Safety assessment for the Rokkasho LLW disposal facilities

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JAPAN NUCLEAR FUEL LIMITED

Contents

1. Introduction: the location of JNFL

JNFL

Mainland of Japan

Today, we are here!
@Kyushu Univ.

JNFL

Tokyo

5. LLW Disposal Center

4. Uranium Enrichment Plant

3. Mixed Oxide Fuel Plant

1. Reprocessing Plant

2. Vitrified Waste Storage Center

Facility location

Shimokita Peninsula

Mutsu Bay

Rokkasho-mura

Aomori Prefecture

Rokkasho Visitors Center

National Petroleum Storage Site

Oishitai

Iyasakatai

Obuch Lake

Emergency Management Facilities

Obe River

Obuchi-hama

Route 338

Pacific Ocean

Mutsuogawara Port

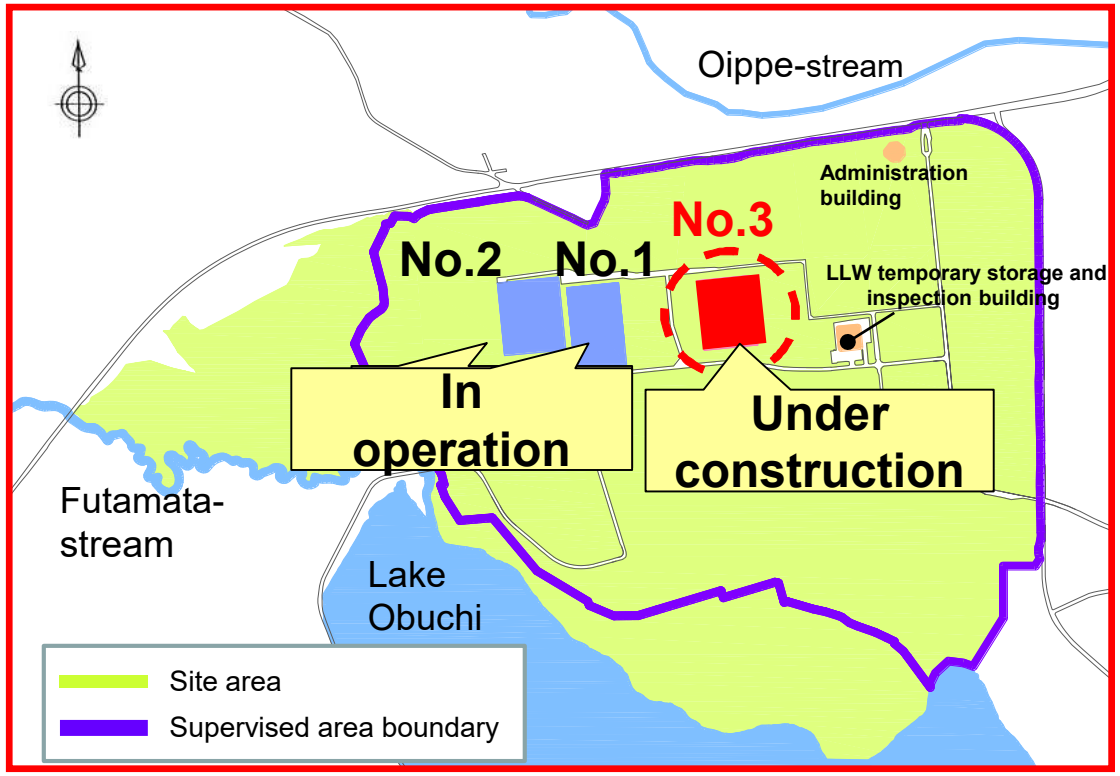
Spa facility "Rokka Pokka"

0 1 2 3km

N

Rokkasho-village

1. Introduction: The location of LLW disposal facilities



LLW disposal facilities

There are 3 disposal sites, No.1, No.2 and No.3.

No.1 & No.2

- The First 2 LLW disposal facilities have been in operation for 30 years.

