世界의 核燃料週期施設 現況

지금까지 全世界의 原子炉 基數와 위치에 대해서는 많은 관심을 갖고 있는 반면 核燃料週期施設에 대해서는 무심하였다. 최근 Nuclear Engineering International誌가 옐로케이크(U_3O_8) 형태 이후의 우라늄을 취급하는 施設을 조사하여 '87年 12月號에 게재하였다. 다음은 各國의 核燃料週期 관련 플랜트의 위치, 所有主 및 그 容量 등을 정리한 것이다.

우라늄濃縮플랜트現況

Country/ Site	Owner	Process	Status	Capacity (kswu/y)	Notes
Argentina					
Pilcaniyeu	CNEA	Diffusion	OP	20	Capacity 100kswu/y by 1990
Brazil					
Resende	Nuclebras	Jet nozzle	OP	30	Capacity 200kswu/y in 1990s
Sorocaba	IPEN	Centrifuge	PL	n/a	Start of construction 1988
China					
Lanchou	—	Diffusion	OP	80	Will be expanded to 200kswu/y
France					
Pierrelatte	Comurhex	Diffusion	OP	400	—
Tricastin	Eurodif	Diffusion	OP	10 800	—
FR Germany					
Gronau	Urenco	Centrifuge	OP	250	Capacity 400kswu/y by 1988, 1000kswu/y by 1992
Karlsruhe	Steag	Jet nozzle	OP	50	—
India					
Trombay (BARC)	DAE	Centrifuge	OP	n/a	—
Mysore	DAE	Centrifuge	PL	n/a	—
Japan					
Ningyo-toge	PNC	Centrifuge	OP	50	—
Ningyo-toge	PNC	Centrifuge	OP	100	Capacity 200kswu/y by 1988
Rokkasho-mura	JNFI	Centrifuge	UC	150	Start-up in 1991. Capacity 1500kswu/y by 2000
Western Japan (No site yet)	JNFI	Centrifuge	PL	150	Start-up in 1995. Capacity 1500kswu/y by 2004

Country/ Site	Owner	Process	Status	Capacity (kswu/y)	Notes
Netherlands					
Almelo	Urenco	Centrifuge	OP	1 000	Capacity 1500kswy/y by 1991
Pakistan					
Kahuta	—	Centrifuge	OP	5 est	Will be expanded to about 15kswu/y
South Africa					
Valindaba	UCOR	Helikon	OP	300	—
Soviet Union					
Siberia	—	Diffusion	OP	10 000 est	—
United Kingdom					
Capenhurst	Urenco	Centrifuge	OP	600	Capacity 1000kswu/y by 1990, 1500kswu/y by 1993
United States					
Oak Ridge	DoE	Diffusion	SB	7 700	—
Paducah	DoE	Diffusion	OP	11 300	—
Portsmouth	DoE	Diffusion	OP	8 300	—

