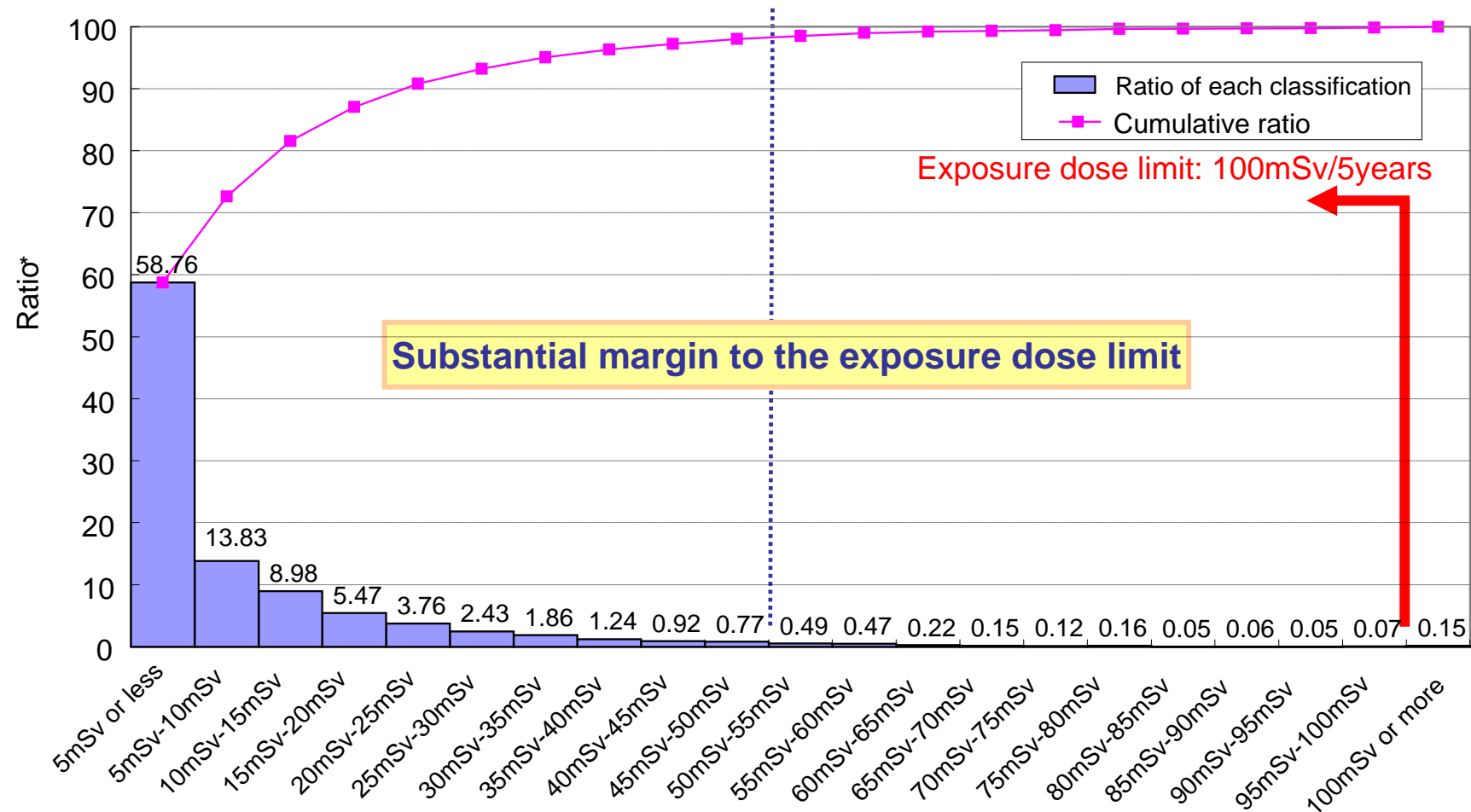
14,137 (99.9%): 100mSv or less

13,877 (98.0%): 50mSv or less

(Cumulative)

## from Radiation Work (Cumulative Dose since March 11, 2011)

Exposure dose distribution (cumulative dose since March 11, 2011) among the dismissed workers



\*Ratio (%) = [Number of dismissed workers in each classification] / [Number of all dismissed workers] x 100

As for the 21 workers who engaged in work right after the accident, the exposure dose exceeded 100mSv. The exposure doses of 99.9% of all workers are 100mSv or less and 98.0% of all workers are 50mSv or less.