  (No.1 started operation in 1992) 30th anniversary

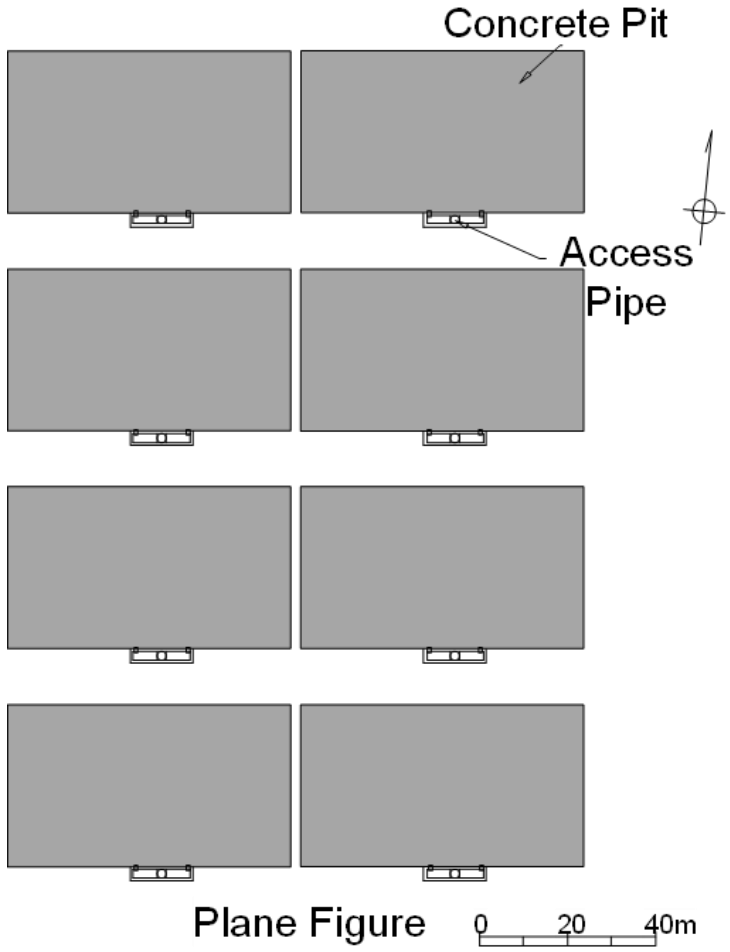
- JNFL had disposed of more than 300,000 drums, which are generated from the operation of NPPs.

No.3 (New disposal facility)

- Furthermore, JNFL applied for the amendment of No.3 disposal business permission in Aug. 2018, which got approved in Jul. 2021 from Nuclear Regulation Authority (NRA)

