
Actions Taken by the Nuclear Regulation Authority

- Five Years after the Fukushima Daiichi Nuclear Accident
and Lessons Learned -

23 March, 2016

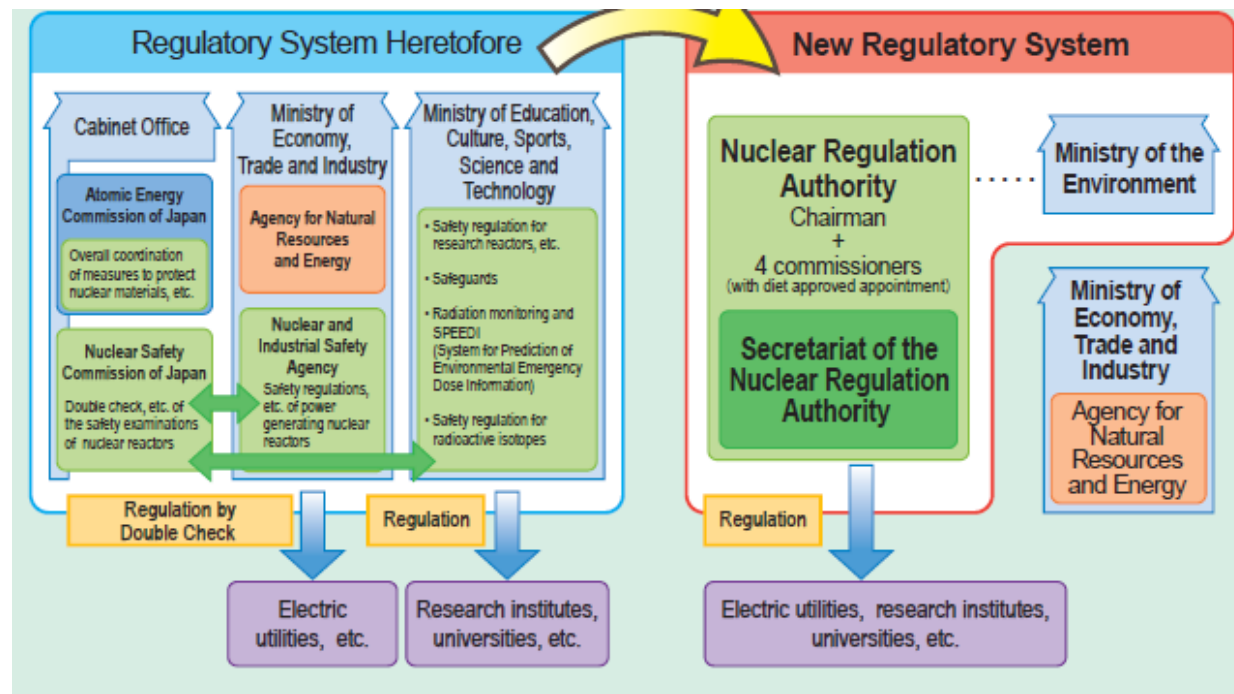
Shunichi Tanaka

Chairman of Nuclear Regulation Authority

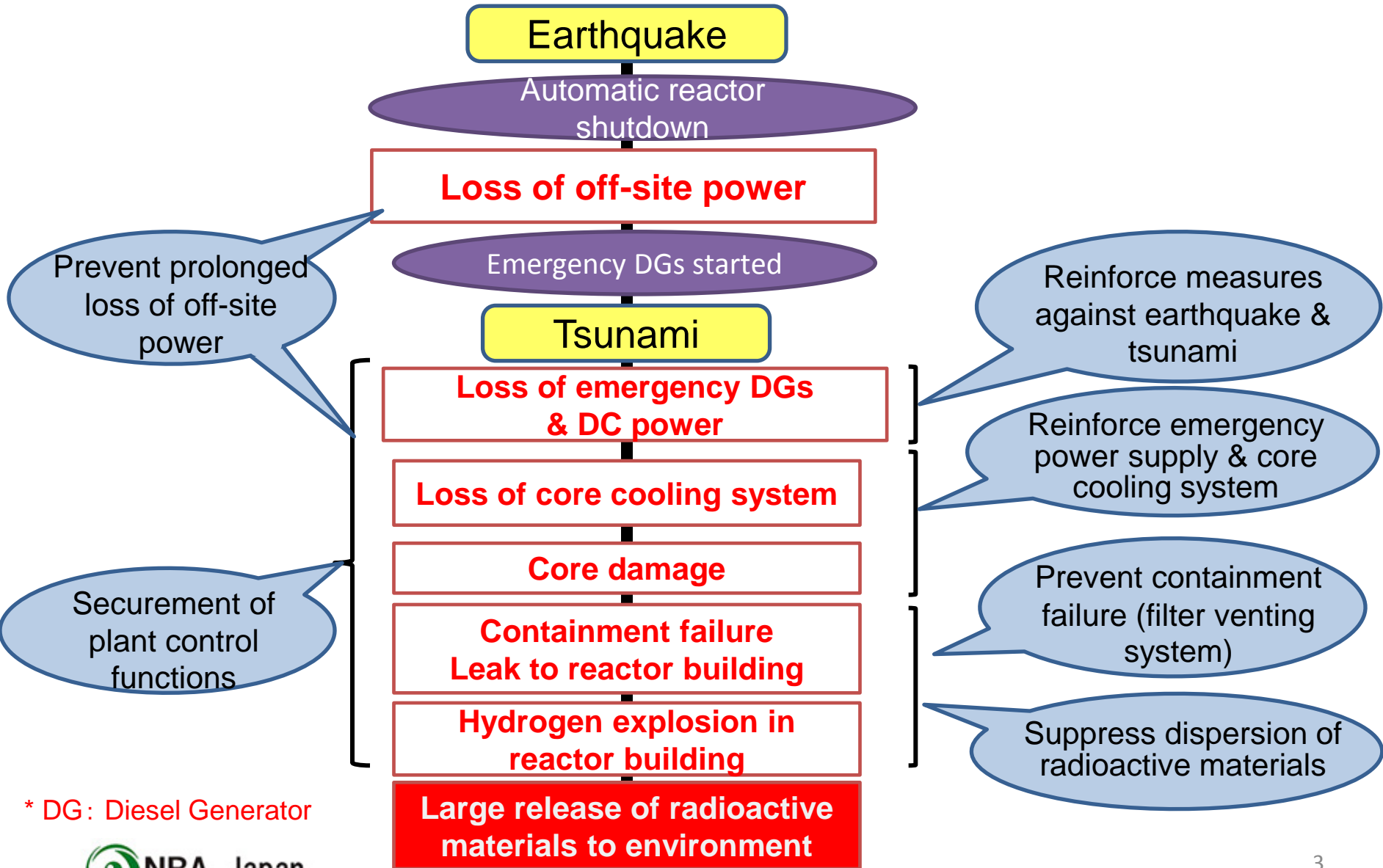
Lessons Learned from the Fukushima Daiichi Nuclear Accident and New Regulatory Requirements

