

# Overview of Mihama Power Station

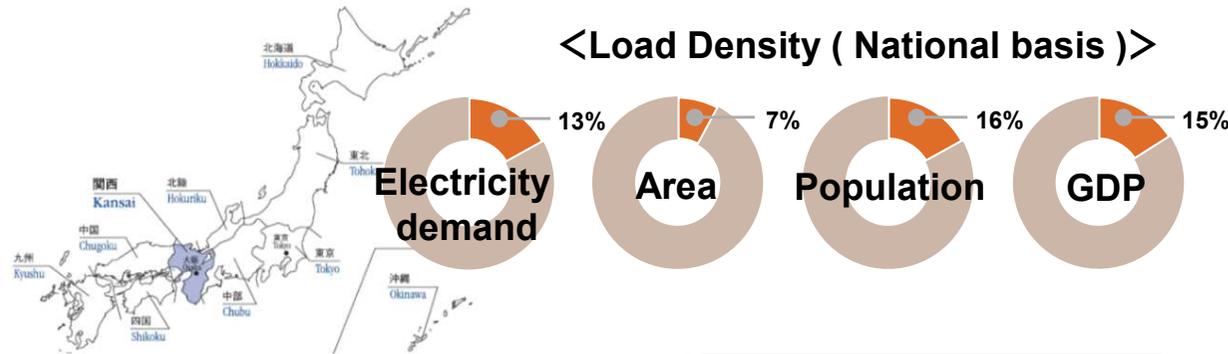
September 22, 2023



Mihama Power Station

# Company Overview

## <Load Density ( National basis )>



## <Company Data ( As of the end of Mar. 2023 )>

Establishment	May 1, 1951	
Paid-in capital	JPY 489.3 billion	
Common shares issued	939 million	
Total assets	JPY 8,774.4 billion (Consolidated)	
Generation facilities	Hydropower	8.25 GW
	Thermal	13.82 GW
	Nuclear	6.58 GW
	Renewable energy	0.01 GW
	<b>Total</b>	<b>28.65GW</b>
Total electricity sales	127.3 TWh	
<b>Retail Electricity sales volume</b>	111.6 TWh	
Electricity sales to other non-utilities	15.7 TWh	
Sales volume of Gas & LNG	1.53 million tons	
Operating revenues	<u>JPY 3,951.8 billion (Consolidated)</u>	
	JPY 3,462.1 billion	(Energy business)
	JPY 1,138.4 billion	(Transmission and Distribution)
	JPY 291.6 billion	(IT/Communications business)
	JPY 190.7 billion	(Life/business solutions business)
Ordinary income	JPY ▲6.6 billion (Consolidated)	
Net income	JPY 17.6 billion (Consolidated)	
Employees	31,628 (Consolidated)	
	8,474 (Non-consolidated)	

## <Overview of Facilities>



[Reference] Renewables Facilities [including facilities other than in Kansai Area] -Solar 188 MW, Wind 24 MW, Biomass 257 MW

# Nuclear facilities of Kansai Electric Power

■ Nuclear Power Division  
(593 people)



■ Community Relations Division

Located in Fukui City  
(partially in Mihama Town)



■ Takahama Power Station  
(560 people)



Unit	Rated power output (MW)	Start of commercial operation
1	826	Nov. 1974
2	826	Nov. 1975
3	870	Jan. 1985
4	870	Jun. 1985

■ Ohi Power Station  
(407 people)



Unit	Rated power output (MW)	Start of commercial operation
1	1175	Mar. 1979
2	1175	Dec. 1979
3	1180	Dec. 1991
4	1180	Feb. 1993

Decommissioning of Ohi Units 1 and 2 was decided on December 22, 2017, and operation ended on March 1, 2018

■ Mihama Power Station  
(343 people)



Unit	Rated power output (MW)	Start of commercial operation
1	340	Nov. 1970
2	500	Jul. 1972
3	826	Dec. 1976

Decommissioning of Mihama Units 1 and 2 was decided on March 17, 2015, and operation ended on April 27, 2015

Mihama

Takahama

Ohi

Nuclear Power Division

Nuclear Training Center (Takakahama)

Nuclear Training Center (Ohi)



⇒ Available on YouTube (25min., 6min. and 48sec. versions)

  Restarted  
  Operation ended

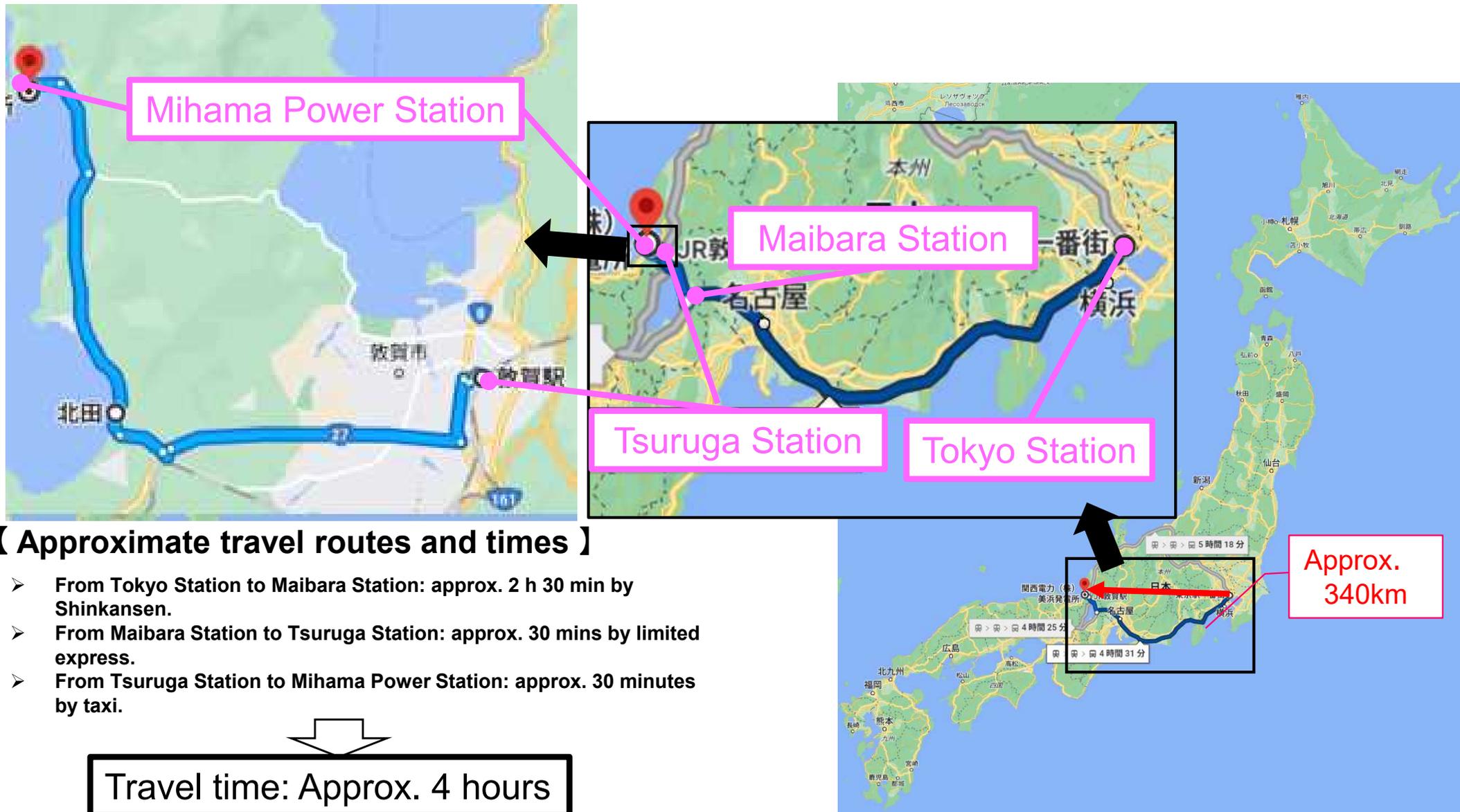
Received Gold Award (2nd place among 50 projects) in the "Internal Award In-house Video Newsletter Category" of the nationwide in-house newsletter contest

