

# 11 years

Decommissioning  
of Fukushima Daiichi  
NPS



福島第一廃炉

11年の歩み

# Fukushima Daichi site today

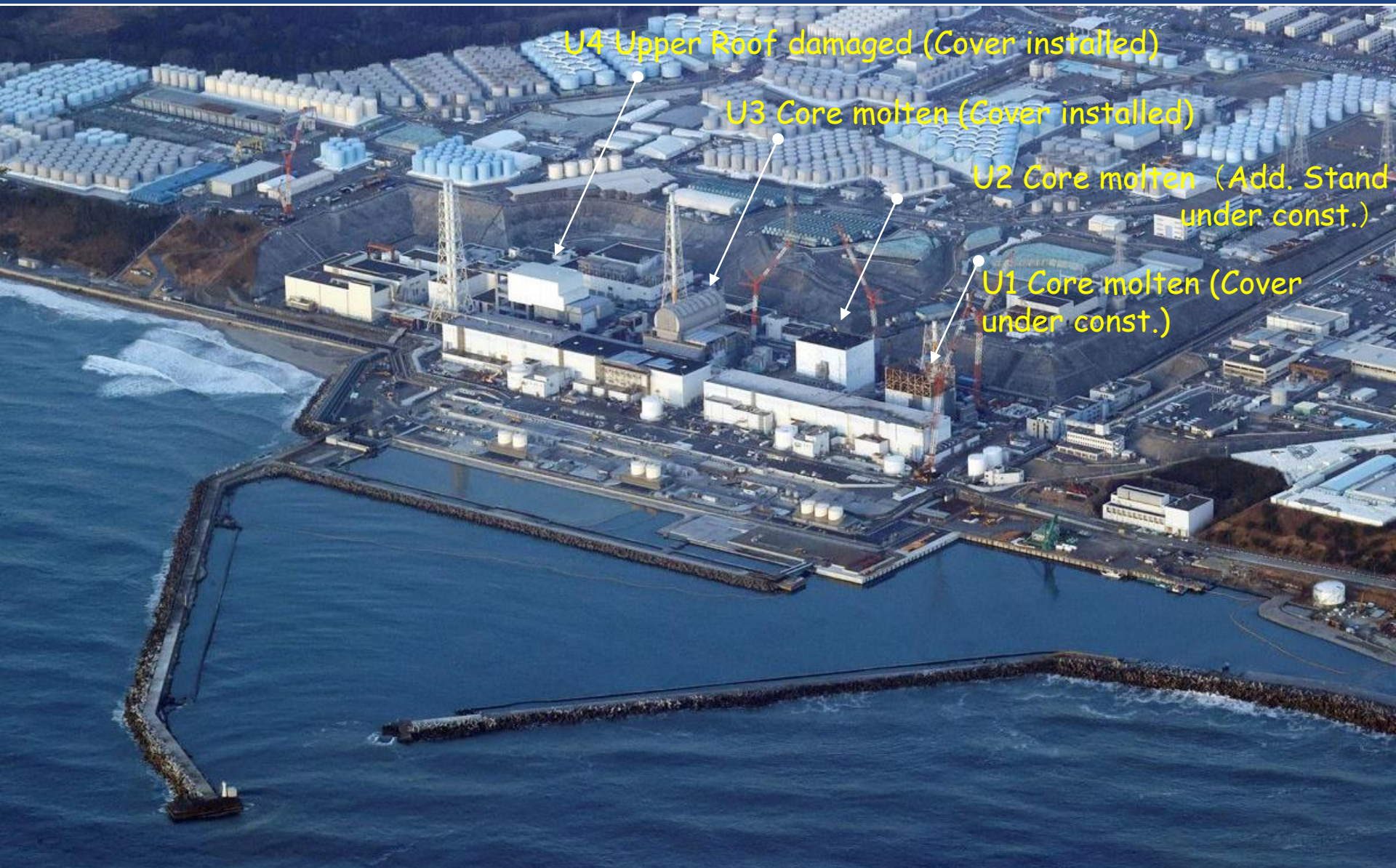


Photo : REUTER, May 19, 2022 (<https://www.reuters.com/world/asia-pacific/japan-nuclear-regulator-grants-initial-nod-fukushima-water-release-plan-2022-05-18/>) (Originally taken by Kyodo on Mar 17, 2022)



# What happened in the reactor?



- Tsunami attacked
- Power source lost



Hydrogen explosion @ U1,3 and 4

Spent fuel pool

Air release with radionuclides to avoid pressure build-up at reactor

Radionuclides leak from PCV

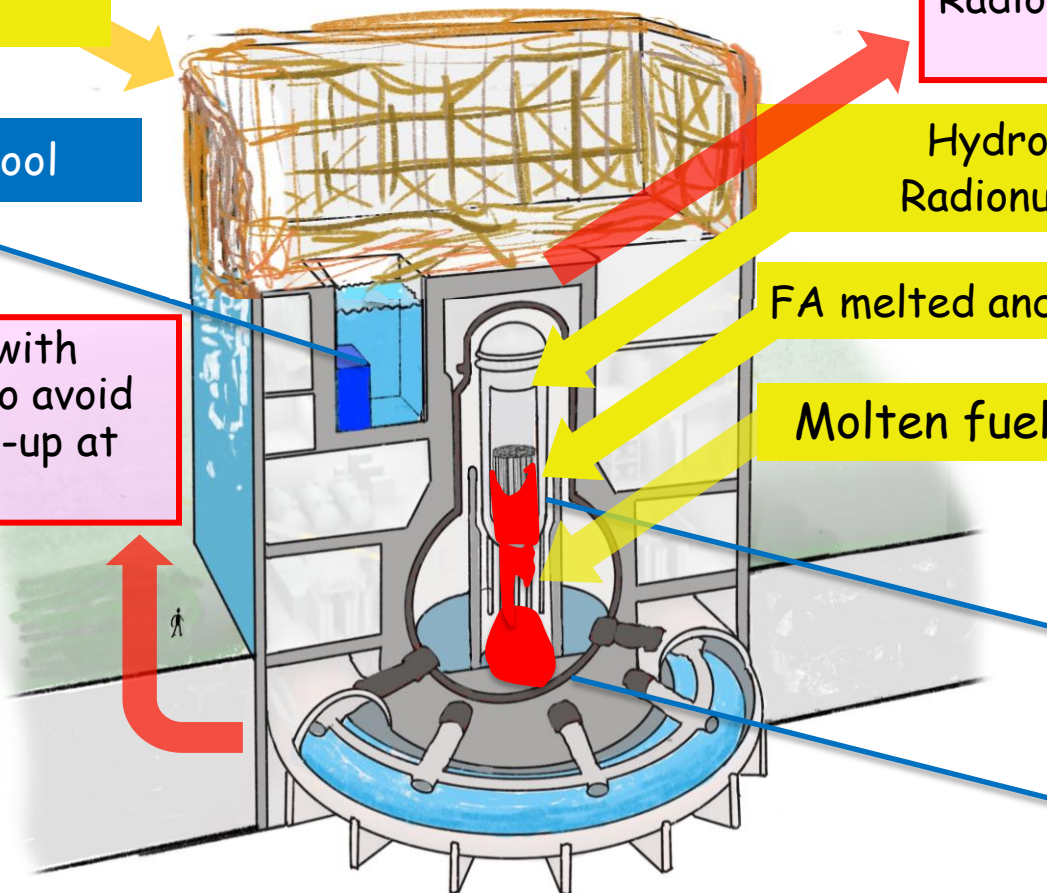
Hydrogen generated/  
Radionuclide evaporated

