

# Decommissioning situation of Nuclear Power Plant in Japan

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Kazuhiro Suzuki

Tokyo Electric Power HD Inc.

# Current Status of NPPs in Japan

Status	Number of NPPs	Remarks
Commercial operation	3	Sendai-1 Sep. 10. 2015 Senda-2 Nov. 17.2015 Ikata-3 Aug. 15. 2016 Date: Restart commercial operation
Provisional disposition order for prohibition of operation	2	Takahama-3,4
Amendment of the reactor establishment license is approved	3	Takahama-1,2 Mihama-3
In the process for the amendment of the reactor establishment license	18	Tokai No.2 Tsuruga-2 etc.
Under consideration	16	Fukushima Daini etc.
Permanent Shutdown	6	Shutdown on Apr. 2015:Tsuruga-1 and the other 4 units Shutdown on May 2016: Ikata-1
Decommissioning	4	Tokai-1, Hamaoka-1,2, Fugen
Handling of the accident	6	Fukushima Daiichi (unit 1-6)

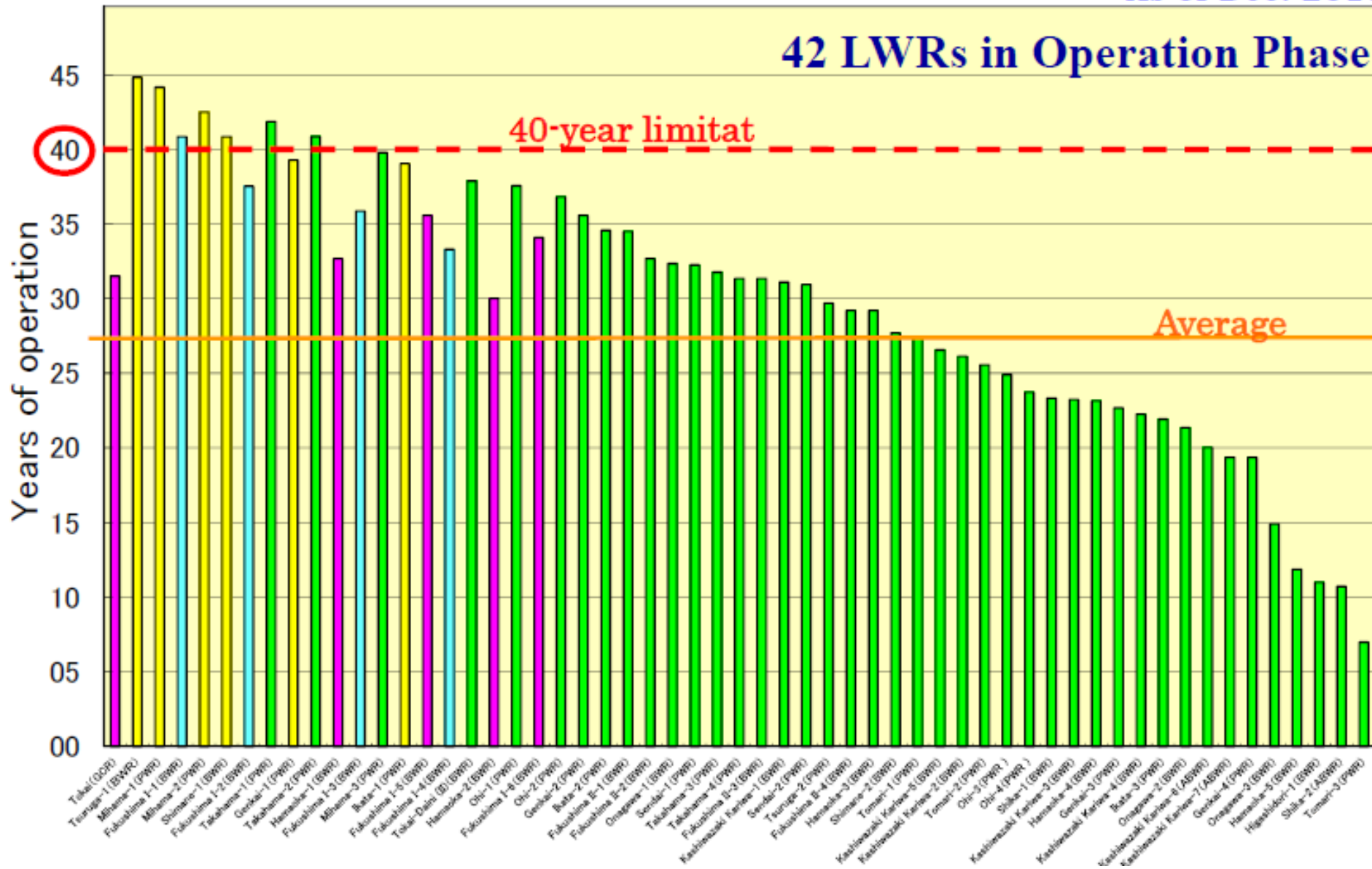
# NPPs under decommissioning in Japan

Plant	Operator	Type	Capacity	Commercial Operation starts	Shutdown Date
Tokai-1	JAPC	GCR	166MWe	Jul.25. 1966	Mar.31. 1998
Fugen	JAEA	ATR	165MWe	Mar.20. 1979	Mar.29. 2003
Hamaoka-1	CHUBU	BWR	540MWe	Mar.17. 1976	Jan.30. 2009
Hamaoka-2	CHUBU	BWR	840MWe	Nov.29. 1978	Jan.30. 2009
New comer to decommissioning group					
Tsuruga-1	JAPC	BWR	357MWe	Mar.14. 1970	Apr.27. 2015
Mihama-1	KANSAI	PWR	340MWe	Nov.28. 1970	Apr.27. 2015
Mihama-2	KANSAI	PWR	500MWe	Jul.25.1972	Apr.27. 2015
Genkai-1	KYUSHU	PWR	559MWe	Oct.15. 1975	Apr.27. 2015
Shimane-1	CHUGOKU	BWR	460MWe	Mar.29. 1974	Apr.30. 2015
Ikata-1	SHIKOKU	PWR	566MWe	Sep.30. 1977	May 10. 2016