※Number of people as of end of March 2023

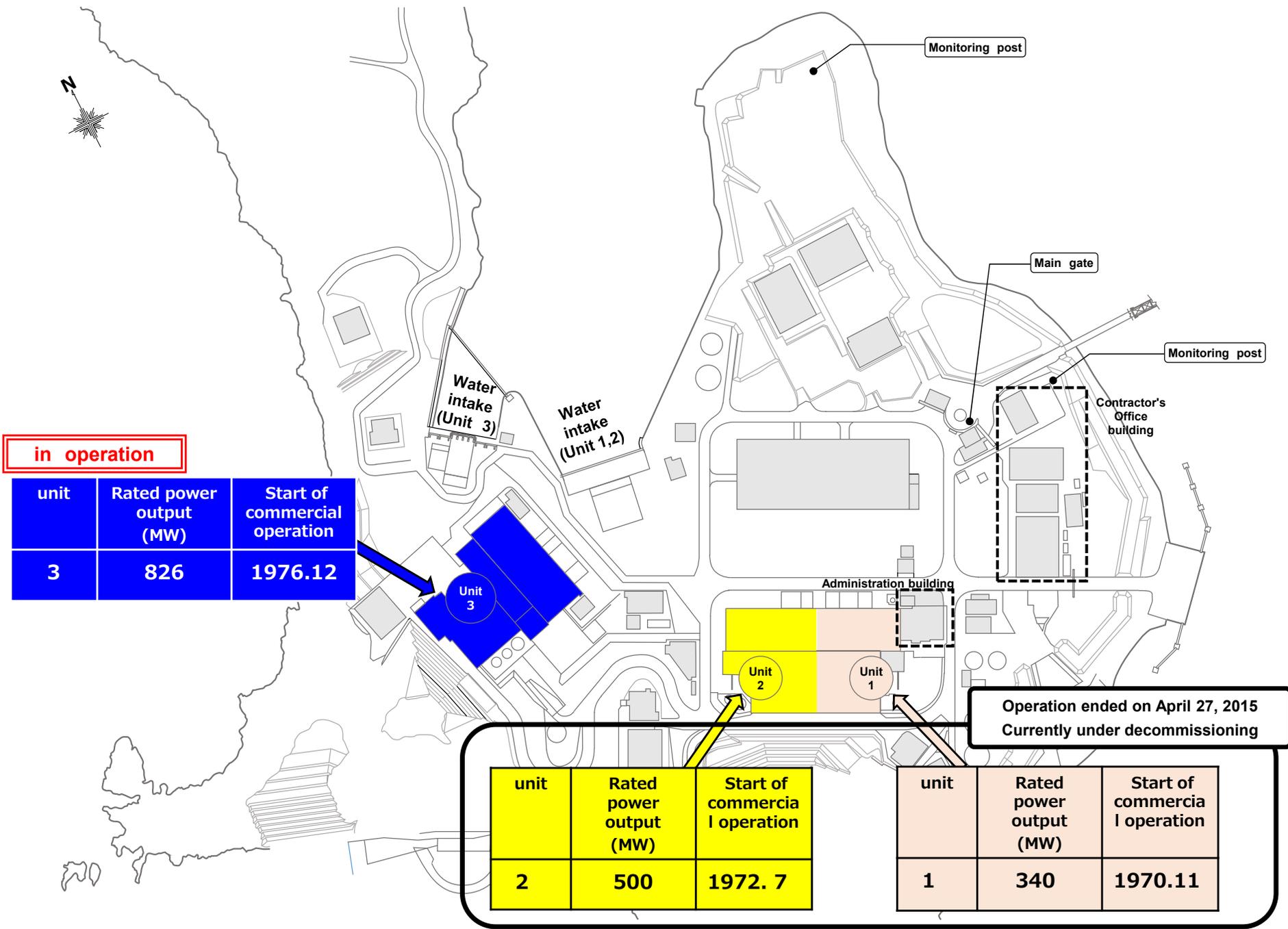
# Location of Mihama Power Station

Mihama Power Station is located in Mihama Town, Fukui Prefecture, which is approximately 340 km west of Tokyo along the coast of the Sea of Japan.

The area of Mihama Power Station is approximately 0.52 square-kilometers.



# Layout of Mihama Power Station



**in operation**

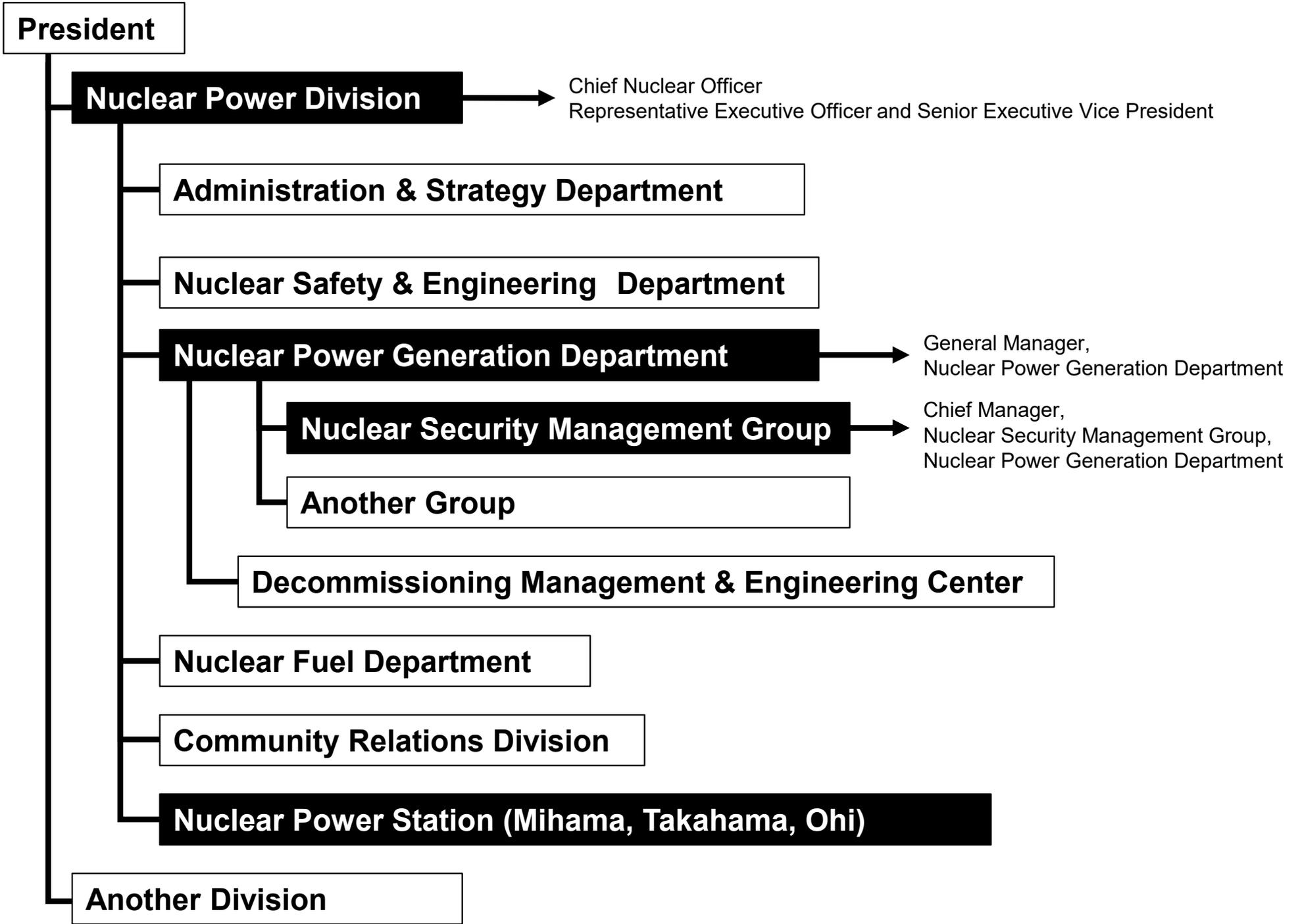
unit	Rated power output (MW)	Start of commercial operation
3	826	1976.12

