国立研究開発法人

日本原子力研究開発機構

Japan Atomic Energy Agency

Mission

私たちが果たすべき使命

原子力の未来を切り拓き、
人類社会の福祉に貢献する。

Break new ground for the future of nuclear energy, and contribute to welfare of human society

私たちは、安全確保を大前提として、我が国のエネルギーの安定確保及び地球環境問題の解決並びに新しい科学技術や産業の創出を目指した原子力の研究開発を総合的、計画的かつ効率的に行うとともに、成果の普及等を行うことにより、人類社会の福祉及び国民生活の水準向上に貢献を果たします。

On the basic premise of ensuring safety, we will conduct R&D in the field of nuclear energy in a systematic, comprehensive and efficient manner, aiming to secure stable energy supplies, solve global environmental issues and create new science, technology and industry, widely disseminating our R&D achievement, and thus contribute to the improvement of welfare of human society and rise in the national living standards.

Toshio Kodama

President of the Japan Atomic Energy Agency

I would like to express my sincere appreciation for your continued support for research and development projects that the Japan Atomic Energy Agency (JAEA) undertakes.

Mission of JAEA is to make contribution to welfare and prosperity of human society through nuclear science and technology as Japan's sole comprehensive nuclear research and development institution. We are committed to fulfilling the mission with a keen sense of responsibility.

The followings show the priority fields we will focus on in accordance with our medium- and long-term objectives.
- Response to the accident at the Fukushima Daiichi Nuclear Power Plant operated by Tokyo Electric Power Company Holdings, Inc.
- Research into improving nuclear power safety
- Basic and fundamental research of nuclear power
- R&D on nuclear fuel cycle

With respect to the effort to respond to the accident at the Fukushima Daiichi Nuclear Power Station, we have been conducted and will conduct further the R&D for decommissioning and environmental restoration based on the medium-to long-term roadmap for decommissioning and the Basic Policy for Recovery and Reconstruction of Fukushima.

Considering the increasing public demand for the improvement of nuclear safety, we will continue to conduct research on the analysis of reactor accidents and improvement of safety such as material technology.

With our endeavoring to conduct basic and fundamental research to support above mentioned efforts, we also strive to resume operations of the research reactor and to promote its utilization.

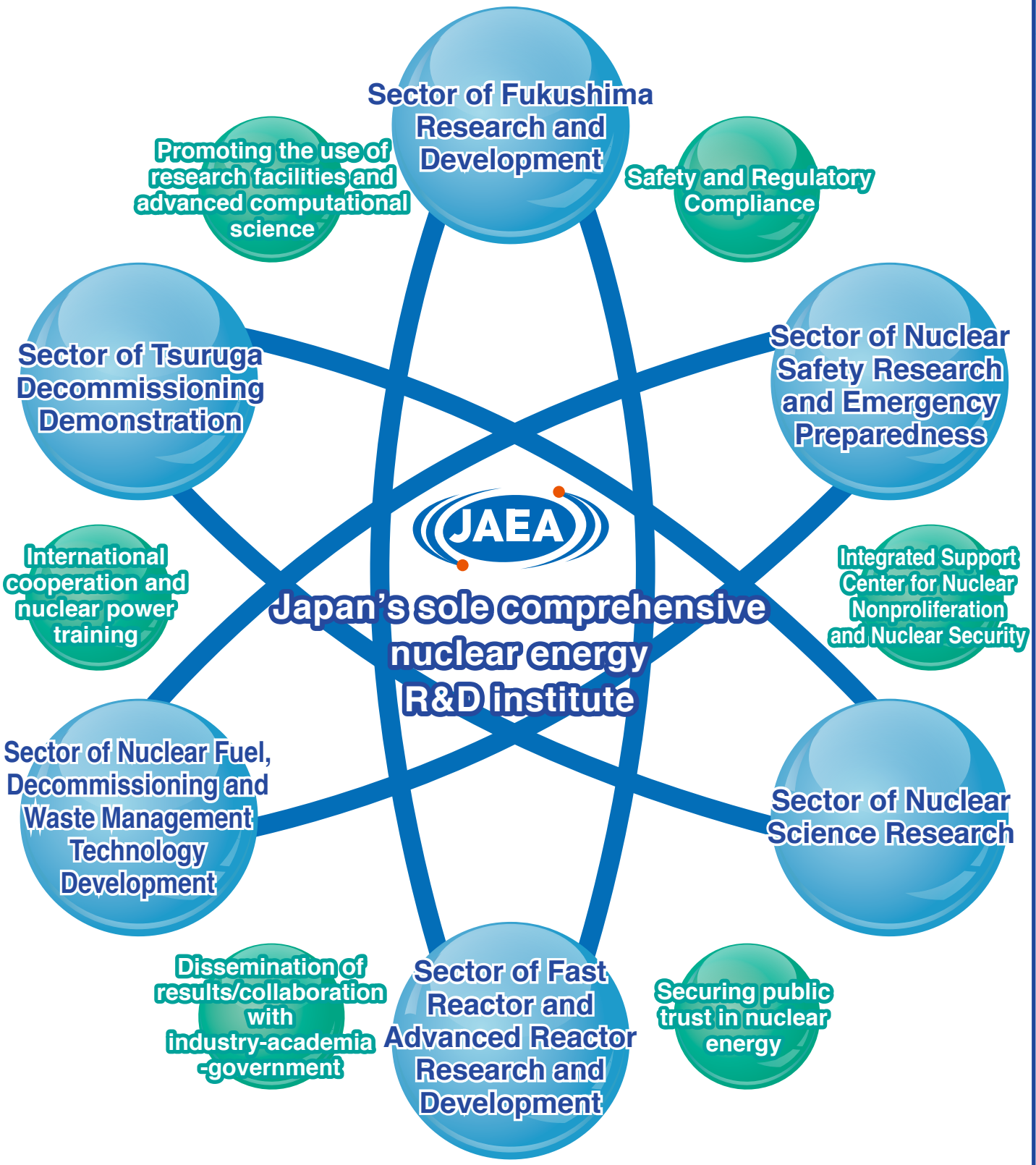
As for our own facilities, such as "Fugen","Monju" and Tokai Reprocessing Plant, we implement decommissioning task safely and steadily, along with conducting decommissioning technology field tests utilizing international cooperation. Meanwhile we also conduct R&D on fast reactors and nuclear fuel cycle such as processing and disposal methods for nuclear waste.

Based on the needs of the government and business sectors with regard to conducting R&D.
We strive to attain the primary goal which is as a national research and development agency a national research and development agency, "to maximize R&D achievement". Having this goal in mind with united hearts, all JAEA employees work with high aspirations to fulfill the duties, placing the maximum priority on safety.

I appreciate your continued understanding and cooperation for JAEA.

June 2018

JAEA Profile



2018.6

R&D Institutes and Centers

http://www.jaea.go.jp/english/centers/index.html

Aomori Research and Development Center
(Mutsu) 400 Kitasekine, Sekine, Mutsu-shi, Aomori 035-0022
Tel:+81-175-25-3311
(Ohminato) 4-24 Minato-machi,Mutsu-shi,Aomori 035-0064

Tsuruga Head Office
65-20 Kizaki, Tsuruga-shi, Fukui 914-8585
Tel:+81-770-23-3021

Tsuruga Comprehensive Research and Development Center
65-20 Kizaki, Tsuruga-shi, Fukui 914-8585
Tel:+81-770-23-3021
2-1 Shiraki, Tsuruga-shi, Fukui 919-1279
Tel:+81-770-21-5060

Head Office of Tsuruga Decommissioning Demonstration
65-20 Kizaki, Tsuruga-shi, Fukui 914-8585
Tel:+81-770-23-3021

Fugen Decommissioning Engineering Center
3 Myojin-cho, Tsuruga-shi, Fukui 914-8510
Tel:+81-770-26-1221

Prototype Fast Breeder Reactor Monju
2-1 Shiraki, Tsuruga-shi, Fukui 919-1279
Tel:+81-770-39-1031

Horonobe Underground Research Center
432-2 Hokushin, Horonobe-cho, Teshio-gun, Hokkaido 098-3224
Tel:+81-1632-5-2022

Iwaki Office
8F Taira Central Building, 7-1 O-machi, Taira, Iwaki-shi, Fukushima 970-8026
Tel:+81-246-35-7650

Collaborative Laboratories for Advanced Decommissioning Science
790-1 Motooka, Tomioka-machi, Futaba-gun, Fukushima 979-1151
Tel:+81-240-21-3530

Naraha Center for Remote ControlTechnology Development
1-22 Nakamaru, Yamadaoka, Naraha-machi, Futaba-gun, Fukushima 979-0513
Tel:+81-240-26-1040

Okuma Analysis and Research Center
Tel;*81-246-35-7650(Iwaki Office)

Fukushima Environmental Safety Center
(Miharu)10-2 Fukasaku, Miharu-machi, Tamura-gun, Fukushima 963-7700
Tel:+81-247-61-2910
(Minamisoma)
45-169 Sukakeba, Kaibama, Haramachi-ku Minamisoma-shi, Fukushima 975-0036
Tel:+81-244-25-2072

Headquarters
765-1 Funaishikawa, Tokai-mura, Naka-gun, Ibaraki 319-1184
Tel:+81-29-282-1122

Nuclear Science Research Institute
2-4 Shirakata, Tokai-mura, Naka-gun, Ibaraki 319-1195
Tel:+81-29-282-5100

J-PARC Center
2-4 Shirakata, Tokai-mura, Naka-gun, Ibaraki 319-1195
Tel:+81-29-284-4578

Nuclear Fuel Cycle Engineering Laboratories (NCL)
4-33 Muramatsu, Tokai-mura, Naka-gun, Ibaraki 319-1194
Tel:+81-29-282-1111

Oarai Research and Development Institute
4002 Narita-cho, Oarai-machi, Higashi-ibaraki-gun, Ibaraki 311-1393
Tel:+81-29-267-4141

Nuclear Emergency Assistance and Training Center (NEAT)
11601-13 Nishi-jusanbugyo, Hitachinaka-shi, Ibaraki 311-1206
Tel:+81-29-265-5111

Tokyo Office
19F Fukoku Seimei Building, 2-2-2 Uchisaiwaicho, Chiyoda-ku, Tokyo 100-8577
Tel:+81-3-3592-2111

Tono Geoscience Center
・Mizunami Underground Research Laboratory
1-64 Yamanouchi, Akiyo-cho, Mizunami-shi, Gifu 509-6132
Tel:+81-572-66-2244

