Status and Roles of Monju

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History of Monju

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A future plan for the second and third steps of SSTs is to be determined when the direction of the national nuclear and energy policies are established in 2012.

Preparation for SST-2, 40% power-level test

Sodium leak detection and monitoring system

Modification of 2ry sodium piping

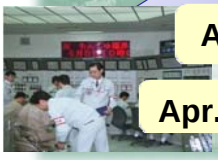
Jul. 2010 Completion of SST-1

May 2010 Restart of SST-1

2005-2007 Plant modification to improve sodium safety

Dec.1995 Sodium leak accident

Aug.1995 First grid



Apr. 1994 Criticality

Achievement of Monju before Restart in 2010

Technology base and experience in Monju

- Design, licensing, construction and initial commissioning of Monju are based on Joyo experience and R&Ds in various areas: such as safety, fuel and material, components, thermo-hydraulics, measurement and control.
- This technology base is materialized as a design of Monju, but needs to be further developed and advanced through the plant operation and maintenance.

Activities after the accident

Safety improvement	➢ Replacement of thermometers ➢ Plant modification to improve safety against sodium leak ➢ Feedback from operating experience ➢ Review and feedback of the safety research results
Seismic safety evaluation	➢ Back-check evaluation with a severer design-based earthquake, based on a revised national design guide ➢ Additional measures to increase safety margin
Management on operation	➢ Improved operation manuals including emergency operation procedures with severe accident management
Management on maintenance	➢ Systematic and comprehensive preventive maintenance program, taking advantage of experience in Japanese LWRs ➢ Good practice and trouble experience from other NPPs ➢ Continued R&Ds on in-service inspection especially for SGs

Achievement of Core Confirmation Test

SST-1 (Core confirmation test) successfully conducted

- Successful operation, after a long blank for more than 14 years, with no major troubles
- Extremely valuable data with a complicated fuel composition