2.(1) Outline of the No.3 disposal facility

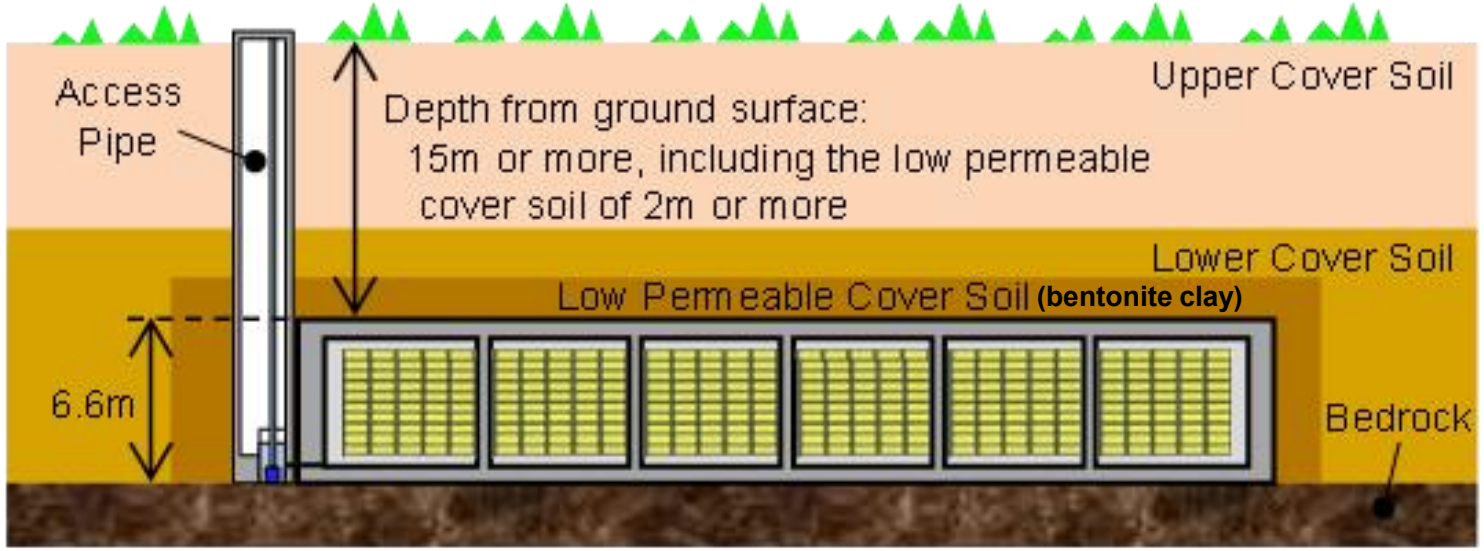
Overlooking



8 Concrete pits

- No.3 disposal facility consists of 8 concrete pits.
- Each concrete pit has disposal capacity 26,400 drums, then in total 211,200 drums/8pits.
- Type of waste is solidified dry active waste, which is encapsulated in a drum of 200L.
- In addition, 3 layered-cover soil with low permeability is to be installed to restrict the ground water flow.

Cross section



2.(2) Regulatory requirements for LLW

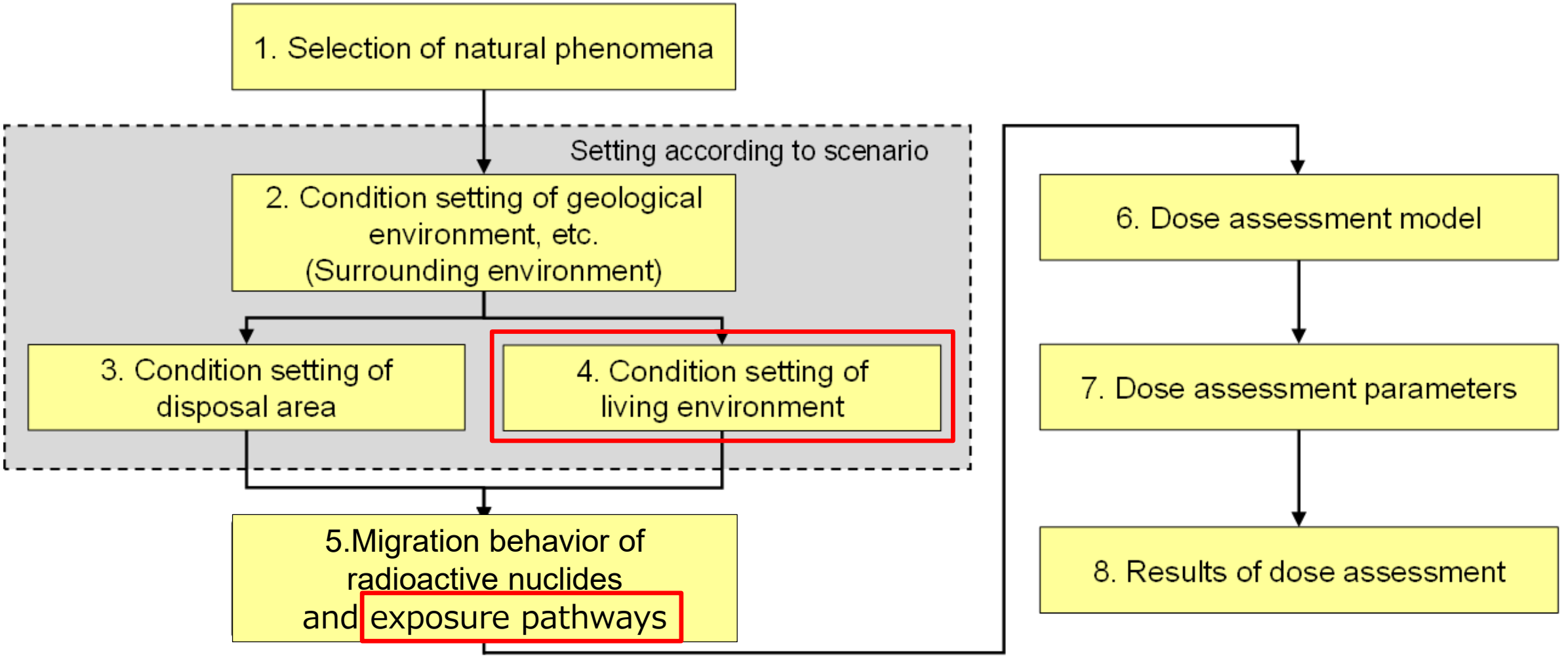
Table: Type of radiation exposure scenario in the post-institutional control period

