

Principles of the interim storage facilities necessary for managing environmental pollution by radioactive materials discharged by the TEPCO Fukushima Daiichi Nuclear Power Plant accident

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Ministry of the Environment

Introduction

The “Basic Policy for Emergency Response on Decontamination Work” (Nuclear Emergency Response Headquarters, 26 August 2011) states about management of waste and soil contaminated with radioactive materials that “it shall be realistic to construct temporary storages in each municipality or local community for the time being”. It also states that “the national government shall be responsible for providing disposal sites that are necessary for long-term management of the waste and for safety commitment; therefore the government shall formulate a roadmap for the construction of the disposal sites and make an announcement with no delay”.

In relation to the above, the following are the principles for the disposal of soil and wastes, and of the temporary storage and interim storage facilities required for the disposal.

1. Securing temporary storage facilities

Temporary storage facilities are considered to be essential for conducting actions such as decontamination promptly. Actions to secure the temporary storage facilities have been taken based on a policy that the Ministry of the Environment takes charge of the special decontamination area in cooperation with the municipal governments, while each municipal government takes charge of the decontamination implemented areas under financial and technical supports from the national government.

The concept for safety commitment and the visual image of the temporary storage facility are illustrated in Figure 1.

2. Purpose and locations of the interim storage facilities

For removed soil which is anticipated to be generated in a massive volume during the course of the decontamination works that includes highly contaminated materials as well as designated wastes that are contaminated to or over a certain level (hereafter referred to as “massive removed soil,

etc.”), since it is difficult at this point to envisage clearly the method of final disposal and because of its enormous quantity, interim storage facilities shall be provided and operated in order to manage and store the massive removed soil, etc. safely and in a concentrated manner for a certain period of time.

Taking into consideration the importance of safe management at concentrated locations and the social acceptability for siting, every prefecture shall in principle have one facility within the prefecture to store the massive removed soil, etc. generated within that same prefecture. Based on that concept, in reality, the facility shall need to be constructed only in Fukushima prefecture where massive removed soil, etc. is anticipated to be generated. The flow of the specific waste and soil to be stored is shown in Figure 2.

In other prefectures, the generation of the removed soil and designated waste is expected to be relatively small in scale, and the degree of contamination is anticipated to be relatively low, thus, the existing controlled type landfill site shall be utilized as the disposal site, without planning to construct an interim storage facility (Figure 3). However, if the estimated quantity of the removed soil, etc. needs to be changed significantly in the future, the concept will be revised.

3. Image of an interim storage facility

In order to define design conditions of the interim storage facility such as objects to be stored, storage capacity and management method, quantity of the generated soil, etc., characteristics, contamination level, and the volume reduction method need to be estimated. Assumptions at this point are as follows.

- 1) Since there is a variety of contamination levels of the soil, etc., and types and contamination levels of the wastes to be stored and managed, soil and wastes to be stored shall be grouped according to the types and contamination levels. Storage areas shall be divided into compartments for each group using storage technologies appropriate for each group (Figure 4).
- 2) By constructing a storage compartment as a group of smaller sections one-by-one, the facility may start providing its service without waiting for the completion of the entire facility, and that will also shorten the delivery time for the smaller sections.
- 3) An interim processing facility based on treatment technologies that are technically feasible and expected to contribute to safe management and volume reduction shall be built in the same site.
- 4) The capacity of the interim storage facility is assumed in the range of approximately 15 - 28 million m³, although it depends on the volume of the contaminated soil to be removed according to the decontamination implementation plan in the future as well as the development

of applicable volume reduction technologies. By including an additional maintenance area to the facility area, the required site area shall be estimated to be approximately 3 - 5 km² (Material 1).

- 5) The interim storage facility shall be used only for managing the environmental pollution by radioactive materials discharged by this accident.

4. Progress schedule for the construction of interim storage facilities (Roadmap)

With a goal to start using the facility within 3 years from the fully active launch of the soil and waste delivery into the temporary storage facility, the national government shall make best efforts to construct the interim storage facilities according to the roadmap (Figure 5) with the understanding and support from the municipal government and the residents. The roadmap will be reviewed and revised whenever necessary during the course of the progress.

Even after the major decontamination works soon after the accident, it is envisaged that a long-term additional decontamination might be required in response to the migration of contaminated materials in the natural environment. In spite of that, the government will complete the final disposal mission outside Fukushima Prefecture within 30 years from the launch of the interim storage.