unit	Rated power output (MW)	Start of commercial operation
2	500	1972.7

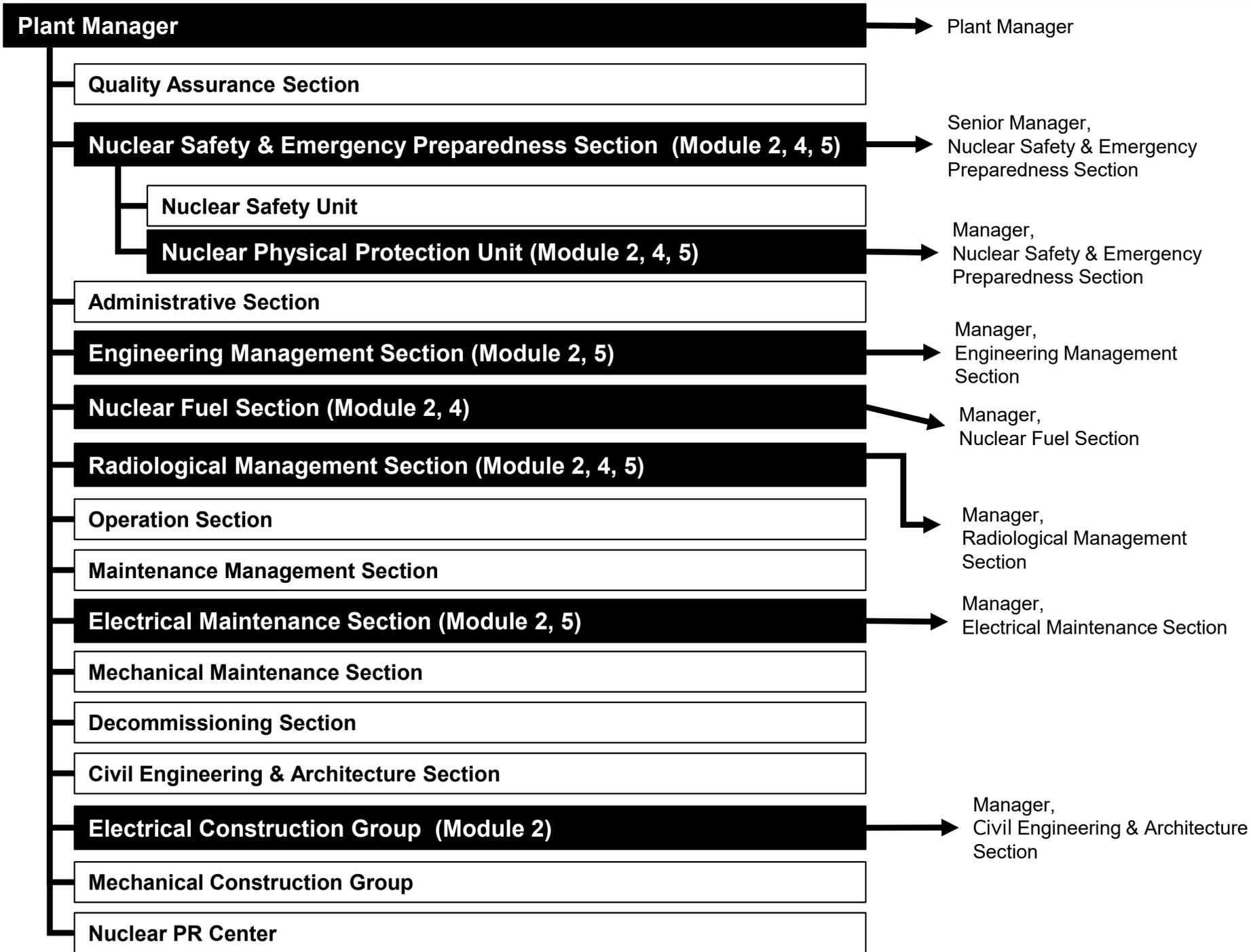
Operation ended on April 27, 2015  
Currently under decommissioning

unit	Rated power output (MW)	Start of commercial operation
1	340	1970.11

# Organization Chart of KANSAI Electric Power Co., Inc.



# Organization Chart of Mihama Power Station



# History of Mihama Power Station

## ~Pioneer of pressurized water reactor power station~



Practical training in the US



June 1969 Unit 1 Installation of reactor vessel



April 1988 Unit 1 Plutonium-thermal demonstration test conducted

August 1970 Unit 1 First power transmission to the Expo site  
November 1970 Unit 1 Start of commercial operation



September 1968 Visit by Their Imperial Highnesses Crown Prince and Crown Princess (currently Their Majesties the Emperor Emeritus and Empress Emerita)



July 1974 Unit 1 Stopped due to leakage of steam generator condenser tube (stopped for 6.5 years)



February 1991 Unit 2 Steam generator heat transfer tube damage accident (stopped for 3 years and 8 months)



April 19, 2017 Reported to Fukui Prefecture and Mihama Town

April 27, 2015 Units 1&2 End of operation

2015

2010

March 2011 Tohoku-Chihou-Taiheyu-Oki Earthquake TEPCO Fukushima Daiichi Nuclear Power Station Accident

November 2010 Start of voluntary investigation to establish successor unit of Mihama (suspended)

August 9, 2004 Unit 3 Secondary system piping rupture accident (stopped for 2.5 years)

March 1979 Three Mile Island Nuclear Power Plant Accident

April 1986 Chernobyl Nuclear Power Plant Accident

2004

1991

1988

1976

1974

July 1972 Unit 2 Start of commercial operation

1972

December 1976 Unit 3 Start of commercial operation

July 1972 Unit 3 Start of construction

October 1968 Unit 2 Start of construction

1968

1967

1962

May 1967 Nyu Bridge completed  
November 1967 PR Center opens



May 1967 Unit 1 Start of construction



June 1962 Mihama Town Council resolves to attract a power station  
November 1962 Construction in Nyu area is determined

April 19, 2017 Units 1&2 Approval of decommissioning plan

2017

2016

February 27, 2020 Unit 3 Approval of changes in technical specification

November 28, 2020 50<sup>th</sup> anniversary of Mihama Power Station

February 12, 2016 Units 1&2 Application of decommissioning plan

October 5, 2016 Unit 3 Approval of changes in reactor establishment for review of compliance with the New Regulatory Requirements

