Current Status of Nuclear Safety Research Reactor (NSRR)

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01 NSRR

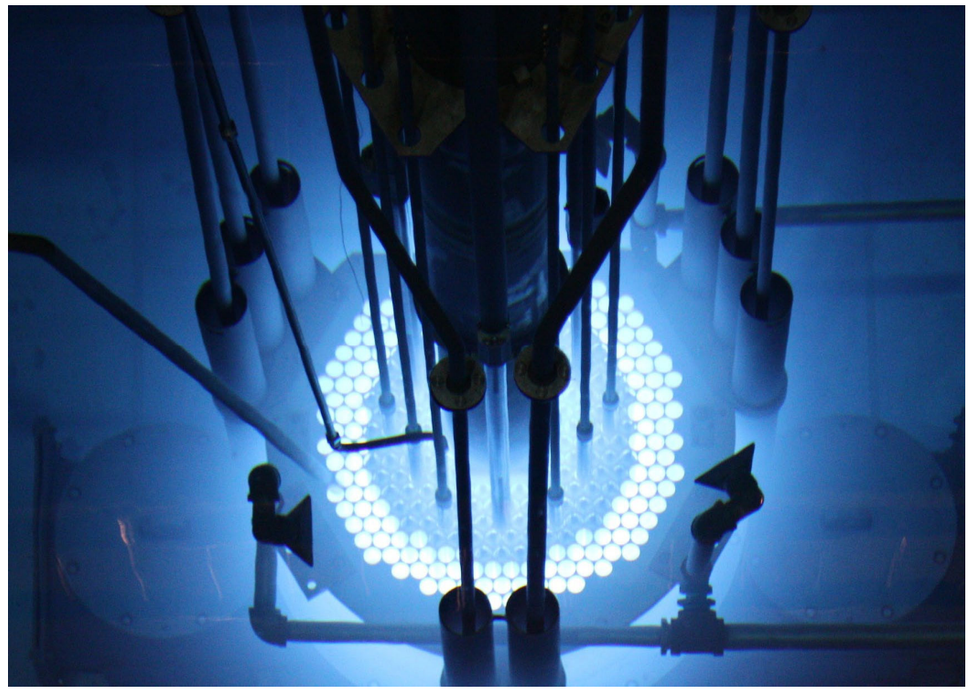
02 Maintenance

03 Human Resource Development

04 Summary

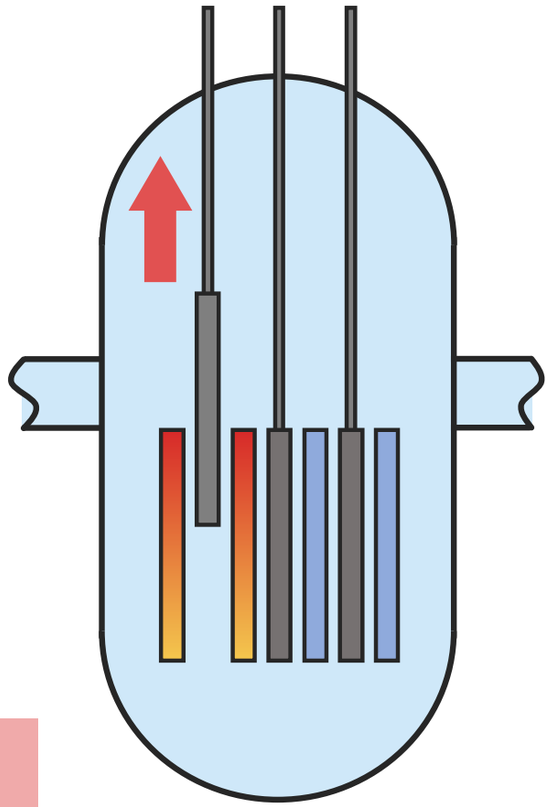
2005 -2025 20th anniversary

01
NSRR



Overview

- Training Research Isotopes General Atomics (TRIGA) Reactor
- Pulse operation
- Reactivity-initiated accidents (RIAs) simulation
- Fuel safety research
- Technical basis for Japanese safety guidelines
- Hands-on training for external users



