Current Status of Nuclear Power in Japan

The 2nd World Nuclear Energy Development Forum

April 28, 2017

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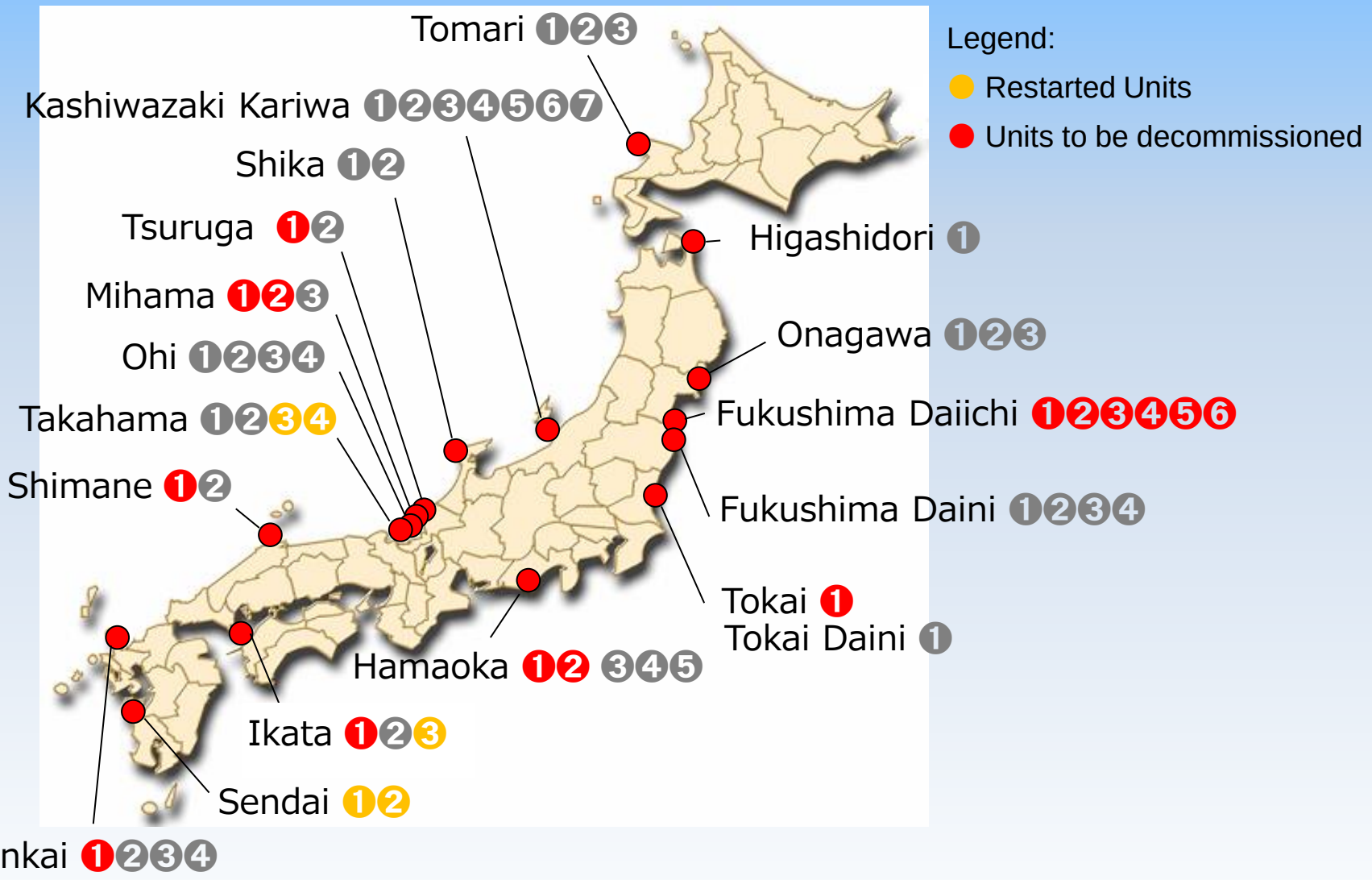
JAPAN ATOMIC INDUSTRIAL FORUM,INC

Contents

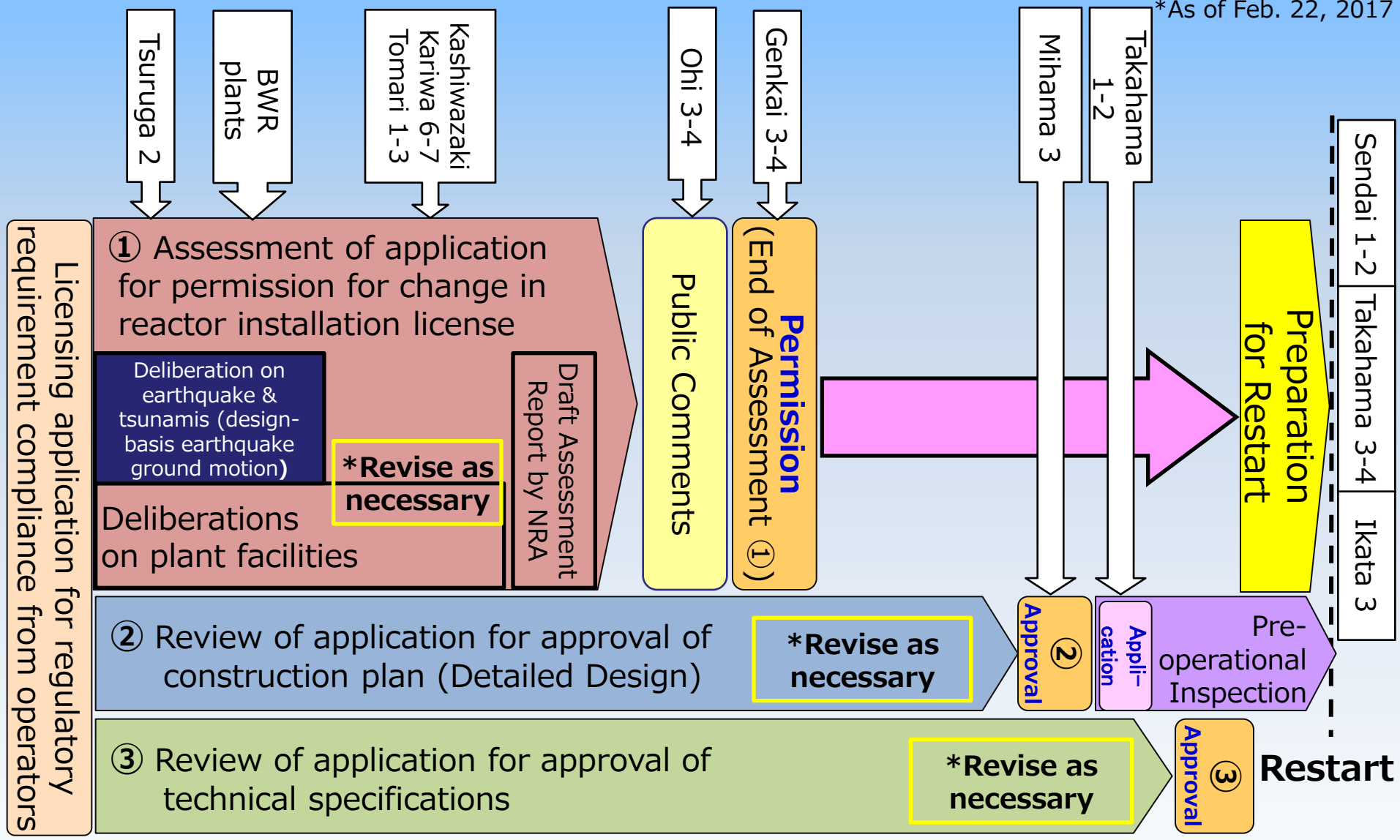
Status of Restarted NPPs



Source: Meeting of *Federation of Electric Companies of Japan* (FEPC), Nov. 22, 2016