How to conduct the final disposal depends largely on the technological development of effective isolation/concentration of radioactive materials; thus, the national government shall promote the research, development and assessment of the technologies.

5. Location of the interim storage facility

The location of the interim storage facility shall be selected, while asking for understanding and cooperation of the municipal government and the local residents, by the end of fiscal 2012 at the latest when the objects to be stored, storage capacity and method of storage/management are foreseen to be known and the size and environmental conditions for siting the facility are clarified.

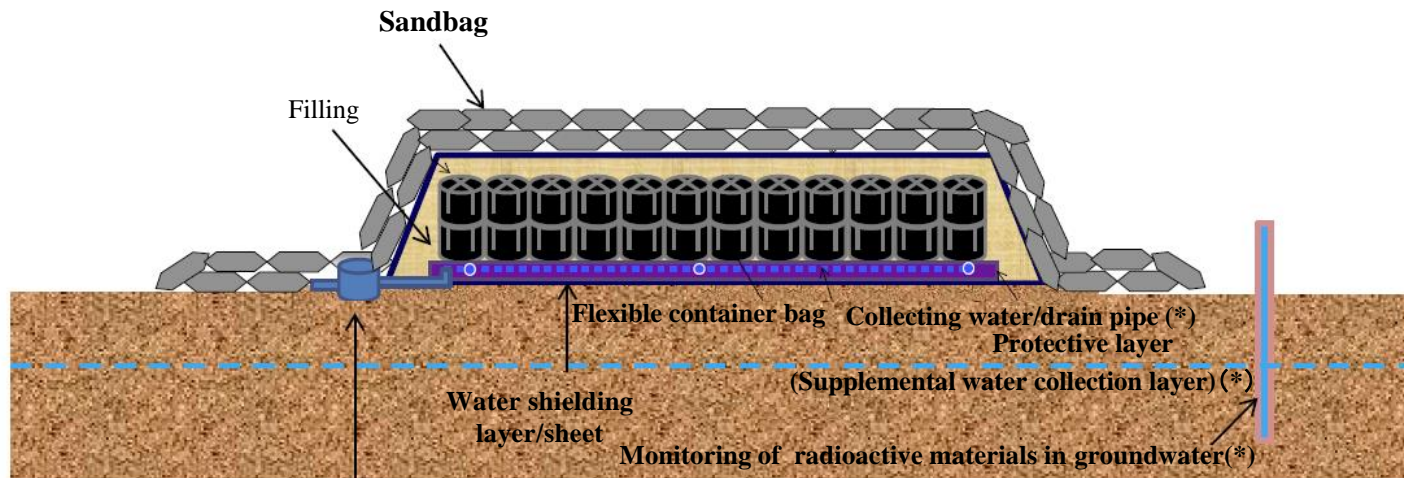
6. Safety commitment of the interim storage facility and due consideration of the environment

The national government shall secure the safety of and maintain the interim storage facility while making due consideration for the health of the local residents and preservation of the environment.

Before siting the interim storage facility, the government shall assess impacts of the facility to the environment and conduct safety assessment of the facility, and take appropriate measures for preserving the environment and ensuring safety of the facility.

Image of a Temporary Storage Facility (Example)

Figure 1



Tank for checking
radioactive materials in
seeping water (*)

* Except for temporary storage on site

Concept on safety commitment at the temporary storage facility

- Prevention of spreading/washout of the removed soil stored in the facility (including covering with soil/housing in container)
- Taking measures to prevent inflow of rainwater (e.g. rainwater seepage preventive sheet)
- Taking measures to prevent contamination of groundwater (e.g. water-shielding sheet, bentonite, etc.)
- Taking measures required to protect from radiation exposure (e.g. prevention of access, covering with soil/ shielding)

(Note) For temporary storage for combustible waste, fire prevention measures and mixing prevention measures are also required

Figure 2

Processing flow of the designated waste and the waste generated by decontamination works (In Fukushima Prefecture)

