

## 1. Background

- Ministry of the Environment estimates that **approximately 15 - 31 million** tons of soil and waste are generated from decontamination and other contaminated waste has reached **approximately 0.56 million tons** in the Fukushima Prefecture alone .
- The Ministry will start deploying full-scale activities to dispose of these waste **in summer, 2013**.

## 2. Objectives of the revision

- Activities for accident-derived waste disposal (\*) are subject to the Ordinance on Prevention of Ionizing Radiation Hazards (the Ionizing Radiation Ordinance); however, the current ordinance does not contain sufficient regulation for employers involved in disposal. (\* e.g., final disposal (landfill), interim storage, interim treatment (incineration, crushing, etc.))
- The advisory committee by experts on radiological protection and waste disposal were held to consider measures to prevent radiological hazards. The report was published on February 14.
- Based on the report, the Ionizing Radiation Ordinance and others will be revised and the clear guidelines will be developed that summarize relevant laws and regulations.

## 3. The advisory committee

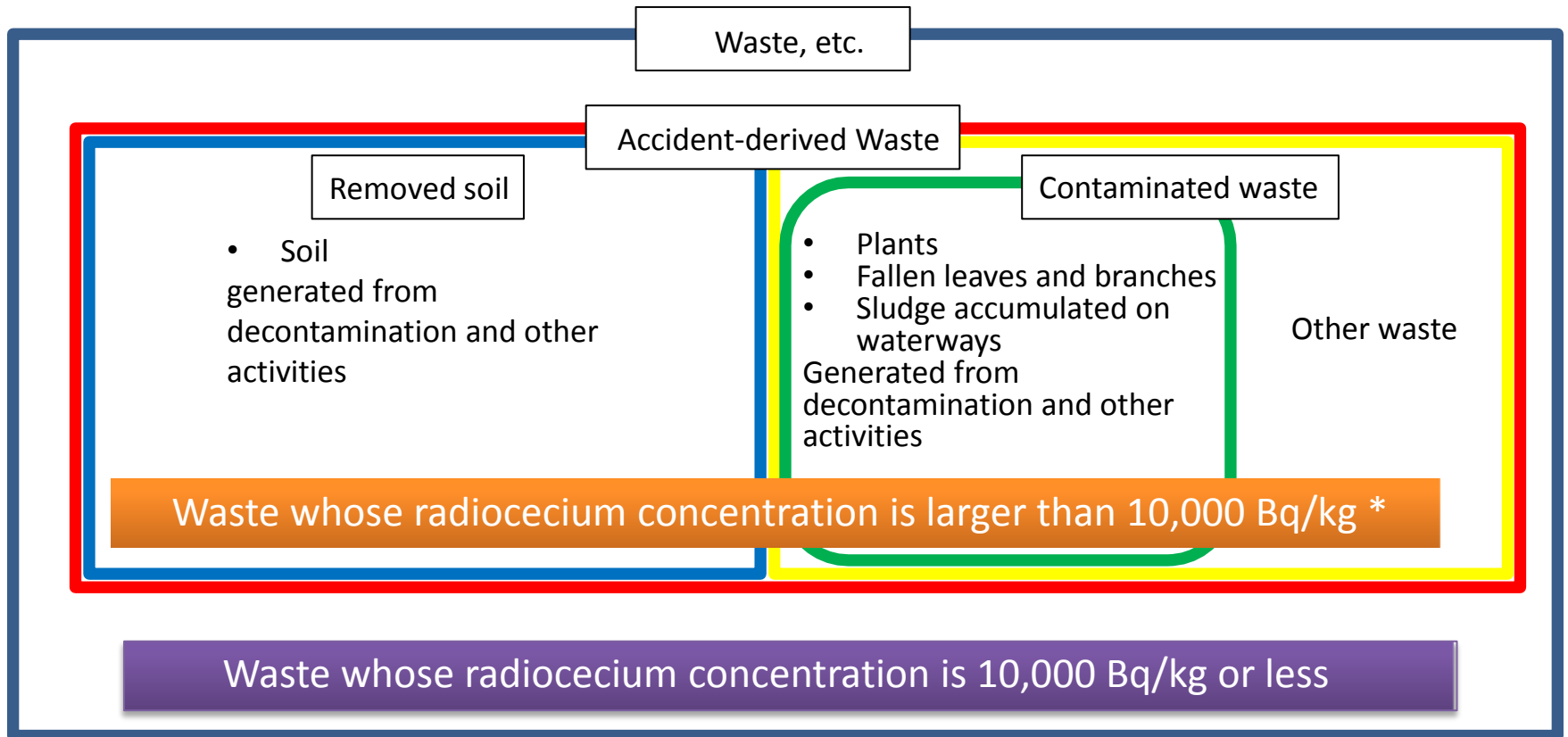
Name	Title
Masahiro Osako	Director, Research Center for Material Cycles and Waste Management, National Institute of Environmental Studies
Nobuyuki Sugiura	Director, Research Center for Radiation Emergency Medicine, National Institute of Radiological Sciences
Shunji Suzuki	Manager, Technical Department, Japan Industrial Waste Management Foundation
Shunji Nagoya	Professor, Faculty of Science and Engineering, Waseda University
Yoshimi Matsumura	Councilor, Technology Institution of Industrial Safety
Koji Mori (Chair)	Professor and Director, Occupational Health Training Center, University of Occupational and Environmental Health
Toshiyuki Monma	Senior Engineer, Fukushima Environmental Safety Center, Headquarters of Fukushima Partnership Operations, Japan Atomic Energy Agency