・Toki Research Institute of Isotope Geology and Geochronology
959-31 Jorinji, Izumi-cho, Toki-shi, Gifu 509-5102
Tel:+81-572-53-0211

Ningyo-toge Environmental Engineering Center
1550 Kamisaibara-son, Kagamino-machi, Tomata-gun, Okayama 708-0698
Tel:+81-868-44-2211

Harima Office
1-1-1 Kouto, Sayo-cho, Sayo-gun, Hyogo 679-5148
Tel:+81-791-58-0822

Washington Office
2120 L Street, N.W., Suite 860
Washington, D.C. 20037, U.S.A.
Tel:+1-202-338-3770

Paris Office
28, rue de Berri, 75008 Paris, FRANCE
Tel:+33-1-4260-3101

Vienna Office
Leonard Bernsteinstrasse 8/2/34/7
A-1220 Wien, AUSTRIA
Tel:+43-1-955-4012

2018.6

Sector of Fukushima Research and Development

https://fukushima.jaea.go.jp/english/index.html

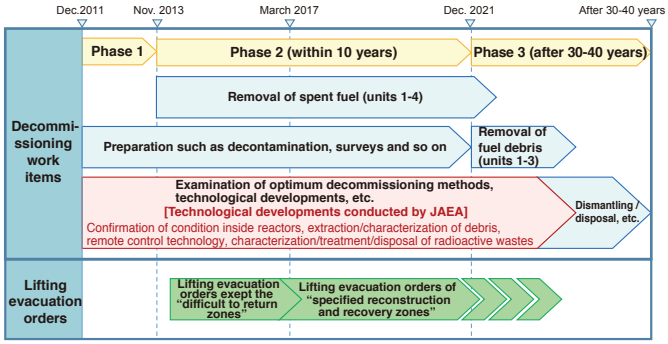
Commitment to research and development for the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station "1F" and restoration of Fukushima

Center: Fukushima | Tokai | Oarai

R&D for decommissioning of 1F

JAEA carries out R&D with a view to securing and developing human resources in accordance with Mid-and-Long-Term roadmap towards the decommissioning of 1F, the strategy planned by the Nuclear Damage Compensation and Decommissioning Facilitation Corporation "NDF" and on-site requirements from medium-to long-term perspective. Moreover, JAEA will provide on-site plants with the technical information and contribute to achieving the highly safe and efficient early decommissioning while enhancing the safety of nuclear energy.

【Mid-and-Long-Term roadmap towards the decommissioning】



[Source] Reference to Important Stories on Decommissioning –Ministry of Economy, Trade and Industry (addendum)

R&D for environmental restoration

In collaboration with Fukushima Prefecture and National Institute for Environmental Studies "NIES", JAEA promotes R&D in accordance with Medium- and Long-Term Activities of the Centre for Environmental Creation "CEC", in order to implement the policy of Basic Guidelines for the Reconstruction and Revitalization of Fukushima. JAEA will carry out R&D and survey for restoration of environment contaminated by radioactive materials.

JAEA will research dynamics of radioactive materials in the larger fields such as forests, rivers, visualize distribution of radiation dose rate, and develop prediction system of dose rate. Moreover, JAEA will actively offer the technical expertise.

【Medium- and Long-Term Activities of the Centre for Environmental Creation】

In view of the fact that there are no precedents or models for the activities of CEC, and of possible future environmental changes, the ten-year term of the Medium- and Long-Term Activities is divided into: Phase 1: FY2015 through FY2018; Phase 2: FY2019 through FY2021; and Phase 3: FY2022 through FY2024.

In Phase 1, the three participants in CEC will give priority to the most urgent issues, including thorough decontamination, appropriate disposal of removed contaminated soil and waste, and clarification of the movement of radioactive materials in the environment.

The Phase 2 and 3 activities will be developed after the results of the activities of the three participants in Phase 1 are assessed, with consideration to changes in the situation, including environmental changes.

Research and Development organizations

Naraha Center for Remote Control Technology Development

-Development/demonstration tests of remote control equipment and devices such as robots-

Full-scale test device simulated the lower part of the PCV installed by IRID

Naraha Town, Fukushima

application

Collaborative Laboratories for Advanced Decommissioning Science "CLADS"

-Acting as international research hub and symbol of the shared international interest for decommissioning R&D-

Fukushima Research Conference toward decommissioning at

Tomioka Town, Fukushima

application

Okuma Analysis and Research Center

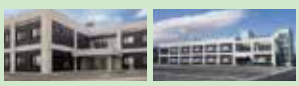
(partly opened in 2018)

-Characterization of radioactive wastes and fuel debris-

Okuma Town, Fukushima (next to the 1F site)

Fukushima Environmental Safety Center

R&D on environmental dynamics, radiation monitoring, etc.



Miharu Town Minamisoma City Fukushima

Application of results

Offering of technical expertise to municipalities ,etc.

Cooperation

・Tokyo Electric Power Company Holdings, Inc. "TEPCO"
・International Research Institute for Nuclear Decommissioning "IRID"
・Nuclear Damage Compensation and Decommissioning Facilitation Corporation "NDF"

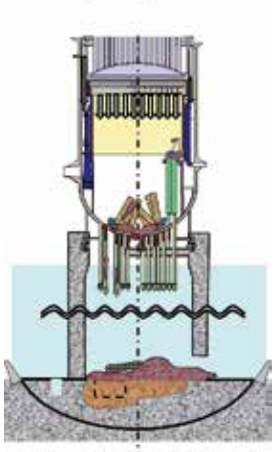
【・Domestic and oversea universities, research institutes, etc.】 【・Government, Fukushima Prefecture】

【・JAEA's facilities for handling nuclear fuels/radioactive materials and irradiation facilities at Tokai and Oarai in Ibaraki Prefecture are also utilized.】

JAEA contributes to the decommissioning of TEPCO's 1F and environmental restoration of Fukushima.

R&D for Decommissioning

CLADS



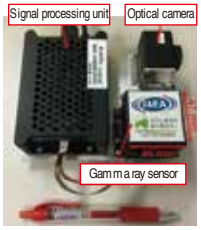
Estimated state inside reactor (Unit 3)

<Offering technical expertise>

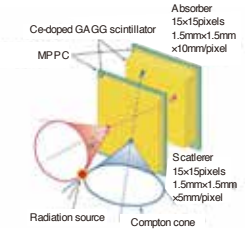
All related data on accident progression at 1F were comprehensively reviewed in an expert group of Japan(JAEA, TEPCO, universities, nuclear power plant manufacturers, etc) and then the current status of the damaged reactors was evaluated and delivered to decommissioning projects (JFY2016-2017). Also, JAEA carries out tests using simulated fuel debris for the characterization of fuel debris which has an impact on the decommissioning process.

<Example of R&D>

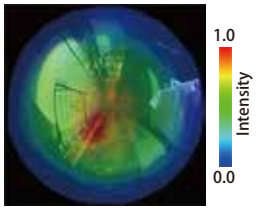
JAEA is developing a new radiation imaging system for visualization of radioactive contamination inside the buildings of 1F.



Compton camera



Operating principle of Compton camera



Visualized image in 1F site

Development of R&D Infrastructures

Naraha Center for Remote Control Technology Development

The facilities here are available for users who are involved in R&D on remote-control devices (e.g., robots) necessary for decommissioning work.The users can conduct demonstration/element tests and operation training. The facilities are not only for decommissioning related work, but also for developing robots and their demonstration tests for disaster responses. JAEA is working on technology development aiming at the improvement of the test equipment.

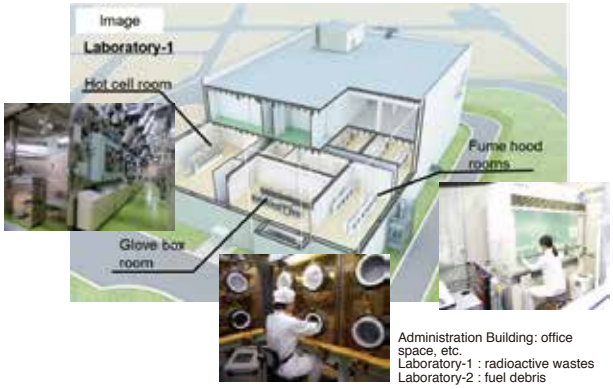
Mock-Up Stairs

Robot Test Pool

Virtual Reality System

Okuma Analysis and Research Center

JAEA is constructing Okuma Analysis and Research Center for characterization of radioactive wastes and fuel debris, for radioactive waste management and necessary R&D.

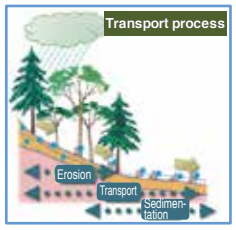


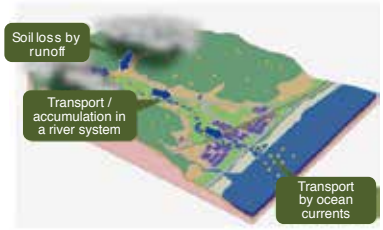
Administration Building: office space, etc.
Laboratory-1 : radioactive wastes
Laboratory-2 : fuel debris

R&D for Environmental Restoration

Fukushima Environmental Safety Center

In order to evaluate the future impact of radiation, JAEA has been developing the technologies to measure the deposition amount of radioactive materials in mountains, forests, rivers and lakes, with a high degree of accuracy and greater rapidity, resolving the sorption mechanism of radio-cesium into clay minerals and studied the radio-cesium behavior in the environment.





https://fukushima.jaea.go.jp/QA/

JAEA will offer technical expertise based on scientific basis to contribute to the regeneration of agriculture and forestry, and the reconstruction planning of municipalities. Furthermore, these research findings will be applied to on-site decommissioning technorogies.

Sector of Nuclear Safety Research and Emergency Preparedness

https://www.jaea.go.jp/04/anzen/en/index_e.html

This sector contributes to improvement of regulations on nuclear safety and emergency preparedness and response through scientific studies and investigations.