Pressure vessel

Mechanism of RIAs initiation

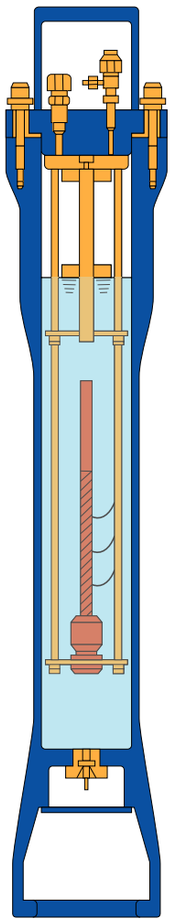
Control rod ejection → Rapid temperature rise under prompt criticality →

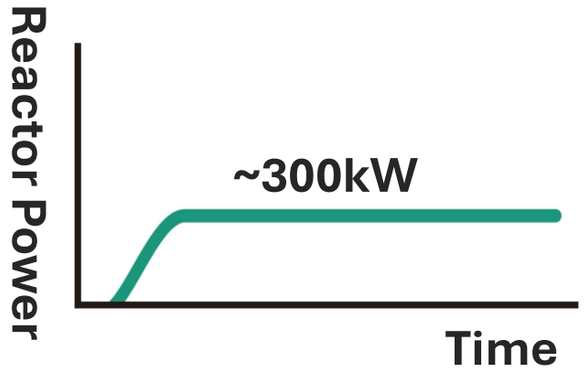
- Fuel failure
- Damage to reactor structures

Experimental Outline

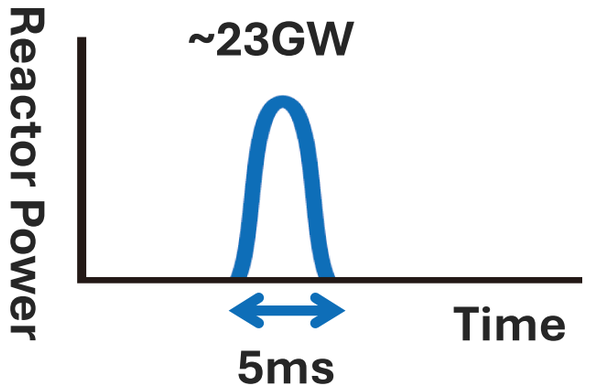
Measurement devices

- Water mass velocity sensor
- Thermocouple sensor
- Pressure transducer inside capsule
- Embedded pressure sensor in fuel rods
- Acoustic emission sensor

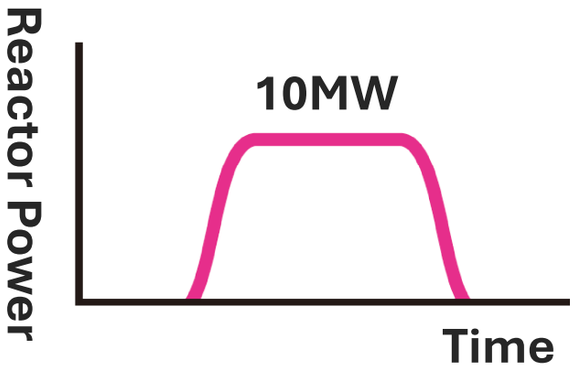




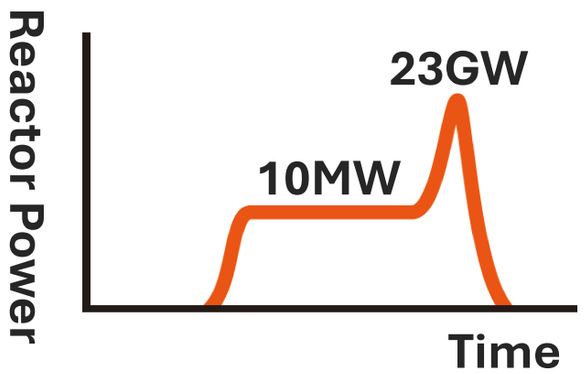
Steady State Operation



Natural Pulse (NP)

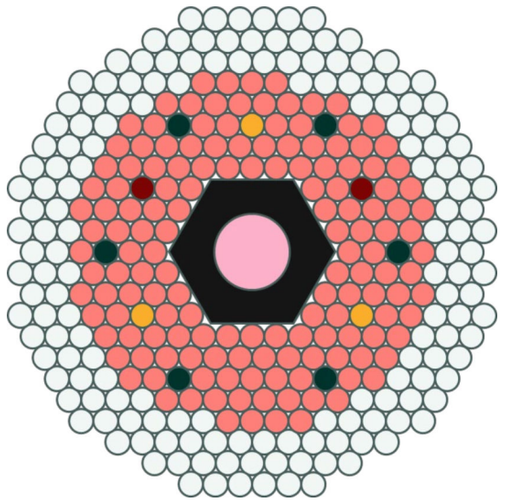


Shaped Pulse (SP)