## 4. Schedules

- Advisory committee meetings (Dec. – Mar.)
- Publication of the report (Feb. 14)
- Public comments (Feb. 15 – Mar. 17)
- Consultation to and recommendation from the Labor Policy Council (Mar. 22)
- Promulgation of the ordinance (Apr. 12)
- Enforcement of the ordinance (Jul. 1)

# Definition of Accident-derived Waste

Removed soil	Soil generated from activities such as decontamination (concentration of radiocecium > 10,000 Bq/kg)
Contaminated waste	Waste contaminated with radioactive materials discharged by the accident (radioactive material emitted from the accident at Fukushima Daiichi Nuclear Power Plant of Tokyo Electric Power Company) (concentration of radiocecium > 10,000 Bq/kg)
Accident-derived Waste	Removed soil and contaminated waste (*)



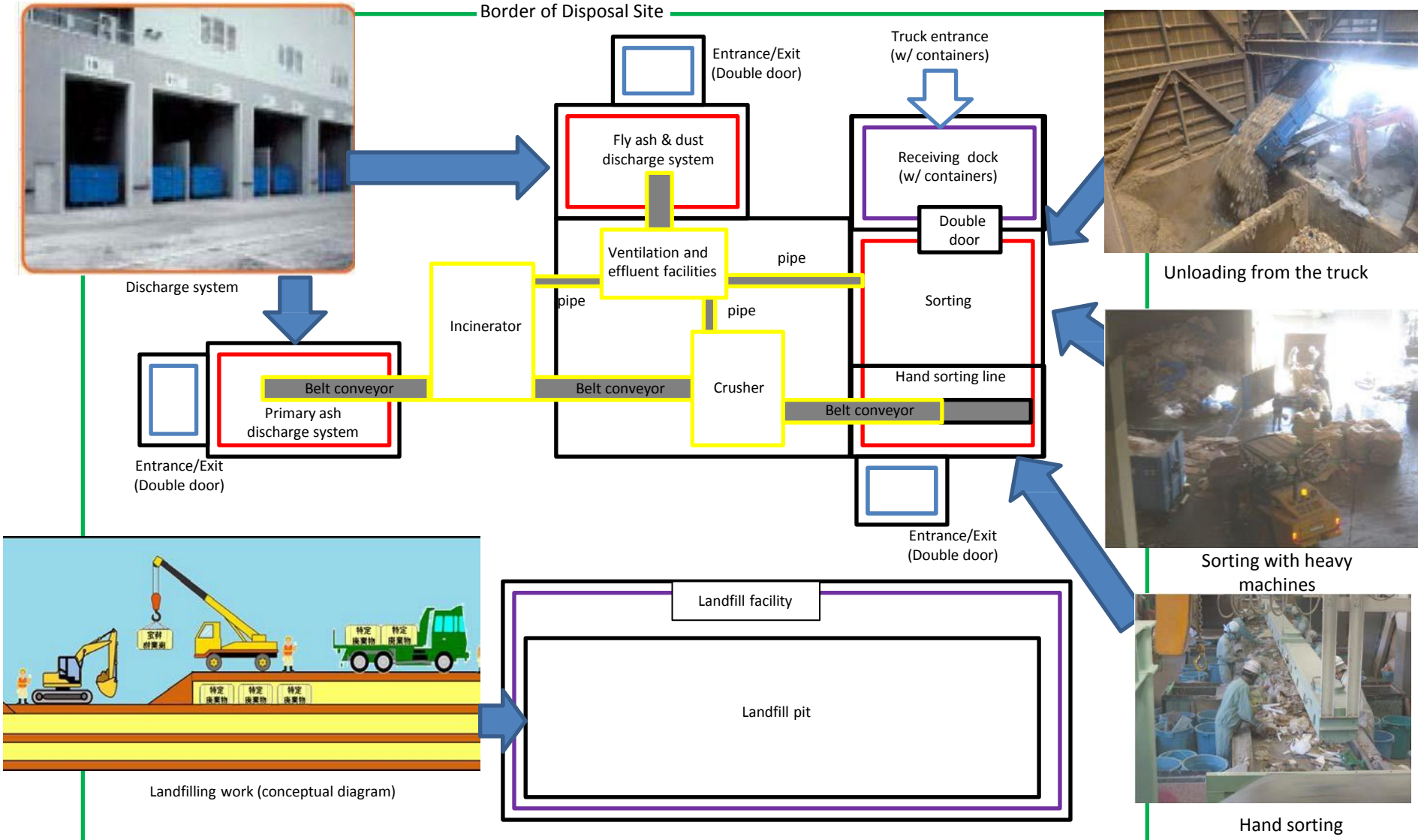
\* It includes radioactive materials discharged by the accident in which non-caesium isotope exceeds the volume and the minimum limit of concentration defined in the Ionizing Radiation Ordinance, due to the process of concentration during waste disposal.