Though there are some workers with high exposure dose due to the emergency work they engaged in right after the accident, the doses of most workers have a substantial margin to the dose limit.

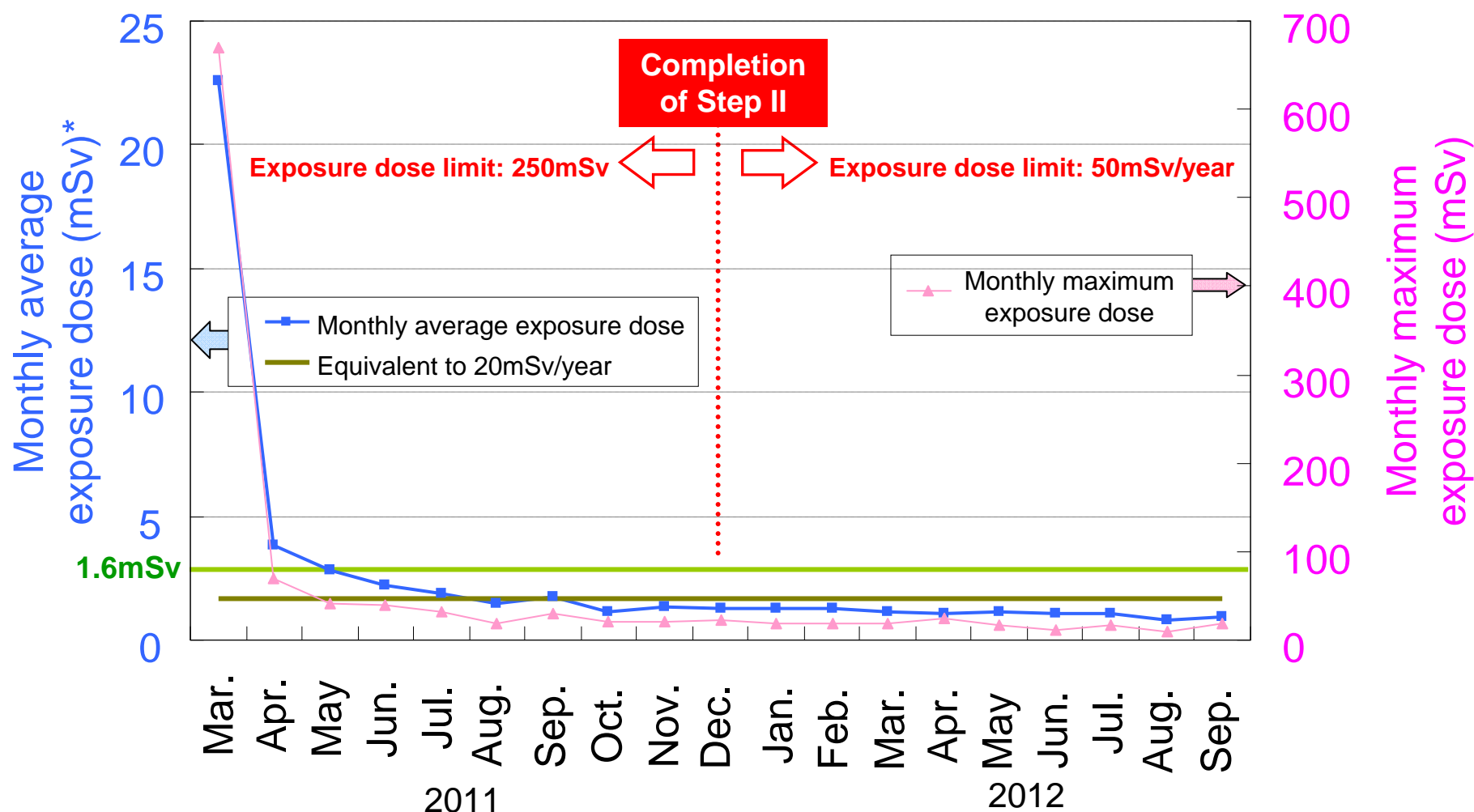
## 1-4 Cumulative Exposure Dose after the Accident

- The majority of the workers were dismissed with exposure dose substantially lower than the dose limit stipulated by law, and therefore are still capable of engaging in radiation work.
- Of the 95 dismissed workers with exposure dose exceeding 100mSv or close to the dose limit stipulated by law (exceeding 75mSv), 91 workers are still employed in locations other than Fukushima Daiichi Nuclear Power Station.