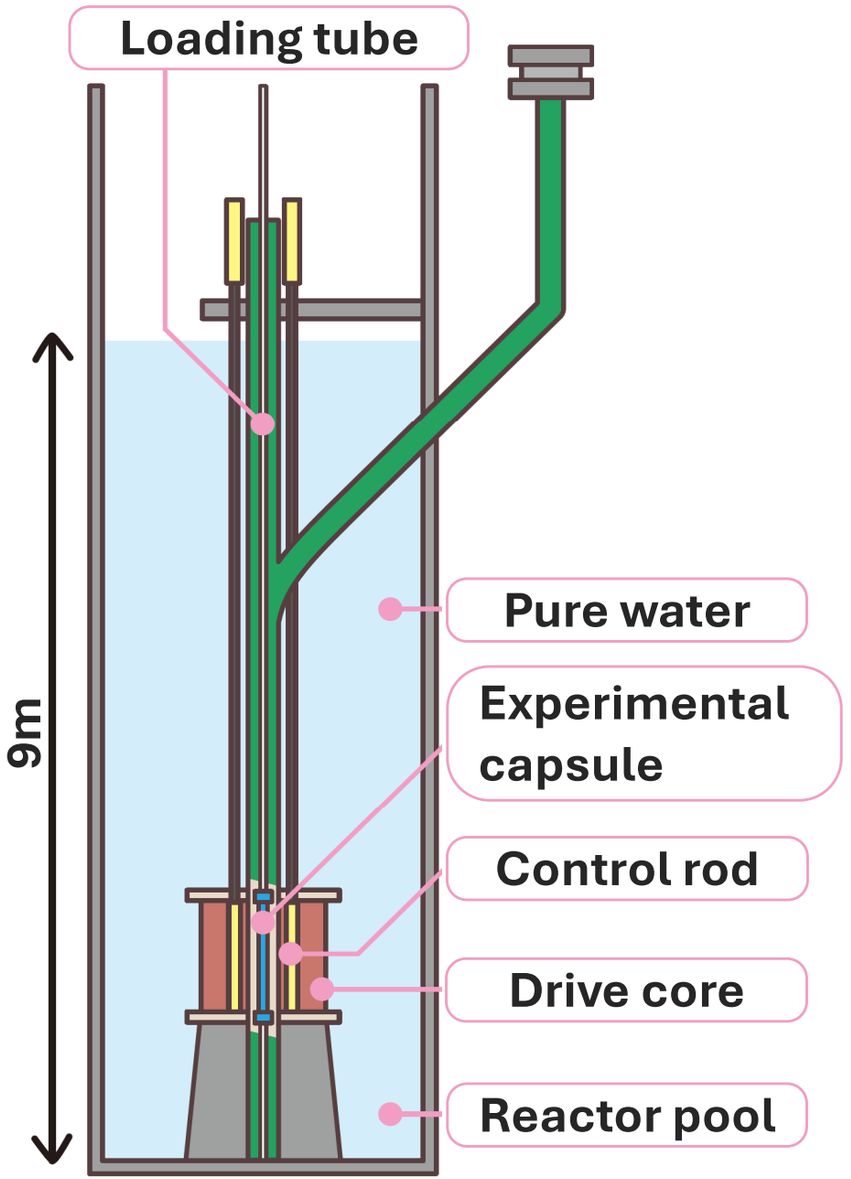
Combined Pulse (CP)

NSRR Reactor Core



- Fuel elements
- Regulating rods
- Safety rods
- Transient rods
- Experimental capsule with test fuel
- Empty

Reactor	
Diameter / Height	630 mm × 380 mm
Fuel rods	
Fuel	Uranium–Zirconium hydride (U–ZrH)
Shape / dimensions	ϕ 37.5 mm × L 650 mm
Number of rod	149
Thermal neutron flux	9.6×10^{14} n/cm^2·s