Establishment of the Nuclear Regulation Authority (NRA)

- The Nuclear Regulation Authority was established in September 2012 in light of the lessons learned from Fukushima Daiichi Accident as a new independent and transparent organization.



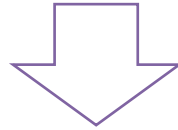
Lessons and Countermeasures against the Fukushima Daiichi Nuclear Accident



* DG: Diesel Generator

Investigation and verification of Fukushima Daiichi Accident and New Regulatory Requirements

The NRA obtained knowledge sufficient to establish new regulatory requirements to prevent a nuclear accident similar to Fukushima Daiichi Accident, judging from information identified in its investigation into the accident to date.



Establishment and enforcement of
New Regulatory Requirements (July 2013)

The NRA is willing to incorporate new findings into its criteria for safety assessment.

Outline of New Regulatory Requirements

< New Regulatory Requirements >

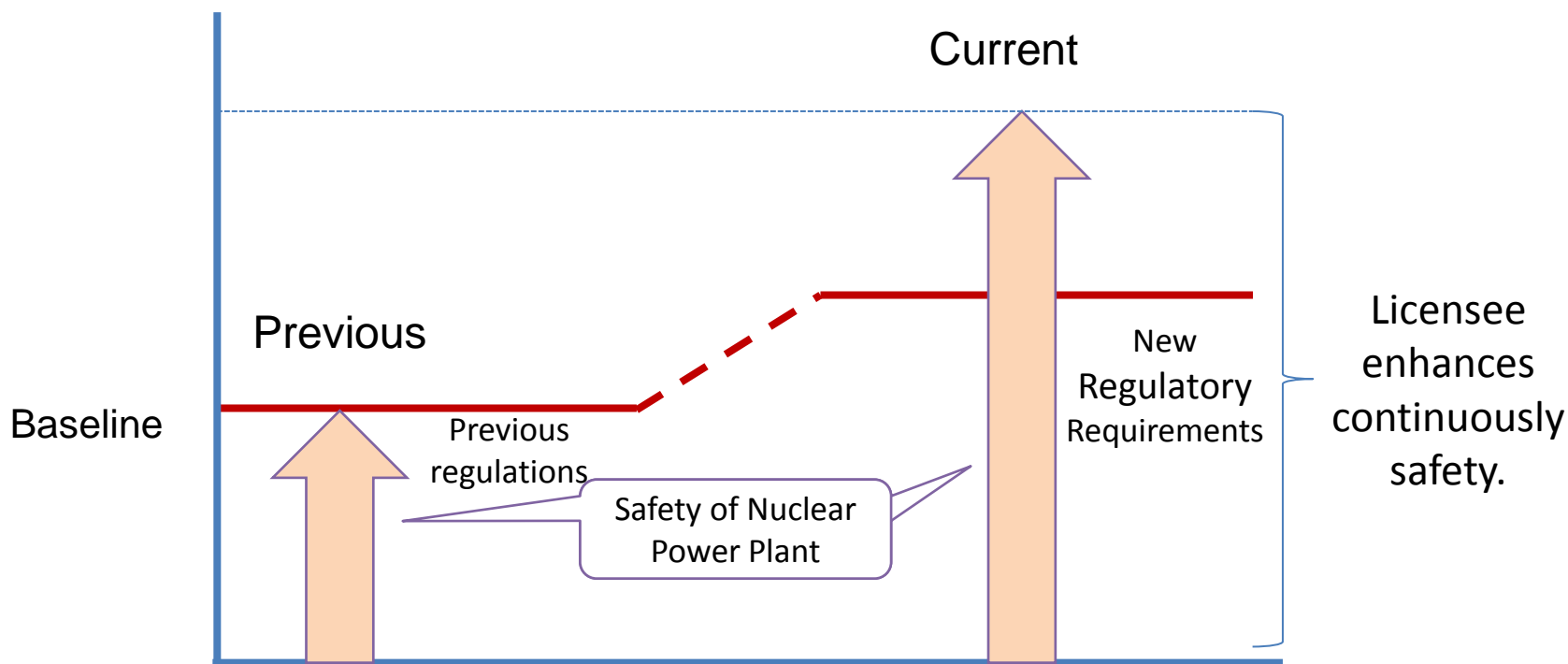
< Pre-existed Regulations >

Regulations to prevent a severe accident (design basis provisions)
(Based on a single failure and confirmed not to lead to damage)

Natural phenomena
Fire protection
Reliability of power supply
Function of other SCCs
Seismic/Tsunami resistance

Countermeasures for intentional aircraft crash	[Counterterrorism] NEW
Suppression of radioactive materials dispersal	
Prevention of CV failure	[Severe accident measures] NEW
Prevention of core damage (Assumptions of multiple failures of SCCs)	
Internal Flooding [New]	
Natural phenomena (Volcano eruption, tornado, forest fire) [New]	Reinforced
Fire protection	
Reliability of power supply	
Function of other SCCs	
Seismic/Tsunami resistance	Reinforced

Important Things in Considering Nuclear Safety



Without satisfaction in compliance with the safety regulations, it is fundamental for licensees to continue the efforts to enhance the safety, according to characteristics of each power plant.