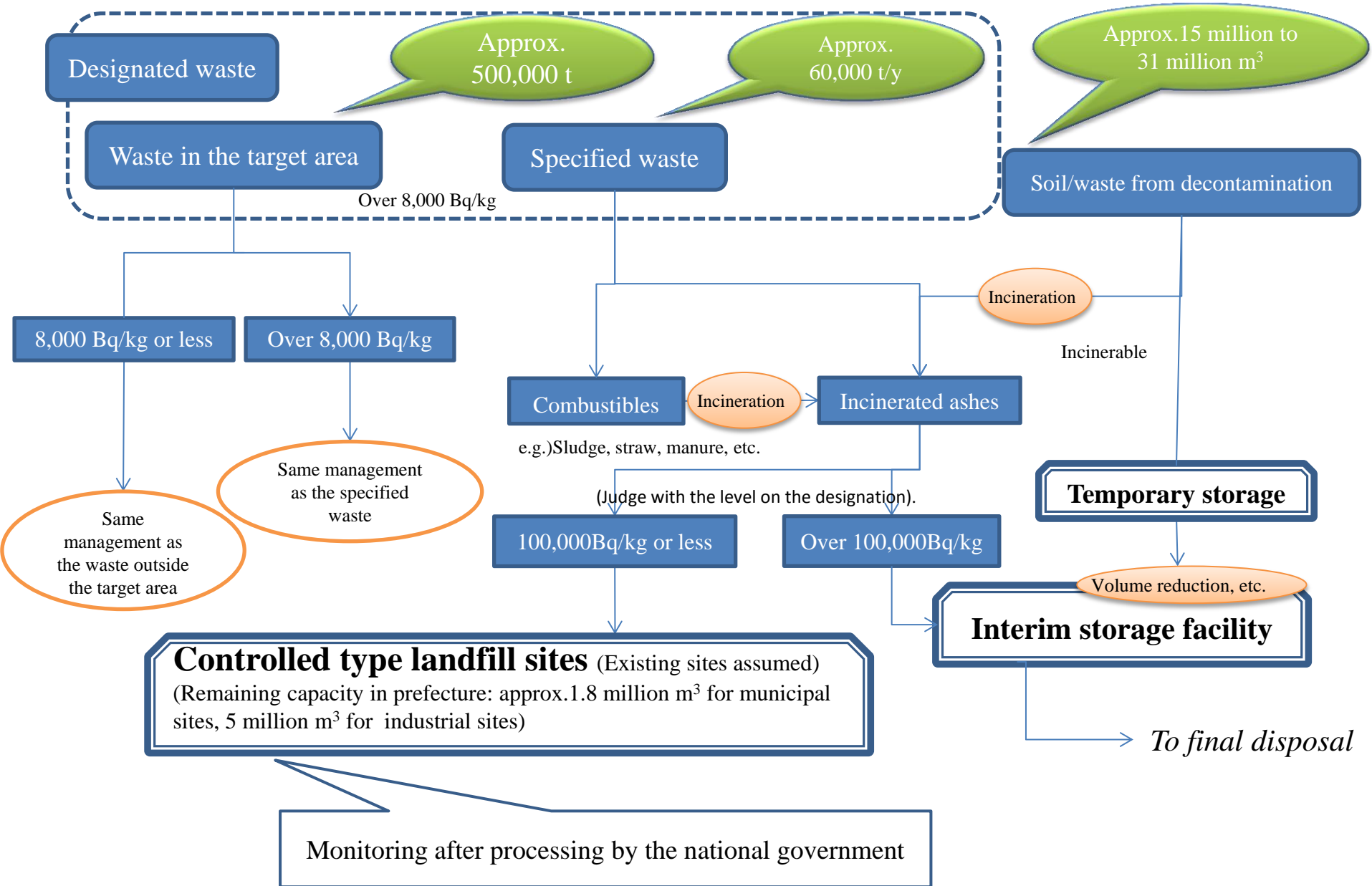


Figure 3

Processing flow of the designated waste and the waste generated by decontamination works (All prefectures other than Fukushima)