FA melted and collapsed

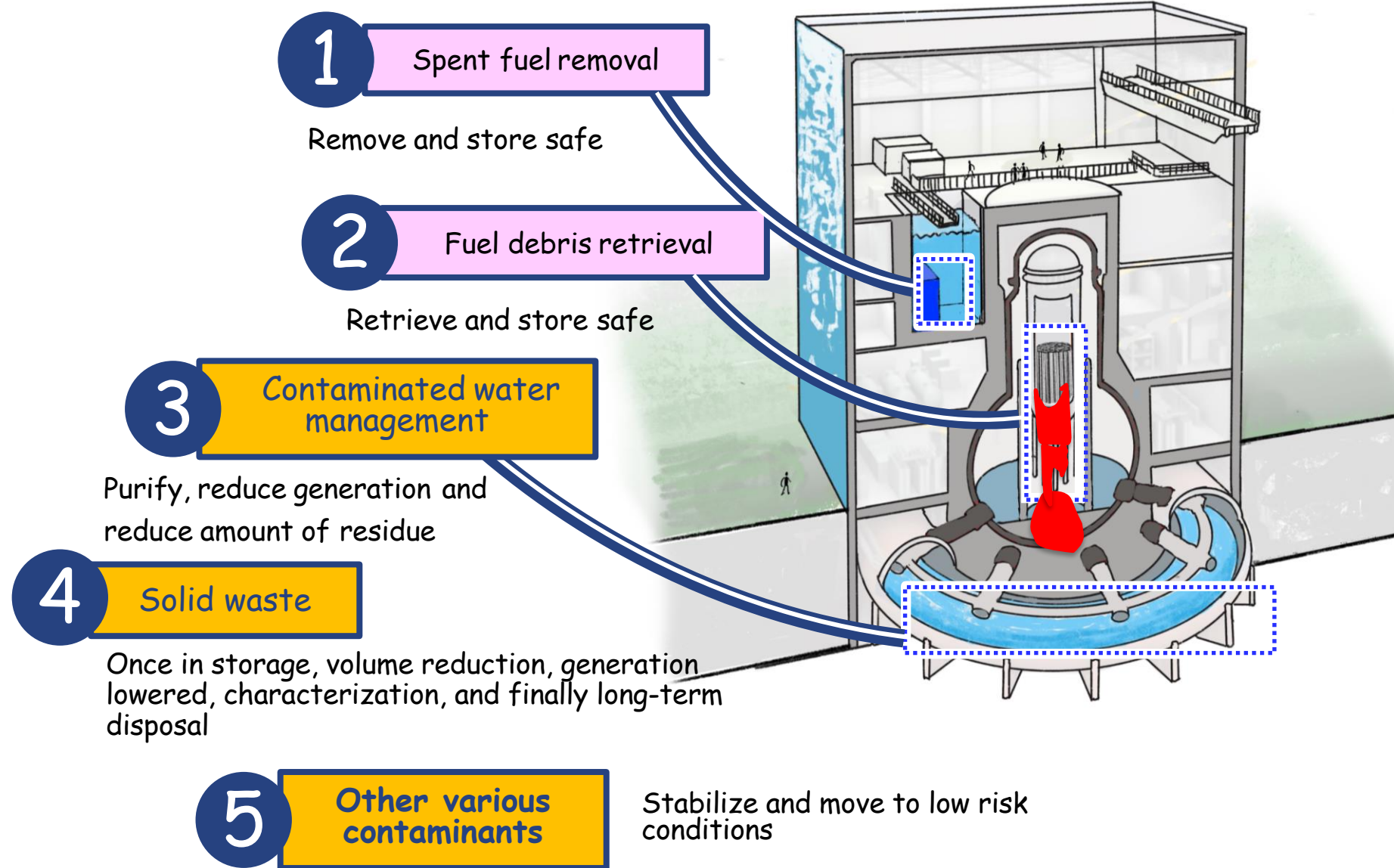
Molten fuel dropped

Reactor pressure vessel

Primary containment vessel

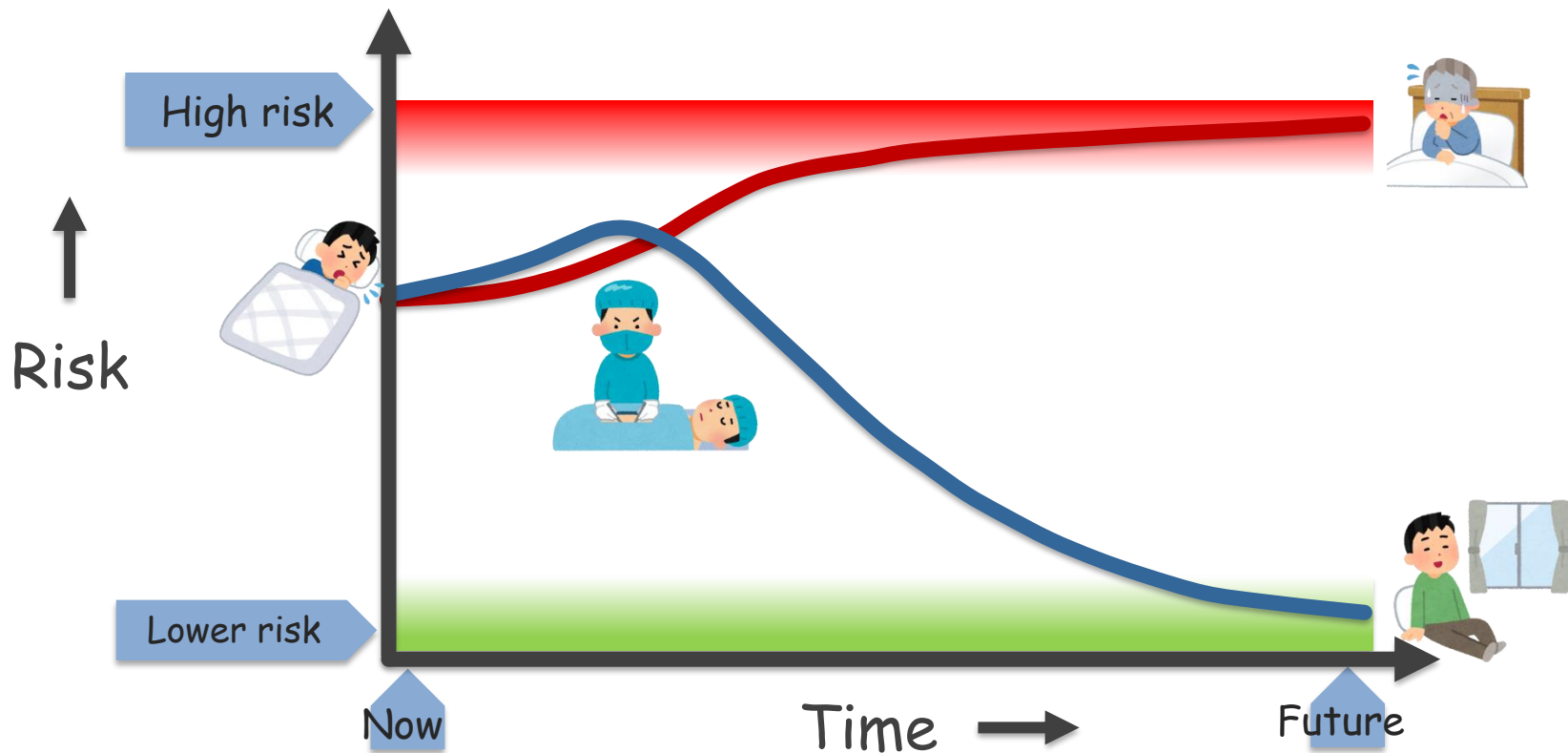


# Major risk sources



# Long-term Strategy (Risk varies with time)

- If current risks leave untouched, risk further increases due to ageing etc.
- By implementing lower risk work with careful preparation, future risks could be reduced



# Long-term decommissioning plan (Government's policy)






2011.03.11

2011.11~

2013.11~

Ca. 2023~

Ca. 2031~

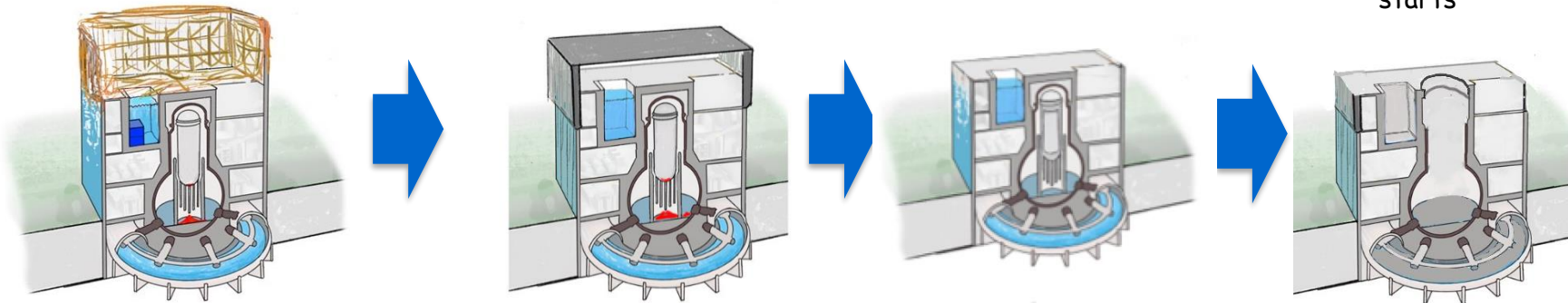
Early stage	Step 1	Step 2	Step 3— I	Step 3— II
<p>Until cold shutdown</p> <p>Significantly reducing release of radioactive materials/ waters</p> 	<p>Until start of spent fuel removal</p> 	<p>Until start of fuel debris retrieval</p> 	<p>End of Stage 2~End of Remediation</p> <p>Final goal; Finish of Step 2(2011 End) ~30-40 years later</p>	
			<ul style="list-style-type: none"> <li>• SF removal complete</li> <li>• Trial fuel debris (FD) retrieval</li> <li>• Stepwise expanded retrieval of FD retrieval</li> <li>• Minimize contaminated water</li> <li>• Promote Waste management</li> </ul> 	<ul style="list-style-type: none"> <li>• Full-fledged SF removal</li> <li>• Solve contaminated water issue</li> <li>• Solid waste storage, volume-reduction, management etc.</li> <li>• Challenge to building demolishing and site use</li> </ul> 
<p>Until today</p> <p>In-reactor inspection</p> <p>Study FD retrieval method</p> <p>Treat in-house stagnant water management</p> <p>Contaminated water treatment</p> <p>U. 3,4 SF removal</p> <p>U. 1,2 SF removal prepa.</p>	<p>From tomorrow</p> <p>Aiming at full-scale D&amp;D at Step-3, projects and engineering being advanced by TEPCO D&amp;D company</p>			