November 16, 2016 Unit 3 Approval of operation extension

July 27, 2021 Unit 3 Restart (restart of full-scale operation)

June 29, 2021 Unit 3 Start of power transmission after the 40-year mark

2021

2020

2017

2016

2015

2010

2004

1991

1988

1976

1974

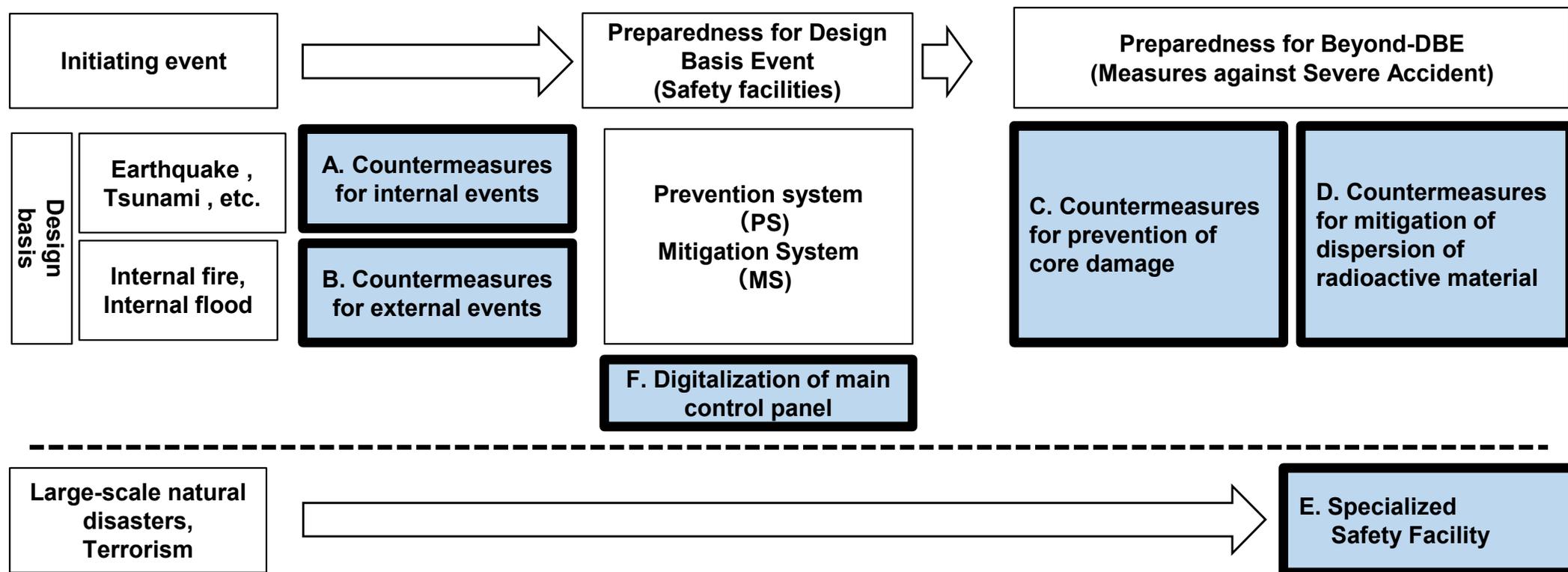
1972

1968

1967

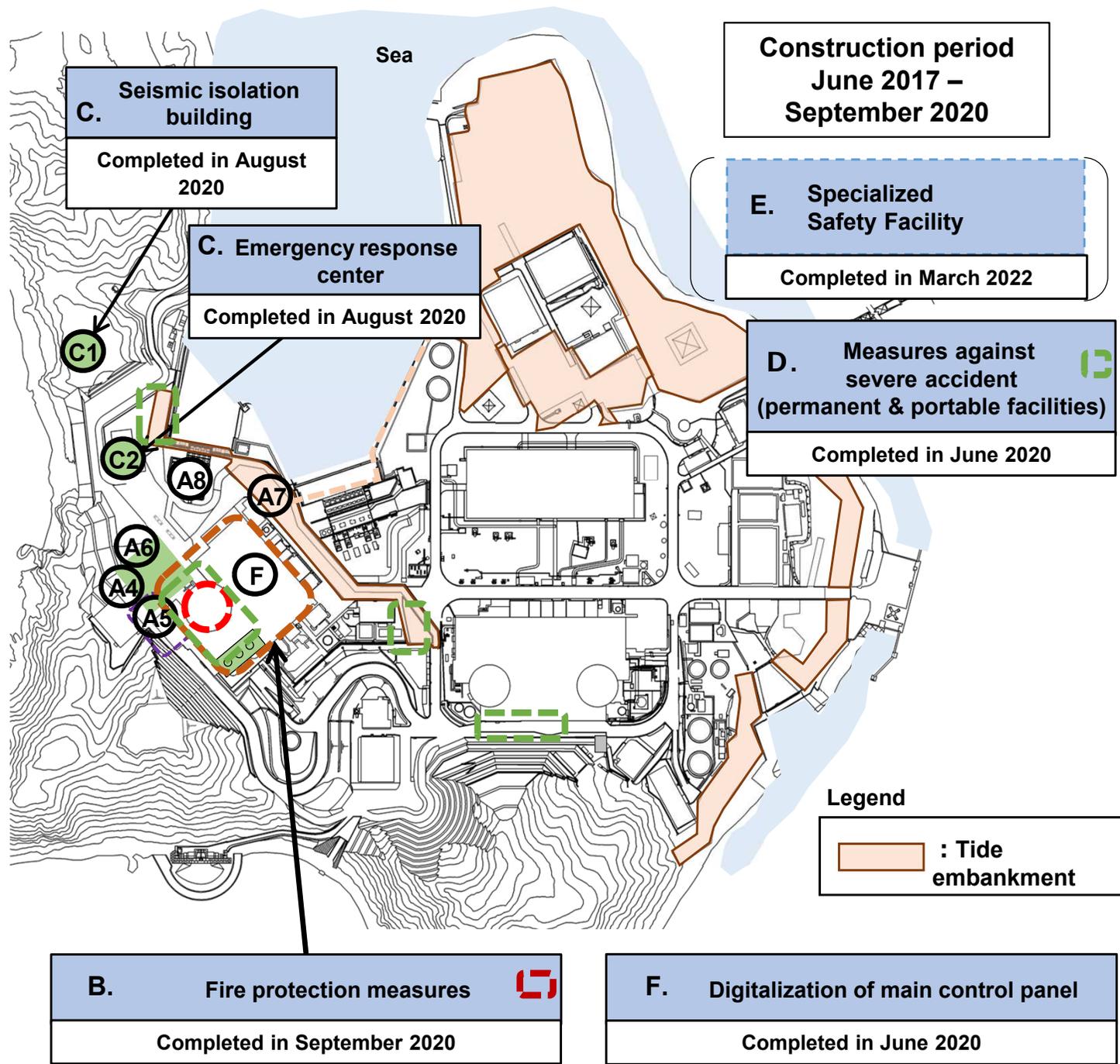
1962

- In July 2013, NRA enforced new regulatory requirements based on lessons learned from the accident at the Fukushima Daiichi Nuclear Power Plant.
- In order to comply with the regulatory requirements and voluntary safety improvement initiatives, countermeasures for external/internal events (A/B), prevention (C) and mitigation (D) of severe accidents were installed. Furthermore, “Specialized Safety Facility”.(E) for beyond-design-basis natural disasters and terrorism were also constructed. In addition, the main control panel was digitalized (F) for keeping procurement as a voluntary initiative.