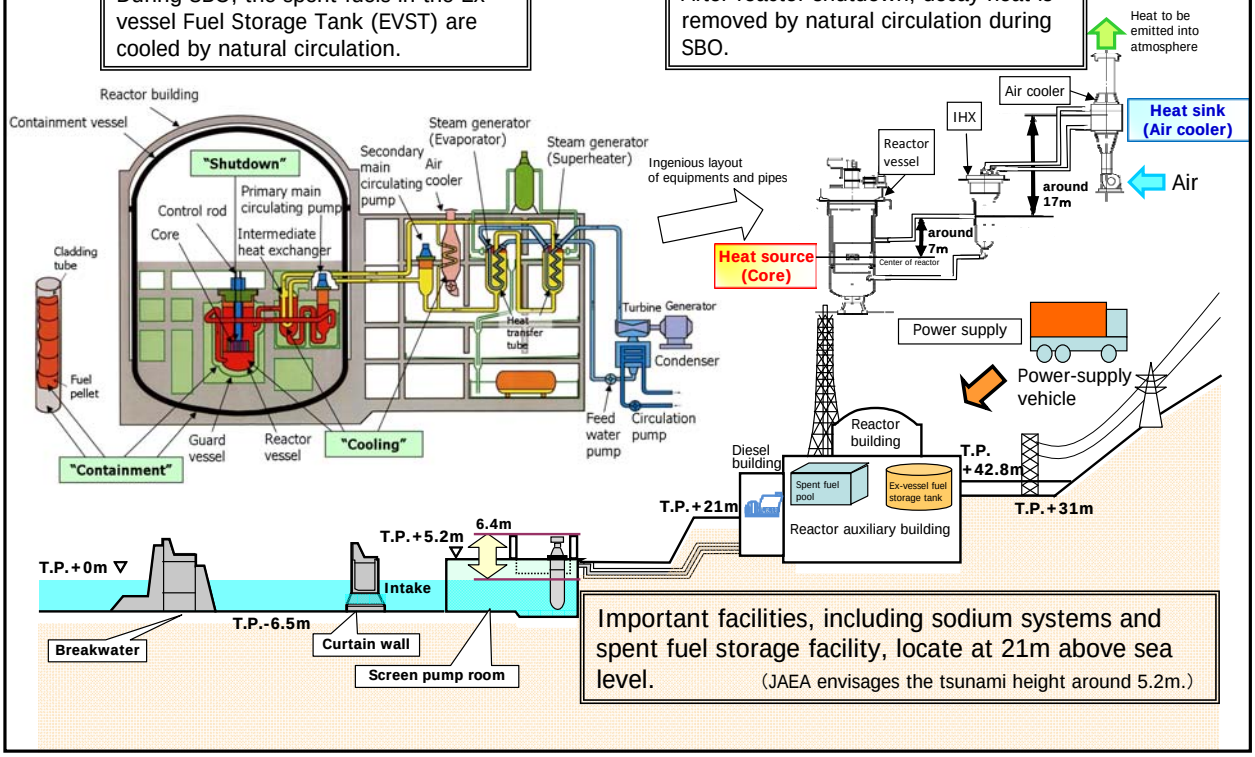
Major achievement

Startup and operation	➢ Safe startup and operation of the reactor and cooling system ➢ Reactor core with 14-year-old fuel and some new fuel
Safe control of reactor	➢ Reactivity worth of all the 19 control rods ➢ Safe control and shutdown of the reactor
Inherent self-stability	➢ Negative reactivity feedback characteristics ➢ Inherent self-stability upon power increase
Accurate prediction of criticality	➢ Complex reactor core composition with three different types of fuel subassemblies including Am-rich 14-year-old fuel
New technologies	➢ Basic physics studies in collaboration with universities ➢ Test with an advanced ultrasonic thermometer
Reactor physics data	➢ Valuable reactor physics data with the fuel containing about 1.5% americium

Features of Monju and Measures for SBO

During SBO, the spent fuels in the Ex-vessel Fuel Storage Tank (EVST) are cooled by natural circulation.

After reactor shutdown, decay heat is removed by natural circulation during SBO.



Important facilities, including sodium systems and spent fuel storage facility, locate at 21m above sea level. (JAEA envisages the tsunami height around 5.2m.)

Roles of Monju as a Prototype Reactor

Strategy to develop an advanced nuclear systems, sodium fast reactors ⇒ **Prudent, step-by-step, safety-first approach for scale-up and technology advancement: from experimental, prototype to demonstration. Conservative design up to prototype.**

Small-scale confirmation of SFR

Safe and reliable power generation in larger scale

Scale-up from technology base and experience in Monju and innovative technol. for improved performance and economy

Experimental Joyo
Power: 140MWth
Coolant temp: 500°C

⇒

Prototype Monju
Power: 280MWe
Coolant temp: 529°C

⇒

Demo SFR
Power: 750MWe
Coolant temp: 550°C

⇓

Commercial SFR
Power: 1500MWe
Coolant temp: 550°C

Rational operation/maintenance

Sodium handling technology

Design method validation

Knowledge preservation/ transfer and training

Base R&D in many areas incl. Na components

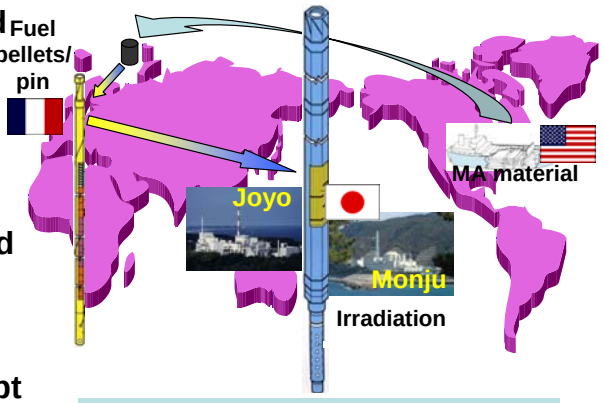
Fuel and material development with long-term irradiation

Innovative technologies for commerc. SFR with safety and economy goals

Difficult to commercialize SFR in Japan, without technology and operation/ maintenance experience in Monju.

Monju as a National and International Asset

- A future of Monju is to be determined based on a direction of the government energy and nuclear policies which will be established in summer 2012.
- The safety of Monju is to be improved taking the lessons learned from Fukushima.
- The fast reactor option should be kept in Japan having almost no energy resources.
- The roles of Monju as a prototype stays important.
- International joint research programs are continuing, especially with France, US, and other GIF partners.



Japan-France-US Joint Study on actinide recycling, with demo. Irradiation in Monju

- Monju is expected to play a role as an international asset to provide research facility and knowledge/technology transfer for future generations.