Status of License Application for Restart

*As of Feb. 22, 2017

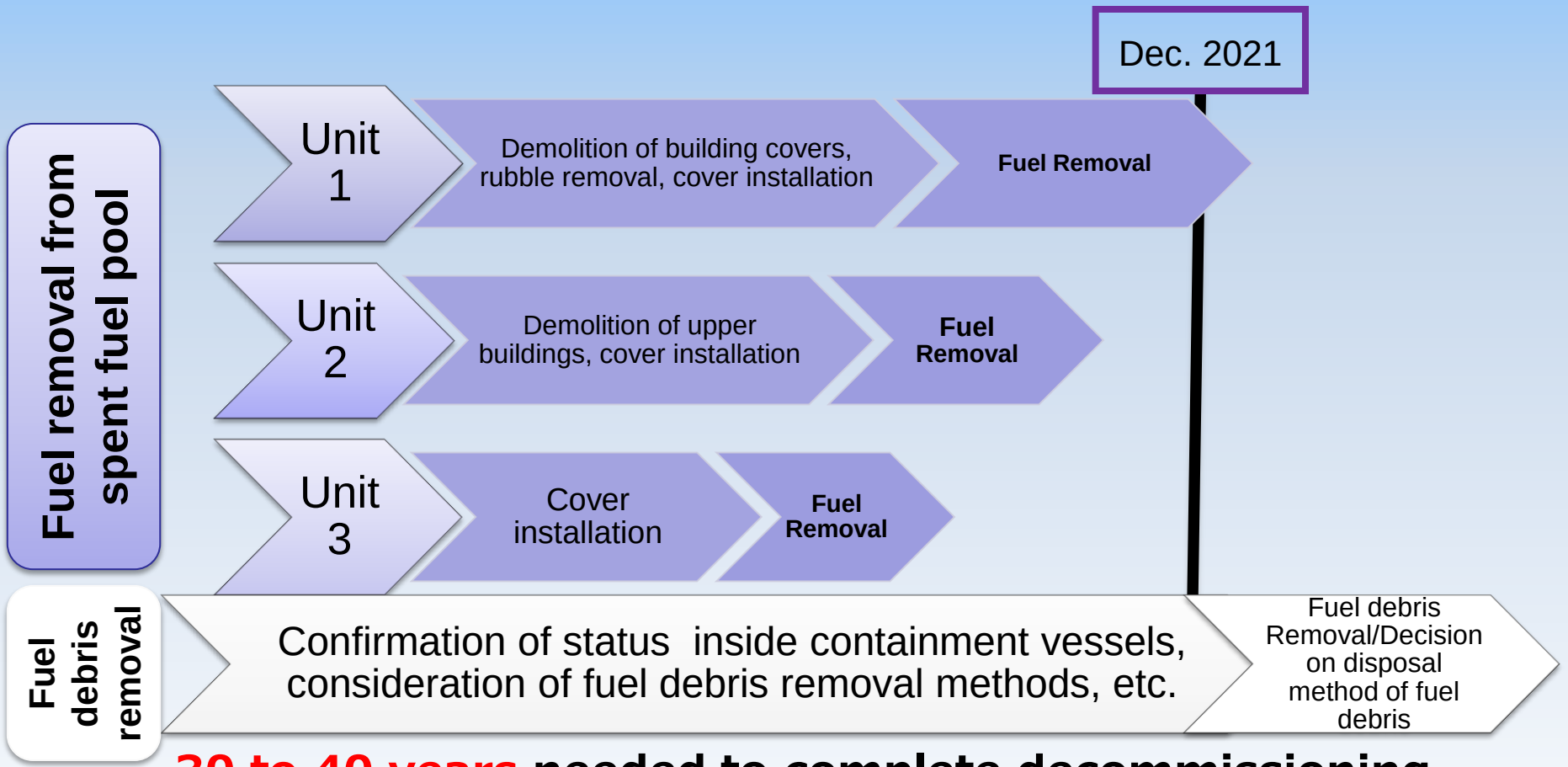


Source: FEPC

Local Consent (before restart)

II. Current Status of Fukushima Daiichi NPS

Roadmap for Decommissioning



30 to 40 years needed to complete decommissioning

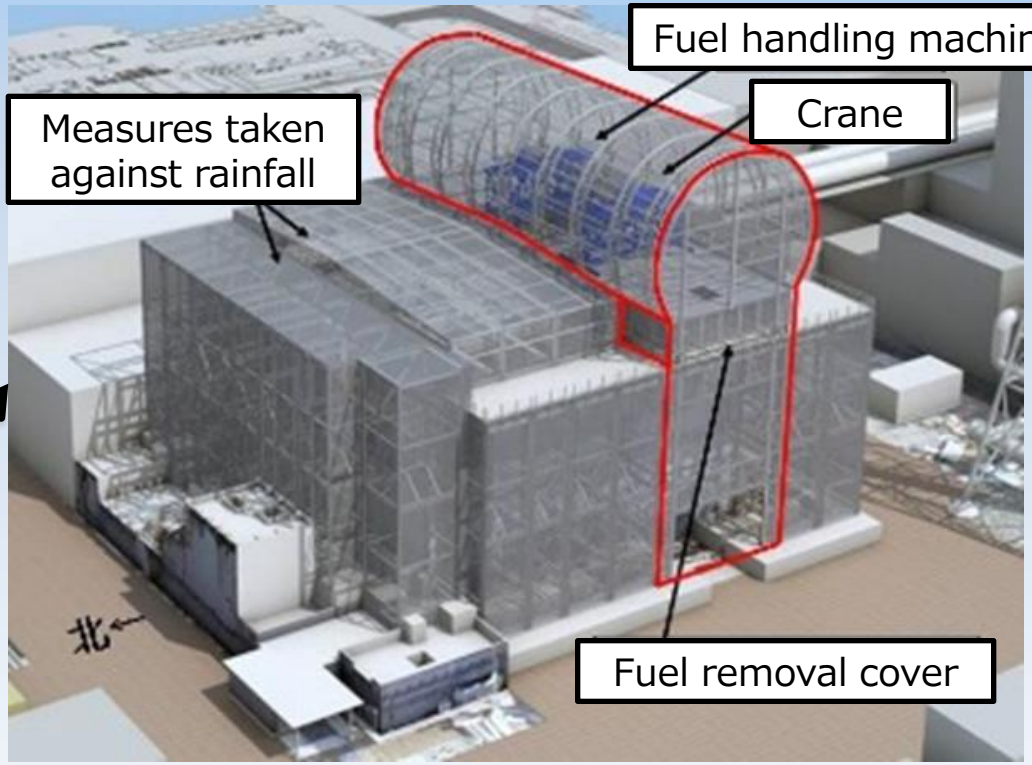
Source: Meeting of METI 's Team for Countermeasures for Decommissioning and Contaminated Water Treatment

II. Current Status of Fukushima Daiichi NPS

Installation of Unit 3 Fuel Removal Cover

Unit 3, Mar. 2011

Unit 3 Operating floor, Mar. 2016

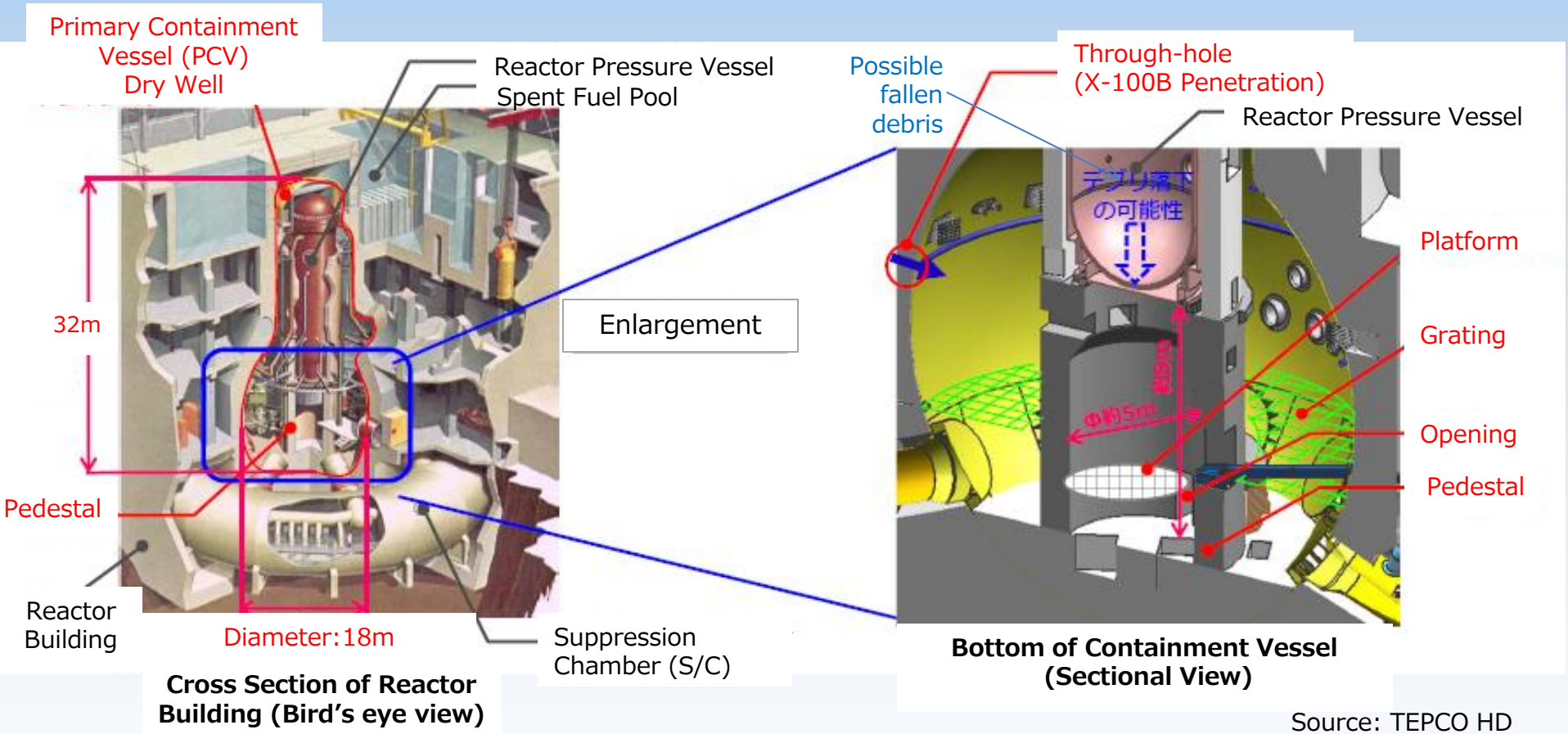


Installation of fuel removal cover (conceptional drawing)

Source: TEPCO HD

PCV Internal Investigation

Purpose: To obtain current situation inside the containment vessel and its surroundings to ensure smooth removal of fuel debris.