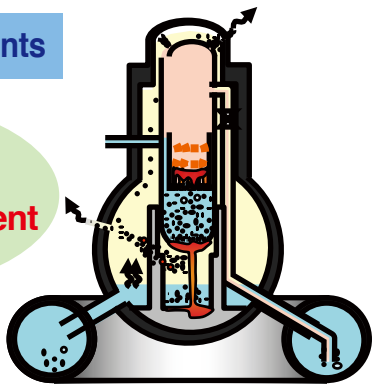
Center: Tokai (NSRI) | Hitachinaka

Safety research for contribution to nuclear safety regulations

- Based on the lessons learned from the Fukushima Daiichi Nuclear Power Station accident, the Nuclear Safety Research Center (NSRC) is carrying out research to enhance the defense-in-depth safety concept through continuous improvement toward the highest standards of safety.
- We conduct near-term research according mainly to the needs of safety research of the Nuclear Regulation Authority to establish scientific and rational regulation in risk-informed regulatory scheme, and advanced studies in long-term technical aspects.
- Our activities are based on the principle of transparency and technological neutrality.
- We have cooperative relationship with research institutes and universities of other countries and international organizations.

Research focused on responding to beyond design-basis accidents

Severe Accident Prevention | Severe Accident Evaluation | Environmental / Radiation Assessment



Specific research fields and research facilities / devices

Safety research of light water reactors

Fuel Safety

NSRR
Nuclear Safety Research Reactor

RFEF
Reactor Fuel Examination Facility

Thermal-hydraulic Safety

CIGMA
Containment Integral Measurement Apparatus

LSTF
Large Scale Test Facility (Thermal-hydraulic integral effects test facility for PWR)

Safety research of nuclear fuel cycle facilities

Fuel Cycle Safety

ACUA
Apparatus for Evaluating Clogging Effect of HEPA Filter on Confinement Capability Under Fire Accident

Criticality Safety

STACY
Static Experiment Critical Facility
※Under conversion

Safeguards

CLEAR
Clean Laboratory for Environmental Analysis and Research

Waste Safety

BECKY
Back-end Fuel Cycle Key Elements Research Facility

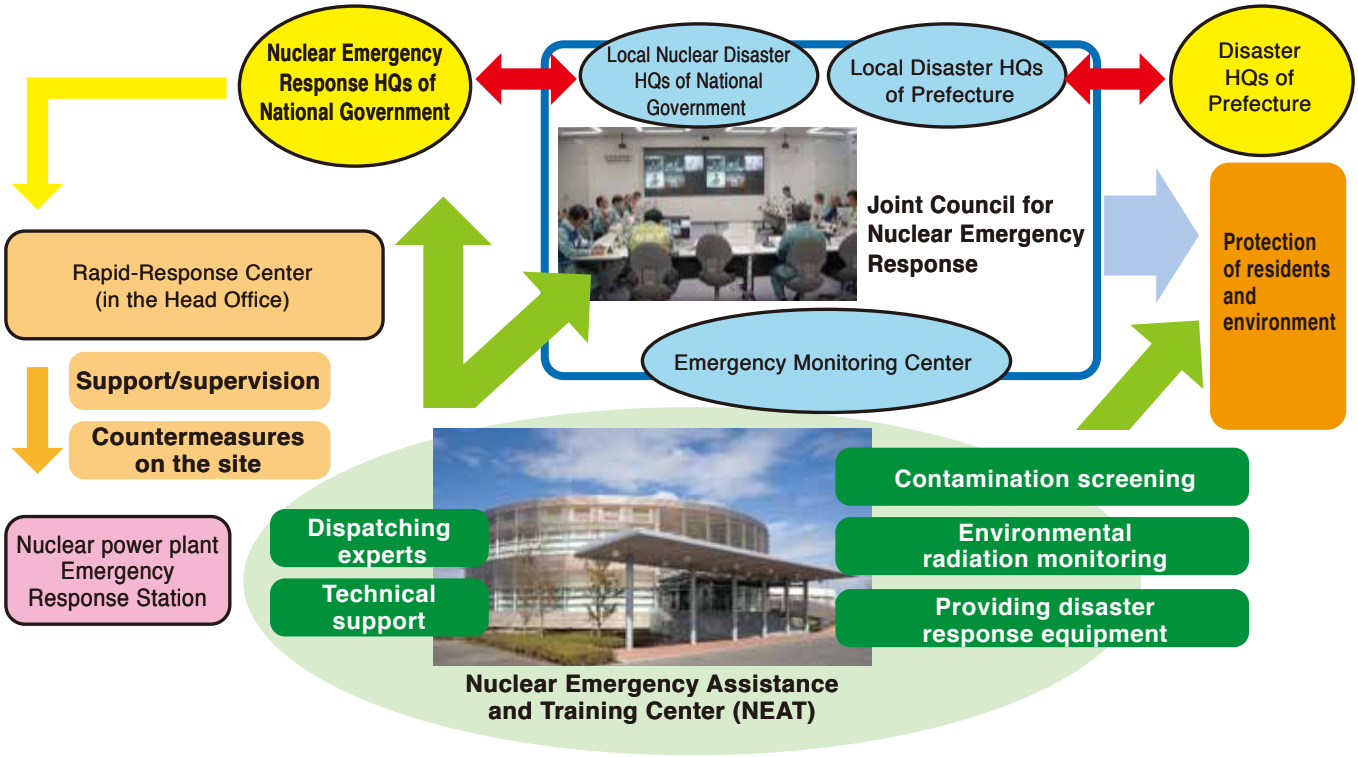
Nuclear Emergency Assistance and Training

https://www.jaea.go.jp/04/shien/en/

JAEA supports activities on nuclear emergency preparedness and response with mobility, information and technology.

Activities in Nuclear Emergency

JAEA provides technical support for national and local governments' nuclear disaster response activities as one of the designated public institutions based on law.
The Nuclear Emergency Assistance and Training Center (NEAT) serves as a base of JAEA's technical support.




HQ function on emergency support

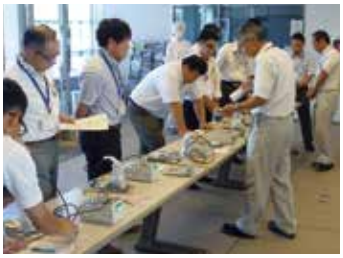

Local dispatching of experts


Local dispatching of special vehicles

Activities in Normal Times

NEAT supports nuclear disaster drills of national and local governments and personnel training related to nuclear disaster prevention. We also conduct research to give support in strengthening the nuclear disaster prevention system and provide technical assistance for nuclear disaster countermeasures in Asian countries, etc.


Supporting nuclear disaster drills


Training for local government staff


International workshops

JAEA Sector of Nuclear Science Research

https://snsr.jaea.go.jp/en/index.html

We devote ourselves to produce scientific knowledge and technologies for supporting the nuclear energy utilization and to foster human resources having abilities to produce them.

Center: Tokai (NSRI) Oarai

Promoting basic nuclear science and engineering research and advanced nuclear science research

We will lead the nuclear science and technologies for supporting nuclear energy utilization.

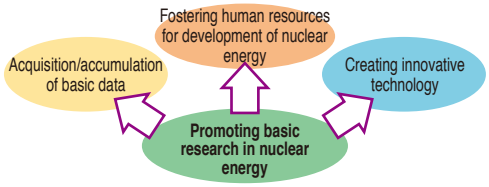
In the basic nuclear science and engineering research, we are devoting ourselves to research activities related to nuclear reactor, improvement of its fuel and material performances, radionuclide behaviors and radiation properties in order to reinforce the technology platform in nuclear science. In addition, considering the public needs, we struggle with issues in the nuclear energy utilization such as reduction in volume and toxicity of high-level radioactive waste and safety improvements of nuclear reactors, by using the developed technologies.

In the advanced nuclear energy science research , we are promoting world-leading, advanced research in actinides science and nuclear materials science , playing a key role as a core institution around the world. JAEA aims to acquire new knowledge beyond existing frameworks by discovering new principles and phenomena and creating new materials.

Furthermore, by making full use of JAEA's infrastructure facilities, JAEA is committed to the development of researchers and engineers with sophisticated problem-solving capabilities at our R&D sites.

Basic nuclear science and engineering

We are devoted to basic research and development for creating innovative technologies of the nuclear energy utilization, with maintaining our research and development capabilities and fostering nuclear scientists and engineers.



- Nuclear data and reactor engineering
- Nuclear fuel and material science
- Nuclear chemistry
- Environmental and radiation science
- Key technologies for the light water reactor
- Partitioning and transmutation technologies

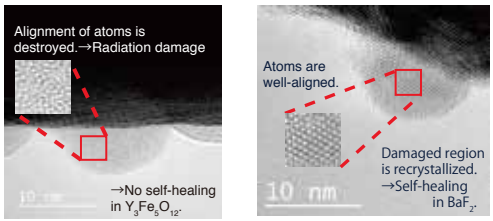
Advanced nuclear energy science research

Implementing world-leading research in Advanced actinides science and advanced nuclear materials science, which is making a strong impact for its groundbreaking science and technology in leading the development of nuclear energy science.

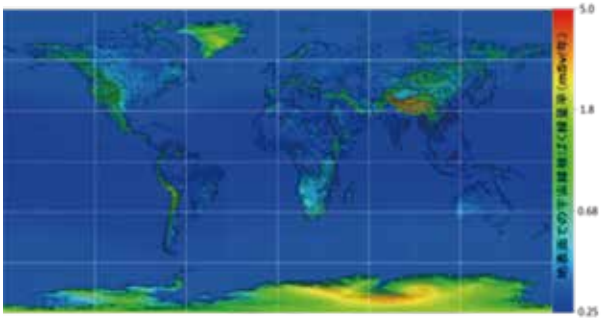
Advanced actinides science / Advanced nuclear materials science

- Condensed system science, heavy element science, etc. → nuclear transmutation, MA nuclear data, etc.
- Energy conversion materials science → thermoelectric/multifunctional materials, etc.

Basic nuclear science and engineering



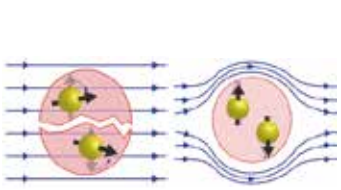
Discovery of self-healing capability of ceramics under radiation environment



Cosmic-ray dose rates at the surface of the Earth estimated based on the PARMA model developed by JAEA

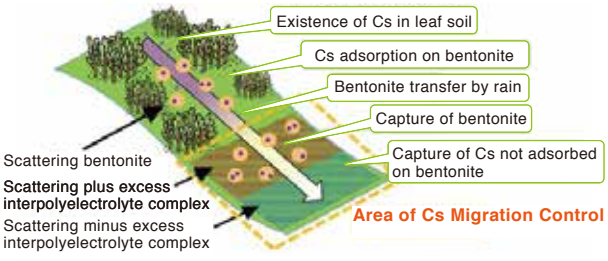
https://nsec.jaea.go.jp/pressrelease/en_index.html

Advanced nuclear energy science research



Superconductivity of uranium compound surviving in high magnetic field

Lawrencium's Ionization potential bridges a knowledge gap



New technology for migration control of cesium from forests to living area

Research for improving safety performance in nuclear energy utilization

We will promote fundamental research and development for improving the safety of light water reactors, and developing technologies for safer decommissioning.