02
Maintenance

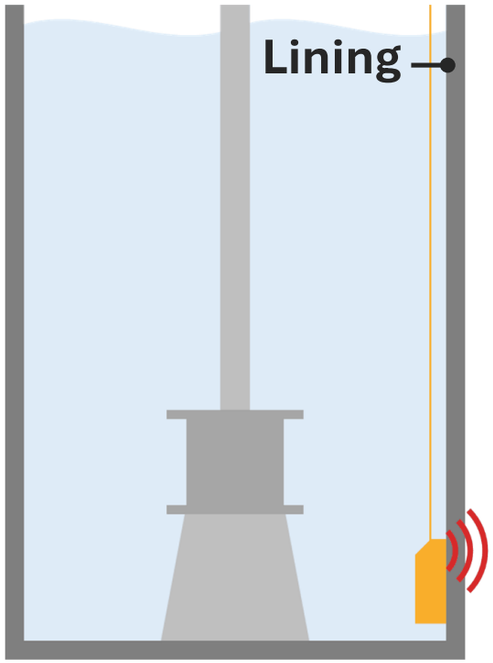
Inspection Targets

- Nuclear instrumentation
- Process instrumentation systems
- Seismometers
- Measurement and control systems
- Reactor auxiliary cooling system
- Visual inspection of fuel elements
- Functional test of the reactor interlock and shutdown circuit
- Measuring the lining　　etc.

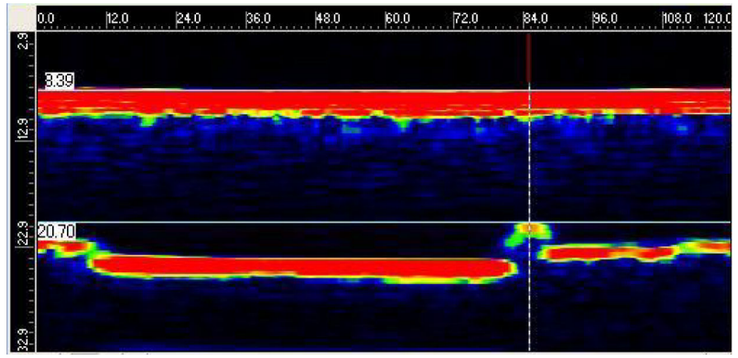
Measuring the Lining

- Thickness measurements conducted regularly since 2008.
- Corrosion has not progressed even at the latest inspection.