In case of U1

SF removal completed

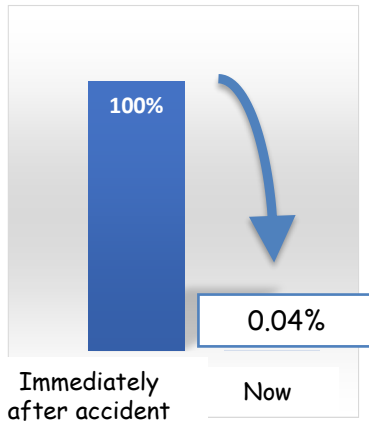
FD retrieval

Future demolishing starts

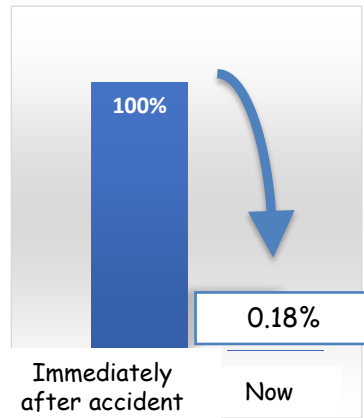


# Hazard level of reactor decreases drastically with time

Reactor decay power

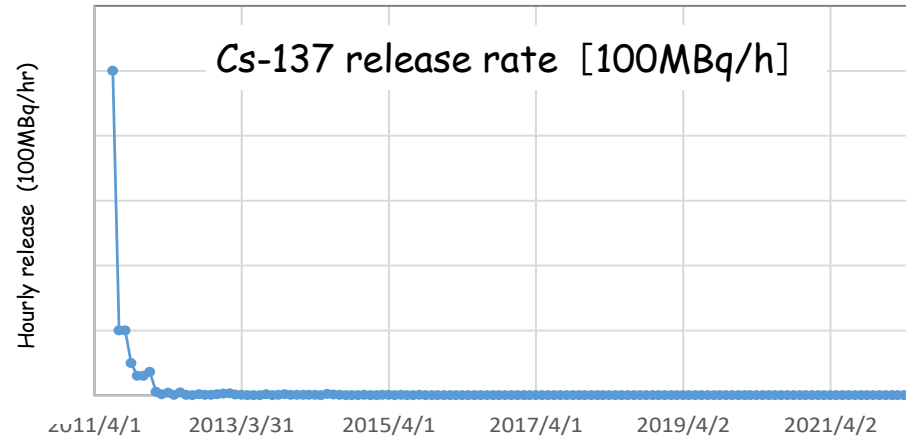


Core radioactivity

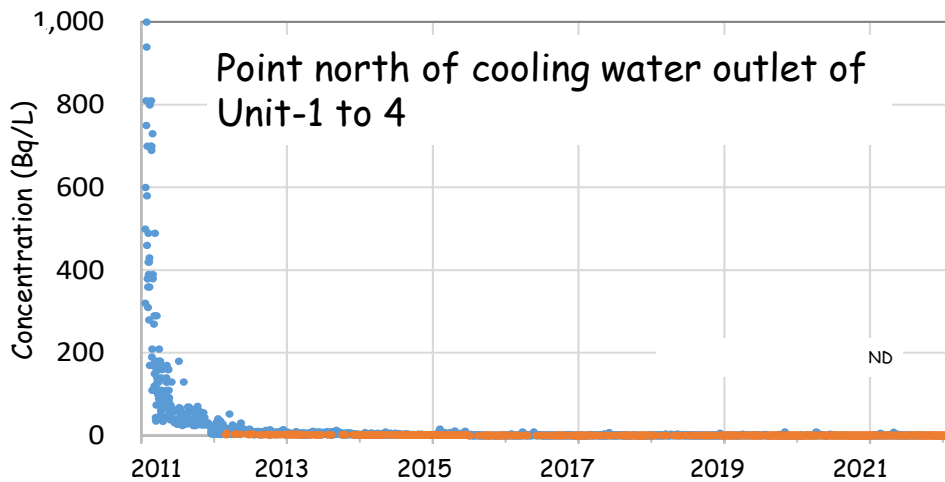


By calculation for U3

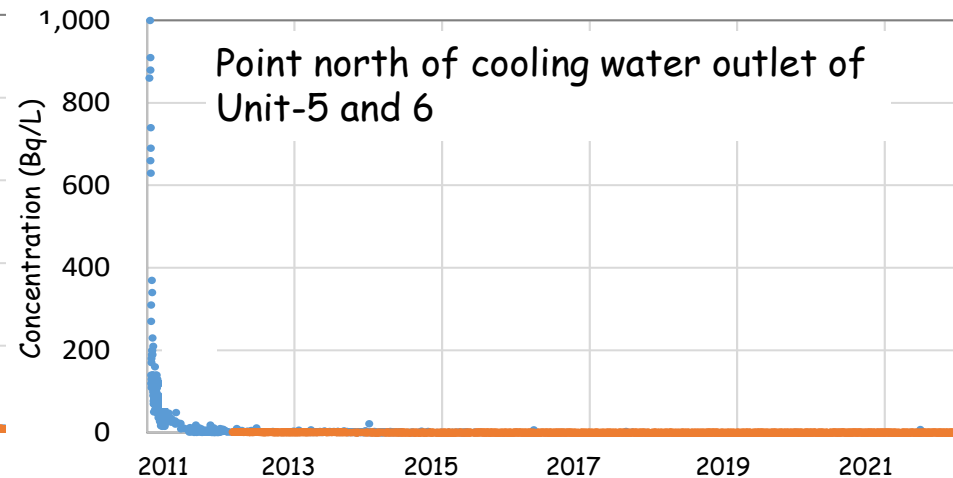
## Ambient Cs-137 release from reactor buildings



## Cs137 inside of harbor



## Cs137 outside of harbor





# Priority is to ensure safe storage

- SF removed from accident reactor is securely stored in dry casks (custody facility).
- Large amount of solid radioactive waste in temporal storage will be stored in a robust waste facility that is being extended, with efforts to reduce the amount generated and volume of waste in the future .



Rubble storage facility



Miscellaneous solid waste incinerator



New waste storage



SF custody cask





- **Insufficient information**
- **Uneasiness** . . .
- **Possible reputational damage**

## “Natural question” to be jointly thought of:

Q-1; Influence to environment?

Q-2 ; Reputational damage?

Q-3 ; Comparison with precedents or world experiences?

Q-4 ; Long term impact on 1F D&D?

Q-5 ; How to overcome psychological burden of you?

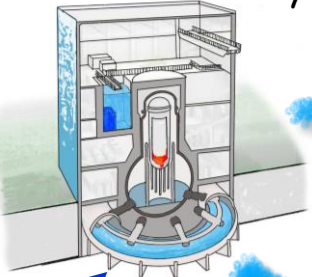


Photo : NUCLEAR HISTROY, Mar 11, 2022 (<https://www.ans.org/news/tag-fukushima+daiichi/>)



# How ALPS treated water generated?

Reactor cooled by water



Remove radioactive Cs



Underground water  
150m<sup>3</sup>/day

Remove salt

Remove radioactive nuclide  
by ALPS

Store T-containing water



Photo NUCLEAR HISTROY, Mar 11, 2022 (<https://www.ans.org/news/tag-fukushima+daiichi/>)