# Summary of Measures for Preventing Radiological Hazards to Workers

Laws and places of application	Dose Limit at designated facilities for dose management	Type of work	Work Requirements	Exposure Limit & Health Care, etc.
<p>[Ionizing Radiation Ordinance]</p> <p>[Places of application]</p> <ul style="list-style-type: none"> <li>- Areas where the radiation sources are located <u>at a certain place under controlled conditions.</u></li> <li>- <u>Indoor work</u> (e.g., operation of equipment)</li> </ul>	<p>[Radiation controlled area]</p> <ul style="list-style-type: none"> <li>- Areas where <u>radiation dose exceeds 1.3mSv per 3 months (2.5μSv/h)</u></li> <li>- Areas where surface contamination exceeds 4Bq/cm<sup>2</sup></li> </ul> <p>[Dose limit at facilities]</p> <ul style="list-style-type: none"> <li>- 1mSv or less per week at high traffic areas constantly accessed by workers</li> </ul> <p>[Measurement of work environment]</p> <p>[Emergency action]</p> <ul style="list-style-type: none"> <li>- Emergency exposure limit is 100 mSv</li> </ul>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Radiation works</p> <ul style="list-style-type: none"> <li>- Operation of nuclear reactors</li> <li>- Handling of radioactive material or contaminated waste</li> <li>- Use of X-ray devices</li> <li>- Mining of nuclear source material in tunnel.</li> </ul> <div style="border: 2px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>- Disposal of accident-derived waste (<u>large volume of waste exists in large scale facilities</u>)</li> </ul> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">revised parts</div> </div>	<ul style="list-style-type: none"> <li>- Requirements equipment</li> <li>- Protection against external radiation</li> <li>- Prevention of contamination</li> <li>- Management of special activities</li> <li>- Operation manager's license</li> </ul> <div style="border: 2px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li>- Requirements for disposal facilities</li> <li>- Prevention of spread of contamination</li> <li>- Work management</li> <li>- Special education</li> <li>- Exemption where disposal facilities are constructed in special decontamination areas, etc</li> </ul> </div>	<p>[Exposure limit]</p> <p>100 mSv or less in 5 yrs. and 50 mSv or less in 1 yr.</p> <p>[Dose measurement]</p> <p>[General medical examination]</p> <p>[Special medical examination] (Except for works under a designated dose rate)</p>
<p>[Ionizing Radiation Ordinance for Decontamination]</p> <p>[Places of application]</p> <ul style="list-style-type: none"> <li>- Areas where <u>the radiation sources are dispersed and cannot be controlled</u> (e.g., special decontamination area, etc.)</li> <li>- Mainly <u>outdoor work</u> (e.g., decontamination, construction)</li> </ul>	<ul style="list-style-type: none"> <li>- Areas to be decontaminated (the simplified measurement if dose is 2.5 μSv/h or less)</li> <li>- Areas where ambient dose rate exceeds 2.5 μSv/h)</li> </ul>	<p>[Decontamination works] (Works for handling designated contaminated soil and wastes)</p> <p>[Works under a designated dose rate] (Works for not handling designated contaminated soil and wastes)</p>	<ul style="list-style-type: none"> <li>- Actions relating to decontamination</li> <li>- Prevention of contamination</li> <li>- Special education</li> <li>- Actions relating to the works under a designated dose rate</li> <li>- Special education</li> </ul>	

# Overview of Disposal Facility for Accident-derived Waste

Flow diagram of activities at the disposal facility for accident-derived waste will be as shown below.