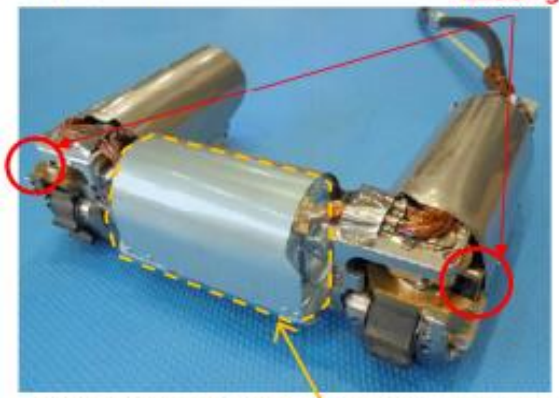
Cross Section of Reactor Building (Bird's eye view)

Bottom of Containment Vessel (Sectional View)

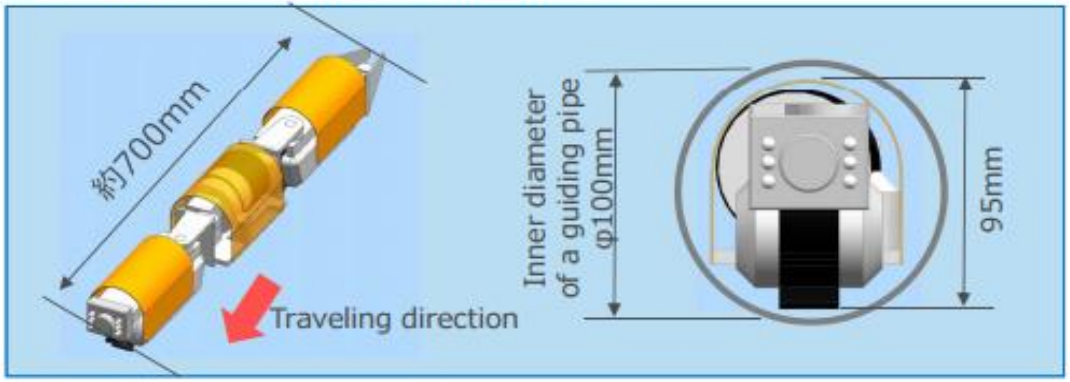
Source: TEPCO HD

Self-Propelled Investigation Device for Unit 1

Appearance

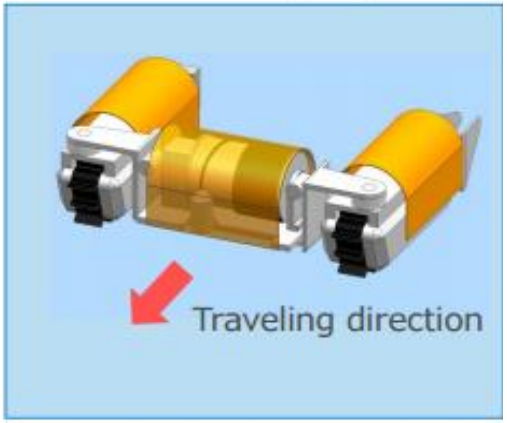


When inserted into a guiding pipe



When capturing digital images and measuring radiation doses

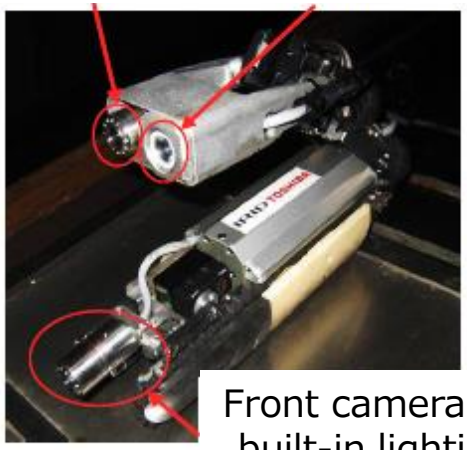
When traveling on grating



Source: TEPCO HD

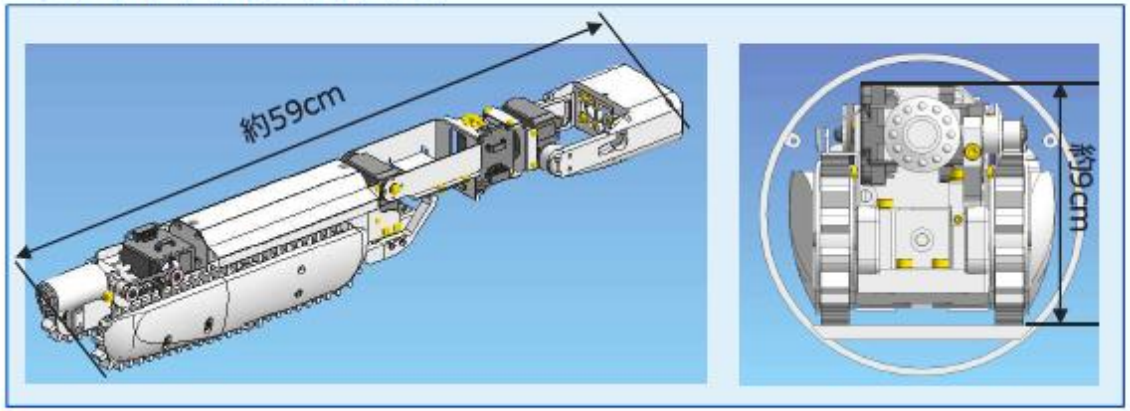
Self-Propelled Investigation Device for Unit 2

Rear camera Rear light

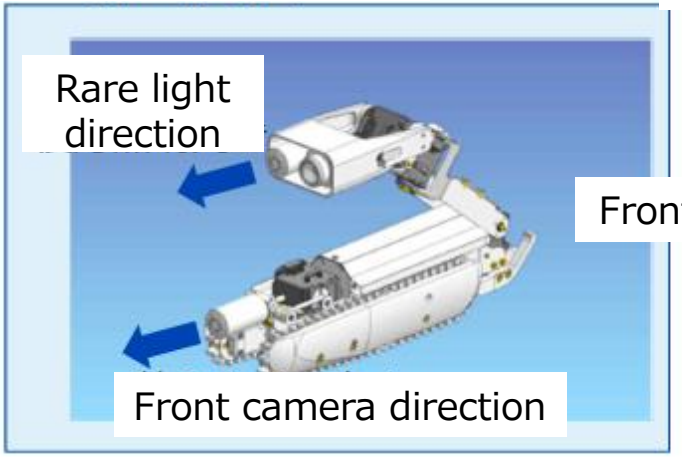


Front camera w/ built-in lighting

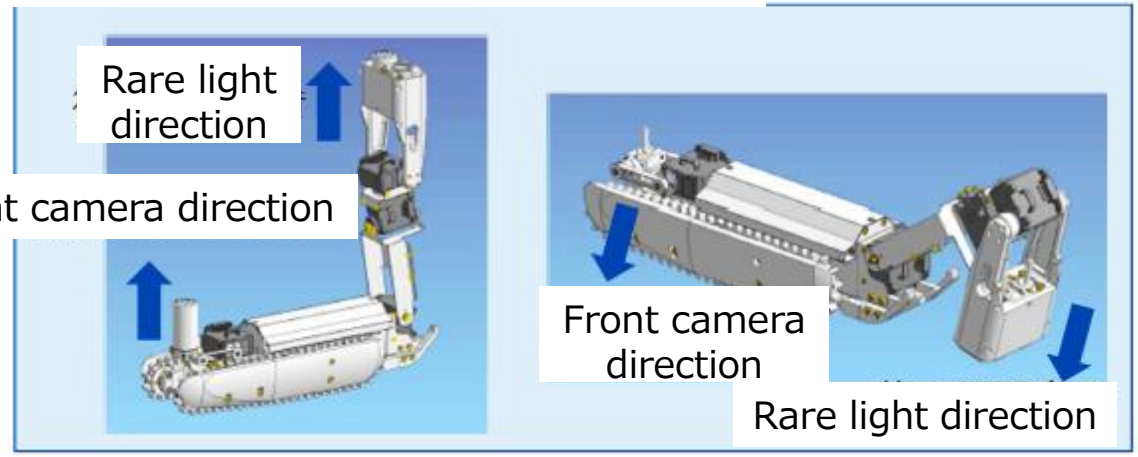
When inserted into a guiding pipe



When moving forward



When investigating inside the pedestal



Source: TEPCO HD

On-Site Tanks for Contaminated Water Treatment

Source: Internet

Improving On-Site Working Environment

R zone	Anorak area	Constant dust monitoring
Y zone	Coverall area	
G zone	Standard working clothes area	