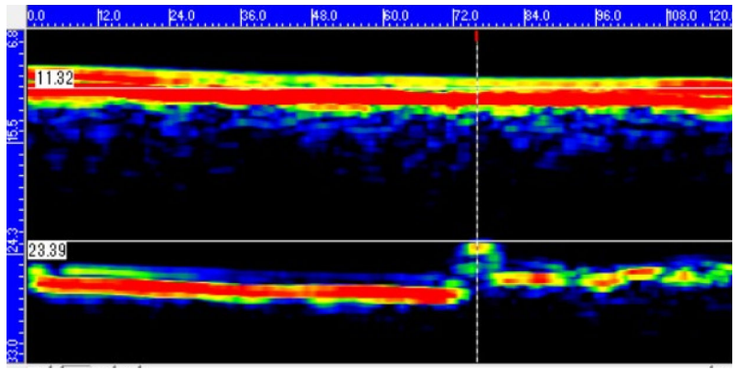
Ultrasonic thickness gauge



Measurement image



2008

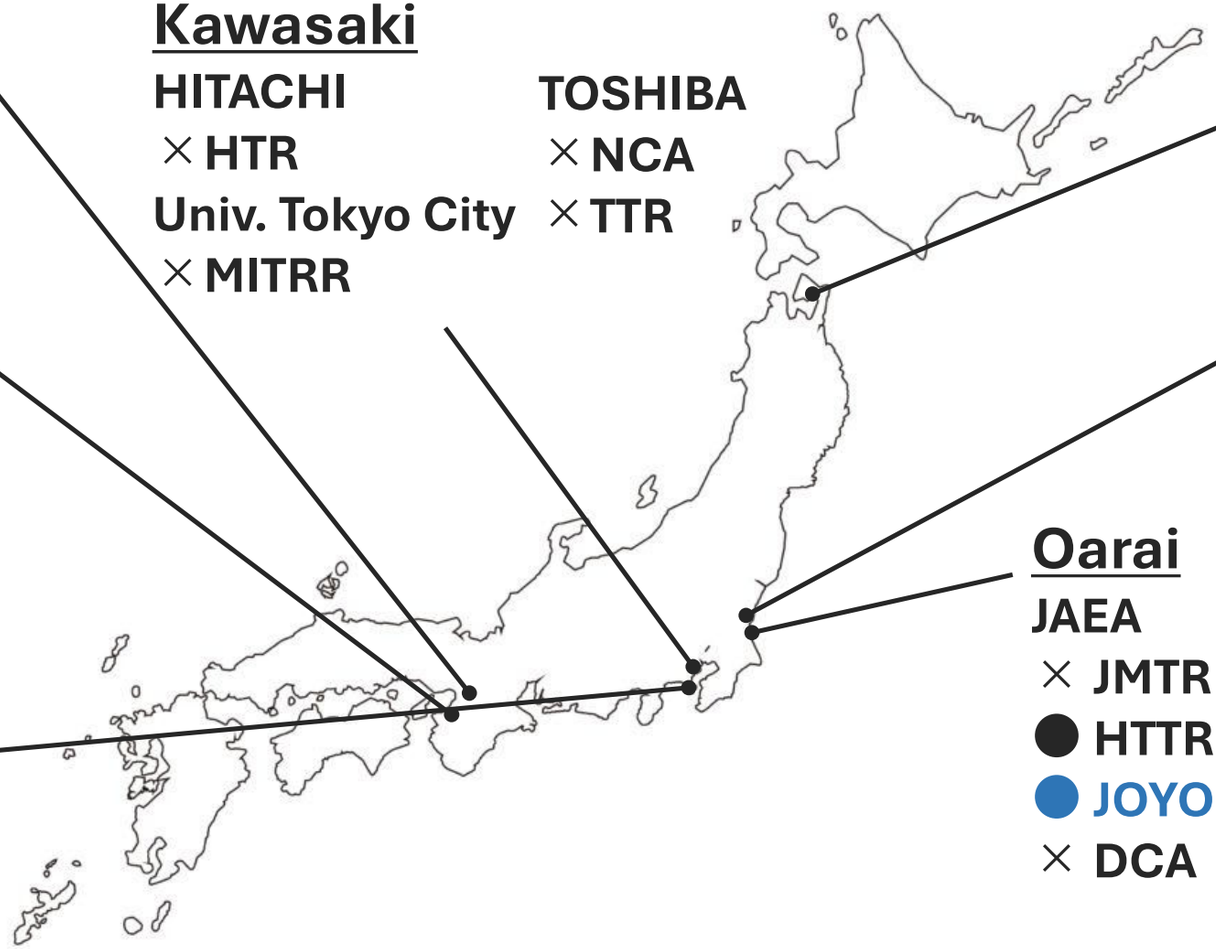


2025

Pitting corrosion measurement of the reactor pool wall lining

03
Human Resource Development

Research Reactor in Japan



Higashi-Osaka
Kindai University
● UTR-KINKI

Kumatori
Kyoto University
● KUR
● KUCA

Yokosuka
Rikkyo University
× RUR

Kawasaki
HITACHI
× HTR
Univ. Tokyo City
× MITRR

TOSHIBA
× NCA
× TTR

Oarai
JAEA
× JMTR
● HTTR
● JOYO
× DCA

Mutsu
JAEA
× MUTSU

Tokai
Univ. Tokyo
× YAYOI
JAEA
● STACY
× TRACY
● NSRR
× JRR-2
● JRR-3
× JRR-4
× FCA
× TCA

● : In Operation (Use for training and education), ● : In Operation, × : Decommissioning