(Source: Interview with the main contractor regarding the workers dismissed by July 31, 2012. As of November 2012)



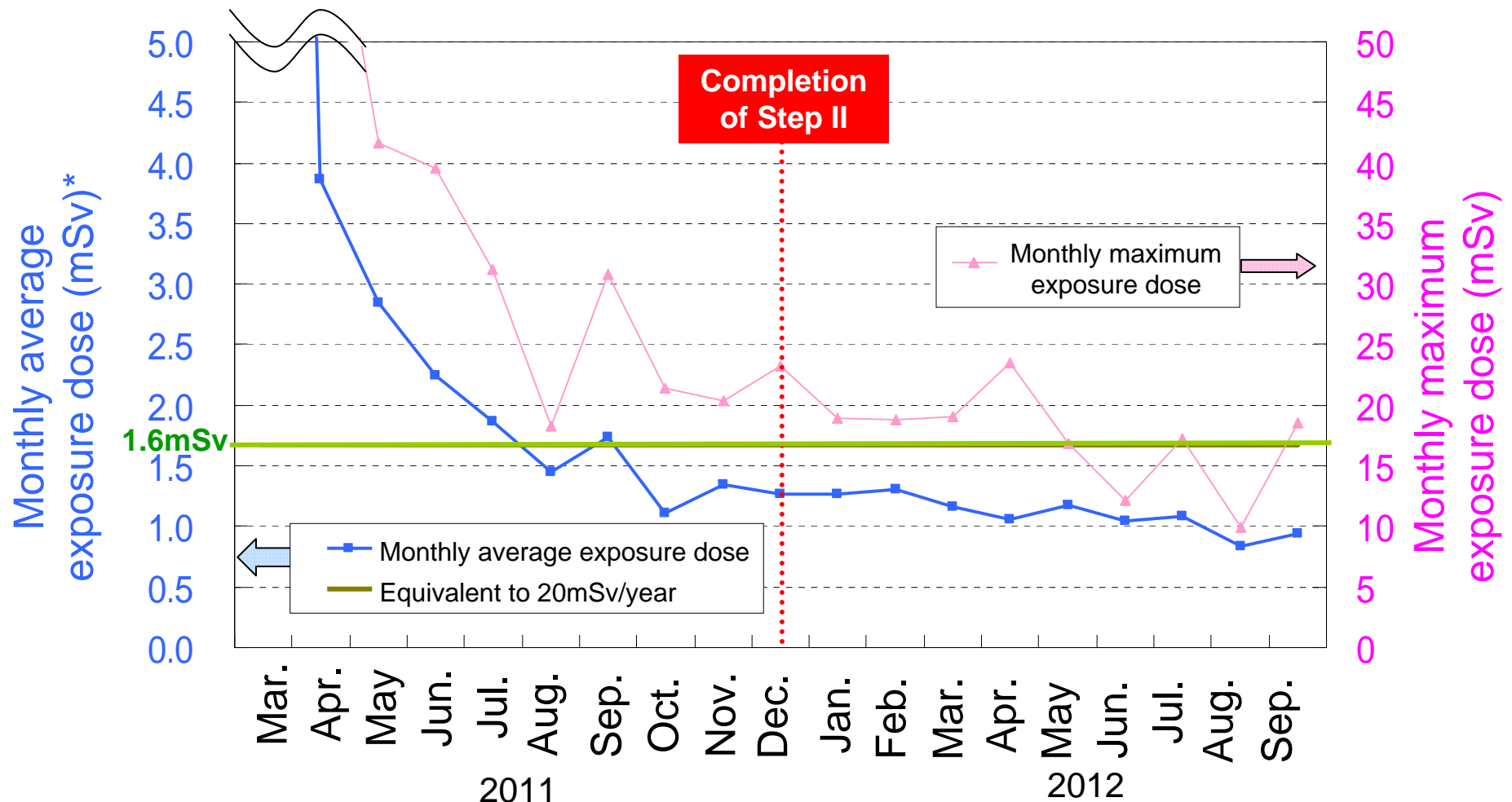
## 2-1 Reduction in Radiation Exposure Dose per Month since the Accident (Monthly Average Dose)



\*Average exposure dose = Total exposure dose in a given month / Number of workers who engaged in work in the month