# Operational years of commercial NPP in Japan

As of Dec. 2016

## 42 LWRs in Operation Phase



# Amendments to the Nuclear Regulation Act promulgated in June 2012

- New regulation on severe accidents
- Legally-requested measures to prevent and to mitigate severe accidents.
- Regulation based on the state-of-the-art information
- Develop new regulatory standards and apply to existing nuclear facilities (back fitting).
- Introduce new systems, e.g. design certification.
- 40-years operational limit for NPPs
- Legally define the limit to 40 years.
- NRA can permit a less-than-20-years extension.
- Special regulation to disaster-experienced NPPs

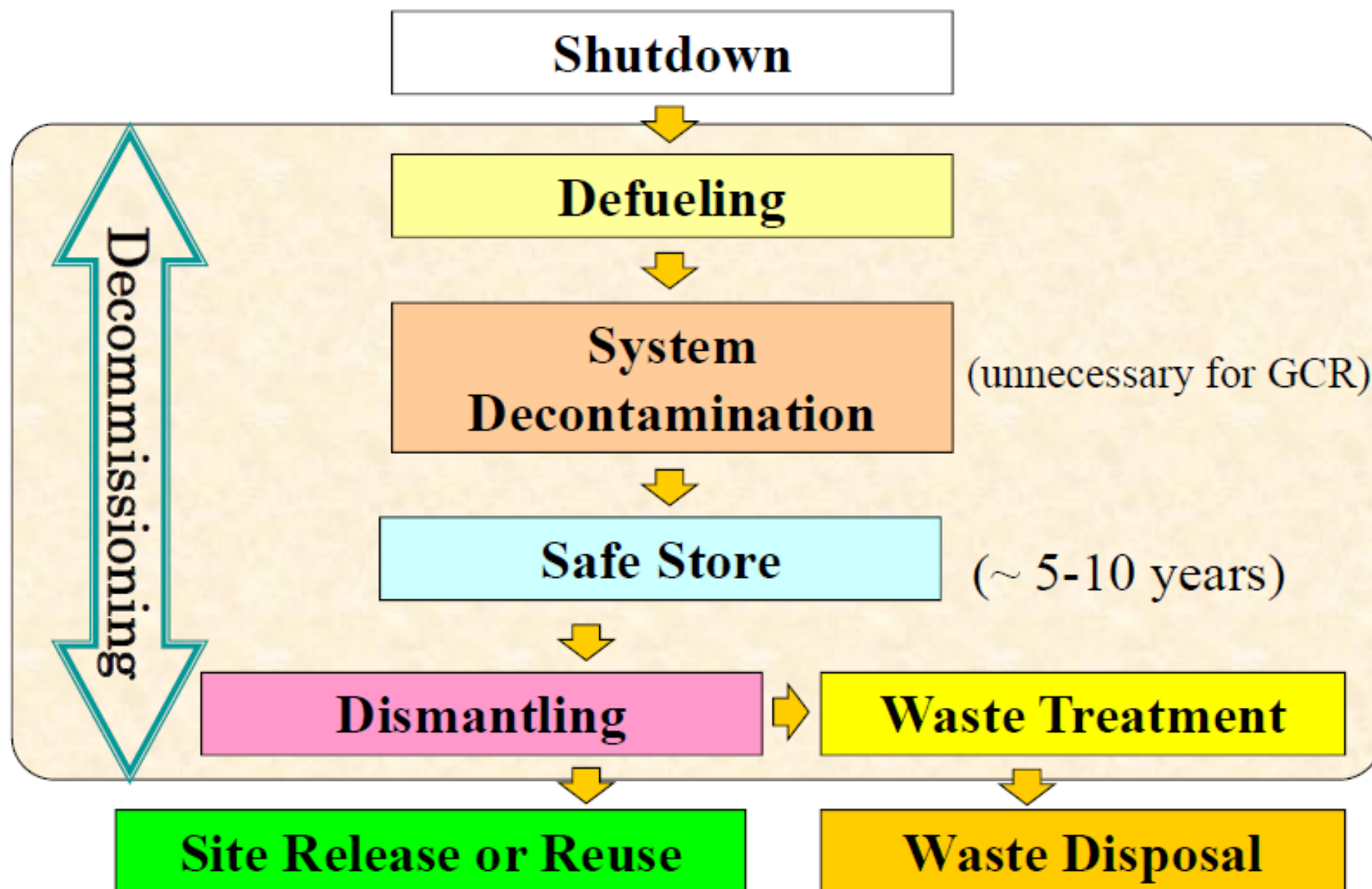
# The Decommissioning status in Japan (Except 1F)

- From the 1970s, examination of development of the technology relevant to decommissioning is repeated.
- Dismantling of JPDR of Japan Atomic Energy Research Institute (Current Japan Atomic Energy Agency) was completed in Mar, 1996.
- As a commercial nuclear power plant, the JAPC starts Tokai Decommissioning project for the first time on Dec, 2001.
- JAEA Fugen and the Chubu Electric Power Co Hamaoka 1,2 are started decommissioning.
- Five plants(Tsuruga-1, Mihama-1&2, Shimane-1, Genkai-1) will be shutdown by the end of April 2015.
- Ikata-1 will be shutdown by 10 May 2016.