R zone (アノラックエリア)	Y zone (カバーオールエリア)	G zone (一般服エリア)
Full-face mask 	Full or half face mask 	Disposable mask
Anorak on top of Coverall  or Coverallx2	Coverall 	Standard Staff wear

Areas not requiring full-face masks increases

Source: TEPCO HD

II. Current Status of Fukushima Daiichi NPS

Improving On-Site Working Environment

Paving work

Tank installation work

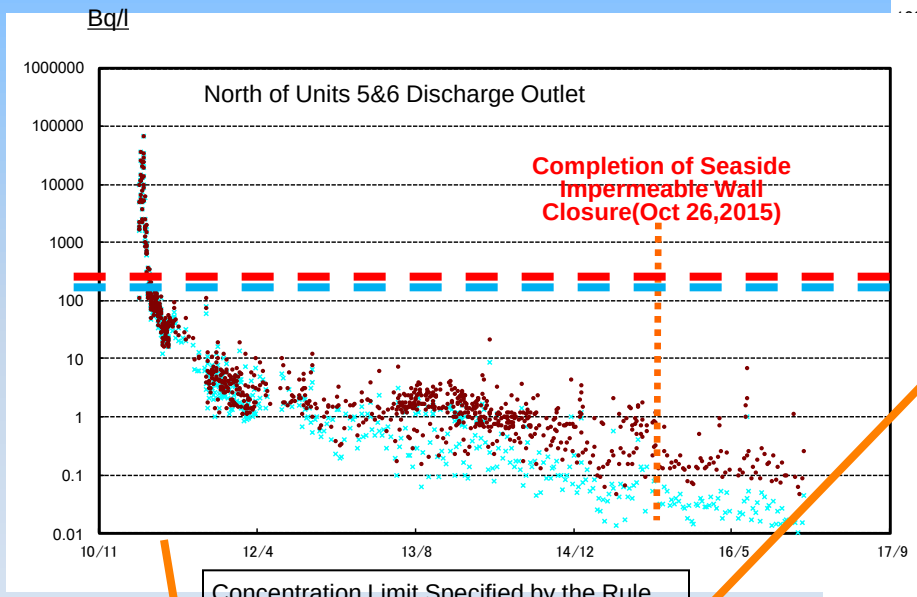
On-site workers working in standard working clothes

Source: TEPCO HD

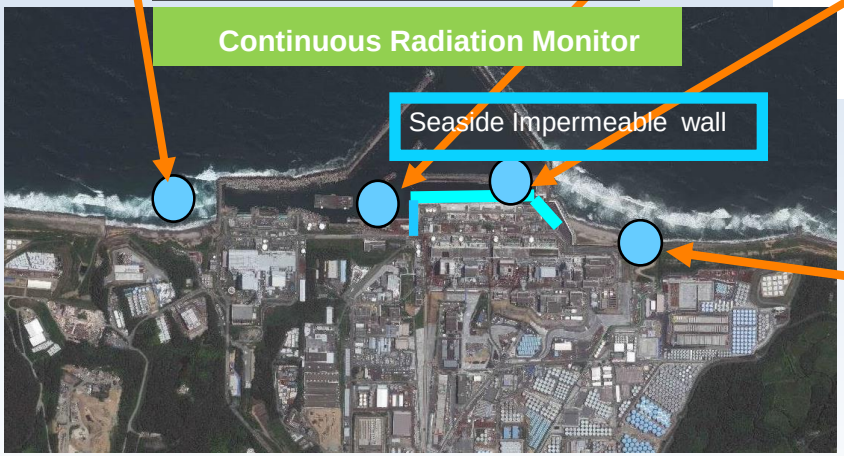
II. Current Status of Fukushima Daiichi NPS

Sea Area Monitoring Status

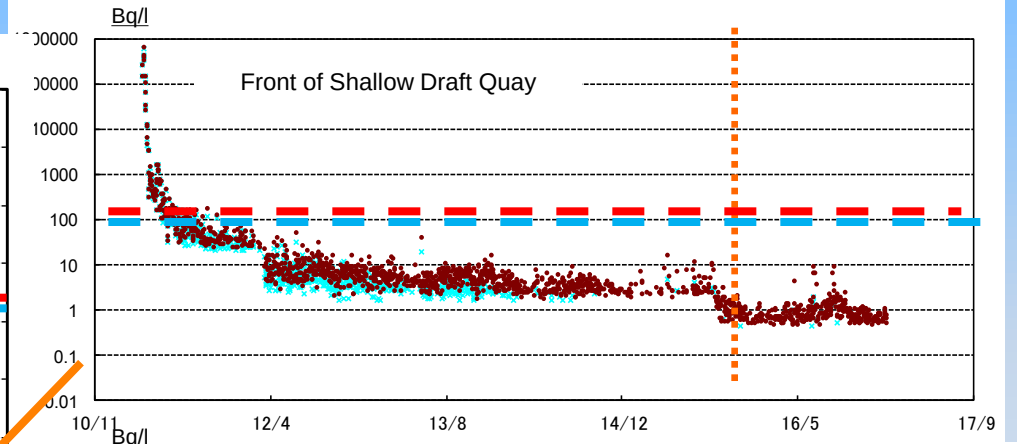
The radioactive material concentration in the sea area by one- 1,000,000th after the accident

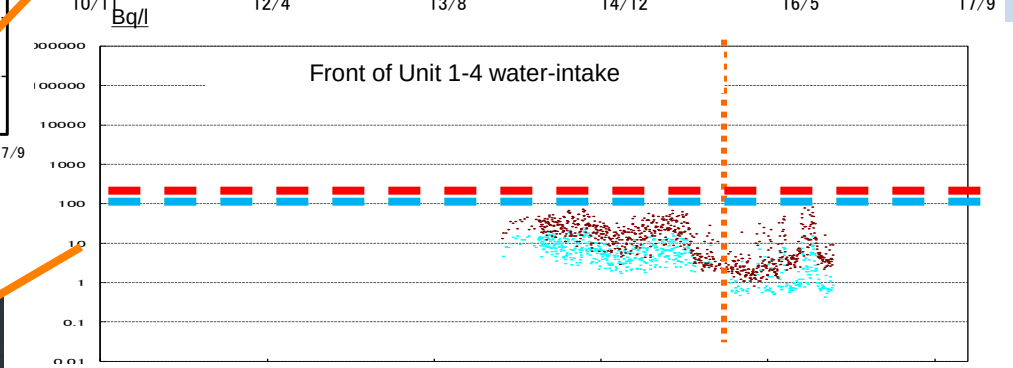


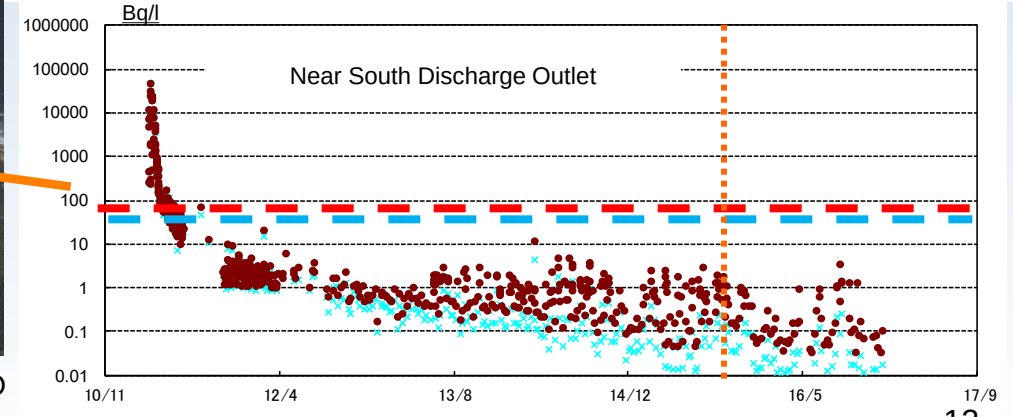
Concentration Limit Specified by the Rule
- Cesium 137: 90Bq/L
- Cesium 134: 60Bq/L



