Construction and Operation Experience of Rokkasho Reprocessing Plant

2009 Fuel Cycle Information Exchange(FCIX)

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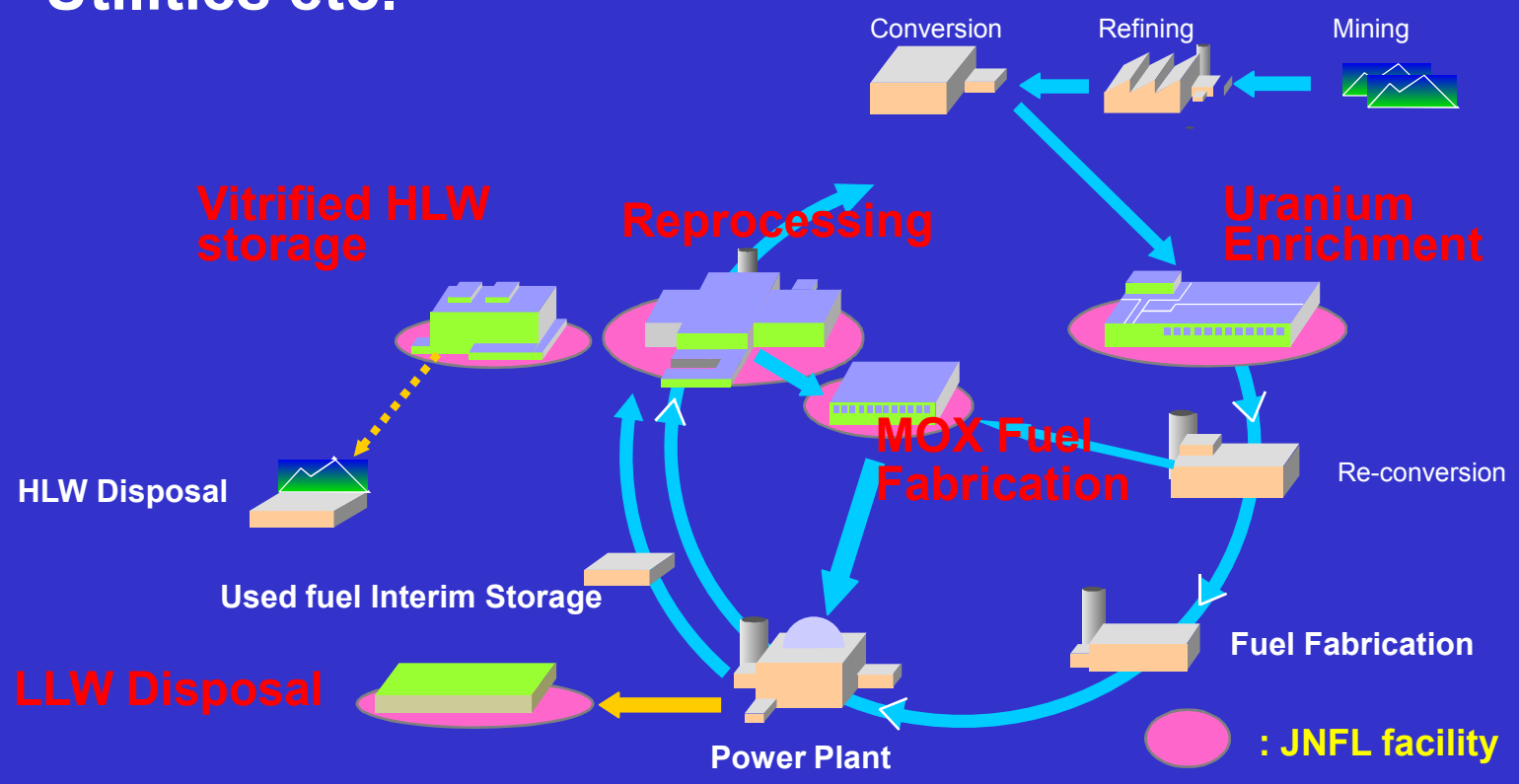
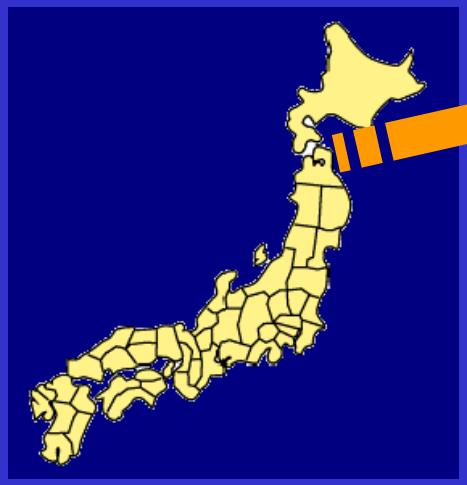
About JNFL