# Institution for decommissioning allowance

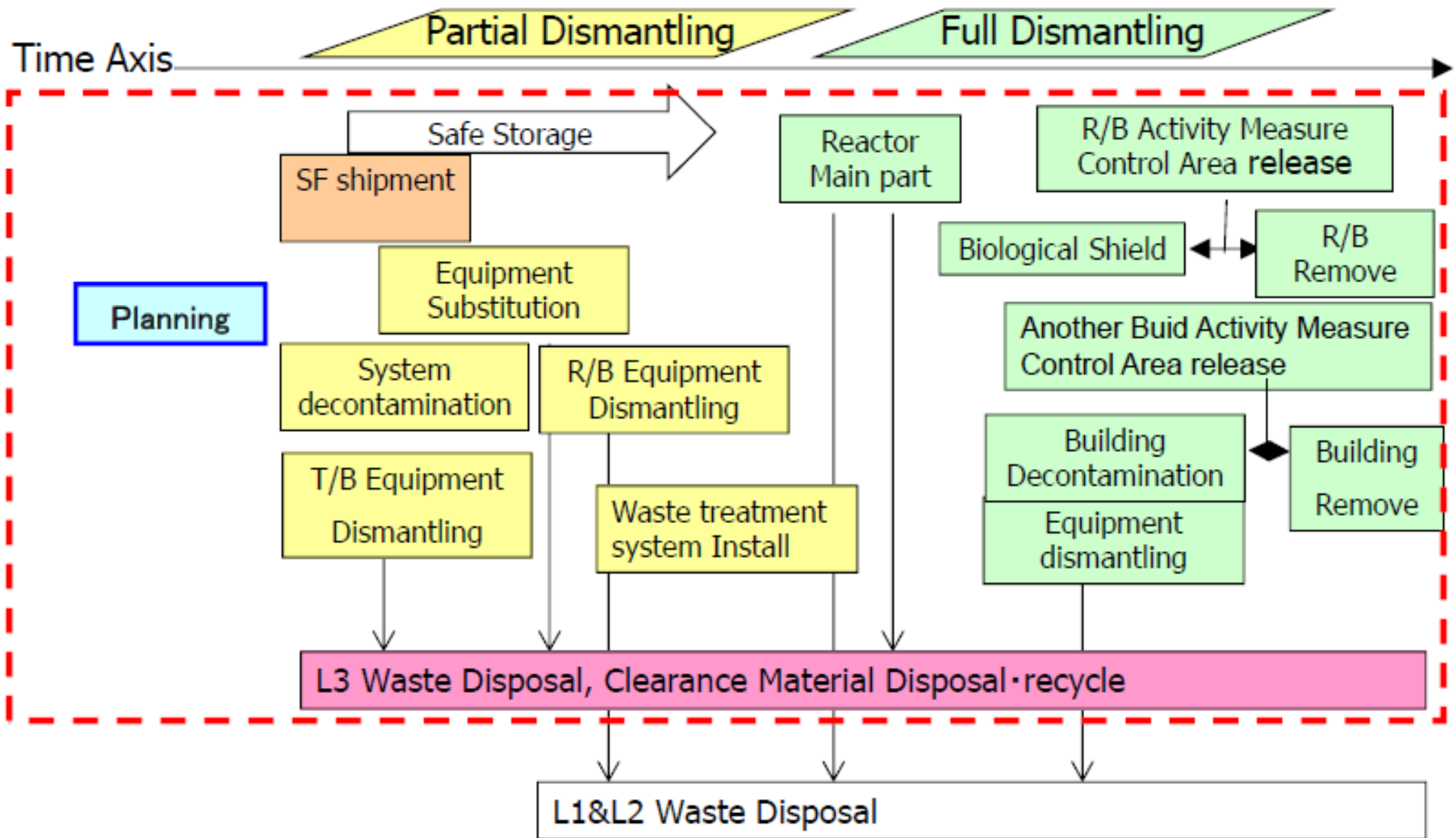
- It is required to accumulate decommissioning cost while plant operation. It is fair that the user of the electricity of the plant absorb the decommissioning cost to prevent leave burdens on future generations.
- Because,
  - ① Decommissioning cost is large sum, there is a big delay the timing that required decommissioning cost from electric generating period,
  - ② Decommissioning cost is required result of electric generation,
  - ③ It is possible to estimate rational decommissioning cost based on decommissioning standard process shown by Advisory Committee for Natural resources and Energy

