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INTERNATIONAL NUCLEAR
FUEL CYCLE FACT BOOK

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Pacific Northwest Laboratory
Richland, Washington 99352

MASTER

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PREFACE

As the U.S. Department of Energy (DOE) and DOE contractors have become increasingly involved with other nations in nuclear fuel cycle and waste management cooperative activities, a need has developed for a ready source of information concerning foreign fuel cycle programs, facilities, and personnel. This Fact Book was compiled to meet that need.

The information contained in the International Nuclear Fuel Cycle Fact Book has been obtained from many unclassified sources: nuclear trade journals and newsletters; reports of foreign visits and visitors; CEC, IAEA, and OECD/NEA activities reports; proceedings of conferences and workshops, etc. The data listed do not reflect any one single source but frequently represent a consolidation/combination of information.

The organizations and agencies listed in this publication often have a much wider range of activities and many more facilities or staff than described here. Lack of space, as well as the intent and purpose of the Fact Book, limit the information given to that pertaining to the nuclear fuel cycle and to data considered of primary interest or most helpful to the majority of users.

Every effort was made so that all the information is as accurate and current as possible, incorporating updates as they became available until actual time of printing; however, the nature of the content makes it subject to frequent changes. If you have suggestions which would improve the usefulness of the book or if you can provide more current information, please let us know so that these changes can be included in periodic updates.

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Richland, WA 99352

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INTRODUCTION

INTRODUCTION

The International Nuclear Fuel Cycle Fact Book has been compiled in an effort to provide current data concerning fuel cycle and waste management facilities, R&D programs and key personnel.

The Fact Book is organized as follows:

- **National summaries**--a section for each country which summarizes nuclear policy, describes organizational relationships and provides addresses, names of key personnel, and facilities information.
- **International agencies**--a section for each of the international agencies which has significant fuel cycle involvement, and a listing of nuclear societies.

The national summaries, in addition to the data described above, feature a small map for each country as well as some general information. The latter is presented from the perspective of the Fact Book user in the United States. Please note the following:

DIRECT DIALING

For convenience in direct dialing from the United States to foreign countries, complete telephone numbers are listed, including country and city codes. Outside the United States, depending on the origin and destination of the call some of these codes may not be necessary. Instead, "0" may need to precede the local number. Since it is impossible to cover the various situations for calls originating outside the United States, accurate information concerning direct dial is best obtained from local sources (telephone company or hotel operator).

HOLIDAYS

The major holidays have been listed as they generally apply to the **entire** country, though no doubt some regional holiday may very well also be considered major in a particular area.

MAPS

Most of the major facility locations are shown on each country's map within a circle for easier identification. Where space permitted, the name of the organization or facility has been added. The major cities are also circled and some of the smaller towns are listed to assist as a reference when consulting a large-scale map.

PASSPORTS/VISA

Requirements listed are those applicable to United States citizens.

SOURCES

Electric Power Plant Capacity and Electric Power Production figures in Austria, Belgium, Canada, Finland, France, Federal Republic of Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom and United States are obtained from Energy Balances of OECD Countries 1986/1987 and Electricity, Nuclear Power and Fuel Cycle in OECD Countries, OECD/Nuclear Energy Agency, Paris, France, 1989.

Nuclear Power Plant Capacity figures are obtained from NUKEM Market Report on the Nuclear Fuel Cycle, 12/89, NUKEM GmbH, Hanau, Federal Republic of Germany.

Reactor Mix figures are obtained from "World List of Nuclear Power Plants," Nuclear News, 8/89.

TIME

The hours listed are the standard time difference between the country and Washington, DC. A specific reference is identified if more than one time zone exists in a given country. It should be noted that the variation in daylight saving time periods may influence the stated time differences.

VISITS TO U.S. DOE FACILITIES

Foreign visitors to U.S. DOE facilities must complete and submit a form IA-473 (OMB 1910-2100) "Request for Foreign National Unclassified Visit or Assignment" to **DOE Office of International Affairs**, Washington, DC 20585, at least 30 days before the proposed visit. The itinerary should be based on prior arrangement with appropriate DOE or DOE contractor staff concerning a suitable time for the visit.

In addition, for visits requested under a bilateral waste management agreement, notification of the visit should be made by the Principal Coordinator of the visitor's country to the U.S. Principal Coordinator for that agreement. The U.S. Principal Coordinator will assist, if necessary, in making the arrangements for the visit.

NATIONAL SUMMARIES

ARGENTINA



ARGENTINA

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	June 18	Flag Day
Jan. 6	Epiphany	July 9	Independence Day
Feb. 3-7	Carnival	Aug. 1	Assumption
Apr. 12	Holy Thursday	Aug. 20	General San Martin
Apr. 13	Good Friday	Oct. 15	Columbus Day
May 1	Labor Day	Nov. 1	All Saints
May 25	Revolution Anniv.	Nov. 6	Bank Holiday
May 28	Corpus Christi	Dec. 8	Immac. Conception
June 10	Sovereignty	Dec. 25	Christmas

TIME

Standard Time Washington D.C.: + 2 hours
Standard Time Period: 03/04 - 10/13/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; a visa is currently not required for a visit to Argentina. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1850.00 Austral
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Argentina are complete as listed, after dialing international access code: 011. Country code is 54; listed local numbers include city code.

U.S. EMBASSY - BUENOS AIRES

American Embassy
4300 Colombia
1425 Buenos Aires
Argentina

Tel: 54-1-774-7611
Fax: 54-1-774-7110
Tlx: 18156 AMEMBAR

Science Counselor

Dr. Robert G. Morris

ARGENTINA

ENERGY

Population	1988	31.9 million
Electric Power Plant Capacity	1988	12.7 GWe
Electric Power Production	1987	42.8 TWh 44% hydro/geoth. 41% oil/coal 15% nuclear

NUCLEAR POWER

Policy: High priority on CANDU-based nuclear power industry with indigenous fuel cycle; government ownership and operation of all nuclear power plants; develop nuclear plant and services export capability.

Nucl. Power Plant Capacity	1989	0.9 GWe
	1995	1.6 GWe
	2000	1.6 GWe
Reactor Mix	1989	IIWR: 2 (1974/83) 1 (1994)

INDUSTRIAL FUEL CYCLE

Policy: Develop all phases of the CANDU-type PIIWR fuel cycle, gaseous diffusion capability for U enrichment (Pilcaniyeu), and D₂O production; may export Pu to breeder nations. Interim AR and AFR storage of spent fuel.

Waste Management Strategy: Reprocess spent fuel; vitrify HLW in pot process; dispose of HLW glass canisters in granite host-rock repository. Reduce volumes of LLW/ILW for disposal in shallow ground.

Cumulative Spent Fuel Arisings (HWR)	1987	1,070 tU
	1990	1,900 tU
	2000	5,800 tU

ARGENTINA

Demonstration/Production Activities

- D₂O production: delayed--250 t/a D₂O enrichment plant, supplied by a Swiss firm; developing domestic technology.
- Uranium mining and milling (t/a): 1987--150; 1985--680. Uranium enrichment (kg/a): 500 ($\leq 20\%$ enr.U).
- Conversion of yellowcake to UO₂: 300 t/a; UO₂ fuel fabrication.

Major Milestone

- HLW geologic repository 2010
(Patagonia, area of Gastre, Chubut province was previous target site; ruled out in 1989)

INTERNATIONAL RELATIONSHIPS

Member of IAEA. Has not signed non-proliferation treaty (NPT).

ORGANIZATION

- CNEA (Comision Nacional de Energia Atomica)-- National Atomic Energy Commission, owns and operates all facilities.

CNEA (National Atomic Energy Commission)

Comision Nacional de
Energia Atomica (CNEA)
Avenida del Libertador 8250
1429 Buenos Aires
Argentina

Tel: 54-1-70-7711
Fax:
Tlx: 21388 PREAT AR

President
Radioactive Waste Mgt.
(Ezeiza Atomic Center)

Manuel A. Mondino
Dr. Jaime Pahissa Campá

ARGENTINA

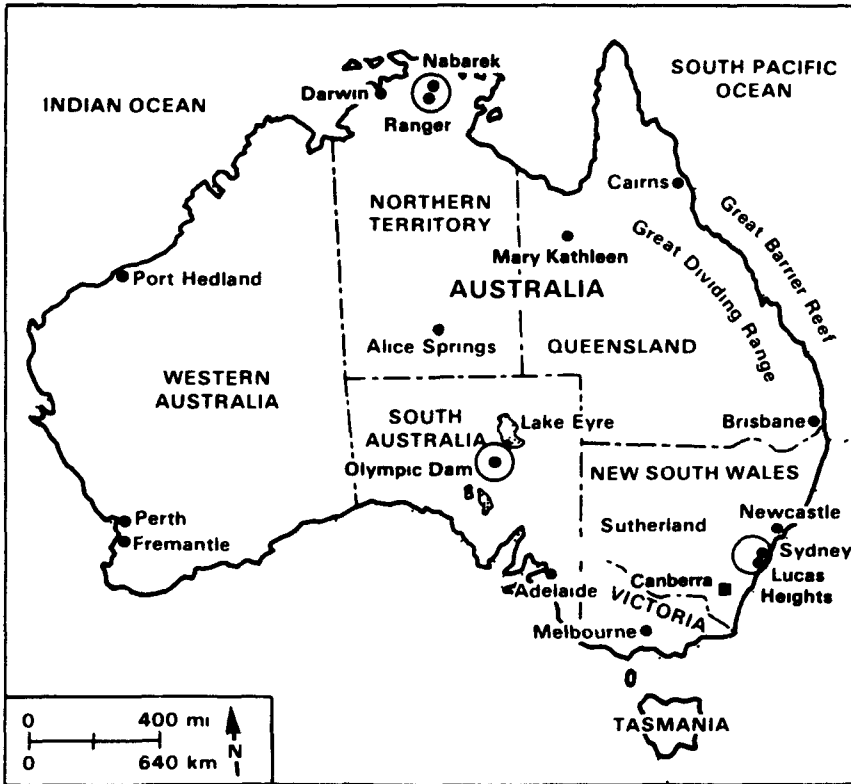
EZEIZA ATOMIC CENTRE

Location: 40 miles northwest of Buenos Aires, near airport.

Facilities

- Fuel fabrication: the first of three planned fabrication lines started up in 1982; second line 1985; produces 240 elements/yr for Atucha I and 5,360 elements/yr for Embalse; third line to produce Atucha II fuel elements.
- Fuel reprocessing: Ezeiza pilot plant, planned capacity of 20 kgU/d feed, 10-15 kgPu/a product; non-radioactive runs--1990; hot startup--1994. Potential expansion of pilot plant to commercial facility or new plant with 160 kg/d (40 MTU/yr) capacity (late 1990s). Reprocessing plant construction has been put on indefinite hold.

AUSTRALIA



AUSTRALIA

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Apr. 25	ANZAC Day
Jan. 26	Australia Day	June 11	Queen's Birthday
Apr. 13	Good Friday	Dec. 25-26	Christmas
Apr. 15-16	Easter		

TIME

Standard Time Washington D.C.: (New S. Wales) + 15 hours
Standard Time Period: 03/04 - 10/27/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to Australia. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1.27 Australian Dollar
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Australia are complete as listed, after dialing international access code: 011. Country code is 61; listed local numbers include city code.

U.S. EMBASSY - CANBERRA

American Embassy
Moonah Place, Yarralumla
Canberra

Australian Capital
Territory (A.C.T.) 2600

Tel: 61-62-70-50-00

Fax: 61-62-70-59-70

Scientific Attaché

Donald R. Cleveland

AUSTRALIA

ENERGY

Population	1988	16.5 million
Electric Power Plant Capacity	1988	34.8 GWe
Electric Power Production	1988	110.8 TWh 80% coal 11% hydro/geoth. 9% gas 1% oil

NUCLEAR POWER

Policy: No nuclear power installed; none planned. Large uranium reserves; uranium currently produced for export. Government sponsors nuclear R&D.

INTERNATIONAL RELATIONSHIPS

Member of IAEA and OECD/NEA.

Cooperative agreements for radioactive waste management R&D (including development of the SYNROC process) with Japan, Italy and the UK.

Bilateral safeguards agreements (controlled use of Australian-derived uranium) with Japan, Republic of Korea, Philippines, United States, Canada, United Kingdom, France, Switzerland, Sweden, Finland, and Euratom (EC).

Joint Alligator Rivers analogue project with Japan, Sweden, the UK, and the U.S.

ORGANIZATION

- Department of Primary Industries and Energy
- Department of Industry, Technology and Commerce
- ANSTO--Australian Nuclear Science and Technology Organization and Lucas Heights Research Laboratory

AUSTRALIA

ANSTO - LUCAS HEIGHTS

Australian Nuclear Science
and Technology Organization
New Illawarra Rd, Lucas Heights
Private Mail Bag 1
Menai N.S.W. 2234
Australia

Tel: 61-2-543-31-11
Fax: 61-2-543-50-97
Tlx: AA 24562

Executive Director
Chairman
Deputy Chairman
General Manager, Scientific
Advanced Materials
Materials Technology
Advanced Ceramics and
SYNROC
Operations
Environmental Science
Nuclear Technology
Nuclear Services

Dr. D. Cook
Prof. R. E. Collins
Russell Fynmore
D. Davy
Dr. A. Jostsons
Dr. K. U. Snowden

Dr. Keith D. Reeve
A. Ridal
Dr. J. Evans
D. McCulloch
Justin M. Silver

Function: Fuel cycle R&D--HLW immobilization (SYNROC process development and waste form properties), mill tailings treatment, actinide transport, surface hydrology, and radionuclide release.

Facilities:

- **Non-radioactive SYNROC Demonstration Plant**
Mission: Engineering-scale tests of SYNROC process to provide data for a conceptual radioactive SYNROC plant design by mid-1991.
Design Basis: 10 kg/h SYNROC (40 cm); all operations compatible with remote handling; highly instrumented and partly automated.
History: Startup, 5/88 (integrated operation of all steps; three days of operation per month since).
- **SYNROC Glove Box Line**
Mission: Produce SYNROC containing actinides/⁹⁹Tc.
Process Scale: Hundreds of grams.
History: Startup, 1984.

ANSTO - LUCAS HEIGHTS (contd)

- **Hot-Cell Processing Line for SYNROC**
Mission: Produce SYNROC containing beta/gamma-active fission products.
Process Scale: Hundreds of grams.
History: Startup, 1984.
- **Semi-Dry Mixer/Rotary Calciner**
Mission: Detailed process improvements on mixing/calcining nitrate/powder.
Design Basis: 5 kg/h with in-mixer drying to reduce the size of the rotary calciner.
History: Startup, 1988.
- **Alkoxide Powder Preparation Facility**
Mission: Provide fine powders for mixing with nuclear waste slurry.
Design Basis: 100 kg/d.
History: Startup, 1987; upgraded, 1989.
- **Advanced Ceramics Fabrication Laboratory** - with full analytical and materials characterization capability.
- **Engineering Plant Design Team** - with 3-D finite element stress analysis, Apollo computers and CAD/CAM.

ANU

Australian National University
P.O. Box 4
Canberra 2600, Australia

Director, Research School
of Earth Sciences

Prof. A. E. Ringwood

Waste Management R&D: HLW immobilization (SYNROC process).

AUSTRALIA

GRIFFITH UNIVERSITY

Griffith University
Nathan, Queensland 4111
Australia

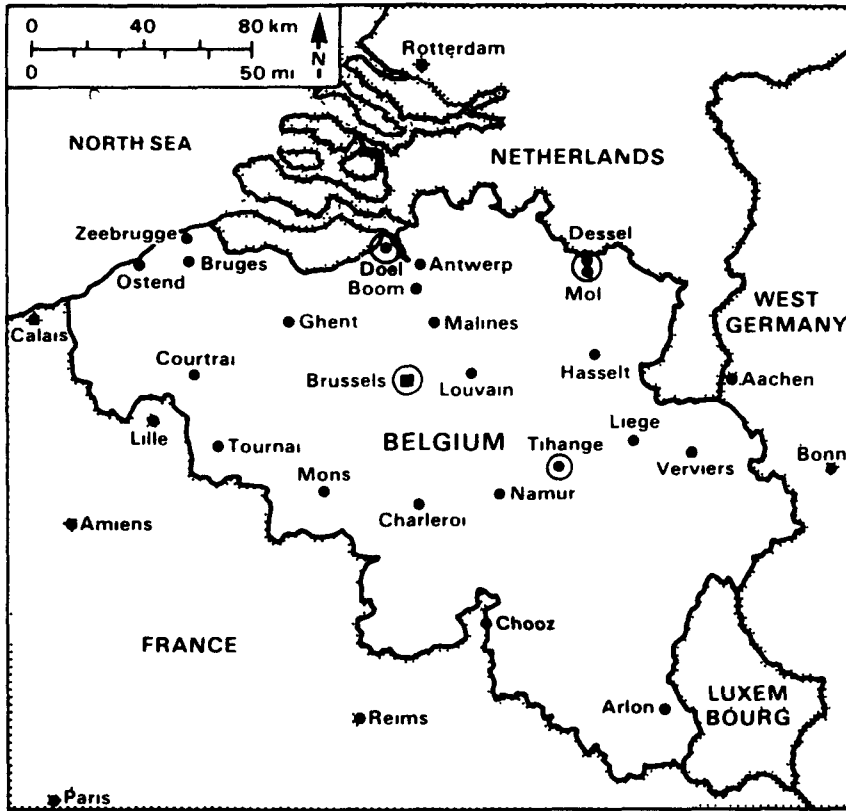
Tel: 61-7-275-7111
Fax:
Tlx: AA 40362

Chancellor

Sir Theodore Bray

Waste Management R&D: Characterization of SYNROC waste forms.

BELGIUM



BELGIUM

MAJOR PUBLIC HOLIDAYS (1990)

Jan.	New Year	July 21	National Day
Apr. 15-16	Easter	Aug. 15	Assumption
May 1-2	Labor Day	Nov. 1	All Saints
May 24	Ascension	Nov. 15	Dynasty Day
June 3-4	Pentecost	Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Belgium; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 35.40 Franc
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Belgium are complete as listed, after dialing international access code: 011. Country code is 32; listed local numbers include city code.

U.S. EMBASSY - BRUSSELS

American Embassy
27 Boulevard du Regent
1000 Brussels
Belgium

Tel: 32-2-513-3830
Fax: 32-2-511-2725

Science Counselor

Patricia Haigh

BELGIUM

ENERGY

Population	1988	9.9 million
Electric Power Plant Capacity	1987	14.0 GWe 39% nuclear
	1988	14.0 GWe 39% nuclear
	1990	14.0 GWe 39% nuclear
	1995	14.1 GWe 39% nuclear
Electric Power Production	1987	58.6 TWh 66% nuclear 25% coal 3% oil 3% gas 2% hydro/geoth.
	1988	66% nuclear
	1990	62% nuclear
	1995	58% nuclear

NUCLEAR POWER

Policy: Produce base load electricity by nuclear and coal power plants. Decision against addition of proposed eighth (1300 MWe) nuclear unit (at least during next few years).

Nuclear Power Plant Capacity	1989	5.5 GWe
	1995	5.5 GWe
	2000	6.8 GWe
Reactor Mix	1988	PWR: 7 (1975-85)

INDUSTRIAL FUEL CYCLE

Policy: Well-rounded capability--uranium enrichment (share in Eurodif); MOX and UO₂ fuel fabrication; purchase of foreign reprocessing services; decision made to dismantle former Eurochemic plant.

BELGIUM

Waste Management Strategy (responsibility of ONDRAF): Vitrify HLW and store 50 years (investigation of HLW, ILW and LLW disposal in clay formation underway); treat and immobilize other wastes; sea-dumping of LLW halted; shallow-ground disposal of LLW under investigation.

Cumulative Spent Fuel	1980	196 tU
Arising (LWR)	1985	560 tU
	1990	1,290 tU
	2000	3,000 tU

Major Milestone

- Acceptance of waste from reprocessing in France 1993

INTERNATIONAL RELATIONSHIPS

DOE/SCK Umbrella Agreement for Waste Management Exchange

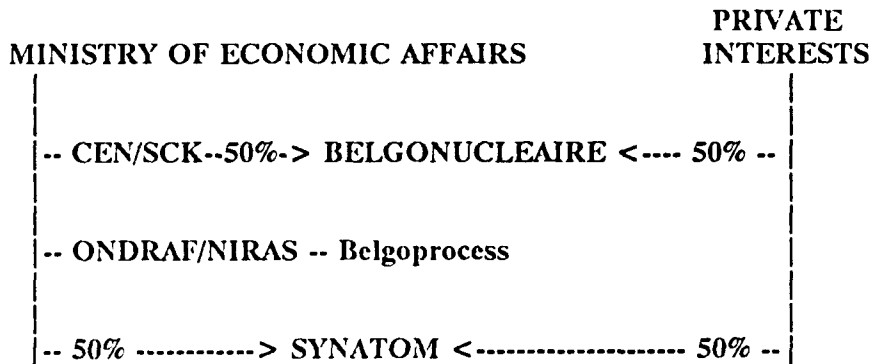
Term: 1-19-81 to 1-19-94.

Scope: Terminal storage in geologic formations; technology of retrievable storage; waste processing technology; environmental effects.

Emphasis: General information exchange.

Member of EC, IAEA, OECD/NEA. Partnership in Eurodif uranium enrichment plant (France) and in SNR-300 LMFBR demonstration project (FRG). Belgian underground research laboratory at Mol is co-sponsored by CEC.

ORGANIZATION



BELGIUM

BELGONUCLEAIRE

Belgonucleaire S.A.
Rue du Champ de Mars 25
1050 Brussels, Belgium

Tel: 32-2-513-9700
Fax: 32-2-511-0359

General Director

J. Van Dievoet
32-2-513-9690

Function: Provide engineering services for nuclear power plants, nuclear fuel cycle facilities, and waste treatment plants; fabricate MOX fuels.

Sponsor: CEN/SCK (50%), utilities/holding companies (50%).

Facility:

- **MOX Plant** (at Dessel, near Mol)
Mission: Produce MOX fuels for FBRs and LWRs.
Design Capacity: 30 t/a LWR or 10 t/a FBR fuel.
History: Startup, 1973.

BELGOPROCESS

Belgoprocess
Gravenstraat
2480 Dessel, Belgium

Tel: 32-14-24-41-11
Fax: 32-14-31-30-12

[Brussels National Airport (Zaventem); then by rental car or train (1-1/2 hours) to Mol.]

Managing Director
Operations
Decommissioning
Safety

J. Claes
Paul Luyckx
L. Teunckens
J. P. Minon

Activities: Maintenance/dismantling of ex-Eurochemic facilities; medium-level waste conditioning; operation of PAMELA pilot plant (Mol) which vitrifies liquid high-level radioactive waste; interim waste storage; operation of FRG CEN/SCK waste treatment facility.

Owner: ONDRAF/NIRAS

BELGIUM

BELGOPROCESS (contd)

Facilities:

- **Eurobitum** (bituminization plant)
Mission: Immobilize ILW.
Design Basis: Batch chemical pretreatment; screw extruder-evaporator (continuous); capacity, 650 m³/a ILW.
History: Startup, 1978; on-stream time, 87% through June 1983. Plant now on stand-by.
- **Eurowatt** (hot pilot plant-solvent treatment)
Mission: Treat PUREX (TBP-kerosene) solvent.
Design Basis: Extract TBP with concentrated H₃PO₄, pyrolyze H₃PO₄ fraction; capacity, 1 m³/d.
History: Startup, 1982; now dismantled.
- **PAMELA HLLW Vitrification Plant** [built by FRG (see WAK in FRG Section) and operated by WAK/Belgoprocess team]
- **Eurowetcomb** (hot pilot plant-acid digestion)
Mission: Wet combustion of combustible TRU wastes and Pu recovery.
Design Basis: Acid digestion with H₂SO₄-HNO₃.
History: Startup, 1982; now shut down.

CEN/SCK (Nuclear Energy Research Center)

Centre d'Étude de l'Énergie
Nucléaire/Studiecentrum
voor Kernenergie
Laboratory of the CEN/SCK
Boeretang 200
2400 Mol
Belgium

Tel: 32-14-31-18-01
Fax: 32-14-31-50-21

Chairman of the Board
General Manager
Geological Disposal Research

I. Van Vaerenbergh
Carl M. Malbrain
Arnold A. Bonne

Owner: Government--Ministry of Economic Affairs.

CEN/SCK (contd)

Waste Management R&D: FBR fuel reprocessing (head-end and off-gas treatment), incineration of TRU wastes, immobilization of cladding hulls, LLW treatment, geologic waste isolation in clay formations.

Facilities:

- **HERMES Pilot Plant** (Head-End Research facility on Mockup Engineering Scale)
Mission: Develop head-end treatment technology for LWR fuels.
Design Basis: Chop-leach; silver zeolite and cryogenic treatment of off gas.
Process Components: Double-pin chopper, critically safe dissolver, centrifugal filtration for solution clarification, fuel residue dissolver, "super dissolver" for cleanup of hulls, off-gas scrubbers, treatment of hulls by high-pressure compaction, encapsulation of compacted hulls.
Throughput: 10 kg irradiated fuel (20-30% PuO₂ in UO₂) per batch.
History: No longer in operation.

- **FLK Slagging Incinerator** (radioactive)
Mission: Volume reduction of combustible, and of selected noncombustible, low-activity TRU wastes.
Design Basis: High-temperature combustion (1200-1500°C); capacity, 50 kg/h; product, insoluble granular slag.
History: Startup, 1975; first tests with Pu-bearing wastes (tens of grams Pu in several tons of waste), 1983; shutdown, 1988.

- **CEN/SCK Waste Preparation Plant**
Mission: Immobilize Belgian LLW.
Design Basis: Stirred evaporator, batch process; capacity, 800 ℓ/h liquid LLW or 100 kg/h dried sludge.
History: Startup, 1964 (liquids), 1970 (solids).

BELGIUM

CEN/SCK (contd)

- **HADES Underground Research Laboratory**

Mission: In-situ investigation in a deep clay formation to develop technology for disposal of ILW, TRU waste, and HLW.

Description: Access shaft to -230 m level, 2.65 m useful dia.; laboratory gallery, 3.5 m useful dia. by 30 m length; cast iron liner. Demo/test facility being added for tests with actual wastes.

Test Program: Geomechanical behavior of clay around underground structures, water-flow measurements, in-situ heater tests, clay stability studies, liner stresses, borehole atmospheres, corrosion; test emplacement of HLW and TRU incinerator residues.

History: Laboratory operational, late 1984.

FBFC (French-Belgian Fuel Fabrication Company)

Société Franco-Belge de
Fabrication de Combustibles
Europalaan 12
2480 Dessel
Belgium

Tel: 32-14-31-58-51
Fax: 32-14-31-58-45

Plant Manager

M. Huberlant

Function: Fabrication of fuel assemblies for LWR (capacity: 400 t/a). French owned.

FBFC Tour Manhattan-La Defense

6 Place de l'Iris
92400 Courbevoie, France

Tel: 33-1-4762-8800

MINISTRY OF ECONOMIC AFFAIRS

Ministry of Economic Affairs
Administration of Energy
Rue de Mot, 30
1040 Brussels
Belgium

Tel: 32-2-233-6636
Fax: 32-2-514-0635

BELGIUM

MINISTRY OF PUBLIC HEALTH AND ENVIRONMENT

Ministère de la Santé Publique
et de l'Environnement
Quartier Vésale 2-3/32
1010 Brussels
Belgium

Tel: 32-2-210-4978
Fax: 32-2-210-4967

ONDRAF/NIRAS (National Institute for Radioactive
Wastes and Fissile Materials)

Organisme National des Déchets
Radioactifs et des Matières
Fissiles (ONDRAF/NIRAS)
Place Madou 1, B.P. 24/25
1030 Brussels
Belgium

Tel: 32-2-212-1011
Fax: 32-2-218-5165

Chairman, Board of Directors	M. Frerotte
Chair., Perm. Tech. Committee	F. Deconinck
General Manager	E. Detilleux
Tech. Mgr./Deputy Gen. Mgr.	F. Decamps

Owner: Government.

Function: Organize transportation of radioactive materials, waste treatment/conditioning and interim storage, spent fuel AFR storage, waste disposal; fissile material storage; define waste management R&D requirements.

ORGANIZATION

ONDRAF/NIRAS is governed by a Board of Directors composed of a president, vice-president, and board members representing various national ministries and local government executives. The Board is advised by a Permanent Technical Committee.

BELGIUM

SYNATOM

SYNATOM S.A.
Avenue Marnix, 13
1050 Brussels
Belgium

Tel: 32-2-518-66-66
Fax: 32-2-513-10-76

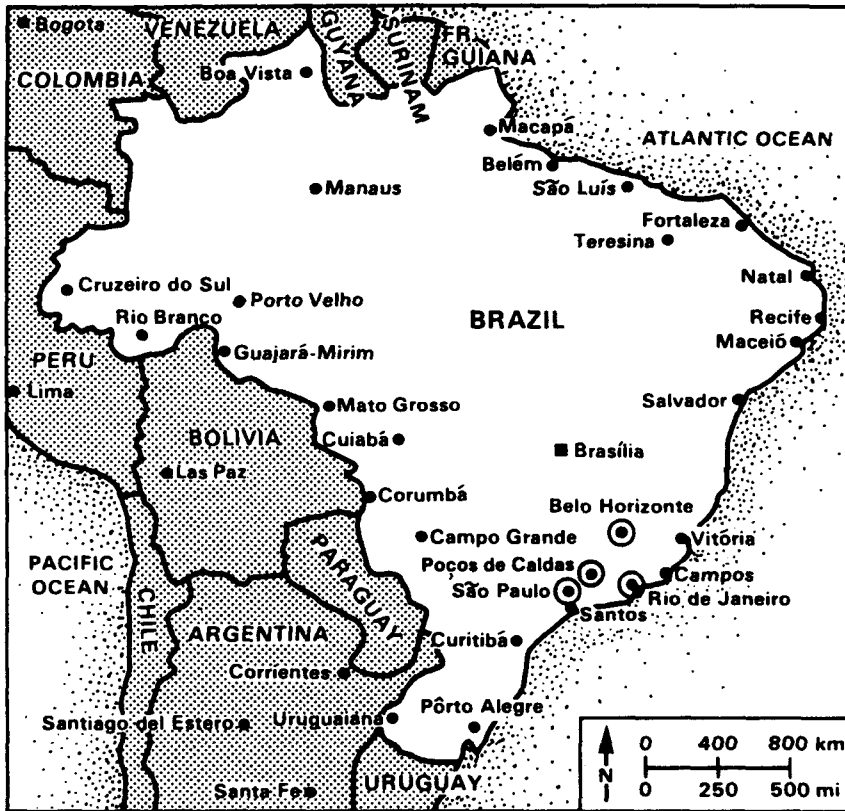
Chairman, Board of Directors
Managing Director
General Manager
Fuel Reprocessing Service

R. De Cort
R. Cayron
Pierre Goldschmidt
Jean Danguy

Function: Provide commercial fuel cycle services for the Belgian nuclear utilities.

Owners: Government/SNI (50%), INTERCOM (20%), EBES (20%), UNERG (10%).

BRAZIL



BRAZIL

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Sept. 7	Independence
Feb. 26-27	Carnival	Oct. 12	N.S. Aparecida
April 13	Good Friday	Nov. 2	All Souls
April 21	Tiradentes Day	Nov. 15	Proclamation of the Republic
May 1	Labor Day		
June 14	Corpus Christi	Dec. 25	Christmas

TIME

Standard Time Washington D.C.: (East/all coast) + 2 hours
Standard Time Period: 02/11 - 10/13/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to Brazil. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 17.14 Cruzados (Cz\$)
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Brazil are complete as listed, after dialing international access code: 011. Country code is 55; listed local numbers include city code.

U.S. EMBASSY - BRASILIA

American Embassy
Avenida das Nações, Lote 3
CEP 70403, Brasilia
Brazil

Tel: 55-61-321-7272
Fax: 55-61-225-9136
Tlx: 61-1091

Science Counselor

Barbara Tobias

BRAZIL

ENERGY

Population	1987	141 million
Electric Power Plant Capacity	1987	45 GWe
Electric Power Production	1987	201.6 TWh 94% hydro 6% thermal 0.3% nuclear

NUCLEAR POWER

Policy: Ambitious program to develop complete nuclear industry with closed fuel cycle, based upon technology transfer from FRG and other countries.

Nuclear Power Plant Capacity	1989	0.6 GWe
	1995	1.9 GWe
	2000	3.1 GWe
Reactor Mix	1989	PWR: 1 (1984) 2 (1994/97)

Reactor Development: Low power PWR; Research/isotope production reactor (light water-low enrichment); FBR (experimental).

INDUSTRIAL FUEL CYCLE

Policy: To develop full commercial capability for closed fuel cycle --conversion of U_3O_8 to UF_6 ; enrichment; UO_2 fuel fabrication; fuel reprocessing.

Waste Management Strategy: Not yet defined.

Cumulative Spent Fuel Arisings (LWR)	1989	32 tU
	1990	48 tU
	1995	162 tU
	2000	~412 tU

BRAZIL

Demonstration/Production Activities

- Uranium mining and milling: 300 tU₃O₈/a--in operation.
- UF₆ production: (1984) 90 tU/a; planned expansion delayed indefinitely.
- Uranium enrichment (gas centrifuge): small experimental demonstration (1987).
- Uranium enrichment (Becker nozzle process), at Resende:
 - First Cascade, 24 stages; 6 kSWU/a (1985).
 - Second Cascade, 64 kSWU/a (1988).
- Fuel fabrication: 100 tU/a (1982); design capacity--400 tU/a.
- Spent fuel reprocessing: 10 kg/d pilot plant (1986 startup originally scheduled, currently delayed indefinitely).

INTERNATIONAL RELATIONSHIPS

Joint Natural Analog Studies - Pocos de Caldas Project

Joint study by Sweden, Switzerland, United Kingdom, and United States of migration of radionuclides from ore deposits in Brazil.

Member of IAEA (has not signed NPT); dependence on nuclear technology transfer from other nations, principally from FRG.

ORGANIZATION

- Federal Republic--President (Executive), Bicameral National Congress (Legislative), and Supreme Federal Tribunal (Judiciary).
- Federal Ministry of Mines and Energy--planning, execution and control of nuclear power program.
- CSPN (Superior Council for Nuclear Policy)--sets guidelines for nuclear industry and controls CNEN through non-military board.

BRAZIL

ORGANIZATION (contd)

- **CNEN (National Nuclear Energy Commission)**--regulatory/R&D. Research Institutes: **CDTN, IEN, IPEN, IRD.**
- **INB (Brazilian Nuclear Industries)**--commercial nuclear fuel cycle activities, uranium mining and processing.
 - Uranio do Brasil, S.A.
 - Ownership: 51% government (CNEN); 49% private.
- **Electrobras**--construction and operation of nuclear power plants.

CDTN (Center for the Development of Nuclear Technology)

Centro de Desenvolvimento de Tecnologia

Nuclear de Nuclebras (CDTN)

Rua Gonçalves Dias No. 1054

Belo Horizonte, MG, Brazil

Tel: 55-31-441-5422

Fax:

Director

V. Mattos Andrade Silva

Function: Applied research and industrial development of uses for atomic energy. Triga reactor (research/isotope production); laboratory scale enrichment nozzle process.

CNEN (National Nuclear Energy Commission)

Comissão Nacional de Energia Nuclear (CNEN)

Rua General Severiano 90

Botafogo ZC-82, CEP 22290

Rio de Janeiro, RJ, Brazil

Tel: 55-21-295-2232

Fax: 55-21-295-6098

President

Director, Nuclear Safety

Head, Waste Disposal

Rex Nazare Alves

Luiz Arrieta

H. R. Franzen

Function: Regulation, financing and licensing of nuclear reactors, fuel cycle facilities and radiation-emitting installations. Promotion of nuclear technology R&D--technology transfer to private industry. Promotion/training of personnel. Controls four research institutes: CDTN, IEN, IPEN, and IRD.

BRAZIL

IEN (Nuclear Engineering Institute)

Instituto de Engenharia Nuclear
Cidade Universitária
Ilha do Fundão
Caixa Postal 2186
CEP 20001, Rio de Janeiro, RJ
Brazil

Tel: 55-21-280-5622
Fax:
Tlx: 21-21112 CNEN BR

Director **Alcyr Mauricio**

Activities: Nuclear reactor physics; cyclotron radioisotope production; reactor engineering; research reactor operation; metallurgy; nuclear/applied chemistry; nuclear instrumentation (development/production); health physics; mathematics/computation and sodium technology; reactor development.

Facilities:

- Laboratories for Nuclear Chemistry, Metallurgy and Engineering
- Argonaut type reactor - 10 kW
- Sodium loop - 300 kW
- Cyclotron

IPEN (Energy and Nuclear Research Institute)

Instituto de Pesquisas Energeticas e Nucleares
Cidade Universitária
Caixa Postal 11.049
Pinheiros
CEP 01000, São Paulo, Brazil

Tel: 55-11-211-6011
Fax:
Tlx: 11-23592 IPEN

Superintendent **Claudio Rodrigues**

Nuclear Activities: Nuclear physics; nuclear medicine; radiobiology; radiation health/safety; engineering/reactor technology/instrumentation; nuclear materials chemistry; isotope and radiation applications/production; nuclear waste disposal; nuclear metallurgy; radiochemistry.

IPEN (contd)

Facilities:

- Laboratory for spent fuel reprocessing
- Small experimental gas centrifuge uranium enrichment
- Low power PWR reactor development
- Swimming pool 10 MW reactor (isotope production)

IRD (Health Physics and Dosimetry Institute)

Instituto de Radioproteção e Dosimetria

Avenida das Américas Km 11,5

Barra Da Tijuca

CEP 22700, Rio de Janeiro, RJ

Brazil

Tel: 55-21-5252

Fax:

Tlx: 21-31624 IRD

Director

Anamelia Habib de Mendonça

Activities: Personal dosimetry control, calibration of radiation detectors, reactor environment control; nuclear medicine and X-ray equipment control, radiobiology, background evaluation, dosimetry research.