**After Step II, the monthly average exposure dose and the monthly maximum exposure dose have been significantly reduced compared to right after the accident.**

## 2-2 Change in the Monthly Average Exposure Dose (Close-up on lower dose level)



\*Average exposure dose = Total exposure dose in a given month / Number of workers who engaged in work in the month

**After Step II, the monthly average exposure dose has been kept under 20mSv/year (1.6mSv/month).**

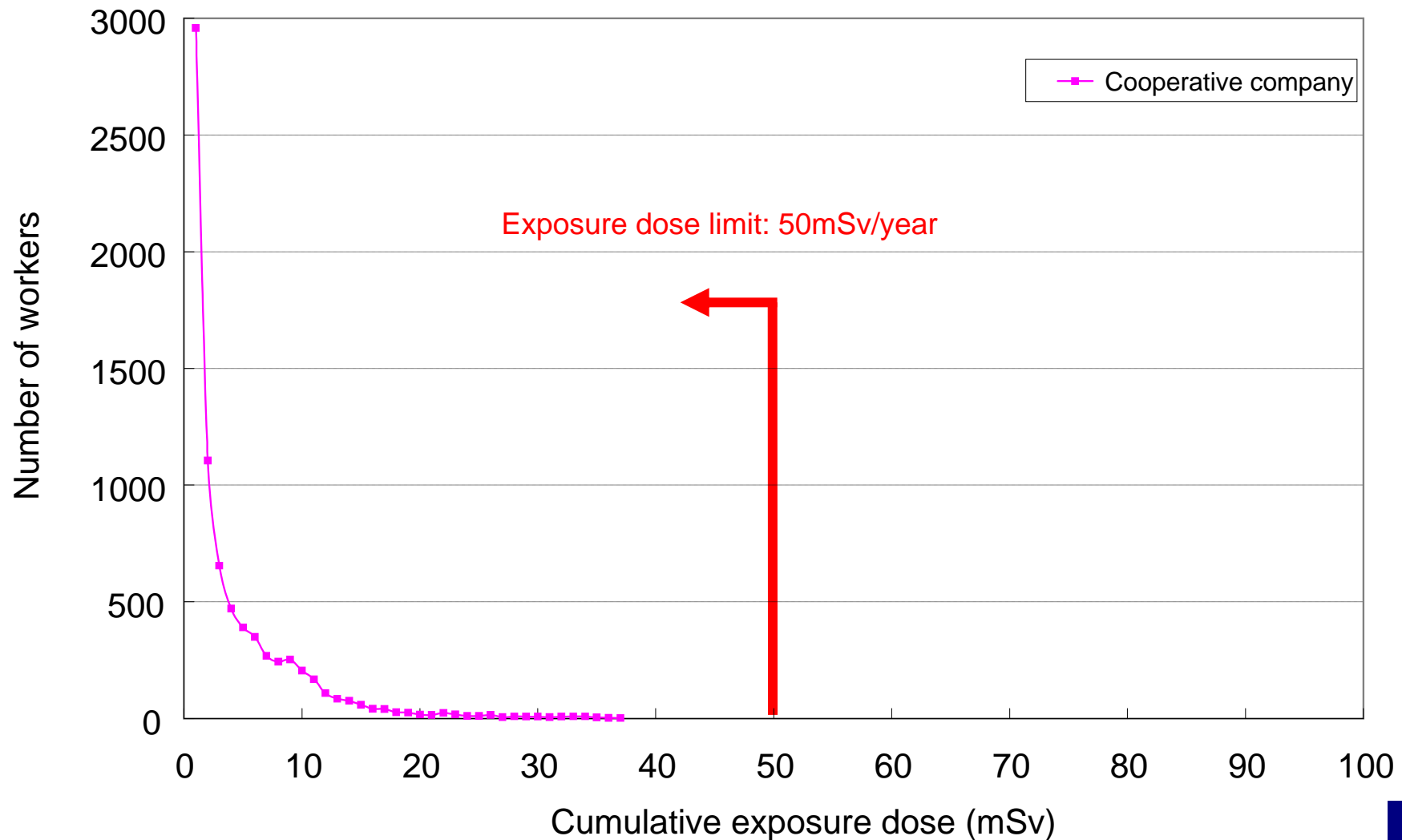
**In FY 2012 second quarter, the monthly average exposure dose was approx. 1mSv.**



In order to evaluate the current condition, the exposure dose distribution among workers who engaged in work in FY 2012 is summarized.