# Plan of ocean discharge of ALPS treated water (Licensing)

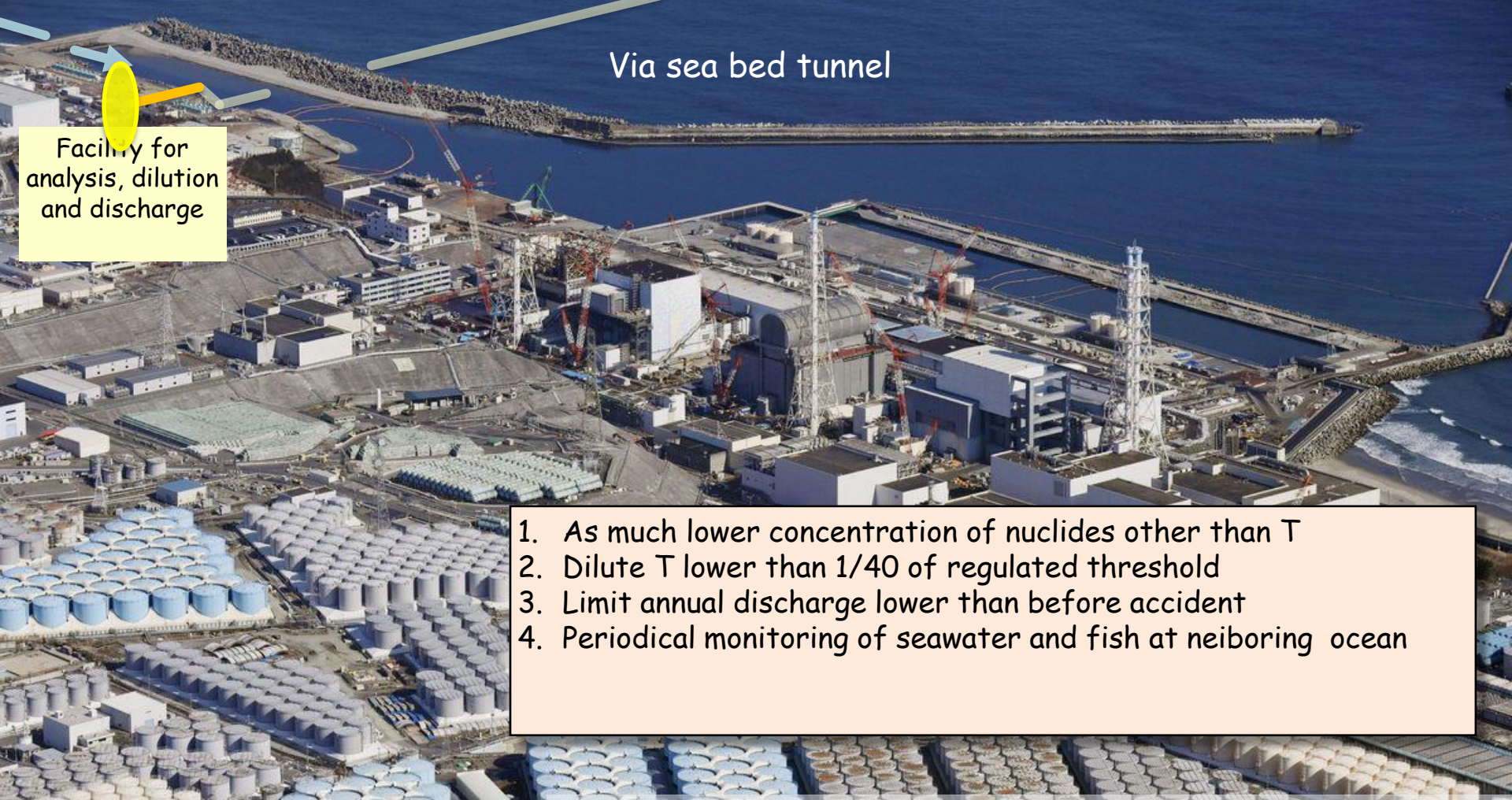
Dilute treated water with seawater taken from the harbor and discharge

Discharge from seabed offshore 1km



Via sea bed tunnel

Facility for analysis, dilution and discharge



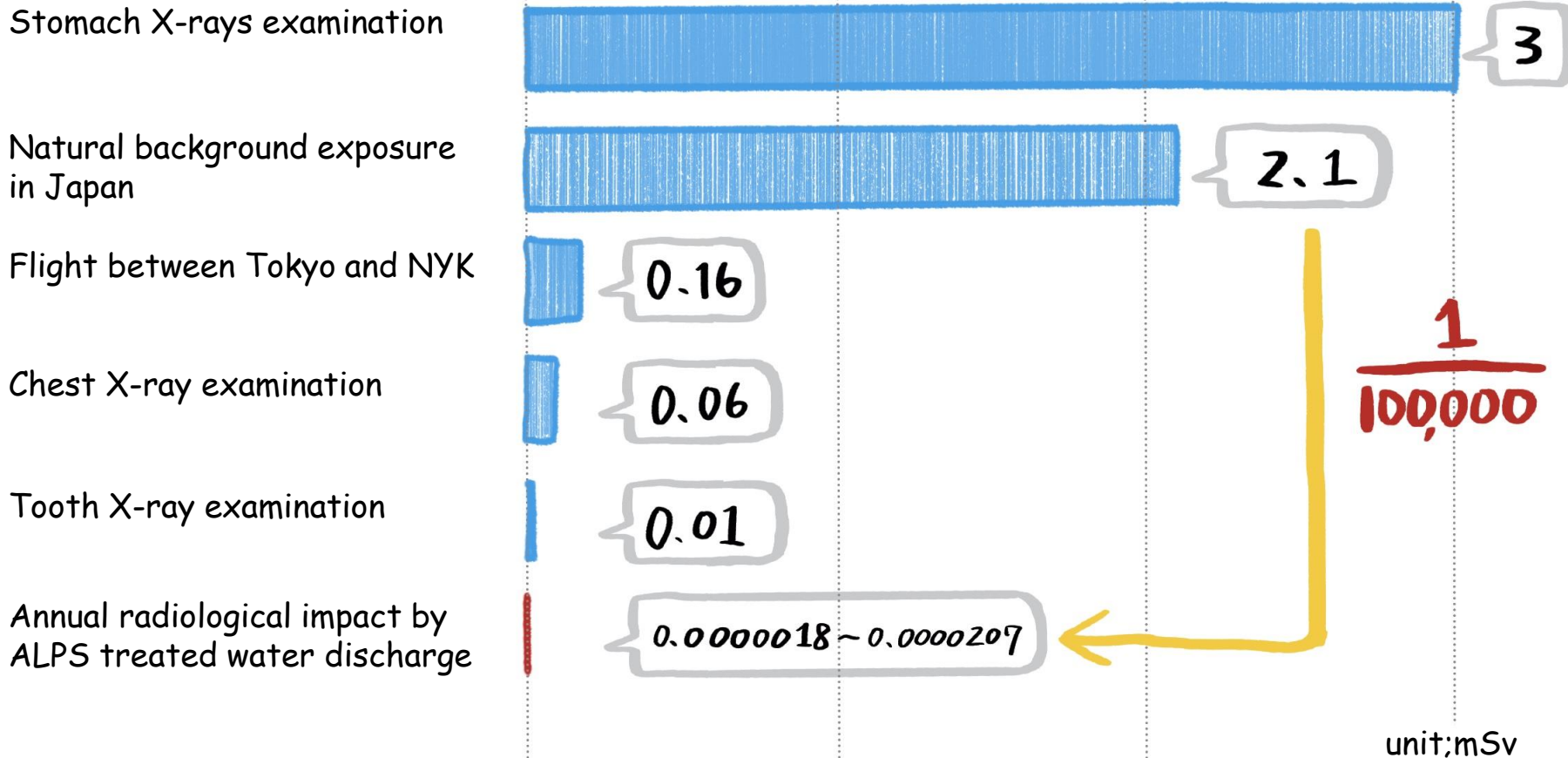
1. As much lower concentration of nuclides other than T
2. Dilute T lower than 1/40 of regulated threshold
3. Limit annual discharge lower than before accident
4. Periodical monitoring of seawater and fish at neighboring ocean

