

NRA presentation

C4 Occupational Radiation Protection

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1. Requirements for Occupational Exposure in **GSR Part 3**

Requirements	Note
Responsibilities of the regulatory body (Requirement 19)	→ P.3~P.5
Assessment of occupational exposure and workers' health surveillance (Requirement 25)	→ P.4 Coordination with MHLW
Special arrangements for female workers etc. (Requirement 28)	→ P.5
Arrangements under the radiation protection program (Requirement 24)	→ P.6
Information, instruction and training (Requirement 26)	→ P.6



2. Overview of Regulation on Occupational Radiation Protection

Regulations on Occupational Radiation Protection in Japan

Type	Example
LAW	Industrial Safety and Health Act (※MLHW) Reactor Regulation Act RI Regulation Act
CABINET ORDER	Reactor Regulation Enforcement Cabinet Order
ORDINANCE	MHLW Ordinance on Prevention of Ionizing Radiation Hazards (※MLHW) NRA Ordinance for Commercial Power Reactors NRA Ordinance for Fukushima Daiichi NPS
NOTIFICATION	NRA Notification for Dose Limits NRA Notification for Fukushima Daiichi NPS

(Relevant IAEA Standards) GSR Part3 Req. 19

- The government or the regulatory body shall **establish and enforce requirements to ensure that protection and safety is optimized.**



2. Overview of Regulation on Occupational Radiation Protection

Coordination with Ministry of Health, Labor and Welfare (MHLW)

Industrial Safety and Health Act (MSHA)

- Medical examinations*
- Delivering exposure records to the designated institution etc.

Reactor Regulation Act (NRA)

- Establishment of **controlled areas**
- Measuring and recording of **air dose rates** of controlled areas
- **Measures** to control exposure of radiation workers
- Special education etc.

Requirements for nuclear installations

Requirements for industries in general

*GSR Part3 Req. 21

licensees shall ensure that **health surveillance** are provided for all workers .(3.76.(f))



2. Overview of Regulation on Occupational Radiation Protection

Specific Requirements on Occupational Radiation Protection

NRA Notification for Fukushima Daiichi NPS

(Dose Limits for Radiation Workers)

Article 5

with regard to effective dose

100 mSv per 5 years and 50 mSv per year

For the lens of eye

100 mSv per the 5 years and 50 mSv per year

For the skin

500 mSv per year

(Relevant IAEA Standards) GSR Part3 Req. 19

- regulatory body shall enforce compliance with **dose limits** for occupational exposure.

3. Occupational Radiation Protection Program in Fukushima Daiichi NPS



TEPCO takes measures for Occupational Radiation Protection;

- designating approximately whole area of Fukushima Daiichi NPS as **expanded controlled area**
- Adopting individual monitoring for workers in all part of the **expanded controlled area**
- providing adequate instructions for radiation protection and safety, which are described in the **Implementation Plan**

*GSR Part3

Req. 24

- licensees shall designate a **controlled area** (3.88.)
- **individual monitoring** shall be undertaken for whom works in a controlled area (3.100.)