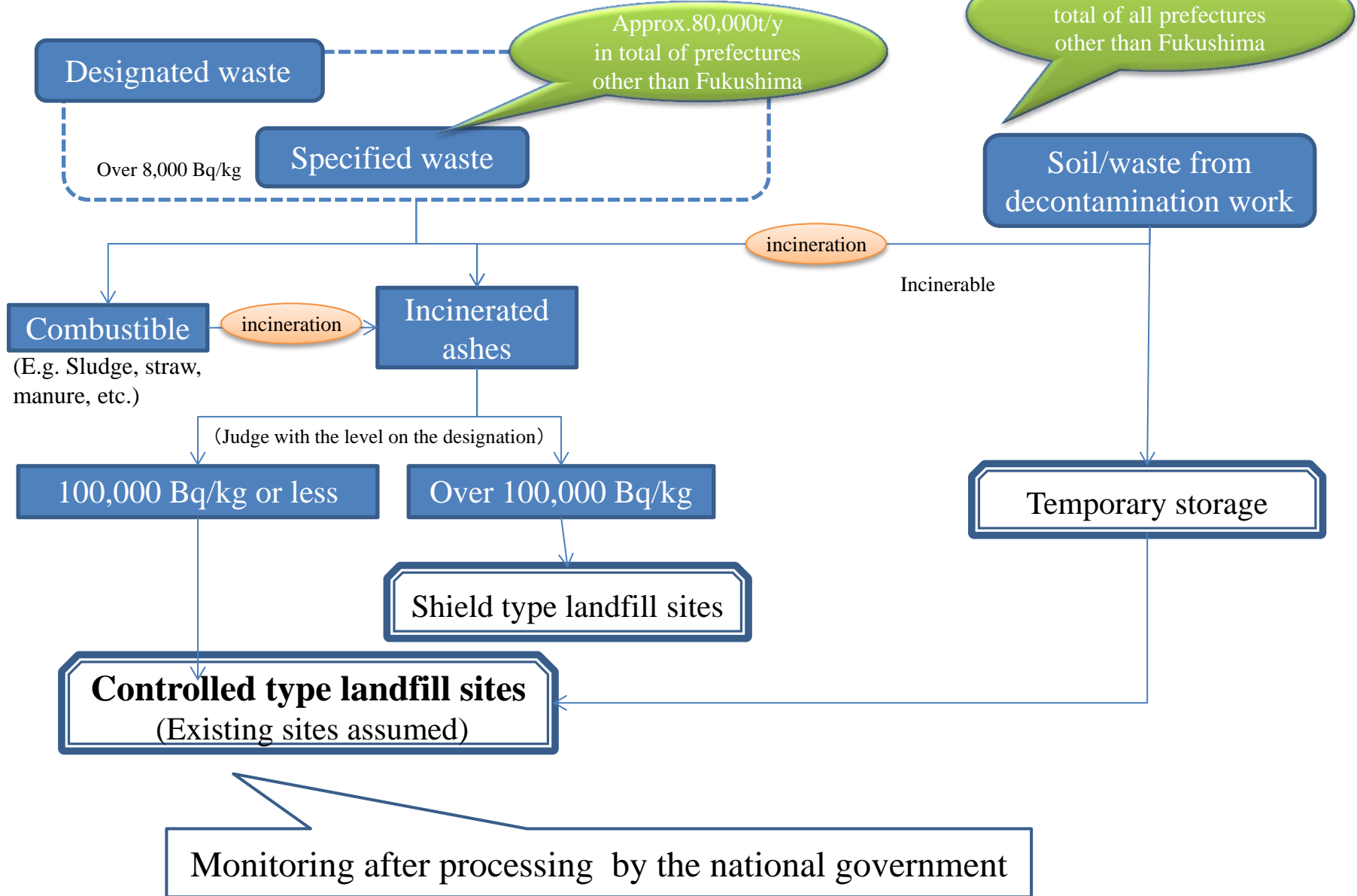
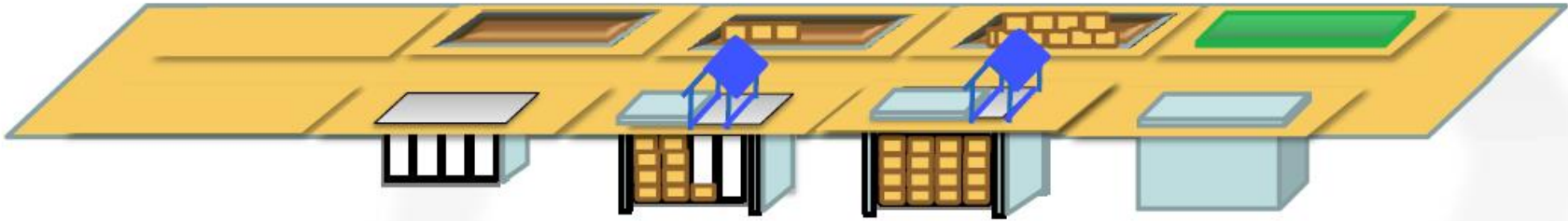