# Major revisions in the Ionizing Radiation Ordinance

## Activities controlled under the revised Ionizing Radiation Ordinance

### **1. Activities for disposing the “accident-derived waste” are as follows :**

- (1) Soil generated from decontamination whose radioactivity concentration exceeds 10,000 Bq/kg (**Removed soil**)
- (2) Waste contaminated with radioactive materials discharged by the accident(emitted by Fukushima Daiichi Nuclear Power Plant of TEPCO) whose radioactivity concentration exceed 10,000 Bq/kg (**Contaminated waste**)

Note: These include radioactive materials discharged by the accident in which non-caesium radioisotopes exceed the volume and the minimum concentration limit specified in the Ionizing Radiation Ordinance due to the process of concentration during waste disposal.

### **2. “Disposal” comprises the following activities :**

- (1) Final disposal (landfill) and interim storage
- (2) Interim treatment (sorting, crushing, compression, concentration, incineration, etc.)
- (3) Maintenance and inspection of relevant facilities and equipment

## Overview of the revisions

Employers involved in the waste disposal and other related projects are required to abide by the additional regulations described in (1) to (5)

### **(1) Requirements for the accident-derived waste disposal equipment**

Applied facilities: waste etc. handling facilities, crushing system, incinerator, landfilling facility, storage facility, effluent processing facility, etc.

Description: Facilities must have the structure with no potential risk of leakage for contaminated gas or liquid, and be equipped with double doors at the entrance/exit.

### **(2) Measures to prevent spread of contamination**

Use of respiratory protective equipment and protective clothing appropriate for the contamination level, contamination inspection after work, use of containers, etc.

### **(3) Work management**

Operation methods and procedures, developing a manual concerning the adjustment of safety equipment, submission of maintenance and inspection request to the authority

### **(4) Special education**

Provide education in advance to prospective waste disposal workers regarding the methods of dose control, work procedures, and how to use machines

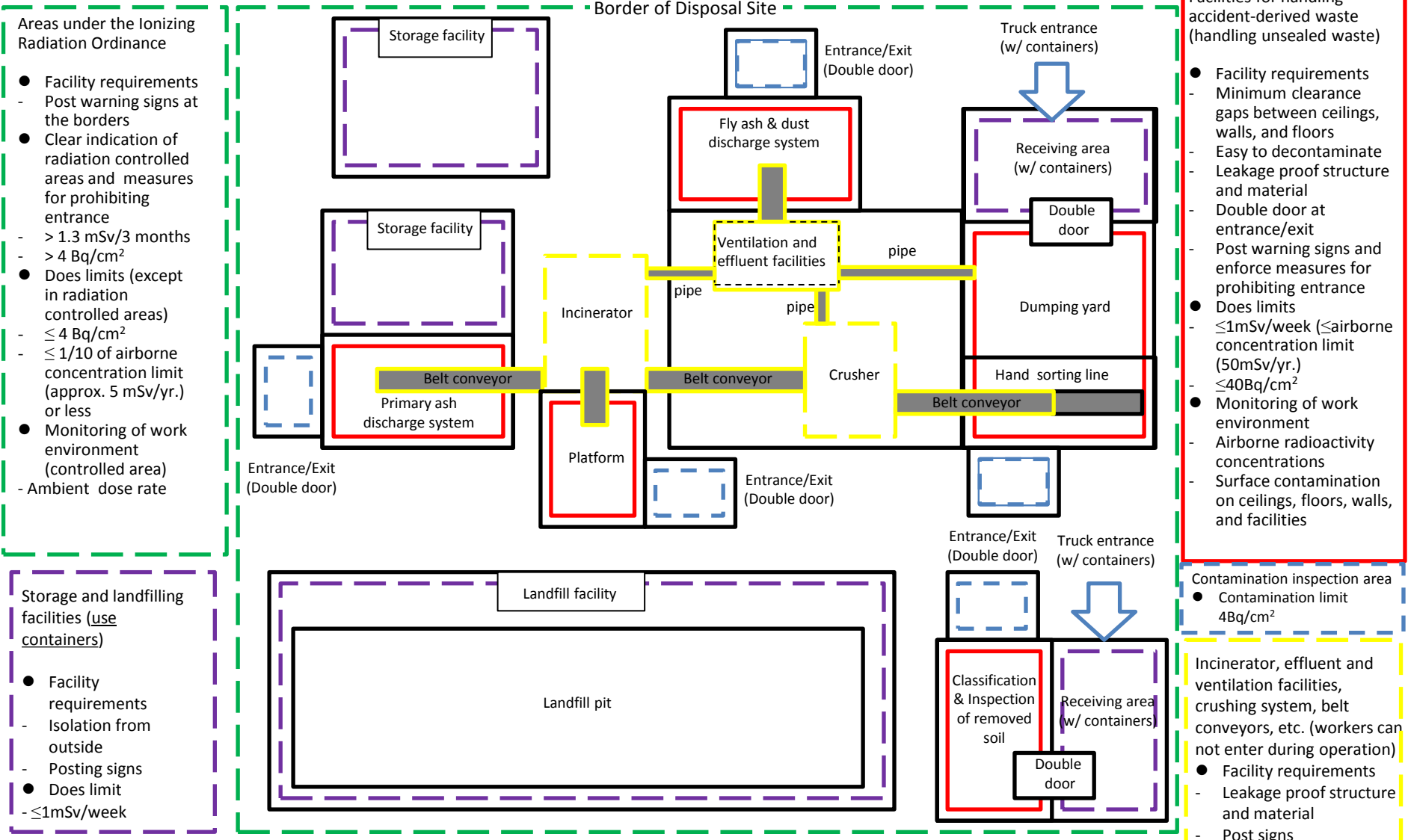
### **(5) Exemption for building disposal facilities in special decontamination area,etc**