Trends in the Number of Interns

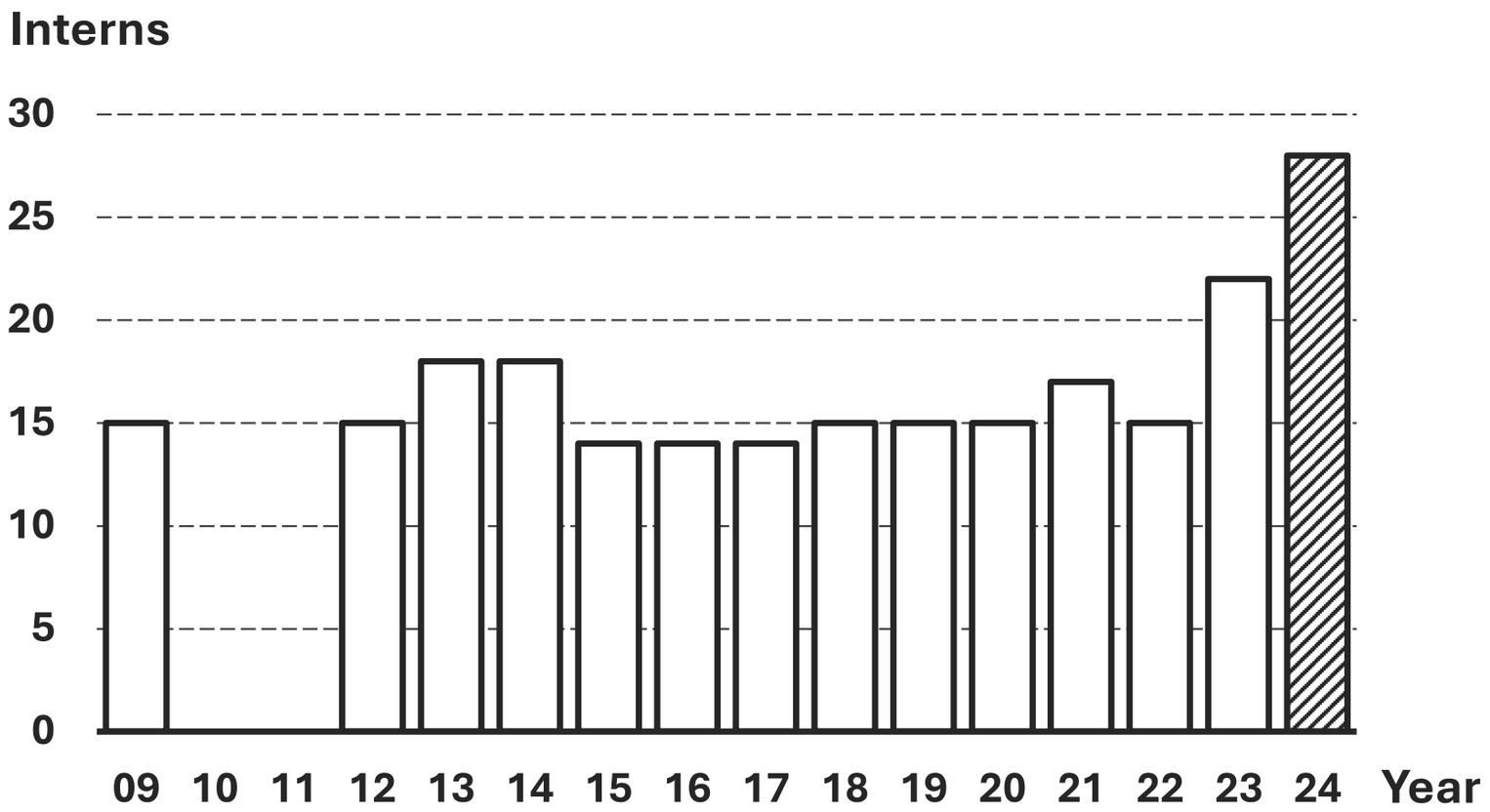
2009
Institute of Science Tokyo

2012 ~
Nuclear Professional School,
The Univ. Tokyo

2021 ~
Summer training program

2023 ~
Advanced Nuclear Education
Consortium for future society

2024 ~
Course launched for chief
reactor engineer candidates



Practical Training Program

Day 1	Day 2
Lectures on reactor physics	Preliminary instruction
Reactor physics training	Reactor maintenance training
Approach-to-criticality training	Reactor operation training
Calibration of control rods	Observation of pulse operation

Public Affairs

Public observation program of pulsed operation

Creation of a child-friendly NSRR brochure

- Mascot character and comics to spark interest
- Simple, clear language
- Detailed notes at page bottom
- Available online (https://nsrr.jaea.go.jp)

Photo from the reactor observation

‘Pulsetan’, the mascot character of the NSRR

Promotional brochure for NSRR

04
Summary

- The NSRR has been in operation since 1975 as a research reactor dedicated to LWR fuel safety research.
- Since 2008, the reactor pool lining thickness has been continuously monitored; no progress of corrosion has been observed even after 50 years.
- The NSRR is offering hands-on operation training using a real reactor.
- In addition to research and training, we are actively engaged in public outreach, aiming to raise awareness of the role and safety of research reactors.