New Regulatory Requirements and Conformity Reviews

- The NRA established the new regulatory requirements in 10 months after its inauguration.
- 26 power reactors (16 nuclear power stations) and 20 fuel cycle facilities are under review. Two units of the Sendai Nuclear Power Station were restarted.
- Regarding application for extending the operational period, 3 reactors of 2 nuclear power stations are under review.

Safety Regulation and Nuclear Emergency Preparedness

NRA's view on Nuclear Emergency Preparedness

- In nuclear facilities satisfied the New Regulatory Requirements, the possibility of a severe accident - seen in Fukushima Daiichi NPS - is extremely low.
- Apart from safety regulations, it is necessary to establish Nuclear Emergency Preparedness measures against unexpected nuclear events.

IAEA's "Defense in Depth" Concept

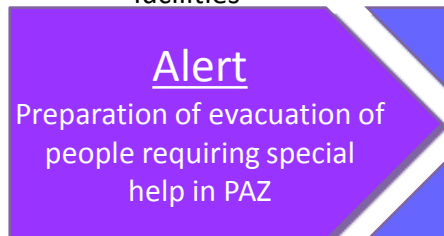
Level of Defense	Objectives	Essential Measures	
1	Prevention of abnormal operation and failures	Quality improvement of siting, design, maintenance and operation, after taking into account natural phenomena	NRA
2	Control of anticipated abnormal plant operation, and countermeasures to prevent evolution towards an accident.	Installation of control/surveillance systems and equipment	
3	Control of accidents within the design basis to prevent the progress to core damage.	Facilities and operating procedures for accident situations	
4	Prevention of the core damage and the containment failure for the beyond design basis accident (severe accident)	Countermeasures and responses for a severe accident	
5	Mitigation of the radiological consequences of significant external releases of radioactive materials	Radiation protection measures (evacuation of residents, etc.). Development and improvement of evacuation plans	* Cabinet Office

Nuclear Emergency Response Guideline

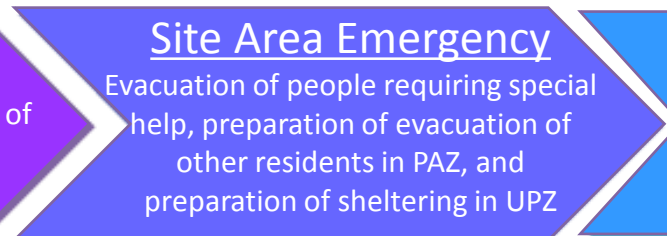
- Setting up the extents of priority areas in the new Nuclear Emergency Response Measures and establishment of criteria for assessment of emergency protective measures for residents
- Taking preventive/protective measures before discharging radioactive material in response to conditions in the facilities
- Taking further protective measures after discharge of radioactive material according to emergency monitoring results
- Staving off deterministic effects of radiation exposure and curbing the risks of probabilistic effects to the minimum

[Example]

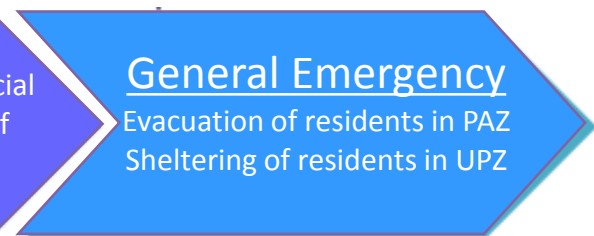
Intensity-6-lower earthquake
in an area near nuclear
facilities



Station Blackout
(Loss of all power supply)