### 3-1 Current Condition (Cumulative Radiation Exposure Doses of the Radiation Workers from Cooperative Companies, FY 2012)

Time period: From April 1 to August 31, 2012 (5 months)



## 3-1 Breakdown

Time period: From April 1 to August 31, 2012 (5 months)

Classification (mSv)	Number of cooperative company workers
50 and up	0
40-50	0
30-40	42
20-30	125
15-20	152
10-15	496
5-10	1319
1-5	2622
1 or less	2959
Total (Number of workers)	7715
Max. (mSv)	36.49
Ave. (mSv)	3.90

**Exposure dose limit per year: 50mSv**

No worker falls into the range.

**Exposure dose equivalent to 5 months of the dose limit per year (50mSv):  $50\text{mSv} \times 5/12 \text{ months} = 20\text{mSv}$**

167 workers

Of the 7,175 workers who engaged in work in FY 2012 (April to August),

**7,548 (97.8%): 20mSv or less**

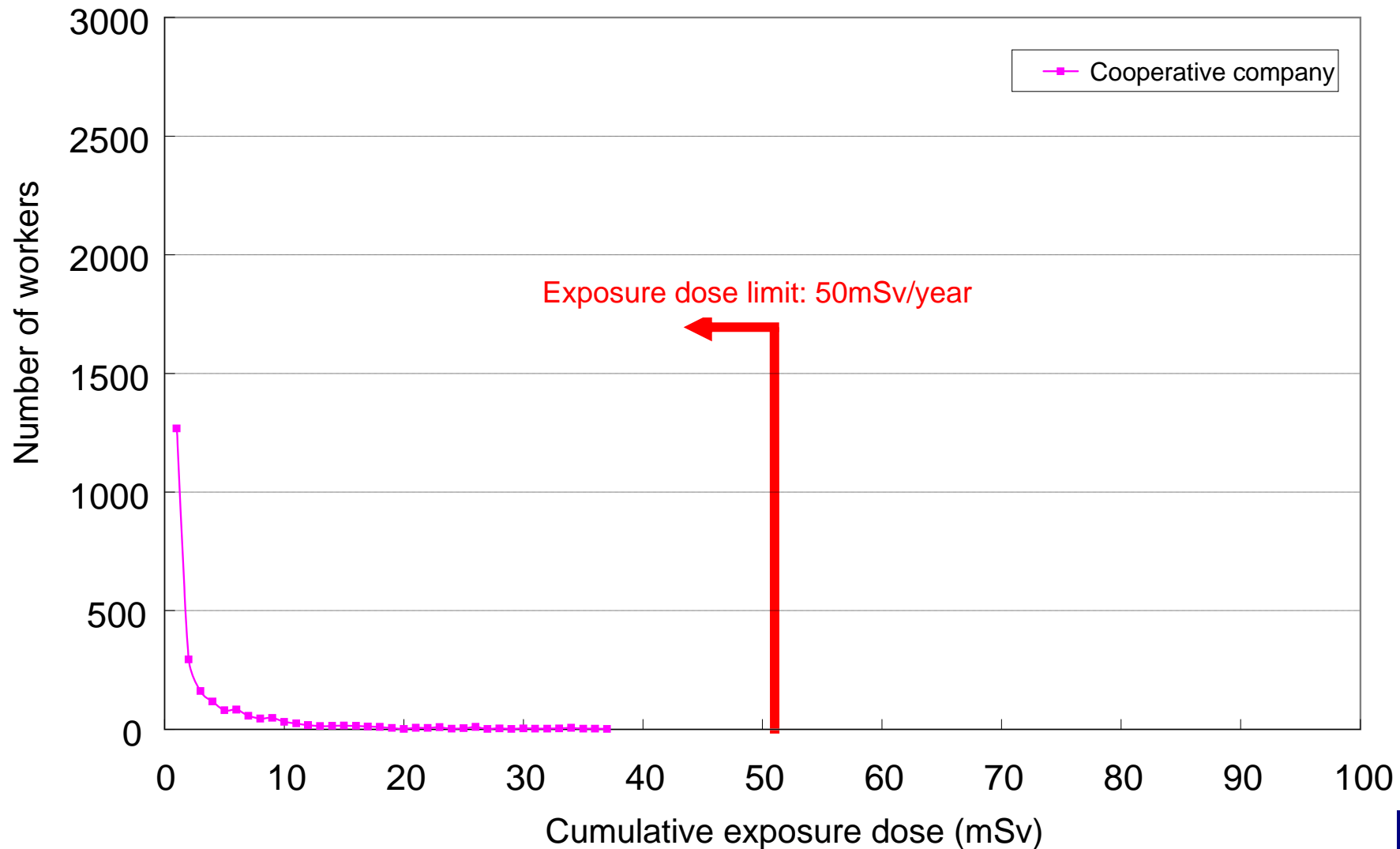
Given that the exposure dose equivalent to 5 months of 20mSv/year is 8.4mSv,

