NRA presentation

C4  Occupational Radiation Protection

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IAEA Regulatory Review Mission on ALPS Treated Water Handling
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1. Requirements for Occupational Exposure in **GSR Part 3**

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2. Overview of Regulation on Occupational Radiation Protection

Regulations on Occupational Radiation Protection in Japan

<table>
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<tr>
<th>Type</th>
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<tr>
<td>LAW</td>
<td>Industrial Safety and Health Act (※MLHW)</td>
</tr>
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<td>Reactor Regulation Act</td>
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<td>RI Regulation Act</td>
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<td>CABINET ORDER</td>
<td>Reactor Regulation Enforcement Cabinet Order</td>
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<td>ORDINANCE</td>
<td>MHLW Ordinance on Prevention of Ionizing Radiation Hazards (※MLHW)</td>
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<td></td>
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<td>NOTIFICATION</td>
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<td></td>
<td>NRA Notification for Fukushima Daiichi NPS</td>
</tr>
</tbody>
</table>

(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 (MHLW)
- 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.

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*GSR Part3 Req. 21
licensees shall ensure that **health surveillance** are provided for all workers (3.76.(f))
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 Part 3

**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/
### Criteria for zoning (area control)

<table>
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<tr>
<th>Area</th>
<th>Contaminated level</th>
<th>Place</th>
<th>Wear</th>
</tr>
</thead>
</table>
| **Red Zone** | • Areas such as Unit1~3 R/B, handling stagnant water or contaminated water  
• Existence of Alpha nuclides | • Unit1~3 R/B  
• Buildings containing stagnant water near Unit 1~4 | • Full-face mask  
• Double coverall or waterproof coverall (anorak) etc. |
| **Yellow Zone** | • Concern on radioactive dust  
• Existence of Beta nuclides | • Near Unit1~4  
• Buildings with RO desalination facilities or ALPS facility etc. | • Full-face/Half-face mask  
• Coverall etc. |
| **Green Zone** | • Not required for full-face mask | Other area | • Normal dust mask  
• General work wear etc. |

### Wearing and equipment according to zoning

<table>
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<tr>
<th>R zone</th>
<th>Y zone</th>
<th>G zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>全面マスク</td>
<td>全面マスク 又は 半面マスク （※1 ※2）</td>
<td>使用捨て式防じんマスク</td>
</tr>
<tr>
<td>カバーオールの上にアノラック</td>
<td>カバーオール</td>
<td>一般作業服</td>
</tr>
<tr>
<td>waterproof coverall</td>
<td>coverall</td>
<td>general work wear</td>
</tr>
</tbody>
</table>

- 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
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 1µSv/h so that general radiation protection measures taken in G-zone area are applicable.
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.