Facility

- Brazilian Secondary Standards Dosimetry Laboratory

CANADA



CANADA

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Sept. 3	Labor Day
Apr. 13	Good Friday	Oct. 8	Thanksgiving
Apr. 15-16	Easter	Nov. 11	Remembrance Day
May 21	Victoria Day	Dec. 25-26	Christmas
July 1	Canada Day		

TIME

Time zones correspond to those in the United States.

Daylight Saving Time period: 04/01 - 10/27/90

PASSPORT/VISA

In lieu of passport, proof of U.S. citizenship such as birth certificate (but not driver's license) is sufficient for a visit to Canada. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1.18 Canadian Dollar
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Canada are complete as listed. Dial long distance access code: 1, followed by 3-digit area code + 7-digit local number.

U.S. EMBASSY - OTTAWA

American Embassy
100 Wellington Street
Ottawa K1P 5T1
Canada

Tel: 613-238-5335
Fax: 613-238-8750

Science Counselor

Victor D. Comras

CANADA

ENERGY

Population	1988	26.3 million
Electric Power Plant Capacity	1987	101.3 GWe 12% nuclear
	1988	101.0 GWe 12% nuclear
	1990	106.2 GWe 13% nuclear
	1995	120.4 GWe 13% nuclear
Electric Power Production	1988	489.0 TWh 62% hydro/geoth. 18% coal 16% nuclear 2% oil 2% gas
	1988	16% nuclear
	1994	17% nuclear
	1995	19% nuclear

NUCLEAR POWER

Policy: Strong support for domestic use and export of the CANDU reactor system.

Nuclear Power Plant Capacity	1988	11.7 GWe
	1990	13.9 GWe
	1995	15.6 GWe
	2000	15.6 GWe
Reactor Mix	1988	PHWR: 18 (1968-87) 4 (1990-93)

INDUSTRIAL FUEL CYCLE

Policy: Retrievable storage of used fuel for decades, pending an assessment of a concept for disposal of nuclear fuel waste.

Waste Management Strategy: Geologic disposal of "nuclear fuel waste," either used CANDU fuel or immobilized HLW, in a crystalline rock repository.

CANADA

Cumulative Used Fuel	1988	12,400 tU
Arising (PHWR)	1990	17,700 tU
	2000	33,900 tU

Major Milestones

- Environmental assessment panel appointed 1989
- Env. assessment panel issue identification phase 1990
- Env. impact statement on geological disposal concept 1991

INTERNATIONAL RELATIONSHIPS

DOE/AECL Umbrella Agreement for Cooperation in Radioactive Waste Management Exchange

Term: 9-8-76 to 8-25-92.

Scope: Waste treatment; storage; geological disposal; transportation requirements; operational considerations; environment and safety; public acceptance issues.

Emphasis: Information exchange in radioactive waste management, geological disposal, waste form characterization, waste/used fuel storage, and intercomparison of performance assessment computer models and codes.

Member of IAEA and OECD/NEA. Information exchange agreements with EEC (Euratom), BMFT/Germany, SKB/Sweden, UKAEA/United Kingdom, PNC and JAERI/Japan, KAERI/South Korea, IVO and TVO/Finland.

ORGANIZATION

- AECS (Atomic Energy Control Board)--regulatory.
- AECL (Atomic Energy of Canada Limited)--a Crown Corporation owned by the federal government. Design, engineering and sale of CANDU reactors at CANDU operations (Ontario). Nuclear R&D at WNRE (Manitoba) and CRNL (Ontario).

ORGANIZATION (contd)

- **OH (Ontario Hydro)**--provincial public utility. Owns/operates 11,200 MWe CANDU nuclear power plants and has 3,500 MWe more under construction. (The first of these new units is now undergoing preliminary testing.) Waste management R&D.
- **HQ (Hydro Quebec)**--provincial public utility. Owns/operates Gentilly 2 (600 MWe CANDU station).
- **NBEP (New Brunswick Electric Power Commission)**--provincial utility. Owns/operates Point Lepreau Nuclear Generating Station (600 MWe CANDU).

CANADA

**FEDERAL GOVERNMENT RESPONSIBILITIES--FUEL
CYCLE/WASTE MANAGEMENT**

Ministry of Energy, Mines and Resources (EMR)

- **Atomic Energy Control Board (AECB)**
 - **Regulations, Licensing**
- **Atomic Energy of Canada, Limited (AECL)**
 - **CANDU Operations**
 - **Reactor Design, Engineering, Export**
 - **AECL Research (see CA-4)**
- **Department of Energy, Mines and Resources (EMR)**
 - **Geological Survey of Canada**
 - **Information/Services**
 - **Minerals/Continental Geoscience**
 - **Sedimentary/Cordilleran Geosciences**
 - **Geophysics/Marine Sciences**
 - **Canadian Centre for Mineral and Energy Technology (CANMET)**
 - **Mining Research Laboratories**
 - **Sudbury Laboratory**
 - **Elliot Lake Laboratory**
 - **Canadian Mining Technology Laboratory**
 - **Mineral Sciences Laboratories**
 - **Radionuclide Recovery from Thorium Mill Tailings**
 - **Metal Technology Laboratories**

**ATOMIC ENERGY OF CANADA LIMITED -- PARTIAL
ORGANIZATION**

AECL RESEARCH

-- Whiteshell Nuclear Research Establishment (WNRE)

- **Small Reactor Technology/Local Energy Systems**
- **Reactor Safety Research**
- **Material Sciences**
- **Radiation Applications Research**
- **Analytical Science**
- **Waste Management Program**
 - **Geological/Environmental Science**
 - **Geochemistry/Waste Immobilization**

-- Chalk River Nuclear Laboratories (CRNL)

- **Nuclear Waste Management Technology**
- **Reactor Development**
- **Physics and Health Sciences**
- **Radiation Application and Isotopes**

-- Research Company Head Office, Ottawa

- **Low-Level Radioactive Waste Management Office**

CANADA

AECB

Atomic Energy Control Board
P.O. Box 1046
270 Albert Street
Ottawa, Ontario K1P 5S9
Canada

Tel: 613-995-5894
Fax: 613-995-5086

President
Fuel Cycle/Materials Regulations
Waste Management
Safeguards and Security
Reactor Regulation
Research and Radiation Protection
Safety and Safeguards

Dr. Rene J. A. Levesque
W. D. Smythe
G. C. Jack
D. B. Sinden
Z. Domaratzki
J. W. Beare
J. R. Coady

AECL

Atomic Energy of Canada Ltd.
344 Slater Street
Ottawa, Ontario K1A 0S4
Canada

Tel: 613-237-3270
Fax: 613-563-9499

Acting Chairman
Acting President/CEO
Acting Pres., AECL Research
Low-Level Waste Management

Marnie Paikin
Dr. Stanley R. Hotcher
Dr. Terry E. Rummery
Dr. Robert Pollock

AECL-CRNL

AECL-Chalk River Nuclear
Laboratories
Chalk River, Ontario KOJ 1J0
Canada

Tel: 613-584-3311
Fax: 613-589-2039

General Manager
Reactor Development, V.P.
Physics/Health Sciences, V.P.
Radiation Appl./Isotopes, V.P.
Waste Management Technology

Dr. P. J. Harvey
Dr. R. E. Green
Dr. J. D. Milton
Dr. G. Dolling
Dr. Don H. Charlesworth

AECL-CRNL (contd)

Facilities

- WTC (Waste Treatment Center)
Mission: Development and operation of processes for the treatment of low- and intermediate-level wastes using incineration, compaction, micro-filtration/reverse osmosis, evaporation, ion exchange, and solidification in bitumen.
- IRUS (Intrusion Resistant Underground Structure)
Mission: LLW/ILW repository consisting of two concrete vault "prototype units." Each vault, with a capacity of 3,000 m³ radwaste in barrels or bales, will be covered with backfill, roofed with concrete and mounded with earth. Waste can be retrieved from the IRUS module until concrete cap is poured over the vault.
Milestone: Construction start, 1990.
- IST (Improved Sand Trench)
Mission: An enhanced shallow-ground concept for the lowest class of low-level waste. It is currently in the conceptual design stage.

AECL-WNRE

AECL-Whiteshell Nuclear
Research Establishment
Pinawa, Manitoba ROE 1L0
Canada

Tel: 204-753-2311
Fax: 204-753-8404
Verif: 204-753-2311 ext. 3162

General Manager
Waste Management, V.P.
Geological/Environmental
Geochem./Waste Immobilization

M. G. Wright
Dr. D. Torgerson
Dr. K. W. Dormuth
Dr. K. Nuttal

AECL-WNRE (contd)

Facilities

- **BITF (Borehole Instrumentation Test Facility)**
Mission: Test and calibrate geotechnical borehole instruments under pressure, temperature, and chemical conditions that could exist in exploration boreholes to depths of 1200 m below ground surface in granitic rock.
Design Basis: Stainless steel vertical test chamber to simulate a 10 m long borehole section, 76 mm inside diameter. Temperature, pressure, flow rates, and water chemistry can be precisely controlled and monitored.
History: Startup, 1983.

- **URL (Underground Research Laboratory),** located about 20 km from WNRE, on the Lac du Bonnet Batholith.
Mission: Provide a research facility in a virgin granite pluton characteristic of the Canadian granite formations which may be selected for waste repository construction. (U.S./DOE has participated in experimental programs).
Design Basis: Vertical shaft with shaft stations at 130 m, 240 m, 300 m, and 420 m depths. Horizontal tunnel with adjoining rooms located at 240 m level. Experiment access at the 420 m level being developed. Currently planning major experiments at 240 m and 420 m levels. Licensed radioactive sources and selected licensed tracers may be used in the facility, but no radioactive wastes are to be employed there.
Milestones: Underground operation startup, 1985; completion of shaft extension and 420 m level access, 1990. Start of major siting experiments, 1980; start of major in situ experiments, 1989.

- **IITF (Hydrostatic Test Facility)**
Mission: Test the performance of containers made of different metals under temperature/pressure conditions that could exist in an underground disposal vault.
Design Basis: Carbon steel pressure chamber with a test cavity 1.5 m in diameter and 3 m in depth contained in a 4 m x 4 m x 4.6 m deep concrete-lined pit. Temperature/pressure can be adjusted and controlled over long periods of time.
History: Startup, 1984; currently inoperative. Studies underway to assess feasibility of facility upgrading.

AECL-WNRE (contd)

- IFTF (Immobilized Fuel Test Facility)**
Mission: Test the effects of water, heat and pressure on waste forms, containers, buffer, and rock in the presence of a radiation field. Waste forms include used fuel and fuel recycle glass or glass/ceramics.
Design Basis: Heated concrete canisters contain a number of pressure vessels with container or waste form samples, buffer and groundwater. A radiation source within the canister simulates the radiation field in a disposal vault. The facility also contains "warm cells" for experiments involving moderate levels of radiation. **Three Laboratories:** Analytical, Low-Activity Examination, and Alpha.
History: First canister loaded, August 1984.
- LBRMF (Large Block Radionuclide Migration Facility)**
Mission: Study the migration of non-reactive and reactive contaminants, including radionuclides, over a distance up to 1 m through natural fractures in quarried intact rock. Determine the spatial distribution of sorbed radionuclides on fracture surfaces and in the rock matrix at the end of the migration experiments.
Design Basis: The facility consists of an experimental section, equipped with moveable active fume hoods to hold quarried rock, and an analysis section, equipped with a 2-D gamma-scanner, active fume hoods, and equipment to handle blocks of rock up to 2000 kg.
History: First migration experiment, using uranium, ^{131}I , and ^{137}Cs , has been completed and results published. Second experiment, using uranium, ^3H , ^{85}Sr , $^{95\text{m}}\text{Tc}$, ^{137}Cs , and ^{144}Ce is completed. Third migration experiment being designed.

CAMECO (CANADIAN MINING & ENERGY CORP.)

Cameco
 122 Third Ave. North
 Saskatoon, Saskatchewan
 S7K 2H6, Canada

Tel: 306-956-6200
 Fax: 306-956-6201

Chairman
 Executive V.P./CEO

William A. Gatenby
 Bernard Michel

Commercial operation jointly owned by the governments of
 Canada and Saskatchewan.

CANADA

EMR

Energy, Mines and Resources Canada
Science and Technology
580 Booth Street

Ottawa, Ontario K1A 0E4
Canada

Tel: 613-995-3065

Fax: 613-996-6424

Director General,
Uranium/Nuclear Energy
Director of Radioactive
Waste Management

Dr. R.W. Morrison

Peter Brown

EMR-CANMET

EMR-Canada Centre for Mineral
and Energy Technology

555 Booth Street

Ottawa, Ontario K1A 0G1
Canada

Tel: 613-995-4029

Fax: 613-996-9673

Director General, Policy
Planning/Services

J. Ferron

Director General, Mineral
Technology Branch

Dr. J. T. Jubb

Mineral Research Laboratories

Dr. J. E. Udd

Mineral Sciences Laboratories

Dr. H. Steger

Metals Technology Laboratories

Dr. W. H. Erickson

EMR-GSC

EMR-Geological Survey of Canada

580 Booth Street

Ottawa, Ontario K1A 0E4
Canada

Tel: 613-992-5910

Fax: 613-995-3082

Assistant Deputy Minister
Chief Scientist

Dr. E. A. Babcock

Dr. Robin Riddihough

OH

Ontario Hydro
700 University Avenue
Toronto, Ontario M5G 1X6
Canada

Tel: 416-592-5111
Fax: 416-592-2753

Director, Design/Development	H. S. Irvine
Radioactive Mtls. Management	P. Stevens-Guille
Radioactive Mtls. Storage/Disposal	P. J. Armstrong
Used Fuel Management	S. Naqzi
Radioactive Mtls. Transportation	J. Tanaka
Radioactive Mtls. Processing	R. Kohout

RWOS (Radioactive Waste Operations Site)

Bruce Nuclear Power Development
Box 1540
Tiverton, Ontario, NOG 2T0
Canada

Tel: 519-368-7031

Contact: B. Vaughan

Function: Process and store low- and medium-level radioactive waste from Ontario Hydro CANDU reactors and research and maintenance facilities.

Facilities

- **WVRF (Waste Volume Reduction Facility)**
Processing Equipment: Two-chamber pyrolysis incinerator with a capacity of 30 kg/h; baler with a compaction force of 1100 k/Pa and low force drum crusher.
History: Startup, 1977.

OH (contd)

• **Low-Level Waste Storage:**

5 above-ground warehouse-type buildings; waste with a radiation field of $<1\text{R/h}$ at 30 cm is stored in stackable containers with a storage capacity of 8000 m^3 .

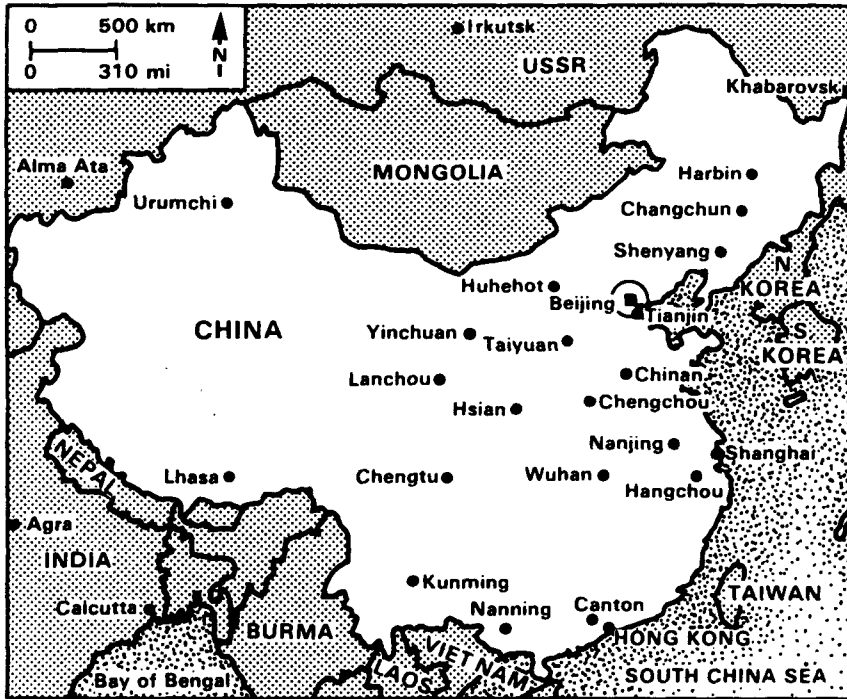
15 trenches; reinforced concrete structures ~ 3 m below ground; designed for waste with radiation fields $>1\text{R/h}$ but $<15\text{ R/h}$. Storage capacity ranges from 360 to 680 m^3 each.

15 quadricells; above-ground, reinforced concrete structures; sufficient shielding for storage of waste with radiation fields of $>15\text{ R/hr}$ (e.g., ion exchange resins, filters and reactor core components), with a storage capacity of 24 m^3 each.

272 in-ground containers; welded steel liners concreted into augered holes; designed for storage of waste with radiation fields $>15\text{ R/h}$ (e.g., ion exchange resins, filters and reactor core components) ranging in storage capacity from 1 to 18 m^3 .

CHINA

(People's Republic of China)



CHINA
(People's Republic of China)

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Jan. 27-28	Spring Festival
Mar. 6	Women's Day
May 1	Labor Day
June 1	Children's Day
Aug. 1	Army Day
Oct. 1, 2	National Liberation

TIME

Standard Time Washington D.C.:	+ 13 hours
Daylight Saving Time Period:	04/15 - 09/15/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to the People's Republic of China. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 4.72 Yuan
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

U.S. EMBASSY - BEIJING

American Embassy	
Xiu Shui Bei Jie 3	
Beijing 100600	Tel: 86-1-532-3831
People's Republic of China	Fax: 86-1-532-3178
Science Attaché	William W. Thomas

ENERGY

Population	1987	1.07 billion
Electric Power Plant Capacity	1985	86 GWe
	1986	91 GWe
Electric Power Production	1985	406 TWh ~70% coal ~24% oil 6% hydro/geoth. gas
	1986	445 TWh

NUCLEAR POWER

Policy: Develop nuclear power as one of three major sources of energy to solve problems caused by uneven distribution of resources; be self-sufficient, but introduce foreign advanced technology.

Nuclear Power Plant Capacity	1990	0.3 GWe
	2000	5.0 GWe
Reactor Mix	1989	PWR: 3 (1990-93)
Reactor Development		BWR, HTR, FBR

INDUSTRIAL FUEL CYCLE

Policy: Retrieval storage of spent fuel for 5-8 years, followed by reprocessing and vitrification; final disposal in deep geologic formation. Activities include uranium mining, milling, and diffusion enrichment; fuel fabrication, reprocessing of defense fuels.

Waste Management Strategy: Interim storage of spent fuel in pools if <1,000 tU, in transport/storage casks if >1,000 tU. Interim storage, reprocessing, vitrification, and fuel disposal all to be at one site, to be selected in the Gobi Desert. Plan for a small pilot reprocessing plant, followed by a commercial-sized facility, about 500 tU/a.

CHINA

INTERNATIONAL RELATIONSHIPS

Member of IAEA. Cooperative agreements have been signed with Argentina, Canada, France, Germany, Italy, Japan and the U.S.

ORGANIZATION

- CNNC (China National Nuclear Corporation) -- fuel cycle development
 - IAE (Institute of Atomic Energy)
 - INET (Institute of Nuclear Energy Technology)
 - CNEC (China Nuclear Engineering Corporation)
 - handles import and export.
 - China Zhongyuan Engineering Corporation
 - provides technical services and engineering work, contracts building projects.
- NNSA (National Nuclear Safety Administration) -- responsible for standards/regulations, construction permits/operating licenses, monitoring plant operations; conducts joint safety research with other nations.
- Southwest Institute of Physics -- nuclear R&D.

CNEC

China Nuclear Engineering
Corporation
P.O. Box 840
Beijing
People's Republic of China

Tel: 86-1-89-4794
Fax:
Tlx: 22240 CNEC-CN

Manager
Contact

Jia Dexian
Song Ruo

CNNC

China National Nuclear Corporation
c/o Ministry of Energy Resources
P.O. Box 2102
Beijing
People's Republic of China

Tel: 86-1-86-7784
Fax:
Tlx: 222315 FACNC CN

General Manager
Science/Tech.Com., V.Chairman
Nuclear Fuel Department

Jiang Xingxiong
Lu Rong'Guang
Wang Xiaoli

General Machinery Research Institute

General Machinery Research
Institute
Shu Shan Road
Hefei City, Province Anhui
People's Republic of China

Tel: 86-3-1337
Fax:

Contact Schou Gang

IAE

Institute of Atomic Energy
Academia Sinica
P.O. Box 275 (4)
Beijing, People's Republic of China

Tel:
Fax:

Director Sun Zuxun
Honorary Director Dai Cuanzheng

Waste Management R&D: HLW vitrification, waste form
characterization; pilot plants to be built.

INET

Institute of Nuclear Energy Technology
Qinghua University
P.O. Box 1021
Beijing, People's Republic of China

Tel:
Fax:

Director Prof. Wang Dazhong
Dep. Dir., Radiochem. Technology Prof. Zhu Yong-jun

CHINA

NNSA

National Nuclear Safety
Administration
54 San Lihe Rd.
Beijing
People's Republic of China

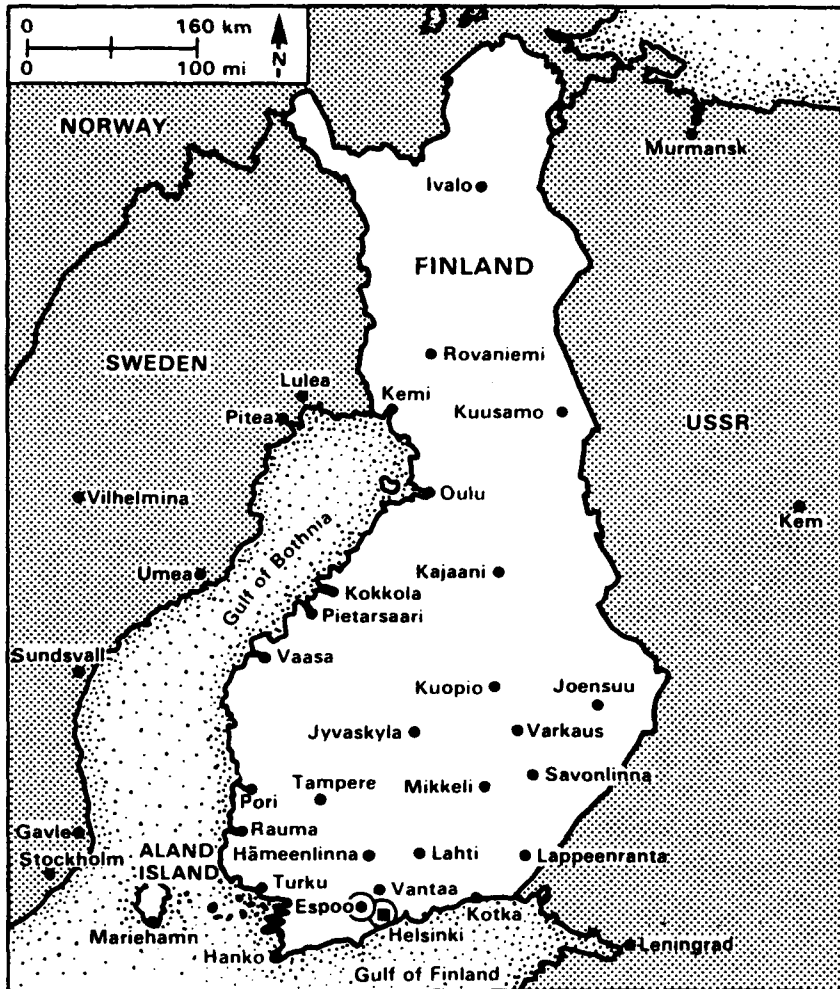
Tel: 86-1-86-8361
Fax:

Director General
Chief Engineer
Dep. Chief Engineer
Dep. Div. Chief
Dep. Div. Chief

Zhou Pin
Lin Chengge
Dong Bonian
Xu Wanjin
Li Zhiyu

CH.4

FINLAND



FINLAND

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Apr. 13	Good Friday
Apr. 15-16	Easter
May 1	May Day
June 22	Midsummer Eve
Dec. 6	Independence Day
Dec. 24-26	Christmas

TIME

Standard Time Washington D.C.:	+ 7 hours
Daylight Saving Time Period:	03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Finland; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 4.01 Markka (FIM)
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Finland are complete as listed, after dialing international access code: 011. Country code is 358; listed local numbers include city code.

U.S. EMBASSY - HELSINKI

American Embassy
Itaainen Puistotie 14A
00140 Helsinki
Finland

Tel: 358-0-17-1931
Fax: 358-0-17-4681
Tx: 12-1644 USEMB SF

FINLAND

ENERGY

Population	1988	5.0 million
Electric Power Plant Capacity	1987	11.5 GWe 20% nuclear
	1988	11.7 GWe 20% nuclear
	1990	12.4 GWe 19% nuclear
	1995	13.4 GWe 17% nuclear
	Electric Power Production	1987
	1988	36% nuclear
	1990	30% nuclear
	1995	27% nuclear

NUCLEAR POWER

Nuclear Power Plant Capacity	1989	2.3 GWe
	1995	2.3 GWe
	2000	2.3 GWe
Reactor Mix	1988	PWR: 2 (1977/81) BWR: 2 (1979/82)

INDUSTRIAL FUEL CYCLE

Policy: Purchase fuel and fuel cycle services from other countries (spent fuel from Soviet-built reactors is returned to USSR).

Waste Management Strategy: According to current plans, spent fuels (non-Soviet fuels) will be stored for 40 years, then placed in granitic bedrock; reactor wastes are conditioned and stored above ground at the nuclear power station sites. Reactor and decommissioning wastes will be disposed of in granitic bedrock.

FINLAND

Cumulative Spent Fuel		<u>TVO</u>	<u>IVO</u>
Arising (LWR), tU	1980	22	46
	1985	228	140
	1990	450	140
	2000	900	140

Major Milestones

- Complete LLW/ILW repository (TVO) 1992
- Complete LLW/ILW repository (IVO) ≥1997
- Complete repository (spent fuel, TVO) site selection 2000
- Complete repository (spent fuel, TVO) 2020

INTERNATIONAL RELATIONSHIPS

Member of IAEA and OECD/NEA. Collaboration with Sweden, Denmark, Norway, and Switzerland in waste management studies. Purchases of fuel cycle services: disposal of spent fuel, from USSR for IVO; for TVO: uranium, conversion/enrichment, fuel element fabrication from various foreign countries, including the USSR and China.

ORGANIZATION

- **Nuclear Energy Commission**--advisory organization for matters connected with the use of nuclear energy.
- **Advisory Committee on Nuclear Safety**--advisory organization.
- **IVO** (government-owned power company)--operates two Soviet-built PWR reactors.
- **TVO** (power company, jointly owned by IVO and several industrial companies)--operates two Swedish-built BWR reactors.
- **VTT (Technical Research Center)**--nuclear research, including waste management R&D.
- **STUK** (Finnish Centre for Radiation and Nuclear Safety)--regulatory authority which also conducts research, in particular, related to transport of radionuclides in biosphere.
- **Geological Survey of Finland**--bedrock-related research.
- **University of Helsinki**--basic research on radiochemistry.

FINLAND

ADVISORY COMMITTEE ON NUCLEAR SAFETY

Advisory Committee on Nuclear Safety
Ydinturvallisuusneuvottelukunta
Säteilyturvallisuuskeskus
Kumpulantie 7
00520 Helsinki
Finland

Tel: 358-0-708-21
Fax: 358-0-708-2392

Chairman
Secretary-General

Prof. Jarl Forstén
Hannu H. Koponen

Function: Advisory organization for safety matters connected with the use of nuclear energy. Coordinated by the Finnish Centre for Radiation and Nuclear Safety (STUK).

GEOLOGICAL SURVEY OF FINLAND

Geological Survey of Finland
Betonimiehenkuja 4
02150 Espoo
Finland

Tel: 358-0-469-31
Fax: 358-0-462-205

Director
Research Director
Nuclear Waste Disposal

Prof. L. K. Kauranne
Prof. K. Korpela
Paavo Vuorela

IVO (National Power Company)

Imatran Voima Oy (IVO)
Rajatorpantie 8
01600 Vantaa
Finland

Tel: 358-0-530-11
Fax: 358-0-563-6823

Nuclear Waste

Jussi-Pekka Palmu

Function: Operate two nuclear power plants (Soviet built) at Loviisa, southeastern Finland.

Owner: Government.

FINLAND

NUCLEAR ENERGY COMMISSION

Nuclear Energy Commission
Ydinenergieneuvottelukunta
Kauppa- ja teollisuusministeriö
Pohjoinen Makasiinikatu 6
00130 Helsinki
Finland

Tel: 358-0-160-5229
Fax: 358-0-160-2695

Chairman
Secretary-General

Prof. Jorma Routti
Sakari Immonen

Function: Advisory organization for general matters connected with the use of nuclear energy. Coordinated by the Ministry of Trade and Industry.

STUK (Finnish Centre for Radiation and Nuclear Safety)

Finnish Centre for Radiation
and Nuclear Safety
P.O. Box 268
Kumpulantie 7
00520 Helsinki
Finland

Tel: 358-0-7082-1
Fax: 358-0-7082-392

Director
Nuclear Fuel Cycle
Nuclear Waste

Prof. Antti Vuorinen
Hannu H. Koponen
Esko Ruokola

Function: Regulatory enforcement and inspection authority. Also, research related to transport of radionuclides in biosphere.

TVO (Industrial Power Company)

Teollisuuden Voima Oy (TVO)
Fredrikinkatu 51-53 B
00100 Helsinki, Finland

Tel: 358-0-605-022
Fax: 358-0-605-135

Nuclear Waste

Veijo Ryhänen

Function: Operate two nuclear power plants (Swedish BWRs) at Olkiluoto in Eurajoki, southwestern Finland.

Owners: Government 43%; private 57%.

TVO (contd)

Facilities:

- **KPA-STORE** (Interim storage facility for spent nuclear fuel) located at reactor site. First stage, construction of three pools (capacity of 600-900 tU, depending on choice of storage racks) completed November 1987. Expansion of capacity to 1,200-1,800 tU planned in second stage.
- **VLJ Repository** located at reactor site. Low- and intermediate-level wastes packaged in metal drums/containers will be buried in two silos 70-100 m deep. ILW silo will have reinforced 0.6 m concrete liner. Construction start 4/88; completion 1992.

VTT (Technical Research Center of Finland)**VTT Nuclear Engineering Laboratory**

P.O. Box 169
00181 Helsinki
Finland

Tel: 358-0-648-931
Fax: 358-0-603-626

Director
Nuclear Waste Management

Dr. Lasse Mattila
Dr. Seppo Vuori

R&D Activities: Safety analysis/performance assessment, geologic disposal.

VTT Reactor Laboratory

Otakaari 3A
02150 Espoo
Finland

Tel: 358-0-4561
Fax: 358-0-4610-85

Director
Nuclear Waste Management

Prof. Pekka Hiismaki
Arto Muurinen

R&D Activities: Leaching and dissolution of spent fuel and HLW glass under repository conditions; properties of barrier materials; near-field chemistry in repositories and long-term stability of ILW forms; decommissioning of nuclear power plants.

FINLAND

VTT (contd)

VTT Metals Laboratory

Kemistintie 3
02150 Espoo
Finland

Tel: 358-0-4561
Fax: 358-0-4356-7002

Director
Nuc. Fuel Mtl. Research

Dr. Jari Forsten
Esa Vitikainen

R&D Activities: Corrosion of encapsulation materials in repository conditions; nuclear fuel studies.

VTT Geotechnical Laboratory

Betonimiehenkuja 1
02150 Espoo
Finland

Tel: 358-0-4561
Fax: 358-0-467-927

Director
Rock Mechanics

Dr. Markku Tammirinne
Dr. Kari Saari

UNIVERSITY OF HELSINKI

University of Helsinki
Department of Radiochemistry
Unioninkatu 35
00170 Helsinki
Finland

Tel: 358-0-1911
Fax: 358-0-6565-91

Director

Prof. T. Jaakkola

FRANCE

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	July 14	Bastille Day
Apr. 15-16	Easter	Aug. 15	Assumption
May 1	Labor Day	Nov. 1	All Saints
May 24	Ascension	Nov. 11	Remembrance Day
June 3-4	Pentacost	Dec. 25	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to France; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 5.78 Franc
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to France are complete as listed, after dialing international access code: 011. Country code is 33; listed local numbers include city code.

U.S. EMBASSY - PARIS

American Embassy
2 Avenue Gabriel
75382 Paris
France

Tel: 33-1-42-96-12-02
Fax: 33-1-42-61-80-75

Science Counselor

Dr. Alan L. Sessoms

FRANCE

ENERGY

Population	1987	55.5 million
Electric Power Plant Capacity	1987	97.9 GWe 57% nuclear
	1988	100.5 GWe 52% nuclear
	1990	102.2 GWe 54% nuclear
	1995	105.1 GWe 56% nuclear
Electric Power Production	1988	372.4 TWh 70% nuclear 20% hydro/geoth. 8% coal 2% oil
	1990	76% nuclear
	1995	79% nuclear

NUCLEAR POWER

Policy: Vigorous nuclear power program, scaled down recently to construction of less than one new reactor per year; commercialization of the breeder reactor; export of nuclear plants and services.

Nuclear Power Plant Capacity	1989	51.8 GWe
	1990	53.5 GWe
	1995	61.5 GWe
	2000	64.4 GWe
	2020	77.0 GWe
Reactor Mix	1988	GCR: 4 (1967-72)
		PWR: 49 (1970-88)
		9 (1989-93)
		LMFBR: 2 (1974/88)

FRANCE

INDUSTRIAL FUEL CYCLE

Policy: Maintain full domestic fuel cycle capability; aggressive export of fuel cycle plants, equipment and services (including uranium enrichment and spent fuel reprocessing).

Waste Management Strategy: HLW--vitrify and store in engineered storage facility for indefinite period, then emplace in geologic repository (granite, salt, clay or schist). LLW--immobilize in bitumen, concrete or resin and dispose in engineered surface facility.

Cumulative (PWR) Spent Fuel Arisings, tU	<u>1980</u> 248	<u>1985</u> 2,900	<u>1990</u> 7,300	<u>2000</u> 20,000
Cumulative Waste Arisings, m ³		<u>1983</u>	<u>1990</u>	<u>2000</u>
vitrified HLW		250	750	3,000
packaged TRU waste		10,000	20,000	60,000
packaged LLW/ILW		250,000	450,000	800,000

Industrial-Scale Activities

- Uranium mining and milling (tU): 1988--2800.
- Uranium enrichment (kSWU/a)
 - Pierrelatte, gaseous diffusion: 600
 - Eurodif, gaseous diffusion: 10,800
- Fuel fabrication (tHM/a)
 - UO₂: 1987--1,300
 - MOX: for FBR fuels--5; for LWR fuels--15.
- Spent fuel reprocessing (t/a)
 - Marcoule: 400 (U metal fuels)
 - La Hague: 1600 (UO₂, LWR fuels)

Major Milestones

- R7 vitrification plant (La Hague) 1989
- UP3 reprocessing plant (La Hague) 1989/90
- T7 vitrification plant (La Hague) 1992
- UP2-800 reprocessing plant (La Hague) 1992
- LLW disposal facility (Centre de l'Aube) 1991
- Melox (MOX fuel fabrication plant-Marcoule) 1993
- Underground Research Laboratory 1995
(Site recommendation 1990)

INTERNATIONAL RELATIONSHIPS

DOE/CEA Umbrella Agreement for Cooperative Radioactive Waste Management Technology Exchange

Term: 7-26-83 to 7-26-93.

Scope: Preparation/packaging; D&D; waste/spent fuel storage; geologic disposal; transportation requirements.

Emphasis: Technical workshops in the areas of LLW and TRU waste management; exchange of waste repository site characterization technology and data for granite and salt host rocks.

NRC/CEA Technical Exchange and Cooperation Arrangement in the Field of Safety of Radioactive Waste Management

Term: 1-10-84 to 1-10-89, presently being renegotiated for 5 year extension.

Scope: Cooperative information exchange for improving and thus ensuring the safety of radioactive waste management: characteristics/long-term performance of conditioned high-level and TRU wastes; methods/data for evaluating radionuclide migration from repository to biosphere; methods of classification, treatment and disposal of LLW; methods for analysis/assessment of operational safety at waste disposal sites.

Member of EC, IAEA and OECD/NEA. Major role in Eurodif uranium enrichment consortium (COGEMA). Partnership with German and British companies in United Reprocessors GmbH (COGEMA) and in Nuclear Transport, Ltd. (Transnucléaire).

FRANCE

ORGANIZATION

- **CEA (Atomic Energy Commission)**--controls practically all nuclear R&D; controls long-term waste management, disposal included (**ANDRA**)
 - Nuclear Research Centers:** Cadarache, Fontenay-aux-Roses, Grenoble, Marcoule, Saclay
- **CEA INDUSTRY:** Industrial group concerned with all industrial fuel cycle activities in France
 - **COGEMA (CEA 100%):** mining, reprocessing
 - **COMURHEX (COGEMA 49%):** uranium conversion
 - **EURODIF (COGEMA 51.5%):** commercial enrichment
 - **SICN (100%), FRAGEM (50%), FBFC (50%), COMMOX (50%) - COGEMA subsidiaries:** fuel fabrication
 - **SGN, USSI (COGEMA part subsidiary)**
 - **TECHNICATOME (90% CEA):** design, construction, operation of fuel cycle and/or waste facilities
 - **STMI (60% CEA):** waste management, decontamination, dismantling services
 - **TRANSNUCLÉAIRE:** transport
- **EdF (Electricité de France, 100% government)**-- public power generation; owns and operates all nuclear plants except Phenix (50% EdF, 50% CEA) and SuperPhenix (NERSA: 51% EdF, 33% ENEL, 16% RWE)

CEA STRUCTURE*

Minister of Industry, Telecommunication and Tourism

- CEA CHAIRMAN - Philippe Rouvillois
- HIGH COMMISSIONER - Jean Teillac

OPERATIONS UNITS

- DAM - Military Applications
- IPSN - Institute for Nuclear Safety-François Cogne
- Direction des Sc.de la Matière-Robert Ayma
- Direction des Sc.du Vivant-Michel Sus
- Direction des Reacteurs Nucleaires-Jacques Bouchard
- Direction des Cycles du Combustible- Jean-Yves Barre
- Direction des Techniques Avancées-Yannick D'Escatha
- ANDRA - National Agency for Waste Management-François Chenevier

RESEARCH CENTERS

- CEN (see Page FR-9)

PROGRAM DIRECTORS

- Direction des Technologies
 - DgN Nuclear R&D (Reactor/Fuel Cycle)-Robert Lallement
 - DgED Waste Management-Jean Lefevre
 - DgD Decommissioning-Annie Sugier
 - DgV Diversification-Bertrand Barre

- DAMN - Nuclear Materials
- DPN - Nuclear Propulsion

* A major reorganization of the CEA structure (the first in nearly two decades) has been initiated during recent months. Some of the resultant changes are already reflected above while others were not known at the time of this printing.