- Established in 1980 to provide fuel cycle services to all of commercial nuclear power plants in Japan.
- 100% private company funded by 10 Japanese Electric Utilities etc.



Facility location

- Located in Rokkasho-village, Aomori prefecture
- Cooperation agreement to locate facilities was signed by Governor of Aomori and chief of Rokkasho-village in1985.



Rokkasho Reprocessing Plant

Construction history

2006 Start of active test

2004 Start of uranium test

2002 Start of chemical test

2001 Start of water test

1993 Start of construction

1992 Licensing approval

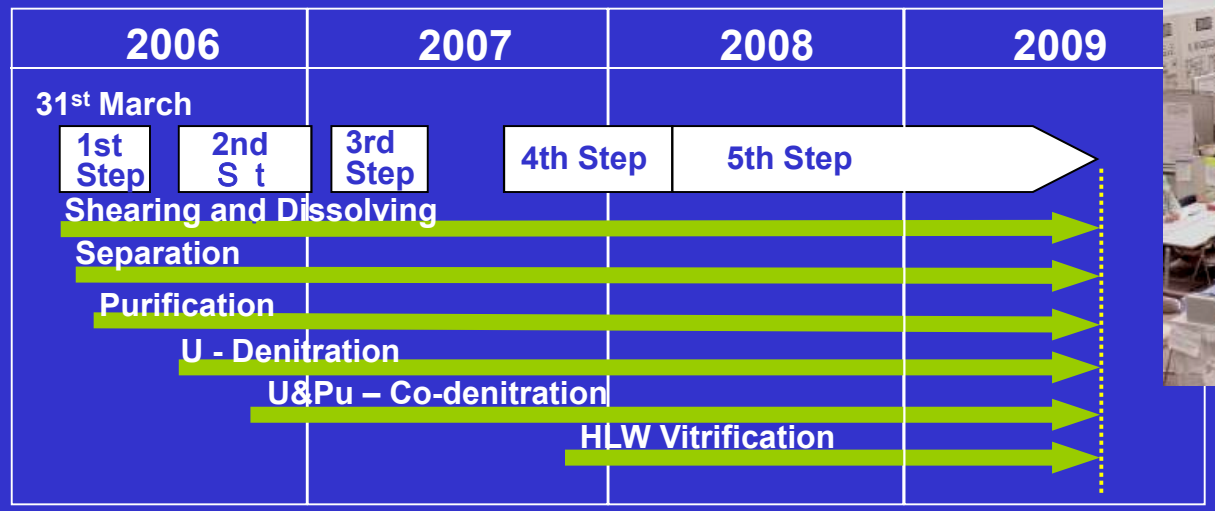
1989 Licensing application

Rokkasho Reprocessing Plant

Progress of active test

- Final test before fully commercial operation (called “active test”) was started in Mar. 2006.
- The objective of active test is to confirm the required performance of systems and equipments, and to demonstrate and evaluate plant safety functions; such as criticality, confinement, radioactive release.
- During active test, 430 tons of used fuel (BWR&PWR) were successfully reprocessed, and tests for the main process were mostly completed.
- Currently concentrating to complete remaining test at HLW vitrification facility.