核燃料成型加工 플랜트 現況

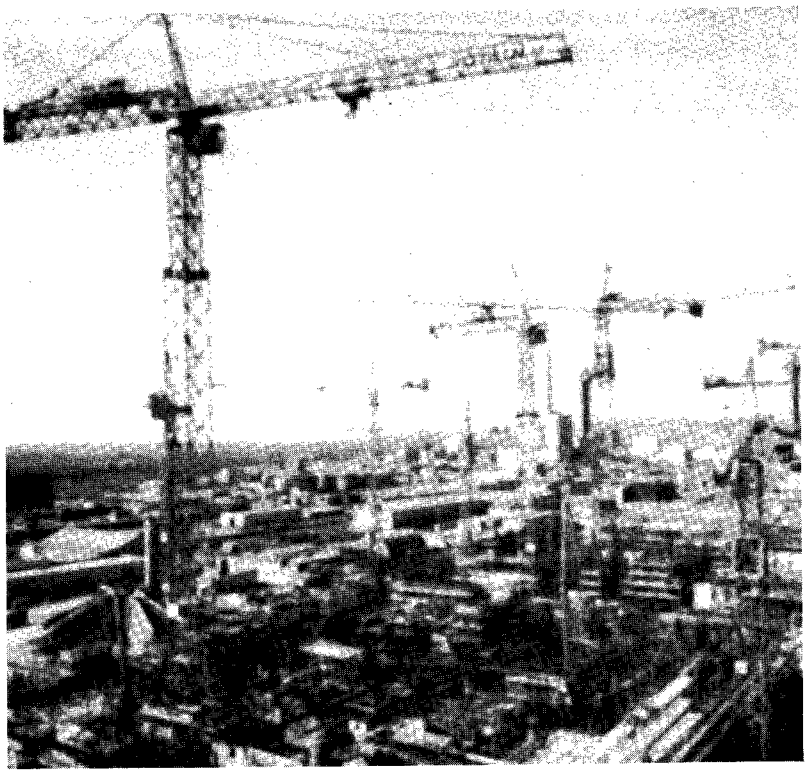
Country/ Site	Owner	Fuel type	Status	Capacity) (tU/y)	Notes
Argentina					
Ezeiza	CNEA	HWR	OP	300	—
Belgium					
Dessel	FBFC	LWR	OP	400	—
Dessel	Belgonucleaire	MOX	OP	45	—
Brazil					
Resende	Nuclebras	LWR	OP	100	Capacity 400tU/y in 1990s
Canada					
Toronto	Canadian GE	HWR	OP	1050	Pellets only
Peterborough	Canadian GE	HWR	OP	1000	Assembly only
Port Hope	Westinghouse	HWR	OP	900	—
China					
Yibin	—	LWR	UC	n/a	Start-up 1987; capacity 150tU/y by 1995
France					
Cadarache	CEA	FBR/MOX	OP	25	—
Pierrelatte	FBFC	LWR	OP	450	—
Romans-sur-Isère	FBFC	LWR	OP	750	—
Annecy	SICN	GCR	OP	500	—
Melox (No site yet)	Cogema	MOX	PL	100	Start-up in 1993

Country/ Site	Owner	Fuel type	Status	Capacity) (tU/y)	Notes
FR Germany					
Hanau	RBU	LWR	OP	750	—
Hanau	Alkem	MOX	OP	25	—
Karlstein	RBU	LWR	OP	400	—
Lingen	ANF	LWR	OP	300	—
India					
Trombay (BARC)	DAE	HWR	OP	n/a	Pilot plant
Hyderabad	DAE	HWR	OP	200	Will expand to meet requirements
Hyderabad	DAE	LWR	OP	25	Uses imported UF_6
Italy					
Bosco-Marengo	FN	LWR	OP	200	—
Rotondella	CN	GCR	OP	200	—
Saluggia	FN	LWR/HWR	OP	60	—
Japan					
Kumatori	NFI	LWR/HWR	OP	465	—
Tokai-mura	PNC	LWR/MOX	OP	450	—
Yokosuka	JNF	LWR	OP	650	—
Pakistan					
Chashma	PAEC	HWR	OP	n/a	—
Korea					
Taejon	KNFC	LWR	UC	200	Start-up in 1989; may expand to 400tU/y
Soviet Union					
Atommash	—	LWR	OP	n/a	—
Spain					
Juzbado	Enusa	LWR	OP	200	—
Sweden					
Vasteras	Asea-Atom	LWR	OP	400	—
Taiwan					
No site yet	—	LWR	PL	n/a	—
United Kingdom					
Sellafield	BNFL	FBR	OP	6	Due to shut-down March 1988
Springfields	BNFL	GCR	OP	1800	1500 Magnox, 300 AGR
Springfields	BNFL	LWR	OP	200	Not yet in full operation
United States					
Columbia	Westinghouse	LWR	OP	1150	—
Lynchburg	B&W	LWR	OP	400	—
Apollo	B&W	LWR	SB	360	Closed at present
Richland	ANF	LWR	OP	700	—
Wilmington	GE	LWR	OP	1000	—
Hematite	C-E	LWR	OP	275	UO_2 powder only
Windsor	C-E	LWR	OP	275	Takes powder from Hematite