FRANCE

COGEMA

- La Hague Center
 - Reprocessing (LWR)
 - AVH - Vitrification
- Marcoule Center
 - APM - Reprocessing (Metal)
 - AVM - Vitrification
 - Melox - MOX Fuel Fabrication

CEA

RESEARCH CENTERS (CEN)

- Cadarache - Jean Megy, Director
 - MOX Fuel
 - TRU Waste and LLW/ILW
 - Environmental
- Fontenay-aux-Roses - Yves Martin, Director
 - Disposal R&D
 - MOX Fuel
 - TRU Waste and LLW/ILW
 - Engineered Barriers
 - Safety and Health Protection
- Grenoble - Francis DeCool, Director
- Saclay - Paul Delpyroux, Director
 - MOX Fuel Fabrication
 - TRU Waste and LLW/ILW Treatment
 - Engineered Barriers
- Marcoule - Albert Teboul, Director
 - FBR Fuel Cycle
 - Reprocessing
 - HLW
 - TRU Waste and LLW/ILW R&D

ANDRA (National Agency for Radioactive Waste Management)

Agence Nationale pour la Gestion
des Déchets Radioactifs
Commissariat à l'Energie Atomique
Route Du Panorama Robert Schumann
B.P. 38
92266 Fontenay-aux-
Roses Cedex
France

Tel: 33-1-46-54-7080
Fax: 33-1-46-54-9925

Director
Deputy Director
Deputy Director

François Chevenier
Denis Alexandre
Yves Marque

Function: Design, construct and manage long-term waste disposal centers; establish radioactive waste packaging/disposal specifications; contribute to R&D programs related to long-term waste disposal.

Facilities:

- **Centre de la Manche**
B.P. 71
50140 Beaumont-Hague

Mission: Disposal of ILW and LLW; capacity: 480,000 m³ (1988: 350,000 m³ in place; to be full and shut down in early 1990s).

- **Two new centers** planned; one site approved (1987): Soulaines (Aube), to be commissioned in 1991; will accommodate 1,000,000 m³ of IL/LLW over a period of 30 years.
- **Four possible sites** (in clay, granite, schist and salt) selected for characterization of underground HLW storage. Site selection of URL early 1990s; disposal facility--2000/TRU; 2010/glass.

FRANCE

BRGM (Bureau of Geological and Mineral Research)

Bureau de Recherches Géologiques
et Minières

B.P. 6009
45060 Orléans Cedex 2
France

Tel: 33-38-64-36-34
Fax: 33-38-64-36-43
Tlx: 78-0258 F

Director
Managing Director, Geology
Waste Storage
Hydrogeology
Geotechnology

Gerard Renon
H. Astie
P. F. R. Peaudecerf
J. J. Collin
Ph. Masure

CEA (Atomic Energy Commission)

Commissariat à l'Energie
Atomique (CEA)
Centre d'Etudes Nucléaires (CEN)
29-33, Rue de la Federation
75752 Paris
France

Tel: 33-1-40-56-10-00
Fax: 33-1-42-53-91-22
Tlx: 200671 ENERGAT

Chairman
High Commissioner

Philippe Rouvillois
Jean Teillac

CEA-IPSN (Institute for Nuclear Safety)

Institut de Protection et de
Sûreté Nucléaire (IPSN)

B.P. 6
92260 Fontenay-aux-Roses
France

Tel: 33-1-46-54-70-80
Fax: 33-1-47-35-14-23

Director
Technical Protection
Waste Protection Research

François Cogne
Anne-Marie Chapuis
33-1-46-54-72-33

Safety Analysis Services

Christian Devillers
33-1-46-54-70-53

Decommissioning (CEN-VALRHO)

Michel Montjoie
33-66-79-63-02

FR.8

CEN-CA (Cadache Nuclear Research Center)

Centre d'Etudes Nucléaires
de Cadache

B.P. 1
13115 Saint-Paul-lez Durance
France

Tel: 33-42-25-70-00
Fax:
Tlx: CEACA 440678 F

Director Jean Megy

(Marseille-Marignane Airport; 65 km to Cadache by car
provided by Center, or rental car.)

Waste Management R&D: Treatment of TRU waste, LLW, and
ILW; properties of non-HLW waste forms and waste isolation
(radionuclide migration).

Facilities:

- **Solid Waste Treatment Pilot Plant (Prolixe, Elise)**
Mission: TRU solid waste reduction by cryogenic crushing
and Pu recovery by acid leaching.
Design Capacity: Eight 100 liter drums per batch, one batch
every 24 - 48 hours.
History: Startup, 1985.
- **Bituminization Plant**
Design Basis: Immobilize reactor wastes; twin- screw extruder;
capacity, 260 m³/a.
History: Startup, 1977.
- **MOX Fuel Fabrication**
- **LLW Incinerator**
- **Resin Embedding Pilot Facility**
- **Solvent Incinerator**

FRANCE

CEN-FaR (Fontenay-Aux-Roses Nuclear Research Center)

Centre d'Etudes Nucléaires
de Fontenay-aux-Roses

B.P. 6

92265 Fontenay-aux-Roses

France

Tel: 33-1-46-54-80-00

Fax: 33-1-46-54-75-22

Director

Dir., Waste Research (DgED)

Dir., Decommissioning (DgD)

Yves Martin

Jean Lefevre

Annie Sugier

33-1-46-54-75-46

CEN-G (Grenoble Nuclear Research Center)

Centre d'Etudes Nucléaires
de Grenoble

Avenue des Martyrs 85X

38041 Grenoble

France

Tel: 33-76-97-41-11

Fax:

Tlx: 320323 ENERGAT
GRENO

Director

Francis DeCool

Facility:

- Waste Resin Embedding Facility

CEN-VALRHO (Marcoule Nuclear Research Center)

Centre d'Etudes Nucléaires
de la Vallée du Rhône

B.P. 171

30205 Bagnols-sur-Ceze

Marcoule, France

Tel: 33-66-79-60-00

Fax: 33-66-89-38-50

Director

Manager, HLW

Deputy Manager

Albert Teboul

Roger Bonniaud

Claude Sombret

33-66-79-63-62

D&D

Decommissioning (IPSN)

André Crégut

Michel Montjoie

CEN-VALRHO (contd)**Facilities:**

- **APM (Cogema-operated demonstration reprocessing plant for FBR, MOX and high burn-up fuels)**
Mission: Develop technology for FBR, MOX and high burn-up fuels.
Design Basis: PUREX flowsheet, mixer-settlers and pulsed columns; 5 tHM/a.
- **PIVER (Hot Pilot Plant-Vitrification)**
Mission: Test batch vitrification processes (1969-1973); produce samples for characterization and advanced (high-temperature) waste forms.
Design Basis: Pot calciner/melter; capacity, 90 kg glass/batch or 25-30 m³ HLW/a; product, borosilicate glass blocks, 25 cm dia by 2.5 m high.
- **PIVER II. Vitrification of HLW from APM.**
- **Hull Fusion Non-Radioactive Prototype. Startup, 1984.**
- **PEV Prototype (full-scale, non-radioactive R7/T7 vitrification process). Startup, 1984.**

CEN-S (Saclay Nuclear Research Center)

Centre d'Etudes Nucléaires
 de Saclay
 91191 Gif-sur-Yvette
 France

Tel: 33-1-69-08-60-00
 Fax:
 Tlx: 690641 F ENERGAT
 SACLAY

Director

Paul Delpeyroux

Facilities:

- **Bituminization Plant (radioactive).**
- **Metal Waste Melter (startup, 1985).**

FRANCE

COGEMA (Compagnie Generale des Matières Nucléaires)

COGEMA

Direction Generale
2, Rue Paul-Dautier
B.P. 4
78141 Velizy-Villacoublay Cedex
France

Tel: 33-1-39-46-96-41
Fax: 33-1-34-65-14-52

President, CEO, COB
Vice President
Ind. Director, Reprocessing

Jean Syrota
Christian Gobert
Maurice Delange

COGEMA, Inc.

7401 Wisconsin Ave.
Bethesda, MD 20814-3416

Tel: 301-986-8585
Fax: 301-652-5690

President, CEO
Vice President

Michael McMurphy
Frank A. Shallo

NUMATEC, Inc.

(subsidiary of/same location as Cogema, Inc.)

President

William Gallagher

COGEMA-LA HAGUE CENTER

COGEMA, Centre de La Hague

B.P. 508
50105 Cherbourg
France

Tel: 33-33-03-60-00
Fax: 33-33-44-71-77

Director

Hugue Delaunay
33-33-03-60-01

Fuel Cycle Program: Spent fuel reprocessing and HLW vitri-
fication. The La Hague plant was originally designed to handle
magnesium-clad U metal fuels from gas/graphite power reactors.
Transfer of all reprocessing of gas/graphite fuels to Marcoule UP1
has been completed and La Hague is devoted to treating LWR
fuels with occasional FBR fuel campaigns through UP2.

COGEMA-LA HAGUE CENTER (contd)**Facilities**

- **UP2 (Fuel Reprocessing Plant)**
Mission: Reprocess magnesium-clad, natural uranium metal fuels from gas/graphite reactors and oxide fuels from LWRs and Phenix FBR (Phenix fuel has been reprocessed from 1979 to 1984, diluted with natural uranium fuel for criticality control).
Design Basis: PUREX flowsheet; oxide fuels: shear-leach HAO head-end; remote maintenance
Capacity: 400 t/a of LWR fuels.
History: UP2 startup, 1967; HAO startup, 1976. From startup (6/76) through 8/88 total HAO throughput was 2,310 t fuel from LWRs and 10 t from Phenix.

- **UP2-800 (Fuel Reprocessing Plant)**
Mission: Reprocess U oxide and MOX fuels from French LWRs.
Design Basis: Progressive expansion of UP2 plant from 400 to 800 t/a of LWR fuel started in 1984, to be completed in 1992. Chop leach head-end, PUREX flowsheet, AVM vitrification process [R7 vitrification plant: rotary calciner, metallic or ceramic melter; capacity, 600 m³/a HLLW feed three lines - 60 liters/h HLLW, 25 kg/h glass; canister dimensions: 42 cm dia x 1.3 m high (400 kg glass)].
Capacity: 800 t/a.
History: Startup, 1992; R7 startup, 1989, 125 glass canisters poured at the end of 1989. (UP2 HLLW backlog).

- **UP3 (Fuel Reprocessing Plant)**
Mission: Reprocess LWR fuels.
Design Basis: Chop-leach head-end; PUREX flow-sheet; AVM vitrification process (T7 plant: identical to R7 vitrification plant).
Capacity: 800 MTU/a.
History: Startup, 1989.

- **STE3 (Liquid Waste Treatment Facility)**
Mission: Processing/encapsulation in bitumen of liquid low- and intermediate-level wastes from reprocessing of spent fuel at the La Hague installations.
History: Startup, 1988.

FRANCE

COGEMA-MARCOULE CENTER

COGEMA, Centre de Marcoule

B.P. 170

30200 Bagnols-sur-CEZE

Marcoule, France

Tel: 33-66-79-60-00

Fax: 33-66-89-38-50

(Marseille-Marignane Airport, then by train to Avignon and by car to the Center.)

Director
Reprocessing Plant
AVM Manager

Jean Charlade
Maurice Chotin
Pierre Hugony

Facilities:

- **UP1 (Reprocessing Plant)**
Mission: Reprocess magnesium-clad natural uranium metal fuels from military or gas/graphite power reactors.
Design Basis: Mechanical declad; PUREX flowsheet; contact maintenance
Capacity: 400-450 tU/a of gas/graphite reactor fuel, in addition to military fuel load.
History: Startup, 1958; total gas/graphite power reactor fuels processed up to 11/88: 3,800 t.
- **AVM (Ateliers de Vitrification de Marcoule)**
Mission: Demonstrate AVM process: vitrify Marcoule UP1 wastes.
Design Basis: Rotary calciner feeding an induction-heated metallic melter; capacity 30 liters/h HLLW feed and 360 kg/d (1 canister) borosilicate glass product; waste form, glass blocks 0.5 m dia x 1.0 m high.
History: Hot startup, 6/78; as of 1/01/90, 1,213 m³ of HLLW had been vitrified (1,650 canisters = 530 t borosilicate glass).

COGEMA-MARCOULE CENTER (contd)

- **Incinerator**
- **Bituminization Facility**
- **APM: Reprocessing of fast breeder fuel; 1988.**
- **PIVER II: Vitrification of HLW from APM.**
- **Melox: MOX fuel fabrication (100 t/a); 1993.**

DAM (Directorate of Military Applications)

Direction des Applications Militaires
Commissariat à l'Energie Atomique
31-33 Rue de la Fédération
B.P. 510
75752 Paris, Cedex 15
France

Tel: 33-1-40-56-10-00
Fax:
Tx:

Director, Quality/Security

Jean Ohmann

FBFC (Franco-Belge Company for Fuel Fabrication)

Société Franco-Belge de Fabrication
de Combustibles
Tour Manhattan La Défense
2-6 Place de l'Iris
92400 Courbevoie, France

Tel: 33-1-47-62-88-00
Fax: 33-1-47-74-71-67

Facilities:

- **Fuel Fabrication Plant (Romans, France)**
Mission: Fabricate UO_2 fuels for power reactors.
Design Capacity: 400 t/a (to be increased to 600 t/a).
- **Fuel Fabrication Plant (Dessel, Belgium)**
Mission: Fabricate UO_2 fuels.
Design Capacity: 400 t/a.

FRANCE

PARIS SCHOOL OF MINES

Ecole Nationale Supérieure
des Mines de Paris
Centre d'Informatique Géologique
35 Rue Saint-Honore
77305 Fontainebleau
France

Tel: 33-1-64-22-48-21
Fax: 33-1-64-22-39-02

Director, Math. Geol. Center
Deputy Director

Dr. Ghislain de Marsily
Dr. G. E. Ledoux

Waste Management R&D: Geologic waste isolation (fluid flow, heat transport and mass transport studies--theoretical, laboratory and field tests).

SGN

Société Générale pour les
Techniques Nouvelles
1 Rue des Hérons
Montigny-le-Bretonneux
78182 Saint-Quentin
en Yvelines Cedex
France

Tel: 33-1-30-58-60-00
Fax: 33-1-30-58-60-61

President
Vice President
Technical Director

Claude Ayçoberry
Jean Louis Ricaud
Claude Bernard

TN

Transnucléaire
11 Rue Christophe-Colomb
75008 Paris
France

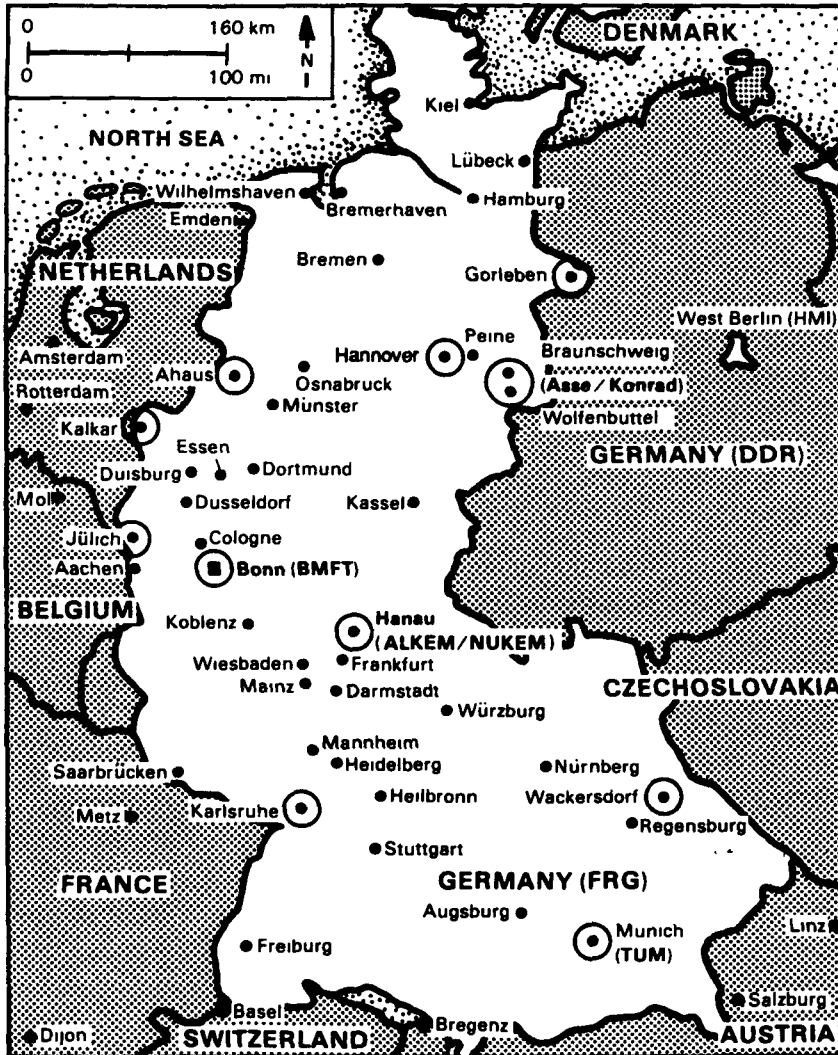
Tel: 33-1-47-23-78-50
Fax:
Tlx: 280992

General Manager
Technical Manager

Bernard Savornin
Paul Blum

GERMANY

(Federal Republic of Germany)



GERMANY (FRG)

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	May 24	Ascension
Apr. 13	Good Friday	June 3-4	Pentecost
Apr. 15-16	Easter	June 17	Day of Unity
May 1	May Day	Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Germany; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1.70 Mark (DM)
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Germany are complete as listed, after dialing international access code: 011. Country code is 49; listed local numbers include city code.

U.S. EMBASSY - BONN

American Embassy	
Deichmannsaue	Tel: 49-228-339-1
5300 Bonn 2	Fax: 49-228-339-2125
Federal Republic of Germany	Tlx: 885-452

Science Counselor Edward M. Malloy

GERMANY

ENERGY

Population	1987	59.2 million
Electric Power Plant Capacity	1987	95.5 GWe 20% nuclear
	1988	97.2 GWe 22% nuclear
	1990	98.7 GWe 23% nuclear
	1995	101.1 GWe 23% nuclear
Electric Power Production	1987	418.3 TWh 54% coal 31% nuclear 7% gas 5% hydro/geoth. 3% oil
	1988	34% nuclear
	1990	37% nuclear
	1995	36% nuclear

NUCLEAR POWER

Nuclear Power Plant Capacity	1989	22.7 GWe
	1990	22.7 GWe
	2000	22.7 GWe
Reactor Mix	1986	PWR: 14 (1972-88) BWR: 7 (1972-85) FBR: 1 (1990) HTR: 1 (1987)

GERMANY

INDUSTRIAL FUEL CYCLE

Policy: Full commercial capability--enrichment; fuel fabrication; plutonium recycle to FBRs and LWRs. Reprocessing is to be handled by foreign plants.

Waste Management Strategy: Vitrification of HLW (by foreign plants) and interim storage of HLW glass for at least 10 years; disposal of reprocessing wastes in salt-dome repository; disposal of reactor and decommissioning wastes in abandoned iron mine or salt repository.

Cumulative Spent Fuel

Arising (LWR)	1985	1,800 tU
	1990	3,800 tU
	2000	8,950 tU

Cumulative Waste Arisings

2000	196,300 m ³ conditioned, radioactive waste with negligible heat production
	5,800 m ³ conditioned, radioactive waste with heat production

Industrial-Scale Activities

- Uranium mining and milling (tU/a): 100.
Uranium enrichment (tSWU/a): 1985--100, 1986--400.
- Fuel fabrication
 - UO₂ fuel: 950 tU/a
 - MOX fuel: either 40 tHM/a for LWR fuels or 10 tHM/a for FBR fuel elements (ALKEM).
- AFR spent fuel storage
 - 1,500 t, dry storage (Gorleben), startup 1988.
 - 1,500 t, dry storage (Ahaus), startup 1989.

GERMANY

Major Milestones

- Acceptance of HLW from Cogema/La Hague 1993
- Konrad (iron mine) repository 1993
- Gorleben repository, HLW 2008

INTERNATIONAL RELATIONSHIPS

DOE/BMFT Umbrella Agreement for Cooperative Radioactive Waste Management Technology Exchange

Term: 12-20-74 to 12-31-89 (In the process of being extended.)

Scope: Geologic disposal in salt deposits; retrievable surface storage; D&D; operational aspects of LL/ILW storage and disposal; transportation.

Emphasis: Waste treatment technology (design/operation of HLW vitrification pilot plants, conditioning of LLW/TRU wastes, waste form characterization), waste package development; collaboration in in-situ tests in FRG's Asse salt mine; U.S. observation of shaft drilling at the Gorleben repository site; cooperation in tests of transport/storage casks and in waste transportation studies.

DOE/BMFT Implementing Agreement for HLW Immobilization Studies

Term: 11-28-84 to 11-28-90.

Scope: Plant design, construction and operation; fabrication at PNL of heat-and-radiation sources simulating HLW glass canisters, for FRG tests at Asse.

DOE/BMFT Agreement in the Field of Remote Systems Technology

Term: 04-24-87 to 04-24-92.

Scope: Exchange of information regarding R&D, demonstration and operational activities in the field of remote/offgas technology.

GERMANY

ORGANIZATION

- **Federal Government**
 - **Coordinate FRG nuclear program**
 - **Sponsor R&D**
 - **Build and operate radioactive waste disposal facilities**
 - **Set licensing rules**
- **States (Länder)**
 - **License nuclear installations**
 - **Provide LLW interim storage area**
- **Utilities**
 - **Provide spent fuel/reactor waste storage, contract for reprocessing and waste treatment**
 - **Pay for waste disposal**

GERMANY

GOVT. RESPONS. -- NUCLEAR FUEL CYCLE/WASTE MGT.

BMFT (Federal Ministry for Research and Technology)

- **Government Fuel Cycle/Waste Management Program Administration**

-- GSF/IFT

- **FRG Geologic Waste Disposal R&D**
- **Supporting Lab Work - Salt Properties**
- **Asse II Studies**

-- KfK

- **LWR/FBR Spent Fuel Reprocessing R&D**
- **LWR Fuel Cycle Waste Treatment/Packaging R&D**
- **LWR Spent Fuel Management Alternatives R&D**
- **HLW Vitrification R&D - PAMELA Support**

-- KFA

- **HTGR Fuel Cycle**
- **Waste Treatment**

-- DBE

- **Emplacement**
- **Backfill/Sealing R&D**
- **Safety Analysis**

GERMANY

**GOVT. RESPONS. -- NUCLEAR FUEL CYCLE/WASTE MGT.
(contd)**

BMWI (Federal Ministry for Economics)

- BGR
 - Geologic Survey
 - Salt Dome Repository R&D (Salt Properties, Rock Mechanics)

BMU (Fed. Ministry-Environmental Protection/Reactor Safety)

- Supervision of State Licensing Procedures
- Nuclear Safety/Radiation Protection

- RSK (Reactor Safety Commission)

- SSK (Radiation Protection Commission)

- BfS
 - Transportation/Storage/Licensing
 - Responsibility for Repository Construction/Operation

- DBE
 - Construction/Operation (Repositories)
 - Gorleben and Konrad Projects

LÄNDER (State Governments)

- Licensing of Nuclear Installations

INDUSTRIAL/UNIVERSITY RESPONSIBILITIES

DWK - Owned by FRG nuclear utilities

- **Construction of Spent Fuel Conditioning Plant at Gorleben (PKA)**

-- WAK - DWK Subsidiary

- **Reproc. Pilot Plant**
- **DWK R&D Program Mgt.**
- **Operation of PAMELA Pilot Plant**

NUKEM - Owned by Degussa (35%), RWE (45%), RTZ (10%), MG (10%)

- **LLW/TRU Waste Treatment R&D Facility Design**
- **R&D--Spent Fuel Packaging for Disposal**

GNS - Owned by Nuclear Utilities (80%), STEAG (20%)

- **Waste Treatment/Conditioning**
- **Transportation of Radioactive Materials**
- **Shipping Cask Development**
- **Engineering & D&D Services**

-- BLG - GNS Subsidiary

- **Operation of Gorleben Spent Fuel/LLW Storage Facilities**

-- BZA - GNS Subsidiary

- **Operation of Ahaus Spent Fuel Interim Storage Project**

NCS - Nuclear Cargo Service

- **Transportation of Radioactive Materials**

SBH - Owned by Siemens AG

- **Fabrication of Uranium/MOX Fuels, including R&D/Waste Management**

TUM - Technical University Munich

- **Actinide Chemistry R&D**

GERMANY

BAM (Federal Materials Research/Testing Institute)

Bundesanstalt für Materialforschung
und -prüfung (BAM)

Unter den Eichen 87

1000 Berlin 45

Federal Republic of Germany

Tel: 49-30-8104-1

Fax: 49-30-8112-029

BfS (Federal Institute for Radiation Protection)

Bundesamt für Strahlenschutz

Postfach 10 01 49

3320 Saltzgitter 1

Federal Republic of Germany

Tel: 49-5341-188-0

Fax: 49-5341-188-188

Chief Executive

Prof. Dr. Alexander Kaul

Department

Nuclear Waste Disposal/
Transport (Braunschweig)

Tel: 49-531-592-7600

Fax: 49-531-592-7614

Director

Mining Safety

Dir., Div. Project Mgt.

Dir., Div. Waste Disposal
Safety

Radioactive Waste

Geoscience

Radiology and Radiation
Protection

System Analysis

Dir., Div. Transport/Storage
of Radioactive Materials

Prof. Dr. Helmut Röthemeyer

Gert Wosnik

Henning Rösel

Prof. Dr. Horst Schneider
49-531-592-7620

Dr. Ernst Warnecke

Dr. Gerhard Stier-Friedland

Dr. Dietrich Ehrlich

Dr. Heinrich Illi

Prof. Dr. Wilhelm Collin

Function: Execution of the federal responsibilities concerning radiation protection, nuclear safety, radioactive waste disposal and transport/storage of radioactive materials, in particular the responsibility of construction and operation of repositories.

BfS (contd)**Facilities**

- **Gorleben Site** (planned repository), 100 km northeast of Braunschweig.
Mission: Disposal of all types of solid radioactive waste.
Repository Concept: 300 to 600 m deep boreholes in tunnel floors at depths of about 850 m in the Gorleben salt dome.
Milestone: Startup of disposal, 2008.
- **Konrad Site** (planned repository in a former iron ore mine), 10 km southwest of Braunschweig.
Mission: Disposal of waste with negligible thermal impacts on host rock formation.
Milestone: Startup of disposal, 1994/95.

**BGR (Federal Institute for Geosciences
and Natural Resources)**

Bundesanstalt für Geowissenschaften
und Rohstoffe

Stilleweg 2, Postfach 510153

3000 Hannover 51

Federal Republic of Germany

Tel: 49-511-643-0

Fax: 49-511-643-2304

Director, Division 2,
Tech. Environmental Geology

Prof. Dr. Helmut Venzlaff

Director, Subdivision,
Engin. Geology/Geotechniques

Prof. Dr. Michael Langer

Rock Mechanics

Prof. Dr. A. Pahl

Engineering Seismology

Dr. R. Lüdeling

Salt Mechanics

Dr. H. Albrecht

Mining Rock Mechanics

Dr. D. Meister

Salt Geology

Dr. W. Jaritz

Numerical Modeling

Dr. Manfred Wallner

Hydrogeology

Dr. H. Vierhuff

Groundwater Geophysics

Dr. W. Giesel

Function: Responsible to BMWI for all geological/geo-technical aspects related to planning, construction/operation of a final repository for radioactive wastes; also conducts special research for BMU.

GERMANY

BMFT (Federal Ministry for Research and Technology)

Bundesministerium für Forschung
und Technologie

Heinemannstrasse 2

Postfach 200240

5300 Bonn 2

Federal Republic of Germany

Tel: 49-228-591

Fax: 49-228-59-3605

Minister, Science/Technology
Director General, Energy/

Environment/Raw Materials

Director, Energy Sci. Tech.

Fuel Cycle/Safeguards

Waste Mgt./D&D

U Supply/Fuel Fabrication

U Enrichment

Waste Disposal

Direct Disposal

Geological Disposal

Dr. Heinz Riesenhuber
Dr. Walter Borst

Dr. Knut Bauer
Dr. Rolf-Peter Randl
49-228-59-3759

Dr. Stefan Theis
49-228-59-3754

Dr. Ernst Budde
49-228-59-3757

Dr. A. H. Remagen
49-228-59-3755

Dr. Diethard Lummerzheim
49-228-59-3762

Dr. S. Riotte
49-228-59-3764

W. Busch
49-228-59-3764

BMU (Federal Ministry for Environmental Protection and Reactor Safety)

Bundesministerium für Umwelt,
Naturschutz und Reaktorsicherheit

Husarenstrasse 30

5300 Bonn 1

Federal Republic of Germany

Tel: 49-228-305-0

Fax: 49-228-305-2899

Minister

Dir. Gen., Nuc. Installation

Safety/Radiation Protection/

Nuclear Fuel Cycle

Dir., Nuc. Installation Safety

Prof. Dr. Klaus Töpfer
Walter Hohlefelder

Dr. Gast
49-228-305-2805

GERMANY

BMU (contd)

Director, Radiation Protection	Dr. von Ertzen 49-228-305-2905
Director, Fuel Cycle	Dr. Arnolf Matting 49-228-305-2950
Policy	Dr. Bröckling 49-228-305-2930
International Relations	Dr. Ch. Breest 49-228-305-2800
Fuel Supply	Arno Ehret 49-228-305-2831
Reprocessing/Conditioning	Armin Hagen 49-228-305-2821
Treatment/Storage/Transp.	Herbert Dreisvogl 49-228-305-2721
Final Repository	Dr. Manfred Bloser 49-228-305-2951
Chairman, Reactor Safety Commission (RSK)	Dr. Mayinger
Chairman, Radiation Protection Commission (SSK)	Prof. Dr. A. M. Kellerer

DBE (German Company for Construction and Operation of Waste Disposal Facilities)

Deutsche Gesellschaft zum Bau
und Betrieb von Endlagern
für Abfallstoffe mbH

Woltorfer Strasse 74

3150 Peine 1

Federal Republic of Germany

Tel: 49-5171-43-1

Fax: 49-5171-43-218

Managing Directors

Dr. Jürgen P. Lempert
Manfred Florl

Project Gorleben, Mgr.

Dr. Hans-Jürgen Krug
Wolfgang Schulz
49-5171-43-250

Project Konrad, Mgr.

Rüdiger Putzer
49-5171-43-310

Project-Related R&D, Mgr.

Dr. Hans-Jürgen Engelmann
49-5171-43-272

GERMANY

DBE (contd)

Activities: Conceptual design of repositories, site investigations, construction of surface/subsurface facilities for repositories: heat-related stress analyses, development of emplacement techniques, construction of emplacement equipment, risk assessments, safety analysis operational/post-operational phases (long-term calculations), design/construction of engineered barriers.

DHI (German Hydrographic Institute)

Deutsches Hydrographisches Institut
Isotopenlaboratorium
Bernhard-Nacht-Str. 78

P.O. Box 220

2000 Hamburg 4

Federal Republic of Germany

Tel: 49-40-3190-1

Fax:

Tlx: 21-1138 BMVHH D

President

Prof. Gerhard Zickwolff

DWK (German Fuel Reprocessing Company)

Deutsche Gesellschaft für Wiederaufarbeitung

von Kernbrennstoffen mbH

Hamburger Allee 4, Postfach 1407

3000 Hannover 1

Federal Republic of Germany

Tel: 49-511-3390-0

Fax: 49-511-3390-207

Board Member/Plant Operations

R&D/Cooperation Division

Dr. Walter Weinländer

Dr. Karl-Dieter Kuhn

49-511-3390-676

Project Direction, PKA

Dr. Hans-Otto Willax

Function: Planning, acquisition, construction and operation of facilities as well as performing services involved in the back end of the fuel cycle. Major organizational and functional changes have recently taken place and are expected to be completed during 1990.

DWK (contd)

Facility:

- **PKA Pilot Fuel Conditioning Plant (Gorleben)**
Mission: Conditioning and encapsulation of spent fuel to meet the requirements for interim storage and final disposal.
Design Basis: Hot cell with installations for rod consolidation, compaction of fuel assembly skeletons, loading of canisters.
Maximum throughput 35 tHM/yr.
Milestone: Startup, 1994.

GNS (Company for Nuclear Service)

Gesellschaft für
Nuklear-Service mbH
Goethestrasse 88
4300 Essen 1
Federal Republic of Germany

Tel: 49-201-7220-0
Fax: 49-201-7220-181

Managers

Dr. Henning Baatz
Dr. Klaus Janberg
49-201-7220-102
Norbert Semann

Function: Service to nuclear facilities, including waste treatment/conditioning, transportation of radioactive materials, shipping cask development and facility dismantling.

Ownership: 80% nuclear utilities, 20% STEAG.

Facility:

- **AFR Spent Fuel Storage Facilities (Gorleben and Ahaus sites)**
Design Basis: Dry storage in CASTOR casks - 400 casks in a building which has dimensions of 600 ft x 125 ft x 62 ft high.
Capacity: 1500 t each.
History: Startup of AFR Gorleben, 1988; Ahaus, 1989.

GERMANY

GRS (Company for Reactor Safety)

Gesellschaft für
Reaktorsicherheit mbH
Schwertnergasse 1
5000 Köln 1
Federal Republic of Germany

Tel: 49-221-2068-0
Fax: 49-221-2068-442

General Manager

Prof. Dr. Adolf Birkhofer

Function: Provide technical support to BMU and other regulatory/licensing entities concerned with reactor safety issues.

**GSF/IFT (Company for Radiation and Environmental Research/
Institute for Underground Storage)**

Gesellschaft für Strahlen- und
Umweltforschung mbH München,
Institut für Tief Lagerung
Theodor-Heuss-Strasse 4
3300 Braunschweig
Federal Republic of Germany

Tel: 49-531-8012-1
Fax: 49-531-8012-200

Director, GSF/IFT and
Director, Disposal Technology
Engineering Development
Geotechnology
Test Fields
Geophysics
Director, Disposal Safety
Safety Analysis
Chemical Waste
Geochemistry
Geology/Hydrogeology
Director, Project Management
ILW/HLW Projects
Direct Disposal Project
Asse Projects
Konrad/Gorleben Work
Test Dam Project
Long-Term Safety Projects
Director, Mine Operations

Prof. Dr. Klaus Kühn
49-531-8012-231
Alfred Beinlich
Manfred W. Schmidt
Tilman Rothfuchs
Dr. Dieter Flach
Dr. Wernt Brewitz
Dr. Richard Storck
Dr. Thomas Brassler
Dr. Hermann J. Gies
Dr. Konrad Klarr
Dr. Rolf Stippler
Dr. Ingo Müller-Lyda
Jürgen Kunze
Christoph Starke
Dr. Wolfgang Bode
Dr. Helmut Fleck
Dr. Peter Faber
Klaus Dürr
49-531-8012-211

GERMANY

GSF/IT (contd)

Waste Management R&D: Development and testing of safe, final geological storage for radioactive wastes, and of data for planning, constructing and operating repositories.

Schachtanlage Asse

3346 Remlingen

Federal Republic of Germany

Tel: 49-5336-891

Mine Manager

Oswald Opp

Tech. Planning

Helmut Kolditz

Radiation Protection

Herbert Meyer

Facilities:

- **Asse II Salt Mine** (12 km southeast of Wolfenbüttel)
Mission: In situ testing and disposal technology development for a salt dome repository; through 1978, disposal of LLW and ILW.
History: Startup, 1967.
- **Chemical and Hydrology Laboratories** (Braunschweig)
- **Rock Mechanics Laboratory** (Braunschweig)

KEWA (Fuel Cycle Consulting Company)

KEWA Kernbrennstoff

Wiederaufarbeitungstechnik GmbH

Hamburger Allee 4

Tel: 49-511-3390-0

3000 Hannover 1

Fax: 49-511-3390-699 or

Federal Republic of Germany

49-511-3390-207

Executive

Hanns-Rudolf Oeser

49-511-3390-601

Function: Consulting and design services in the area of reprocessing and waste treatment of LWR fuel elements and related technology such as remote handling, environmental protection, safety techniques and others. KEWA is a DWK subsidiary.

GERMANY

KFA (Jülich Research Center)

Forschungsanlage Jülich GmbH
Postfach 1913
5170 Jülich
Federal Republic of Germany

Tel: 49-2461-610
Fax: 49-2461-61-5327

Director, Institute of
Chemical Technology (ICT)

Prof. Dr. Erich R. Merz
49-2461-61-3114

Director, Institute of
Reactor Materials (IRW)

Prof. Dr. Hubertus Nickel
49-2461-61-3058

HTGR Fuel Cycle Project
(HTA/HBK)

Dr. Norbert Kirsch
49-2461-61-6991

ILW/Spent Fuel HTGR Fuel

Dr. Heiner Brücher
49-2461-61-6409

Waste Treatment (ZFK-DE)

Dr. Manfred Laser
49-2461-61-5288

Quality Assurance (PKS)

Dr. Reinhard Odoj
49-2461-61-3058

Function: Develop advanced waste management procedures.