Type of scenario		Dose criteria	The future human activities	Parameters association
Natural evolution scenario	Most likely scenario	10 μSv/y **(ALARA)**	• Realistic and plausible assumptions considering the current lifestyles*1	• Realistic value on the basis of the latest statistics and etc..
	Most severe scenario	300 μSv/y **(Dose constraints)**	• Conservative* assumptions, considering the current lifestyles*1	• Conservative* values on the basis of the latest statistics and etc..
Human Intrusion scenario		1,000 μSv/y **(Dose limits)**		

* To calculate so that the result of dose assessment is larger than the actual value.

*1: The current lifestyles are principally estimated on the basis of the latest statistics, investigations and literatures. Note that the trends and the singularities in the past are considered.

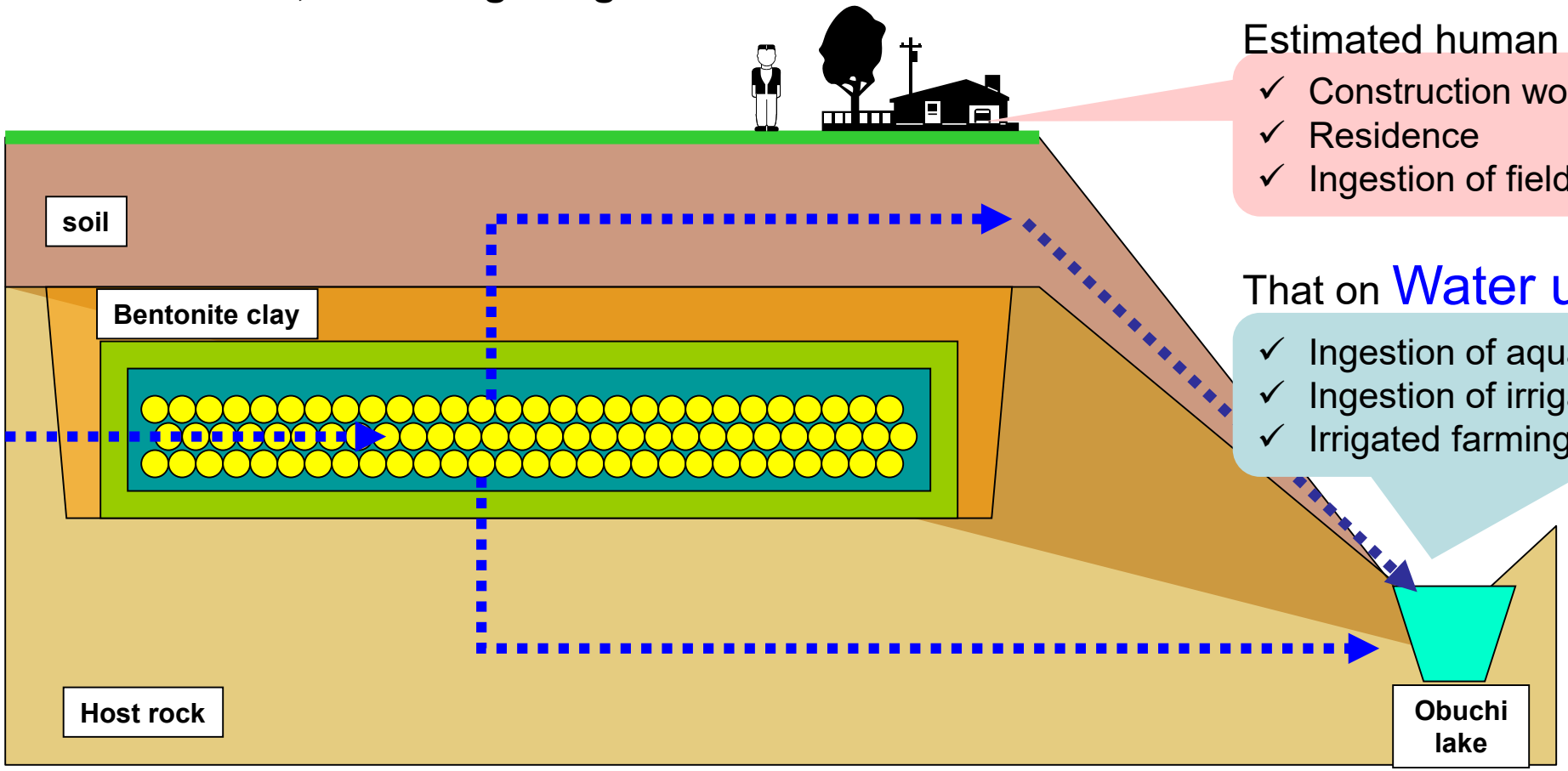
2.(3) Flow of the dose assessment in the post-institutional control period



