■ Fast Breeder Reactor

Fast Breeder Reactor (FBR) power stations can generate electricity while producing more fuel than they consume. The production of new fuel is achieved by transforming non-fissile Uranium-238 into fissile Plutonium-239; this greatly improves the efficiency with which precious uranium resources are used. Resource-scarce Japan is therefore promoting the development of fast breeder reactors as the major nuclear power source for the future.

Prototype FBR MONJU

The prototype FBR MONJU, constructed by JNC, is located at Tsuruga City in Fukui Prefecture. Its design is based on the results of extensive research and development carried out at the O-arai Engineering Center and the Experimental Fast Reactor JOYO.

In the same way that experience from the construction and operation of JOYO contributed to the design of MONJU, so MONJU in its turn will provide valuable information for the establishment of commercial FBR technology.

MONJU was first taken critical in April 1994 and generated electricity for the first time in August 1995. Towards the end of the commissioning test, in December 1995, a sodium leak accident occurred. A thorough investigation of the cause of the accident has been carried out, and the safety of all aspects of the MONJU design and operation has been reviewed. In June 2001, JNC submitted an application to the regulatory authority for the license for the plant modification of MONJU to reinforce the countermeasures against the sodium leakage accident. The license was granted in December 2002 after their review. We intend to start the plant modification as soon as we obtain the understanding of the local community.

For detailed information, click the following website of MONJU.

Internal Links

the MONJU website

A comprehensive description of the plant, how it works, and the background of its construction. Including an explanation of the Monju sodium leak accident.

Experimental FBR JOYO

JOYO, Japan's first fast reactor, started operation in 1978. Initially generating 50MW of heat, its power was raised to 75MW in 1979. Following an upgrade, power was increased to 100MW in 1983, and was further raised to 140MW in 2003 in order to upgrade the irradiation test capacity of the reactor.

This reactor serves as a research facility in the development of FBR technology and as a test-bed for FBR fuels and materials. In 1984, plutonium from the reprocessing of spent fuel from JOYO was successfully recycled back into the reactor, thus completing a nuclear fuel cycle.

Experimental results and operational experience from JOYO were invaluable in the development of MONJU and will continue to contribute towards the commercialization of the fast breeder reactor.

For detailed information, click the following website of JOYO.

Internal Links

Experimental FBR JOYO

A full description of JOYO, Japan's first fast breeder reactor, and the important experimental work and continuing development program conducted there.

R&D Facilities

Most of JNC's fast breeder reactor R&D facilities are located at the O-arai Engineering Center (OEC).

There are at present three main fields of FBR R&D:

- Fuel and materials
- High temperature structures and systems
- Safety

The behaviour of mixed oxide fuel is of vital importance to improve the durability of FBR fuel. A major irradiation and analysis program is being carried out using the reactor JOYO and overseas FBR facilities.

In the field of high-temperature structures and systems, research is being conducted on: integrity of existing materials, new materials, heat transfer and flow, and monitoring and measurement techniques.

Finally, safety research is focused on experimental examination of heat transfer and flow in the case of a violent change in sodium temperature and sodium combustion following leakage.

For detailed information, click the following website of OEC.

Internal Links

A pictorial introduction to the R&D work at OEC using the large scale fuel and material test facilities.

The OEC Website