우라늄 정련/전환 플랜트 현황

Country/ Site	Owner	Process	Status	Capacity (tU/y)	Notes
Argentina					
Cordoba	CNEA	YC/UO_2	OP	150	Built with RBU of FR Germany
Cordoba	CNEA	YC/UO_2	OP	15 est	Built with indigenous technology
Brazil					
São Paulo	IPEN	YC/UF_6	OP	90	—
Resende	Nuclebras	YC/UF_6	PL	2 000	Construction deferred
Canada					
Blind River	Eldorado	YC/UO_3	OP	18 000	—
Port Hope	Eldorado	UO_3/UF_6	OP	9 000	—
Port Hope	Eldorado	UO_3/UO_2	OP	2 800	—
France					
Malvesi	Comurhex	YC/UF_4+U	OP	13 000	Capacity 14 000tU/y by 1988
Pierrelatte	Comurhex	UF_4/UF_6	OP	12 300	—
India					
Trombay (BARC)	DAE	YC/U	OP	n/a	—
Hyderabad	DAE	YC/UO_2	OP	50	—
Japan					
Ningyo-toge	PNC	YC/UF_6	OP	200	—
South Africa					
Valindaba	UCOR	YC/UF_6	OP	700	—
Korea					
Taejon	KNFC	YC/UO_2	UC	100	Start-up in 1987
Soviet Union					
Siberia	—	YC/UF_6+UO_2	OP	n/a	—
United Kingdom					
Springfields	BNFL	YC/UF_6	OP	9 000	—
Springfields	BNFL	YC/UO_2+U	OP	2 200	1500tU/y as U, 700tU/y as UO_2
United States					
Gore	Sequoyah	YC/UF_6	OP	9 090	—
Metropolis	Allied	YC/UF_6	OP	12 700	—

Abbreviations:
CNEA – Comision Nacional de Energia Atomica (Argentina)
IPEN – Instituto de Pesquisas Energèticas y Nucleares (Brazil)
DAE – Department of Atomic Energy (India)
PNC – Power Reactor and Nuclear Fuel Development Corporation (Japan)
UCOR – Uranium Enrichment Corporation (South Africa)
KNFC – Korea Nuclear Fuel Company
BNFL – British Nuclear Fuels plc
NFI – Nuclear Fuel Industries (Japan)
JNF – Japan Nuclear Fuel Co
PAEC – Pakistan Atomic Energy Commission
B&W – Babcock & Wilcox (US & Canada)
ANF – Advanced Nuclear Fuels (US & FR Germany)



英國 Sellafield에
건설중인 THORP플랜트

GE – General Electric (US)
C-E – Combustion-Engineering (US & Canada)
FBFC – Franco-Belge de Fabrication de Combustible
CEA – Commissariat à l'Energie Atomique (France)
SICN – Société Industrielle de Combustible Nucléaire (France)
FN – Fabbricazioni Nucleari SpA (Italy)
DoE – Department of Energy (US)
JNFS – Japan Nuclear Fuel Service Co
UKAEA – UK Atomic Energy Authority
JNFI – Japan Nuclear Fuel Industries Co
CN – Combustibili Nucleari (Italy)

OP – Operating
UC – Under construction
PL – Planned
SB – Standby
n/a – not available
est – estimate

Main sources: International Atomic Energy Agency; US Department of Energy; British Nuclear Fuels plc; OECD Nuclear Energy Agency; The Uranium Institute.

各國別 우라늄生産量

Country	Yellowcake (U_3O_8) production (tU/y)
Argentina	185*
Australia	4160
Brazil	115*
Canada	11 730
China	1000 est
Czechoslovakia	9-10 000 est
France	3200
Gabon	885
FR Germany	40
India	170 est
Japan	9
Namibia	3500
Niger	3130
Portugal	110
South Africa	4620
Soviet Union	5-6000 est
Spain	215
United States	5500

(註) *표는 1985년도 수치, 나머지는 1986년도 수치임.