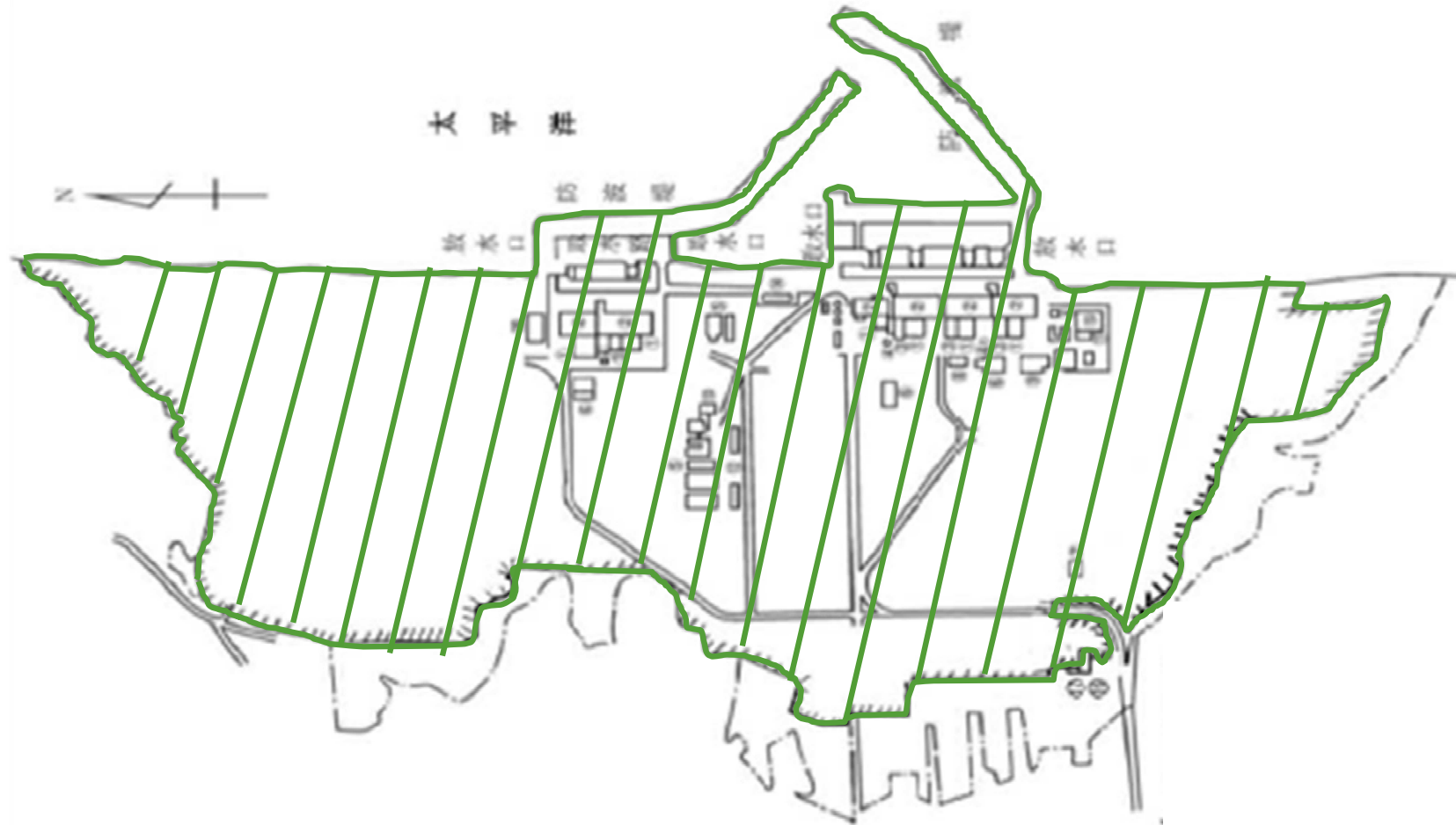
Req. 26

- licensees shall provide workers with **adequate information, instruction and training**

3. Occupational Radiation Protection Program in Fukushima Daiichi NPS



The map indicating expanded controlled area



- The approximately whole area of the Fukushima Daiichi NPS site are designated as expanded controlled area

(Source) the Implementation Plan



3. Occupational Radiation Protection Program in Fukushima Daiichi NPS

Zoning (Area control) in Fukushima Daiichi NPS as of May 2018



(source) TEPCO HP: <https://www.tepco.co.jp/decommission/progress/environment/>



3. Occupational Radiation Protection Program in Fukushima Daiichi NPS

Criteria for zoning (area control)

Area	Contaminated level	Place	Wear
Red Zone	<ul style="list-style-type: none">• Areas such as Unit1~3 R/B, handling stagnant water or contaminated water• Existence of Alpha nuclides	<ul style="list-style-type: none">• Unit1~3 R/B• Buildings containing stagnant water near Unit 1~4	<ul style="list-style-type: none">• Full-face mask• Double coverall or waterproof coverall (anorak) etc.
Yellow Zone	<ul style="list-style-type: none">• Concern on radioactive dust• Existence of Beta nuclides	<ul style="list-style-type: none">• Near Unit1~4• Buildings with RO desalination facilities or ALPS facility etc.	<ul style="list-style-type: none">• Full-face/Half-face mask• Coverall etc.
Green Zone	<ul style="list-style-type: none">• Not required for full-face mask	Other area	<ul style="list-style-type: none">• Normal dust mask• General work wear etc.

(source) METI HP: https://www.meti.go.jp/earthquake/nuclear/decommissioning/committee/ose/nsuitaisakuteam/2016/pdf/0225_3_7b.pdf



3. Occupational Radiation Protection Program in Fukushima Daiichi NPS

Wearing and equipment according to zoning

R zone	Y zone	G zone
全面マスク 	全面マスク 又は 半面マスク (※1 ※2) 	使い捨て式防じんマスク 
カバーオールの上にアノラック  waterproof coverall	カバーオール  coverall	一般作業服  general work wear