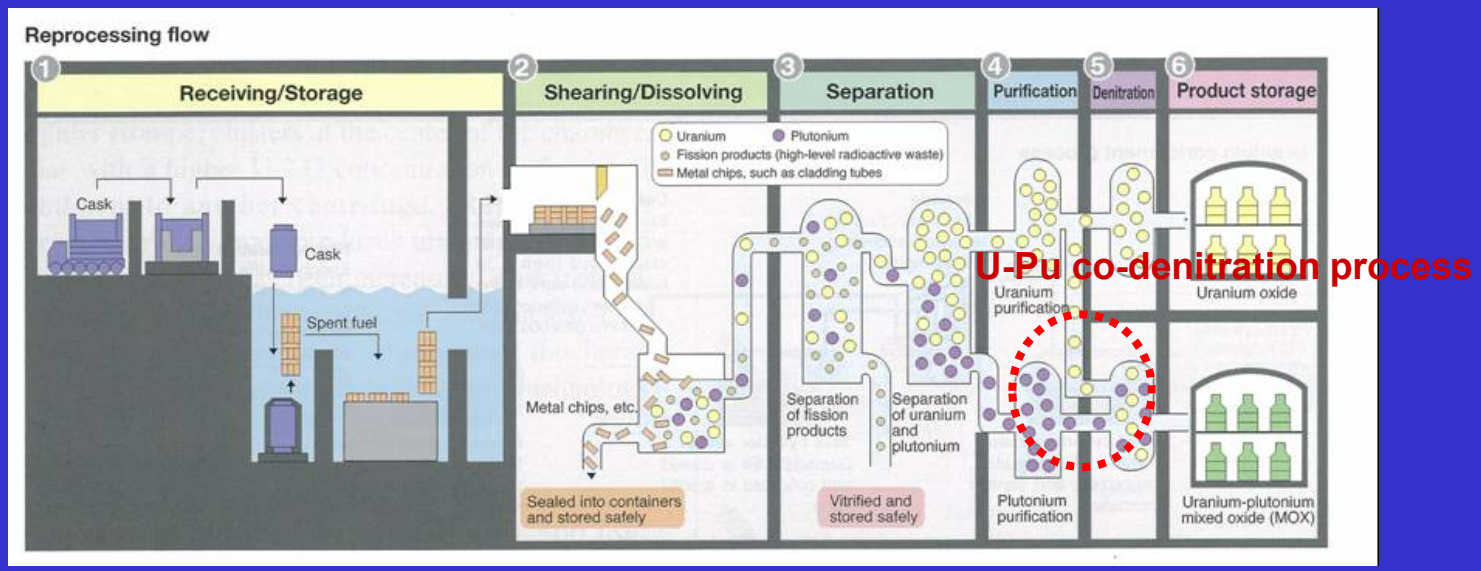
Progress of Active Test



Rokkasho Reprocessing Plant

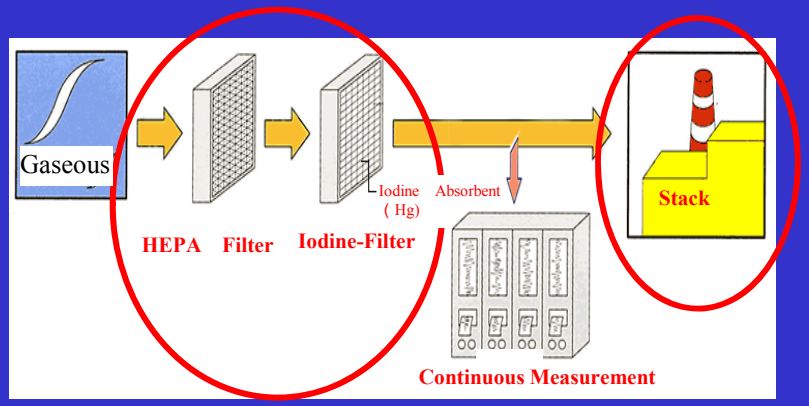
Key design features:

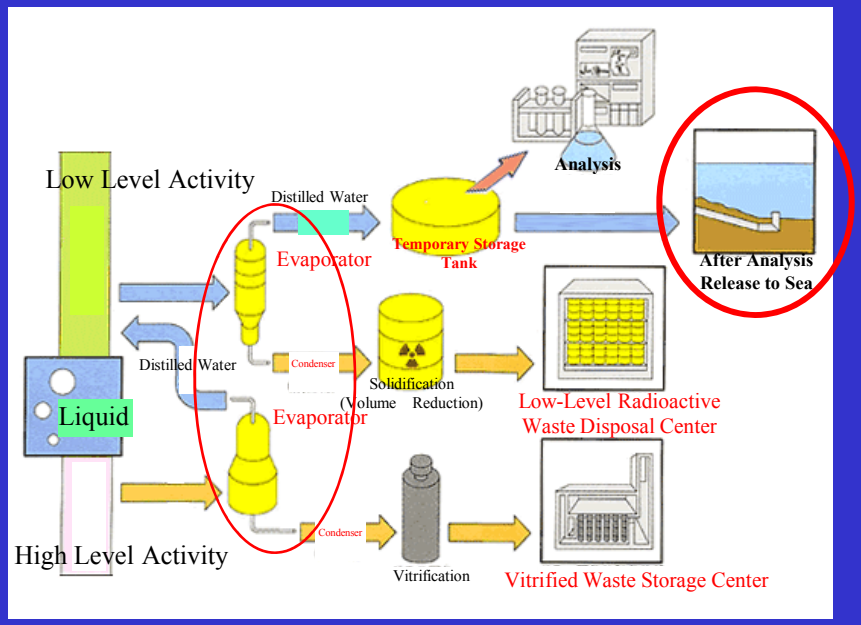
- 800 tons/y plant with 3,000 tons receiving fuel pool
- The capacity was selected in terms of reprocessing demand and reliability/maturity; to make the best use of UP3 plant experiences.
- The plant is to be coupled with J-MOX plant for LWR-recycling.
- "U-Pu co-denitration process" was combined with traditional PUREX process.
  (Final products : U-Pu (50%:50%) mixed oxide(MOX), and U oxide)
- "Full scope safeguards" has been implemented by IAEA and Japanese Authority.



To minimize radioactive release(1):

- The plant is designed to decrease dose to the public as low as reasonably achievable.
  - remove radioactive materials by means of evaporation, scrubbing, filtering, etc.
  - controlled releases through the stack and the sea discharge pipeline that allow to make dispersion and dilution very efficiently.
- The amount of control release not to exceed the annual target values.





Rokkasho Reprocessing Plant

To minimize radioactive release(2):

type / nuclide		activity [Bq/y]			target values [Bq/y]
		Apr. 2006～ Mar. 2007	Apr. 2007～ Mar. 2008	Apr. 2008～ Mar. 2009	
Gaseous effluent	Kr-85	1.7×10^{16}	4.6×10^{16}	1.8×10^{16}	3.3×10^{17}
	H-3	6.0×10^{12}	9.8×10^{12}	3.7×10^{12}	1.9×10^{15}
	C-14	9.1×10^{11}	2.1×10^{12}	1.4×10^{12}	5.2×10^{13}
	I-129	2.2×10^{8}	3.3×10^{8}	2.0×10^{8}	1.1×10^{10}
	I-131	3.2×10^{5}	1.1×10^{7}	5.8×10^{6}	1.7×10^{10}
	Alpha Emitters	ND	ND	ND	3.3×10^{8}
	Other Beta(Gamma) Emitters	ND	ND	2.6×10^{5}	9.4×10^{10}
Liquid effluent	H-3	4.9×10^{14}	1.3×10^{15}	3.6×10^{14}	1.8×10^{16}
	I-129	9.4×10^{7}	2.4×10^{8}	2.1×10^{8}	4.3×10^{10}
	I-131	3.1×10^{6}	4.6×10^{6}	4.9×10^{7}	1.7×10^{11}
	Alpha Emitters	ND	ND	ND	3.8×10^{9}
	Other Beta(Gamma) Emitters	ND	ND	ND	2.1×10^{11}

ND: not detected

To minimize radioactive release(3):

Public impact

(mSv/y)