**5,581 (72.3%): 5mSv or less**

**(Cumulative)**

### 3-2 Radiation Exposure Dose Distribution Among the Dismissed Workers (Cumulative Exposure Dose in FY 2012)

Target: Workers dismissed during the period from April 1 to August 31, 2012 (5 months)



## 3-2 Breakdown

Classification (mSv)	Number of cooperative company workers
50 and up	0
40-50	0
30-40	25
20-30	52
15-20	45
10-15	88
5-10	268
1-5	654
1 or less	1268
Total (Number of workers)	2400
Max. (mSv)	36.49
Ave. (mSv)	3.26

**Exposure dose limit per year: 50mSv**



No worker falls into the range.



**Exposure dose equivalent to 5 months of the dose limit per year (50mSv):  $50\text{mSv} \times 5/12 \text{ months} = 20\text{mSv}$**

77 workers

Similarly to the overall results, the majority of the dismissed workers fall into low exposure dose level.

Of the 2,400 dismissed workers,

**2,323 (96.8%): 20mSv or less**

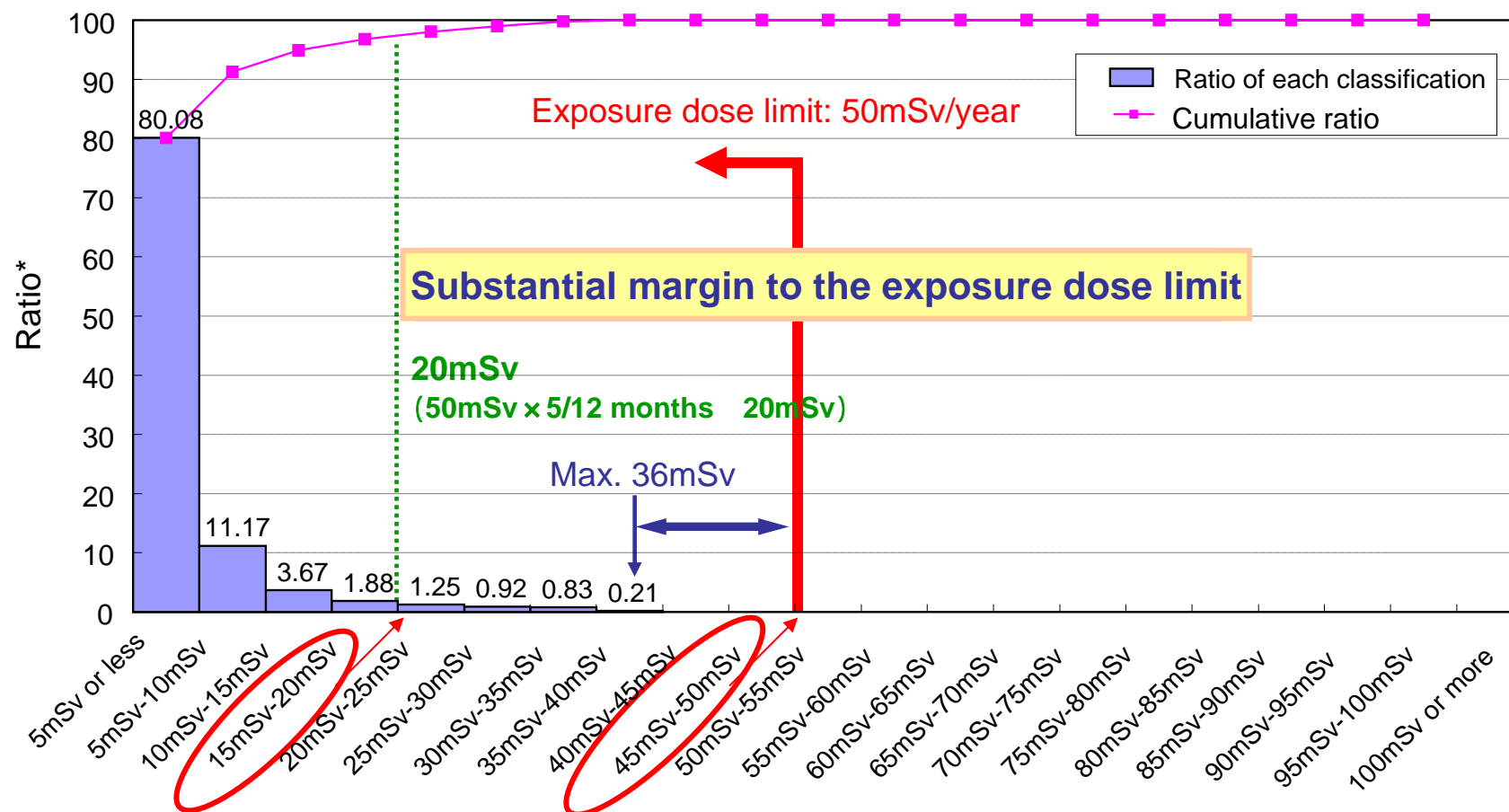
Given that the exposure dose equivalent to 5 months of 20mSv/year is 8.4mSv,