# Major safety improvement measures at Mihama Unit 3

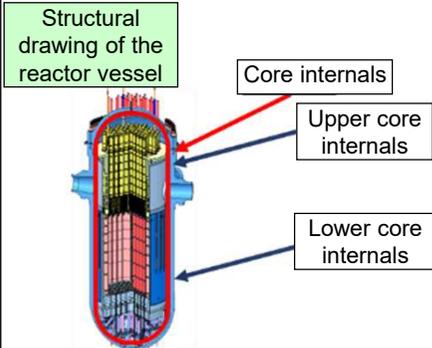
- |                        |                               |
|------------------------|-------------------------------|
| <b>A1.</b>             | Replacement of core internals |
| Completed in June 2020 |                               |
- |                            |   |
|----------------------------|---|
| <b>A2.</b>                 | Seismic reinforcement of primary containment vessel |
| Completed in November 2019 |   |
- |                       |   |
|-----------------------|---|
| <b>A3.</b>            | Seismic reinforcement of primary containment vessel external shielding wall |
| Completed in May 2020 |   |
- |                         |                                 |
|-------------------------|---------------------------------|
| <b>A4.</b>              | Reinforcement of spent fuel pit |
| Completed in March 2020 |                                 |
- |                         |                                    |
|-------------------------|------------------------------------|
| <b>A5.</b>              | Replacement of spent fuel pit rack |
| Completed in April 2020 |                                    |
- |                         |                                   |
|-------------------------|-----------------------------------|
| <b>A6.</b>              | Construction of new work platform |
| Completed in March 2020 |                                   |
- |                          |                                 |
|--------------------------|---------------------------------|
| <b>A7.</b>               | Construction of tide embankment |
| Completed in August 2020 |                                 |
- |                          |                         |
|--------------------------|-------------------------|
| <b>A8.</b>               | Tornado countermeasures |
| Completed in August 2020 |                         |



## Countermeasures specific to Mihama Unit 3

### A1. [Replacement of core internals]

- Replacing core in internals with the latest model.



[New core internals (exterior view)]



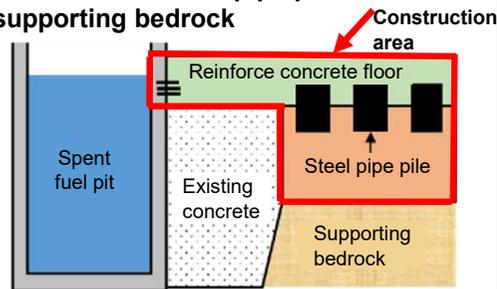
### A2. [Seismic reinforcement of primary containment vessel]

- Installing reinforcement materials to the cylindrical part of the primary containment vessel



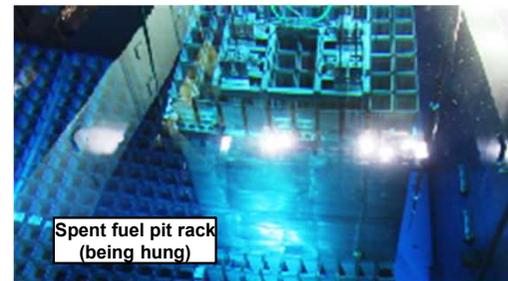
### A4. [Reinforcement of spent fuel pit]

- Reinforcing concrete floor and installation of steel pipe piles for supporting bedrock



### A5. [Replacement of spent fuel pit rack]

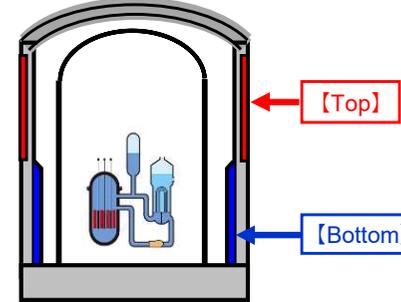
- Replacing existing rack with "free standing rack", not fixed to the floor



Spent fuel pit rack (being hung)

### A3. [Seismic reinforcement of primary containment vessel external shielding wall]

- Adding rebars to the primary containment vessel external shielding wall (Top/Bottom)



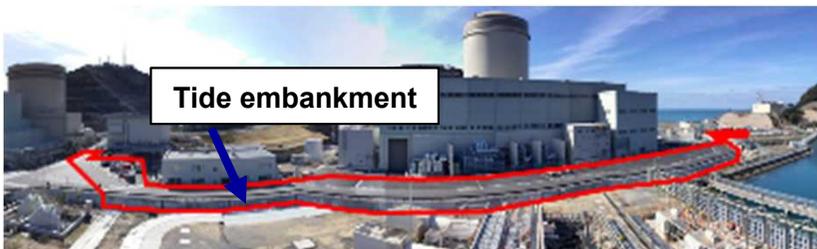
### A6. [Construction of new work platform]

- Removal of existing platform (embankment) and constructing new platform (for seismic countermeasure)

After establishment of assembly base



### A7. [Construction of tide embankment]

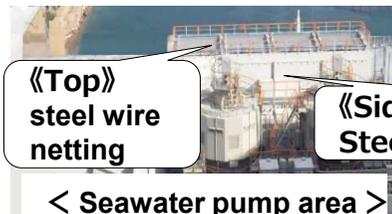


Tide embankment

- Tide embankment (+5.5-6.0m above sea level), constructed to improve tsunami resistance (+4.0-4.2m above sea level)

### A8. [Tornado countermeasures]

- Countermeasures for protection against flying objects to protect safety equipment (seawater pump, etc.)



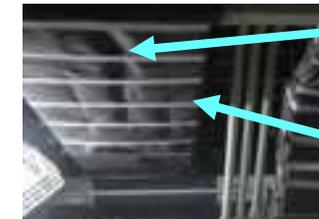
«Top» steel wire netting

«Side» Steel Panel

< Seawater pump area >

### B. [Fire protection measures]

- Replacing existing safety cables with flame-retardant ones
- Installation fireproof sheets around cable trays.



Fireproof sheet

Binding belt

# Example of safety improvement (F. Digitalizing main control panel)

The main control panel was replaced from analog panel to the state-of-the-art digital panel, which allows operation and monitoring with touch-panels. The large wall panel was also installed.