I would like to explain these details, “living environment” and “exposure pathways”.

2.(4) Condition setting of living environment

- The radioactive nuclides would migrate from disposal area to the living environment, resulting in the radiation exposure to the public.
- In the condition setting of living environment, **Future human activities** were estimated by **the surrounding environment, such as geological and social environment.**



Estimated human activities on **Land Use**

- ✓ Construction work
- ✓ Residence
- ✓ Ingestion of field farming products

That on **Water use**

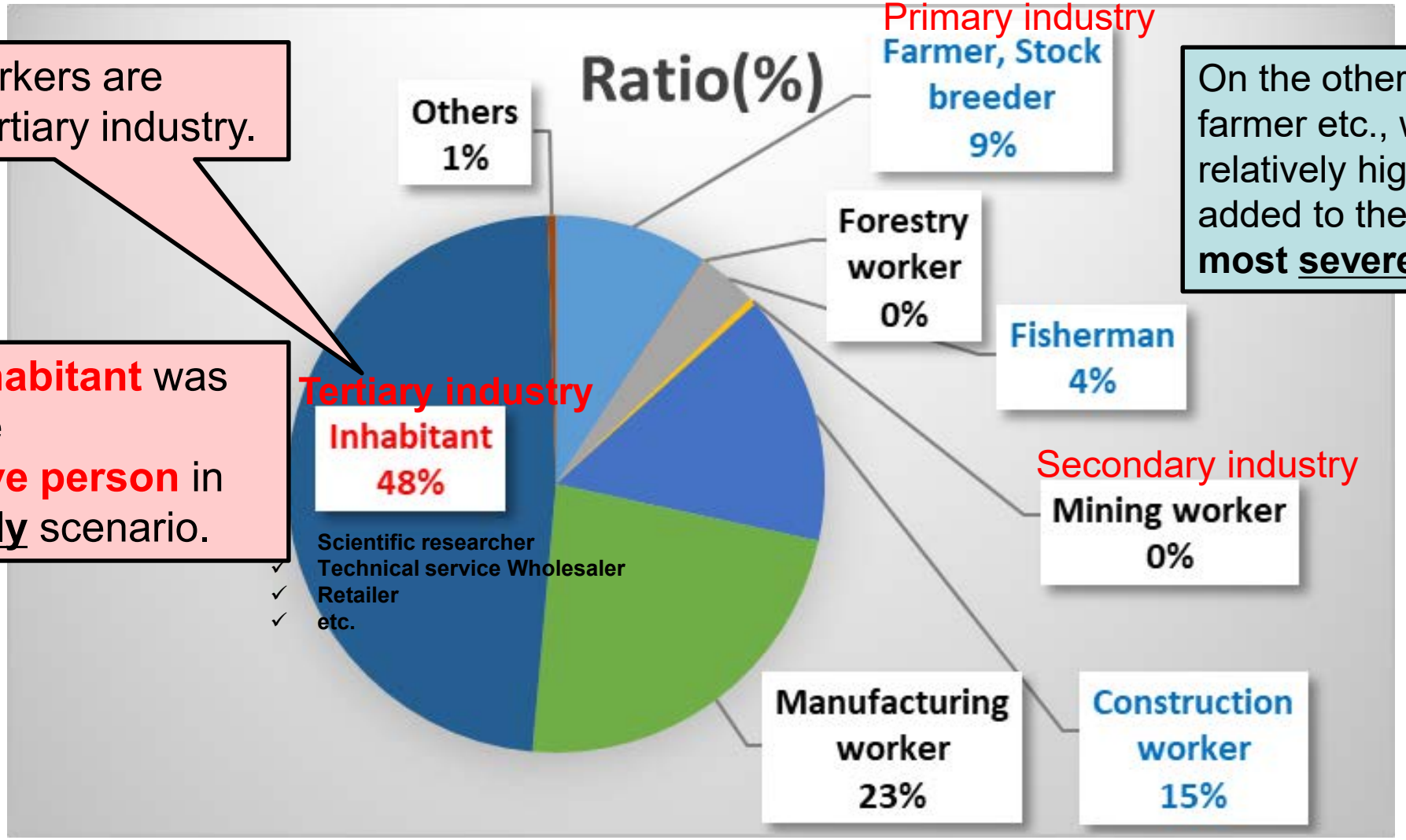
- ✓ Ingestion of aquatic products
- ✓ Ingestion of irrigated farming products (Rice)
- ✓ Irrigated farming works