Incapable water injection by emergency
core-cooling systems



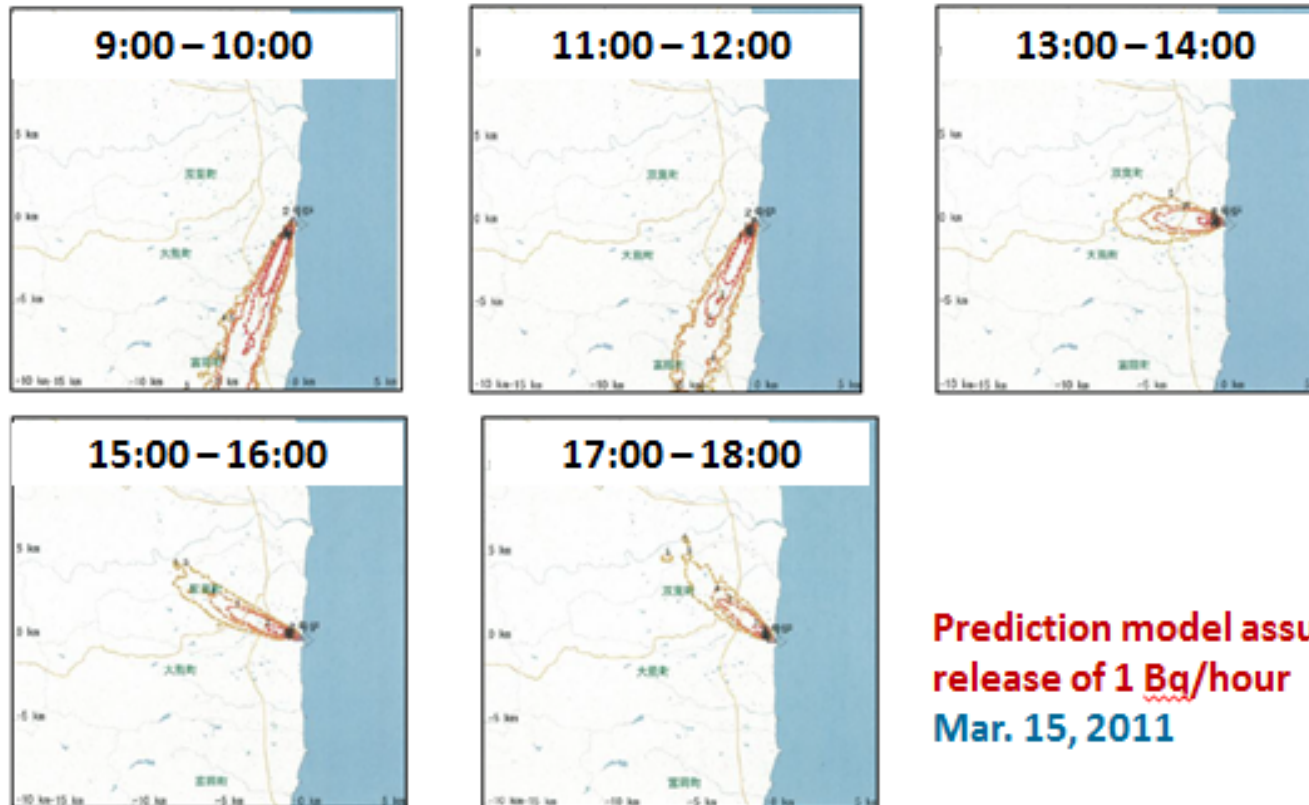
Emergency Monitoring Information

- In nuclear emergency, swift responses are necessary based on secure information.
- Monitoring information should be integrated and assessed by the government and swiftly released to the public on the NRA web-site in a way easy-to-understood.



Reference information: Simulation results of SPEEDI at the time of the Fukushima Daiichi Nuclear Accident

- The wind was whirling clockwise on March 15, 2011.