Photo : REUTERS, Feb 14,2022 (<https://www.reuters.com/world/asia-pacific/japan-welcomes-iaeas-inquiry-into-fukushima-water-release-2022-02-14/>)



# Radiological impact of ALPS treated water discharge to ocean

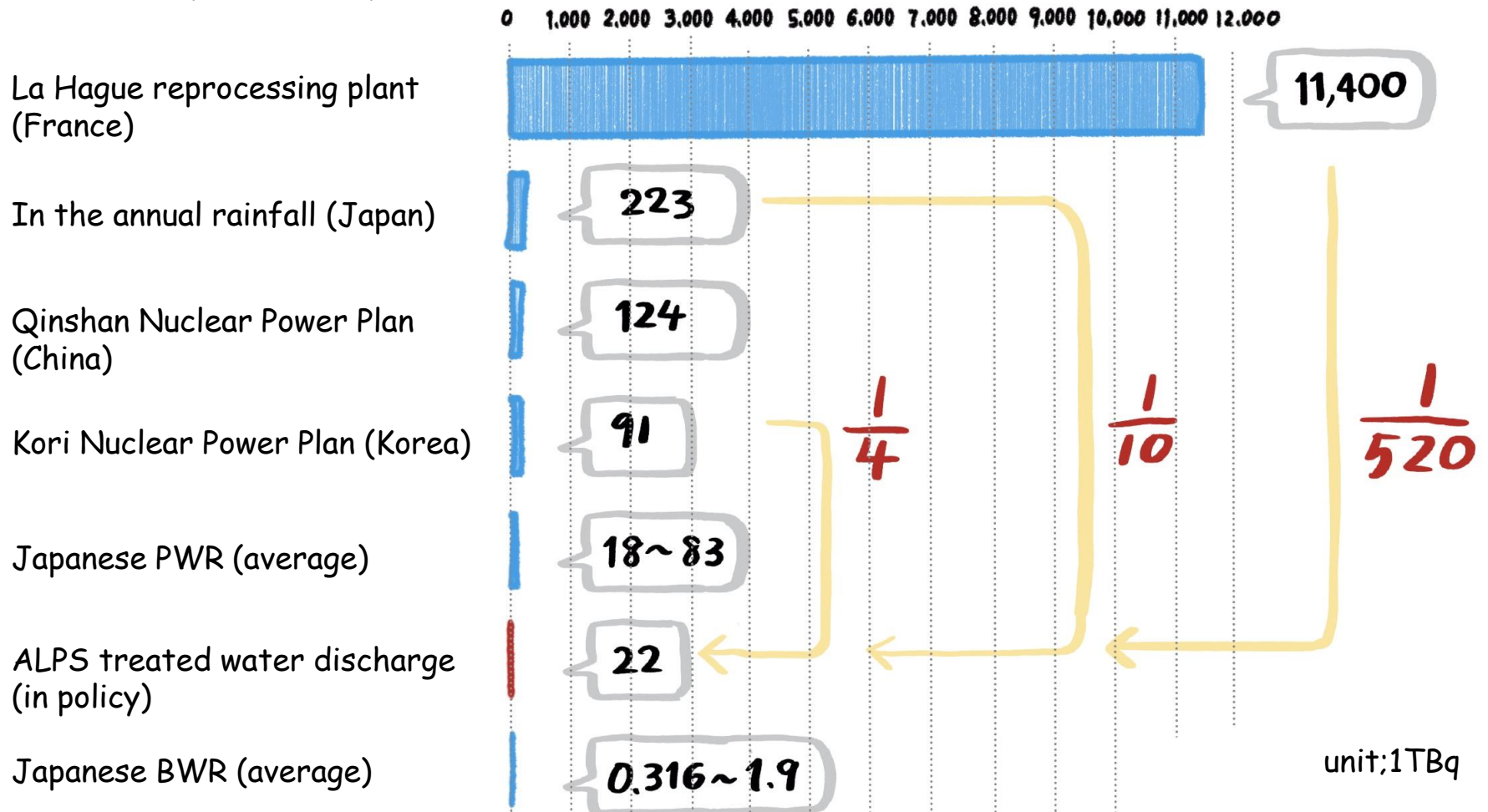
## Q-1 Influence to environment? (Impact of exposure at site vicinity)



# Amount of T discharge at world nuclear facilities

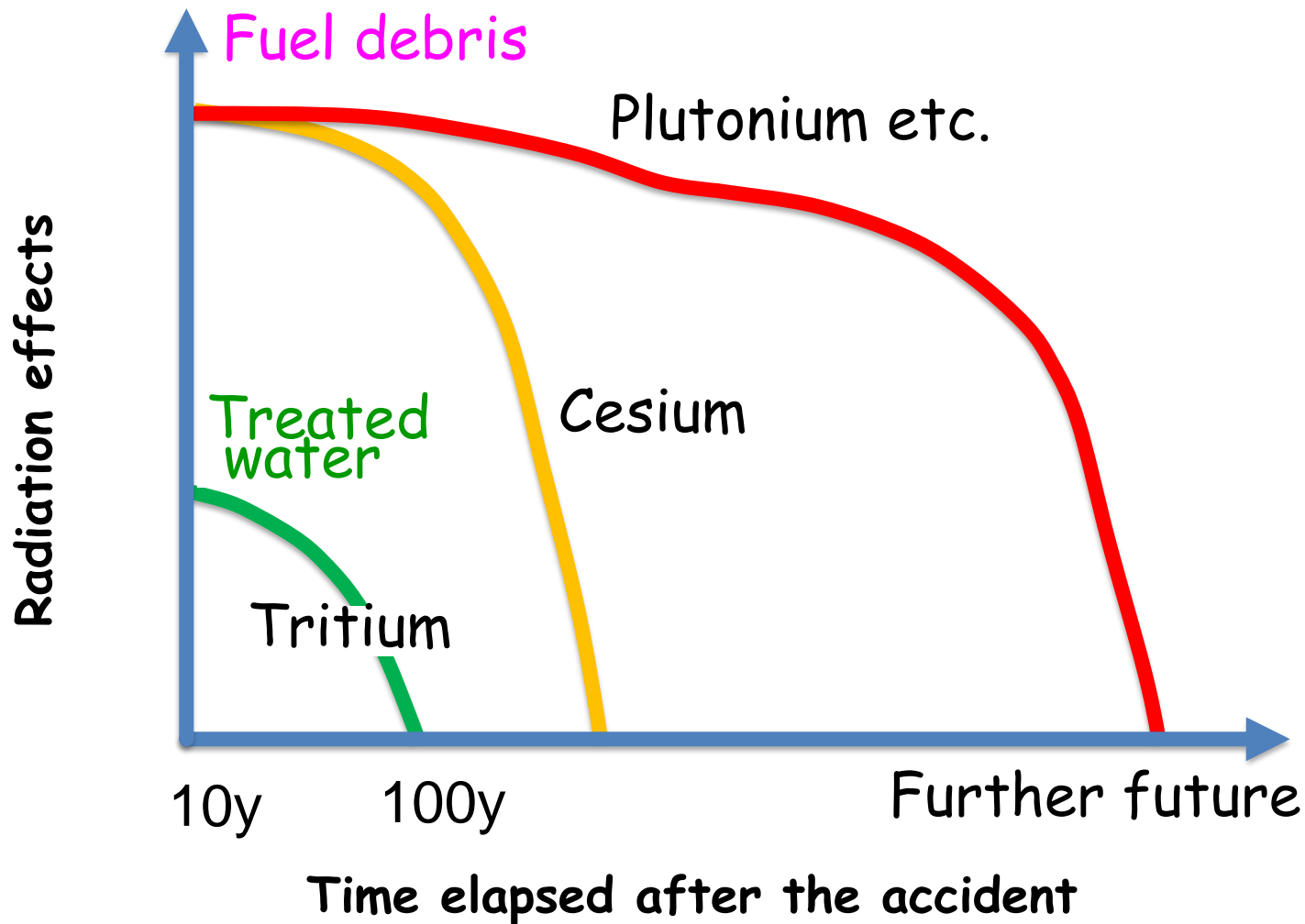
## Q-3 Comparison with precedents or world experiences?