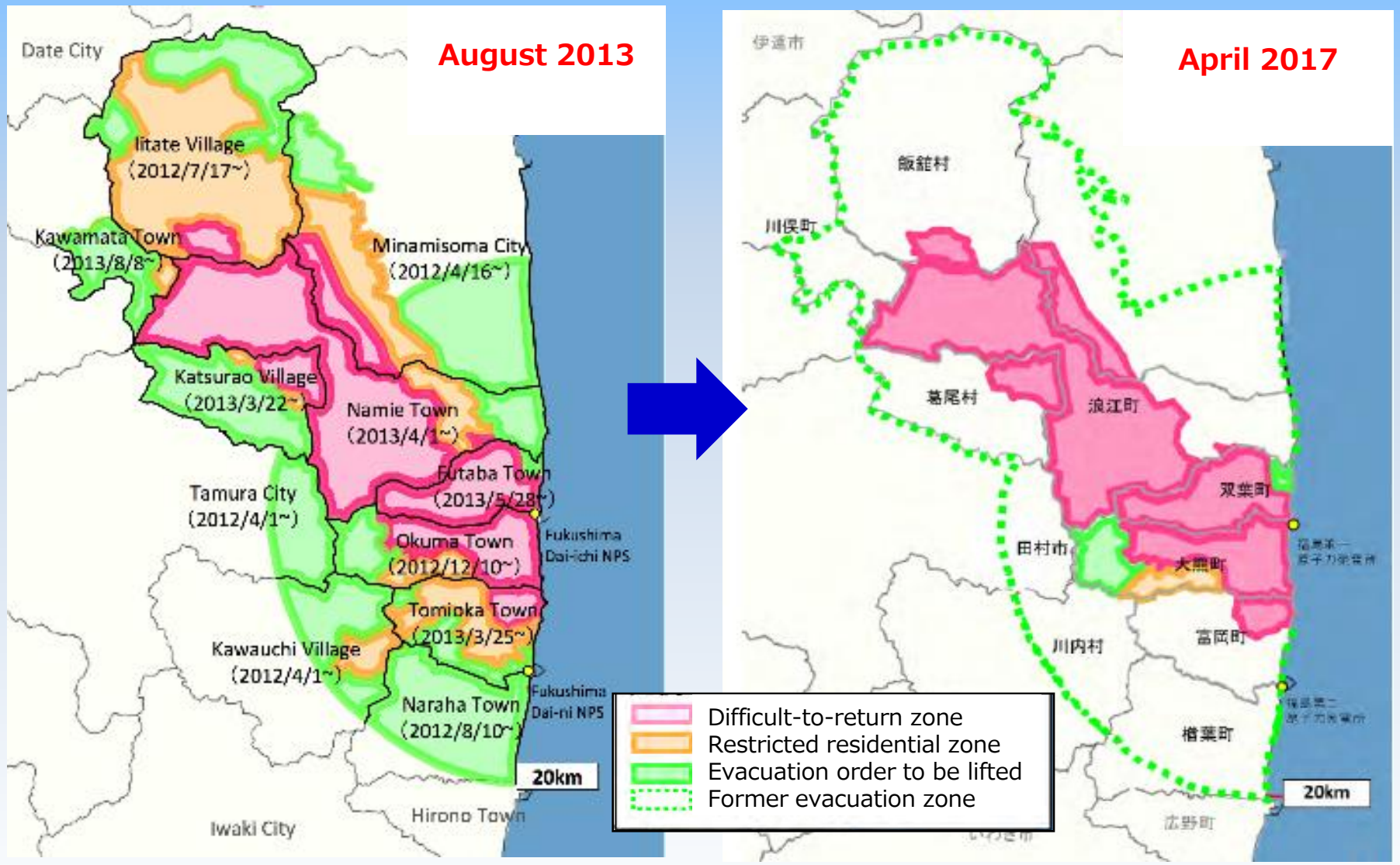
Source: TEPCO HD







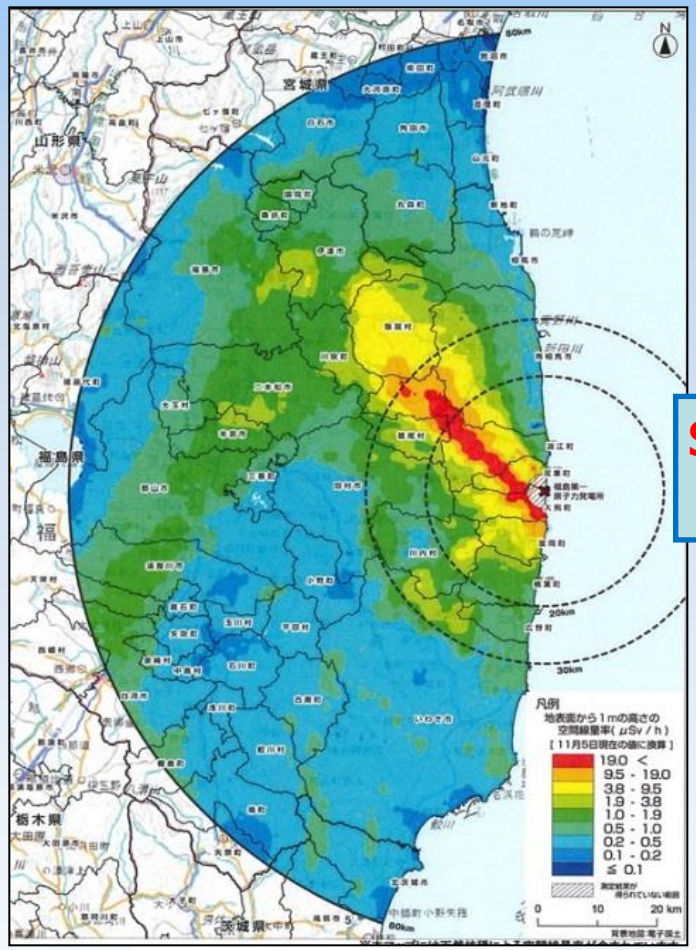
Transition of Evacuation Zone



Source: Meeting material for the 45th Nuclear Emergency Response Headquarters Meeting (http://www.kantei.go.jp/jp/singi/genshiryoku/dai45/siryou3.pdf)

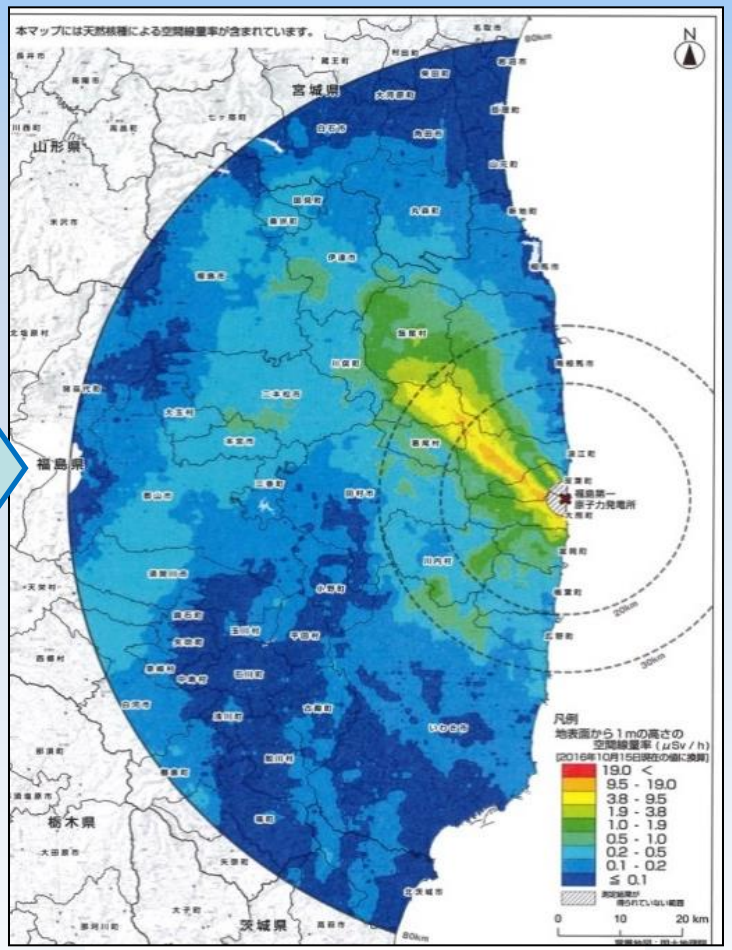
Changes in Radioactivity Level

Results of Airborne Radiation Monitoring (Map of air dose rate 1m above ground surface)



Nov. 5, 2011
(8 months after accident)

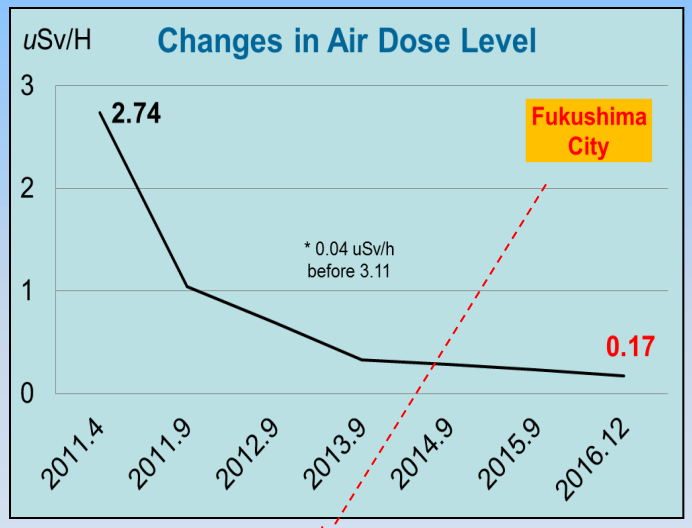
Significant Drop



Oct. 15, 2016
(5 years & 7 months after accident)