# Japanese Standard Scenario for Decommissioning of NPPs

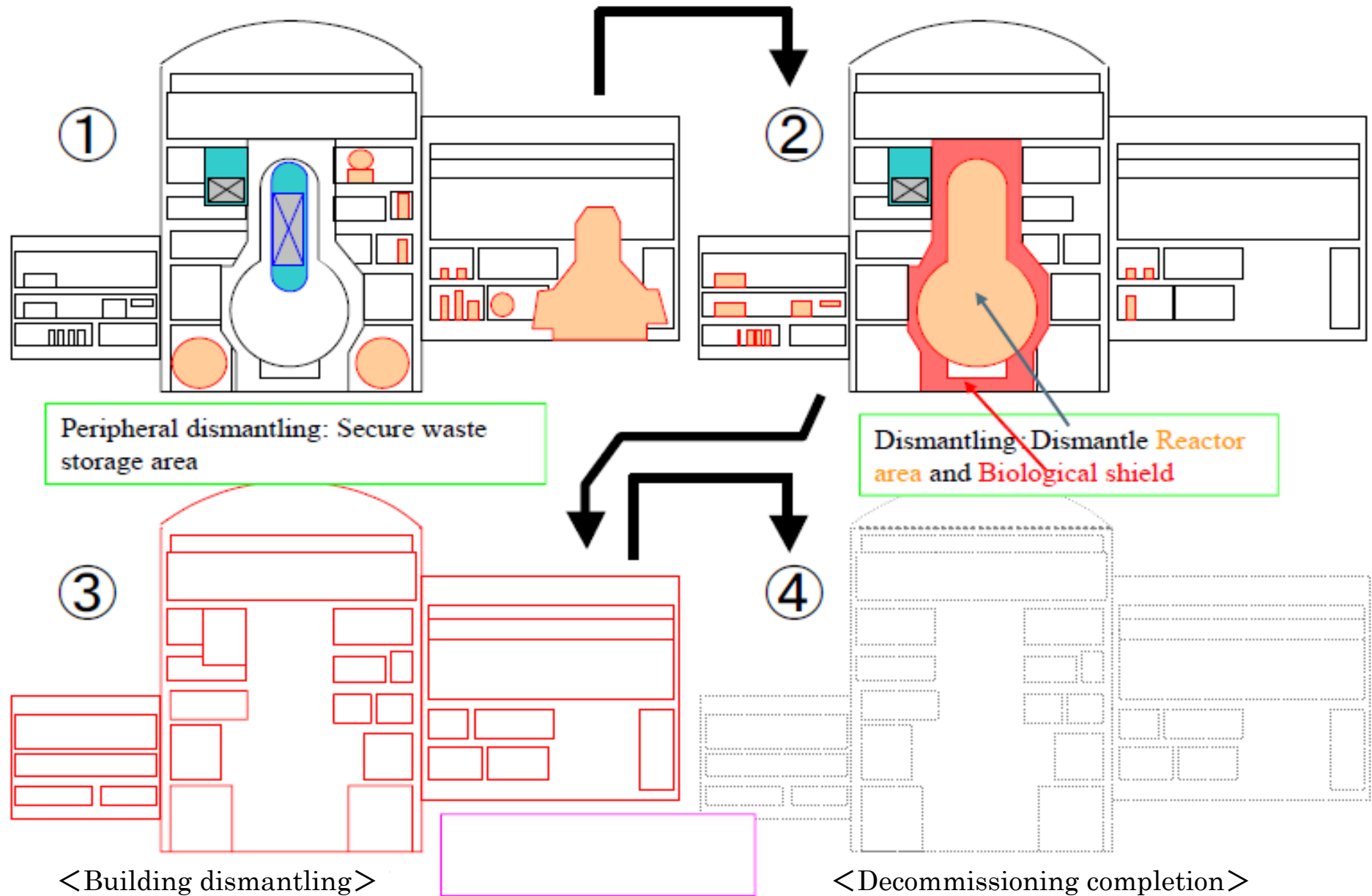




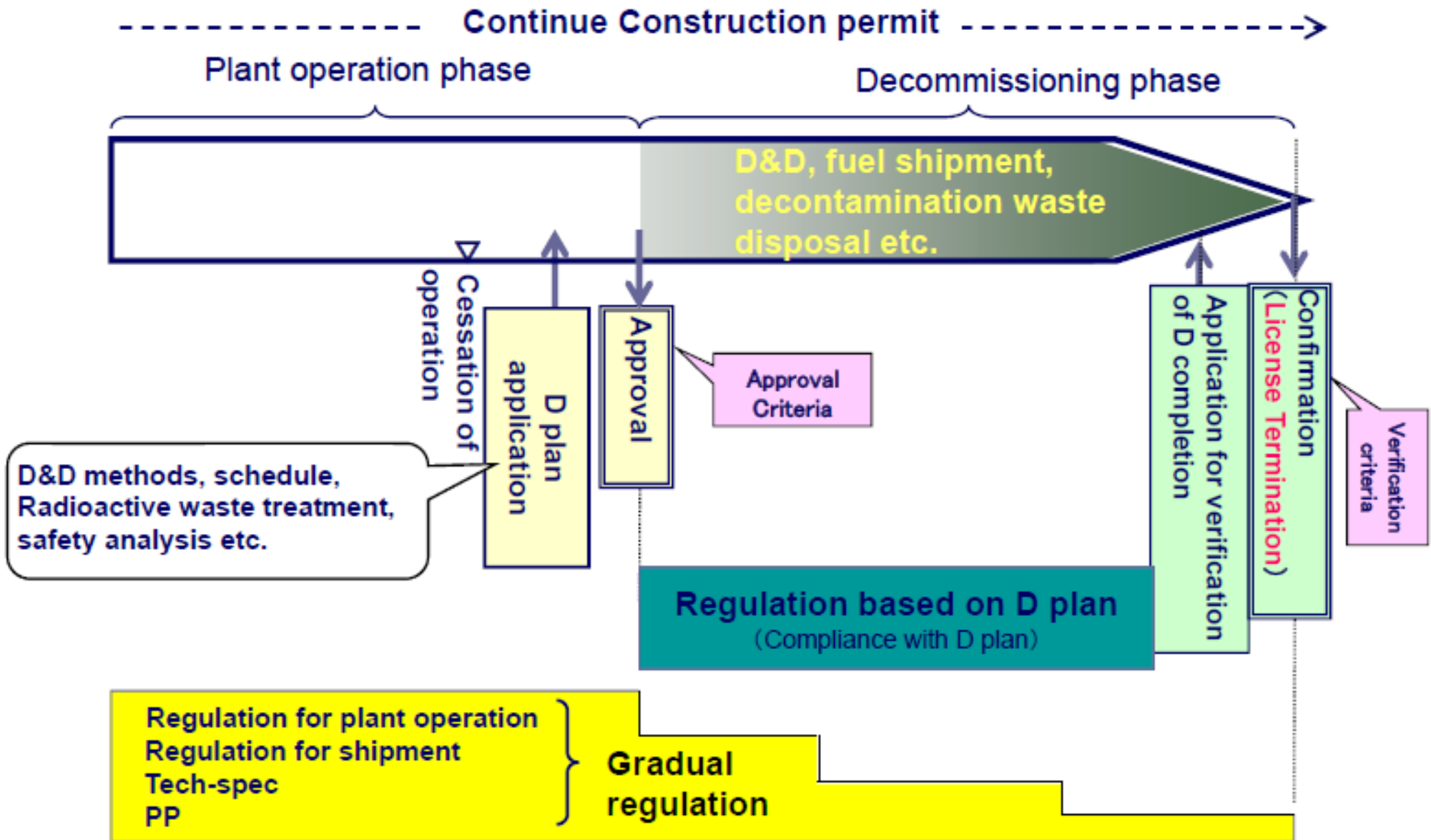
# Decommissioning Work Flow for