Image of interim storage facility

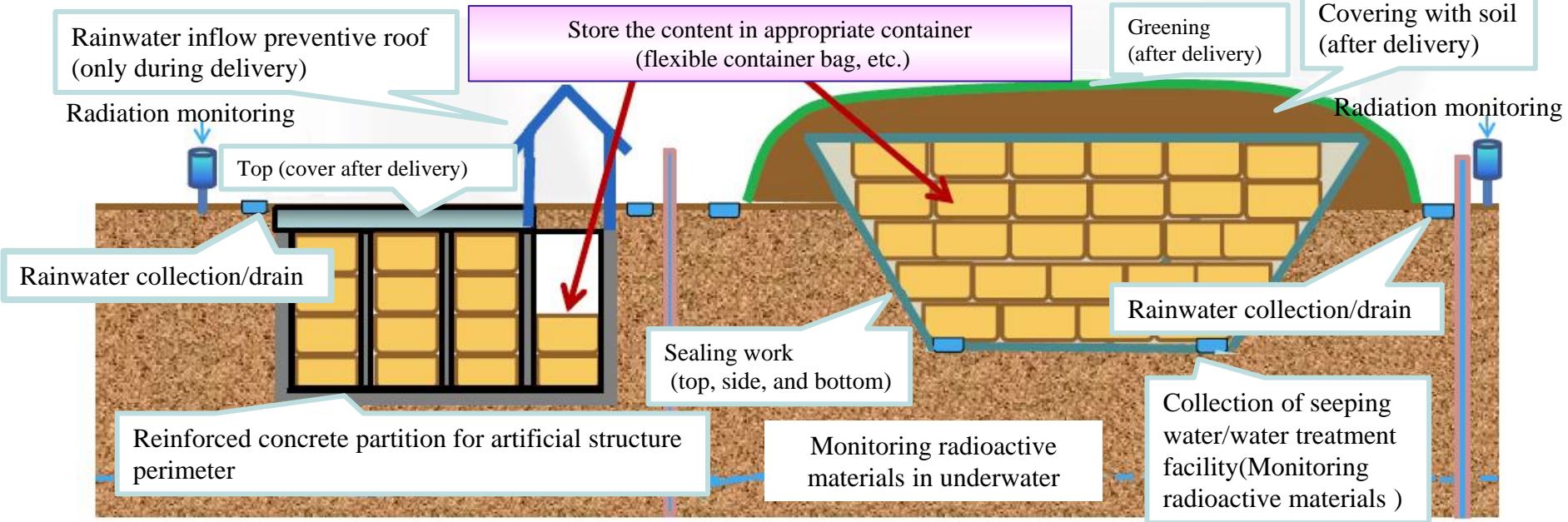
Cell type (parallel construction/operation) to start operation from the completed compartment for sooner utilization of the facility

Waiting for construction Under construction Receiving delivery Delivery completed After delivery