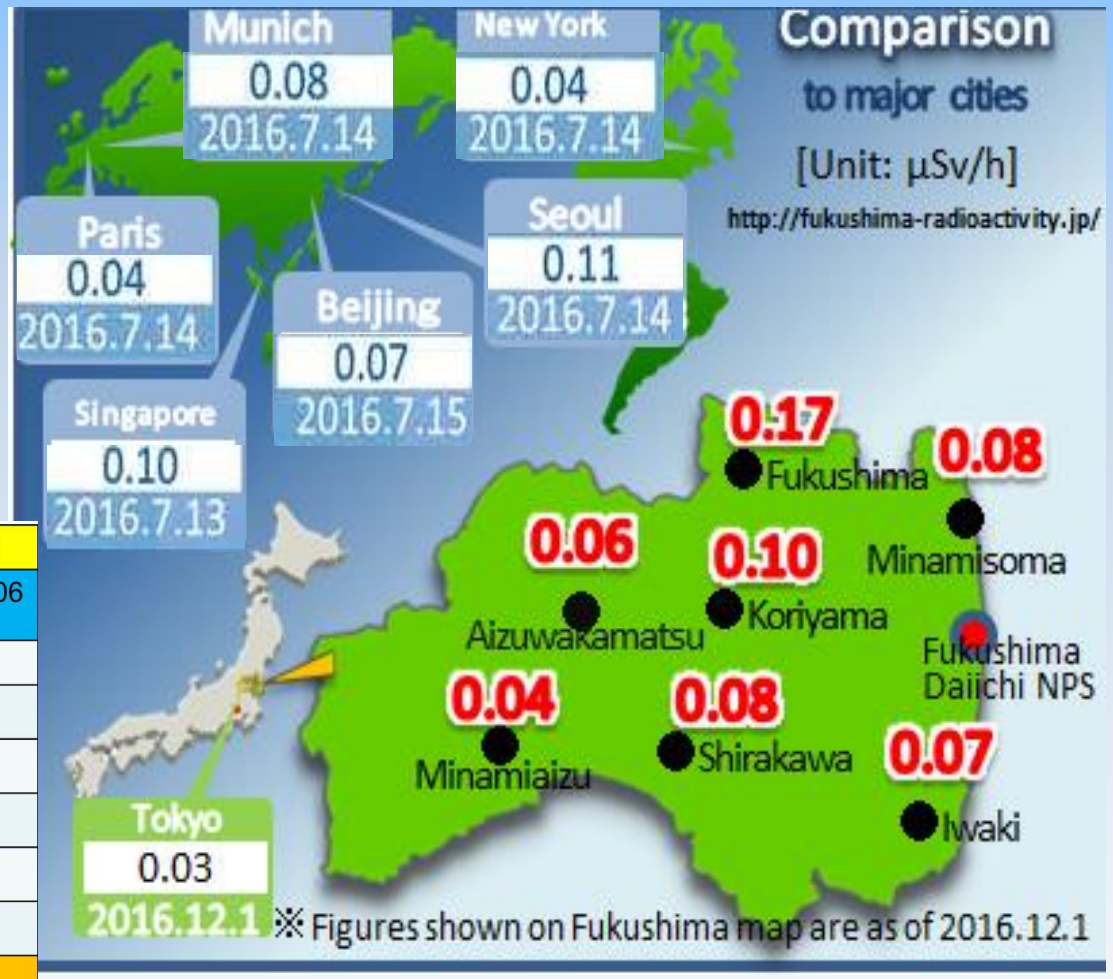
Source: Nuclear Regulation Authority, Japan

Radiation Status in Fukushima Pref.



	Fukushima	Aizuwakamatsu	Iwaki
Before 3.11	0.04	0.04-0.05	0.05-0.06
Apr. 2011	2.74	0.24	0.66
Sep. 2011	1.04	0.13	0.18
Mar. 2012	0.63	0.10	0.17
Sep. 2012	0.69	0.10	0.10
Mar. 2013	0.46	0.07	0.09
Sep. 2013	0.33	0.07	0.09
Dec. 2016	0.17	0.06	0.07

Unit: *u* Sv/h



Source: *Steps for Revitalization in Fukushima* (Dec. 5, 2016 edition), Fukushima Pref.

Changes in Hirono Town

Hirono Station (east side)

Photo credit: Hirono Town

Elevated disaster prevention green area (10.7m higher than original ground level)

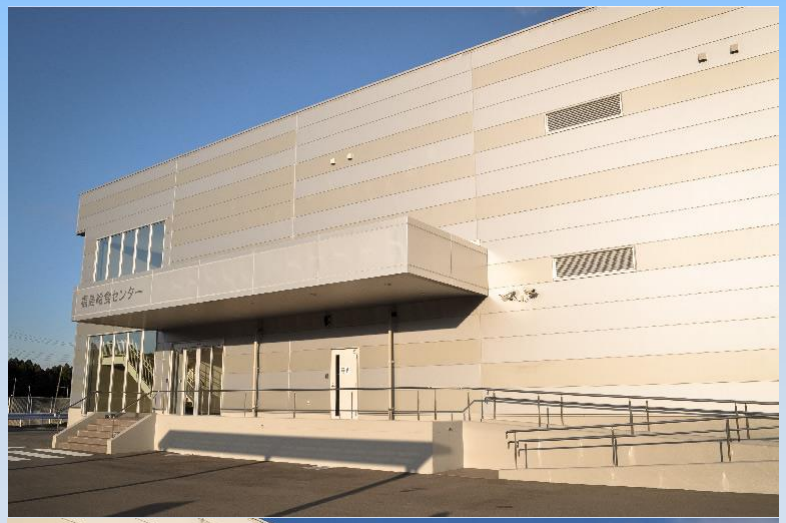
New public restoration housing ready for move-in, Oct. 2014

New office building opened in Mar. 2016.

Photo by JAIF

Changes in Okuma Town

TEPCO Housing Units for single staff



Fukushima Meal Supply Center

Photo by JAIF

Changes in Tomioka Town

Front of Tomioka Station after tsunami

Station square to be completed in 2017 spring

Public restoration housing (ready for move-in in April 2017)

Photo credit: Tomioka Town

Changes in Naraha Town

View from Tenjinmisaki (2012.11)

View from Tenjinmisaki (2017.02)

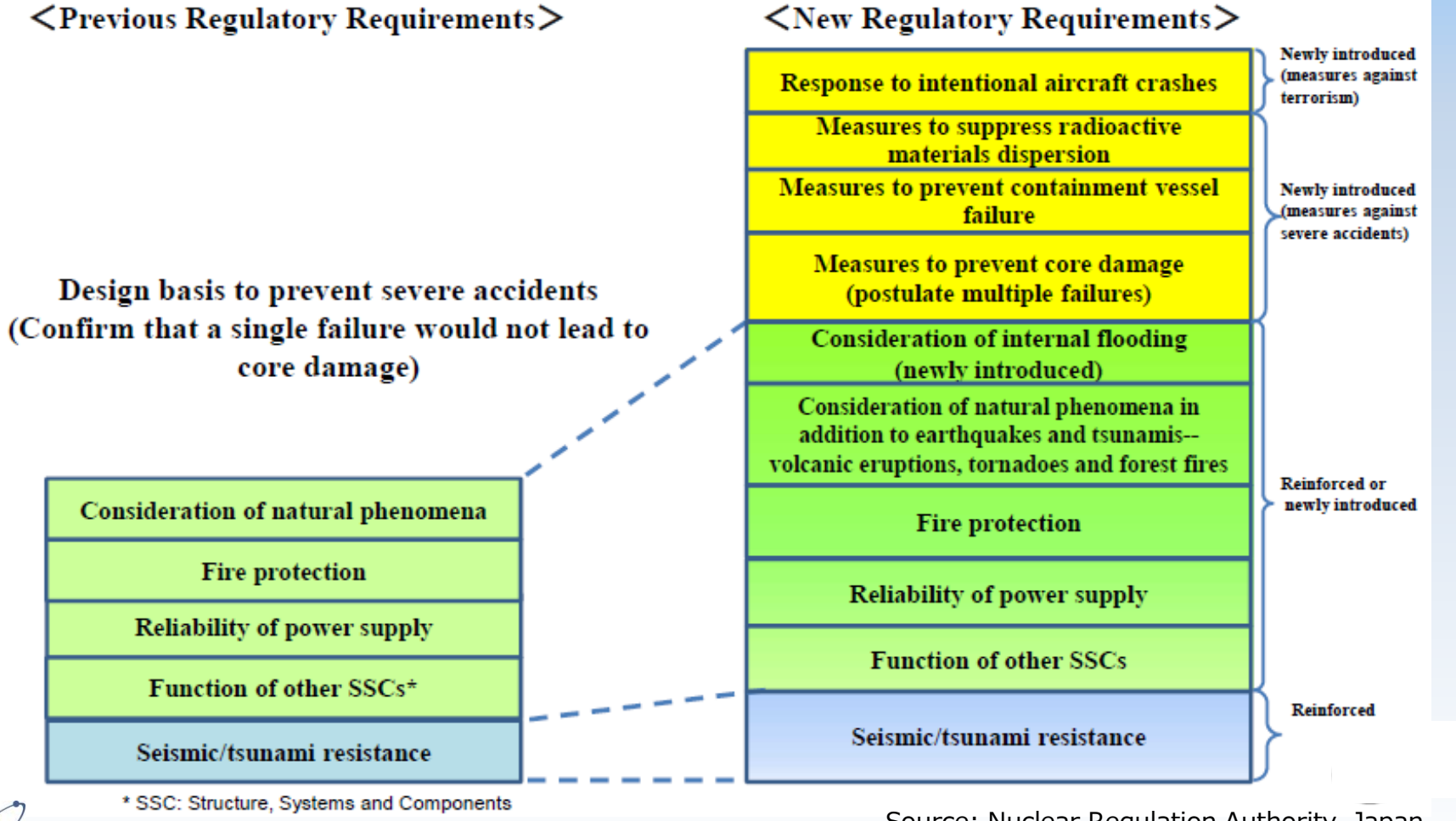
Scene of Naraha (2012.11)