Old control panel



Removal of old control panel  
October – December 2018



Use of temporary main control room  
August 2018 – October 2019



Installation of new control panel  
June – August 2019



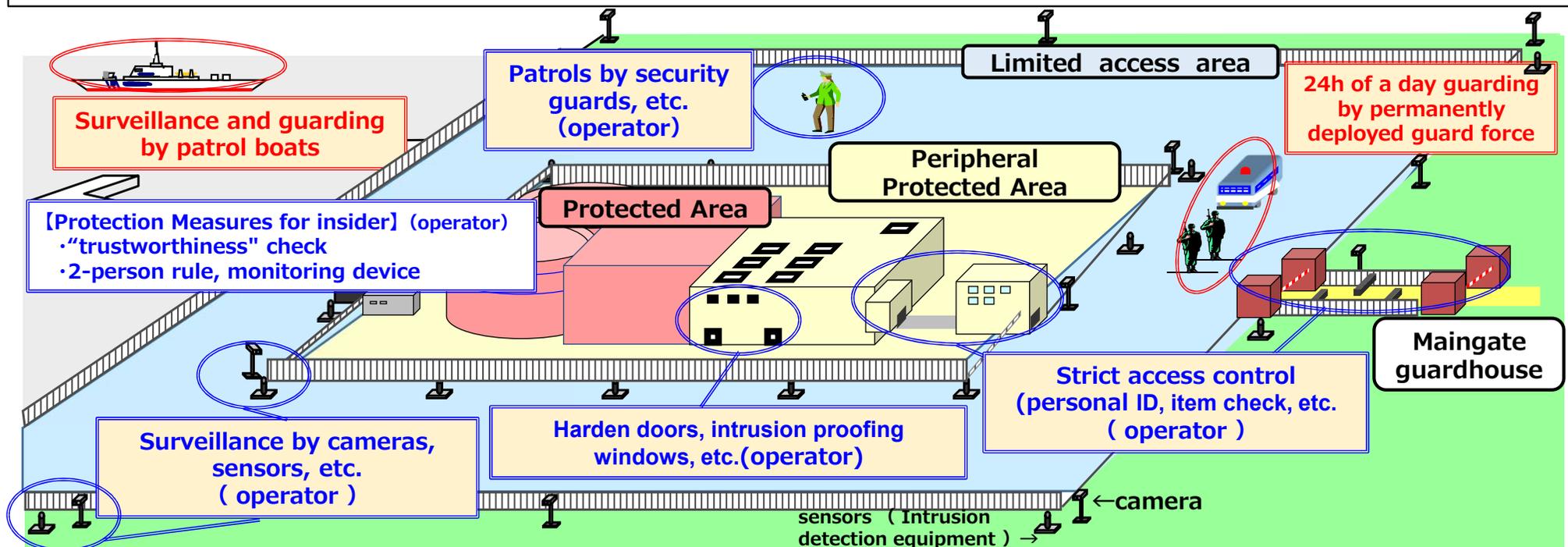
Operation touch panels and wall panel have been installed  
Transfer of functions to new control panel completed  
September 2019 – June 2020

The main features of nuclear security measures for restarted plants are as follows:

- Expanding the equipment to be protected  
Not only nuclear materials and safety facilities, “Specialized Safety Facility” were added.
- “3S (Safety, Security, Safeguards) ” Mutual impact assessment  
“3S” measures shouldn’t adversely affect each other.
- Nuclear security management to ensure that numerous security measures are maintained
- RI protection in cooperation with nuclear materials protection measures
- Cyber security measures for digital safety systems and physical protection systems

# Measures for Physical protection (Mod. 2)

- To prevent the facilities from theft of nuclear materials, illegal transfer and sabotage by external threats, barriers around "Limited access area", "peripheral protected area" and "protected area" are constructed. At these boundaries, intrusion detection, camera monitoring and patrols are located.
- In the event of unauthorized access, information regarding intrusion detection and camera monitoring are shared with law enforcement authorities in order to assist their response action. Related drills are conducted in cooperation with the authorities.
- Access control, such as personnel identification and item checking, are conducted. As additional protection measures for insider, "trustworthiness" check are conducted, and "2-person" rule is applied within the Protected Area.



The specification of each security measures is decided, after identifying the current plant safety and safeguards profiles and reviewing how the security measures interfere with each profiles.

Following table shows items for reviewing the impacts.

Review item		Example of specific Mutual impact assessment
Impact on measures for external event	Earthquakes	Seismic evaluation for barriers.
	Tsunami	
	Tornadoes	
	External Fires	
Impact on measures for internal event	Internal Fires	Fire load evaluation for sensor and cameras.
	Internal Floods	
Impact on response during design-base incident	Safety Evacuation Passages	Check the impact of aisles for incident activities
Impact on response during severe accident	Access Routes for emergency preparedness	Check the impact to procedures for severe accident prevention and mitigation.
	Work place for emergency preparedness	
Impact on compliance to technical specifications	Requirements of "Operational Safety Programs <sup>※</sup> <sup>※</sup> : Standard Tech. Spec.	Confirm no-impact to "Limiting Condition of Operation"

For maintaining nuclear security, it is essential to foster the nuclear security culture, which is based on the recognition that both organizations and individuals are responsible for nuclear security. Following activities are conducted for nuclear security culture;

- To establish standards for the implementation procedure for nuclear security management.
- To set goal for nuclear security activity, and make the fiscal-year action plan for nuclear security culture and nuclear security measures.
- “Nuclear Security Committee” chaired by the CNO reviews the action plan, its implementation and result of evaluation.
- If any non-conformance matters occurs, they are addressed in accordance with Corrective Action Program (CAP). Furthermore, Nuclear Security Committee also reviews them in case that they are significant events.
- The result of the fiscal-year plan is evaluated based on the nuclear security culture assessment (self-assessment through questionnaires) and the progress of nuclear security measures.
- Nuclear Security Committee and CEO each review the result of the evaluation and areas for improvements.

Action measures

1. Nuclear security culture assessment and planning for the next year.
2. Nuclear Security Message from Senior management of NPP.
- 3. Sharing information related to terrorism, etc., and cooperating with contractors, in order to carry out “solid” security activities.**
4. Sharing information related to information security.
- 5. Lectures for fostering a nuclear security culture.**
6. Continuous learning for knowledge of nuclear security.  
(including contracted security guards)
7. Dialogue with security guards



Posting posters and slogans for nuclear security



Examples of mottoes



Lecture for fostering a nuclear security culture, by Law enforcement agencies (Japan Coast Guard, etc.)



Distributing leaflets for nuclear security

In accordance with regulatory requirements, protective and controlled measures to protect radioisotopes (RI) are implemented. Protective measures are taken while utilizing physical protection measures for nuclear material and nuclear facilities as much as possible.

## 【 Response 】

Establish procedures to ensure a rapid and reliable response if detects theft.

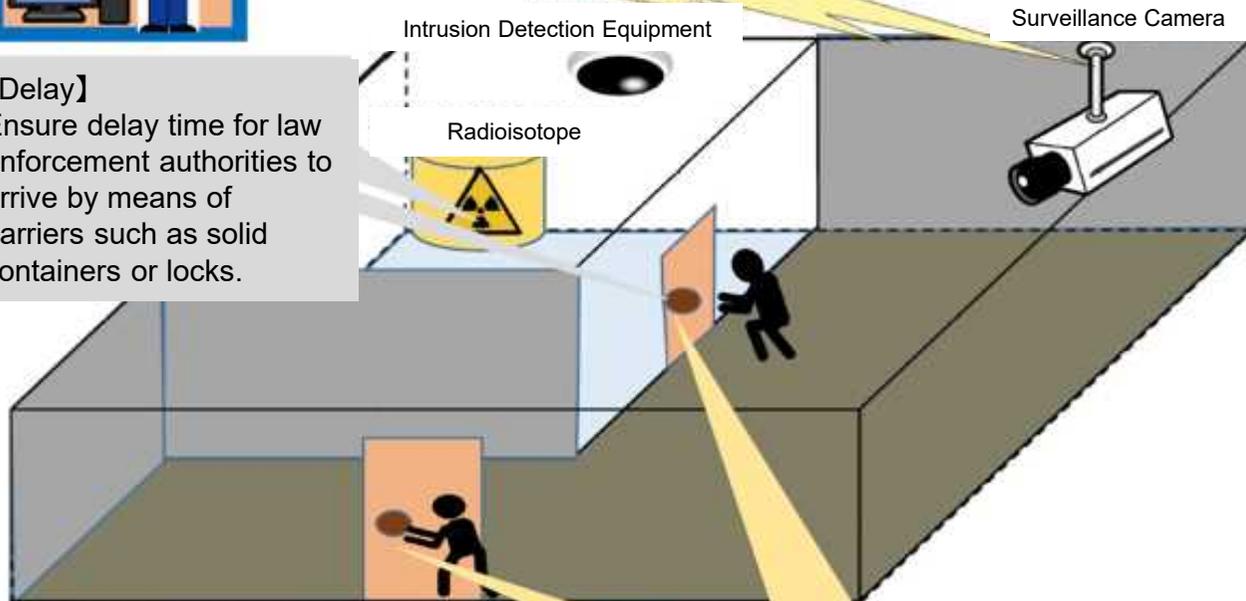


## 【 Delay 】

Ensure delay time for law enforcement authorities to arrive by means of barriers such as solid containers or locks.