The level of contamination in the soil should be considered before establishing the facilities. Depending on the condition of the soil, exemption will be made regarding inspections and use of containers.

\* Note that the current rules remain intact regarding setting of controlled areas, measurement and record of exposure dose, exposure limit, and dose limit in facilities.

# Requirements for Facilities in the Disposal Site and Dose Limit

The structure that prevents leakage of internal gas and liquid (requirements for facilities) as well as ambient dose rate and surface contamination limit (dose limit) controls disposal facilities for accident-derived waste.



## Areas under the Ionizing Radiation Ordinance

- Facility requirements
- Post warning signs at the borders
- Clear indication of radiation controlled areas and measures for prohibiting entrance
- > 1.3 mSv/3 months
- > 4 Bq/cm<sup>2</sup>
- Does limits (except in radiation controlled areas)
- ≤ 4 Bq/cm<sup>2</sup>
- ≤ 1/10 of airborne concentration limit (approx. 5 mSv/yr.) or less
- Monitoring of work environment (controlled area)
- Ambient dose rate

## Storage and landfilling facilities (use containers)

- Facility requirements
- Isolation from outside
- Posting signs
- Does limit
- ≤ 1mSv/week

## Facilities for handling accident-derived waste (handling unsealed waste)

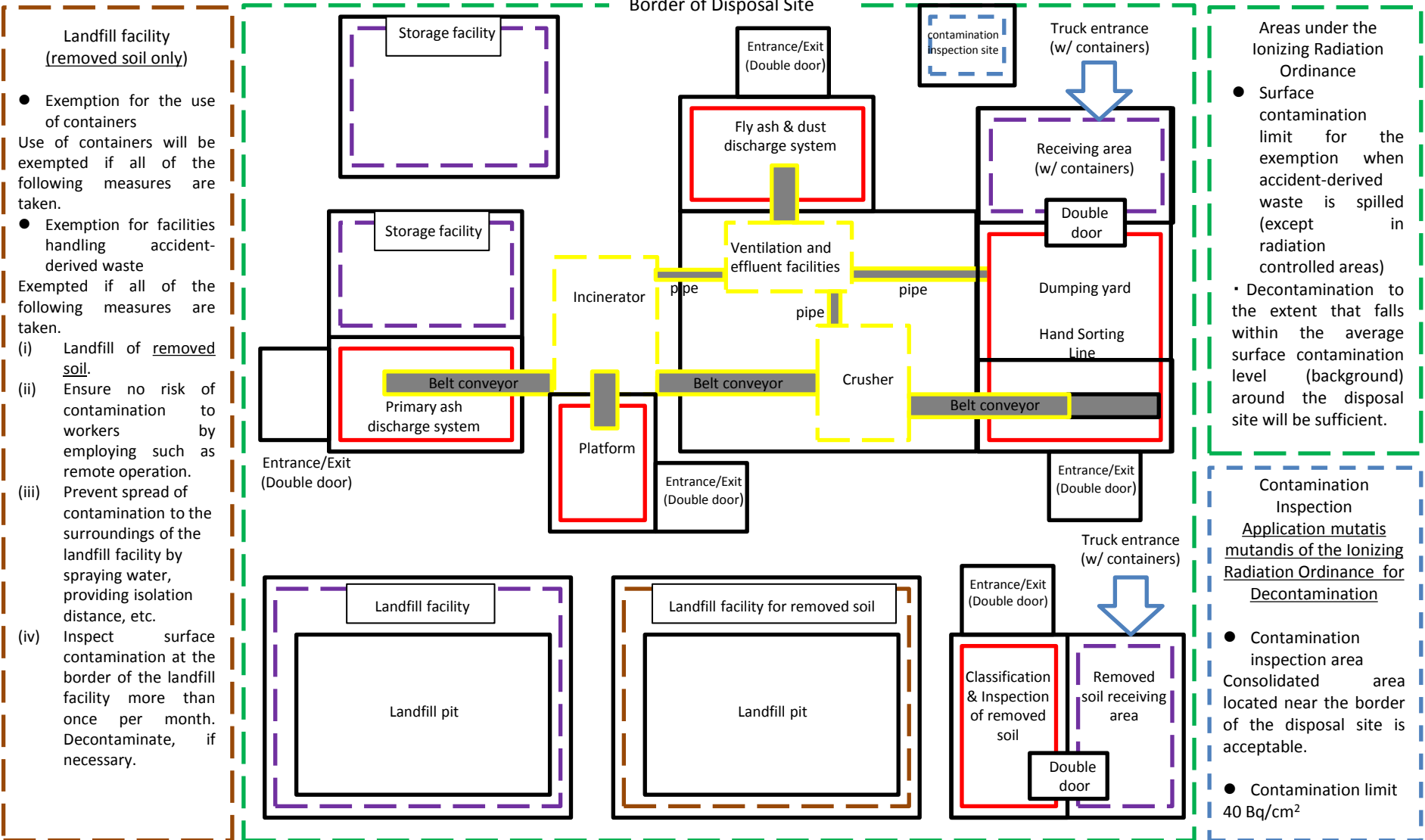
- Facility requirements
- Minimum clearance gaps between ceilings, walls, and floors
- Easy to decontaminate and material
- Leakage proof structure and material
- Double door at entrance/exit
- Post warning signs and enforce measures for prohibiting entrance
- Does limits
- ≤ 1mSv/week (≤ airborne concentration limit (50mSv/yr.)
- ≤ 40Bq/cm<sup>2</sup>
- Monitoring of work environment
- Airborne radioactivity concentrations
- Surface contamination on ceilings, floors, walls, and facilities