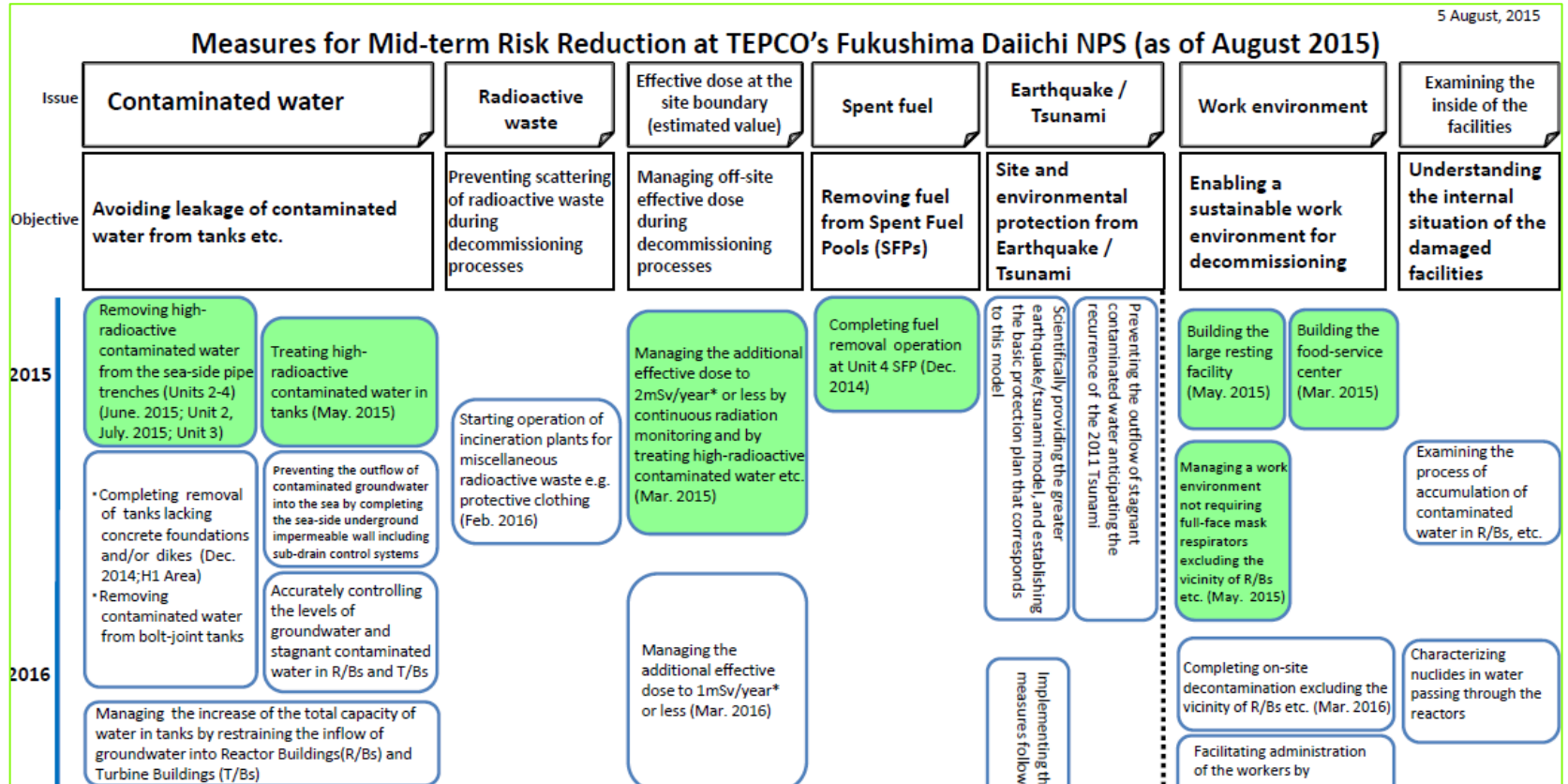


**Prediction model assuming a unit release of 1 Bq/hour
Mar. 15, 2011**

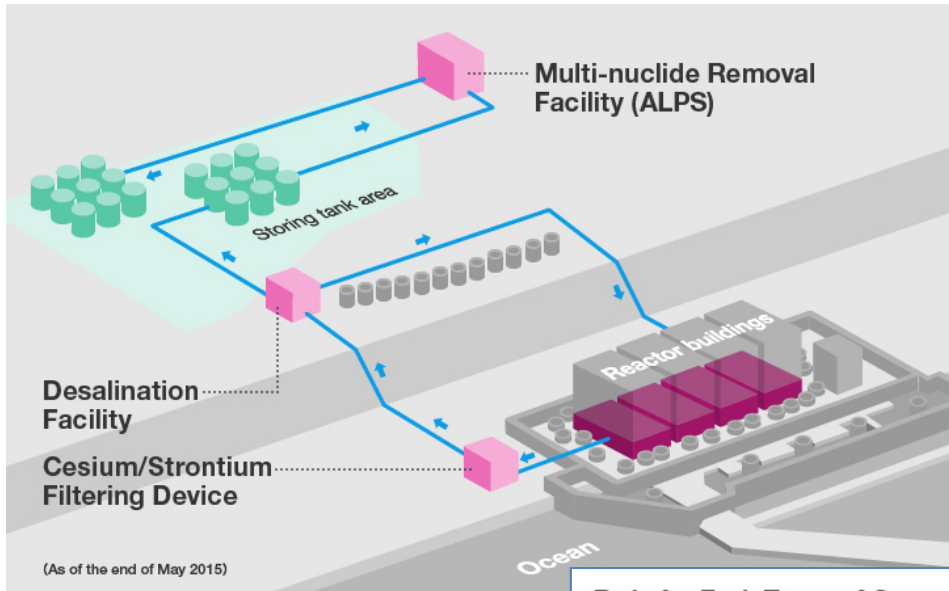
Source: Final Report, Investigation Committee on the Accident at Fukushima NPS of TEPCO, July 23, 2012

Actions and Responses towards the Decommissioning of the Fukushima Daiichi Nuclear Power Station

Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (as of March 2016)



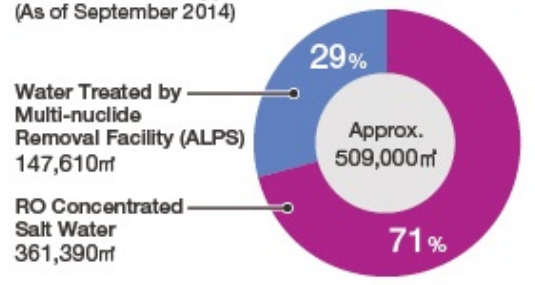
Reduction of Concentration of Radioactive Materials by Treatment of Highly Contaminated Water



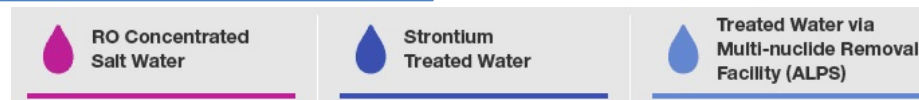
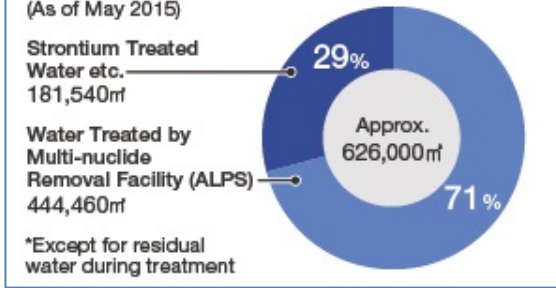
Sep. 2013

May 2015

Ratio for Each Types of Contaminated Water
(As of September 2014)