Public restoration housing
(move-in began in Nov. 2016)

Photo by JAIF

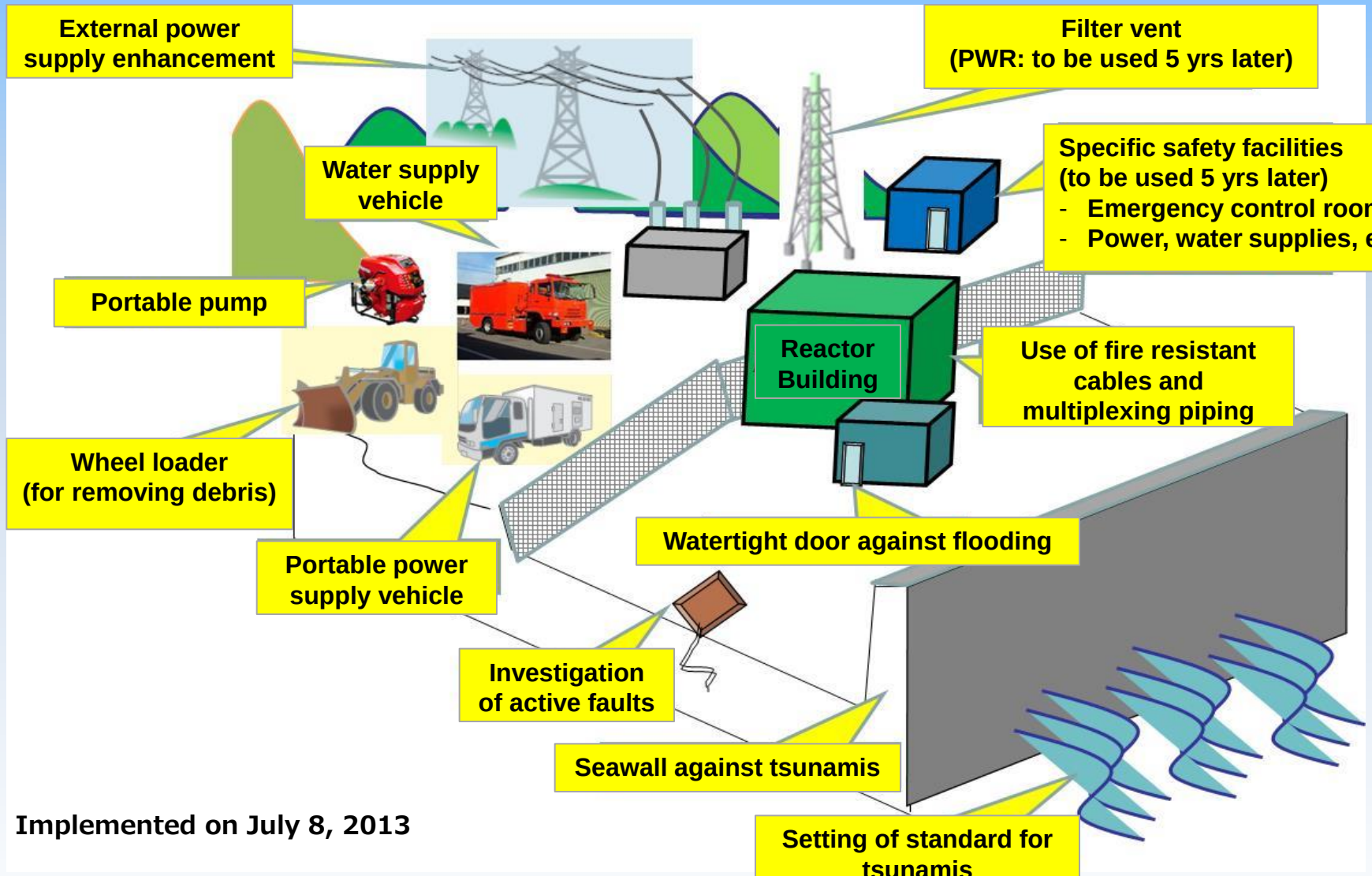
Comparison between Past and New Regulatory Requirements

- The New Regulatory Requirements tighten measures to prevent or deal with severe accidents and acts of terrorism



Source: Nuclear Regulation Authority, Japan

Improved Safety Measures



Implemented on July 8, 2013

Source: Chubu EPC

Tsunami Countermeasures by Hamaoka NPS (Chubu EPC)

Tsunami protection wall (22m)

Cement-mixed soil embankment

Source: Chubu EPC

IV. Post-Fukushima Safety Enhancements

Voluntary Measures for Safety Enhancement

Voluntary Measures	How to achieve?
Improving methods of risk assessment & decision-making	Base on appropriate combinations of assessment results, engineering judgments, etc.
Identifying areas for improvement	Through peer reviews and responses
Conducting further discussions on safety enhancement	Base on peer review results
Improving abilities to respond to emergencies	Through operation of the *Mihama Nuclear Emergency Assistance Center*
Establishing a system of cooperation	Through collaboration among nuclear operators

Source: FEPC

COP21 Commitment

Future Energy Mix of Japan

44% emission-free generation sources in **2030**

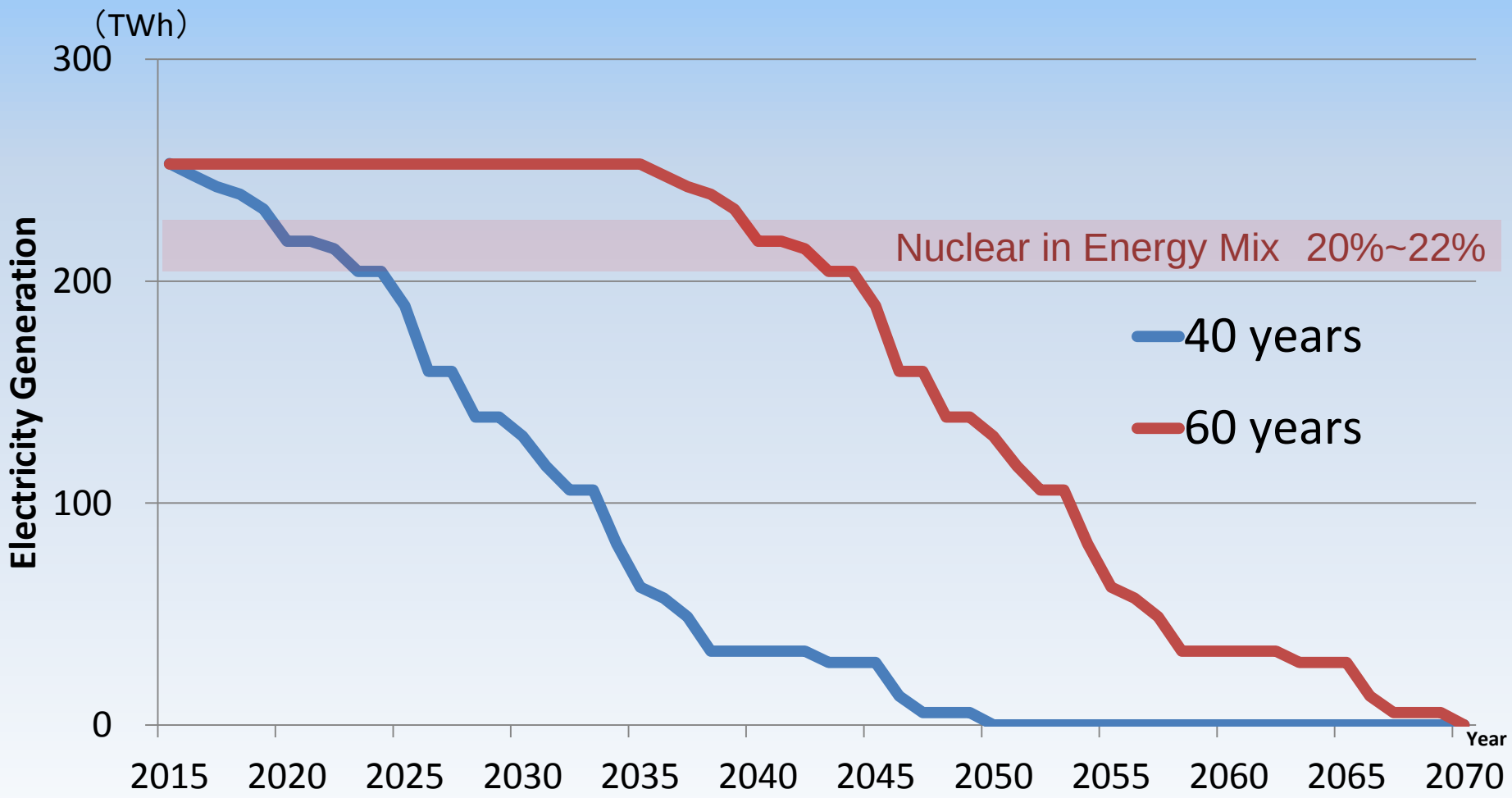
▲26% total CO2 emission reduction compared with 2013