Activities: Hot cell experiments dealing with the development of advanced ILW/HLW conditioning processes; characterization of waste products/packages; conditioning of radioactive wastes generated from research center; development/demonstration of quality assurance measures for waste packages; retrievable in-situ testing of ILW disposal techniques in Asse salt mine including direct disposal of HTR fuel elements; LLW incineration using Jülich furnace design; HTR fuel reprocessing R&D terminated 1987; FIPS (HLLW vitrification facility) closed down 1987.

GERMANY

KfK (Karlsruhe Nuclear Research Center)

Kernforschungszentrum Karlsruhe GmbH

Postfach 3640

7500 Karlsruhe 1

Federal Republic of Germany

Tel: 49-7247-821

Fax: 49-7247-82-5070

(Convenient route from U.S. is by plane to Frankfurt, then by train or car to Karlsruhe.)

Manager, Waste
Management Project (PWA)

Dr. Reinhard Kroebel
49-7247-82-2032

Fax: 49-7247-82-4315

Manager, Waste Treatmt. (HDB)

Wolfgang Pfeifer
49-7247-82-4050

Manager, Alternative SF Mgt./
Disposal Techniques

Dr. Klaus-Detlef Closs
49-7247-82-5790

Director, Inst. for Hot Chem.

Prof. Klaus Ebert
49-7247-82-2400

Deputy Director

Dr. Gunter Koch
49-7247-82-2405

Director, Institute for Nuc.
Waste Tech. (INE)
Final Disposal

Dr. Helmut Krause
49-7247-82-2230

Dr. R. Koester
49-7247-82-2302

Chemistry

Dr. Werner Lutze
49-7247-82-4457

Process Engineering

Dr. S. Weisenburger
49-7247-82-4288

Director, Institute for
Radiochemistry (IRCh)
Director, Ctrl. Eng. Dept. (IT)

Prof. Ache
49-7247-82-3200

Dr. Hermann Rininsland
49-7247-82-3000

Remote Handling

G. Boehme
49-7247-82-2600

Director, Lab. for Aerosol
Phys./Filter Tech. (LAF II)

J. Wilhelm
49-7247-82-3107

GERMANY

KfK (contd)

Facilities:

- **MILLI Hot Cell Facility (fuel reprocessing)**
Mission: LWR and FBR fuel reprocessing R&D.
- **MINKA Hot Glove Boxes (U and Pu)**
Mission: Extraction code verification for pulsed columns and maloperation experiments.
Design Basis: Small scale pulse columns first extraction cycle.
History: U startup, 1985; Pu startup, 1986.
- **PUTE Hot Facility (fuel reprocessing)**
Mission: U/Pu Separation.
Design Basis: Pulsed Columns, Electr. Chem. Reduction.
History: Startup, 1982.
- **PASSAT Facility**
Mission: Development and testing of DOG filters.
Design Basis: Packed fiber mist eliminators, HEPA-filter, iodine-filter.
History: Startup, 1978 (program completion, 1990/91).
- **BEATE Facility**
Mission: Aerosol source term destination and VOG-behavior.
Design Basis: Stirring and transport of liquids by air and steam.
History: Startup, 1983 (program completion, 1990/91).
- **Ceramic Melter (nonradioactive)**
Mission: HLW vitrification process development with ceramic melter for the PAMELA pilot plant.
Design Basis: Liquid-fed, joule-heated melter;
PAMELA capacity: 30 liter/h HLLW or 30 kg/h glass.
History: Startup, PAMELA melter -- 1976;
Mark 1 -- 1985, hot; Mark 2 -- 1990, cold.
- **Waste Concreting Plant (radioactive)**
Mission: Immobilize KfK ILW.
Design Capacity: 2.5 t/d waste.
History: Startup, 1977.

GERMANY

NUKEM

NUKEM GmbH
Industriestrasse 13
P.O. Box 1313
8755 Alzenau
Federal Republic of Germany

Tel: 49-6023-500-0
Fax: 49-6023-500-214

Managing Directors

Process Engineering
Fuel Cycle Services
Non-Destructive Testing
Environmental Technology
System Manufacturing
Solar Energy Technology

Bernd Jobst Breloer
L. Aumüller, H. Pirk
H.W. Binzel
K. Schreiber
Dr. R. Gerhardt
Dr. P.G. Maurer
H. Wagner
Dr. W. Hoffmann

Function: Nuclear fuel cycle services; environmental technology, hazardous waste/toxic residues treatment; off-gas/exhaust gas treatment, mist eliminator filters; general/nuclear process engineering, safety engineering, container systems.

SBH

Siemens AG Brennelementewerk Hanau
Postfach 110060
6450 Hanau 11 (Wolfgang)
Federal Republic of Germany

Tel: 49-6181-58-0
Fax: 49-6181-58-3502

Director

Horst Roepenack
49-6181-58-4600

Fabrication Manager

Jürgen Krellmann
49-6181-58-4599

Chemistry/Waste Management

Dr. Volker Schneider
49-6181-58-4590
Dr. F.-W. Ledebink
49-6181-58-4169

Function: Fabrication of uranium fuel for BWR/PWR and MOX for BWR/PWR/SBR, including R&D/waste management.

GERMANY

SBH (contd)

Facility:

- **Fuel Fabrication Plant**

Capacity: MOX - 40 t/a, LWR fuel; 10 t/a, FBR fuel;

LEU - 800 tHM/a.

TUM (Technical University Munich)

Technische Universität München

Institut für Radiochemie

Walther-Meissner-Strasse

8046 Garching (München)

Federal Republic of Germany

Tel: 49-89-3209-220

Fax: 49-89-3209-2204

Director

Prof. Franz Baumgärtner

WAK (Fuel Reprocessing Company)

Wiederaufarbeitungsanlage Karlsruhe

Betriebsgesellschaft mbH

Postfach 220

7514 Eggenstein-Leopoldshafen 2

Federal Republic of Germany

Tel: 49-7247-2881

Fax: 49-7247-4755

(WAK and the WAK plant are located on the site of the Karlsruhe Nuclear Research Center. WAK is a subsidiary of DWK.)

Chief Executive

Dr. K. L. Huppert

49-7247-88-2507

Reprocessing Plant Manager

Dr. Martin Weishaupt

Facilities:

- **WAK Reprocessing Plant (owned by KfK)**

Mission: Reprocess UO_2 and MOX fuels; recover plutonium for recycle; test advanced technology.

Design Basis: Chop-leach head-end; PUREX process; capacity, 175 kgHM/d.

History: On-line from 9/71 to early 1980, when it was shut down for dissolver replacement. Operation resumed, October 1982.

Total throughput to 1989, 203 tHM (130 tHM from LWR fuel).

WAK (contd)

- **TEKO Hall** (cold semi-works, owned by KfK)
Mission: Test fuel cycle components and unit operations; currently being equipped for fuel reprocessing studies.
Design Basis: Shear, centrifuge, solvent extraction battery; capacity: 4 tHM/d.

Manager

Dr. Lorenz Finsterwalder

- **PAMELA Pilot Plant*** (Mol, Belgium--ownership transferred to Belgoprocess in 1986; operated by WAK/Belgoprocess team)
Mission: Demonstrate ceramic melter and VITROMET production with stored Eurochemic HLLW.
Design Basis: Liquid-fed ceramic melter, 0.72 m² surface area; capacity, 36 liters/h feed, 25 kg/h glass (3 canisters/d @ 150 kg glass/canister); product, borosilicate glass blocks, 0.3 m dia by 1.2 m high.
History: Hot operation, startup 1985 (KfK development). As of December 1989: 531 m³ waste vitrified, 1791 canisters filled.

DWK-PAMELA

c/o Belgoprocess

Gravenstraat

2480 Dessel, Belgium

Tel: 32-14-244-501

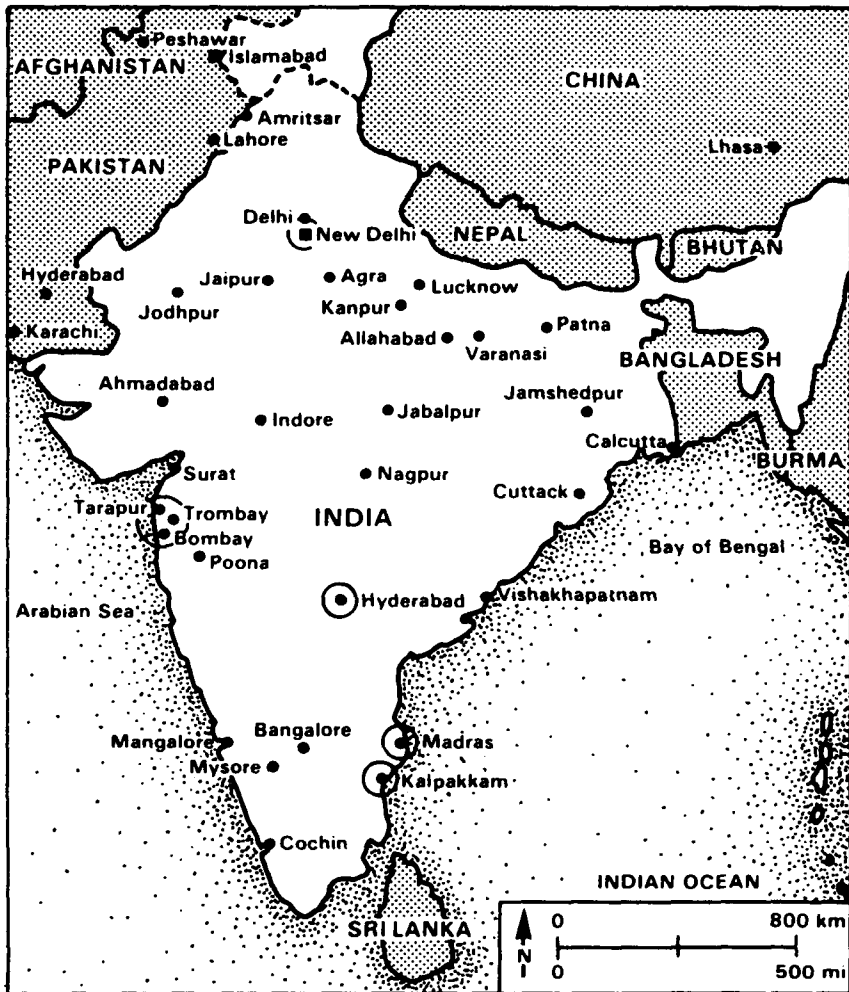
Fax: 32-14-319-497

PAMELA Plant Manager

Horst Wiese

* As of 4/1/90 under WAK (previously a DWK facility).

INDIA



INDIA

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Aug.	Raksha Bandhan
Jan. 26	Republic Day	Aug. 14	Janmashtami
Feb.	Vasanta	Aug. 15	Independence
Feb.	Maha Sivarati	Sept.	Anant Choudas
Mar. 10	Holi	Sept. 28	Dusehra
Mar.	Dulhendi	Oct.	Bhaiya Dooj
Apr. 27	Durga Ashtmi/ Idu'l Fitr	Oct. 2	Gandhi's Birth
Apr. 28	Muharram	Oct. 18	Diwali
Apr. 29	Mahavir Jayanti	Oct. 18	Fest. of Lights
Apr. 13	Baisakhi	Nov. 2	Guru Nanak's Birthday
May 9	Buddha Purima	Dec.	Singh's Birth
July 4-6	Sacrifice Feast	Dec. 13	Bank Holiday
July 25	Islamic New Year	Dec. 25	Christmas

TIME

Standard Time Washington D.C.: + 10.5 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to India. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 16.89 Rupees

per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

U.S. EMBASSY - NEW DELHI

American Embassy
Shanti Path
Chanakyapuri
New Delhi, 110021
India

Tel: 91-11-600-651
Fax: 91-11-672-476
Tlx: 031-65269 USEM IN

Science Counselor

Peter Heydemann

INDIA

ENERGY

Population	1987	815 million
Electric Power Plant Capacity	1986	45 GWe
	2000	100 GWe
Electric Power Production	1988	180 TWh 58% coal 33% hydro 6% oil 3% nuclear
	2000	10% nuclear

NUCLEAR POWER

Policy: Heavy dependence on nuclear power to augment the nation's electric power generating capacity. A three-phase program--first phase, reactors fueled with natural uranium; second phase, FBRs fueled with Pu produced by first-phase reactors; third phase, self-sustaining thorium-uranium cycle reactors.

Nuclear Power Plant Capacity	1989	1.5 GWe	
	1990	1.7 GWe	
	1995	3.7 GWe	
	2000	4.4 GWe	
Reactor Mix	1989	BWR: 2 (1969)	
		HWR: 5 (1973-89)	
		5 (1990-95)	
Reactor Development	1985	FBR	12-15 MWe test unit
	Late 1990s	FBR	500 MWe commercial

INDUSTRIAL FUEL CYCLE

Policy: Achieve self-sufficiency in CANDU-type fuel cycle--uranium milling, conversion to UO_2 , fuel fabrication, reprocessing (in small plants adjacent to power stations); if enriched UF_6 supply for India's BWRs is cut off, they may fuel with UO_2 - PuO_2 .

INDIA

Waste Management Strategy: Vitrification of HLW, interim storage for at least 20 years and disposal in a crystalline rock formation.

Cumulative Spent Fuel	1980	370 tU
Arisings (LWR and HWR)	1985	780 tU
	1990	1,580 tU
	2000	5,000 tU

Cumulative Waste Arisings	<u>1982</u>	<u>2000</u>
Primary solid wastes	1,700 m ³	107,000 m ³
LLW concentrates	2,500 m ³	77,000 m ³
ILW	650 m ³	20,000 m ³
HLW	350 m ³	8,000 m ³

Industrial-Scale Activities

- Heavy-water design capacity (t/a): 1985--85, 1988--150; additional capacity is planned.
- Uranium mining and milling (t/a): 1985--130, 1988--170.
- UO₂ fuel fabrication (t/a): 1981--100; 1984--210; 2000--1500.
- Fuel reprocessing:
Trombay pilot plant, 30 t/a (1962--)
Tarapur plant, 100 t/a (1982--)
Kalpakkam plant, 100 t/a (1992/93).
- HLW vitrification: Tarapur (1985--)

Major Milestones

- | | |
|--|------|
| • Interim Storage Plant - Tarapur | 1990 |
| • Interim Storage/Waste Immobilization Plant | |
| - Trombay | 1989 |
| - Narora | 1989 |
| - Kalpakkam | 1993 |

INTERNATIONAL RELATIONSHIPS

Member of IAEA. Agreement with U.S. on peaceful nuclear cooperation.

India has not signed the non-proliferation treaty (NPT) and has generally resisted the imposition of safeguards by individual suppliers (this has led to difficulties with supply of enriched uranium, reactor equipment, and heavy water).

ORGANIZATION

Prime Minister

- **Department of Atomic Energy**
 - **Atomic Energy Commission**
 - **Atomic Minerals**
 - **Nuclear Fuels**
 - **Power Project Engineering**
 - **Research and Development**
 - **Reactor Research Center (Kalpakkam)**
 - **Fuel Cycle R&D**
 - **Waste Management**
 - **Atomic Research Center (Trombay)**
 - **Fuel Cycle R&D**
 - **Waste Management**

INDIA

BARC

Bhabha Atomic Research Centre Tel: 91-55-141711
Trombay, Bombay 400 085 Fax:
India Tlx: 011-71-017

Director	Dr. P. K. Iyengar
Director, Nuclear Safety Group	V. N. Meckoni
Waste Management Division	M. T. Samuel
Central. WM Facil., Kalpakkam	R. V. Amalraj
Radiol. Protection Division	K. G. Vohra
Director, Chem. Engineering Group	B. K. Garg
Fuel Reproc. Division	A. N. Prasad

Activities: BARC has five test reactors; radiochemistry and isotope laboratories; an isotope production and processing unit; pilot plants for production of heavy water, zirconium, titanium, etc.; a thorium plant; a uranium metal plant; a fuel reprocessing plant; the Fuel Irradiation and Processing Laboratory; and supporting facilities. Fuel cycle R&D includes fuel reprocessing, HLW solidification, treatment of alpha-emitting wastes (incineration, wet oxidation, decontamination, and immobilization of cladding hulls), D&D, and waste isolation in geologic formations.

Facilities:

- **Trombay Fuel Reprocessing Plant**
Mission: Reprocess natural uranium metal fuels.
Design Basis: Chemical declad, PUREX flowsheet; contact maintenance; capacity, 0.1-0.15 tHM/d.
History: On-line, 1965-1974; modified and being readied to operate again.
- **WIP (Waste Immobilization Plant) - Trombay**
- **HLW Vitrification Plant**
Startup construction, 1981; commissioning, 1990.
- **Experimental Uranium Enrichment Facility**

DAE

Department of Atomic Energy
Chhatrapati Shivaji Maharaj Marg
Bombay 400 039, India

Minister, Science/Technology M. G. K. Menon

Atomic Energy Commission (AEC)

Chairman Dr. P. K. Iyengar
Secretary K. V. Mahadeva Rao

Atomic Energy Regulation Board (AERB)

Chairman A. K. De (Inst. of Tech.)

Function: Regulation and licensing of nuclear facilities.

Nuclear Power Corporation (formerly Nuclear Power Board)

Function: Design, construction, and operation/maintenance of nuclear power stations. Help realize nation's goal of having 10,000 MWe of nuclear power on line by the year 2000.

IGCAR

Indira Ghandi Centre
for Atomic Research
Kalpakkam 603 102
Tamil Nadu, India

Tlx: 041-6244

Fast Breeder Reactor Centre C. V. Sundaram

Located near Madras power station.

Function: Fuel cycle R&D; FBR technology; reprocessing of FBR fuels.

INDIA

IGCAR (contd)

Facilities:

- **Fast Breeder Test Reactor**
- **Kalpakkam Fuel Reprocessing Laboratory**
Mission: Develop and test equipment and unit operations for FBR fuel reprocessing.

KOLAR WASTE DISPOSAL RESEARCH STATION

Located in the Kolar gold mine area near Bangalore, Karnataka State.

Function: Assess the suitability of peninsular gneisses for location of a repository (in situ studies).

Description: Tunnel extended from abandoned section of one of the Kolar gold mines into a neighboring gneissic formation.

History: Startup, late 1979.

MAPS

Madras Atomic Power Station
Kalpakkam, India

Function: Nuclear power production, fuel reprocessing and waste treatment, plutonium fuel fabrication for FBRs.

Facilities:

- **Fuel Reprocessing Plant Kalpakkam**
Mission: Reprocess spent fuel from the Kalpakkam reactors and from the 15-MW FBTR commissioned 1985.
Design Basis: PUREX process, with a separate line for FBTR mixed-carbide fuels; capacity, 0.5 tHM/d for PHWR fuels.
- **WIP (Waste Immobilization Plant)-Kalpakkam**
Startup construction, 1983; commissioning, 1993.
- **ISF (Interim Storage Facility)-Kalpakkam**

TARAPUR ATOMIC POWER STATION

Tarapur Atomic Power Station
Tarapur, Maharashtra, India

Function: Provide electric power, reprocess spent fuel from Tarapur reactors and immobilize the associated wastes.

Facilities:

- **Tarapur Fuel Reprocessing Plant (PREFRE)**
Mission: Reprocess natural and low-enriched UO_2 fuels.
Design Basis: Chop-leach head-end; PUREX flowsheet; contact maintenance; capacity, 0.5 tHM/d.
History: Construction completed, 1975; hot operation, 12/82.
- **WIP (Waste Immobilization Plant)-Tarapur**
Mission: Vitrify Tarapur HLW.
Design Basis: Two-step calcination and melting in drainable pot; capacity, 25 liters/h HLLW, 125 kg glass/canister, 1 canister/d; product, borosilicate glass blocks.
History: Construction completed, 1981. Hot startup, 1985.
- **SSSF (Solid Storage Surveillance Facility)**
Mission: Provide air-cooled storage for WIP products.
Design Basis: Stack-induced natural-draft air cooling; capacity for 20 years' storage of Tarapur and Trombay waste.
Milestone: Completion, 1990.
- **ILW Bituminization Plant**
- **Polymerization Facility**

ITALY



ITALY

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Jan. 6	Epiphany
Apr. 15-16	Easter
Apr. 25	Liberation Day
May 1	Labor Day
Aug. 15	Assumption
Nov. 1	All Saints
Dec. 8	Immaculate Conception
Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Italy; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1266 Lira
per Wall Street Journal, 01/03/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Italy are complete as listed, after dialing international access code: 011. Country code is 39; listed local numbers include city code.

U.S. EMBASSY - ROME

American Embassy
Via Veneto 119/A
00187 Rome
Italy

Tel: 39-6-4674-2
Fax: 39-6-4674-2356
Tlx: 62-2322 AMBRMA

Science Counselor

Reno L. Harnish

ITALY

ENERGY

Population	1987	58 million
Electric Power Plant Capacity	1987	56.5 GWe 2% nuclear
	1988	56.9 GWe 2% nuclear
	1990	59.2 GWe 2% nuclear
	1995	70.0 GWe 0% nuclear
	Electric Power Production	1987
	1988	0% nuclear
	1990	0% nuclear
	1995	0% nuclear

NUCLEAR POWER

Policy: The current national energy plan calls for abandonment of nuclear power, and increased use of coal and natural gas for electricity generation. Research into nuclear energy will continue but with a reduced R&D budget.

Nuclear Power Plant Capacity	1989	0.0 GWe
	2000	0.0 GWe
Reactor Mix	1989	PWR: 1 (1964)
		BWR: 1 (1981)
		HWR: 1 (1989)

INDUSTRIAL FUEL CYCLE

Waste Management Strategy: HLW--vitrify and store in engineered surface facility for 50-60 years; emplace canisters in geologic repository (clay).

ITALY

Cumulative Spent Fuel	1980	160 tU
Arising (LWR)	1985	330 tU
	1990	520 tU

INTERNATIONAL RELATIONSHIPS

Member of EC, IAEA, and OECD/NEA. A CEC Joint Research Center establishment is located in Northern Italy at Ispra. Participation in Eurodif and SuperPhenix projects. Cooperative agreement on HLW with Australia.

ORGANIZATION

- **ENEA (National Organization for Nuclear and Alternative Energy Sources)**--safety and regulatory; nuclear R&D (principally at Casaccia, Saluggia and Trisaia).
 - **DISP (Directorate for Nuclear Safety and Health Protection)**--safety inspection/control and Health/environment protection.
- **ENI**--government-owned oil and energy holding company which provides fuel cycle services.
- **Nucleco**--manages institutional and reactor LLW/ILW.
- **CIPE (Interministerial Committee for Economic Planning)**--designated regions where nuclear plants were to be located.
- **ENEL**--state-owned power utility.

AGIP

AGIP S.p.A
Viale Brenta, 29
20139 Milano
Italy

Tel: 39-2-520-1
Fax:
Tlx: 320192 AGN I

Dir., Nucl. Fuel Development Ing. Enrico Crispino

Function: Develop advanced technologies for use in several innovative applications pertaining to the nuclear field (and other non-conventional energy sources).

Facility:

- **Centre for Advanced Technologies (CeTA)**, located at Medicina, near Bologna.
 - Production of GSP (Gel-Supported Precipitation) precursors for application in the SYNROC system of liquid radioactive waste immobilization.
 - Fabrication and characterization of special oxide nuclear fuels.

**ENEA (National Organization for
Nuclear and Alternative Energy Sources)**

Energia Nucleare e Delle
Energie Alternative
Viale Regina Margherita 125
00198 Rome, Italy

Tel: 39-6-8528-1
Fax: 39-6-8528-2591
Tlx: 61183

President
Director General

Prof. Umberto Colombo
Dr. Fabio Pistella

Function: Direct pure and applied nuclear research, maintain technical control over nuclear power plants, cooperate in international program.

Owner: Government.

ITALY

ENEA-CASACCIA

ENEA-Casaccia Center
C.P. 2400
00100 Rome, Italy

Tel: 39-6-3048-3171
Fax: 39-6-3048-3190

Director, Fuel Cycle
Waste Management
Reprocessing

Dr. Paolo Venditti
Dr. B. Dello Vicario
Dr. G. Rolandi

Function: Applied research--advanced technology, fast breeder development; fuel cycle and alternative energies R&D.

Waste Management R&D: MOX fuel reprocessing, HLW solidification, actinide transmutation, treatment of LLW and characterization of waste forms, waste isolation in clay formations (site characterization and thermal properties).

ENEA-SALUGGIA

ENEA-Impianto Eurex
13040 Saluggia (Vercelli)
Italy

Tel: 39-161-48415
Fax:
Tlx: 38-0058 EURI

(Located about 35 km from Torino and 120 km from Milan.)

Director, Eurex Pilot Plant
Deputy Director, Eurex

Dr. Franco Pozzi
Dr. Arnoldo Hall

Function: Applied nuclear research.

Facilities:

- **EUREX** (fuel reprocessing pilot plant-radioactive)
Mission: Reprocess MTR and low-enriched uranium (including UO₂) fuels.
Design Basis: EUREX process for MTR fuel has capacity of 30 kg U-Al/d. Plant will be modified for LWR fuel.
History: Built and operated under a CNEN-Euratom convention 1964-1983. Startup, 1970. CANDU fuels from Canada processed in 1983. A unit will be added for MOX fuel reprocessing.

ENEA-SALUGGIA (contd)

- **IVEX** (HLW vitrification plant-radioactive) - Planned.
Mission: Immobilize EUREX HLW.
- **IFEC** (fuel element fabrication plant)

ENEA-TRISAIA

ENEA-Trisaia Center
S.S. 106 Ionica, km 419.5
75025 Rotondella (Matera)
Italy

Tel: 39-835-972241
Fax:
Tlx: 760085 ENEATR I

(Located about 5 km from the coast of the Ionian Sea in the Gulf of Taranto.)

Energy Research	Dr. G. Lapolla
ITREC Plant	Dr. T. Candelieri
Tech. Devel./Backend Fuel Cycle	Dr. A. Canonico
Vitrif. Plant Operations	Dr. E. Scoditti

Waste Management R&D: Fuel reprocessing; centrifugal contactor development; cladding hulls compaction; HLW vitrification; D&D; waste isolation (clay repositories); operation of inactive vitrification pilot plant; remote technology development for HLW and reprocessing, optimization of glass composition.

Facilities:

- **ITREC** (fuel reprocessing pilot plant-radioactive)
Mission: Special fuel reprocessing R&D; reprocess thorium and MOX (FBR) fuels.
Design Basis: Chop-leach head-end; maintenance by remote removal of modules; capacity, 15 kgHM/d (ThO₂ and UO₂).
History: Startup, 1975.

ITALY

ENEA-TRISAIA (contd)

- **IVET-1** (vitrification pilot plant-nonradioactive)
Owner: ENEA and AGIP.
Mission: Develop full-scale HLW vitrification process.
Design Basis: IVET-1 pot vitrification (rising-level process); capacity, 20 liters/h feed; product, borosilicate glass cylinders, 0.25 m dia x 1 m.
History: Startup, July 1980.
- **IVET-2** (HLW vitrification pilot plant-radioactive) - Planned.
Owner: ENEA.
Mission: Process development; solidify HLW from EUREX fuel reprocessing pilot plant.
Design Basis: Pot vitrification (rising-level process); capacity, 15 liters/h feed (2 canisters/wk) or 10 m³ HLLW/a; product, borosilicate glass cylinders, 0.25 m dia x 1 m.
History: Startup, late 1980s.

ENEL (National Electric Energy Agency)

Ente Nazionale per l'Energia Elettrica
Casella Postale 386 Tel: 39-6-85091
Via Giovan Battista Martini 3 Fax:
00198 Rome, Italy Tlx: 610518

President Franzo Viezzoli
Vice President Dr. Marcello Inghilesi
Director General Dr. Alberto Negroni

Government agency, responsible for all electric power production.

ENI

Ente Nazionale Idrocarburi
Piazza Enrico Mattei
00144 Rome Tel: 39-6-5900-1
Italy Fax: 39-6-5900-2141

President Dr. Gabriele Cagliari

Oil and energy holding company (owned by the government).
Provides nuclear fuel cycle services.

NUCLECO

Nucleco
Via Anguillarese 351
00060 Rome
Italy

Tel: 39-6-3046-302
Fax: 39-6-3048-3081

President

Ing. Silvio Cao

Function: Treat and dispose of low- and intermediate-level wastes from hospitals, laboratories, industrial establishments, and nuclear plants. Eventual plans include decommissioning work on nuclear installations.

Owner: Italian government (ENEA--40%; AGIP--60%).

SNIA TECHINT

Snia Techint
Tecnologie Energetiche
Avanzate S.p.A
Via A. Bargoni 34
00153 Rome
Italy

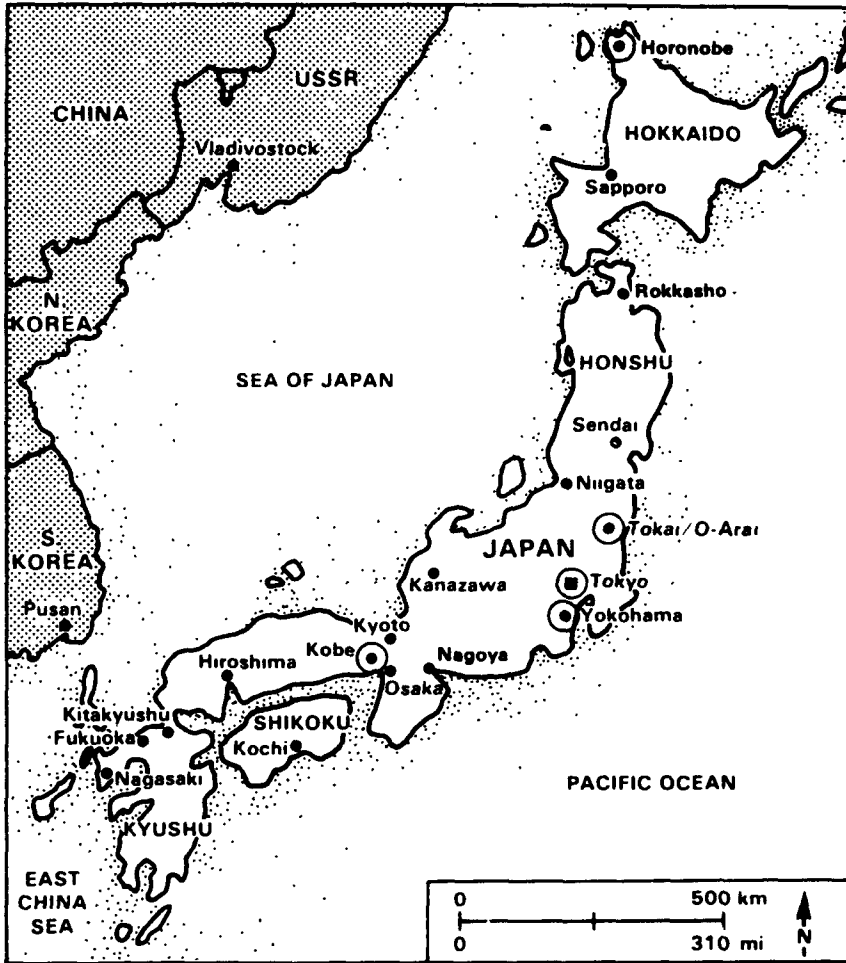
Tel: 39-6-589-4041
Fax: 39-6-580-9058

General Manager

Dr. Marino Fiorelli

Function: Provide architect-engineering services for reprocessing, fuel handling and HLW conditioning facilities.

JAPAN



JAPAN

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Sept. 15	Respect for the Aged
Jan. 15	Adult's Day	Sept. 23	Autumnal Equinox
Feb. 11	National Foundation	Oct. 10	Sports Day
Mar. 21	Vernal Equinox	Nov. 3	Culture Day
Apr. 29	Greenery Day	Nov. 23	Labor Thanksgiving
May 3	Constitution	Dec. 23	Emperor's Birthday
May 4	Peoples' Day	Dec. 29-	Govt. Off Season
May 5	Children's Day	Jan. 3	

TIME

Standard Time Washington D.C.: + 14 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; a visa is currently not required for a visit to Japan. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 145.30 Yen

per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Japan are complete as listed, after dialing international access code: 011. Country code is 81; listed local numbers include city code.

U.S. EMBASSY - TOKYO

American Embassy

10-1, Akasaka 1-chome, Minato-ku
Tokyo 107
Japan

Tel: 81-3-224-5000
Fax: 81-3-505-1862
Tlx: 24-22118 AMEMBJ

Science Counselor
DOE Representative

Dr. Richard W. Getzinger
Milton A. Eaton

JAPAN

ENERGY

Population	1987	122.1 million
Electric Power Plant Capacity	1987	151.7 GWe 17% nuclear
	1988	154.5 GWe 17% nuclear
	1990	161.9 GWe 18% nuclear
	1995	181.0 GWe 21% nuclear
Electric Power Production	1987	719.1 TWh 28% oil 26% nuclear 20% gas 15% coal 11% hydro/geoth.
	1988	27% nuclear
	1990	30% nuclear
	1995	36% nuclear

NUCLEAR POWER

Policy: Strong nuclear power program to lessen dependence on foreign energy sources--install LWRs for near-term needs; develop advanced HWR (ATR); aim for commercial FBR operation, ~2020-2030. Supply domestic needs and build export business.

Nuclear Power Plant Capacity	1990	29.4 GWe
	1995	38.5 GWe
	2000	50.4 GWe
Reactor Mix	1988	GCR: 1 (1966) BWR: 19 (1970-88) 10 (1990-99) PWR: 18 (1970-89) 5 (1991-97) HWR: 1 (1979) FBR: 1 (1993)
Reactor Development		HWR (ATR), LMFBR, HTGR

JAPAN

INDUSTRIAL FUEL CYCLE

Policy: Obtain ownership of foreign uranium resources; develop complete fuel cycle capability (enrichment, reprocessing and waste treatment, buying foreign reprocessing services as long as necessary); recycle Pu to FBRs, HWRs, and LWRs.

Waste Management Strategy: HLW--vitrify with borosilicate glass, store for 30-50 years and dispose in geological formations. LLW--disposal on land, and at sea if politically feasible.

Cumulative Spent Fuel	1980	1,200 tU	
Arising (LWR)	1985		3,600 tU
	1990	7,500 tU	
	1995	12,400 tU	

Industrial-Scale Activities (Capacity)

- Uranium mining and conversion (tUF₆/a): 200
- Uranium reconversion (tU/a): 1,028
- Uranium enrichment (tSWU/a): 1981 -- 50
1988 -- 250
2000 -- 3000
- Fuel fabrication
 - UO₂ (tU/a): 1987 -- 2495
 - MOX--FBR (t/a): 1988 -- 6
 - ATR (t/a): 1988 -- 10
1993 -- 50
- Reprocessing (t/a): 1981 -- 210
2000 -- 800

Major Milestones

- Tokai Vitrification Facility (PNC) 1992
- Return of HLW from COGEMA and BNFL 1992
- MONJU LMFBR 1992
- Commercial uranium enrichment plant (Rokkasho-mura; FEPC/JNFI) ~1991
- Underground Research Laboratory ~1992
- HLW glass storage facility (Horonobe-PNC) 1992
- Commercial LWR fuel reprocessing plant (Rokkasho-mura; JNFS) ~1995
- Selection of demonstration site for in situ test with actual waste package After 2000
- FBR fuel reprocessing pilot plant After 2000
- Commercial HLW vitrification plant ~1997
- Startup of disposal site After 2000
- Experimental sea-dumping of LLW TBD
- Commercial LLW storage facility (Rokkashomura; JNFI) ~1991

INTERNATIONAL RELATIONSHIPS

DOE/PNC Implementing Agreement for Collaborative Testing of the Radioactive Liquid-Fed Ceramic Melter

Term: 3-29-85 to 3-29-90.

Scope: PNC participation in startup and operation of radioactive ceramic melter facility at PNL, including testing of PNC components and simulated waste streams in PNL facility; DOE participation in similar PNC activities.

DOE/PNC Agreement for Cooperation in the Area of Radioactive Waste Management

Term: 12-3-86 to 12-3-96.

Scope: HLW/TRU waste; waste form development, assay and characterization; treatment/packaging/transportation; storage/disposal; D&D; facility operations; environment/safety and public acceptance issues.

Emphasis: Information exchange of HLW and TRU waste conditioning technology.

JAPAN

DOE/JAERI Agreement on Decommissioning Nuclear Facilities

Term: 7-2-87 to 7-2-92.

Scope: Cooperation in the development and verification of decommissioning technologies and techniques regarding dismantling, transportation, and disposal of resulting wastes, radiation exposure to workers, public, and environment. Exchange of information, equipment, and personnel related to activities at specific U.S. and Japanese facilities.

NRC/JAERI Agreement on Cooperation in Radioactive Waste Management Safety Research

Term: 11-7-84 to 11-7-89 (negotiations in progress for extension).