We will improve the safety and reliability of light water reactors, and contribute to technical basis for both the promotion and regulation. For these purposes we will conduct basic researches, such as development of codes and maintenance of database for reduction of accident risk, mitigation of accidents, and safer and steady decommissioning.

Fundamental research in nuclear energy

- Nuclear engineering
- Fuels/materials engineering
- Thermal hydraulic engineering
- Nuclear chemistry

Safer and steady decommissioning

- Development of techniques for evaluating nuclide composition and radioactivity for decommissioning
- Development of technologies for analyzing long-term integrity of decommissioned facilities

Reduction of accident risk

- Development of technologies relevant to the feasibility of candidate cladding materials for accident-resistant fuels
- Development of models for predicting the aging of nuclear facilities
- Advancement of analysis technology of core thermal hydraulics

Mitigation of accident

- Advancement of analysis techniques of core-melt progression in a severe accident
- Advancement of hydrogen recombination catalysts for the risk reduction of hydrogen combustion and explosion
- Development of technology for analyzing radioactive material behavior

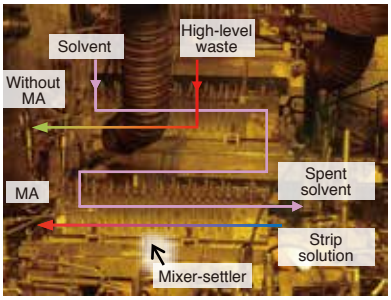
R&D of nuclear transmutation using an accelerator aiming at volume reduction and mitigation of degree of harmfulness of high-level waste

Developing systems for transmutation of minor actinides contained in spent fuel using an accelerator.

Highly radiotoxic, long-lived minor actinides (MAs) are contained in high-level radioactive waste (HLW) generated by reprocessing of spent fuel from nuclear power plants. Conversion of these MAs into low-toxicity, short-lived nuclides or stable nuclides that do not emit radiation (this technique referred to as 'nuclear transmutation') will contribute to volume reduction and mitigation of degree of harmfulness of HLW and then will reduce the difficulty in the disposal of HLW. We are developing technology to separate MAs efficiently from HLW and to transmute the separated MAs efficiently and safely by using an accelerator-driven system (ADS).

Development of MA separation process

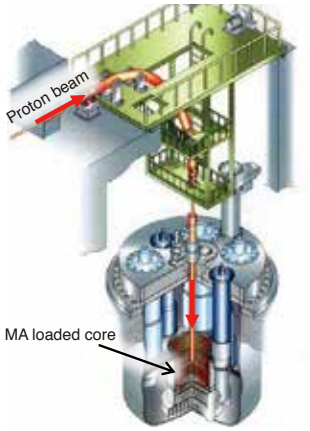
Solvent extraction will give high separation performance in a continuous operation by using highly-selective extractants.
We have developed the extractants and a separation process for MA and are performing demonstration tests of the process using real high-level waste.



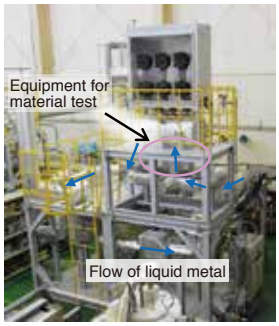
Demonstration tests using real high-level waste

Development of accelerator-driven system (ADS)

ADS is a new system which is driven by a proton beam from an accelerator and is operated safely because chain fission reactions in the MA-loaded sub-critical core can be easily stopped by halting the accelerator. We are conducting design study of the ADS and related technological study such as material development.



Example of ADS design



Equipment for high-temperature and long-term corrosion test for developing material which can be used in liquid lead-bismuth eutectic at high temperature

Sector of Nuclear Science Research

https://snsr.jaea.go.jp/en/index.html

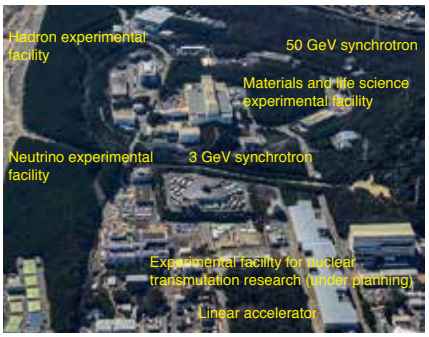
Working on world-leading R&D with neutron and synchrotron radiation.

Center: Tokai (NSRI) | Harima

Promoting cutting-edge research by J-PARC

Supporting the development of science, technology and academia and promotion of industry as a global center of neutron science research.

The Japan Proton Accelerator Research Complex (J-PARC) is a joint project between JAEA and the High Energy Accelerator Research Organization. By utilizing a variety of secondary particles, such as neutrons, muons, neutrinos, etc., which are generated by the world-class proton accelerator, J-PARC is creating results for cutting-edge research from basic science to industrial applications together with users of the system. In addition, J-PARC is advancing R&D on further strengthening the accelerator in order to maintain global cutting-edge research in the future.



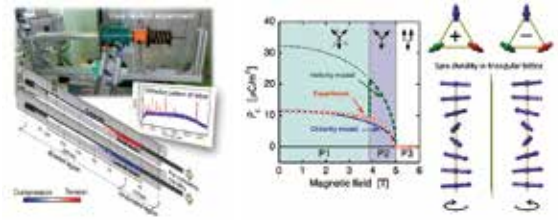
J-PARC
(Tokai)

Neutron and synchrotron radiation applied research and development

By full use of JAEA owned neutron and synchrotron radiation applied advanced structural and functional analysis tools, we promote materials sciences research which contributes to nuclear science and utilization of nuclear energy.

We develop and upgrade neutron and synchrotron radiation applied advanced analysis tools and create innovative results and seeds in a wide range of science and technology and academic fields. Moreover, we provide new findings obtained by the advanced analysis tools for nuclear science and engineering research and advanced nuclear research, and then accelerates the promotion of the research in these areas.

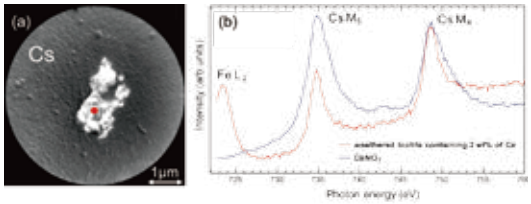
Neutron sciences



We upgrade micro structural analysis techniques, which take advantage of the unique properties of neutrons such as high penetration, high sensitivity to hydrogen, and magnetism. We perform architectural engineering researches to measure the stress distribution of rebar embedded in concrete (left) and materials researches leading to the development of next-generation energy-saving magnetic memory (right).

Research reactor JRR-3 reactor room(left) and beam hall (right)

Synchrotron radiation sciences

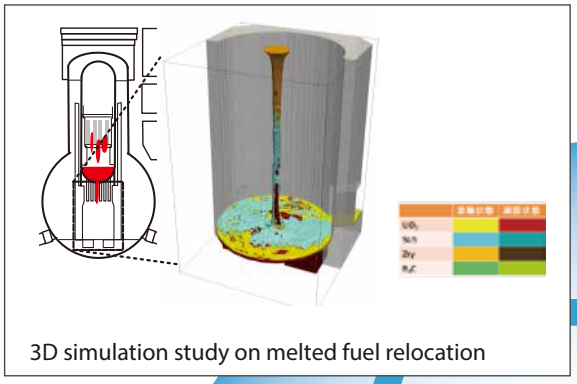


We are developing experimental techniques with synchrotron radiation to elucidate functionalities of materials in nuclear energy sciences. We have applied SR-PEEM (synchrotron radiation photoemission electron microscopy) to observe the distribution (left) and chemical states (right) of cesium contained in soil with nanometer resolution.
https://aip.scitation.org/doi/10.1063/1.5005799

Synchrotron radiation facility SPring-8 BL22XU(left) and BL23SU(right)

By promoting basic nuclear science and engineering research, we are making technological advancement in wide fields and supporting various JAEA's R&D projects in nuclear energy utilization.

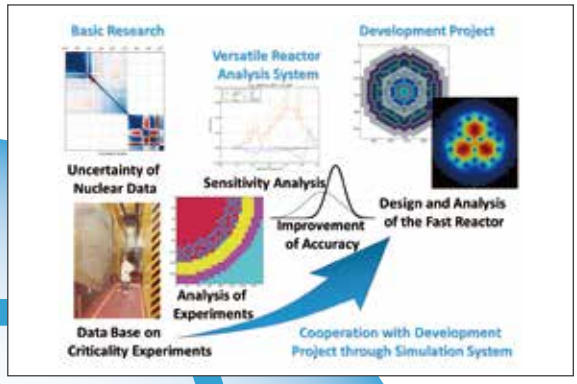
Nuclear safety



3D simulation study on melted fuel relocation

Numerical simulation methods for melt relocation behavior and failure behavior of reactor pressure vessel lower head at severe accident of light water reactor have been developed in cooperation with the Nuclear Safety Research Center.

Development of fast reactors



Simulation system for the fast reactor has been developed as nuclear characteristics analysis system in cooperation with Fast Reactor Cycle System Research and Development Center

Basic science and engineering

Support for R&D projects and activities by promoting basic nuclear science and engineering research

Nuclear security

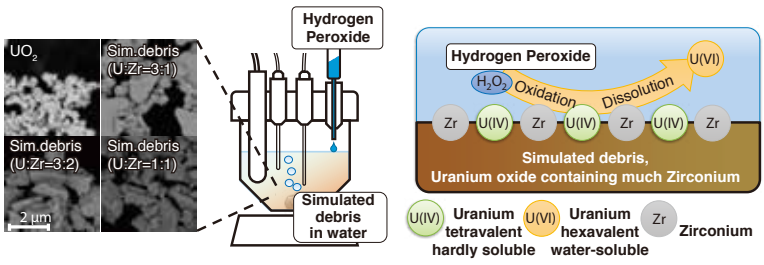
Research and development for the material accountancy of highly radioactive nuclear materials has been conducted with active neutron techniques in cooperation with Integrated Support Center for Nuclear nonproliferation and nuclear security.

