

8-1 To Establish the Nuclear Fuel Cycle

—Promoting Light Water Reactor (LWR) Nuclear Fuel Cycle Technological Development and Technical Co-Operation with Private Industry—



Tokai Reprocessing Plant (TRP)

We execute research and development of spent nuclear fuel reprocessing, mixed oxide (MOX) fuel fabrication, etc., with various approaches including joint research to promote development of nuclear fuel cycle technology in Japan.

Moreover, we execute technology transfer, technical co-operation, entrusted research, consulting, etc. for the Rokkasho Reprocessing Plant (RRP) in Aomori prefecture operated by private industry, to support private industrialization of nuclear fuel cycle business based on current results of our research and development.

(1) Spent Fuel Reprocessing Technology

JAEA's Tokai Reprocessing Plant (TRP) was changed from a commercial reprocessing plant to a R&D facility, the reprocessing operation under contract with electric power companies being ended. TRP will execute the reprocessing experiments with MOX spent fuel of the Advanced Thermal Reactor (ATR) "FUGEN" and with high burnup uranium dioxide (UO_2) spent fuel of LWRs, and development the glass solidification processing technology of high-level radioactive waste (HLW).

1) Reprocessing Experiments with MOX Spent Fuel of "FUGEN"

TRP has the reprocessed about 20 tons of MOX spent fuel of "FUGEN".

Reprocessing experiments MOX spent fuel of "FUGEN" in TRP starting in FY2006 are planned to gather systematic data concerning the dissolution characteristics and the solvent deterioration, etc. using about 100 tons of spent fuel whose plutonium (Pu) content and burnup are higher than the MOX spent fuel that has been previously reprocessed.

In TRP, it is planned to examine it also through this reprocessing examination to contribute to the upgrade of the LWR reprocessing technologies for low environmental burden, nuclear proliferation resistance, economical operation, etc.

2) Reprocessing Experiments with High Burn-up UO_2 Spent Fuel of LWRs

We are planning reprocessing verification experiments using an LWR's high burn-up spent fuel to strengthen the technical base of the reprocessing technology.

In these reprocessing experiments with high burn-up spent fuel, a glass solidification processing method using HLW generated during reprocessing, properties of undissolved residue, and the corrosion behavior of various materials shall be investigated.

3) Glass Solidification Processing Technology of HLW

We are continuing operation of the Tokai Vitrification Facility (TVF) with an improved type glass melter started up in FY2004, gathering and storing data for stable operating of the new glass melter.



Glass Melter

Moreover, we are carrying out research on high volume reducing glass solidification and technology for glass melter dismantlement. In addition, we are pursuing technological development of a long-lived glass solidification melter which will be a business offered to the public by the Ministry of Economy, Trade and Industry (METI).

(2) Technical Co-operation

Nuclear fuel cycle operation by private industry is reaching an important stage of development in Japan.

Active examination of the reprocessing operation of the cycle is beginning at RRP.

For the uranium enrichment, technologies developed by JAEA will be collected, and to develop a new centrifuge, data, personnel, and research work will be shared.

To advance the LWR MOX fuel fabrication business, the grant of license to build a MOX fuel fabrication facility is being promoted.

These projects are based on technological results in fields that we developed and promoted.

In the future, we will positively promote technical co-operation with private industry based on the results of our R&D so that each business may progress surely, as requested by Japan Nuclear Fuel Co. Ltd. (JNFL).

1) Technical Co-operation with Reprocessing Businesses

Most of the main process technologies of the JNFL's RRP were introduced from France.

However, the technologies that we developed concerning uranium denitrating processing, the uranium-plutonium mixture conversion, and the HLW glass solidification were adopted by JNFL.

We are actively cooperating with private industry, sharing its experience in construction, operating, and maintenance of the TRP etc. by dispatch of its engineers, providing technical know-how, receiving JNFL engineers, joint research with

JNFL, conducting experiments upon request, consulting etc., aiming at actual operation of RRP beginning in FY2007.

2) Technical Co-operation to Enrichment Business

The uranium enrichment technologies that we developed were consolidated in JNFL to develop a uranium enrichment centrifuge with global economic competitiveness.

And, to contribute to the development of this super-efficient new-material centrifuge (new model) that JNFL plans to be the replacement for their uranium enrichment factory, we shall provide technical co-operation through dispatch of its engineers, provision of technical know-how for the latest machines of us experiments performed on request, etc., to JNFL.

3) Technical Co-operation to MOX Fuel Fabrication Business

JNFL decided to enter the MOX fuel fabrication business for LWR in November 2000, and is promoting the grant of a license for the construction of the Rokkasho MOX fuel fabrication plant in Aomori Prefecture.

We have the technical expertise and experience in the design, construction, and operating of the MOX fuel fabrication facility for the ATR and FBR.

To incorporate this technical know-how in the Rokkasho MOX fuel fabrication facility, we are giving technical co-operation through the dispatch of its engineers, reception of JNFL engineers, provision of technical know-how, joint research, experiments performed on request, consulting, etc.

Especially, because the Rokkasho MOX fuel fabrication plant incorporates the technologies from France, we are conducting actual scale confirmatory testing of the mixture conversion powder technology, which uses a 1:1 mixture powder of nitric acid plutonium and nitric acid Uranil, to which heating desalination is done by micro wave (a JAEA-developed method), to confirm adaptability to the Rokkasho MOX fuel fabrication plant funded by JNFL.