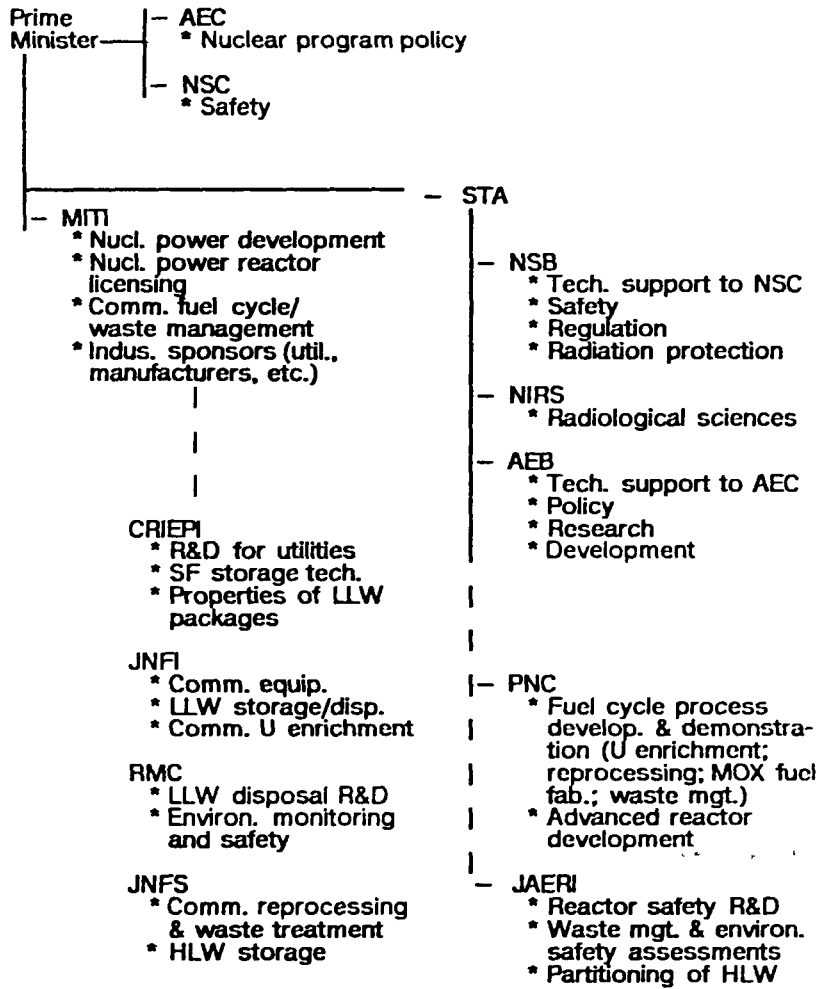
Scope: Cooperation in experimental and analytical studies through technology information exchange. LLW: radionuclide migration through soils; source terms of radionuclides in shallow-land burial sites; safety performance assessment of shallow-land burial sites. HLW: understanding of materials/engineering; characterization of natural barriers; performance assessment.

Member of IAEA and OECD/NEA. Cooperative agreements with Australia (SYNROC development), Canada, China, France, UK.

ORGANIZATION

Government funds nuclear R&D and is responsible for HLW disposal. Industry handles the commercial fuel cycle and LLW disposal and pays for HLW disposal. See next three pages for organizational relationships and responsibilities.

NUCLEAR FUEL CYCLE/WASTE MANAGEMENT ORGANIZATION



— Government
 - - - Semi-government or industry

JAPAN

PARTIAL PNC ORGANIZATION

Board of Directors

- **President**
- **Technology Management Division**
- **International Division**
- **Reactor Technology Development Division**
- **Reactor Construction/Operation Project**
- **Radioactive Waste Management Project**
- **Nuclear Fuel Cycle Development Division**
- **Nuclear Fuel Cycle Engineering Division**
- **Oarai Engineering Center**
 - **Technology Development Division**
 - **Systems and Components Division**
 - **Fuels and Materials Division**
 - **Experimental Reactor Division**
 - **Safety Engineering Division**
- **Tokai Works**
 - **Nuclear Fuel Technology Development Div.**
 - **Plutonium Fuel Division**
 - **Reprocessing Technology Development Div.**
 - **Waste Technology Development**
 - **Waste Plants Operations Division**
- **Tokai Reprocessing Plant**

PARTIAL JAERI ORGANIZATION

President

- **Takasaki Radiation Chemistry Research Establishment**
- **Oarai Research Establishment**
- **Naka Fusion Research Establishment**
- **Tokai Research Establishment**
 - **Department of Reactor Engineering**
 - **Department of Fuels and Materials Research**
 - **Department of High Temperature Engineering**
 - **Department of Research Reactor Operation**
 - **Department of JPDR**
 - **Department of Radioisotope**
 - **Nuclear Safety Research Center**
 - **Department of Reactor Safety Research**
 - **Department of Fuel Safety Research**
 - **Department of Reactor Fuel Examination**
 - **Department of Environmental Safety Res.**
 - **Environmental Radioactivity**
 - **Radioactive Waste Management**
 - **Airborne Waste--Environmental Safety**

JAPAN

AEB

Atomic Energy Bureau
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100
Japan

Tel: 81-3-581-1686
or : 81-3-581-5271
Fax: 81-3-592-1239

Director General
Deputy Director General
Director, Policy
Dir., Power Reactor Dev. Div.
Dir., Nuclear Fuel Div.

Kenjiro Ogata
Katsuhisa Ida
Isamu Sasaya
Yasuhiro Kato
Akio Yuki

Function: Provide support to the Atomic Energy Commission.

AEC

Atomic Energy Commission
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100
Japan

Tel: 81-3-581-2585 or
81-3-581-5271
Fax:

Chairman (Minister of State
for Science/Technology)
Acting Chairman

Eizaburo Saito
Takashi Mukaibo

Function: Formulate national policy on nuclear energy research, development and utilization; advise the Prime Minister.

CRIEPI

Central Research Institute
of Electric Power Industry
1-6-1, Ohtemachi
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-201-6601
Fax: 81-3-287-2880

President

Hiroshi Narita

Function: Provide R&D support for utilities.

Waste Management R&D: Transportation, storage, and disposal of LLW; intermediate and long-term storage of spent fuel; long-term storage and disposal of HLW.

CRIEPI (contd)

Energy and Environmental
Research Laboratory for
Energy and Electric Power
2-11-1, Iwato-kita
Komae-shi, Tokyo 201, Japan

Tel: 81-3-480-211
Fax:
Tlx: 2423098 CRIEPI J

GIRIO

Government Industrial Research
Institute, Osaka
1-8-31 Midorigaoka, Ikeda-shi
Osaka 563, Japan

Tel: 81-727-51-8351
Fax:

Director, 4th Department
Nuclear Waste Program

Dr. Ryozo Hayami
Dr. Ryohei Terai

Waste Management R&D: Alternatives for HLW solidification;
waste form characterization.

HITACHI

Hitachi, Ltd.
6, Kanda-surugadai, 4-chome
Chiyoda-ku, Tokyo 101
Japan

Tel: 81-3-258-1111
Fax: 81-3-258-6218

Gen. Mgr., Nucl. Power Gen.
Nuclear Power Development

Yoshiaki Korei
Hiromasa Kobayashi

Waste Management R&D: Development of volume reduction systems for radioactive waste. Application of automation and robot technology. Development of advanced control technology through use of fiber optics.

Hitachi Engineering Co., Ltd.
1-1 Saiwai-cho, 3-chome
Hitachi-shi, Ibaraki-ken, 317
Japan

Tel: 81-294-21-1111
Fax:
Tlx: 03645511

Nuc. Power Plant Construction
Nuc. Fuel Project
Nuc. Fuel Cycle Project

Kiyoshi Shimizu
Yasuo Hirose
Sadatoshi Inoue

JAPAN

HITACHI (contd)

Waste Management R&D: Develop technology to reprocess spent LWR fuel; fixation, storage, and disposal of HLW; spent fuel storage; Pu fuel production; and decommissioning.

IHI

Ishikawajima-Harima
Heavy Industries Co., Ltd.
Shin-Ohtemachi Bldg.
2-1, Ohtemachi 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-244-5111
Fax:

President
Gen.-Mgr., Nuclear Power

Kousaku Inaba
Masahiro Ogawa

IHI Research Institute
Yokohama Branch
1, Shin-nakaharacho, Isogo-ku
Yokohama 235, Japan

Waste Management R&D: Development of nuclear waste management system.

JAERI

Japan Atomic Energy
Research Institute
2-2, Uchisaiwai-cho, 2-chome
Chiyoda-ku, Tokyo 100
Japan

Tel: 81-3-592-2111
Fax: 81-3-580-6107

President
Vice President
Vice President
Exec. Director, International

Yoshinori Ihara
Toyojiro Fuketa
Eiichi Tsuji
Hakubi Sasaki

Location: JAERI headquarters and Radioisotope Center are in Tokyo. The Tokai and Oarai Research Establishments share government reservations at Tokai-mura and Oarai-machi with PNC. Tokai and Oarai are 120 and 100 km, respectively,

JAERI (contd)

northeast of Tokyo, near the ocean. These sites can be reached by train from Tokyo to the city of Mito, then by taxi. The recently formed Naka Research Establishment (fusion energy) is in Naka-machi near Tokai-mura.

Function: Semi-governmental research organization implementing national long-term programs in nuclear energy, including joint projects and international cooperation.

JAERI: OARAI

Oarai Research Establishment
Oarai-machi, Higashi-
Ibaraki-gun
Ibaraki-ken Pref. 311-13, Japan

Tel: 81-292-67-4111
Fax: 81-292-66-2235

Director General

Konomu Sanokawa

JAERI: TOKAI

Tokai Research Establishment
Tokai-mura, Naka-gun
Ibaraki-ken Pref. 319-11
Japan

Tel: 81-292-82-5111
Fax: 81-292-82-0528

Director General
Deputy Director General
Deputy Director General
Deputy Director General

Dr. Takumi Asaoka
Dr. Shojiro Matsuura
Dr. Sukenobu Taniguchi
Naomoto Shikazono

JAPAN

Facilities:

- **WASTEF** (glove box and hot cell facilities)
Mission: Safety evaluations for high-level waste.
History: Startup: cold, 1981; hot, 1982.
- **STEM** (Simulation Test for Environmental radionuclide Migration)
Mission: Safety evaluation for land disposal of radioactive LLW.
History: Startup, 1983.

JGC

JGC Corporation

Nuclear and Advanced Technology

New Ohtemachi Bldg.

2-1 Ohtemachi 2-chome

Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-279-5441

Fax: 81-3-273-8050

Exec. V.P, General Manager

Deputy General Manager

Deputy General Manager

Dr. Takao Nakajima

Dr. Hiroshi Kuribayashi

Shigemi Morikawa

Function: Design and construction of fuel reprocessing and radwaste treatment facilities.

JGC Nuclear Research Center

2205 Narita-cho, Oarai-machi

Higashi-Ibaraki-gun

Ibaraki Pref. 311-13

Japan

Tel: 81-292-66-3311

Fax: 81-292-66-8810

Nuc. & Adv. Tech. Proj. Div.

Yasuhiro Moriya

Waste Management R&D: Wet oxidation process (decomposition of organic materials such as spent ion exchanger resin) incinerator; waste solidification process (cementing, bituminization, plastic solidification); regeneration waste recycle process; selective nuclide removal process, ash melting process.

JGC (contd)

Facilities:

- **Demonstration Incineration Plant**
Mission: Simultaneously melt combustible and noncombustible wastes.
Design Basis: 100 kg/h at 1500°C. Low-level radwaste combustion technology licensed from Belgonucleaire SA.
- **Contaminated Liquid Waste Recycle Plant**
Mission: Recovery of clean water for re-use from LLLW.
Design Basis: 20 GPM, filtration, reverse osmosis, active-carbon bed adsorption, chelate resin adsorption, ion-exchange adsorption, evaporation, etc.

JNFI

Japan Nuclear Fuel
Industries Co., Inc.
Daiichi Seimei Bldg.
Hirakawa-cho 1-7, Chiyoda-ku
Tokyo, Japan

Tel: 81-3-239-6521
Fax:

President
V. President, U Enrichment
V. Pres., Environmtl. Adjmts.

Tadao Ohgaki
Yuzuru Yukawa
Eisaku Okumura

Function: Construct/operate facilities for uranium enrichment, at an estimated cost of U.S. \$865 million, with a capacity of 1.5 M SWU, and for LLW terminal storage, at an estimated cost of U.S. \$480 million, with a capacity for storing 1 million drums. Proposed site for both facilities is in the Ohishita area of Rokkasho-mura.

JAPAN

JNFS

Japan Nuclear Fuel
Service Co., Ltd.
2-2, 2-chome, Uchisaiwaicho
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-580-6911
Fax: 81-3-591-8723

President
Exec., Mg. Dir.-Technology
Dir., Plant Design/Reproc.

Masatoshi Toyoda
Yoshio Kawashima
Sadao Ito

Facility:

- **Commercial Fuel Reprocessing Plant** (located in Iyasakatai area of Rokkasho-mura).
Mission: Reprocess Japanese fuels.
Design Basis: 800 tHM/a; 3000 tU storage pool; HLW vitrification/storage. Cost: 840 billion yen. Being built by SGN, France.
Milestone: FRP startup, 1997; spent fuel storage, 1993.

KOBE STEEL

Kobe Steel, Ltd.
No. 3-18, Wakinoamacho
1-chome
Chuoh-ku, Kobe 651, Japan

Tel: 81-78-251-1551
Fax: 81-232-3459

General Manager, Mechanical
Eng. Research Lab. (MERL)
Nuclear Engineering

Toru Abe
Fumiaki Komatsu

Kobe Steel, Ltd.
Tekko Building
No. 8-2, Marunouchi 1-chome
Chiyoda-ku, Tokyo 100
Japan

Tel: 81-3-218-7111
Fax: 81-3-218-6425

General Manager, Nuc. Eng.
Deputy General Mgr., Nuc. Eng.
Gen. Mgr., Nuc. R&D Planning

Norio Mitsushima
Kiyoshi Asahina
Shoji Tsuchibuchi

Activities: Spent Fuel transportation/storage cask. Waste treatment, equipment/systems. LLW/HLW handling/storage.

MITI

Ministry of International
Trade and Industry
3-1, Kasumigaseki 1-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-501-1511
Fax: 81-3-501-0643 or 0644

Minister
V.-Min., International Affairs
Director, Nuc. Energy Industry
Director, Int. Nuc. Affairs

Hikaru Matsunaga
Naomichi Suzuki
Kazumasa Kusaka
Toru Ishida

MMC

Mitsubishi Metal Corporation
5-2 Ohtemachi 1-chome
Chiyoda-ku, Tokyo 100
Japan

Tel: 81-3-213-2111
Fax: 81-3-215-2435 or 2436

General Manager, Nuc. Energy
Manager, Tech. Planning
General Manager, Tech. Dept.
General Mgr., Nuc. Resources
Development/Waste Mgt.

Dr. Yumi Akimoto
Dr. Tamotsu Ishii
Eiji Yagi
Takaaki Kashiwagi

Waste Management R&D: Design and research on facilities for spent fuel storage and reprocessing, waste treatment and geologic disposal.

MOFA

Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-580-3311
Fax: 81-3-581-9470

Director, Nuclear Energy
Deputy Director

Tatsuaki Iwata
Yutaka Yoshizawa

JAPAN

NIRS

National Institute
of Radiological Sciences
9-1, Anagawa 4-chome
Chiba-shi, Chiba Pref. 260
Japan

Tel: 81-472-51-2111
Fax: 81-472-56-8301

Director General
Director

Hiromichi Matsudaira
Toshiyuki Kumatori

Function: Attached to the Science and Technology Agency; responsible for carrying out studies on radiation hazards, applications for medical use, and education/training of engineers in these areas.

NSB

Nuclear Safety Bureau
2-1, Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-581-5271
Fax: 81-3-581-0774

Director-General
Deputy Director-General
Dir., Nuc. Mtls. Reg. Div.
Dir., Nuc. Safety Policy Div.
Dir., Reactor Reg. Div.
Dir., Safeguards Division
Dir., Radiation Protec. Div.
Dir., Nuc. Safety Policy Res.

Kenichi Murakami
Akihiko Hayashi
Katsuyoshi Omori
Hiroshi Tani
Mikio Hattori
Jiro Shibata
Tetsuhiko Yoshida
Haruo Suzuki

Function: Provide support to the Nuclear Safety Commission.

NSC

Nuclear Safety Commission
2-1, Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-581-5271
Fax: 81-3-581-0774

Chairman

Hideo Uchida

Function: Responsible for carrying out national policy in regard to safety and security of nuclear energy R&D and utilization; advisory body to the Prime Minister's office.

PNC

Power Reactor and Nuclear Fuel
Development Corporation
Sankaido Building
1-9-13 Akasaka
Minato-ku, Tokyo 107, Japan

Tel: 81-3-586-3311
Fax: 81-3-505-5125

President	Takao Ishiwatari
Vice Presidents	Mitsuru Sata, Hiroshi Ohishi
Exec. Dir. Nucl. Fuel/Reprocess.	T. Sasaki
Exec. Dir., Waste Mgmt.	Yoshikazu Hashimoto
Dir., Fuel Cycle Develop.	Kenji Miyahara
Dir., Fuel Cycle Engineering	Naomi Tsunoda
Senior Dir., Waste Mgmt.	Masao Yamamoto
Deputy Dir., Waste Mgmt.	Takao Tsuboya
Coordination	H. Ando, N. Tajima
Conditioning Research	Tetsuya Shiota, Tadashi Mano
Isolat'n Syst. Research	Sumio Masuda, T. Ohsawa
Geoscience Research	Tetsuya Shiota
Presentation Mgt. Research	Takao Tsuboya, M. Kinugasa
Dir., International	Yoshiaki Matsuno
International Cooperation	Tadatomo Yamaguchi

U.S. DOE Tech. Representative

Jim Scott
81-3-586-3311

PNC Washington Office:

Power Reactor and Nuclear Fuel
Development Corporation
Suite 715
2600 Virginia Avenue NW
Washington, DC 20037

Tel: 202-338-3770
Fax: 202-333-1097

Manager

Takao Yagi

JAPAN

PNC: OARAI

PNC Oarai Engineering Center
Oarai-machi, Higashi
Ibaraki-gun
Ibaraki Pref. 311-13, Japan

Tel: 81-292-67-4141
Fax: 81-292-67-7147

Director
Waste Management Mgr.

Masao Hori
Hidehiko Miyao

Facilities:

- **Incinerator**
Mission: Burn solid LLW.
Design Basis: Three chambers--pyrolysis, combustion, after-burning.
- **WDF (Waste Dismantling Facility)**
Mission: Condition large contaminated equipment; develop decontamination and decommissioning technology.
Design Basis: Capacity to condition 5.5 t/yr.
History: Hot startup, 1984.

PNC: TOKAI

PNC Tokai Works
Muramatsu 3371,
Tokai-mura, Naka-gun
Ibaraki-ken 319-11
Japan

Tel: 81-292-82-1111
Fax: 81-292-82-1469
-1845, or -9398

Director
Deputy Directors

Tanehiko Yamanouchi
Makoto Toda, Nobukazu Saitoh,
Kenichi Matsumoto

Dir., Reprocessing Plant
Dir., Technology Dev. Coord'n
Dir., Waste Technology Devel.
HLW Conditioning
TRU Conditioning
Geological Isolation Tech.
Dir., Waste Plants Operations
Dir., Fuel Production

Kenichi Matsumoto
Y. Kishimoto
Nobukazu Saitoh
Misato Horie
Eiichi Inada
Noriaki Sasaki
Yoshiro Asakura
Katsuruki Otsuka

PNC: TOKAI (contd)

Dir., Reproc. Technol. Devel. Shotaro Hayashi
 Dir., Fuel Technol. Devel. Nobuyuki Sasao

Facilities:

- **Fuel Reprocessing Plant**
 Mission: Reprocess low-enriched UO_2 .
 Design Basis: Oxide fuels: chop-leach head-end. PUREX flowsheet; capacity, 0.7 tHM/d. Remote maintenance of chop-leach equipment; contact maintenance of other components.
 History: Startup, 9/77; 400 tU spent fuel processed through 12/88.
- **Tokai Plutonium Conversion Development Facility**
 Mission: Demonstrate PNC microwave process for co-conversion production of MOX.
 Design Basis: 10 kg/d MOX (50% PuO_2 , 50% UO_2).
 History: Startup of hot operation, 10/83.
- **Tokai Plutonium Fuel Fabrication Facility**
 Mission: Fabricate FBR and ATR fuels.
 Design Basis: FBR fuels--1 t/a (30% PuO_2 in enriched UO_2); ATR fuels--10 t/a (2% PuO_2 in UO_2).
 Throughput: Since 1979, 100 t MOX produced through 5/89.
- **Tokai Plutonium Fuel Production Facility**
 Mission: Fabricate large quantities of MOX fuel for FBR and ATR.
 Design Basis: FBR fuels, 5 t/a; ATR fuels 40 t/a.
 History: Startup of hot operation, 4/88.
- **EDF (Engineering Demonstration Facility)**
 Mission: Nonradioactive, full-scale and/or engineering mockup tests of processes and equipment for FBR spent fuel reprocessing.
 History: Startup, 4/82.

JAPAN

PNC: TOKAI (contd)

- **ETF (Engineering Test Facility)**
Mission: Develop engineering test of vitrification and ceramic melter technologies.
Design Basis: Joule-heated melter.
History: Facility startup, 2/80.
- **CPF (Chemical Processing Facility) - reprocessing and HLW treatment.**
Mission: Radioactive studies of FBR spent fuel reprocessing and HLW solidification processes.
Design Basis: Five standard hot cells for breeder-fuel reprocessing R&D, five cells for waste conditioning R&D. Reprocessing--1 kg/batch; HLW solidification--10 liter/batch HLW.
History: Hot tests, 9/82.
- **KRF - Krypton Recovery Facility (pilot plant)**
Mission: Demonstrate ^{85}Kr recovery from Tokai-mura reprocessing plant off gas.
Design Basis: Cryogenic distillation and pressurized cylinder storage.
History: Hot test, 3/88. Radioactive operation, 4/88.
- **Bitumization Demonstration Facility**
Mission: Immobilize low-level liquid waste concentrate.
Design Basis: 200 liter/h.
- **Incinerator**
Mission: Burn solid LLW.
Design Basis: 600 kg/d.
- **PWTF (Plutonium-contaminated Waste Treatment Facility)**
Mission: Prepare PNC TRU wastes for disposal.
Design Basis: Acid digestion of chloride-containing wastes; incineration of other combustibles; mechanical volume reduction.
History: Operation startup, 1987.

PNC: TOKAI (contd)

- **PWSF (Plutonium-contaminated Waste Storage Facility)**
Mission: Store PNC TRU waste.
Design Basis: 6000-drum capacity.
History: Operation startup, 1981.
- **TVF (Tokai Vitrification Facility)**
Mission: Vitrify and store HLW from the Tokai reprocessing plant; demonstrate technology.
Design Basis: Ceramic melter to produce a borosilicate glass; capacity, 0.35 m³ HLLW/d.
History: Construction started 4/88.
Milestone: Startup, 1992.
- **Recycle Equipment Test Facility (site to be determined)**
Mission: Demonstrate FBR fuel reprocessing equipment and process technology.
Design Basis: 10 kg/h
Milestone: Startup, 1994.
- **FBR Fuel Reprocessing Pilot Plant (reprocessing and HLW treatment, site to be determined)**
Mission: Demonstrate FBR fuel reprocessing and HLW solidification.
Design Basis: 120 kg MOX/d (12 t/a).
Milestone: Hot operation, 1997.

RMC

Radioactive Waste Management Center

No. 15, Mori Building

2-8-10, Toranomom

Minato-ku, Tokyo, 105, Japan

Tel: 81-3-504-1081

Fax:

President

Managing Director

Toshio Fukuda

Syunichi Murakoshi

Function: Studies of safe and rational operation of low-level radioactive waste disposal.

Owners: Japanese industry, MITI and STA.

JAPAN

STA

Science and Technology Agency
2-1 Kasumigaseki, 2-chome
Chiyoda-ku, Tokyo 100
Japan

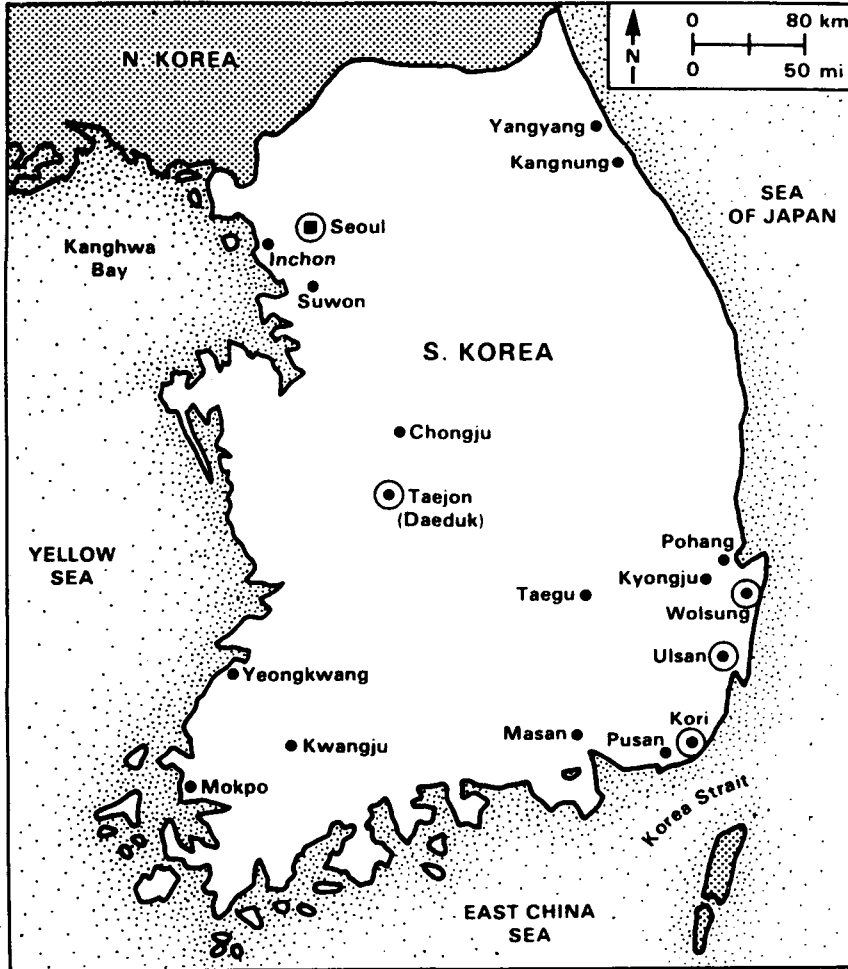
Tel: 81-3-581-5271
Fax:
Tlx: 2226720 STASGD

Minister, Science/Technology
Deputy Minister
Director General
Deputy Director-General
Director, Policy Div.
Director-General, NSB
Director-General, AEB

Eizaburo Saito
Harumitsu Yoshimura
Mitsugu Ishizuka
Yasumichi Hirose
Shigeo Suehiro
Mitsugu Ishizuka
Kenjiro Ogata

Function: Established as an extra-ministerial agency of the Prime Minister's office for comprehensive administration and the promotion of science and technology. The Atomic Energy Bureau (AEB) and the Nuclear Safety Bureau (NSB) are under STA jurisdiction. Appropriate listings are under AEB and NSB, respectively.

KOREA (Republic of Korea)



REPUBLIC OF KOREA

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1-2	New Year
Mar. 1	Independence Movement
Apr. 5	Arbor Day
May 2	Buddha's Birthday
May 5	Children's Day
June 6	Memorial Day
July 17	Constitution Day
Aug. 15	National (Independence) Day
Oct. 2-4	Chusok (Thanksgiving)
Oct. 3	National Foundation Day
Oct. 9	Korean Alphabet Day
Dec. 25	Christmas

TIME

Standard Time Washington D.C.: + 14 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to Korea. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 685.7 Won (W)

per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Korea are complete as listed, after dialing international access code: 011. Country code is 82; listed local numbers include city code.

U.S. EMBASSY - SEOUL

American Embassy
82 Sejong-Ro, Chongro-Ku
Seoul
Korea

Tel: 82-2-732-2601
Fax: 82-2-738-8845

Science Counselor

Kenneth D. Cohen

KOREA

ENERGY

Population	1989	43 million
Electric Power Plant Capacity	1988	19.9 GWe 34% nuclear
Electric Power Production	1988	25.6 GWe 37% nuclear
	1988	85.5 TWh 44% nuclear 28% coal 22% oil 6% hydro

NUCLEAR POWER

Policy: Continue expansion of electric power capacity; reduce dependence on foreign oil by strong nuclear program with indigenous manufacturing capability; long-term goal-- develop FBR capability.

Nuclear Power Plant Capacity	1989	7.2 GWe
	1990	7.2 GWe
	1995	8.1 GWe
	2000	11.4 GWe
Reactor Mix	1989	PWR: 8 (1978-89)
		2 (1995-96)
		HWR: 1 (1983)

Reactor Development (feasibility studies): FBR

INDUSTRIAL FUEL CYCLE

Policy: Develop long-term contracts for fuel supplies, holdings of foreign uranium resources; fabricate fuel for PWR and HWR (CANDU); "wait and see"--reprocessing and recycle of Pu for FBR, CANDU and LWRs.

KOREA

Waste Management Strategy: LLW/ILW repository to be constructed by mid-1990 with emphasis on engineered barriers. Candidate sites have been identified but final decision on site is pending. Utility surcharge of 2 mil/kWh to fund waste management. Extended storage (~ 60 years) of spent fuel planned, in AR and AFR facilities. No decision has been made on reprocessing or disposal.

Cumulative Spent Fuel	1980	17 tU
Arisings	1985	60 tU
	1987	500 tU
	1990	1,500 tU
	1995	2,600 tU
	2000	4,400 tU

Industrial-Scale Activities

- Uranium milling--3 t ore/d pilot plant.
- Uranium conversion, yellowcake to UO₂--100 tU/a.
- UO₂ fuel fabrication pilot plant--10 tU/a.
- UO₂ fuel fabrication--200 tU/a. Startup, 1989.

Major Milestones

- LLW disposal site (550,000 t) 1996

INTERNATIONAL RELATIONSHIPS

Member of IAEA. Agreement with U.S. for peaceful nuclear cooperation.

ORGANIZATION

Atomic Energy Commission (AEC)

- Ministry of Energy and Resources (MER)
 - Electric Power Bureau (EPB)
 - Korea Electric Power Corporation (KEPCO)
 - Korea Power Engineering Company (KOPEC)

- Ministry of Science and Technology (MOST)
 - Atomic Energy Bureau (AEB)
 - Nuclear Policy Division
 - Nuclear Reactor Division
 - Nuclear Energy R&D Division
 - Radiation Safety Division
 - Nuclear Safety and Cooperation Office
 - Nuclear Safety Division
 - Nuclear Cooperation Office
 - Korea Nuclear Fuel Corporation (KNFC)
 - Korea Advanced Institute of Science/Technology (KAIST)
 - Korea Power Engineering Co. (KOPEC)
 - Korea Institute of Energy and Resources (KIER)
 - Korea Atomic Energy Res. Institute (KAERI)
 - Korea Nuclear Safety Technology Institute (KNSTI)

KOREA

AEB

Atomic Energy Bureau
Ministry of Science and Tech.
Gwacheon 171-11
Republic of Korea

Tel: 82-2-503-7654
Fax: 82-2-503-7673

Director-General
Director, R&D Division
Director, Nuclear Policy
Director, Nuclear Reactor
Director, Internl. Cooperation

Ki Hun Chang
Uk Jong Yoo
Sang Hoon Choi
Kyong Chul Jang
Tae Sik Min

AEC

Atomic Energy Commission
1, Chungang-dong
Kwachon Kyonggi-do
Republic of Korea

Tel: 82-2-503-7646
Fax: 82-2-503-7673

Chairman: Deputy Prime Minister Soon Cho

Function: Decision-making body for policies regarding nuclear energy: research and development plan for nuclear fuel and nuclear energy applications. Always chaired by current Deputy Prime Minister. Required members are ministers of MOST and MER, and president of KEPCO.

EPB

Electric Power Bureau
Ministry of Energy and Resources
Seoul
Republic of Korea

Tel: 82-2-503-7171
Fax: 82-2-503-9649

Dir. General, Nuclear Power Se-Jong Kim

KAERI

Korea Atomic Energy Research
Institute
150 Tukjin-dong
Chung-gu, Taejon
Republic of Korea

Tel: 82-42-820-2000
Fax: 82-42-820-2702

President

Dr. Pil-Soon Han
82-42-820-2121

Sr. V.P., Nuclear
V.P for MRR Project
Dir., Rad. Waste Management
Director, Safety/Exam. Analysis
Dir., Nuclear Safety/Research
Dir., Spent Fuel Management

Kwang Jae Lee
Poong Eil Jhun
Hun Hwee Park
Seung Gi Ro
Sung Ki Chae
Hyun Soo Park

Function: Development of reactor engineering and nuclear fuel cycle technology. Assist government (MOST) with regulatory/licensing issues and in establishing national nuclear policy.

Waste Management R&D: Fuel fabrication, uranium ore processing and conversion, radioactive waste management, and post-irradiation examination.

KAIST

Korea Advanced Institute of
Science and Technology
207-43 Cheongryangri-dong
Seoul
Republic of Korea

Tel: 82-2-962-8835
Fax: 82-2-963-4013

President

Dr. Sang Soo Lee

KOREA

KEPCO

Korea Electric Power Corporation
167, Samsung-dong
Kangnam-Gu
Seoul
Republic of Korea

Tel: 82-2-550-3114
Fax: 82-2-550-5981

President Ahn Byong Wha
Gen. Mgr., Nuc. Safety/Tech. Eun Rae Roh

Function: Development of power resources, and the generation/
transmission/transformation of electricity. Responsible to the
government (MOST).

KIER

Korea Institute of Energy and
Resources
71-2 Chang-dong
Chung-gu, Taejon
Republic of Korea

Tel: 82-42-861-9700
Fax: 82-42-861-9734

President Dr. Jee-Dong Kim

KNFC

Korea Nuclear Fuel Company, Ltd.
150 Tukjin-dong, Chung-gu
Taejon
Republic of Korea

Tel: 82-42-822-9441
Fax: 82-42-820-1000

President Dr. Pil-Soon Han

Function: Development of domestic nuclear fuel fabrication.

Owners: KEPCO (90%), KAERI (10%).

Facility:

- Fuel Fabrication Plant, Daeduck site,
200 tU/a (under construction, 1989)

KOREA

KNSTI

Korea Nuclear Safety Technology
Institute

P.O. Box 7

Daeduk-Danji, Choong-Nam
Republic of Korea

Tel: 82-42-820-2000-1

Fax: 82-42-820-2702

President

Director, Safety Review

Director, Safety Inspection

Director, Standards Development

Sang-Hoon Lee

Byung-Joon Koh

Philip Suc-Hyong Moon

Chae-Shik Rho

KOPEC

Korea Power Engineering Co., Inc.

87 Samsong-dong, Kangnam-gu

Seoul

Republic of Korea

Tel: 82-2-540-7701

Fax: 82-2-540-4184

President

Kee Jo Shin

Function: Development of Korea's self-reliance in nuclear power technology. Involved in plant design for all Korean nuclear power plants.

MER

Ministry of Energy and Resources

1, Chungang-dong

Kwachon, Kyonggi-do

Republic of Korea

Tel: 82-2-503-9641

Fax: 82-2-503-9649

Minister

Vice Minister

Dir. General/Electric Power

Dr. Bong-Suh Lee

Sang Jin Chang

Se Jong Kim

KOREA

MOST

Ministry of Science and Technology
1, Chungang-dong
Kwachon, Kyonggi-do
Republic of Korea

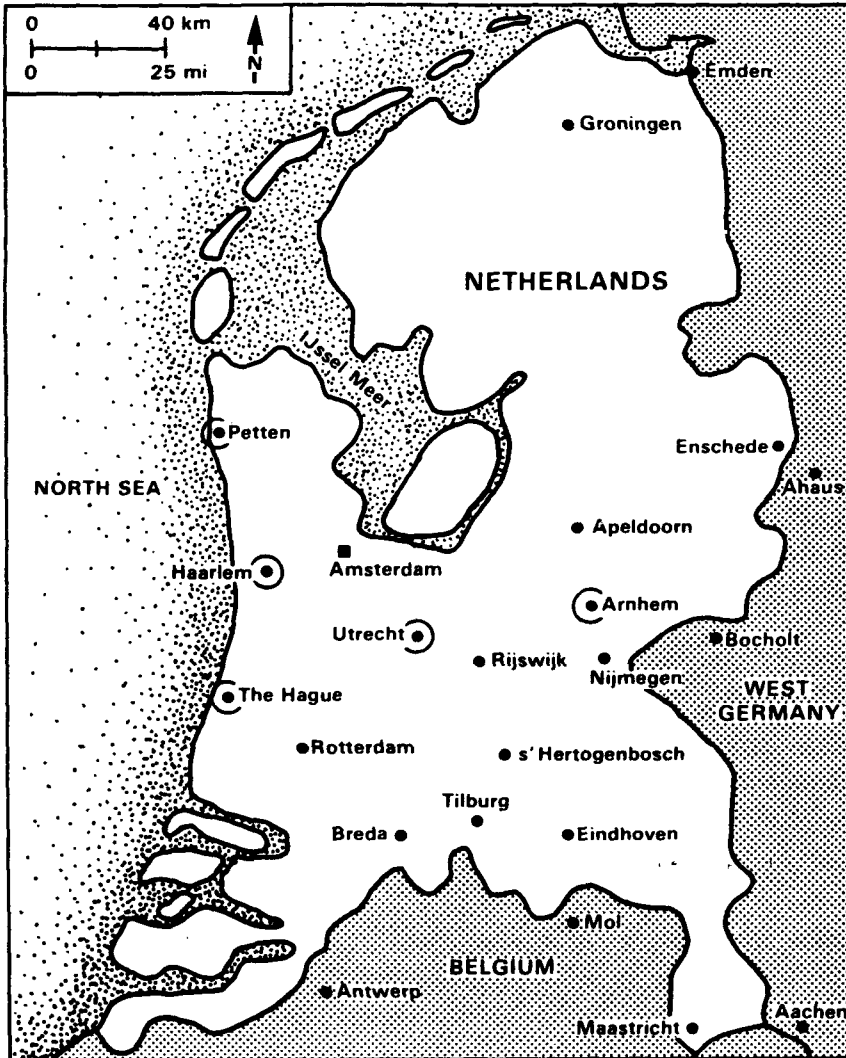
Tel: 82-2-503-7171
Fax: 82-2-503-7673

Minister
Vice Minister
Dir. Gen./Atomic Energy Bureau
Dir. Gen./Nuclear Safety
 Assessment Officer
Director, Radiation
Director, Nuclear Policy
Director, Energy R&D
Director, Nuclear Cooperation

Shang Hi Rhee
Young Hwan Choi
Young Sung Hahn

Poong Il Chun
Hong Shik Choi
Sang Un Choi
Kun Soo Yim
Jong Taek Park

NETHERLANDS



NETHERLANDS

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Apr. 13	Good Friday
Apr. 15-16	Easter
Apr. 30	Queen's Birthday
May 24	Ascension
May 5	Liberation Day
June 3-4	Pentecost
Dec. 25-26	Christmas

TIME

Standard Time Washington + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to the Netherlands; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1.92 Guilder (Fl.)
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to the Netherlands are complete as listed, after dialing international access code: 011. Country code is 31; listed local numbers include city code.