핵연료 성형가공공장인 아르헨티나의 Ezeiza플랜트

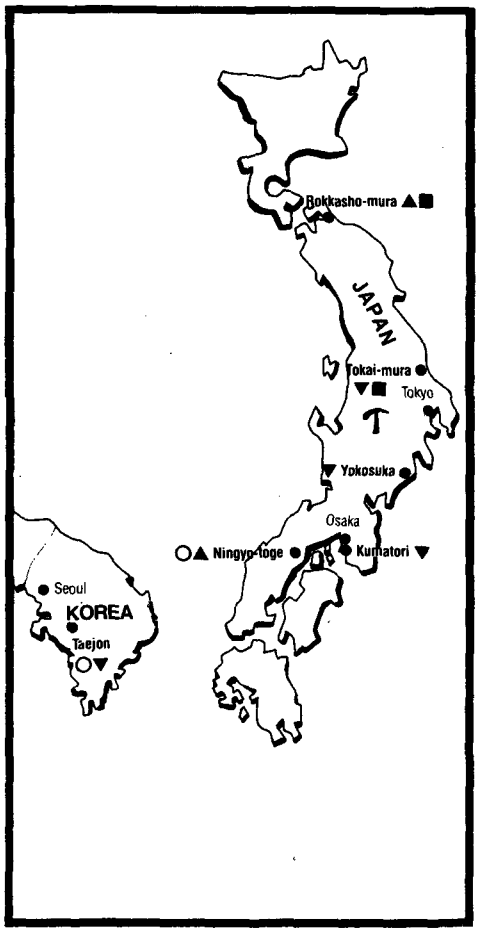
核燃料再處理 플랜트 現況

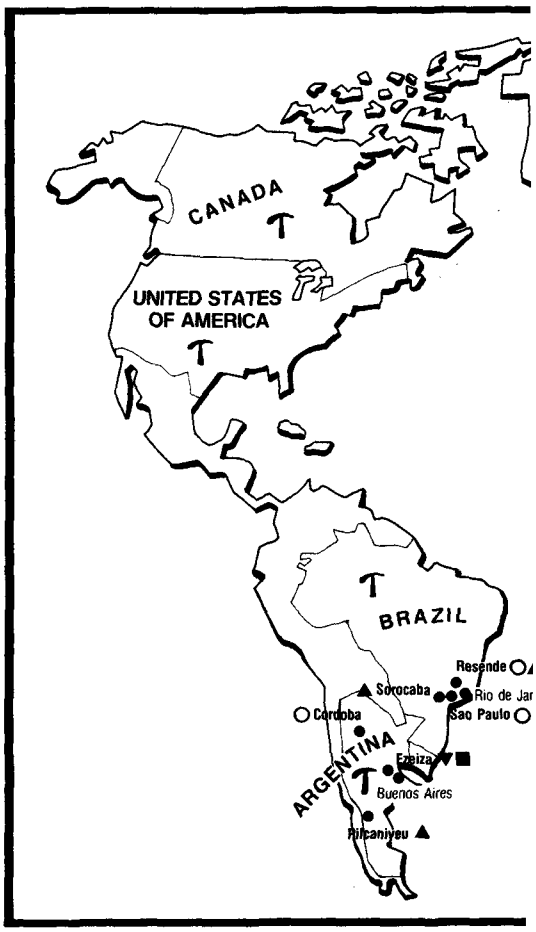
Country/ Site	Owner	Fuel type	Status	Capacity (tU/y)	Notes
Argentina					
Ezeiza	CNEA	Oxide	UC	5	Start-up in 1989
Belgium					
Mol	Eurochemic	Oxide	SB	100	Re-start has been considered
Brazil					
Resende	Nuclebras	Oxide	PL	2	
São Paulo	IPEN	Oxide	UC	n/a	Pilot plant
France					
La Hague UP2	Cogema	LWR/MOX	OP	400	Expanded to 800tU/y by 1991
La Hague UP3	Cogema	LWR	UC	800	Start-up in 1989
Marcoule	Cogema	U metal	OP	600	Now for GCR fuel only
FR Germany					
Karlsruhe	KFK	Oxide	OP	40	
Wackersdorf	DWK	Oxide	UC	350	Start-up in 1993
India					
Kalpakkam	DAE	Oxide	OP	125	Additional capacity under construction
Tarapur	DAE	Oxide	OP	100	—
Trombay (BARC)	DAE	Oxide	OP	30	—
Japan					
Tokai-mura	PNC	Oxide	OP	210	—
Rokkasho-mura	JNFS	Oxide	UC	800	Start-up in 1995
United Kingdom					
Dounreay	UKAEA	FBR	OP	8	—
Sellafield	BNFL	U metal	OP	1500	—
Sellafield Thorp	BNFL	Oxide	UC	1200	Start-up in 1992
United States					
Idaho Falls	DoE	Oxide	OP	n/a	—
Hanford	Rockwell	Oxide	OP	2400	—
Savannah River	DoE	Oxide	OP	2700	—