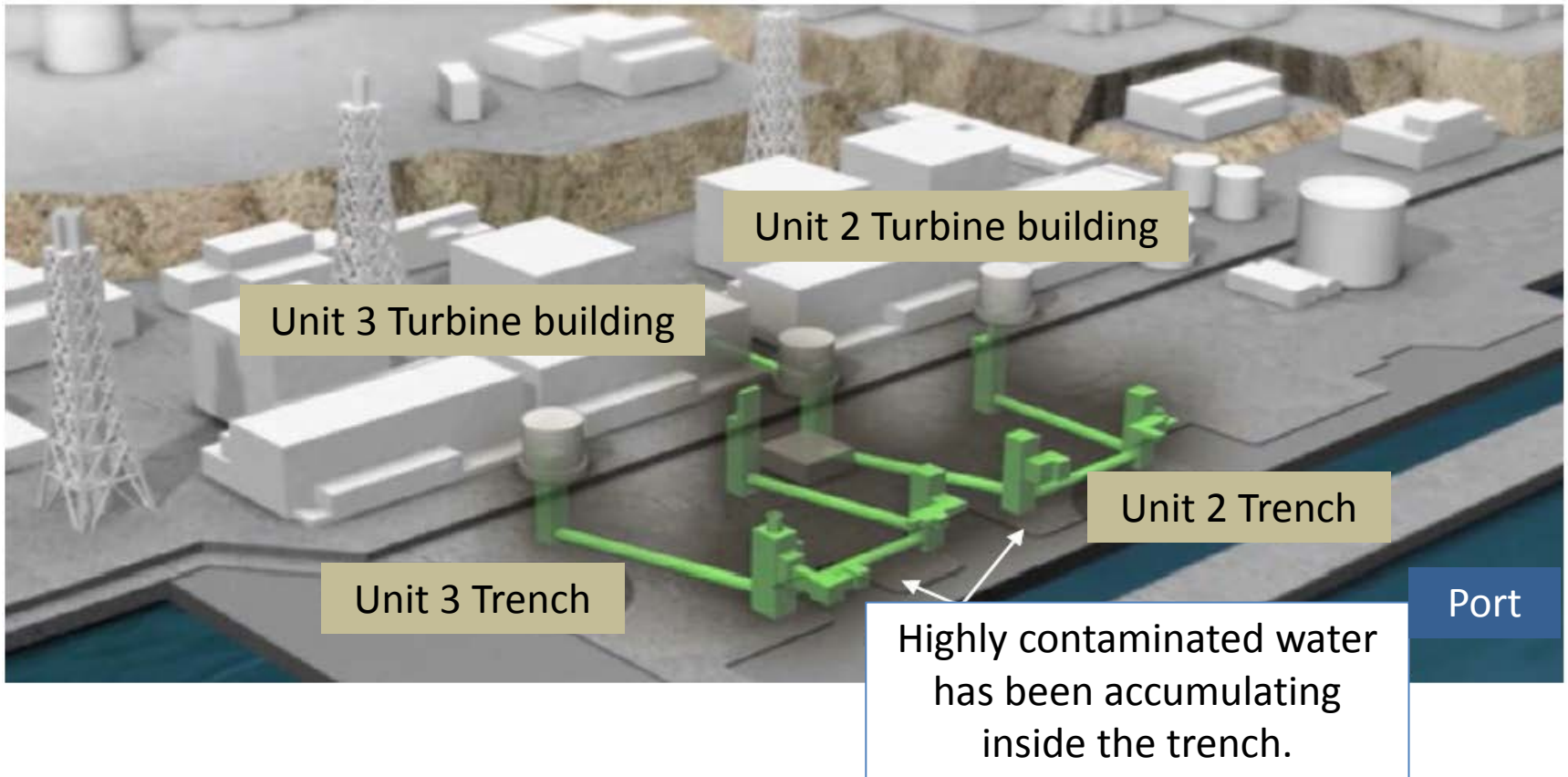


Ratio for Each Types of Contaminated Water
(As of May 2015)

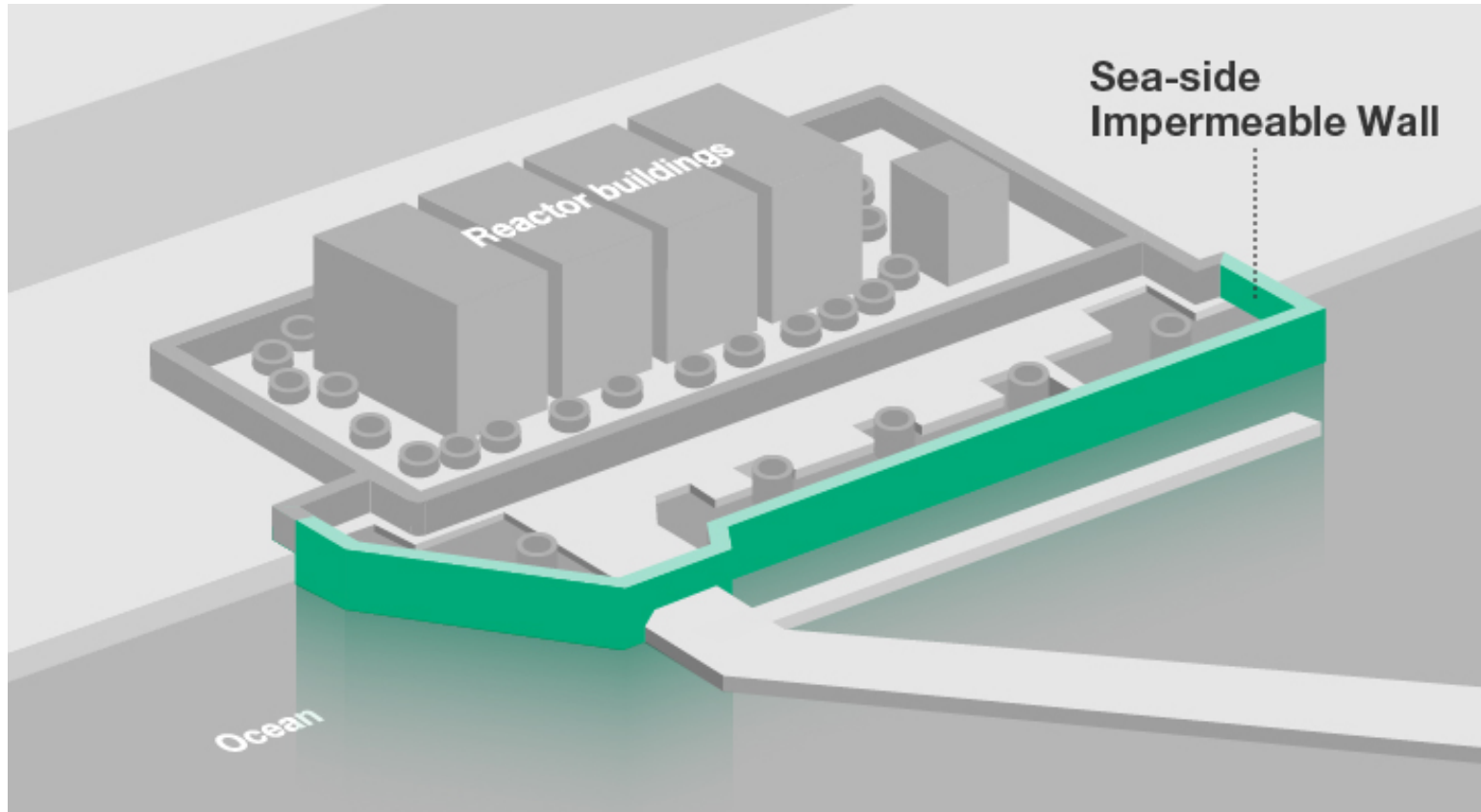


Source TEPCO, Edited by NRA

Completion of Removal of Highly Contaminated Water (approx. 10,000 tons) in Seaside Piping Trench