Energy Mix	2010	2013	- - - -	2030
Nuclear	29%	1%		20 to 22%
Renewable	10%	11%		22 to 24%
Thermal	61%	88%		56%

CO2 emissions	2010	2013	- - - -	2030	
total	1.304Gt	1.408Gt		1.042Gt	▲26%
CO2kg/kwh	0.350	0.570		0.370	

Complied by JAIF

Life Extension & Decommissioning



Complied by JAIF

Life Extension & Decommissioning

NPPs in Japan to be Decommissioned

(as of April 2017)

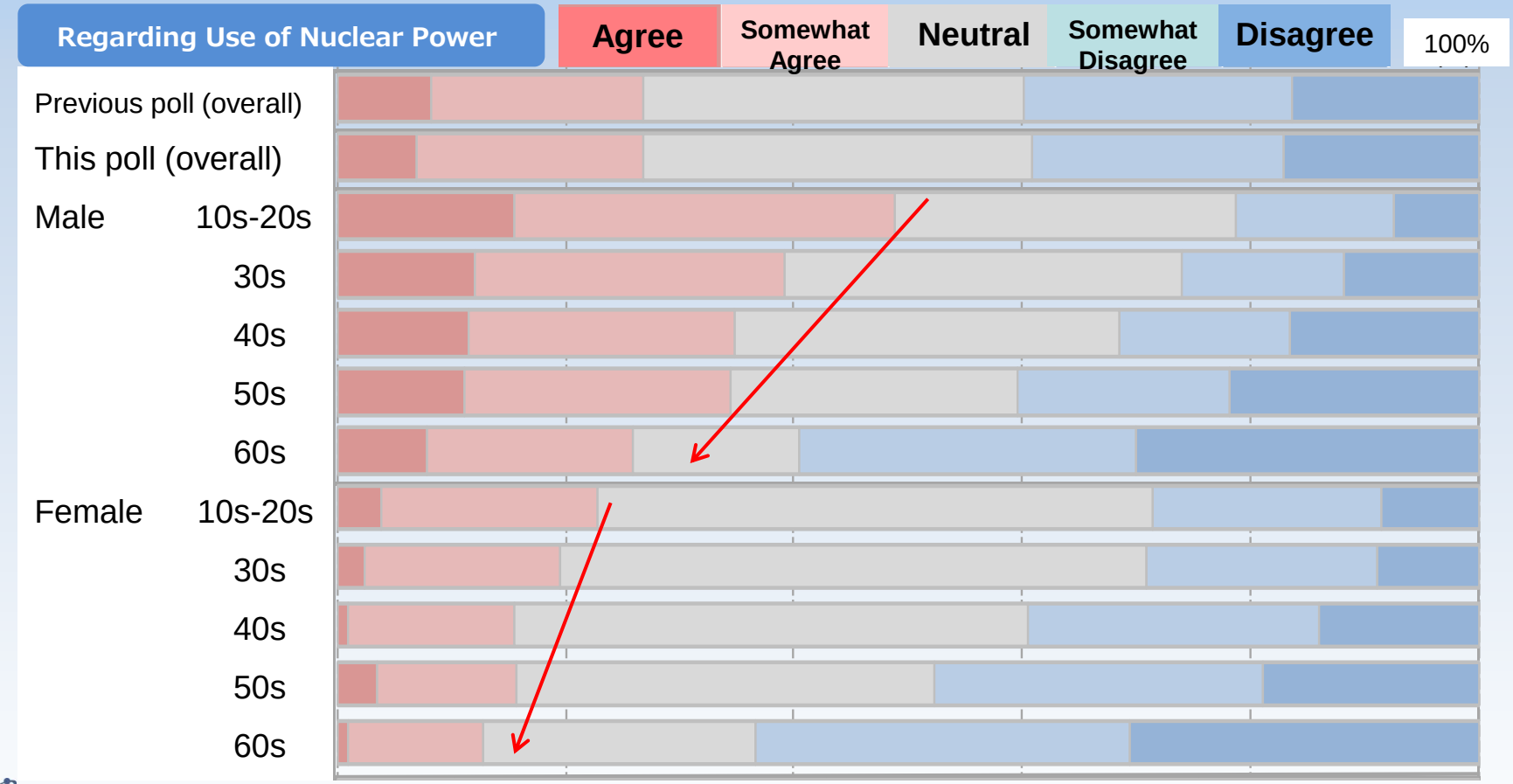
	Plant Name	Commercial Operation	Reactor Type
1	Tokai-1	1966.07	GCR
2	Hamaoka-1	1976.03	BWR
3	Hamaoka-2	1978.11	BWR
4	Fukushima Daiichi-1	1971.03	BWR (BWR-3)
5	Fukushima Daiichi-2	1974.07	BWR (BWR-4)
6	Fukushima Daiichi-3	1976.03	BWR (BWR-4)
7	Fukushima Daiichi-4	1978.10	BWR (BWR-4)
8	Fukushima Daiichi-5	1978.04	BWR (BWR-4)
9	Fukushima Daiichi-6	1979.10	BWR (BWR-5)
10	Tsuruga-1	1970.03	BWR (BWR-5)
11	Mihama-1	1970.11	PWR W(2 loop)
12	Mihama-2	1972.07	PWR M(2 loop)
13	Genkai-1	1975.10	PWR M(2 loop)
14	Shimane-1	1974.03	BWR (BWR-3)
15	Ikata-1	1977.09	PWR M(2 loop)

Complied by JAIF

Efforts to Improve Public Understanding

Public Poll on Nuclear Power

Period: Dec. 22-24, 2016
Target: Adults aged 18-69
Area covered: Japan nationwide (major metropolitan cities)
Sample size: 3,800
Method: Internet survey



Conducted by JAIF

Dispelling Unfounded Fears and Rumors

Reference Values for Cesium Concentration in Foods

［Unit: Bq/kg］

	Japan（2012.4-）	Codex Alimentarious Commission※	EU (Products distributed within the EU)	U.S.A.
Drinking water	10	1000	1000	1200
Milk	50	1000	1000	1200
General food	100	1000	1250	1200
Baby food	50	1000	400	1200

Note: As seen in the next slide, the assumptions for calculating reference values vary; thus the reference values can be quite different and are not directly comparable.

※ An intergovernmental organization issuing international food standards (Codex Standards), established in 1963 by the Food and Agriculture Organization and the World Health Organization (WHO) of the United Nations.

Source: Basic Information on Radiation Risk, Cabinet Office, Et Al. (February 2016)

Dispelling Unfounded Fears and Rumors

Reference Values for Cesium Concentration in Foods

Assumptions in calculations of reference values

	Standard Limit	Assumption
Japan	Upper limit of additional effective dose by food ingestion at **1 mSv/year**	**50% of general foods** are contaminated at levels equivalent to the reference value. Given that marketed milk and baby food are mostly domestically produced, the effective dose from them is half the reference value for general foods.
Codex Alimentarius Commission	Based on the Operational Intervention Level of **1 mSv/year** (below which no need for special measures)	**10% of all foods** come from radioactively contaminated areas.
EU	Additional exposure dose of not more than **1 mSv/year**	**10% of all foods** for human consumption in a lifetime are contaminated at levels equivalent to regulation values.
U.S.A.	Effective dose of **5 mSv/year**	**30% of all food intake** is radioactively contaminated.

Source: Basic Information on Radiation Risk, Cabinet Office, Et Al. (February 2016)

Dispelling Unfounded Fears and Rumors

Efforts to Ensure Safety of Food in Fukushima

Monitoring of Fukushima Food Products

- Fukushima Prefecture conducts repeated inspections on all local food products in each stage of production, distribution and consumption, in order to ensure their safety.
- Only primary products certified to be safe through multiple inspections in each stage are shipped out to the market.

Food Types	# of Inspected Cases	Cases Exceeding Standard Limits	Ratio
Brown rice (2006 grown)	8,600,000	0	0.00%
Fruits & vegetables	2,998	0	0.00%
Livestock	2,496	0	0.00%
Cultivated mushrooms	562	0	0.00%
Marine fish & shellfish	4,908	0	0.00%
Farm-raised fish	66	0	0.00%
Edible wild plants & mushrooms	1,031	2	0.19%
Freshwater fish	502	4	0.80%

No single case exceeding inspection standard limits!

Data collected between 2016.4.1-10.31
(Brown rice: 2016.8.24-10.31)

Source: *Steps for Revitalization in Fukushima* (Dec. 5, 2016 edition), Fukushima Pref.

VI. Final Message

「知己知彼,百战百胜」

（孙子兵法）

To know one's own strength and the enemy's is the sure way to victory.

(The Art of War by Sun Tzu)

Thank you very much for your attention.

Akio Takahashi
www.jaif.or.jp/en/