Decommissioning and waste treatment

A non-destructive measurement system using fast neutron direct interrogation method has been developed for measuring uranium in a waste drum in collaboration with Ningyo-toge Environmental Engineering Center. It has been utilized for the material accountancy of uranium in actual waste drums.

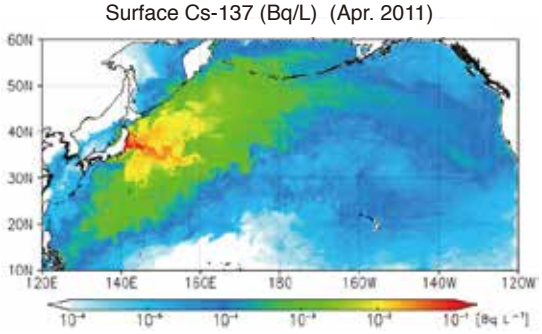
Response to Fukushima-Daiichi NPS accident

R&D for the decommissioning of Fukushima-Daiichi NPS and the environmental restoration of Fukushima has been conducted in cooperation with Sector of Fukushima Research and Development.



UO_2 fuel becomes less water-soluble under oxidative conditions when it contains Zr as might be expected for the molten corium.

https://nsec.jaea.go.jp/pressrelease/en_index.html



Migration mechanism of Cs-137 in the ocean

Sector of Fast Reactor and Advanced Reactor Research and Development

We conduct research and development for realization of advanced reactor and fuel cycle system to enable stable energy supply with high safety for the future.

Facility: Tsuruga Oarai

Role of Sector of Fast Reactor and Advanced Reactor Research and Development

The “Sector of Fast Reactor and Advanced Reactor Research and Development” conducts research and development (R&D) on advanced reactors such as fast reactor and high-temperature gas-cooled reactor and R&D on fuel cycle techniques toward the improvement of energy sustainability, safety, reliability, economy, etc. for the future.
In addition, the sector conducts following R&Ds to promote decommissioning and waste management.

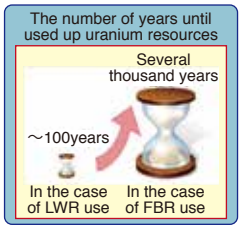
- ○R&D for decommissioning of Fukushima Daiichi nuclear power station accident
- ○Planning and technical development for decommissioning of the Japan Materials Testing Reactor (JMTR)
- ○Technical development on radioactive waste management and decommissioning
- ○Technical development on laser application study

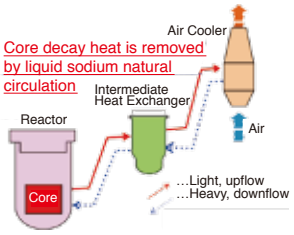

JMTR


OWTF

Significance of R&D of fast reactor cycle system

A widely-used light-water reactor (LWR) nuclear power plant generates electricity by using a small part of uranium (0.7% fissile (burnable) uranium) as its fuel. On the other hand, a fast-breeder reactor (FBR) one can produce plutonium from the remaining uranium (99.3% fertile (non-burnable) uranium) while generating electricity, and the plutonium can be used as fuel. When using uranium resources with the fast-breeder reactor, it could be possible to utilize several tens of times energy resources compared with using them with the light-water reactor, and it can be used for centuries.



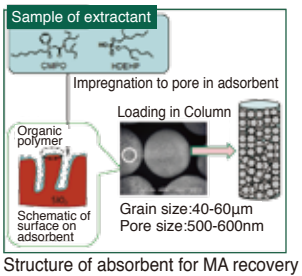


It is unnecessary to pressurize sodium coolant in the fast-breeder reactor owing to its good property as a fluid to maintain a liquid state in a very wide temperature range. Sodium coolant also has excellent cooling capacity to remove heat from the reactor core efficiently. Even if the loss of power supply when event occurs, the core can be cooled by natural circulation due to the temperature difference.

R&D to reduce the volume and radioactive toxicity of high-level radioactive waste

We are conducting R&D to reduce the volume and radioactive toxicity of high-level radioactive waste discharged from the reprocessing of spent fuel. In this R&D, SmART project has been promoted as a fuel cycle test using small amount of MA from irradiated fuel.
The small scale of fuel cycle test is focused on technology for separation and recovery of MA from spent fuel, technology for fabricating fuel containing MA, irradiation testing at Joyo to demonstrate the MA partitioning and transmutation technology using fast reactor.

Remotely fabricated fuel pellets containing MA



Structure of absorbent for MA recovery using extraction chromatography

R&D on advancement of sodium treatment technology

In the Sodium Engineering Research Facility, we conduct R&D on advancement of sodium treatment technology with such as research on sodium chemical reaction to improve safety of fast reactor, technical development concerning inspection and maintenance of fast reactor with high temperature and high radiation environment, etc. It is also expected to utilize this facility to develop effective technology for fast reactor decommissioning in the future.


Sodium Engineering Research Facility


Multipurpose Sodium Test Loop

High-Temperature Gas-cooled Reactor (HTGR) and its Heat Application

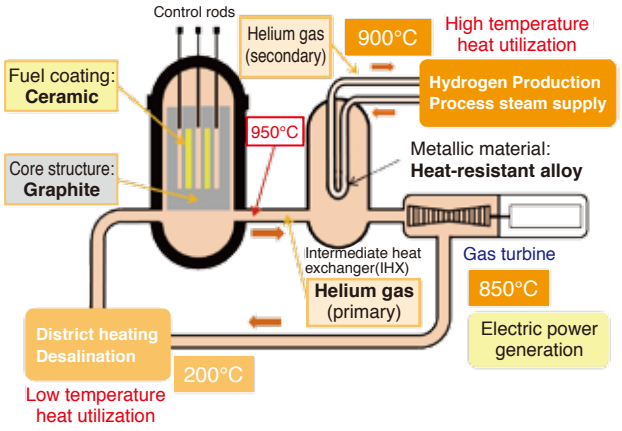
HTGR is expected to play a dominant role not only for electric power generation but also for heat application i.e. hydrogen production in the world near future.

Inherent safety characteristics of HTGR, which stems from consisting key elements: coated fuel particles with excellent heat resistance and radioactive material confinement properties, a highly heat-resistant and large heat capacity graphite moderator, and chemically inert helium gas coolant, make it possible to practically eliminate severe accidents which are postulated in LWRs. Also, HTGR heat is expected to contribute in reduction of CO2 emission by extending the use of nuclear heat to wider spectrum of heat application such as hydrogen production, etc.

HTTR (High Temperature Engineering Test Reactor) (Oarai)

R&D on HTGR System

HTGR for Multiple Energy Applications

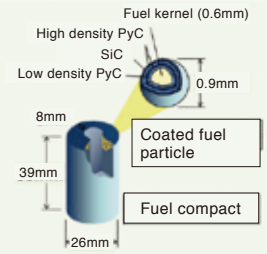


Fulfill the requirements of 3E+S in Japan's Strategic Energy Plan

Safety(S)
・Inherent safety characteristics of HTGR

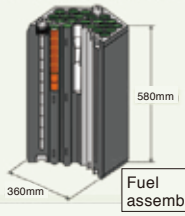
TRISO fuel coating

Retain radioactive material at 1600°C



Graphite core structure

Temperature limit 2500°C



Helium coolant

Stable at high temperature (No temperature limit)

Improvement of economical Efficiency (E)
- Energy utilization efficiency - approx. 80%
- Power generation efficiency - approx. 50%
- High availability with high burnup fuel (160GWd/t)
- Easy maintenance with low helium coolant contamination

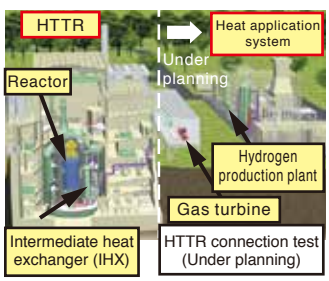
Adaptability to Environment (E)
- Reduction of spent fuel quantity to 1/4 of LWR's
- Contribution to substantial CO_2 emission reduction by H_2 supply and by steam supply to various industries

Stable Energy supply (E)
- Stable supply of H_2 energy using nuclear energy

R&D on Heat Application

・Validation of Heat Application Technologies using HTTR

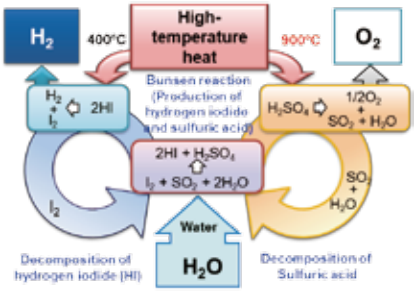
Confirmation of hydrogen production technology and gas turbine power generation technology using high temperature heat supplied from nuclear reactor (Planning)



Establishment of safety standards for coupling chemical plants to nuclear reactor (Planning)

・Thermochemical water splitting Iodine Sulphur (IS) Process to produce hydrogen

The world's first achievement of continuous hydrogen production by thermochemical IS process that thermally decomposes water using Iodine(I) and sulphur(S)



Demonstration of Component integrity and stability of hydrogen production. (In progress)

Sector of Nuclear fuel, Decommissioning and Waste Management Technology Development

https://www.jaea.go.jp/04/tisou/english/index/e-index.html

Committed to developing technology for decommissioning, processing disposal of radioactive wastes and promotion of surface disposal project of low level radioactive wastes arising from research, industrial and medical facilities.

Center: Tokai (NCL) | Horonobe | Tono(TGC) | Ningyo-toge | Aomori

R&D on disposal technologies of high-level radioactive waste

Steadily promoting fundamental R&D required for achieving disposal and enhancing reliability of long-term safety of geological disposal technologies.

Research on the deep geological environment

In Japan, the two major rock types (crystalline and sedimentary rocks) are widely distributed. Therefore, JAEA has conducted comprehensive R&D about deep geological environment such as characteristics of groundwater and rock mechanics at Mizunami and Horonobe Underground Research Laboratories (URLs) .

[TGC] Mizunami URL (crystalline rock)

[TGC] Pelletron Tandem Accelerator Mass Spectrometer (date measurement system)

Study for long-term stability of the geological environment

JAEA has conducted research in the TGC aiming at establishing techniques for estimating long term evolutions of geological environment by characterizing neotectonic events and processes such as crustal movements and volcanic activities etc. in Japan.