### Annual Tritium release amount



# Impact of radioactivity in fuel

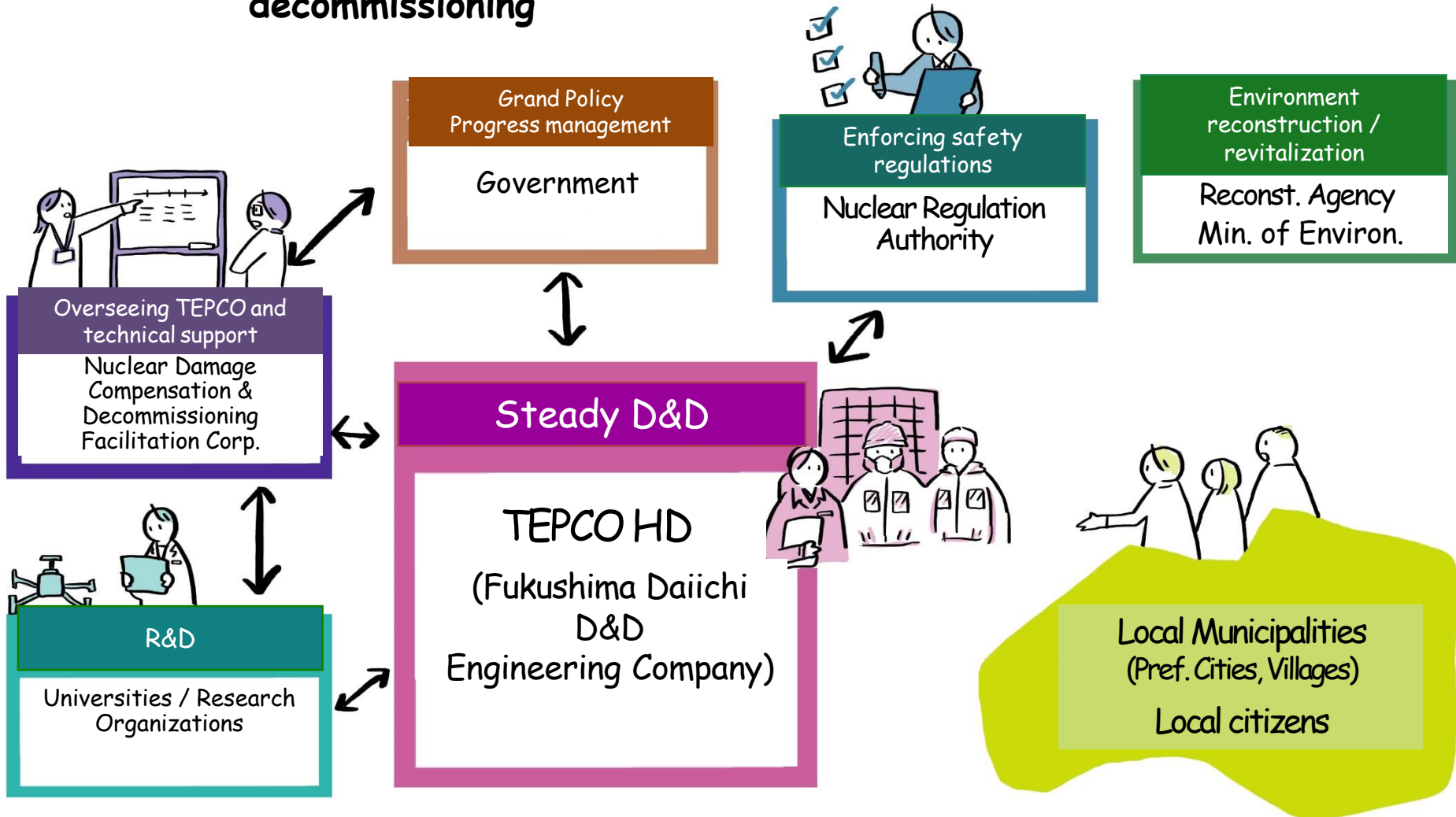
Q-4 How to see the impact to the long-term 1F D&D?





# Alliance and role-sharing toward decommissioning

Organizations in place across the country to ensure safe and steady advancement of decommissioning