U.S. EMBASSY - THE HAGUE

American Embassy
Lange Voorhout 102
2514 The Hague
Netherlands

Tel: 31-70-624911
Fax: 31-70-614688

NETHERLANDS

ENERGY

Population	1987	15 million
Electric Power Plant Capacity	1987	17.1 GWe 3% nuclear
	1988	17.5 GWe 3% nuclear
	1990	16.9 GWe 3% nuclear
	1995	17.6 GWe 3% nuclear
Electric Power Production	1987	68.4 TWh 61% gas 28% coal 5% nuclear 5% oil
	1988	5% nuclear
	1990	5% nuclear
	1995	5% nuclear

NUCLEAR POWER

Policy: Expansion of nuclear capacity (by at least two 1000 MWe plants) is on indeterminate hold as a consequence of events at Chernobyl.

Nuclear Power Plant Capacity	1989	0.5 GWe
	2000	0.4 GWe
Reactor Mix	1988	BWR: 1 (1969)
		PWR: 1 (1973)
Reactor Development	Participation in SNR-300 FBR	

INDUSTRIAL FUEL CYCLE

Policy: Use foreign services (fuel fabrication, reprocessing). Participate with FRG and U.K. in URENCO (uranium enrichment consortium).

NETHERLANDS

Waste Management Strategy: Designate single centralized waste collection service; extend interim storage of all wastes (50-100 years). Studies on final disposal of all radioactive wastes in geological formations are executed in the framework of the national research program (OPLA). Ocean dumping of LLW and ILW has been terminated; the Netherlands contributed to NEA feasibility study regarding seabed disposal. Feasibility of disposal within international or bilateral framework is also being explored.

Cumulative Spent Fuel	1980	103 tU
Arising (LWR)	1985	190 tU
	1990	270 tU
	2000	420 tU

ORGANIZATION

- Government--Ministries of Economic Affairs; Housing, Physical Planning and Environment; and Social Affairs exercise overall control of nuclear matters with Parliamentary approval of their decisions.
- COVRA (Centrale Organisatie Voor Radioactief Afval)--stores and collects all radioactive wastes.
- Interim Storage Center, 1994.
- ECN (Netherlands Energy Research Foundation)-- provides nuclear-related services, including waste treatment and disposal research.
- ILONA (Integrated National Research for Nuclear Waste - Policy Committee)--supervises and coordinates waste disposal research.

COVRA (CENTRAL ORGANIZATION FOR RADIOACTIVE WASTE)

Centrale Organisatie Voor
Radioactief Afval

Westerduinweg 3
1755 ZG Petten, Netherlands

Tel: 31-2246-3344
Fax: 31-2246-1556

Director
Radiation Protection
Waste Storage/Transportation

Dr. Jan Vrijen
Dr. H.D.K. Codee
U. Bakema

COVRA (contd)

Function: Responsible for collection, treatment and storage of all waste. (Multi-funded: utilities, government, ECN).

Facility: New interim storage center for all radioactive wastes is in preparation and will be fully operational in 1994. Currently an interim storage facility for a limited quantity of low- and intermediate-level waste is being operated by COVRA.

ECN (Netherlands Energy Research Foundation)

Stichting Energieonderzoek
Centrum Nederland
Westerduinweg 3
Postbus 1
1755 ZG Petten
Netherlands

Tel: 31-2246-4949
Fax: 31-2246-4480

Chairman, Governing Board

Dr. G. M. V. van Aardenne

Function: Organize and sponsor energy research and development (partially government-funded).

Research Center

Managing Director

Prof. Dr. H. H. van den
Kroonenberg

Nuclear Energy Research

Dr. A. M. Versteegh

Nuc. Waste/Geologic Disposal

Dr. Klaas A. Duijves

Exp. Underground Disp. Program

J. R. van Seuren

Safety Assessment

Dr. J. Prij

Radionuclide Migration

Dr. A. van Dalen

Function: Scientific and technical center: applied energy research; waste treatment.

Waste Management R&D: Geologic waste isolation--salt dome repositories (conceptual design; thermo-mechanical, safety, and radionuclide migration studies), seabed disposal, decontamination study of large component.

NETHERLANDS

GEOLOGICAL SURVEY OF THE NETHERLANDS

Geological Survey of the Netherlands

Nieuwe Gracht 13

Postbus 157

2000 AD Haarlem

Netherlands

Tel: 31-23-319362

Fax: 31-23-351614

Director

Deep Subsurface Dept.

Dr. C. Standt

Dr. H. M. van Montfrans

KEMA (Research and Testing Electrochemical Materials Company)

N.V. Tot Keuring van Elektro-
technische Materialen Arnhem

Utrechtseweg 310

Postbus 9035

6800 ET Arnhem

Netherlands

Tel: 31-85-457057

Fax: 31-85-421625

Deputy Director, Research

Research Technology

Nuclear Waste Research

Acid Digestion/Incineration

Dr. J. H. Blom

Dr. J. Kuypers

Dr. H. Boekschoten

Dr. J. Matteman

Function: Development and engineering services for utilities.

Waste Management R&D: Volume reduction and storage of reactor station wastes.

MINISTRY OF ECONOMIC AFFAIRS

Ministerie van Economische Zaken

Postbus 20101

2500 EC Gravenhage

Netherlands

Tel: 31-70-798911

Fax: 31-70-796358

Dir. Electricity/Nuclear Energy

Radioactive Waste

Dr. H. F. G. Geuzers

31-70-796471

Dr. E. D. A. Dankums

31-70-797849

NETHERLANDS

**MINISTRY OF HOUSING, PHYSICAL
PLANNING AND ENVIRONMENT**

Ministerie van Volkshuisvesting
Ruimtelijke Ordening en
Milieubeheer

Postbus 450

dr. v.d. Stamstr. 2

2260 MB Leidschendam

Netherlands

Tel: 31-70-209367

Fax: 31-70-279868

Director, Rad. Protection
Radioactive Waste

Dr. W. J. K. Brugman

Dr. A. Cornelissen

MINISTRY OF SOCIAL AFFAIRS

Ministry of Social Affairs

Postbus 6g

2270 MA Voorburg

Netherlands

Tel: 31-70-624611

Fax: 31-70-714357

Nuclear Safety

Dr. J. Versteeg

**RIVM (National Institute of Public Health
and Environment Protection)**

Rijksinstituut voor Volksgezondheid
en Milieuhygiene

Antonie van Leeuwenhoeklaan 9

Postbus 1

3720 BA Bilthoven

Netherlands

Tel: 31-30-749111

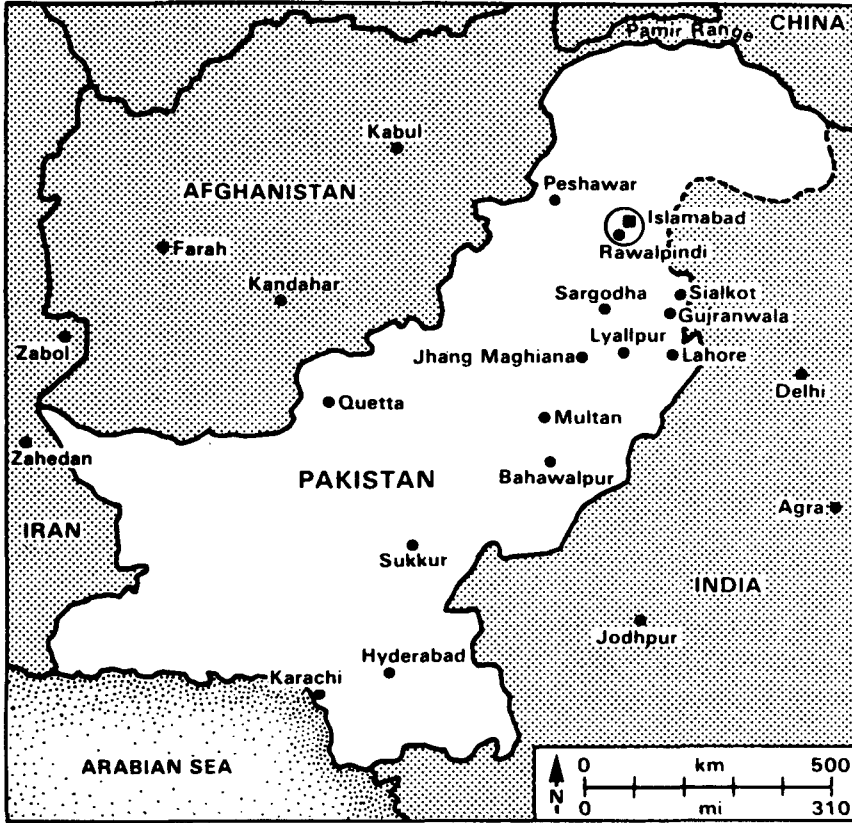
Fax: 31-30-742971

Safety Assessment of
Underground Disposal Studies

Dr. Peter Glasbergen

31-30-743397

PAKISTAN



PAKISTAN

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Mar. 23	Pakistan Day
Mar. 28	Start of Ramadan
Apr.27-28	Ramadan
May 1	May Day
July 2	Bank Holiday
July 4-5	Sacrifice Feast
Aug. 14	Independence Day
Sept. 6	Defense of Pakistan
Sept. 11	Death of Quaid-i-Azam
Oct. 3	Phropheht's Birthday
Nov. 9	Iqbal Day
Dec. 25	Birthday of Quaid-i-Azam

TIME

Standard Time Washington D.C.: + 10 hours
Work week: Sunday - Thursday

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to Pakistan. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 21.25 Rupees
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Pakistan are complete as listed, after dialing international access code: 011. Country code is 92; listed local numbers include city code.

U.S. EMBASSY - ISLAMABAD

American Embassy
P.O. Box 1048
Islamabad, Pakistan

Tel: 92-51-826161
Fax: 92-51-822004

Economic Section

Lawrence N. Benedict

PAKISTAN

ENERGY

Population	1986	103.6 million
Electric Power Plant Capacity	1986	5.7 GWe
Electric Power Production	1988	33.0 TWh 0.6% nuclear

NUCLEAR POWER

Policy: Provide up to 50% of electrical power supply with nuclear.

Nuclear Power Plant Capacity	1989	0.1 GWe
	1997	0.1 GWe
	2000	0.1 GWe
Reactor Mix	1988	HWR: 1 (1972)

INDUSTRIAL FUEL CYCLE

Policy: Develop complete domestic fuel cycle: uranium mining, milling, conversion, and enrichment; fuel fabrication; reprocessing.

Cumulative Spent Fuel	1980	49 tU
Arisings	1985	110 tU
	1990	170 tU
	2000	440 tU

INTERNATIONAL RELATIONSHIPS

Member of IAEA. Agreement with U.S. on peaceful nuclear cooperation. Has not signed non-proliferation treaty.

ORGANIZATION

- Pakistan Atomic Energy Commission--control of nuclear matters.
- Pakistan Institute of Science and Technology (Rawalpindi)--fuel cycle R&D, including lab-scale reprocessing facility.

PAKISTAN

PAEC

Pakistan Atomic Energy Commission
P.O. Box 1114
Islamabad, Pakistan

Tel: 92-51-811030-9
Tlx: 5725 ATCOM PK

Chairman

Dr. Munir Ahmad Khan

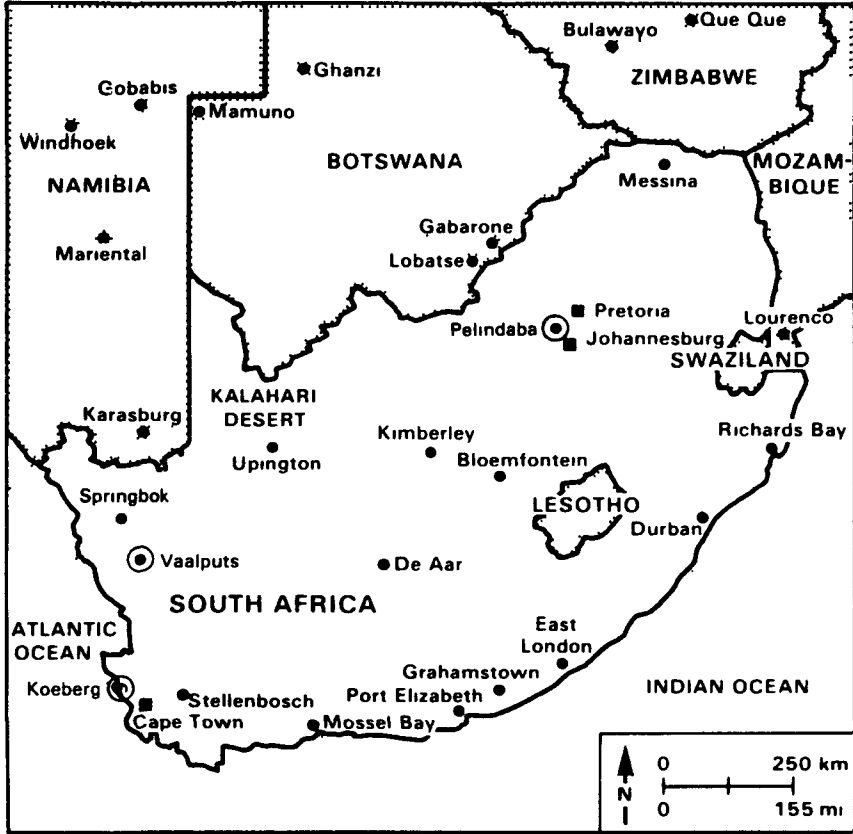
PINSTECH

Pakistan Institute of
Science & Technology
Islamabad, Pakistan

Director

I. H. Qureshi

SOUTH AFRICA



SOUTH AFRICA

MAJOR PUBLIC HOLIDAYS (1989)

Jan. 1	New Year
Apr. 6	Founder's Day
Apr. 8	Family Day
Apr. 13	Good Friday
May 4	Worker's Day
May 24	Ascension
May 31	Republic Day
Oct. 10	Kruger Day
Dec. 16	Day of the Vow
Dec. 25	Christmas
Dec. 26	Day of Goodwill

TIME

Standard Time Washington D.C.: + 7 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to South Africa. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 2.55 Rand

per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to South Africa are complete as listed, after dialing international access code: 011. Country code is 27; listed local numbers include city code.

U.S. CONSULATE GENERAL - JOHANNESBURG

U.S. Consulate General
Kine Center, 11th Floor
Commissioner Street
P.O. Box 2155
Johannesburg 2000, South Africa

Tel: 27-11-331-1681
Fax: 27-11-331-1327

Science Officer

Robert J. McSwain

SOUTH AFRICA

ENERGY

Population	1988	37 million
Electric Power Plant Capacity	1988	33.2 GWe 7% nuclear
	1995	34.1 GWe 5% nuclear
	1998	37.9 GWe 5% nuclear
Electric Power Production	1988	140.5 TWh 89% coal 7% nuclear 2% other 2% hydro
	1995	5% nuclear
	1998	4% nuclear

NUCLEAR POWER

Policy: Expand electric power production capacity chiefly through coal-burning plants, but develop modest nuclear capability to complement coal, particularly post-2000.

Nuclear Power Plant Capacity	1989	1.8 GWe
	2000	1.8 GWe
Reactor Mix	1989	PWR:2 (1984/85)

INDUSTRIAL FUEL CYCLE

Policy: Produce (1988: 3,775 tU; 1987: 3,963 tU) and export uranium; enrichment capability (300 tSWU/a) commissioned August 1988. Fuel fabrication plant commissioned 1988. No plans for reprocessing. UF₆ conversion plant of 700 tU/a (1986).

Waste Management Strategy: Interim storage of reactor wastes (LLW/ILW) at the reactor, followed by disposal at Vaalputs about 400 miles north of Cape Town.

SOUTH AFRICA

Cumulative Spent Fuel	1985	22 tU
Arising (LWR)	1990	254 tU
	2000	714 tU

Major Milestone

- Dry spent fuel storage facility (Vaalputs) 1994

ORGANIZATION

Ministry of Economic Affairs and Technology

--Department of Mineral & Energy Affairs

| --Atomic Energy Corporation (AEC)

| | --Pelindaba National Nuclear Research Center

- R&D
- Research Reactor
- Isotope Production
- Fuel Fabrication
- LLW Disposal

| | --Vaalputs National LLW Disposal Facility

- LLW/ILW Disposal
- Site Characterization

| | --Valindaba Site

- Uranium Enrichment
- Uranium Conversion

| | --Gouriqua Research Site

- R&D

--Council for Nuclear Safety

- Independent Regulatory Agency

Eskom

- Electricity Production

SOUTH AFRICA

ATOMIC ENERGY CORPORATION

Atomic Energy Corporation
of South Africa Ltd.

P.O. Box 582

Pretoria 0001

South Africa

Tel: 27-12-316-4911

Fax: 27-12-323-7731

Chief Executive Officer

Dr. W. E. Stumpf

Senior General Managers:

Nucl. Fuel Production

Dr. J. J. Wannenburg

Research and Development

Dr. D. M. Kemp

Engineering

L. S. Snyders

Marketing/Commercial Svcs.

Dr. A. G. M. Jackson

Manager, Nuc. Waste Technology

H. J. Van der Westhuizen

Function: Overall responsibility for Government nuclear activities including uranium conversion and enrichment, R&D, radioisotope production, radwaste disposal and repository.

Facilities:

- **Pelindaba National Nuclear Research Center**

Tel: 27-12-324-2811

Mission: Performs nuclear R&D; operates research reactor, isotope production line, food irradiation facility; performs fuel fabrication; operates LLW treatment and shallow-land disposal facilities.

- **Vaalputs National LLW Disposal Facility**

Mission: Operates LLW/ILW shallow-land disposal facilities; performs site characterization and environmental studies.

Design Basis: 1,470 m³/a LLW/ILW disposal.

- **Valindaba Uranium Enrichment and Conversion Plants**

Mission: Performs enrichment R&D and operates semi-commercial enrichment and pilot-scale conversion plants.

Design Basis: 300,000 SWU/a enrichment plant

700 tU/a conversion plant

- **Gouriqua Research Site**

Mission: New R&D center.

SOUTH AFRICA

Council for Nuclear Safety

Council for Nuclear Safety
7106 Hennopsmeer 0046
South Africa

Tel: 27-12-663-5500
Fax: 27-12-663-5513

Chairman
Vice-Chairman
Exec. Off./Gen. Mgr., Licensing
Dep. Gen. Mgr., Licensing

Prof. J. B. Martin
L. D. Hobbs
J. O. Tattersall
B. C. Winkler

Function: Independent regulatory/licensing agency for nuclear installations (construction and operation); empowered in 1988 by the Nuclear Energy Amendment Act.

ESKOM

ESKOM
P.O. Box 1091
Johannesburg 2000
South Africa

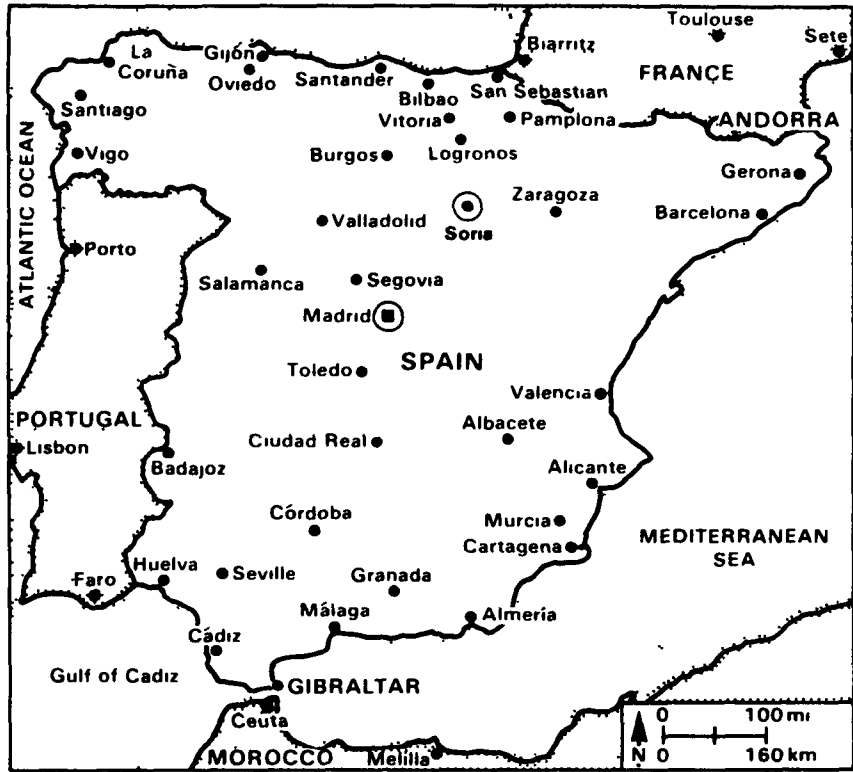
Tel: 27-11-800-8111
Fax: 27-11-800-4983

Chief Executive/C.O.B.
Chairman, Electricity Council
Senior General Manager

I. C. McRae
Dr. John B. Maree
J. L. Rothman

Function: Provide electricity for public use.

SPAIN



SPAIN

MAJOR PUBLIC HOLIDAYS (1989)

Jan. 1	New Year	June 24	King's Birthday
Jan. 6	Epiphany	July 25	St. James
Mar. 19	St. Joseph	Aug. 15	Assumption
Apr. 12	Holy Thursday	Nov. 1	All Saints
Apr. 13	Good Friday	Dec. 8	Immaculate Concept.
May 1	Labor Day	Dec. 25	Christmas
June 14	Corpus Christi		

TIME

Standard Time Washington D.C.: +6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Spain; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 109.28 Peseta
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct dialing to Spain are complete as listed, after dialing international access code: 011. Country code is 34; listed local numbers include city code.

U.S. EMBASSY - MADRID

American Embassy	Tel: 34-1-577-4000
Serrano 75	Fax: 34-1-577-5735
Madrid, Spain	Tlx: 27-763

Science Attaché Ishmael Lara

SPAIN

ENERGY

Population	1987	38.7 million	
Electric Power Plant Capacity	1987	42.1 GWe 16% nuclear	
	1988	44.5 GWe 17% nuclear	
	1990	43.2 GWe 18% nuclear	
Electric Power Production	1987	133.1 TWh 42% coal 31% nuclear 21% hydro/geoth. 5% oil 1% gas	
		1988	36% nuclear
		1990	35% nuclear

NUCLEAR POWER

Policy: Continue to operate existing nuclear power plants. Moratorium on new nuclear power plant construction has been in place for several years--changes pending revision of the National Energy Plan (PEN).

Nuclear Power Plant Capacity	1989	7.5 GWe
	1990	7.5 GWe
Reactor Mix	1988	GCR: 1 (1972) PWR: 7 (1969-88) BWR: 2 (1971-85)

INDUSTRIAL FUEL CYCLE

Policy: Once-through fuel cycle for LWR; no domestic reprocessing and no further contracts for foreign reprocessing, except GCR fuel (Vandellos I).

SPAIN

Waste Management Strategy: Store spent fuels at the reactor sites for at least 10 years. Reracking taking place in some reactor pools and other alternatives under consideration in order to provide additional capacity until geologic repository is ready to receive "high-level wastes" (spent fuels). Granite, salt and clay are being considered as host rock for repository. Shallow-land burial of LLW in fully engineered structures. Some low-level radioactive wastes are currently placed in a temporary storage facility (bays) at El Cabril (province of Córdoba).

Cumulative Spent Fuel	1985	202 tU
Arising (LWR)	1990	950 tU
	1995	1800 tU
	2000	2800 tU

Industrial-Scale Activities

- Uranium mining and milling: 270 tU/a.
- Uranium enrichment: 11.1% interest in Eurodif.
- Fuel fabrication: 200 tU/a.
- Intermediate spent fuel storage: 3000 tU.

INTERNATIONAL RELATIONSHIPS

DOE/JEN (now: CIEMAT) Memorandum of Understanding for Cooperation in Energy Research and Development

Term: 6-6-86 to 6-5-91.

Scope: Includes nuclear safety technology and radioactive waste management.

Emphasis: General information exchange.

CIEMAT (Energy Research Center)

Centro de Investigaciones
Energéticas, Medio Ambientales
y Tecnológicas
Avenida Complutense 22
Ciudad Universitaria
28040 Madrid, Spain

Tel: 34-1-3466000/01
Fax: 34-1-3466005

President
General Director
Director, Nuclear Technology
Waste Management

Victor Pérez Pita
Jose Angel Azuara Solis
Manuel Montes
Armando Uriarte

Function: Organized into four research institutes: nuclear technology (R&D--nuclear fuel cycle, decommissioning, material sciences and safety analyses); fundamental research; radiological protection and environment; and renewable energies.

Facility:

- Juan Vigon National Nuclear Energy Center, Madrid

CSN (Council of Nuclear Safety)

Consejo de Seguridad Nuclear
Justo Dorado, 11
28020 Madrid, Spain

Tel: 34-1-346-0100
Fax: 34-1-346-0471

President
Commissioners

Donato Fuejo Lago
Enrique Echavarri Lozano
Fabio Sarmiento Almeida
Rafael Caro Manso
Eduardo Gonzalez Gomez

Function: Independent body responsible to Parliament with powers on nuclear safety and radiation protection matters.

SPAIN

ENRESA (National Waste Management Company)

Empresa Nacional de Residuos
Radiactivos S.A.

Emilio Vargas, 7
28043 Madrid, Spain

Tel: 34-1-519-52-55

Fax: 34-1-519-52-68

President

Juan M. Kindelán
34-1-279-26-67

Director General

Alberto Lopez
34-1-279-28-58

Director, Engineering
International Relations

Aurelio M. Ulibarri
Carlos Melches
34-1-519-5314

Function: Supply waste management services and disposal facilities to all Spanish nuclear companies and radwaste producers. Responsible to Ministries of Industry and Economy. Shared by CIEMAT (80%) and the National Institute of Industry (20%).

Facility:

- LLW Surface Storage Facility, El Cabril, Córdoba

ENUSA (National Fuel Cycle Company)

Empresa Nacional del Uranio S.A.
Santiago Rusinol 12
28040 Madrid, Spain

Tel: 34-1-533-6207

Fax:

Tlx: 43042 URAN E

President

José Manuel Jimenéz Arana

Function: Supply fuel cycle services except waste management and disposal (uranium mining and milling; fuel fabrication) for Spanish nuclear power plants.

Facility:

- **LWR Fuel Fabrication Plant**
Commissioned late 1985.
Capacity: 200 tU/a, can be expanded to 500 tu/a.

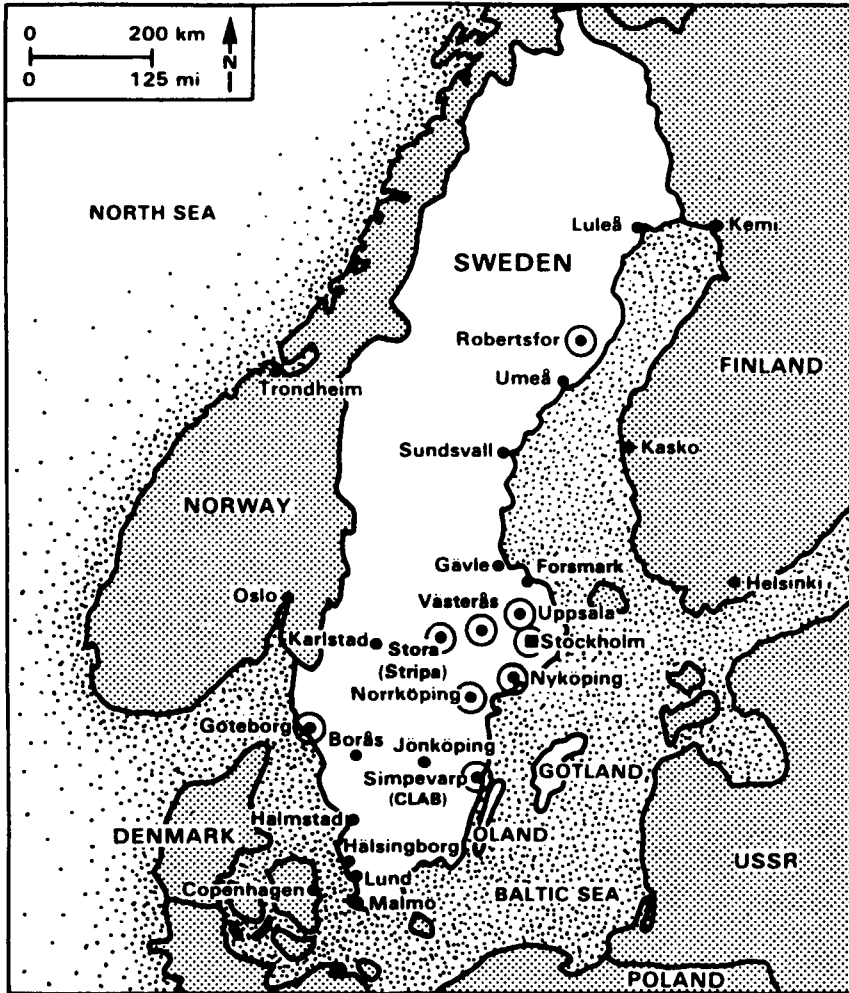
SPAIN

MINISTRY OF INDUSTRY AND ENERGY

Minister
Secretary General,
Energy/Mineral Resources
Director General, Energy

José Claudio Aranzadi Martinez
Victor Pérez Pita
Ramon Pérez Simarro

SWEDEN



SWEDEN

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Jan. 6	Epiphany
Apr. 13	Good Friday
Apr. 15-16	Easter
May 1	Labor Day
May 24	Ascension Day
June 3-4	Pentecost
June 22	Midsummer Day
Nov. 1	All Saints
Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Sweden; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 6.20 Krona (SEK)
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Sweden are complete as listed, after dialing international access code: 011. Country code is 46; listed local numbers include city code.

U.S. EMBASSY - STOCKHOLM

American Embassy
Strandvagen 101
10000 Stockholm
Sweden

Tel: 46-8-783-5300
Fax: 46-8-661-1964
Tlx: 12060 AMEMB S

SWEDEN

ENERGY

Population	1987	8.5 million
Electric Power Plant Capacity	1987	33.0 GWe 29% nuclear
	1988	33.1 GWe 29% nuclear
	1990	33.4 GWe 29% nuclear
	1995	35.3 GWe 26% nuclear
Electric Power Production	1987	147.2 TWh 46% nuclear 49% hydro/geoth. 3% coal/solids 2% oil
	1988	47% nuclear
	1990	47% nuclear
	1995	47% nuclear

NUCLEAR POWER

Policy: Phase out all nuclear plants at the latest by the year 2010. Change of this policy would require a new decision by Parliament.

Nuclear Power Plant Capacity	1988	9.6 GWe
	2000	9.6 GWe
Reactor Mix	1988	BWR: 9 (1972-85) PWR: 3 (1975-83)

INDUSTRIAL FUEL CYCLE

Policy: Direct disposal of spent fuel. No Pu recycle is planned. Costs for waste management and for future decommissioning of nuclear power plants are paid by fees collected from the nuclear utilities.

SWEDEN

Waste Management Strategy: Store spent fuel for 30-40 years in an underground pool storage facility; encapsulate spent fuel in a highly corrosion-resistant canister; emplace in a deep geologic (crystalline rock) repository.

New facilities: 3000 t AFR (completed 1985); spent fuel encapsulation plant; repositories for spent fuel, reactor, and other long-lived wastes.

Cumulative Spent Fuel	1985	1,330 tU
Arising (LWR)	1990	2,360 tU
	2010	7,800 tU

Cumulative Waste Arisings (conditioned and encapsulated - ready for disposal)	2020	
	Spent fuel	5,600 canisters
	TRU waste	6,000 m ³
	Reactor waste	95,000 m ³
	" core comp.	19,000 m ³
	D&D waste	113,000 m ³

Industrial-Scale Activities:

- LWR fuel fabrication: 400 tU/a.

Major Milestones (Spent Fuel Repository)

- Start characterization of three candidate sites 1993
- Perform detailed investigations of two sites 1996
- Submit license application 2003
- Start repository construction 2010
- Start repository operation 2020

INTERNATIONAL RELATIONSHIPS

DOE/SKB Umbrella Agreement for Waste Management Exchange

Term: 7-1-77 to 12-31-90.

Scope: Preparation and packaging of waste forms; storage; field and laboratory testing; geologic disposal; operations; safety and environment; institutional and public relations issues.

Emphasis: Collaboration in Stripa Mine test program (NEA coordination); U.S. participation in performance assessment computer model and code intercomparison sponsored by SKB.

Member of IAEA and OECD/NEA. Waste management cooperative agreements with Canada, EEC, Finland, France, Spain, Switzerland. Host country for NEA Stripa Project.

ORGANIZATION

- **Waste Management**
 - **SKB** (Swedish Nuclear Fuel and Waste Management Company)--executes spent fuel and waste management program for the utilities; manages waste disposal R&D programs.
 - **SKN** (National Board for Spent Nuclear Fuel)--administers waste management fund collected from the nuclear utilities; oversees back-end of the fuel cycle activities.

- **Licensing Responsibilities**
 - **SKI** (Swedish Nuclear Power Inspectorate)--constructs/operates nuclear facilities.
 - **SSI** (Swedish National Institute of Radiation Protection)
 - National Swedish Franchise Board for Environment Protection
 - Municipality where the facility is to be located (right of veto).

- **Coordination**
 - **KASAM** (Consultative Committee for Nuclear Waste Management)--11 member expert committee; coordinates R&D activities between SKI, SSI, and SKN.

SWEDEN

CHALMERS (TECHNICAL UNIVERSITY)

Chalmers Tekniska Hoegskola
412 96 Goeteborg
Sweden

Tel: 46-31-72-10-00
Fax: 46-31-16-84-94

Nuclear Chemistry

Jan-Olof Liljenzin

Waste Management R&D: Radionuclide transport by groundwater, sorption on natural clays and rock minerals.

KEMAKTA

Kemakta Konsult AB
Luntmakargatan 94
113 51 Stockholm
Sweden

Tel: 46-8-54-06-80
Fax: 46-8-52-16-07

Bertil Grundfelt

Function: Computer calculations on hydrology/nuclide migration.

KTH (Royal Institute of Technology)

KTH
100 44 Stockholm
Sweden

Tel: 46-8-790-60-00
Fax: 46-8-109-199

Chemical Engineering
Inorganic Chemistry

Ivars Neretnieks
I. Grenthe

Waste Management R&D: Near- and far-field migration modeling, rock-matrix diffusion experiments. Actinide-chemistry, solubility calculations, groundwater sampling and characterization.

NUCLEAR SAFETY AND TRAINING CENTER

Kärnkraftssäkerhet och
Utbildning AB

Box 5864
102 48 Stockholm
Sweden

Tel: 46-8-665-28-00
Fax: 46-8-782-95-28

Director Svante Nyman

Function: Promote coordination cooperation among the Swedish utilities in their nuclear power plant safety work; nuclear simulator training in Sweden.

SGAB (Swedish Geological Company)

Sveriges Geologiska AB
Vretgränd 18
Box 670
751 28 Uppsala
Sweden

Tel: 46-18-15-64-20
Fax: 46-18-14-02-10

Geology, Site Investigations Kaj Ahlbom
Hydrogeology Leif Carlsson
Geologic Waste Disposal Otto Brotzen

Waste Management R&D: Evaluation of rock formations for use as waste disposal sites (permeability; groundwater behavior, age and chemistry).

SKB (Nuclear Fuel and Waste Management Company)

Svensk Kärnbränslehantering AB
Box 5864
102 48 Stockholm
Sweden

Tel: 46-8-665-28-00
Fax: 46-8-661-57-19

President
R&D, Director
R&D, Dep. Dir./Safety Analysis
Geoscience
Hard Rock Laboratory (SFR)

Sten Bjurström
Per-Eric Ahlström
Tönis Papp
Göran Bäckblom
Tommy Hedman
46-8-665-28-01

SWEDEN

SKB (contd)

Chemistry	Fred Karlsson
Design & Engineered Barriers	Anders Bergström
Material Sciences	Lars Werme
Field Investigations	Olle Zellman
International Relations	Torsten Eng 46-8-665-2833
Systems/Facilities, Director	Hans Forsström
Transport/Storage (CLAB)	Bo Gustafsson 46-8-665-28-16

Function: Coordinate and arrange for nuclear fuel supply and reprocessing services for all Swedish nuclear power reactors; manage and fund R&D for the back-end of the fuel cycle. Responsible for design, construction, and operation of all necessary storage and disposal facilities. Demonstrate that spent nuclear fuel and fuel reprocessing wastes can be disposed of safely and permanently.

Owners: Utilities.

Facilities:

- **CLAB** (Central Storage for Spent Fuel, located at Simpevarp adjacent to Oskarshamn Power Station)
Mission: AFR storage facility.
Design Capacity: Initially, 3000 t.
History: Startup construction, 5/80; startup operation, 1985.
- **SFR** (Subseabed Forsmark Repository for LLW and ILW, located in rock 50 m below seabed, 1 km outside Forsmark harbor on Gulf of Bothnia).
Design: Concrete silos inside cylindrical rock caverns isolated by layer of bentonite clay backfill between silo and rock for ILW. Conventional tunnel rooms for LLW. 1 km-long tunnels leading to repository to be plugged with concrete.
Capacity: 90,000 m³.
History: Startup Phase 1 construction, 1983; startup operation, 1988; startup Phase 2 construction, late 1990s.

SKB (contd)

• **Stripa Mine**

Stripa Mine Service AB
717 00 Stora
Sweden

Tel: 46-581-414-20
Fax: 46-581-419-19

Stripa Project Manager
Mine Operations

Bengt Stillborg
Gunnar Ramqvist

(Near Kopparberg, 15 km north of Lindesberg and about 250 km west of Stockholm. Site of the NEA Stripa Project)

Function: Research in realistic environment of matters connected to disposal in crystalline rock. Development of investigation methods and instruments; measurement of radionuclide migration/supporting studies.

Description: Granite body, about 350-400 m below surface, at the Stripa iron mine.