[Horonobe] Horonobe Underground Research Laboratory (sedimentary rock)

[NCL] QUALITY (Quantitative Assessment Radionuclide Migration Experimental Facility)

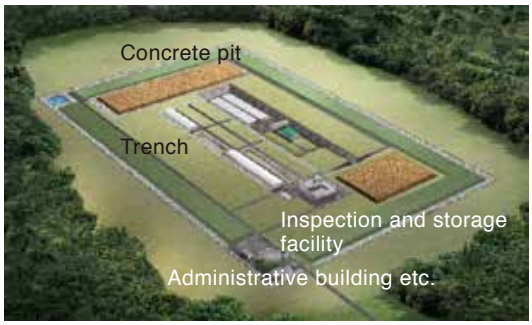
R&D on geological disposal

In order to enhance the safety and reliability of the geological disposal, NCL has been proceeding fundamental R&D steadily such as research on deep geological environment, improvement of disposal technologies and development of advanced safety assessment methods.

Promotion of Disposal Project of Low Level Radioactive Wastes Arising from Research, Industrial and Medical Facilities

As the implementation body of the disposal project of low level radioactive wastes generated from research facilities, industrial and medical facilities, JAEA will promote the project steadily.

JAEA will promote the disposal project of low level radioactive wastes generated from JAEA's facilities and other research facilities, industrial and medical facilities.
According to the procedure and criteria for site selection, siting process will be progressed. Furthermore, for the basic design of the disposal facilities, technical studies on structure of the disposal facilities, such as concrete pit, trench facilities, and waste acceptance criteria are being carried out.



Conceptual Design of Disposal Facility

Technological Development for Reprocessing of Spent Fuel

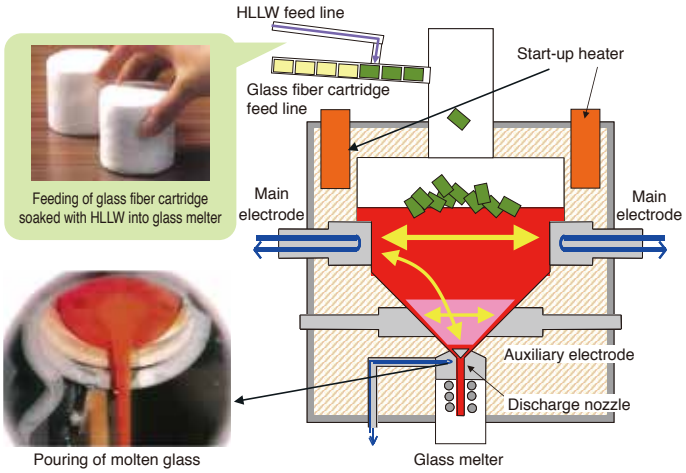
Tokai Reprocessing Plant (TRP) contributes for steady implementation of vitrification/stabilization of high-level radioactive waste, and establishing systematized decommissioning technology.

As an activity for decommissioning Tokai Reprocessing Plant (TRP), some processes such as shearing and dissolution, etc. were suspended.
TRP decommissioning plan that provides decommissioning procedures, schedule, and current facility utilization plans was submitted. Activities for getting approval of this plan are underway.

To comply with the new regulatory requirements for safety management of stored spent fuel and waste in TRP and to implement vitrification/stabilization of high-level radioactive waste for risk reduction are conducted.

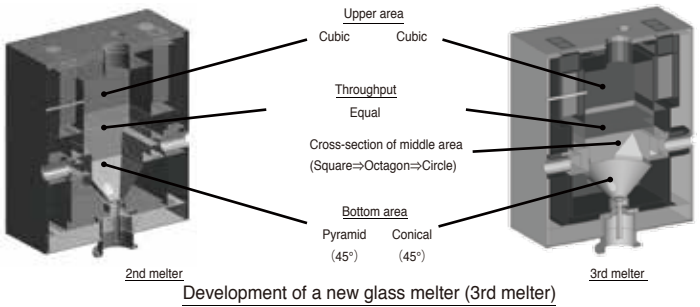
In order to improve vitrification technology of HLLW further as improvement of the reprocessing technology, accumulation of the data of the behavior of platinum-group elements in glass melter and design of a new glass melter for Tokai Vitrification Facility (TVF) are progressing.

Through these activities, to continue technology cooperation for nuclear fuel cycle business, and to establish systematized decommissioning technology are contributed.



Feeding of glass fiber cartridge soaked with HLLW into glass melter

Pouring of molten glass



Development of a new glass melter (3rd melter)

Technological Development of Decommissioning of Nuclear Facilities and Radioactive Waste Management

JAEA conducts decommissioning actions safely and cost effectively and transmits information on technological developments throughout Japan and overseas.

In order to rationally procced with the decommissioning of nuclear facilities, R & D such as the decommissioning engineering system has been promoted. In this R & D the decommissioning cost evaluation system for nuclear facilities was developed and this system is used for preparing nuclear facility decommissioning plans and establishing the JAEA facility plan.

At the Ningyo-toge Environmental Engineering Center (NEEC), we undertake the R & D program themes “Uranium and Environmental Research Platform” for uranium front-end facilities decommission by the created framework of the Platform concerning researching uranium and environmental, utilizing the comprehensive uranium handling experience and human resources accumulated through R & D ranging from the uranium mining to the enrichment at NEEC.

Aomori Research and Development Center administers decomissioning of nuclear facilities, analysis of ultratrace element in environmental samples and management of Mutsu Science Museum.


Accelerator mass spectrometer


Exhibition of reactor dismantled from nuclear ship (Mutsu Science Museum)

Sector of Tsuruga Decommissioning Demonstration

JAEA will implement the decommissioning for "Fugen" and "Monju" while gaining the understanding of the public and the local community.

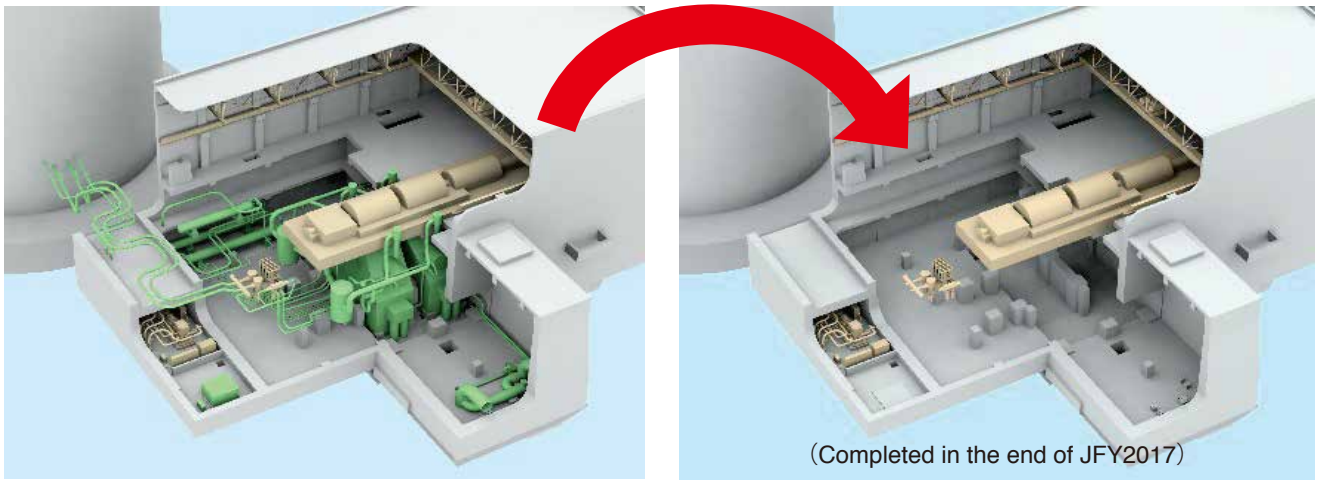
Center: Tsuruga

Toward the Completion of Decommissioning of “Fugen”

“Fugen” was permanently shut down in March, 2003 after the operation for approximately 25 years. The decommissioning plan for “Fugen” was approved in February, 2008 and the decommissioning is currently being proceeded to be completed in fiscal year 2033.

Example of Dismantling Equipment (Turbine facility)

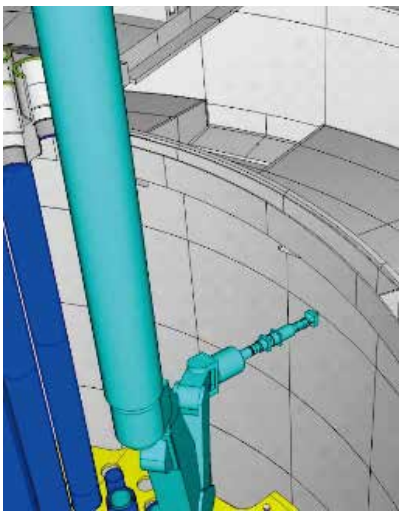
Dismantlement proceeds steadily, starting with less contaminated facilities such as turbine facility.



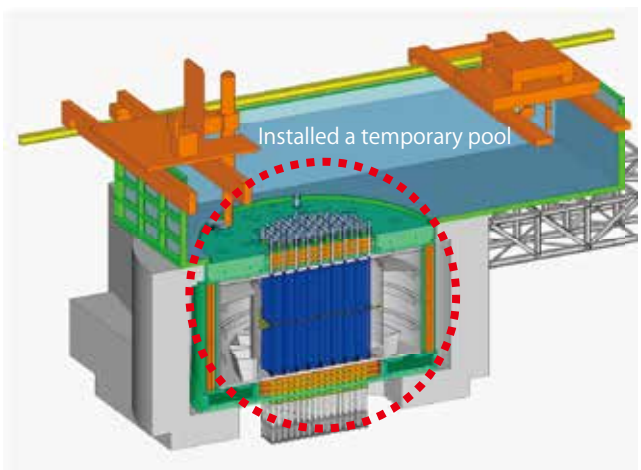
(Completed in the end of JFY2017)

Example of new technology development on decommissioning: (Development of dismantling technology incorporating laser technology)

JAEA is working on the development of new decommissioning technology for nuclear reactor dismantling.