LWR



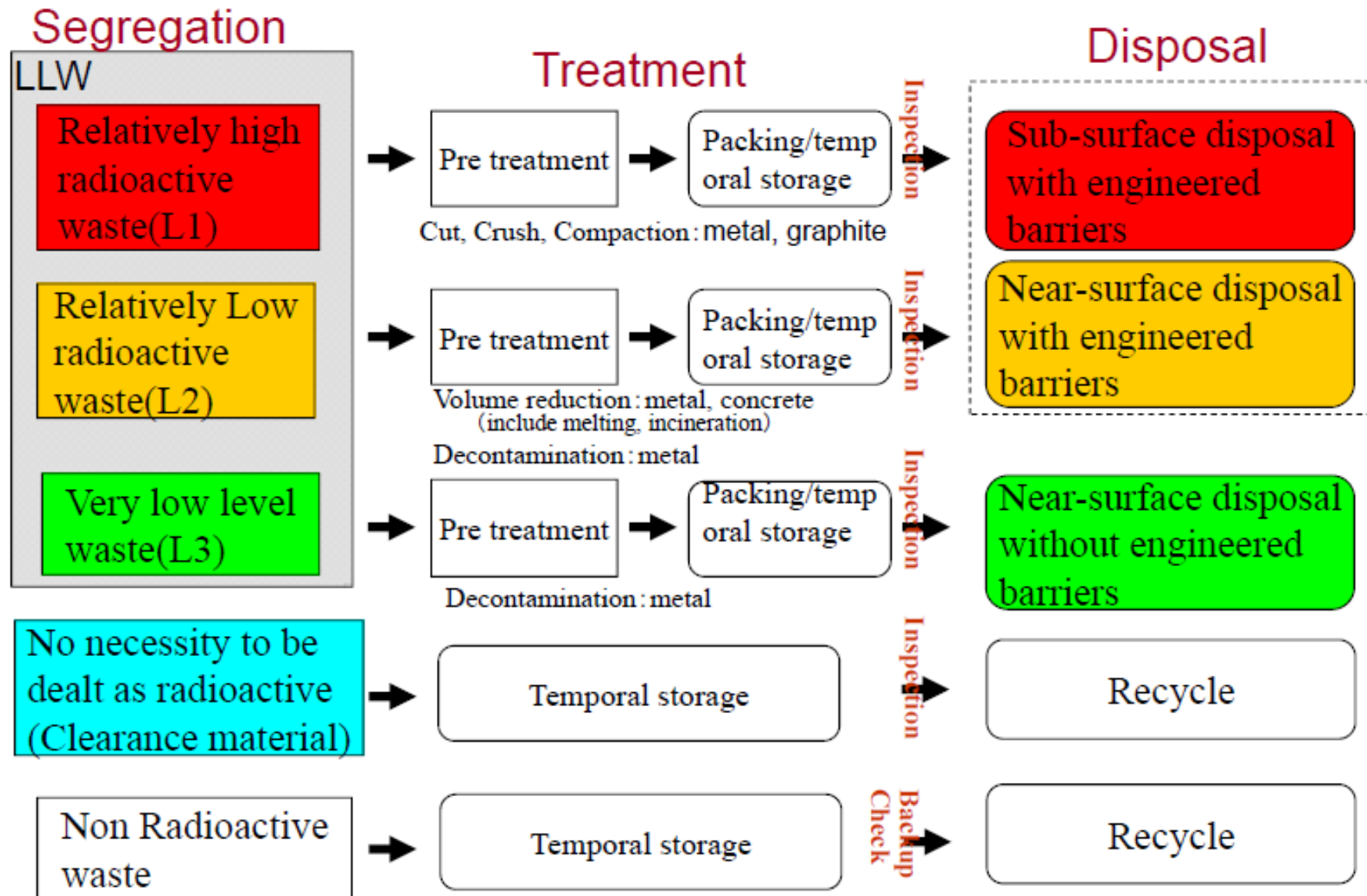
# Plant dismantling flow (example)



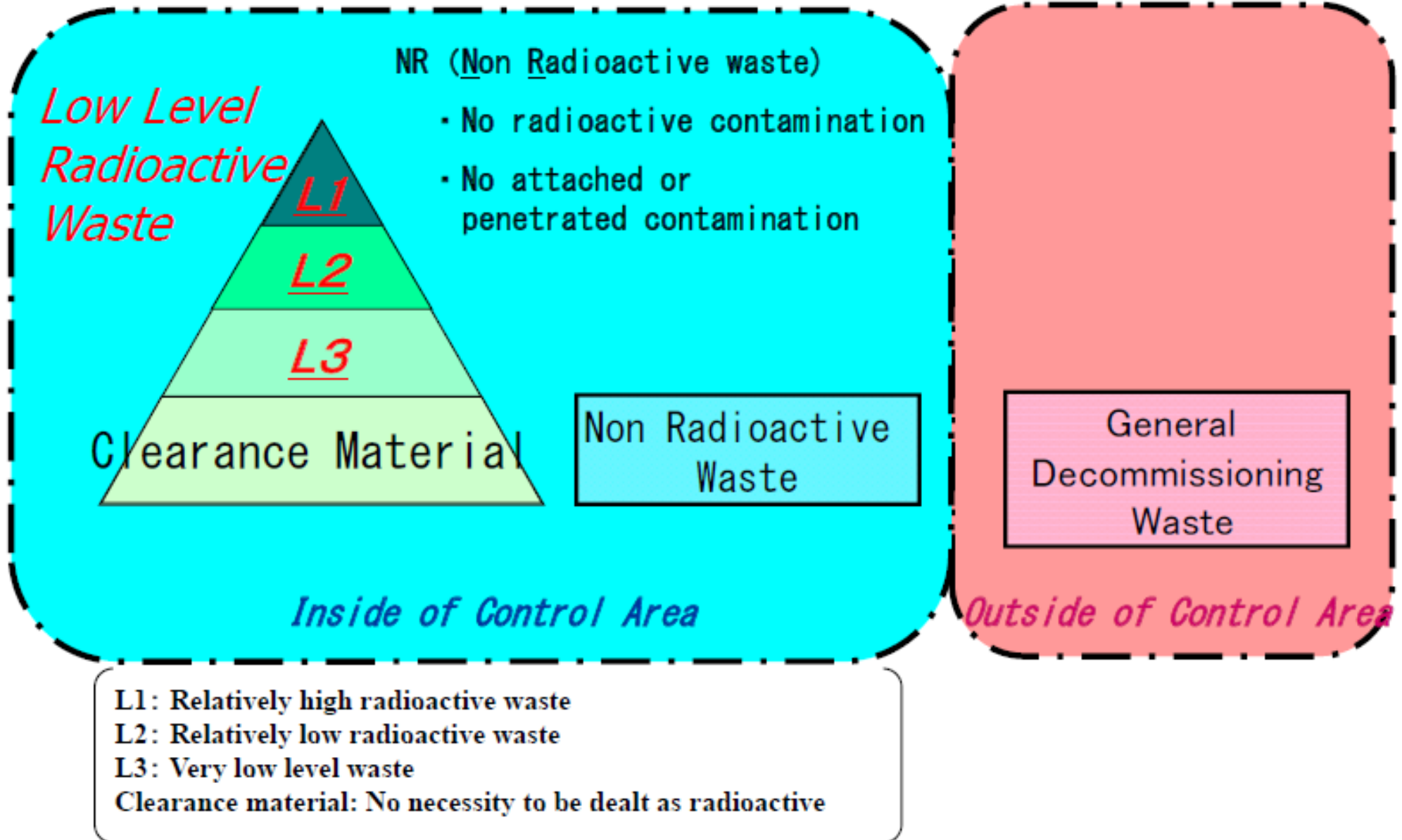
# Safety regulation on decommissioning in Japan