Fig. Conceptual image of dose assessment in natural evolution scenario.

2.(5) Assumption of representative person

Half of the workers are engaged in tertiary industry.

Thus, The **inhabitant** was chosen as the **representative person** in the **most likely** scenario.



On the other hand, the farmer etc., who have relatively high ratio are added to the R.P. in the **most severe** scenario.

Number of workers in Rokkasho-village (according to statistics in 2016)

2.(6) Assumption of exposure pathways①

Table: the assumption of exposure pathways **in the most severe scenario and the most severe scenario.**

- The exposure pathways are different from each type of representative person.
- Exposure pathways were estimated by considering the combination of H.A and R.P.

Scenario	Human activities	Exposure pathway	Representative person: Fisher-man	Farmer (Rice)	Farmer (Others)	Stock breeder	Const-ruction worker	Inhabi-tant
Most likely/ Most severe scenario	Water use	Ingestion of the aquatic products caught in Obuchi-numa	✓	✓	✓	✓	✓	✓
		Ingestion of the irrigated farming products cultivated with river water	✓	✓	✓	✓	✓	✓
		Irrigated farming works using river water	-	✓	-	-	-	-
	Land use	Outside works in the disposal area	-	-	-	-	✓	-
		Inhabitation in the disposal area	✓	✓	✓	✓	✓	✓
		Ingestion of the field farming products cultivated in the disposal area	✓	✓	✓	✓	✓	✓

In the most likely scenario, dose assessment for the inhabitant was performed only.

In the most severe scenario, dose assessment for each representative person was performed

2.(6) Assumption of exposure pathways②

Table : the assumption of exposure pathways in the dose assessment **in human intrusion scenario**

Representative person

Scenario	Human activities	Exposure pathway	Construction worker	Inhabitant
Human intrusion scenario	Water use	Ingestion of the aquatic products caught in Obuchi-numa in case of low permeability of the cover soil was lost by the large-scale construction in the disposal area	-	✓
		Ingestion of the irrigated farming products cultivated with river water in case of low permeability of the cover soil was lost by the large-scale construction in the disposal area	-	✓
	Land use	Large-scale construction works in the disposal area	✓	-
		Inhabitation on the excavated soil which accompanies the large-scale construction	-	✓
		Ingestion of the field farming products cultivated on the excavated soil which accompanies the large-scale construction		✓