Full scale mock-up test for the demonstration of underwater dismantling (from JFY2018)



Remote controlled underwater dismantling the nuclear reactor by laser (planed: from JFY2023)

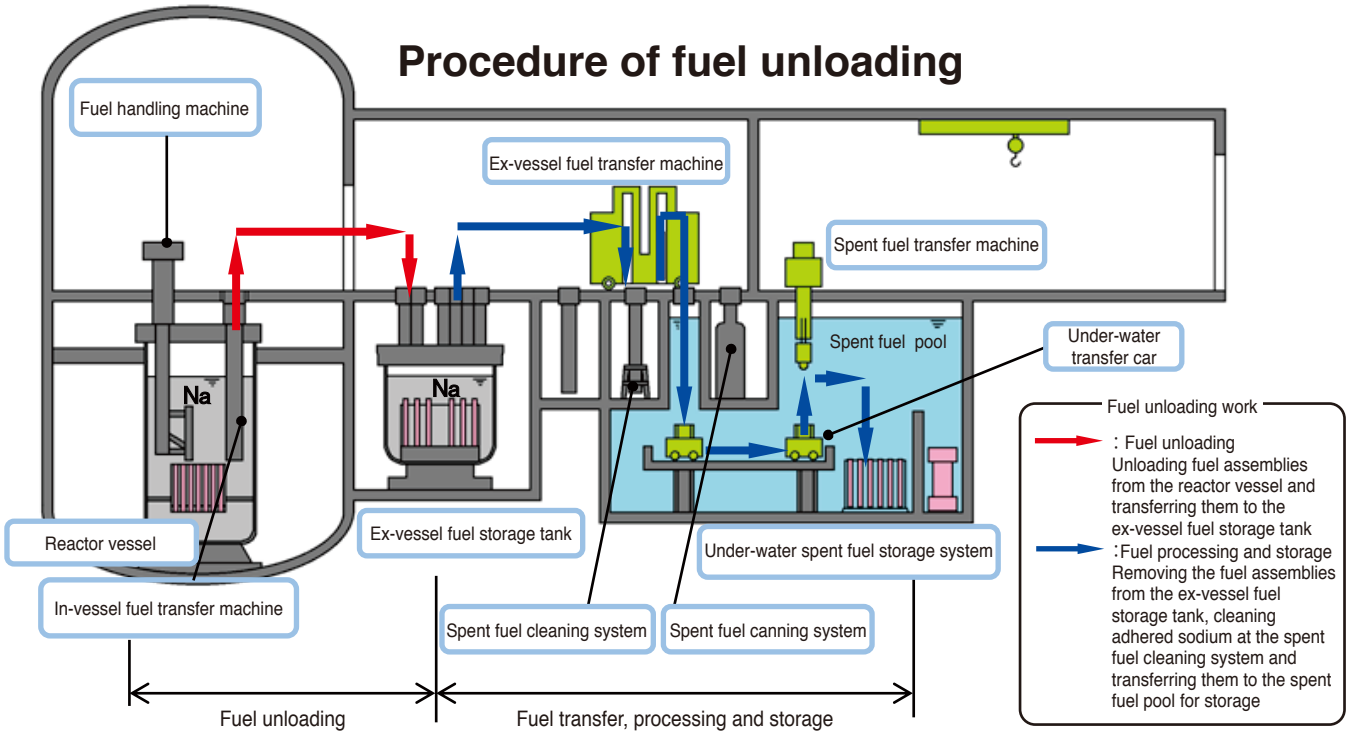
Toward the Completion of Decommissioning Plan for “Monju”

JAEA established a new system for the decommissioning in Tsuruga area and will implement Japan’s first decommissioning of a sodium-cooled reactor safely and steadily in accordance with “The Basic Plan for Decommissioning Monju” approved by Nuclear Regulation Authority on March 28, 2018.

Outlines of the Decommissioning Plan for Monju

- The decommissioning process for approximately 30 years as a whole is implemented in the following four phases.
  - ・1st phase：Fuel unloading
    Transferring fuel assemblies in the reactor vessel and ex-vessel fuel storage tank to the spent fuel pool
  - ・2nd phase：Preparation for dismantling
    Preparations for the dismantling of sodium-cooling equipment, dismantling and removing power-generating facilities
  - ・3rd phase：Dismantlement I
    Dismantling and removal of sodium-cooling equipment and power-generating facilities）
  - ・4th phase：Dismantlement II
    Dismantling and removing buildings）
- Fuel unloading work is implemented with top priority and scheduled to be completed in fiscal year 2022.

Procedure of fuel unloading



Outline of fuel unloading process

Fiscal year	2018	2019	2020	2021	2022
Fuel processing and storage					Completion▼
Fuel unloading					
Periodic facility inspection					

Safety and Regulatory Compliance

https://www.jaea.go.jp/about_JAEA/

Committed to R&D by making comprehensive safety and regulatory compliance our top priority.

Safety Initiatives

Raising awareness of our individual employees and ramping up a safety-first mindset.

Fostering a Safety & Security Culture

JAEA is fostering safety-first mindset by advancing JAEA's projects by placing the utmost priority on ensuring safety and conducting safety culture enhancement activities. Also, JAEA is promoting autonomous and continuous improvements of safety activities by management reviews, nuclear safety audits, etc. In addition, JAEA is committed to nuclear security development activities and strives to ensure nuclear security.
JAEA implements workplace risk assessments, all types of security education, and health and safety patrols as general safety initiatives.

Crisis Management Capability

JAEA is working to improve the crisis management capability of its individual employees by implementing regular education and training in order to implement rapid reporting and emergency response at the time of an accident or incident.
In addition, JAEA implements various safety measures at each of its facilities as countermeasures against a nuclear facility disaster accompanying a major earthquake.

Power supply vehicle connection drills

Outdoor contamination-control drills

Major earthquake response drills
(local emergency response HQ)

Compliance Initiatives

JAEA is actively commits itself to compliance standands as an organization that is trusted by local residents and citizens.

Being an organization that is trusted by society, JAEA commits itself to preventing R&D misconduct and unfair trading practices by promoting compliance activities.
Specifically, JAEA sets activity policies to foster compliance consciousness and effective communication in all its directors and employees. JAEA also implements ethics seminar for technical and research personnel and holds compliance seminar at each center, small group workshops at each section/office, and distributing compliance-related email newsletters.

Engineer and researcher ethics seminar

2018.6

Supporting Nuclear Non-proliferation and Nuclear Security, Domestically and Internationally

https://www.jaea.go.jp/04/iscn/

Towards the world without nuclear proliferation and nuclear terrorism, JAEA/ISCN works on Technological developments, Policy research, Supporting human capacity building and Contribution to the CTBT International Verification Regime in the field of nuclear non-proliferation and nuclear security.

Further strengthening nuclear nonproliferation and nuclear security

Technological developments

JAEA is setting targets for development themes focusing on domestic and international issues and requirements in the field of nuclear non-proliferation and nuclear security, and is carrying out technology development that is expected to be utilized by international agencies, such as the IAEA, in cooperation with research institutes in Japan, US and Europe.
JAEA is developing various fundamental technologies which will contribute to enhance safeguards and nuclear proliferation resistance on future nuclear fuel cycle facilities, and establishing technologies essential to strengthen nuclear security, such as detection and measurement of nuclear materials, and nuclear forensics, etc.

Policy research

JAEA is conducting policy research established on the technical understanding of the international trends on nuclear nonproliferation and nuclear security. JAEA is collecting and compiling relevant information and data, and disseminating information, through the ISCN newsletters featuring topics related to nuclear non-proliferation, nuclear security, and international and domestic trends, etc.

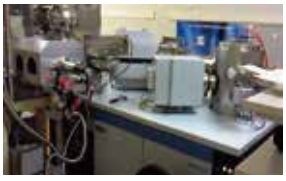
Supporting human capacity building

JAEA is committed to supporting human capacity building in Asian countries by developing training curriculums, conducting training, seminars, and workshops, improving nuclear fuel cycle related facilities and teaching the importance of ensuring nuclear non-proliferation and nuclear security.

Contribution to the CTBT International Verification Regime

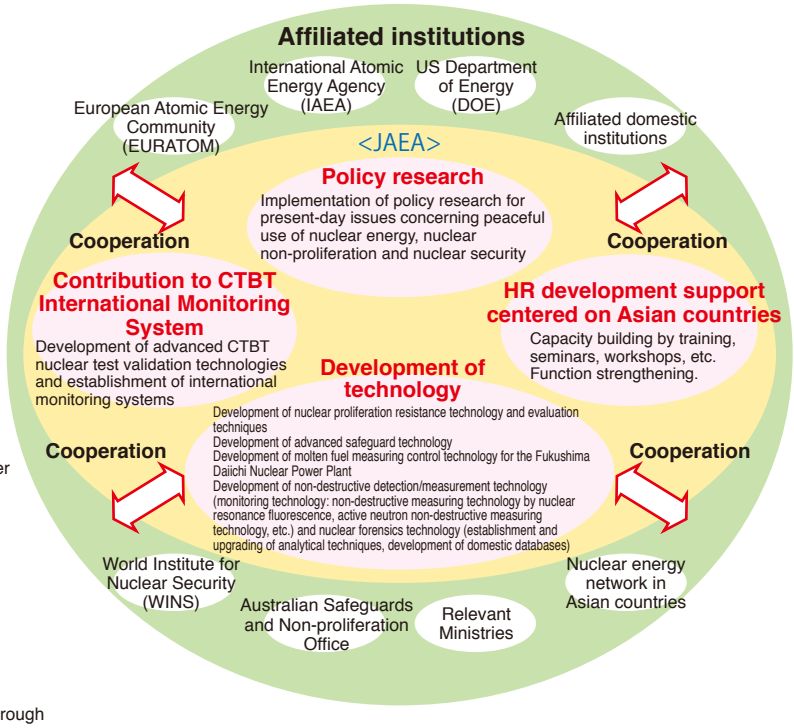
JAEA is contributing to the international nuclear non-proliferation effort by operating international monitoring system facilities for domestic radionuclides as prescribed in the Protocol to the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and a national data center for analyzing and evaluating monitoring data, in addition to developing associated verification technologies for nuclear tests.

Compact NDA system incorporating a helium-3 substitute ceramic scintillator

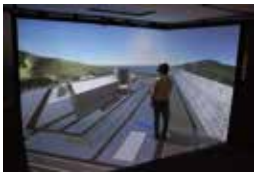


Surface ionization mass spectrometer for use in nuclear forensics

Efforts to promote understandings through International Forum (once a year)



On-site practical facilities training using computers by invited specialists from relevant domestic and international agencies.



Nuclear security in virtual facilities using Virtual Reality

Takasaki Radionuclide Station based on CTBT International Verification Regime

2018.6

Securing Public Trust in Nuclear Energy

https://www.jaea.go.jp/index.html

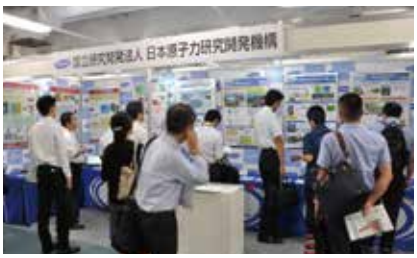
JAEA works to promote mutual understanding with the public through dissemination of the results of its R&D to diverse stakeholders, public consultations, public relations, and dialog activities, etc.