## Contamination inspection area

- Contamination limit 4Bq/cm<sup>2</sup>
- Incinerator, effluent and ventilation facilities, crushing system, belt conveyors, etc. (workers can not enter during operation)
- Facility requirements
- Leakage proof structure and material
- Post signs

# Requirements for Facilities in the Disposal Site and Dose Limit <Exemption>

In the case that a disposal site is set up in special decontamination areas, etc. some exemptions will be made because soil in and around the site has already been contaminated by the radioactive materials discharged by the accident..



### Landfill facility (removed soil only)

- Exemption for the use of containers
- Use of containers will be exempted if all of the following measures are taken.

- Exemption for facilities handling accident-derived waste
- Exempted if all of the following measures are taken.

- Landfill of removed soil.
- Ensure no risk of contamination to workers by employing such as remote operation.
- Prevent spread of contamination to the surroundings of the landfill facility by spraying water, providing isolation distance, etc.
- Inspect surface contamination at the border of the landfill facility more than once per month. Decontaminate, if necessary.

### Areas under the Ionizing Radiation Ordinance

- Surface contamination limit for the exemption when accident-derived waste is spilled (except in radiation controlled areas)
- Decontamination to the extent that falls within the average surface contamination level (background) around the disposal site will be sufficient.

### Contamination Inspection Application mutatis mutandis of the Ionizing Radiation Ordinance for Decontamination

- Contamination inspection area Consolidated area located near the border of the disposal site is acceptable.
- Contamination limit 40 Bq/cm<sup>2</sup>