# Decommissioning solid waste treatment & disposal flow



# Waste arose from decommissioning



# Radioactive Waste Disposal Methodology in Japan

Relatively high  
radioactive waste

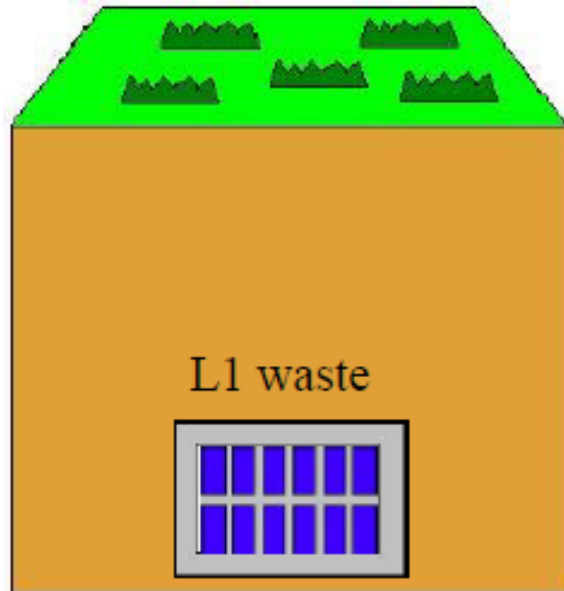
Relatively low  
radioactive waste

Very low level waste

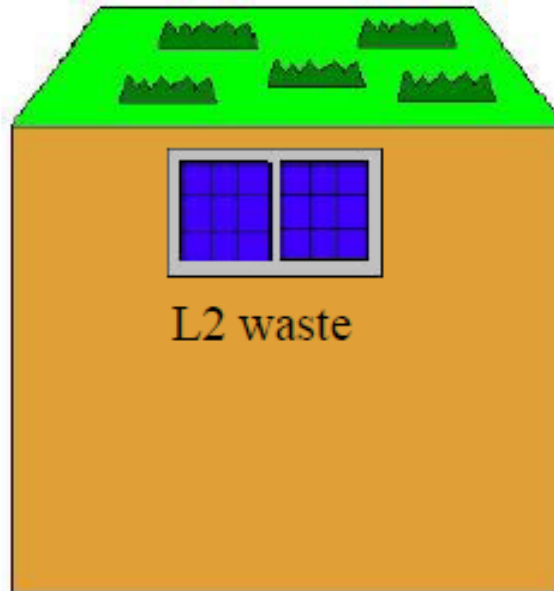
Intermediate depth  
disposal with artificial  
structure