Interaction with diverse stakeholders

JAEA actively disseminates information to diverse stakeholders by staying in tune with society's needs through public hearings, public relations, and dialog activities.

By actively providing and disclosing information relating to JAEA's R&D findings, accidents, incidents, etc., JAEA ensures transparency of its operations. In addition, by taking into consideration the viewpoints of returning these R&D findings to society and communicating risks with society, through deferential public consultations, PR, and dialog, JAEA is able to deepen mutual understanding information on with the public and local communities,which will lead to securing trust.
Furthermore, by paying heed to diverse stakeholder and public view points, JAEA utilizes advice from third-parties in order to contribute to these activities more effectively.

JAEA briefing session


Public consultation, PR, and dialog activities at an exhibition


Briefing about radiation

Internet-based dissemination of results

Transmitting information via the internet for widespread dissemination of results.

Brochure:
https://www.jaea.go.jp/english/about/#pamphlet

Brochure introducing activities performed by each department and R&D findings.

Official social media accounts list:
https://www.jaea.go.jp/sns/

Actively releasing the latest information and R&D findings via SNS.

Newsletter:
https://www.jaea.go.jp/english/publication/#other

Introduction of R&D findings by 'GENKI' and 'graph JAEA' newsletters.

JAEA Channel:
https://www.jaea.go.jp/english/jaea_channel/

Introduction of R&D findings by 'Project JAEA' visually easy-to-understand videos.

2018.6

Dissemination of R&D Results and Promoting Collaboration with Industry Academia Government

https://tenkai.jaea.go.jp/facility/3-facility/05-support/jaea-facilities-eng.html
https://tenkai.jaea.go.jp/english/library/

JAEA aims to maximize the effects of its R&D results for creating innovations with information dissemination, results-sharing and collaboration between industry, academia and government

Promoting collaboration with industry academia government

JAEA contributes to creating new values by our R&D outcomes to society.

JAEA promotes collaboration with industry, academia and government such as joint research, and technical co-operation for creating new values. JAEA introduces its technical achievements and efforts by showing production samples at the academic meetings, industrial exhibitions, etc. In addition, JAEA R&D results, i.e. technical reports, journal articles and intellectual properties are accumulated in database and provided through JAEA web site.

Contact the Intellectual Resources Management and R&D Collaboration Department for further information at: tenkai-ir@jaea.go.jp

Utilization of intellectual properties

JAEA aims to create innovations such as the development of new products using JAEA's patents, etc., by implementing practical joint research with industry.

Practical development

JAEA aims to promote the practical utilization of technology that is highly sought after by industry, such as high sensitivity gas analyzers and radiation measuring instruments, in various fields of manufacturing, medical care, and animal husbandry.

Productization examples

Heat stroke monitoring and warning device

Laser light shade curtain

Utilization examples

High sensitivity gas analyzers
Odor monitoring

Emulsion flow extractor
Recovery of rare metals

Dissemination of R&D results and transmission of information

JAEA will contribute to disseminating R&D results relative to nuclear science and technology by extensively collecting, compiling, and providing of information pertaining to nuclear energy in Japan and overseas.

The JAEA library collects and provides a broad spectrum of domestic and overseas academic information, such as specialized books, scientific journals, and technical reports concerning nuclear science and technology. In addition, JAEA is actively committed to the transmission of information through its activities as the national center for the IAEA INIS (International Nuclear Information System), and by collecting and releasing information related to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station through its Fukushima Nuclear Accident Archive (FNAA).

JAEA Library

JAEA library OPAC

https://library-documents.jaea.go.jp/opac/eng/br_search.asp

For searching JAEA library collections(books, journals and reports)

JAEA Originated Papers Searching System

https://jopss.jaea.go.jp/search/servlet/interSearch?language=1

For searching and browsing JAEA R&D results (JAEA reports and journal articles).

Fukushima Nuclear Accident Archive

http://f-archive.jaea.go.jp/index-s.php?locale=eng

Providing Fukushima nuclear accident information and the related JAEA R&D results.

2018.6

International Cooperation and Nuclear Human Resources Development

https://www.jaea.go.jp/04/kokusaibu/eng/

Promoting effective and efficient R&D through close cooperation with overseas research institutes and international organizations.

Global cooperation and contribution

Based on the Strategy for the International Cooperation, JAEA promotes international cooperation and makes a wide variety of international contributions.

JAEA is actively promoting cooperation with overseas research institutes and international organizations for advancing R&D by incorporating wisdom from other countries. In addition, JAEA is proactively promoting the dispatch of specialists overseas, presentations at international meetings, and international use of JAEA's research facilities in order to contribute to the development of global nuclear science and technology through JAEA's technological know-how and experience.

Multilateral cooperation

Promoting cooperation in multilateral cooperative framework for advanced reactor R&D (Generation IV International Forum), etc.

Bilateral cooperation

Cooperation with the USA on advanced reactor and nuclear non-proliferation technology, and cooperation with France on fast reactor, decommissioning technology, etc.

Overseas Office Events

National flags show principal cooperating partners based on bilateral cooperation arrangements

Contribution to international organizations

Dispatch of specialists to the International Atomic Energy Agency (IAEA) and Organisation for Economic Co-operation, and Development/ Nuclear Energy Agency (OECD/NEA), etc.

IAEA (Vienna)

Contribution to the emerging nuclear energy countries

Promoting activities for nuclear HR development and technological support for emerging nuclear energy countries mainly in Asia

International use of research facilities

Promoting international use of J-PARC and research reactors

Overseas exhibition to introduce JAEA

Responding to the social needs for personnel of ability in the field of nuclear energy in the world, JAEA is committed to;

International nuclear human resource development

https://nutec.jaea.go.jp/english/

By means of domestic and international training courses and of cooperation with universities.

The purpose of the international nuclear human resource development is to foster nuclear engineers at the countries planning to introduce nuclear power plants. With the growing importance of nuclear human resources development both inside and outside Japan, JAEA is involving itself in improvement and expansion of the training courses, such as capacity building courses for the young professionals, etc. to meet the needs of the society.

Domestic Training Course

- Technical Training Courses for
  - Nuclear Engineers,
  - RI & Radiation Engineers,
  - Examinees for National Qualifications
- On-demand Training Courses

Radiation management training in basic course in radiology

Needs-based lectures ⇔ Trainees

International Training Course

- Instructor Training Courses and Follow-up Training Courses for 10 Asian countries
  - Reactor Engineering
  - Environmental Radiation Monitoring
  - Nuclear and Radiological Emergency Preparedness
- Nuclear Technology Seminar for 12 Asian countries

Radiation Measurement Exercise in Instructor Training Course

Trainees ⇔ Dispatch instructors

Nuclear Human Resource Development Center

Nuclear Human Resources Development Network

Collaborative framework among industries, academia and the government for effective and efficient human resource development in the nuclear field.

- Joint secretariat of the network
- Japan-IAEA Joint Nuclear Energy Management School
- Collaboration with the IAEA

Japan-IAEA Joint Nuclear Energy Management School 2016

Construction of Databases, etc. ⇔ Implementation of network activities

Cooperation with universities

- Partnership agreements(19 graduate schools, 1 university faculty, 2 technical colleges)
- Nuclear Professional School of The University of Tokyo
- Japan Nuclear Education Network (JNEN) activities
- Programs for accepting university students

Training lecture

Dispatch instructors ⇔ Students acceptance

Promoting the Utilization of Research Facilities and Advanced Computational Science

https://j-parc.jp/index-e.html

Operating facilities utilization systems for external utilization of JAEA's advanced large research facilities.

Promoting external utilization of research facilities

Contributing to creating innovations in materials and medical care fields and academic research through external utilization of facilities.

JAEA's research facilities and equipment, which are defined as public assets, are available to external users inside and outside of Japan for their R&D, industrial applications, etc.

At the MLF(Materials and Life Science Experimental Facility) in the J-PARC（Japan Proton Accelerator Research Complex）, JAEA is working to promote the utilization, of the facility as a specific neutron beam facility in compliance with laws pertaining to the promotion of public utilization of the specific advanced large research facilities. By utilizing the world's highest performance neutron beam, it is expected to promote the creation of new technologies such as the development of new materials and pharmaceuticals, etc.

Facility external view

No.1 Experimental Hall
Neutron beam lines

J-PARC Materials and Life Science Experimental Facility

We are conducting R&D on the use of supercomputers to improve scientific knowledge and technology supporting the use of nuclear power.

https://ccse.jaea.go.jp/eng/index.html

Support for R&D using high performance scientific computing

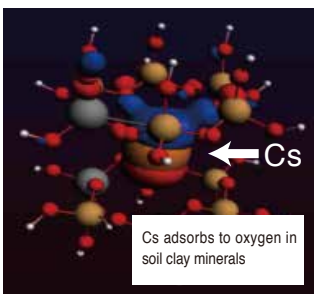
We help spark nuclear power innovation by using supercomputers to perform scientific calculations.

In R&D on nuclear power, there is a need to elucidate the mechanisms of phenomena which are hard to observe in experiments and to predict their progression over time. Computer simulations are an effective way to obtain scientific knowledge and technologies relating to such phenomena. In particular, to find fundamental solutions to problems which arose from the accident at TEPCO's Fukushima Daiichi Nuclear Power Station, and to spark new innovation in nuclear power, simulations of complex phenomena capturing the interplay of various factors are demanded.

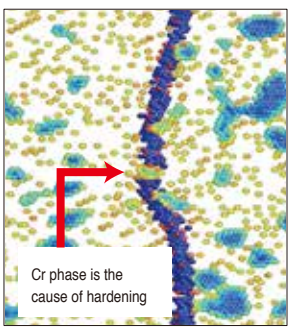
At JAEA, we are working on analyzing real-world complex phenomena by developing cutting-edge simulation technology for multi-scale/multi-physics problems, as well as developing high-speed algorithms for exploiting supercomputers.

We release software developed through these research initiatives publicly, so that they can be used widely in academia and industry.

Supercomputer



Simulation of soil adsorption of cesium



Simulation of reactor structural material deformation

Examples of simulations using supercomputers

2018.6

国立研究開発法人日本原子力研究開発機構
Japan Atomic Energy Agency
http://www.jaea.go.jp/