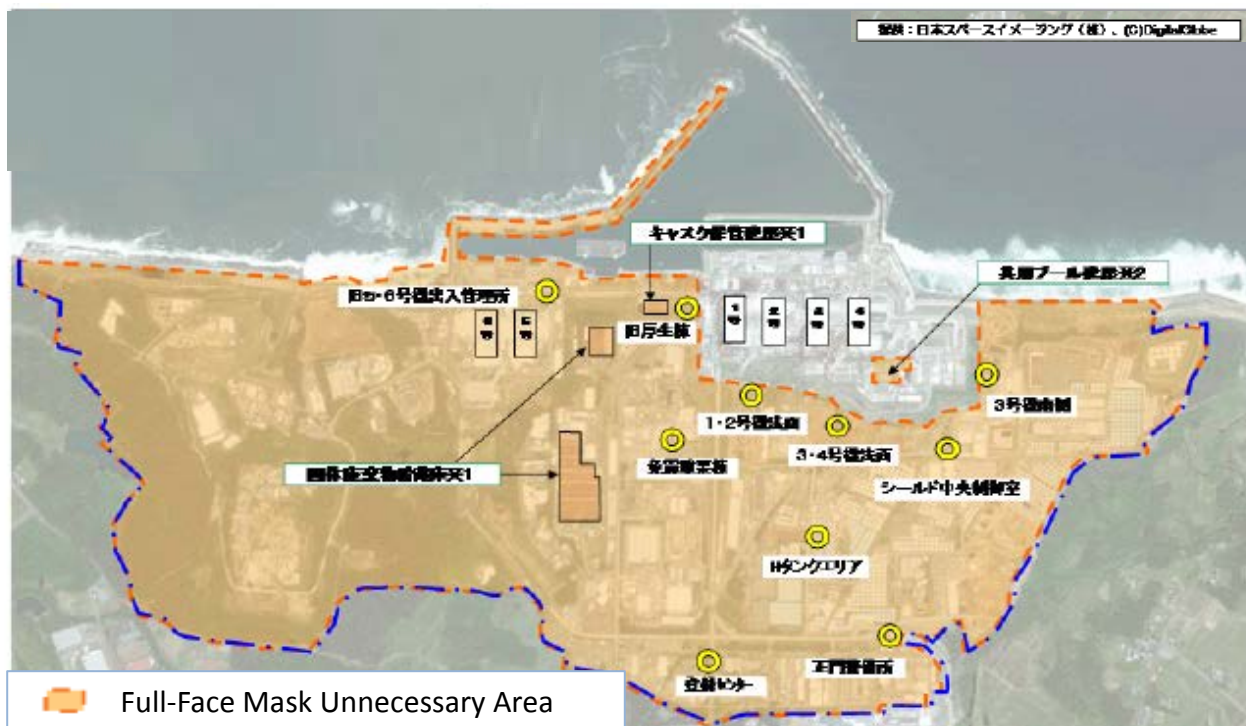


Prevention of Groundwater Flowing into the Port Area (Completion of Construction of Seaside Impermeable Wall)



Source TEPCO, Edited by NRA

Expansion of Full-Face Mask Unnecessary Area



Improvement on Working Environment with Establishment of the Meal Service Center and the Large Rest House



Large Rest House



Challenges: Control of Contaminated Water

Continuous accumulation of storage tanks for contaminated water



Reference information: Tritium Water

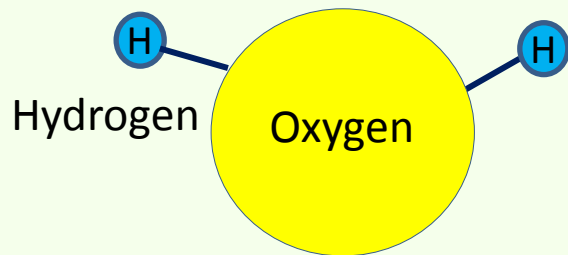
Total amount of tritium in contaminated water is 3.4 peta becquerels_(at Mar.2014) in the site of the Fukushima Daiichi Nuclear Power Station.

3.4 peta becquerels = 3,400,000,000,000,000 becquerels

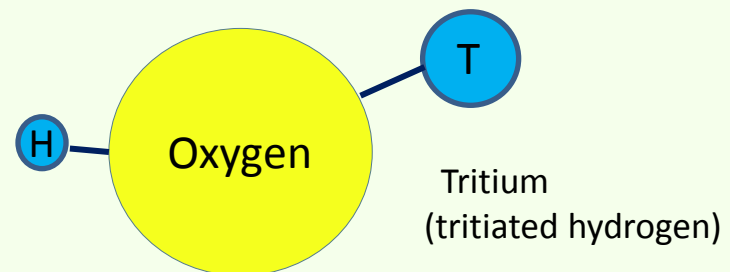
Small glass  57 milliliters of tritium water

Tritium is one of isotopes of hydrogen. It exist in the form of water.

Ordinary water (H₂O)



Tritium water (THO)



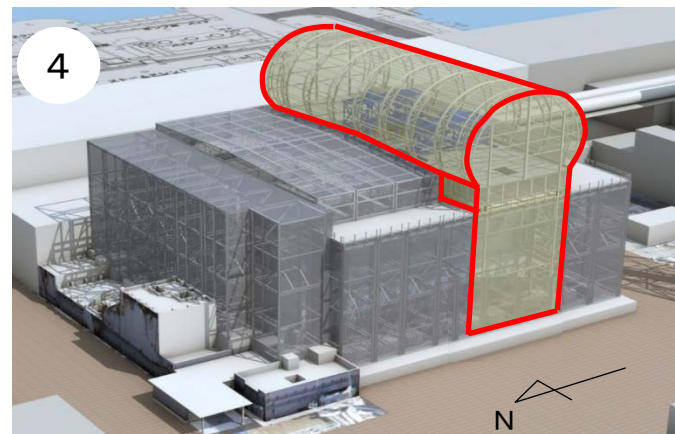
* Tritium is generated by cosmic rays (protons and neutrons) on the earth. Its amount is about 72 peta becquerels per year, according to an estimate.