SKI (Nuclear Power Inspectorate)

Statens Kärnkraftinspektion
Box 27106
102 52 Stockholm
Sweden

Tel: 46-8-663-55-60
Fax: 46-8-661-90-86

Director
Waste Management

Olof Hörmander
Soeren Norrby

Function: Responsible for licensing nuclear facilities.

SWEDEN

SKN (National Board for Spent Nuclear Fuel)

Statens Kärnbränsle Nämnd
Sehlstedtsgatan 9
115 28 Stockholm
Sweden

Tel: 46-8-667-98-20
Fax: 46-8-661-67-35

Director
Chief Engineer

Olof Söderberg
Nils Rydell

Function: Evaluate and supervise nuclear industry's development program on the management and disposal of spent nuclear fuel and on decommissioning of nuclear power plants; administer the Swedish nuclear waste financing system; provide information to the public on spent fuel management and disposal.

SSI (National Institute of Radiation Protection)

Statens Straalskyddsinstitut
Box 60204
104 01 Stockholm
Sweden

Tel: 46-8-729-71-00
Fax: 46-8-729-71-08

Director
Radwaste Group

Gunnar Bengtsson
Ragnar Boge

Function: Responsible for enforcing radiation protection regulations.

STUDSVIK AB (Energy Technology Company)

Studsvik Energiteknik AB
611 82 Nyköping
Sweden

Tel: 46-155-210-00
Fax: 46-155-630-44

Director, Nuclear Division
Waste Technology
Power Plant Services

Stig Bergstroem
Karin Brodén
Claes Harfors

Function: Nuclear energy R&D and service to support Swedish power programs (contract research).

Owner: Government (Ministry of Industry).

SWEDEN

STUDSVIK AB (contd)

Waste Management R&D: LLW and ILW treatment, D&D techniques, leaching of UO_2 from spent fuel, biosphere migration, dose-calculations. AMOS project: Waste treatment plant (1986), interim waste storage in a rock cavity (1985).

SWEDISH STATE POWER BOARD

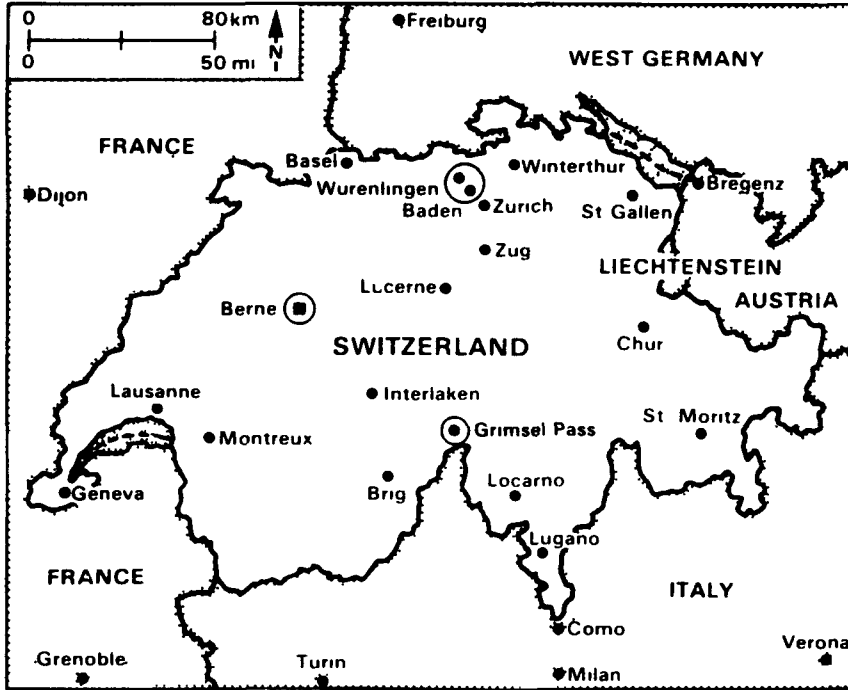
Statens Vattensfallsverk	Tel: 46-8-739-50-00
162 87 Vaellingby	Fax: 46-8-737-01-70
Sweden	Tlx: 19653 SVTELVXS S

President	Carl-Eric Nyquist
Vice President, Production	Lars Gustafsson
Nuclear Power	Stig Sandklef
Low- and Medium-Level Wastes	Stig Pettersson

Function: Operate the power distribution grid in Sweden, produce power (owner of Ringhals Power Plants).

Owner: Government (Ministry of Industry).

SWITZERLAND



SWITZERLAND

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1-2	New Year
Apr. 13	Good Friday
Apr. 15-16	Easter
May 1	Labor Day
May 24	Ascension
June 3-4	Pentecost
Aug. 1	Independence Day
Sept. 19	Day of Prayers
Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 6 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to Switzerland; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 1.5 Franc
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Switzerland are complete as listed, after dialing international access code: 011. Country code is 41; listed local numbers include city code.

U.S. EMBASSY - BERN

American Embassy
Jubilaumstrasse 93
3005 Bern
Switzerland

Tel: 41-31-43-70-11
Fax: 41-31-43-73-44

Economics Officer

Joan Corbett

SWITZERLAND

ENERGY

Population	1987	6.5 million
Electric Power Plant Capacity	1987	15.3 GWe 19% nuclear
	1988	15.3 GWe 19% nuclear
	1990	15.4 GWe 19% nuclear
	1995	16.8 GWe 18% nuclear
	Electric Power Production	1987
	1988	37% nuclear
	1990	36% nuclear
	1995	34% nuclear

NUCLEAR POWER

Policy: Government is neutral but believes nuclear power has a role to play in the future.

Nuclear Power Plant Capacity	1989	2.9 GWe
	2000	2.9 GWe
Reactor Mix	1989	BWR: 2 (1972/84)
		PWR: 3 (1969-79)

INDUSTRIAL FUEL CYCLE

Policy: Foreign reprocessing of spent fuels and Pu recycle to either LWRs or FBRs.

SWITZERLAND

Waste Management Strategy: Develop two waste repositories: a horizontally accessed rock cavern in a geologic host rock with considerable overburden for LLW/ILW, and a deep repository in crystalline rock or sedimentary formations for HLW glass or unprocessed spent fuel elements and alpha wastes. Sea-dumping of LLW discontinued 1982.

Cumulative Spent Fuel	1980	380 tU
Arising (LWR)	1985	650 tU
	1990	1,090 tU
	2000	2,000 tU

Cumulative Waste		
Arising	LLW/D&D Waste	95,000 m ³
[Planning basis:	LLW/ILW	80,000 m ³
after 40 yr operation	HLW glass	750 m ³
(total 4 GWe)]	or	
	Spent fuel	2,500 m ³

Major Milestones

- Initial receipt of HLW glass from COGEMA (France) >1993
- Intermediate-depth repository for LLW/ILW 2000
- Geologic repository for HLW or spent fuels and alpha wastes After 2020

INTERNATIONAL FUEL CYCLE RELATIONSHIPS

DOE/NAGRA Umbrella Agreement for Cooperation in Radioactive Waste Management

Term: 4-19-85 to 4-19-90.

Scope: Preparation and packaging of wastes; field and laboratory testing; storage; geologic disposal; environment and safety; design and operational issues; transportation requirements; public acceptance issues.

Emphasis: Information exchange and direct cooperation, in particular, concerning Grimsel Pass URL activities.

SWITZERLAND

NRC/NAGRA Agreement on Cooperation in Radioactive Waste Management Safety Research

Term: 9-26-86 to 9-25-91.

Scope: Experimental/analytical studies relating to safety research.

Emphasis: General information exchange.

Member of IAEA and OECD/NEA. Cooperative agreements with SKB (Sweden), CEA (France), Euratom (EEC), ONDRAF (Belgium), PNC (Japan), and TVO (Finland).

ORGANIZATION

- **NAGRA--National Cooperative for the Disposal of Radioactive Waste--formed by utilities/government to handle fuel cycle/waste management activities.**
- **PSI--Paul Scherrer Institute--newly formed (1987) through merger of EIR (Federal Institute for Reactor Research) and SIN (Swiss Institute for Nuclear Research).**
- **Federal Energy Office--sets criteria for waste management practices, including geologic disposal.**

BEW (Federal Office for Energy)

Bundesamt für Energiewirtschaft
Nuclear Safety Inspectorate (HSK)
5303 Würenlingen
Switzerland

Tel: 41-56-98-28-53
Fax: 41-56-99-39-07

Waste Management Section Dr. U. Niederer

Function: Licensing and inspection of nuclear installations.

SWITZERLAND

NAGRA/CEDRA (National Cooperative for the Disposal of Radioactive Waste)

Nationale Genossenschaft für die Lagerung
Radioaktiver Abfälle (NAGRA)

or

Société Coopérative Nationale pour
l'Entreposage de Déchets Radioactifs (CEDRA)

Parkstrasse 23

5401 Baden

Switzerland

Tel: 41-56-20-55-11

Fax: 41-56-20-52-07

President

Director, Science/Technology

Geology

Field Operations/Testing

Engineering

Nuclear Technology

Director, Repository Projects

Dr. Hans Issler

Dr. Charles McCombie

Dr. Marc F. Thury

Dr. Ch. Sprecher

Andreas L. Nold

Dr. Piet Zuidema

Dr. E. Kowalski

Function: Provide for safe disposal of radioactive wastes
produced by the Swiss nuclear industry.

Owners: Utilities and government.

Facility:

- URL at Grimsel Pass--operational since 1984.
(Tests/experiments in crystalline rock.)

PSI (Paul Scherrer Institute)

Paul Scherrer Institute

5303 Würenlingen

Switzerland

Tel: 41-56-99-2111

Fax: 41-56-98-2327

Director

Manager, Waste Mgt. Project

Prof.-Dr. A. Menth

Dr. J. Hadermann

Owner: Federal government--Department of Interior.

PSI (contd)

Waste Management R&D: Incineration of TRU wastes, modeling of radionuclide migration through heterogeneous geologic media, chemical behavior of radionuclides during migration, transport of radionuclides through the biosphere, natural analogues, hydrological studies, sorption constants on different rocks, immobilization of LLW and ILW in cements, leaching rates on LLW and ILW forms, and long-term corrosion tests on waste package materials.

Facilities:

- Hot Cells, Active Laboratories, Incinerator
- ADA (Acid Digestion Plant) for TRU wastes.
Design Basis: Carbonization/digestion in H_2SO_4/HNO_3 at 0°C; capacity, 1 kg/h solid wastes.
History: Non-Pu runs, late 1981; Pu runs, 1982.

ZWILAG (Interim Waste Storage Facility)

Zwischenlager Würenlingen AG
Parkstrasse 23
5401 Baden
Switzerland

Tel: 41-56-203-111
Fax: 41-56-203-755

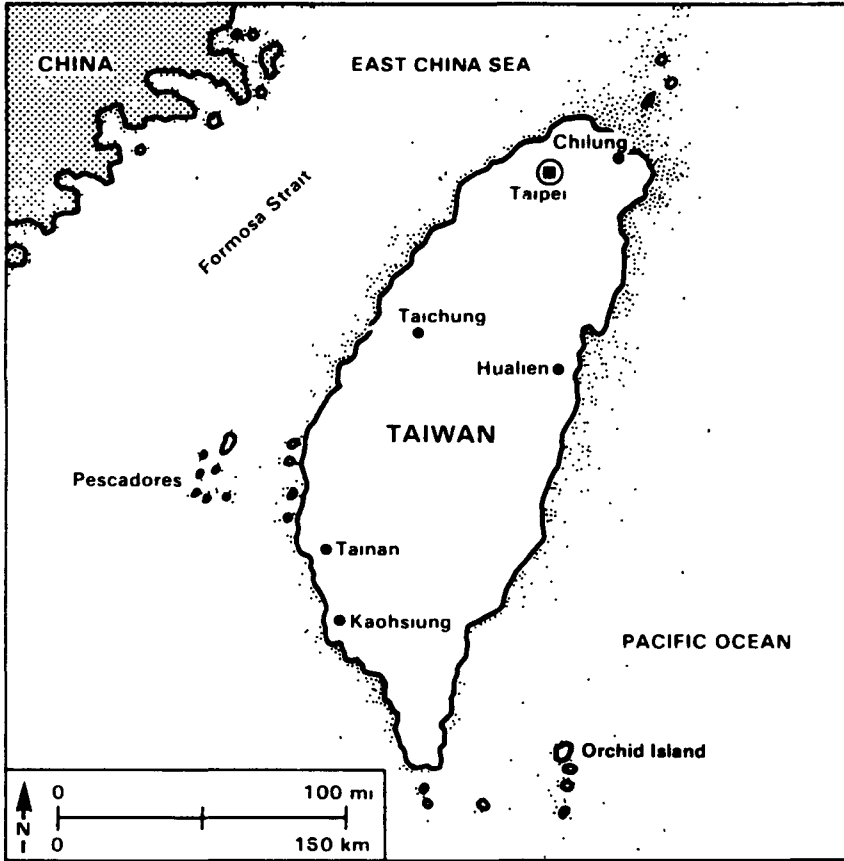
Director
Tech. Project Manager

R. Véya
Dr. C. Vuilleumier

Function: Provide interim storage for low- and medium-level wastes. The facility was voter-approved 11/89 and will be managed by the local council and the nuclear utilities. Construction is expected to take at least two years and to cost ca. U.S. \$4.8 million.

Owner: Consortium of Swiss nuclear utilities.

TAIWAN



TAIWAN

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1-3	Commemoration Day	Oct. 15	Confucious' Birth
Jan. 27-28	Chinese New Year	Oct. 17	Double Ten Day
March 29	Youth Day	Oct. 25	Taiwan Restoration
April 5	Tomb Sweeping Day	Oct. 31	Chiang Kai-Shek's Birthday
May 28	Dragon Boat Festival	Nov. 12	Dr. Sun Yat-Sen's Birthday
Sept. 28	Teacher's Day	Dec. 25	Constitution Day
Oct. 3	Moon Festival		
Oct. 10	National Day		

TIME

Standard Time Washington D.C.: + 13 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to Taiwan. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 25.95 Taiwan Dollar
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to Taiwan are complete as listed, after dialing international access code: 011. Country code is 886; listed local numbers include city code.

AIT - TAIPEI

American Institute in Taiwan
7 Lane 134
Hsin Yi Road, Sec. 3
Taipei, Republic of China

Tel: 886-2-709-2000
Fax:
Tlx: 23890 USTRADE

Science Officer

Christopher Marut

TAIWAN

ENERGY

Population	1987	19 million
Electric Power Plant Capacity	1987	16.6 GWe 31% nuclear
Electric Power Production	1986	59.0 TWh 44% nuclear 31% coal 13% hydro 12% oil
	1988	41% nuclear

NUCLEAR POWER

Policy: Look to nuclear power to meet rapidly growing demand for electric energy.

Nuclear Power Plant Capacity	1989	4.9 GWe
	1997	4.9 GWe
	2000	6.9 GWe
Reactor Mix	1989	BWR: 4 (1978-83) PWR: 2 (1984/85)

INDUSTRIAL FUEL CYCLE

Policy: Develop indigenous fuel production capability: UF₆ conversion; UO₂ pellets; fuel hardware; fuel assembly.

Waste Management Strategy: Evaluating spent fuel/HLW interim storage options; may reprocess (in other countries); LLW going to National Waste Storage Facility on nearby Orchid Island.

Cumulative Spent Fuel	1980	70 tU
Arising (LWR)	1985	430 tU
	1990	1,140 tU
	2000	2,600 tU

TAIWAN

ORGANIZATION

- **TAIPOWER** (Taiwan Power Company)--operation of nuclear power plants (owned by the government).
- **AEC** (Atomic Energy Council)--regulatory functions. RWA (Radwaste Administration)--radwaste disposal.
- **INER** (Institute of Nuclear Energy Research)--nuclear R&D.

AEC

Atomic Energy Council
65, Lane 144
Keelung Road, Section 4
Taipei 107, Taiwan
Republic of China

Tel: 886-2-392-4180
Fax: 886-2-341-5377
or 886-2-321-5448
Tlx: 26554 SINOATOM

Secretary General
Director, Radwaste Admin.

Prof. Yu-Hao Lee
Dr. Chao-Ming Tsai
886-2-396-4324

Director, Planning Division
Director, Rad. Protection Div.
Director, Nuc. Regulatory Div.

Chao-Chin Tung
Dr. Yi-Ching Yang
Yi-Ching Yang

INER

Institute of Nuclear Energy
Research
P.O. Box 3
Lung-Tan, Taiwan 325
Republic of China

Tel: 886-2-381-4014
Fax:
Tlx: 34154 CAEC

Deputy Directors

Sung-Ling Ho
886-2-381-2300
Sen-I Chang
886-2-381-2302

Radwaste Mgt. Tech. Program

Dr. Tise-Sheng Chou
886-2-381-2525

Radwaste Mgt. Division

Dr. Chia-Pao Tung
886-2-381-2524

TAIWAN

INER (contd)

Nuc. Materials Res. Division	Dr. Yaw-Nan Chen 886-2-381-2422
Fuel Engineering Division	Chung-Jyi Wu 886-2-381-2418
Health Physics Division	Dr. Wei-Li Chen

Fuel Cycle R&D: Solvent extraction technology; yellowcake conversion to UO_2 ; production of Zr; cement and thermoplastic waste forms for reactor wastes; HLW conditioning processes; irradiation of sewage sludge with spent fuels; burial of LLW.

TAIPOWER

Taiwan Power Company 17F, 242 Roosevelt Rd., Sec. 3 Taipei 107, Taiwan Republic of China	Tel: 886-2-396-7777 Fax: Tlx: 2564 TPCAPD
President Director, Nuclear Engineering	S. M. Chang Eng Lin 886-2-396-2521
Deputy Dir., Nuc. Engineering	Peng-Chang Chen

UNITED KINGDOM



UNITED KINGDOM

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	May 28	Spring Holiday
Apr. 13	Good Friday	June 9	Queen's Holiday
Apr. 15-16	Easter	August 27	Summer Holiday
May 7	Bank Holiday	Dec. 25-26	Christmas

TIME

Standard Time Washington D.C.: + 5 hours
Daylight Saving Time Period: 03/25 - 10/27/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States. A visa is currently not required for a visit to the United Kingdom; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S.\$ = 0.59 Pound
per Wall Street Journal, 01/31/90. As rates fluctuate daily, it is recommended to obtain current rates from local banks or newspapers prior to departure.

DIRECT DIALING

Individual numbers for direct-dial to the United Kingdom are complete as listed, after dialing international access code: 011. Country code is 44; listed local numbers include city code.

U.S. EMBASSY - LONDON

American Embassy
24/31 Grosvenor Square
West 1A 1AE London
United Kingdom

Tel: 44-1-499-9000
Fax: 44-1-409-1637
Tlx: 26-6777

Science Counselor

James B. Devine

UNITED KINGDOM

ENERGY

Population	1987	56.7 million
Electric Power Plant Capacity	1987	69.0 GWe 13% nuclear
	1988	71.3 GWe 15% nuclear
	1990	73.8 GWe 16% nuclear
	1995	78.4 GWe 14% nuclear
	Electric Power Production	1987
	1988	19% nuclear
	1990	20% nuclear
	1995	21% nuclear

NUCLEAR POWER

Policy: Substantial development of nuclear power based, to date, on gas-cooled reactors but now diversifying to PWRs; eventual active FBR pursuit expected.

Nuclear Power Plant Capacity	1989	12.3 GWe
	1990	12.3 GWe
	2000	12.8 GWe
Reactor Mix	1989	GCR: 24 (1956-72) AGR: 12 (1976-88) PWR: 1 (1994) FBR: 1 (1976) HWR: 1 (1968)

Reactor Development Currently PWR's; long-term LMFBR development.

UNITED KINGDOM

INDUSTRIAL FUEL CYCLE

Policy: Reprocess and recycle U to AGR and LWR systems; develop and maintain complete fuel cycle capability (UF_6 conversion, enrichment, UO_2 and MOX fuel fabrication, spent fuel reprocessing); sell fuel cycle services abroad.

Waste Management Strategy: Reprocess spent magnox fuels as rapidly as plant capacity permits; reprocess other thermal reactor fuel after several years' cooling; vitrify HLW (French process); long-term interim storage of HLW glass for at least fifty years before disposal; shallow-land burial of LLW currently; future deep-land disposal of LLW and ILW.

Cumulative Spent Fuel	1987	750 tU
Arising (AGR)	1990	1,300 tU
	2000	3,250 tU

Industrial-Scale Activities

- Uranium conversion (Springfields)
 - UF_6 production: 9000 t/a
 - UF_6 - UO_2 conversion: 650 t/a.
- Uranium enrichment (Capenhurst)
 - centrifuge plant: 700 tSWU/a.
- Fuel fabrication
 - Springfields
 - U metal (Magnox): 1300 tU
 - Sellafield
 - MOX fuels capacity, 1987: 6 t/a (FBR)
- Fuel reprocessing
 - Magnox fuels (Sellafield): up to 1500 t/a
 - UO_2 fuels (THORP, " "): 1200 t/a (1992)
 - FBR fuels (PFR reprocessing pilot plant, Dounreay): 50 kgHM/d
- HLW vitrification
 - Sellafield Vitrification Plant (1988)

INTERNATIONAL RELATIONSHIPS

DOE/UKAEA Umbrella Agreement in the Field of Radioactive Waste Management Technology

Term: 10-30-86 to 10-29-91.

Scope: LLW/ILW, TRU waste and D&D technology; treatment/geol. disposal; transportation; storage; environment/safety and public acceptance issues; performance assessment; packaging.

Emphasis: Technical information exchange, primarily TRU waste treatment.

Member of EC, IAEA and OECD/NEA. Agreements/partnerships with various nations.

ORGANIZATION

- **AEA Technology:** nuclear research; laboratories at Harwell, Risley, Sellafield, Springfields, Dounreay
- **DOE (Department of Environment):** develops waste management strategy, funds and coordinates generic waste management R&D
- **BNFL (British Nuclear Fuels plc):** commercial fuel cycle for domestic and foreign customers
- **NIREX (government-owned public company):** LLW and ILW disposal
- **BGS and IOS (British Geological Survey and Institute of Oceanographic Sciences):** supporting R&D for the waste management program
- **NRPB (National Radiological Protection Board):** environmental R&D
- **NII (Nuclear Installations Inspectorate):** licensing
- **MAFF (Ministry of Agriculture, Fisheries and Food):** regulation of waste management.

UNITED KINGDOM

NUCLEAR FUEL CYCLE RESPONSIBILITIES

National Government

- Department of Environment (DOE)
 - H.M. Inspectorate of Pollution (HMIP)
 - Rad. Waste Mgmt. Advisory Committee (RWMAC)
 - Building Research Establishment (BRE)

- Department of Health/Social Services
 - National Radiological Protection Board (NRPB)

- Department of Education and Science (DES)
 - Nat. Environment Research Council (NERC)
 - British Geological Survey (BGS)
 - Inst.of Oceanographic Sciences (IOS)

- Department of Energy (DEN)
 - Nuclear Electricity Authorities
 - NIREX
 - British Nuclear Fuels plc (BNFL)
 - AEA Technology

- Health and Safety Executive (HSE)
 - Nuclear Installations Inspectorate (NII)

- Ministry of Defense (MOD)
 - Atomic Weapons Research Establishment (AWRE)

- Ministry of Agriculture, Fisheries and Food (MAFF)
 - Fisheries Laboratories

UNITED KINGDOM

FUEL CYCLE/WASTE MANAGEMENT RESPONSIBILITIES

Department of Energy (DEN)

- Nuclear Electricity Authorities
(Nuclear Electric, Scottish Nuclear)
 - Nuclear Electricity Production
 - Reactor Waste Management
- British Nuclear Fuels plc (BNFL)
 - Risley (HQ)
 - Engineering
 - Sellafield
 - Reprocessing
 - Waste Conditioning
 - MOX Fuel Production
 - LLW Disposal (Drigg)
 - Springfields
 - Fuel Fabrication
 - UO₂ Production
 - Uranium Conversion
 - Capenhurst
 - Uranium Enrichment
- AEA Technology
 - AEA Decommissioning and Radwaste
 - AEA Nuclear Fuel Cycle Technology
 - AEA Thermal Reactors
 - AEA Fast Reactors
 - AEA Fusion
 - AEA Risk Management Technology
 - AEA Industrial Technology
 - AEA Environmental Protection
 - AEA Oil & Gas Technology
- NIREX

UNITED KINGDOM

AEA

AEA Technology
11 Charles II Street
London SW1Y 4QP
United Kingdom

Tel: 44-1-930-5454
Fax: 44-1-930-5454 x 274

Chairman
Managing Dir., Businesses
Dep. Managing Dir., Businesses
Managing Dir., Site Operations
Member for Corp. Develop.
Chief Technologist, Nuclear

John G. Collier
Brian L. Eyre
R. Stuart Nelson
Graeme G. E. Low
Charles C. S. Chapman
Dr. Ron H. Flowers

Government-owned nuclear research agency, since 1986 operating on a fully commercial basis. Provides contract R&D, technical and engineering services to governments and companies in the U.K. and worldwide.

AEA DECOMMISSIONING AND RADWASTE

AEA Decommissioning and
Radwaste
Winfrith Technology Center
Dorchester, Dorset DT2 8DH
United Kingdom

Tel: 44-305-2-5188 x 3374
Fax: 44-305-25-1140

Chief Executive
Head, Business Development

Dr. Mel H. Wood
Dr. Ron K. Webster

Activities: Decommissioning of all types of nuclear facilities; all aspects of radioactive waste storage, processing, transport and disposal; decontamination technology and robotic handling.

UNITED KINGDOM

AEA ENVIRONMENTAL PROTECTION

AEA Technology Harwell
Harwell
Upson OX11 ORA
United Kingdom

Tel: 44-235-82-1111 x 2029

Fax: 44-235-43-2923

Chief Executive
Contact

Dr. J. Rae
Dr. P. B. Taylor

Activities: R&D and consulting services to industry and regulatory bodies covering pollution control technology, waste management, and regional and global environmental impacts.

Facility:

- **Harwell Ceramic Melter Test Unit (nonradioactive)**
Mission: Develop ceramic melter capability for AEA.
Design Basis: Liquid-fed ceramic melter; capacity, 700 kg/d glass; product, borosilicate glass.
History: Initial studies in 1/3 (linear) scale unit 1982-84. Startup, (full scale) 1986.

AEA FAST REACTORS

Dounreay Technology Center
Thurso, Caithness KW14 7TZ
Scotland
United Kingdom

Tel: 44-847-6-2121

Fax: 44-847-6-2121 x 666

[From London by air to Wick (via Aberdeen), then ~30 miles by car to Dounreay; or by train from London to Thurso (via Inverness), then ~10 miles by car to Dounreay.]

Chief Executive
Contact

A. M. Broomfield
Dr. G. E. I. Smith

Function: Manages U.K. fast reactor program and participates in international fast reactor programs, especially European Fast Reactor.

UNITED KINGDOM

AEA FUSION

Culham Laboratory
Culham
Abingdon, Oxfordshire
OX14 3DB, United Kingdom

Tel: 44-235-2-1840
Fax: 44-235-46-3682

Chief Executive
Contact

Dr. D. R. Sweetman
I. M. Pollard

Function: Management of U.K. participation in international fusion programs, in particular the Joint European Torus (JET).

AEA INDUSTRIAL TECHNOLOGY

AEA Technology Harwell
Oxon OX11 0RA
United Kingdom

Tel: 44-235-82-1111 x 2138
Fax: 44-235-42-2105

Chief Executive
Contact

Dr. R. S. Nelson
Dr. S. J. Curl

Function: Provide advanced technology to the process, manufacture, electronics, defense, and aerospace industries. Technologies include: process technology and plant design, instrumentation and control, materials technology and manufacture, structural assessments, advanced computing, laser applications, and computational fluid dynamics.

AEA NUCLEAR FUEL CYCLE TECHNOLOGY

AEA Fuel Cycle Technology
Dounreay Technology Center
Caithness KW14 7TZ
United Kingdom

Tel: 44-847-6-2121 x 674
Fax: 44-847-6-2121 x 666

Chief Executive
Contact

O. Pugh
Dr. R. Anderson

Activities: Fuel reprocessing, special fuel manufacturing and testing, laser enrichment, waste conditioning, R&D in radioactive handling equipment and safeguards.

UNITED KINGDOM

AEA NUCLEAR FUEL CYCLE TECHNOLOGY (cont'd)

Facilities:

- **PFR Reprocessing Plant**
Mission: Reprocess Dounreay Prototype Fast Reactor (MOX) fuels.
Design Basis: Shear single pins and leach; PUREX process; capacity 9-10 tHM/a of 180-day cooled PFR assemblies with 8-10% burnup.
History: Dounreay fast reactor fuels processed from 1961 to 1975; plant rebuilt to handle PFR oxide fuels, resumed operation in October 1980.
- **Solidification Plant**
Mission: Condition liquid wastes by cementation.
History: startup, 1987 (cost U.S. \$8.84 million)
- **Marshall Laboratory**
Fuel-processing research, opened in 1986.

AEA RISK MANAGEMENT TECHNOLOGY

AEA Safety and Reliability

Directorate

Wigshaw Lane, Culcheth

Warrington WA3 6AT

United Kingdom

Tel: 44-925-3-1244 x 4241

Fax: 44-925-7-6681

Contact

A. R. Taig

Function: Safety and reliability analysis and assessment services to government and companies in the nuclear and non-nuclear sectors, including oil and gas, defense contractors, insurance companies and manufacturing and engineering companies.

UNITED KINGDOM

AEA THERMAL REACTORS

AEA Thermal Reactors
Risley, Warrington
Cheshire WA3 6AT
United Kingdom

Tel: 44-925-3-1244 x 2504
Fax: 44-925-78-2514

Chief Executive
Contact

Dr. D. Pooley
Dr. N. M. Irvine

Function: Design and operational techniques for thermal reactors aimed at improving the economies of existing plants and improvements for new plant designs.

AWRE

Atomic Weapons Research
Establishment
Aldermaston, Reading RG7 4PR
United Kingdom

Tel: 44-73-56-4111
Fax:
Tx: 848104/5

Waste Management

Ms. D. Hunter

BGS

British Geological Survey
Nicker Hill, Keyworth
Nottingham, NG12 5GG
United Kingdom

Tel: 44-60-77-6111
Fax: 44-60-77-6602

Director

G. I. Lumsden

British Geological Survey
Harwell Laboratory
Building 151
Harwell, Oxon OX11 0RA
United Kingdom

Tel: 44-235-2-4141
Fax:
Tx: 83135 ATOMHA G

UNITED KINGDOM

BNFL: CAPENHURST

British Nuclear Fuels plc
Capenhurst Works
CHESTER
Cheshire CH1 6ER
United Kingdom

Tel: 44-51-339-4101
Fax: 44-51-339-5541

Dir., Enrichment Division

Dr. Peter C. Upson

Function: Enrichment of U by centrifuge process (URENCO).

BNFL: RISLEY

British Nuclear Fuels plc
Risley, Warrington
Cheshire WA3 6AS
United Kingdom

Tel: 44-925-83-2502
Fax: 44-925-82-2711
Verif: 44-925-83-2369

[About 20 miles by official car or taxi from Manchester International Airport; or train from London to Warrington (approx. 3 hours), then 6 miles by official car or taxi to Risley.]

Chairman

Christopher G.F. Harding
44-925-83-5000

Chief Exec. Officer

Neville L. Chamberlain
44-925-83-5006

Dep. CEO

Dr. Wm. L. Wilkinson
44-925-83-5008

Dir., Corp. Marketing

Douglas S. B. Marr

Dir., Fuel/Engineering

Peter F. P. Roberts

Dir., Reprocess/Reactors

Dr. Greg G. Butler

Engineering Division, Director

Dr. Anthony D. Stevens
44-925-83-5416

Dir., External Business

Trevor Edwards
44-925-83-4616

Dir., Projects

Cedric Mogg

Dir., Technical Services

Bill Heafield

UNITED KINGDOM

BNFL: RISLEY (cont'd)

Function: Provision of spent nuclear fuel handling/waste management technology and engineering services, including R&D feasibility studies, process design, equipment supply, safety assessment and criticality, construction/commissioning of plants.

Intn'l Nuc. Fuels Ltd., Gen. Mgr. Derek May
44-925-83-3108

Transport Division, Director W. A. MacLaughlan
44-925-83-2090

Function: Spent fuel transportation; development, design, licensing/procurement of transport packages; consultation, design/safety studies including monitoring emergency response/recovery.

British Engineering Ltd., Gen. Mgr. J. M. Glanville

BNFL, Inc.
1776 I Street NW Tel: 202-785-2635
Washington, DC 20006 Fax: 202-785-4037

President R. "Landy" Langley

BNFL: SELLAFIELD

British Nuclear Fuels plc
Sellafield, Seascale
Cumbria CA20 1PG Tel: 44-9402-8333
United Kingdom Fax: 44-9467-28987

[By train from London-Euston Station to Carlisle Station (4 hours); transport can be arranged by BNFL from Carlisle to site (approx. 1-1/2 hours). From Manchester International Airport to site by car is approx. 3 hours.]

Dir., Magnox Reprocessing Grahame K. Smith
44-9402-74245
Dir., Oxide Reprocessing Peter F. P. Roberts
44-9402-71274
Dir., THORP Div. Ken G. Jackson

UNITED KINGDOM

BNFL: SELLAFIELD (cont'd)

Dir., Waste Mgt./Decom. Div. Mgr., Vitrification Plant	Stuart Donn Alan Dobson 44-9402-73386
Dir., Reactor Division	A. D. Evans

Function: Provides spent fuel management services, including storage, reprocessing and waste management. In addition, transport of spent fuel/wastes and complete fuel cycle service.

Facilities:

- **B205**

Mission: Reprocess Magnox (magnesium-clad, U metal) fuels from U.K. GCRs.

Design Basis: Magnox fuels--mechanical declad; PUREX flowsheet; "no-maintenance" concept; nominal capacity, 1500 t/a. HLLW storage--SS tanks, 70 m³ and 150 m³, in SS-lined concrete cells.

History: Magnox fuels--B205 startup, 1964; annual throughput of Magnox fuels, 1000-1200 tHM. Oxide head-end (installed in B204), operated 1969-1973 and processed 90 t oxide fuel, before plant was shut down after a contamination release incident.
- **Magnox Fuel Handling Plant**
 - Storage and decanning of magnox fuel.
 - Storage and dismantling of AGR fuel.
- **THORP (Thermal Oxide Reprocessing Plant)**

Mission: Reprocess AGR, domestic and foreign LWR fuels.

Design Basis: PUREX flowsheet, pulsed columns and mixer-settlers. No maintenance concept. Nominal capacity, 1200 tU/a.

Milestone: Startup, 1992.

UNITED KINGDOM

BNFL: SELLAFIELD (cont'd)

- **Drigg Waste Disposal Facility** (300-acre site, 4 miles from Sellafield)
Mission: LLW disposal.
Design Basis: Shallow-land disposal, clay-based trenches and concrete vaults.
Capacity: 650,000 m³ LLW disposed of through 1989.
- **MOX Fuel Fabrication Facilities**
 - Pilot plant, capacity--6 t/a FBR fuels.
 - Production plants (planned), capacity--100 t/a; startup, 1995.

Waste Treatment Facilities:

- **Vitrification Plant**
Mission: Solidify Sellafield HLW.
Design Basis: AVM process; product, borosilicate glass blocks.
Capacity: 250-300 t/a glass.
Milestone: Startup, 1990.
- **Waste Treatment Complex**
Mission: Prepare TRU waste for disposal.
History: Plant is currently on stand-by.
- **EP-1 and EP-2**
Mission: Encapsulate ILW in cement matrix in 500-l drums.
Capacity: 13 500-l drums/d (EP-1); 20 500-l drums/d (EP-2).
Milestones: startup, 1990 (EP-1); 1992 (EP-2).
- **EARP (Enhanced Actinide Removal Plant)**
Mission: Remove actinides from liquid effluents by ultra-filtration and flocculation.
Capacity: 1000 m³/d.
Milestone: startup, 1992.

UNITED KINGDOM

BNFL: SPRINGFIELDS

British Nuclear Fuels plc
Springfields Works
Salwick, Preston
Lancashire PR4 OXJ
United Kingdom

Tel: 44-772-72-8262
Fax: 44-772-72-5607

Director, Fuel Division

Dr. J. R. Smith

Function: Supplying fuel for U.K. reactor program. Facilities for UOC, UF₆ conversion, UF₆ - UO₂ powder/pellet production, and PWR fuel fabrication. Providing recycle services (enrichment in conjunction with Urenco).

BRE

Building Research Establishment
Department of the Environment
Building Research Station
Garston, Watford WD2 7JR
United Kingdom

Tel: 44-9273-74040
Fax:
Tx: 92-3220

Asst. Dir., Geotech./Struc. Eng.
Seabed Disposal
Continental Disposal

Dr. J. B. Menzies
T. Freeman
Ms. C. M. Cooling

Waste Management R&D: Emplacement engineering and related activities; rock mechanics.

DOE

Department of the Environment
H.M. Inspectorate of Pollution
43 Marsham Street
London SW1 3PY
United Kingdom

Tel: 44-1-276-3000
Fax: 44-1-276-8100

Director

Dr. Frank S. Feates
44-1-276-8080

Chief Inspector

Dr. Alan Duncan
44-1-276-8129

Research

Dr. Steven Brown

UNITED KINGDOM

DOE (cont'd)

Waste Management Responsibility: Administer U.K. waste management programs; fund and coordinate waste treatment and waste isolation R&D at Harwell, BGS, NRPB, etc.; regulate discharge of radioactive materials to the environment.

IOS

Institute of Oceanographic Sciences
Brook Road, Wormley, Godalming Tel: 44-42-879-4141
Surrey GU8 5UB Fax:
United Kingdom Tlx: 85-8833

Director Dr. Colin Summershayes
Nuclear Waste Dr. R. B. Whitmarsh

Function: Modelling radionuclide transport in the ocean.

MAFF

Ministry of Agriculture,
Fisheries and Food
Fisheries Laboratories
Pakefield Road Tel: 44-502-62244
Lowestoft, Suffolk NR33 OHT Fax:
United Kingdom Tlx: 97470

Director, Fisheries Research D. J. Garrod

Function: Regulation of waste management.