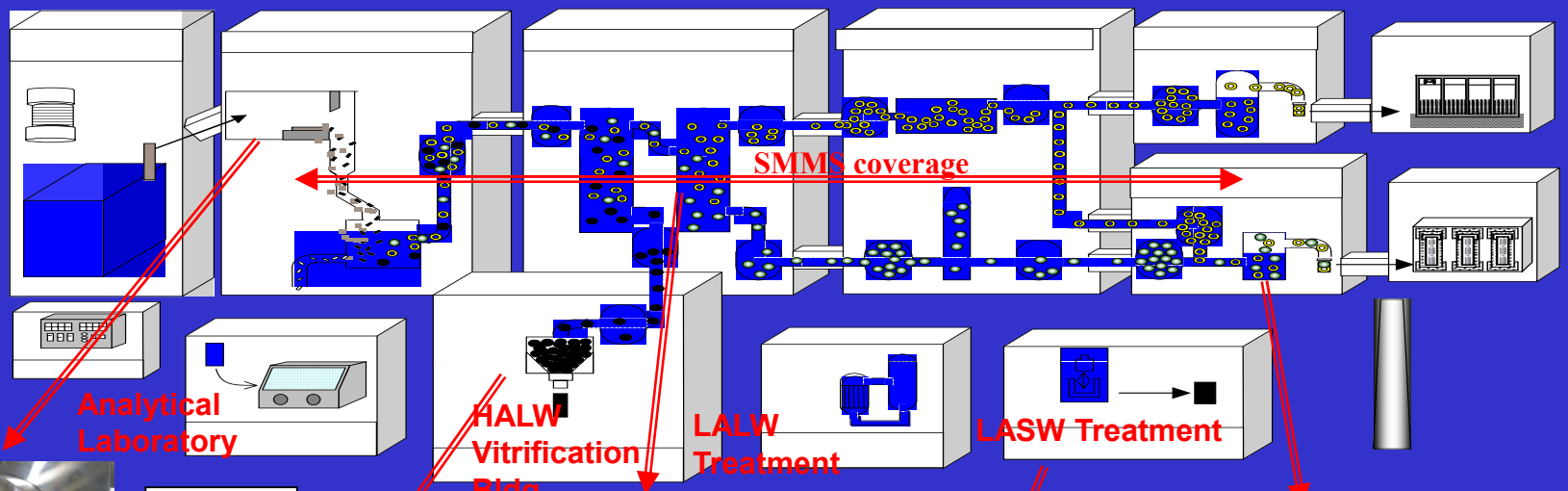
	Public Dose			Public Dose evaluated in safety report
	Apr. 2006 ～Mar. 2007	Apr. 2007 ～Mar. 2008	Apr. 2008 ～Mar. 2009	
Gaseous effluent	4.9×10^{-4}	1.2×10^{-3}	5.3×10^{-4}	1.9×10^{-2}
Liquid effluent	4.6×10^{-5}	1.2×10^{-4}	3.6×10^{-5}	3.1×10^{-3}
Total	5.4×10^{-4}	1.3×10^{-3}	1.3×10^{-3}	2.2×10^{-2}

Dose Limit to the public: 1 mSv/y

Rokkasho Reprocessing Plant

To ensure non-proliferation objective(1):

- Automated monitoring systems are installed throughout the plant process from receiving fuel pool up to MOX powder storage facility.



CRD of IHVS

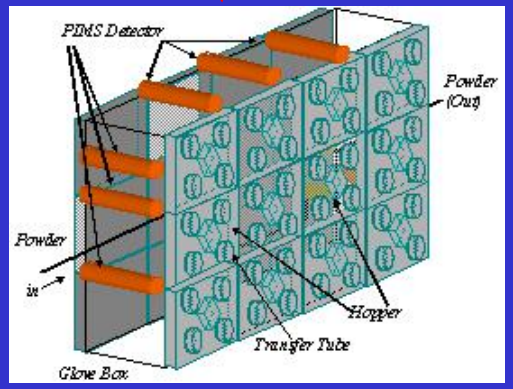
OSL

OSL with ASAS

VCAS

SMMS

WCAS



PIMS on Glove Boxes

To ensure non-proliferation objective(2):

"Full scope safeguards":

- During plant construction, IAEA has confirmed that the plant was constructed the same as design documents reported.
- 24h-inspection : independently collect and evaluate the operational data regarding plutonium.
- Independent analysis using dedicated on-site laboratory.

Plant validation by IAEA

On-site laboratory

Photo : courtesy of Nuclear Material Control Center

Thank you