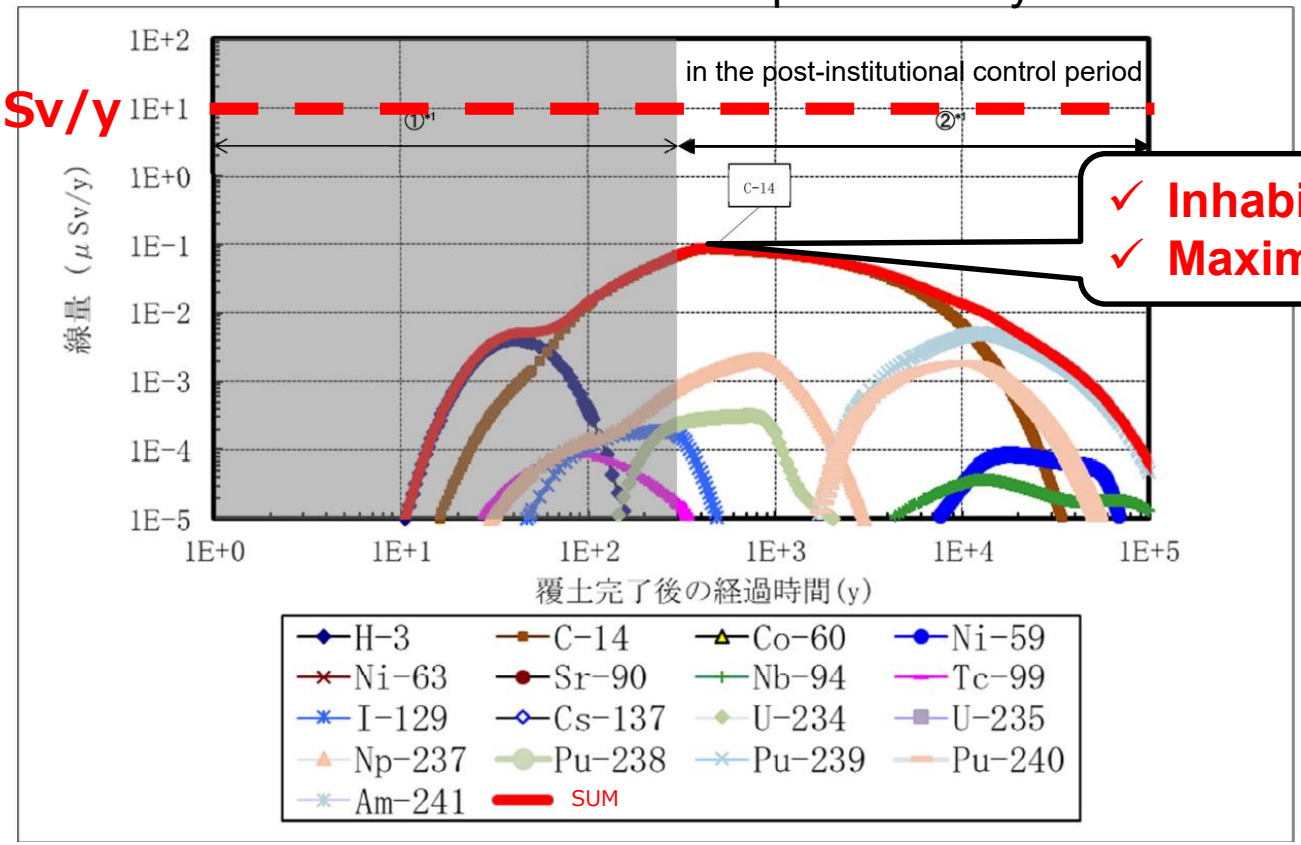
To be exposed through land use

due to the land use after excavation.

- In the human intrusion scenario, construction workers are assumed to be exposed through land use.
- In addition, it is assumed that the inhabitant would be exposed due to the land use after excavation.

2.(7) The result of dose assessment

the result of dose assessment from No.3 disposal facility in the most likely scenario



✓ **Inhabitant : 0.088 μSv/y**
✓ **Maximum dose peak time : 430 y**

The dose*1 from No.3 disposal facility is sufficiently lower than the dose criteria

*1: Pile up dose of No.1, No.2 and No.3 disposal facility:
0.46 μSv/y (the most likely scenario) and 11 μSv/y (the most severe scenario)

3. Summary

- JNFL applied for the amendment of No.3 disposal business permission in Aug. 2018, which got approved in Jul. 2021 from Nuclear Regulation Authority (NRA)
- JNFL performed the dose assessment of the No.3 disposal facility with several representative person and the exposure pathways, based on the latest available statistics.
- JNFL quantitatively confirmed the dose from the No.3 disposal facility would comply with the dose criteria. (e.g. 0.088 μSv/y < 10 μSv/y (in the most likely scenario))