**1,922 (80.1%): 5mSv or less**

**(Cumulative)**

### 3-3 Radiation Exposure Dose Distribution Among the Dismissed Workers (Cumulative Exposure Dose in FY 2012)

**Cumulative exposure doses in FY 2012 among the dismissed workers (5 months)**



\*Ratio (%) = [Number of dismissed workers in each classification] / [Number of all dismissed workers] x 100

**The exposure dose was 20mSv or less for 97% of all the dismissed workers.**

### 3-4 Comparison between FY 2012 First and Second Quarters

The table below shows the comparison between the first quarter (April to June) and the second quarter (July to September) of FY 2012.

		Second quarter (Number of workers)							Total
		Did not work	5mSv or less	5-10mSv	10-15mSv	15-20mSv	20-25mSv	25-30mSv	
First quarter (Number of workers)	35-40mSv	2							2
	30-35mSv		11						11
	25-30mSv	6	7	6					19
	20-25mSv	14	10	12	7				43
	15-20mSv	22	14	17	7	2			62
	10-15mSv	32	43	44	5	2	3		129
	5-10mSv	141	406	135	20	5			707
	5mSv or less	1691	3363	270	60	14	5	1	5404
	Did not work		1615	189	74	11	4	1	1894
Total		1908	5469	673	173	34	12	2	8271

- There is no worker with exposure dose close to the limit.
- The workers with high exposure dose in the first quarter tend to have low exposure dose in the second quarter and vice versa.

Workers are put on rotation between high and low exposure operations.



## 3-5 Current Condition

- After Step II, the monthly average exposure dose has been kept under 20mSv/year (1.6mSv/month), and was approx. 1mSv in FY second quarter.
- The majority of the workers were dismissed with exposure dose substantially lower than the dose limit stipulated by law, and therefore are still capable of engaging in radiation work.
- Based on the exposure doses in the first and the second quarters, workers seem to be put on rotation between high and low exposure operations.
- Of the 50 dismissed workers with exposure dose exceeding 20mSv, 33 workers are still employed in locations other than Fukushima Daiichi Nuclear Power Station. (Source: Interview with the main contractor regarding the workers dismissed by the end of July. As of November 2012)

## 4. Summary

Overall, the radiation exposure condition in the power station has improved.

- Looking at the exposure doses of workers who engaged in work after the accident, there is a substantial margin to the dose limit (100mSv) for most workers.
- After Step II, there is also a large margin to the dose limit of 50mSv/year.
- The monthly average exposure dose has been kept under 20mSv/year (1.6mSv/month) since the start of Step II.
- Though it is still necessary to continue considering work allocation/rotation, the current condition allows for exposure dose reduction.

The majority of the workers were dismissed with exposure dose substantially lower than the dose limit stipulated by law, and therefore are still capable of engaging in radiation work.

**We will continue our efforts in reducing exposure dose in the work environment and monitor workers' exposure doses.**