## 【 Detection 】

Surveillance cameras and intrusion detection devices are installed to detect and prevent theft attempts at an early stage.



## 【 Access Control 】

Only authorised persons have access to specified radioisotopes.

## Security Measures

Robust security of radioisotopes by taking into account IAEA recommendations and implementing protective measures with the main objective of 'Prevention of Theft'.

### 【 Detection 】

- Installation of surveillance cameras
- Installation of intrusion detection equipment

### 【 Delay 】

- Installation of barriers such as strong doors, storage containers, etc.
- Fixing, etc.

### 【 Response 】

- Maintenance of communications equipment
- Maintenance of procedures
- Education and training

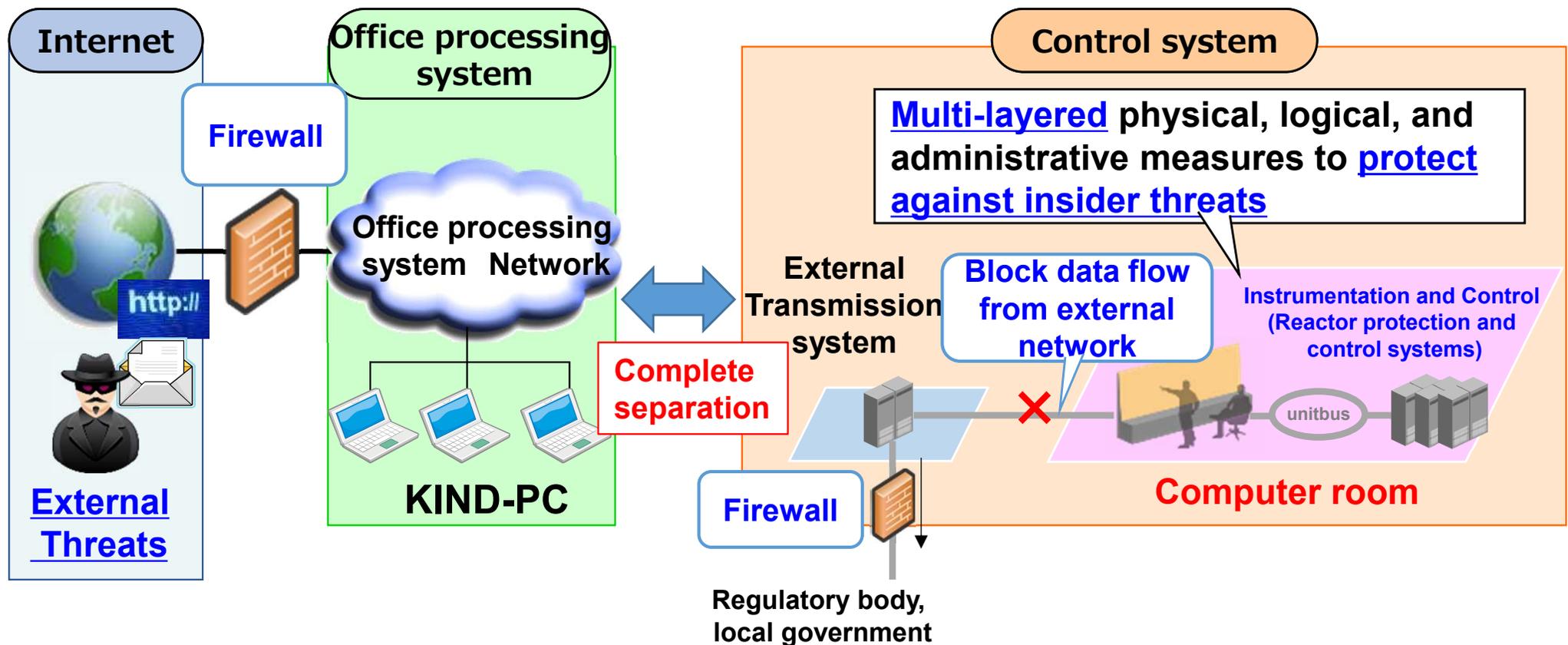
### 【 Access Control 】

- Identification
- Controlled keys, use of ID cards, etc.

### 【 Other necessary measures 】

- Appointment of a manager to control protective measures.
- Establish procedures for systematically implementing the protective measures.
- Information control of protective measures.

- In order to protect (safety related) reactor control system and physical protection system from unauthorized access or sabotage through telecommunication lines, the system are designed to reject access from external networks.
- Additionally, inside computer room, physical, logical and administrative measures are implemented to prevent access to information systems by unauthorized insider.



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Thank you

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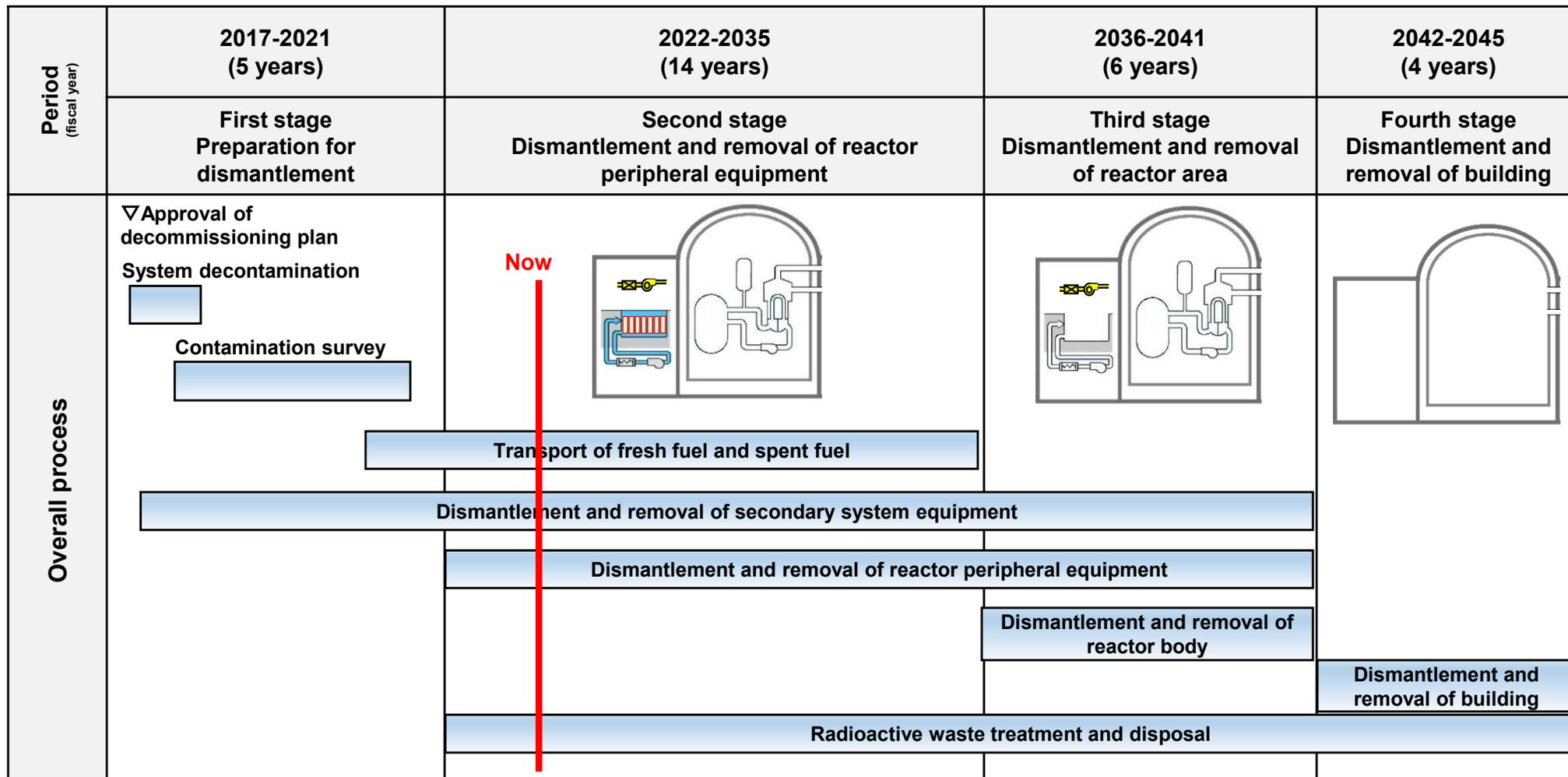
reference