Challenges: Management of Solid Radioactive Waste

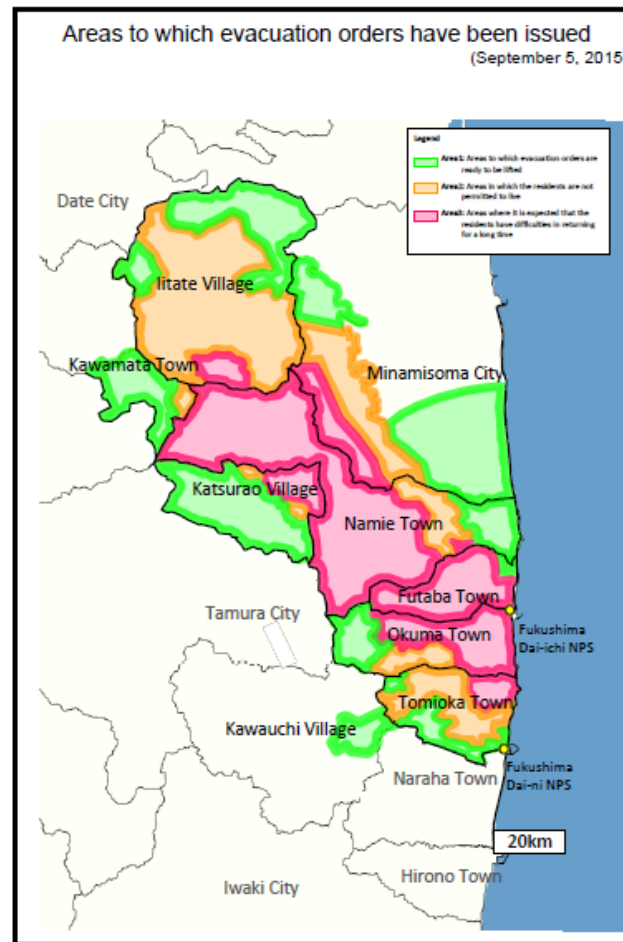


Challenges: Removal of Spent Fuel from Unit 1, 2 and 3

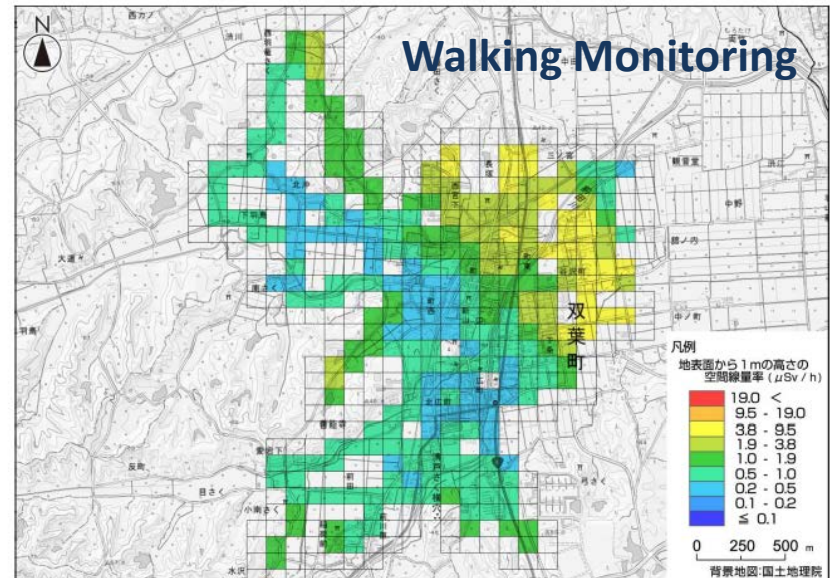
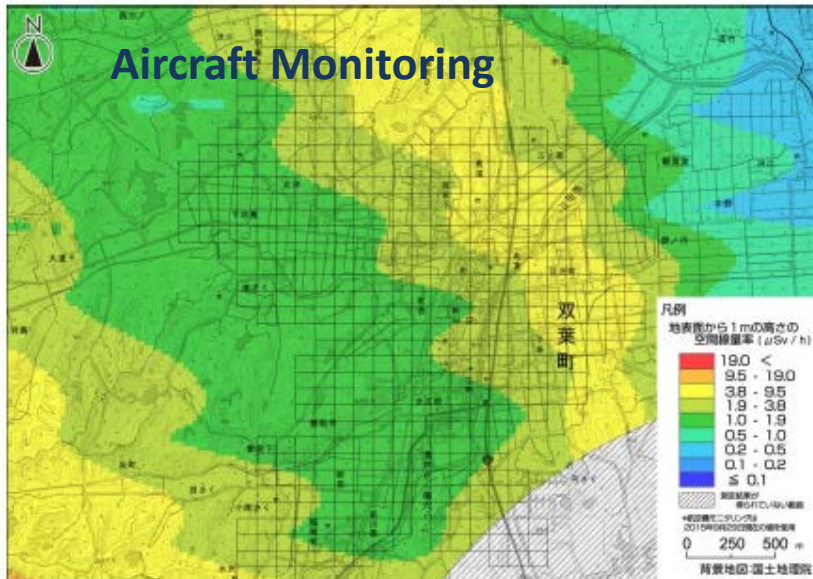
As in the case of Unit 3



Radiation Monitoring in the areas where it is expected that the residents have difficulties in returning for a long time



Radiation Monitoring in the areas where it is expected that the residents have difficulties in returning for a long time



***Walking monitoring is limited to areas with low radiation and low-height.**

The radiation doses have become low even in many areas in the areas where it is expected that the residents have difficulties in returning for a long time.

Radiation Monitoring in the areas where it is expected that the residents have difficulties in returning for a long time

- Future review and readjustment of radiation monitoring



Enhancement of radiation monitoring in the areas where it is expected that the residents have difficulties in returning for a long time, etc.



Areas where it is expected that the residents have difficulties in returning for a long time (Yonomori in Tomioka Town)

Thank you for your attention.