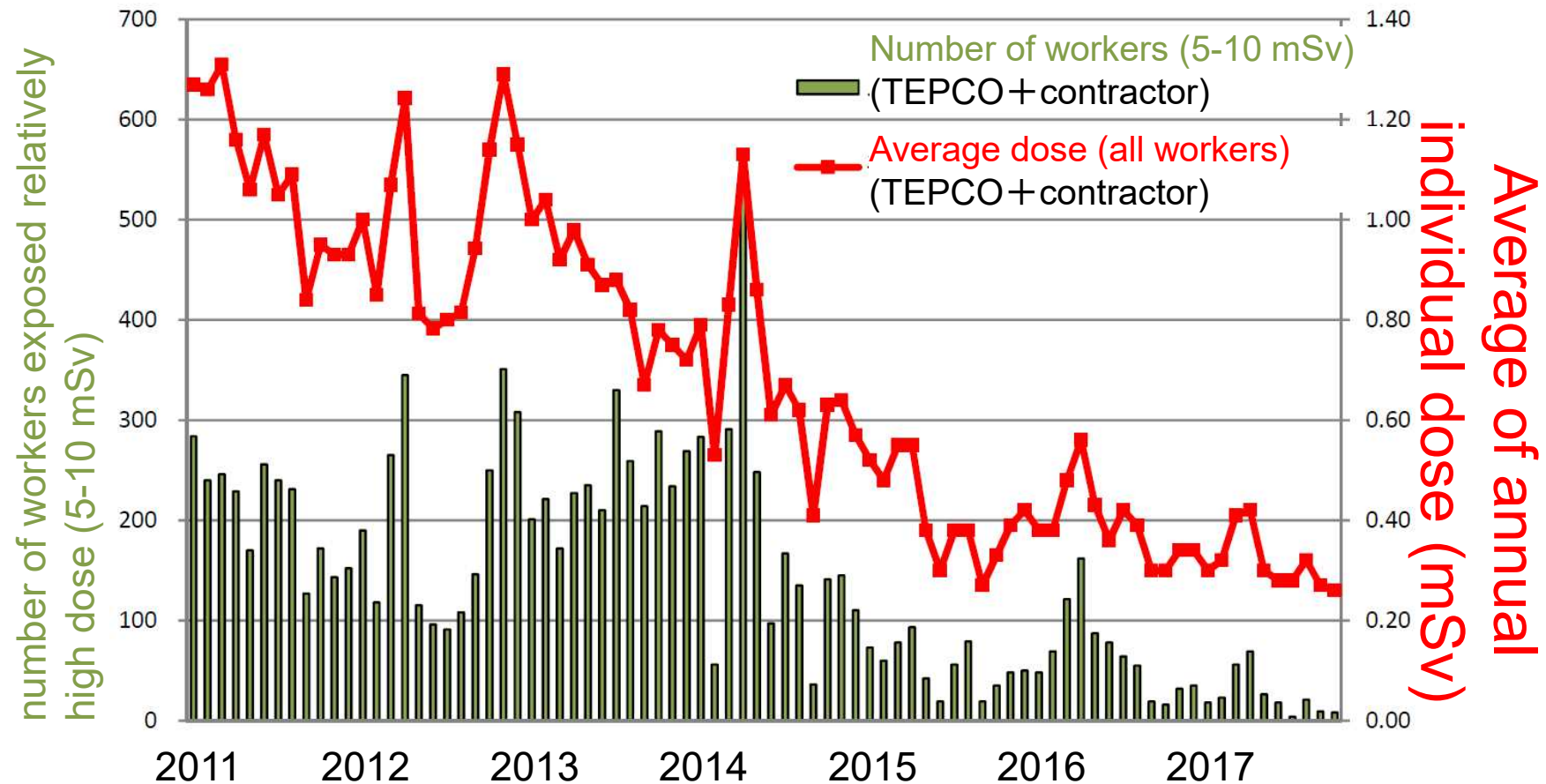
➤ General working wears and dust masks are used in almost all part of the site (G zone: over 95%)

(source) TEPCO HP: <https://www.tepco.co.jp/decommission/progress/environment/>



3. Occupational Radiation Protection Program in Fukushima Daiichi NPS

Average dose of workers at Fukushima Daiichi NPS in each month



- The **average annual dose for all workers** has gradually decreased and the **number of workers exposed relatively high dose (5-10 mSv)** has also decreased for this decade.

(source) MHLW: https://www.mhlw.go.jp/topics/2019/01/dl/17_daijinsoumu-05.pdf



4. Occupational Radiation Protection measures on ALPS Treated Water Discharge

Occupational exposure situation in relation to works of ALPS treated water discharge are as below:

- facility construction work
- patrol
- sampling
- facility maintenance
- emergency response

Radiation protection measures by the operator are:

- area control (G-zone)
 - individual monitoring
- NRA understands that the air dose rate of K4 tanks area are comparable to approximately $1\mu\text{Sv/h}$ so that general radiation protection measures taken in G-zone area are applicable.



4. Occupational Radiation Protection measures on ALPS Treated Water Discharge

The NRA regards the TEPCO's Occupational Radiation Protection measures for the operation of ALPS treated water discharge are acceptable assuming:

- Air dose rate of the tanks area (which is designated as G-zone) is low enough that workers will not be exposed to high radiation in normal operation.
- Workers will not be exposed to high radiation even in unusual situation because the concentration of ALSP treated water is low.
- Exposure of workers are recorded by TEPCO and reported to NRA
- Dose limit for workers are established and workers will not be exposed above that level.