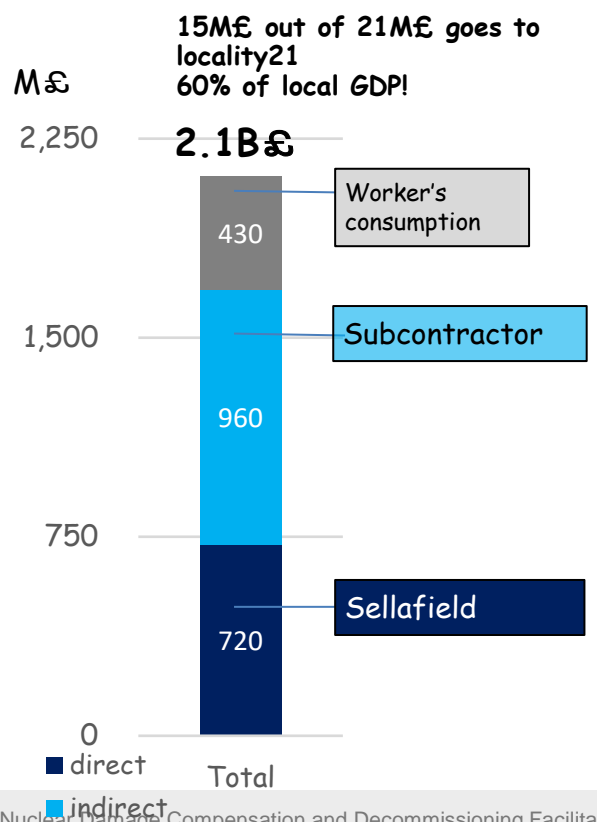


# Toward D&D business jointly with local citizens

## Challenge to build up clusters of D&D industries

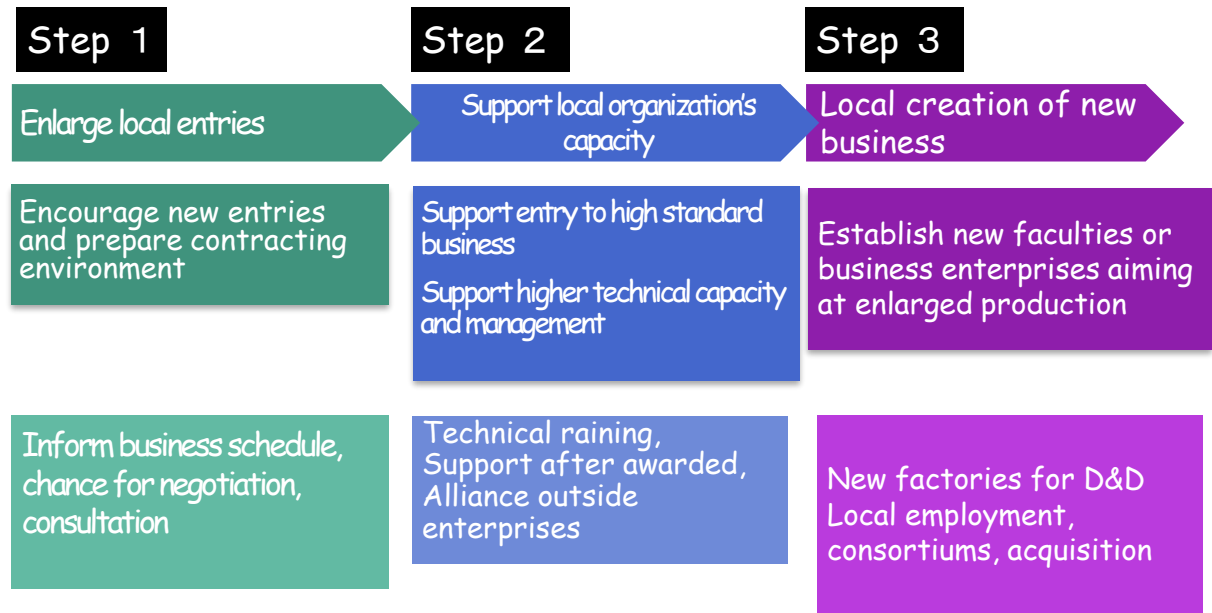


Sellafield (UK)



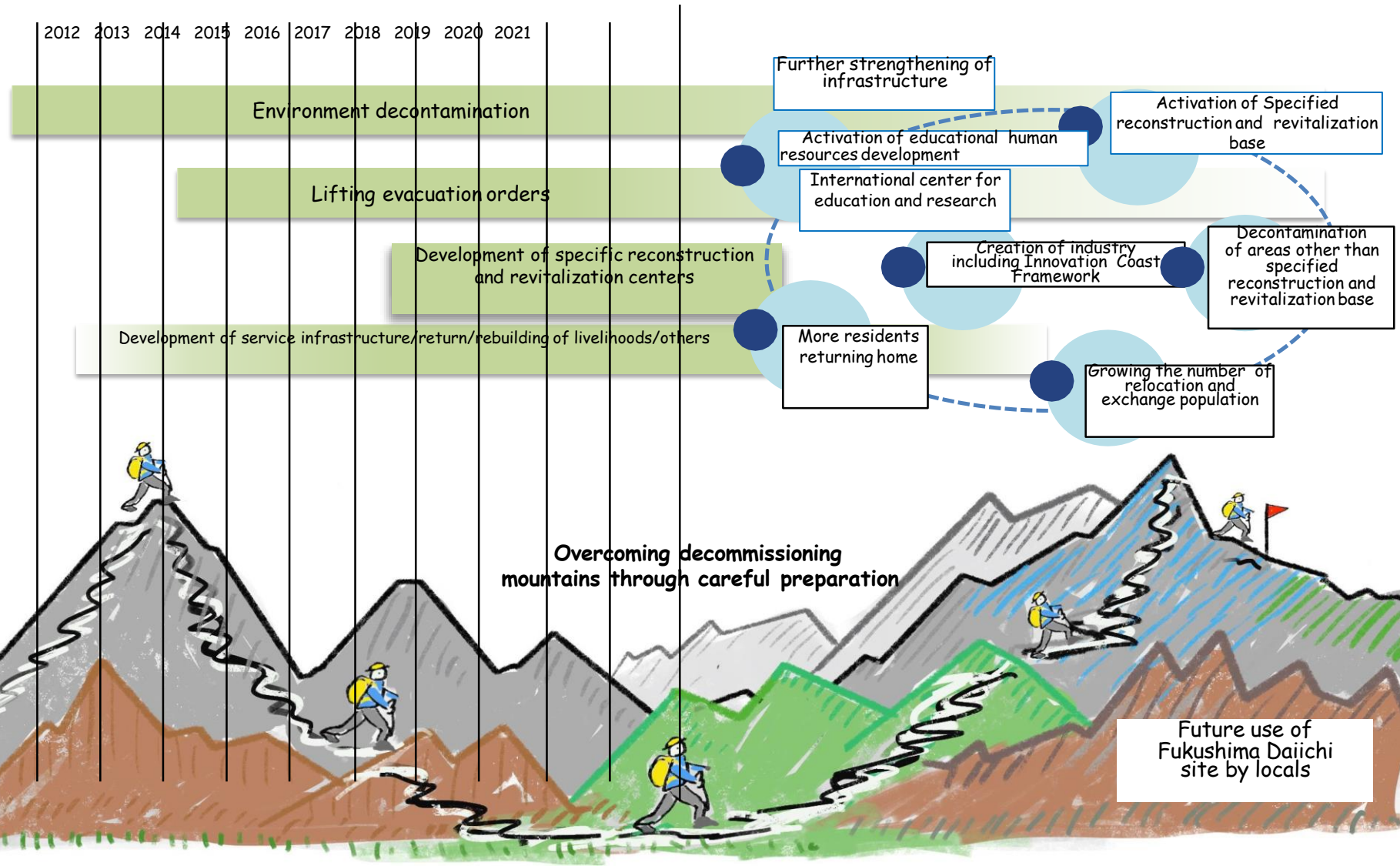
Foster 1F D&D business for 1F to local industry

Regain safe and active Hamadoori by joining of local companies to D&D business promoting D&D and economical activities



# Future of reconstruction progressing together with decommissioning

2011 ————— 2021 ————— 2050





Thank you