# Decommissioning process

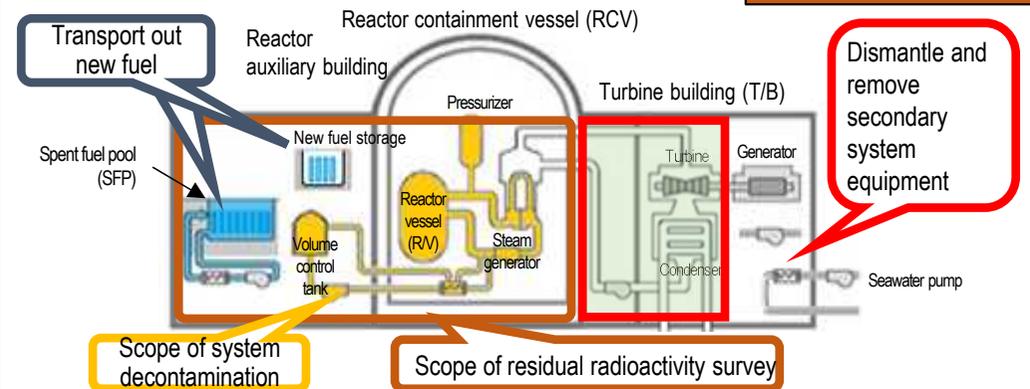
(Details) March 17, 2015,  
 February 12, 2016,  
 April 19, 2017,  
 July 29, 2021,  
 March 23, 2022,

Announcement of decommissioning of Mihama Units 1&2  
 Application for approval of the decommissioning plan to the Nuclear Regulation Authority  
 Approval of decommissioning plan  
 Application for approval of changes in the decommissioning plan to the Nuclear Regulation Authority (review of plan after the second stage)  
 Approval of changes in the decommissioning plan (review of plan after the second stage)

## Mihama Units 1&2 decommissioning plan

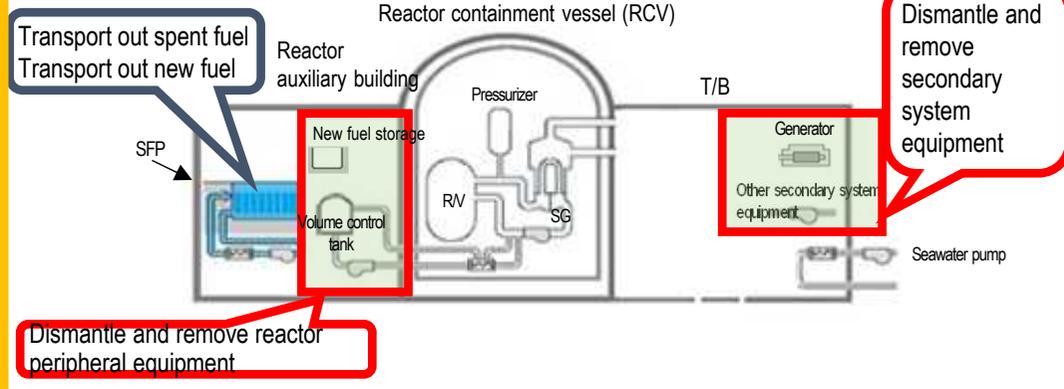


## [Phase 1] Period to prepare for dismantling (FY2017 [post-approval]–FY2021)



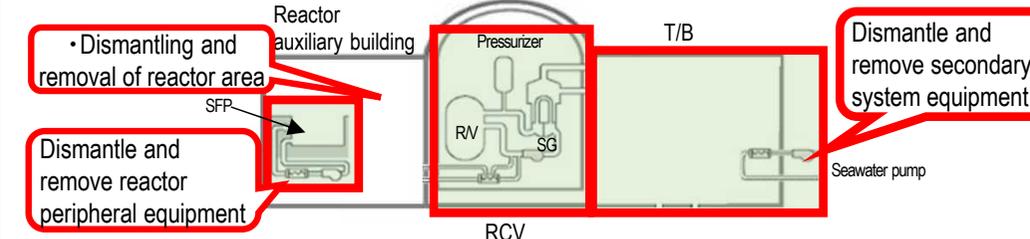
- Content of work**
- System decontamination **[Completed Mar. 2018]**
  - Radiological survey **[Completed Mar. 2021]**
  - Dismantling and removal of secondary system equipment **[Started Mar. 2018]**
  - Transport-out of new fuel **[Started Sep. 2020]**
  - Safe storage

## [Phase 2] Period to dismantle and remove reactor peripheral equipment (FY2022–FY2035)



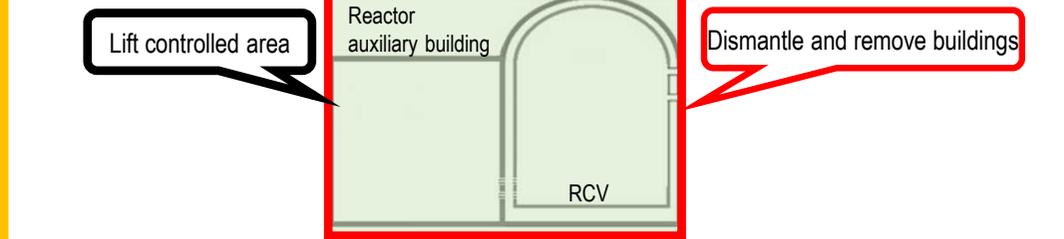
- Content of work**
- Dismantling and removal of reactor peripheral equipment **[Started Oct. 2022]**
  - Transport-out of spent fuel
  - Transport-out of new fuel (cont'd from phase 1)
  - Dismantling and removal of secondary system (cont'd from phase 1)
  - Safe storage

## [Phase 3] Period of dismantling and removal of reactor area (FY2036–FY2041)



- Content of work**
- Dismantling and removal of reactor area
  - Dismantling and removal of secondary system equipment (cont'd from phases 1 and 2)
  - Dismantling and removal of reactor peripheral equipment (cont'd from phase 2)

## [Phase 4] Period of dismantling and removal of buildings (FY2042–FY2045)



- Content of work**
- Lifting of controlled area
  - Dismantling and removal of buildings