Sub surface  
disposal with  
artificial structure

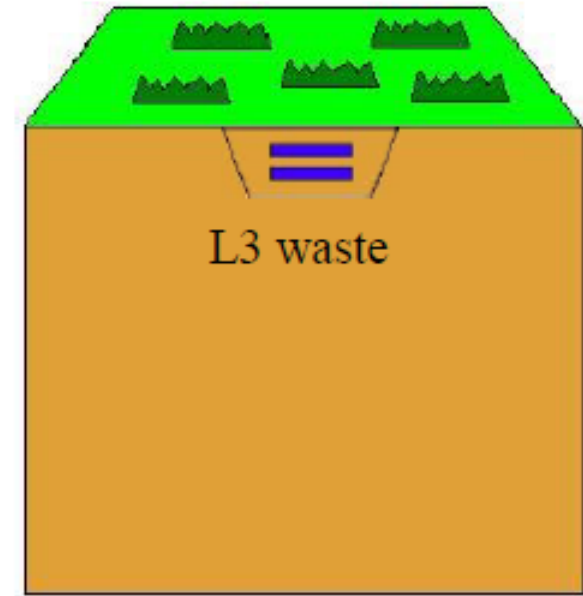
near surface trench  
disposal



Institutions are  
under consideration

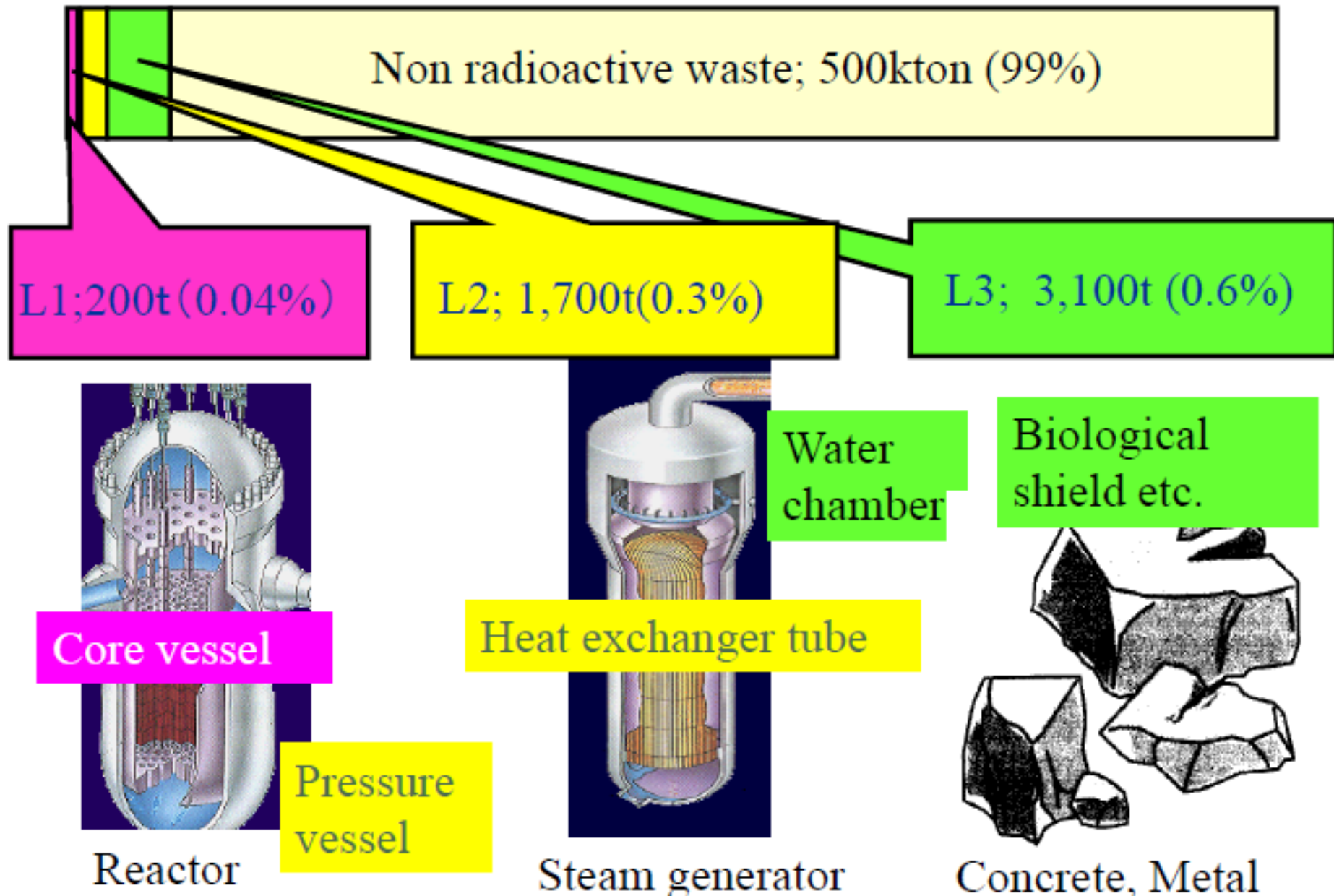


Monitoring  
300~400 years

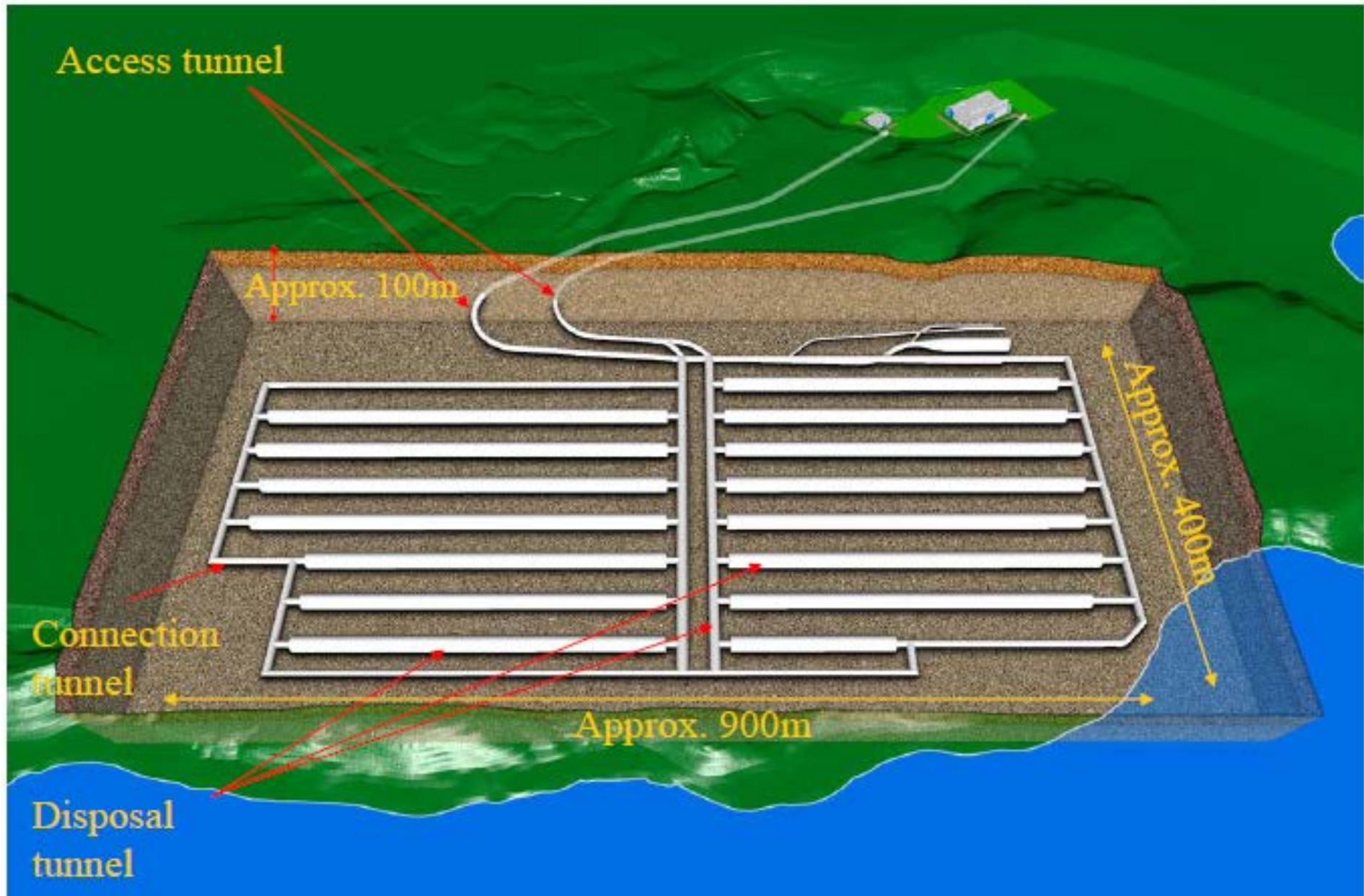


Monitoring  
50 years

# Waste arose from large scale(1,100MW)PWR Decommissioning

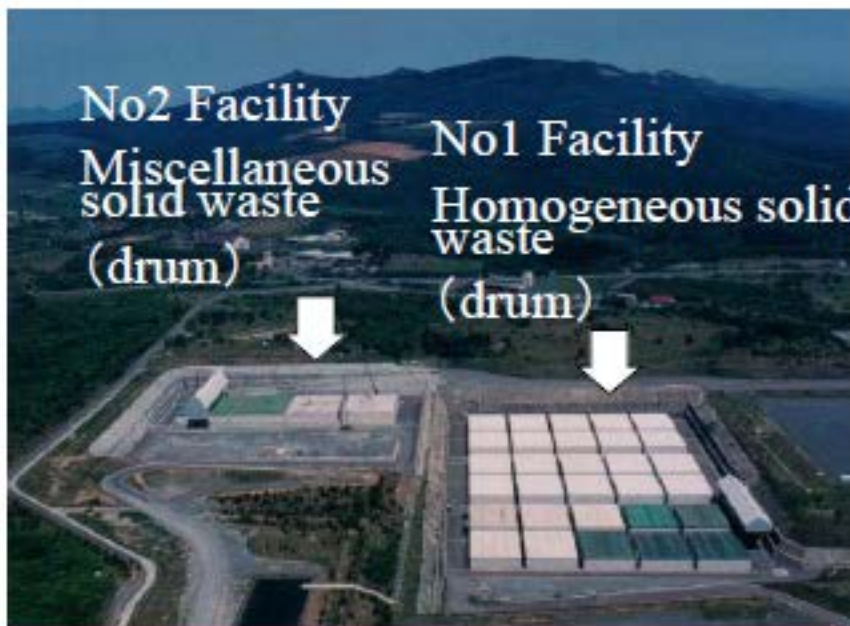


# Concept of L1 Waste Disposal Facility





# Work Flow of Disposal Facility (L2)



① Bird's eye view of the facility



② Putting drums into concrete pit

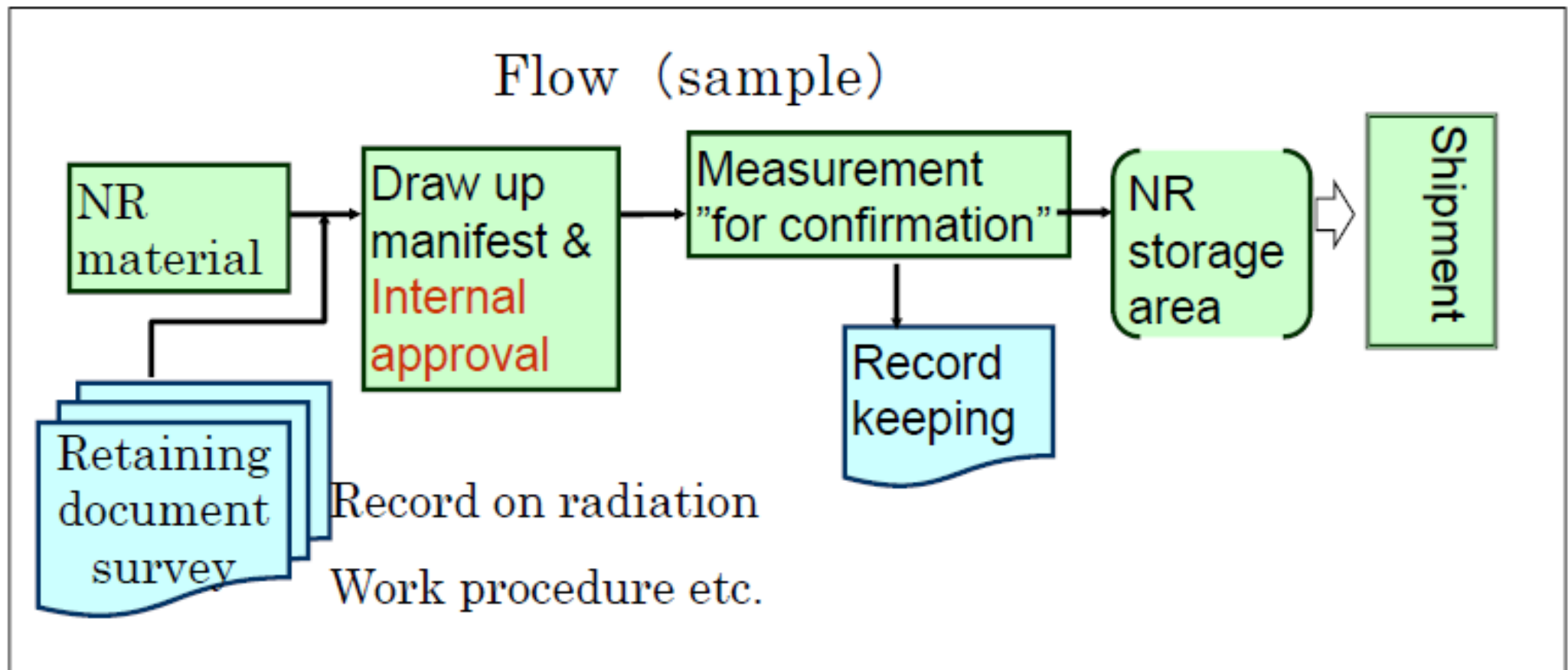


# Clearance System in Japan

- Clearance material is recycled as general material in Japan (free release)
  - The Final target is free release , however a step by step approach is necessary to obtain public acceptance
  - Clearance criteria is  $10\mu\text{Sv}/\text{y}$  Base
  - Clearance level for each Nuclide laid down by Ministerial Ordinance based on IAEA RS-G-1.7

# Treatment of Non Radioactive waste (NR)

- NR is judged by document, not measurement
- Process approval and periodical audit by Regulatory body



# Tasks to be solved in Japanese decommissioning

- Secure facility for SF shipment and waste disposal facility
- Understanding from Stakeholder( local government and Regulatory Body etc.)