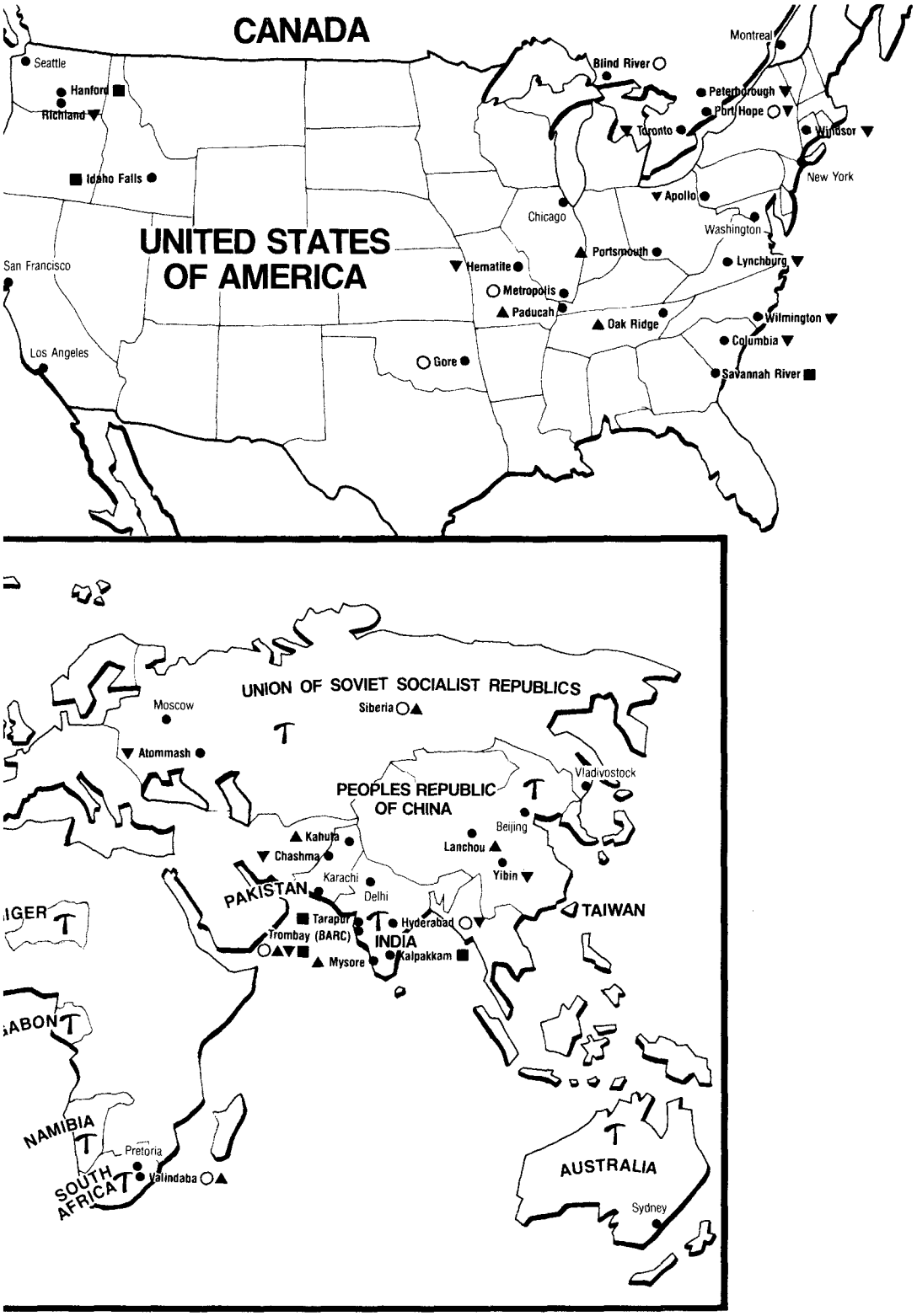
世界의 核燃料週期施設

Key to symbols

- ○ Uranium refining conversion plant
- ▲ Enrichment plant
- ▼ Fuel fabrication plant
- ■ Spent fuel reprocessing plant
- ⊤ Uranium producing country






CANADA
Seattle
Hanford
Richland
Idaho Falls
San Francisco
Los Angeles
UNITED STATES OF AMERICA
Chicago
Blind River
Montreal
Peterborough
Port Hope
Toronto
Windsor
New York
Apollo
Washington
Portsmouth
Lynchburg
Hematite
Metropolis
Paducah
Oak Ridge
Wilmington
Columbia
Savannah River
Gore
UNION OF SOVIET SOCIALIST REPUBLICS
Moscow
Siberia
Atommash
Vladivostock
PEOPLES REPUBLIC OF CHINA
Beijing
Lanchou
Kahuta
Chashma
Yibin
Karachi
Delhi
PAKISTAN
TAIWAN
Tarapur
Trombay (BARC)
Hyderabad
INDIA
Mysore
Kalpakkam
NAMIBIA
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