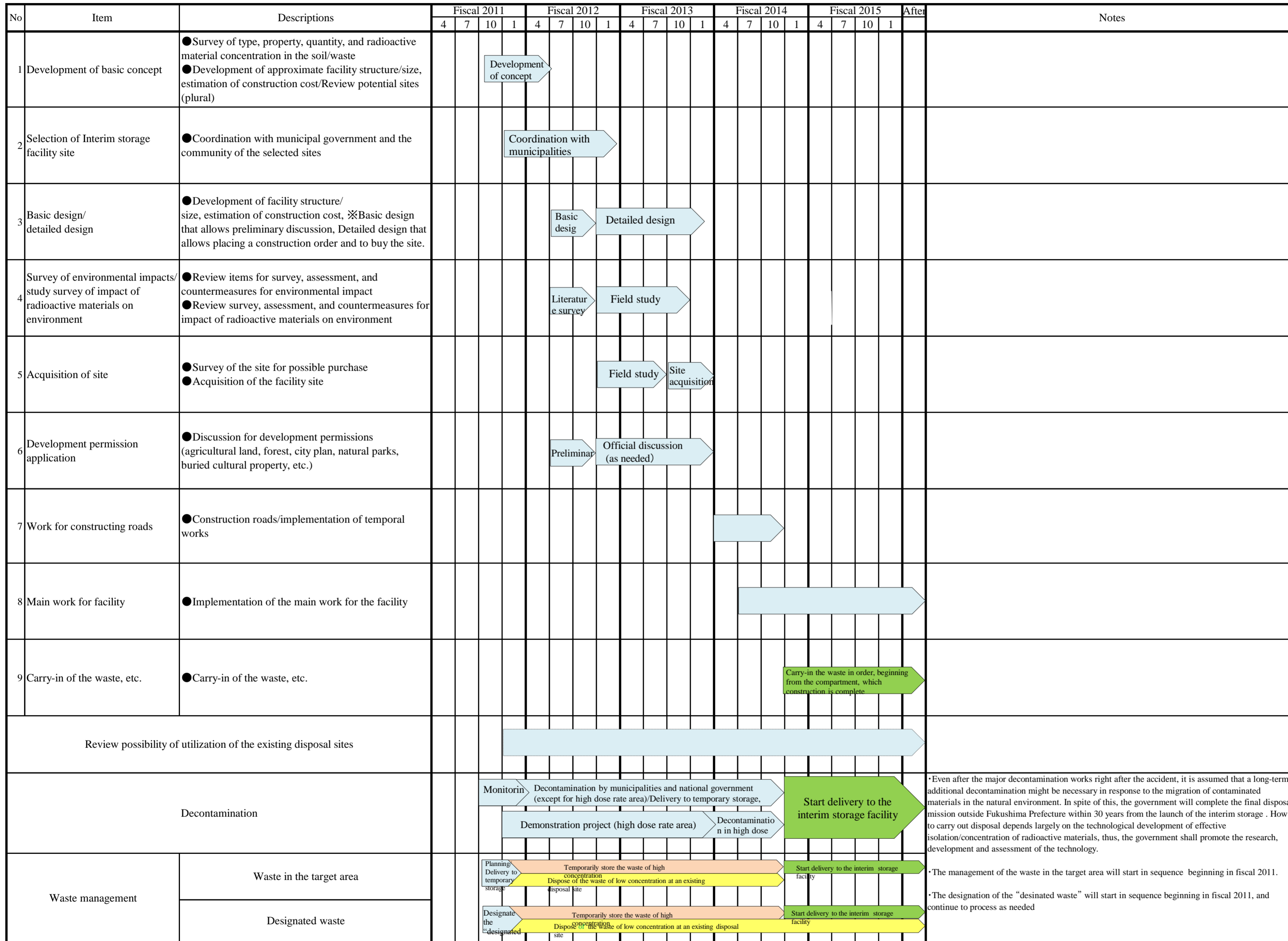


Example of facility for high concentration/elution type

Example of a facility for low concentration/non-elution type



Roadmap for the construction of Interim storage facility



※For the decontamination waste, the delivery to the interim storage facility will start after approx.3 years from the official start of delivery to the temporary storage.

Estimate of removed soil, etc. generated by decontamination

【Overview】

The quantity of the removed soil and the wastes are estimated in the following two example cases.

(Data from “Land use subdivision mesh” (2006) by the Ministry of Land, Infrastructure, Transport and Tourism and “Survey on the aircraft monitoring in the western part of Fukushima prefecture by Ministry of Education, Culture, Sports, Science and Technology (28 August and 18 September 2011)).

○ Case that generates a small quantity of removed soil and waste

In areas with relatively high additional radiation exposure dose, it was assumed that the decontamination is implemented by scraping topsoil, cleaning the side ditches, pruning branches in the forests, and removing fallen leaves, with priority in the living and industrial zones, and in areas with relatively low additional radiation exposure dose, it was assumed that the decontamination is implemented by decontaminating locally the parts or items where the radiation dose is especially higher, or scraping topsoil in children’s living zones.

- Fukushima Prefecture … Approx. 15 mil. m³ after incineration (Approx. 15 mil. m³ before incineration)
- Other areas … Approx. 1.4 mil. m³ after incineration (Approx. 1.4 mil. m³ before incineration)

○ Case that generates a large quantity of removed soil and waste

In addition to the above case, the following is estimated 1) when decontamination was implemented by pruning branches and removing fallen leaves in the forests in the non-living zone (excluding conservation areas), where additional radiation exposure dose is 20 mSv/y or more, and 2) when decontamination was additionally implemented by scraping soil to some extent in the areas where additional radiation exposure dose is relatively low.

- Fukushima Prefecture … Approx. 28 mil. m³ after incineration (approx. 3.1 mil. m³ before incineration)
- Other areas … Approx. 13mil. m³ after incineration (approx.13mil. m³ before incineration)