NII

Nuclear Installations Inspectorate
Baynards House
1 Chepstow Place Tel: 44-1-243-6000
London W2 4TF Fax: 44-1-727-4116
United Kingdom Tlx: 25-683

Chief Inspector/Nuc.Installations E. A. Ryder
Overseas Liaison J. S. MacLeod

UNITED KINGDOM

NIREX

U.K. Nirex Ltd.
Curie Avenue, Harwell
Didcot, Oxon OX11 ORH
United Kingdom

Tel: 44-235-83-5153
Fax: 44-235-83-1239

Managing Director
Technical Program

P. Tom McInerney
Maurice E. Ginniff

Function: Locate, develop and operate facilities and sites for disposal of LLW and ILW.

State-owned public company: Nuclear Electric, Scottish Nuclear, BNFL, and AEA as partners, with the Secretary of State for Energy having absolute powers of veto.

NRPB

National Radiological
Protection Board
Chilton Didcot
Oxfordshire OX11 ORQ
United Kingdom

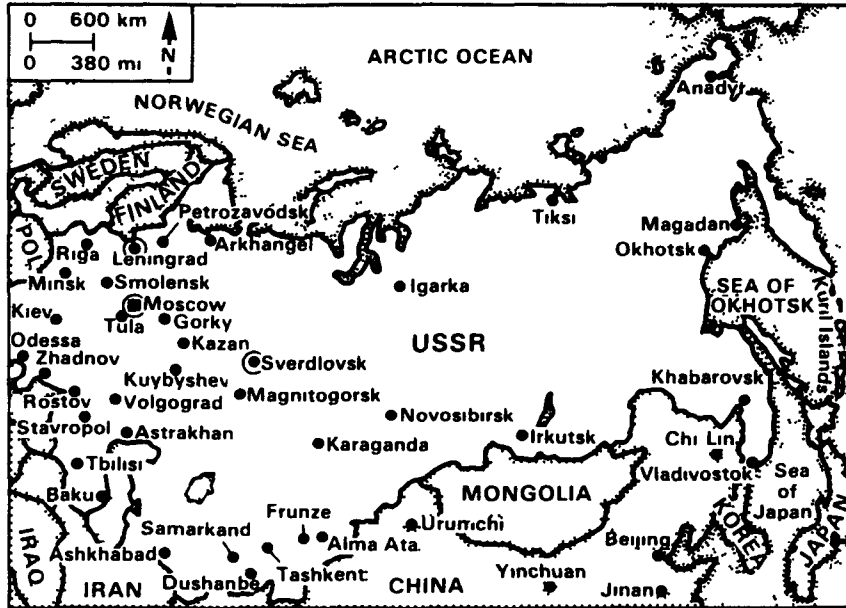
Tel: 44-235-83-1600
Fax: 44-235-83-3891

Director
Secretary
Asst. Dir., Environ. Sci.
Asst. Dir., Physical Sci.
Asst. Dir., Medical Sci.

Dr. Roger H. Clarke
G. A. M. Webb
B. Holliday
Dr. J. A. Dennis
Dr. B. H. MacGibbon

Function: As an independent board (established in 1970 as a result of the Radiological Protection Act, members appointed by the Health Ministry) advises governmental and industrial organizations on radiological protection matters and standards. Also carries out contract research to improve radiological protection and provides some technical services.

USSR (Union of Soviet Socialist Republics)



USSR

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year
Mar. 8	Women's Day
May 1-2	Solidarity Days
May 9	Victory Day
Oct. 9	Constitution Day
Nov. 7-8	October Revolution

TIME

Standard Time Washington D.C.: (Moscow) + 8 hours
Daylight Saving Time Period: 03/25 - 09/29/90

PASSPORT/VISA

A passport is needed to depart and re-enter the United States; in addition, a visa is currently required for a visit to the USSR. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY

The exchange rate is unlisted. Please consult your bank or travel agent.

DIRECT DIALING

Individual numbers for direct-dial to the USSR are complete as listed, after dialing international access code: 011. Country code is 7; listed local numbers include city code. Please note that not all telephones in the USSR are accessible for international calls.

U.S. EMBASSY - MOSCOW

American Embassy	
Ulitsa Chaykovskogo 19/21/23	Tel: 70-95-252-2451
Moscow	Fax:
USSR	Tlx: 41-3160 USGSO SU
Science Attaché	Jack Cosnell

ENERGY

Population	1988	286 million
Electric Power Plant Capacity	1988	327 GWe
Electric Power Production	1988	1712 TWh
		~12.6% nuclear
	1991	21% nuclear

NUCLEAR POWER

Policy: Major program to develop nuclear power, to avoid transport of fossil fuels from east of the Ural Mountains to European Russia.

Nuclear Power Plant Capacity	1988	33.86	GWe
	1992	55	GWe
	2000	100	GWe
Reactor Mix	1988	LGR:	22 (1958-86)
			6 (1991-94)
		PWR:	25 (1964-88)
			16 (1989-94)
		BWR:	1 (1966)
	FBR:	2 (1973/81)	
			1 (1993)

Reactor Development LMFBRs, 1500-MWe PWRs

INDUSTRIAL FUEL CYCLE

Policy: Complete domestic fuel cycle capability, including enrichment, fuel fabrication (UO₂ and MOX); develop commercial reprocessing capability; provide complete fuel cycle services, including spent fuel storage and waste disposal to foreign buyers of USSR reactors and fuel. Shift to future PWRs since Chernobyl accident in 1986.

USSR

Waste Management Strategy: Spent nuclear fuels are stored 3-10 years, followed by reprocessing. Reprocessing is done to allow for recycle of fissile materials, and separation of a number of other specific radionuclides for beneficial uses and separate disposition. HLW is vitrified for disposal in geologic repository. Geologic characterization is currently underway in at least eight unidentified sites in the Soviet Union.

LLW from nuclear reactor operations is currently evaporated, incorporated into bitumen or cement and stored and/or disposed of at reactor complexes and at about 35 other regional disposal facilities. Several sites for LLW burial "are expected to be selected in one or two years" (according to the USSR State Committee for the Utilization of Atomic Energy, 5/88). The Institute of Inorganic Materials is responsible for the LLW management program and is campaigning to cut liquid LLW volumes by 30% through more precise methods of sampling from the primary circuit, organizational methods, and recycling of soluble salts.

Dry waste, compacted at the site, is also stored/disposed of at reactor sites. Regional burial facilities are considered to minimize transportation-related risk.

INTERNATIONAL RELATIONSHIPS

Member of IAEA, CMEA and WANO.

ORGANIZATION

Nuclear Program Control

- **State Committee for Safe Working Practices in Industry and the Nuclear Power Sector**
- **Ministry for Atomic Power and Industry**

Research and Development

- **Institute of Physical Chemistry, Moscow, a branch of the USSR Academy of Sciences (geologic waste disposal; waste form properties)**
- **V. G. Khlopin Radium Institute, Leningrad (chemical separation; fuels reprocessing; geochemistry)**

- **All-Union Scientific Research Institute for Inorganic Materials, Moscow (properties of solid waste forms)**
- **Chemical Plant Research Institute, Sverdlovsk (vitrification pilot plants)**
- **I. V. Kurchatov Institute of Atomic Energy**

**ALL-UNION SCIENTIFIC RESEARCH INSTITUTE
FOR INORGANIC MATERIALS**

All-Union Scientific Research
Institute for Inorganic Mats
Ferganskaya 25
109507 Moscow, USSR

Tel: 70-95-377-0104
Tx: 411026 UKLON SU

Director

A. S. Nikiforov

I. V. KURCHATOV INSTITUTE OF ATOMIC ENERGY

I. V. Kurchatov Institute of
Atomic Energy
Kurchatov Square 1
123182 Moscow, USSR

Tel: 70-95-194-2969
Tx: 411594 Shuga

Nuclear Safety

Ilya V. Elkin
Yuri P. Buzulukov

V. G. KHLOPIN RADIUM INSTITUTE

V. G. Khlopin Radium Institute
Ul. Rentgena 1
197022 Leningrad, USSR

Tel: 70-812-247-5737
Fax: 70-812-534-7752

Director

S. L. Faddeev

Deputy Director

A. A. Rimsky-Korsakov

Chief of Laboratory

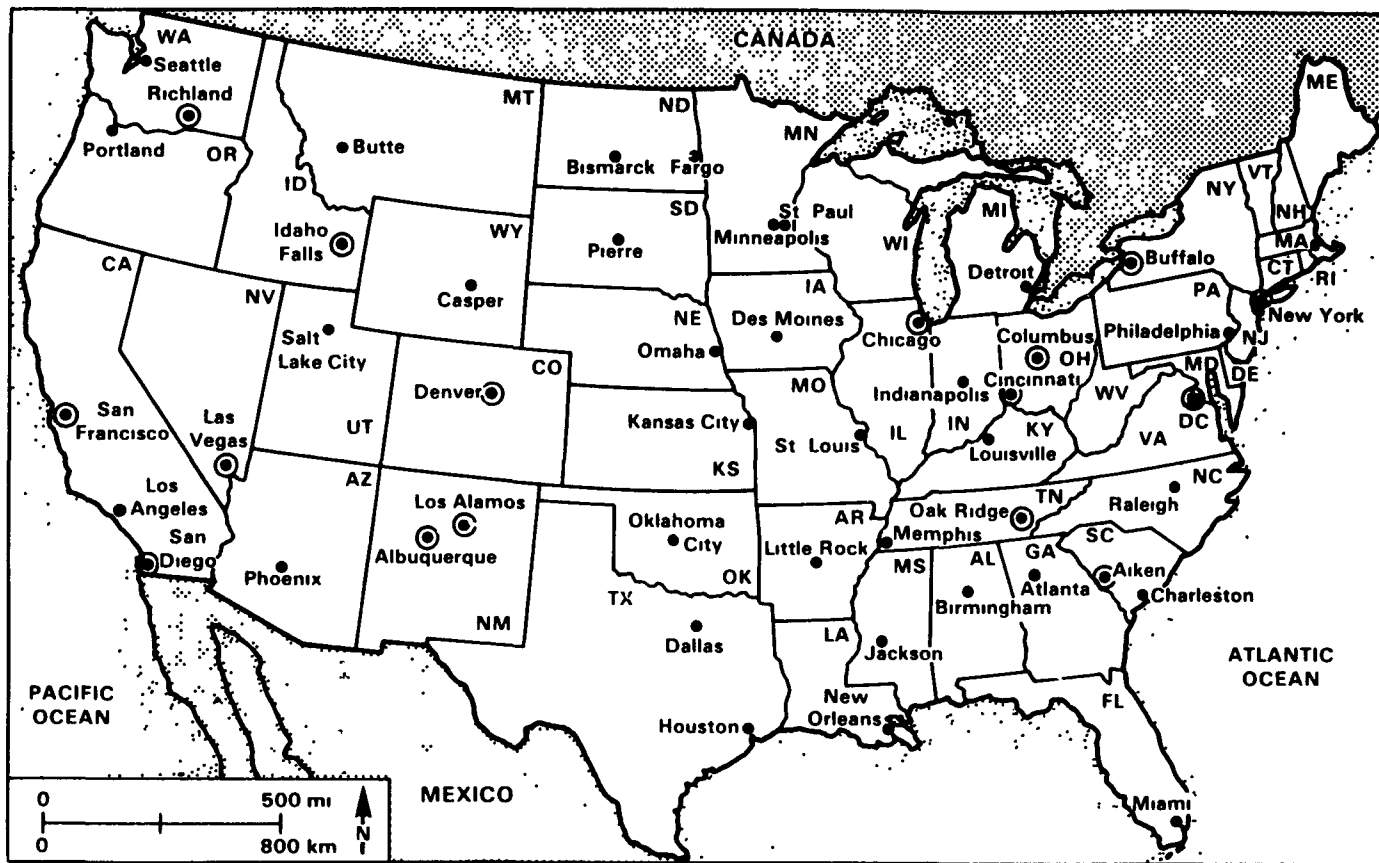
Yergeniy Shashukov

Radiochemical Technology

Valeriy N. Romanovskiy

Environmental Laboratory

Albert S. Aloy



UNITED STATES

UNITED STATES

MAJOR PUBLIC HOLIDAYS (1990)

Jan. 1	New Year	Sept. 3	Labor Day
Jan. 15	Martin Luther King Day	Oct. 8	Columbus Day
Feb. 19	Presidents Day	Nov. 11	Veterans Day
May 28	Memorial Day	Nov. 22	Thanksgiving Day
July 4	Independence Day	Dec. 25	Christmas

STATE ABBREVIATIONS

AL -Alabama	LA -Louisiana	OH -Ohio
AK -Alaska	ME -Maine	OK -Oklahoma
AZ -Arizona	MD -Maryland	OR -Oregon
AR -Arkansas	MA -Massachusetts	PA -Pennsylvania
CA -California	MI -Michigan	RI -Rhode Island
CO -Colorado	MN -Minnesota	SC -South Carolina
CT -Connecticut	MS -Mississippi	SD -South Dakota
DE -Delaware	MO -Missouri	TN -Tennessee
FL -Florida	MT -Montana	TX -Texas
GA -Georgia	NB -Nebraska	UT -Utah
HI -Hawaii	NV -Nevada	VT -Vermont
ID -Idaho	NH -New Hampshire	VA -Virginia
IL -Illinois	NJ -New Jersey	WA -Washington
IN -Indiana	NM -New Mexico	WV -West Virginia
IA -Iowa	NY -New York	WI -Wisconsin
KS -Kansas	NC -North Carolina	WY -Wyoming
KY -Kentucky	ND -North Dakota	

FOREIGN NATIONAL VISITS TO U.S. DOE FACILITIES

Foreign visitors to U.S. DOE facilities must complete and submit an IA-473 form (OMB 1910-2100) "Request for Foreign National Unclassified Visit or Assignment" to the laboratory or site to be visited at least 45 days before the proposed visit. The itinerary should be based on prior arrangement with appropriate DOE or DOE contractor staff.

In addition, for visits requested under a bilateral waste management agreement, notification of the visit should be made by the Principal Coordinator of the visitor's country to the U.S. Principal Coordinator for that agreement. The U.S. Principal Coordinator will assist, if necessary, in making the arrangements for the visit.

UNITED STATES

ENERGY

Population	1987	235 million
Electric Power Plant Capacity	1987	662 GWe 13% nuclear
	1988	674 GWe 14% nuclear
	1990	683 GWe 15% nuclear
	1995	696 GWe 15% nuclear
	1987	2,732.5 TWh 57% coal 18% nuclear 11% gas 9% hydro/geoth. 5% oil
Electric Power Production	1988	20% nuclear
	1990	18% nuclear
	1995	18% nuclear

NUCLEAR POWER GENERATION

Policy: Encourage construction and operation of nuclear power stations by private and public utilities under close regulatory control by NRC and State Public Review Commissions; continue R&D emphasizing LWR safety and small, modular concepts.

Nuclear Power Plant Capacity	1989	99.9 GWe
	1995	104.1 GWe
	2000	103.9 GWe
Reactor Mix	1989	PWR: 74 (1961-89)
		3 (1990-1992)
		BWR: 38 (1960-89)
		1 (1990)
		HTR: 1 (1979)

UNITED STATES

NUCLEAR FUEL CYCLE

Policy: Current U.S. commercial nuclear fuel cycle activities include all phases: uranium mining, milling, and enrichment; fuel fabrication; interim spent fuel and waste storage; transportation, conditioning, and disposal of radioactive waste; except spent fuel reprocessing. Mining, milling, fabrication of UO_2 fuel, and LLW disposal are done predominantly by private firms; enrichment and HLW/spent fuel disposal are the responsibilities of the federal government. While permitted by law, commercial reprocessing is not envisioned in the near future because of economic considerations.

Waste Management Strategy: Disposal of U.S. spent fuel in a geologic repository is planned, possibly after consolidation and packaging in a monitored retrievable storage (MRS) facility. The Nuclear Waste Policy Act (NWPA) of 1982 and its 1987 amendments (NWPAA) mandate start of spent fuel and high-level waste acceptance in 1998 by the U.S. Government. Short-lived LLW is disposed of in near-surface disposal facilities. Alternative concepts are being evaluated.

Cumulative Spent Fuel Arisings	1988	17,600 MTIHM
	1990	21,500 MTIHM
	2000	40,100 MTIHM

Major Milestones

- Start Demonstration Project at Waste Isolation Pilot Plant (defense TRU waste) 1990
- Candidate sites identified for MRS facility 1993
- Startup of MRS Facility
 - Limited waste acceptance 1998
 - Design waste acceptance 2000
- Start construction for geologic repository 2004
- Startup of first repository for civilian waste (spent fuel and HLW) 2010

INTERNATIONAL RELATIONSHIPS

Member of OECD/NEA and IAEA. Bilateral agreements for cooperation with Belgium, Canada, CEC, China, Germany/FR, France, Japan, Spain, Sweden, Switzerland and the United Kingdom. A brief outline of the agreements is provided in the appropriate country's section. International cooperation and exchange of waste management technology is encouraged.

ORGANIZATION

- DOE (Department of Energy) - Responsible for planning and implementing programs for the safe handling of radioactive waste generated by federal activities, and for disposal of all high-level waste, spent fuel, TRU waste, and Greater-Than-Class-C LLW. Responsible also for ensuring availability of adequate technology for safe and efficient management of nuclear waste from both civilian and federal activities.
- HQ (Headquarters) - Provides policy and guidance for nuclear waste management and fuel cycle programs. Specific responsibilities are divided among the offices of:
 - EM (Environmental Restoration & Waste Management) - Environmental cleanup, compliance and waste management activities identified in the Environmental Restoration & Waste Management Five-Year Plan. Includes previous responsibilities of NE (Nuclear Energy) and DP (Defense Programs): R&D technologies for treatment of DOE and civilian low-level radioactive waste; remedial action to treat or stabilize DOE radioactive waste; D&D demonstrations of selected facilities; safe management of radioactive nuclear waste generated primarily by federal facilities, except HLW, which will be disposed together with commercial spent fuel in a geologic repository.
 - RW (Civilian Radioactive Waste Management) - Storage and disposal of spent nuclear fuel and HLW; development of MRS facilities; development of transportation systems for spent fuel and HLW.

UNITED STATES

DOE ORGANIZATION (contd)

- **IE (International Affairs and Energy Emergencies)** - Coordination of DOE's international activities.
- **F.O. (Field/Operations Offices)** - Implement HQ policy and directives, issuing orders to specific sites. Direct efforts of DOE contractors.
- **Contractors** - Operate DOE facilities in accordance with HQ and F.O. guidance and orders.
- **DOI (Department of the Interior)**
 - **USGS (U.S. Geological Survey)** - Laboratory and field geologic investigations.
- **DOT (Department of Transportation)** - Development, issuance and enforcement of safety standards, governing aspects of radioactive and hazardous materials transport.
- **EPA (Environmental Protection Agency)** - Establishment and enforcement of standards for the protection of the general environment.
- **NRC (Nuclear Regulatory Commission)** - Issuance of regulations and licenses for commercial nuclear activities and for disposal of DOE HLW, in compliance with the general environmental standards issued by the EPA.

UNITED STATES

DOE (DEPARTMENT OF ENERGY) PARTIAL ORGANIZATION

Secretary

Deputy Secretary

Under Secretary

- EM - Environmental Restoration and Waste Management
- RW - Civilian Radioactive Waste Management
 - YMPO
- IE - International Affairs and Energy Emergencies
- Field/Operations Offices
 - AL - Albuquerque
 - LANL -- MOUND -- RFP -- SNL -- WIPP
 - CH - Chicago
 - ANL -- BNL -- BATTELLE
 - ID - Idaho
 - INEL -- WVNS -- WINCO -- TMI
 - NV - Nevada
 - OR - Oak Ridge
 - ORNL
 - RL - Richland
 - PNL -- WHC
 - SAN - San Francisco
 - EPRI -- GA -- LLNL -- ROCKETDYNE
 - SR - Savannah River
 - WSRC

UNITED STATES

NRC (NUCLEAR REGULATORY COMMISSION) PARTIAL ORGANIZATION

**Chairman
Commissioners**

-- GPA - Governmental and Public Affairs

-- Executive Director for Operations

-- NMSS - Nuclear Material Safety and Safeguards

-- RES - Nuclear Regulatory Research

-- NRR - Nuclear Reactor Regulation

-- Regional Offices

- Region I (Philadelphia)**
- Region II (Atlanta)**
- Region III (Chicago)**
- Region IV (Dallas)**
- Region V (San Francisco)**

UNITED STATES

DOE-Headquarters

U.S. Department of Energy
Forrestal
Washington, DC 20585

Tel: 202-586-5000
FTS: 896-5000
Twx: 710-822-0176
Fax: 896-8134
5049 or 4529
Verif: 896-5100

U.S. Department of Energy
Germantown
Washington, DC 20545

Tel: 202-586-5000
FTS: 896-5000
Twx: 710-828-0475
Fax: 233-3888
2866 or 3870
Verif: 233-5465

Secretary James D. Watkins

Civilian Radioactive Waste Management

RW-1	Director	John Bartlett	586-6842
	Dep. Director	Samuel Rousso	586-9116
	Dep. Director	Franklin G. Peters	586-6850
	Quality Assurance	Lake H. Barrett	586-2277
RW-10	Resource Mgt.	Samuel Rousso	586-6842
	Dep. Associate Dir.	James C. Bresee	586-9175
RW-20	Facility Siting/Dev.	Stephen H. Kale	586-9694
	Dep. Associate Dir.	Jerome D. Saltzman	586-9692
RW-30	Sys. Integr./Regs.	Ralph Stein	586-6046
	Dep. Associate Dir.	Keith A. Klein	586-9433
RW-40	Ext. Relations/Policy	Thomas H. Isaacs	586-2277
	International Coord'n	Renee Jackson	586-2283
	Dep. Associate Dir.	Lake H. Barrett	586-2277

AREA CODES: 202 for prefix 586; FTS: 896
301 for prefix 353; FTS: 233

UNITED STATES

DOE-HQ (contd)

International Affairs and Energy Emergencies

IE-1	Assistant Secretary	John J. Easton, Jr.	586-5800
IE-2	Prin. Dep. Asst. Sec.	Arlean I. Erdahl	586-5858
IE-10	Deputy Asst. Sec.	Thad Grundy, Jr.	586-5918
	Assoc. Dept. Asst. Sec.	Richard Williamson	586-5493
IE-12	Internatl. R&D Policy	Harold Jaffe	586-6770

Environmental Restoration and Waste Management

EM-1	Acting Director	Leo P. Duffy	586-7710
EM-1	Acting Dep. Dir.	Paul Grimm	586-7709
EM-10	Plan./Resource Mgt.		
	Acting Assoc. Dir.	Carl W. Guidice	586-2661
EM-20	Quality Assurance/ Envir. Control		
	Acting Assoc. Dir.	Randal Scott	586-4419
EM-30	Waste Operations		
	Acting Assoc. Dir.	Jill E. Lytle	586-7709
EM-32	Site Operations	James E. Dieckhoner	353-3956
EM-33	Program Support	Stephan P. Cowan	353-3642
EM-34	Waste Mgt. Projects	Mark Frei	353-9469
EM-35	Technical Support	Joseph Coleman	353-4728
EM-40	Environ. Restoration		
	Acting Assoc. Dir.	R.P. (Pat) Whitfield	586-7705
EM-423	Decon/Decom.	Jim Fiore	353-4716
EM-50	Tech. Development		
	Acting Assoc. Dir.	Clyde W. Frank	586-7709
	Act. Assoc. Dep. Dir.	John E. Baublitz	586-5006
	Internatl. Coord'n	Frank P. Falci, Jr.	353-3595
EM-51	Transportation Mgt.	- - -	
EM-52	Educ. Prog. Develop.	Susan M. Prestwich	353-5543
EM-53	Program Support	Lawrence H. Harmon	353-3506
EM-54	R&D	Steve Lien	353-5246
EM-55	Demon. Testing/Eval.	Carl R. Cooley	353-5519

AREA CODES: 202 for prefix 586; FTS: 896
301 for prefix 353; FTS: 233

UNITED STATES

DOE OPERATIONS OFFICES

ALBUQUERQUE OPERATIONS (AL)

U.S. Department of Energy	Tel:	505-845-4154
Albuquerque Operations Office	FTS:	845-4154
P.O. Box 5400	Fax:	-6058
Albuquerque, NM 87115	Verif:	-6319

Manager	Bruce G. Twining	-6049
Energy Tech./Waste Mgt.	Jim Bickel	-4829
Waste Isolation Pilot Plant	Arlen Hunt	571-2101
Uranium Mill Tailings	Mark Mathews	845-4628

DOE Rocky Flats Office (Denver Site)	Tel:	303-966-7000
Rocky Flats Plant	FTS:	320-7000
P.O. Box 464	Fax:	-4092
Golden, CO 80402-0464	Verif:	-2719

Manager	Robt. M. Nelson, Jr.	-2025
Deputy Manager	David P. Simonson	-2025
Acting Dir., Environmental Restoration Division	Rich Schassburger	-4888

CHICAGO OPERATIONS (CH)

U.S. Department of Energy	Tel:	708-972-2000
Chicago Operations Office	FTS:	972-2000
9800 South Cass Avenue	Tlx:	687-1701
Argonne, IL 60439	Fax:	972-2343 or -2206
	Verif:	-2209

Manager	Hilary J. Rauch	-2110
Repos. Tech. Program (RTP)	Richard C. Baker	-2071
Transportation Prog. (TPO)	Jeffrey B. Roberts	-2228
Waste Operations-Materials Integration Office (MIO)	Joel C. Haugen	-2093

UNITED STATES

IDAHO OPERATIONS (ID)

U.S. Department of Energy	Tel:	208-526-0111
Idaho Operations Office	FTS:	583-0111
785 DOE Place	Twx:	910-977-5915
Idaho Falls, ID 83402	Fax:	583-1405
	Verif:	-1503
Acting Manager	Phillip J. Hamric	-1322
Acting Asst. Mgr., Nucl. Prog.	James Solecki	-1989
Chief, Waste Management	Brenda J. Mikkola	-9316
Fuel Processing/Waste Mgt.	Jerry L. Lyle	-1148
Energy Tech. Div.	Wm. Thielbahr	-0682
Advanced Technologies	Stephen C.T. Lien	-1231
W. Valley Proj. (NY Site)	Willis W. Bixby	716-942-4312
Process Technology	Eli Maestas	716-942-4314

NEVADA OPERATIONS (NV)

U.S. Department of Energy	Tel:	702-295-1212
Nevada Operations Office	FTS:	575-1212
P.O. Box 98518	Fax:	-1371 or -1372
Las Vegas, NV 89193-8518	Verif:	-1369
Manager	Nick Aquilina	-3211
Environ'l Protection	Don Elle	-0956

OAK RIDGE OPERATIONS (OR)

U.S. Department of Energy	Tel:	615-576-5454
Oak Ridge Operations Office	FTS:	626-5454
P.O. Box 2001	Twx:	810-572-1076
Oak Ridge, TN 37831	Fax:	626-1063
	Verif:	-1058
Manager	Joe La Grone	-4444
Dir. Energy Prog. Div.	Lester K. Price	-0710
Chief Energy Tech. Branch	Connor Matthews	-1373
Mgr., Fuel Reprocessing	Martha J. Rohr	-0717
Waste Mgt. Div. Director	Larry Radcliffe	-0732
Program Manager	Larry W. Clark	-2675

UNITED STATES

RICHLAND (HANFORD) OPERATIONS (RL)

U.S. Department of Energy	Tel:	509-376-7411
Richland Operations Office	FTS:	444-7411
825 Jadwin Avenue	Twx:	510-770-5108
P.O. Box 550	Fax:	444-6540
Richland, WA 99352	Verif:	-7317

Manager	Michael J. Lawrence	-7395
Deputy Manager	Ed S. Goldberg	-7397
Asst.Mgr., Envir. Mgt.(Acting)	John H. Anttonen	-7591
Waste Management	Ron E. Gerton	-1366
Tech. Develop.	Paula K. Clark	-4718
Project Management	Larry C. Williams	-4131
Environmental Restoration	Ronald D. Izatt	-5441
Asst. Mgr., Oper./Res.(Acting)	Kenneth W. Bracken	-7434
Operations	John R. Hunter	-7471
R&D	Joseph J. Sutey	-7770
Proj. Mgr., Vitrif. Proj. Off.	John H. Anttonen	-7591
Dep. Project Mgt.	Robert W. Brown	-7391
Asst.Mgr.,Safety/Secur./QA	John J. Keating	-7387
Quality Assurance	R. Pierre Saget	-2611
Safety/Environment	Richard A. Holten	-7461
Safeguards/Security	Ken H. Jackson	-7441

SAN FRANCISCO OPERATIONS (SAN)

U.S. Department of Energy	Tel:	415-273-4237
San Francisco Operations Office	FTS:	536-4237
1333 Broadway	Fax:	-6207
Oakland, CA 94612	Verif:	-7956

Manager	Donald Pearman	-7111
Waste Management	Daniel Nakahara	543-8394
Environ. Safety & Support	Bill Holman	536-6370

UNITED STATES

SAVANNAH RIVER OPERATIONS (SR)

U.S. Department of Energy	Tel:	803-725-6211
Savannah River Operations Office	FTS:	239-6211
P.O. Box A	Twx:	810-771-2670
Aiken, SC 29801	Fax:	239-2033
		-1259 or -3626
	Verif:	-1720

Manager	P.W. (Bill) Kaspar	-2277
Dep. Mgr., Defense Waste Process Facility (DWPF)	A. Lee Watkins	237-1055
Waste Management Process	Robt. L. Chandler	239-5530
Waste Ops. & Technology	Michael O'Rear	-5541

YMPO

Yucca Mountain Project Office		
U.S. Department of Energy	Tel:	702-794-7900
Phase 2, Suite 200	FTS:	544-7900
101 Convention Center Drive	Fax:	-7907 or -7908
Las Vegas, NV 89109	Verif:	-7919

Manager	Carl P. Gertz	-7920
Deputy Project Manager	Ed L. Wilmot	-7137
Intl. Programs Manager	Robert A. Levich	-7946
Regulation/Site Evaluations	Max B. Blanchard	-7939
Regulatory Interactions	David C. Dobson	-7940
Site Investigations	Uel S. Clanton	-7943
Tech. Analysis		
Engineering Development	Leo Little	-7929
Exploratory Shaft		
Field Engineering	Michael Cloninger	-7947
•Systems	Edgar H. Petrie	-7961
Project/Operations Control	Wendy R. Dixon	-7947
Quality Assurance	Donald K. Horton	-7913

DOE CONTRACTORS

ANL

Argonne National Laboratory	Tel:	708-972-2000
9700 South Cass Avenue	FTS:	972-2000
Argonne, IL 60439	Tlx:	687-1701
	Fax:	972-2343
		-2206 or -2528
	Verif:	-2209

Director	Alan Schriesheim	-3872
Waste Management	James E. Holt	-7335
Applied R&D	Stanley S. Borys	-6677
Adv. Comm. on Nucl. Waste	Martin J. Steindler	-4314
Natl. Energy Software Center	Margaret K. Butler	-7172
Special Projects Office	Charles E. Klotz	-6385
ANL-West (ID), Acting Mgr.	D.W. Cissel	583-7106

Fuel Cycle and Waste Management Activities:
 Remedial action for formerly-used MED/AEC sites (FUSRAP)
 and for surplus facilities management program (SFMP) - D&D of
 ANL-East contaminated facilities - Advisory Committee on
 Nuclear Waste/Materials Integration Office - Hazardous Waste
 Remedial Action Program (HAZWRAP), mixed waste treatment
 and disposal, groundwater treatment - LLW/TRU waste technol-
 ogy - TRUEX process development - Pro-metallurgical and pyro-
 chemical fuel reprocessing, electrofinishing - Environmental
 Restoration and Waste Management - Applied R&D Program
 Support - SARP review - Civilian Radioactive Waste, socioecon-
 omic impact assessment, site characterization plan support,
 transportation planning, spent fuel and waste glass performance,
 interaction of waste package with repository environment, in-
 strumentation development - National Energy Software Center.

UNITED STATES

ANL (cont'd)

Major Facilities:

ANL-West: Experimental Breeder Reactor No. 2 (EBR-II) - Zero Power Plutonium Reactor (ZPPR) - Transient Reactor Test Facility (TREAT) - Hot Fuel Examination Facility (HFEF) - Radioactive Scrap and Waste Facility - Sodium Process Demonstration (SPD) Facility - Radioactive Liquid Waste Treatment Facility (RLWTF) - Hot Fuel Examination Facility North/South (HFEF/N, HFEF/S).

ANL-East: High-Level Hot-Cell Facilities - Large Gamma Radiation Facility - Alpha-Gamma Hot-cell Facility (AGHFC).

BATTELLE

Battelle	Tel:	614-424-4295
505 King Avenue	FTS:	same
Columbus, OH 43201	Tlx:	24-5454
	Fax:	424-5601
	Verif:	-4182

Nuclear Systems Group

V.P./General Manager	Richard A. Nathan	-4295
Transp. Syst./Planning (OTSP)	William M. Knaufl	-3686
Nucl. Waste Isolation (SEDM)	Wayne A. Carbiener	-4507

Office of Waste Technology Development

(OWTD)	Tel:	708-655-8600
7000 S. Adams Street	Fax:	-8619
Willowbrook, IL 60521	Verif:	-8618

Waste Tech. Devel. (OWTD)	Walt E. Newcomb	-8620
---------------------------	-----------------	-------

Fuel Cycle and Waste Management Activities:

Site survey/characterization - Waste packaging - Disposal technology - Transportation - Performance assessment - Environmental/Socioeconomic assessments - Decontamination and decommissioning - Monitored retrievable storage - Systems integration - Quality assurance - Licensing - Nuclear Eng./technology - Policy support - Institutional interactions - Communications and outreach - Safety.

UNITED STATES

BATTELLE (contd)

Hazardous Chemical and Mixed Waste Activities:

Transportation - Risk assessment - Modelling - Regulation - Waste management - Policy support.

Major Facilities:

Hot and Cold Development Laboratories - Hot Cells for both destructive and nondestructive examination for development programs.

BNL

Brookhaven National Laboratory	Tel:	516-282-2123
Associated Universities, Inc.	FTS:	666-2123
Upton, NY 11973	Tlx:	685-2516
	Fax:	666-3000
	Verif:	-2547

Director	N. P. Samios	-2772
HLW & NRC LLW Programs	Peter Soo	-4094
DOE LLW Programs	Peter Colombo	-3045

Fuel Cycle and Waste Management Activities:

Low-level waste form evaluation - Waste management criteria

Major Facilities: Hot and Cold Development Laboratories

GA

General Atomics	Tel:	619-455-3000
P.O. Box 85608	FTS:	same
3550 General Atomics Court	Twx:	910-335-1260
San Diego, CA 92138	Fax:	619-455-3621
	Verif:	-3457

Chairman/Chief Executive	J. Neal Blue	-2152
Transp./Utility Waste Mgt.	Robert Grenier	-2583

Fuel Cycle and Waste Management Activities:

HTGR spent fuel treatment - Transportation technology for commercial and defense waste.

UNITED STATES

INEL

Idaho National Engineering Laboratory	Tel:	208-526-0111
EG&G Idaho, Inc.	FTS:	583-0111
P.O. Box 1625	Twx:	910-977-5915
Idaho Falls, ID 83415	Fax:	583-9591
	Verif:	(recipient)

Manager	James O. Zane	-9671
Waste Management	Larry P. Leach	-6212
National LLW Mgt. Program	Calvin B. Ozaki	-0004
TMI-2 Program (TMI Site)	Bill Franz	590-1052

Fuel Cycle and Waste Management Activities:

National LLW technology - D&D (EBR-II, MTR, OMRE, Spent Reactors) - TMI-2 R&D - Operation of stored waste examination pilot plant (SWEPP) for TRU waste - Operation of process experimental pilot plant (PREPP) for TRU waste - LLW disposal operation - Cask systems development - Cask transport and testing - Prototypical rod consolidation.

Major Facilities:

Radioactive Waste Management Complex (RWMC) - Processing Experimental Pilot Plant (PREPP) - Waste Experimental Reduction Facility (WERF) - Stored Waste Examination Pilot Plant (SWEPP) - Test Area North/Spent Fuel Storage Area (TAN).

LANL

Los Alamos National Laboratory	Tel:	505-667-5061
University of California	FTS:	843-5061
P.O. Box 1663	Twx:	910-988-1773
Los Alamos, NM 87545	Fax:	843-1754
	Verif:	-5113

Director	Siegfried Hecker	-5101
Nuclear Waste Mgt.	Richard J. Herbst	-9286

Fuel Cycle and Waste Management Activities:

Fundamental studies of waste materials (BES) - Migration from low-level waste sites (BES) - D&D of various site facilities - Tuff repository support (NNWSI).

UNITED STATES

LANL (contd)

Major Facilities:

Waste Disposal Field Experimental Facility - Controlled Air
Incinerator Demonstration Facility - Glove Box Reduction Facility
- TRU Waste Assay Systems.

LLNL

Lawrence Livermore National	Tel:	415-422-1100
Laboratory	FTS:	532-1100
University of California	Twx:	910-386-8339
P.O. Box 808	Fax:	532-1370
Livermore, CA 94550	Verif:	-4546

Director	John H. Nuckolls	-5435
Dir., Yucca Mountain Project	Leslie Jardine	543-5032
Technical Manager	Lyndon Ballou	532-4911
Energy Programs	Jesse L. Yow, Jr.	-3521

Fuel Cycle and Waste Management Activities:

Particulate filter development - Fundamental geoscience studies -
CLIMAX spent fuel test at NTS - Development of waste package
for tuff repository - Waste package design criteria - Monitoring
techniques for geologic repositories - Geochemical code for tuff
repository performance assessment.

Major Facility:

• CLIMAX Spent Fuel Test Facility at NTS.

MOUND

EG&G Mound Applied Technologies	Tel:	513-865-4020
P.O. Box 3000	FTS:	774-4020
Miamisburg, OH 45343	Twx:	510-600-6643
	Fax:	774-3742 or -4532
	Verif:	-3575

Director	Donald E. Michel	-5090
Nuclear Waste Technology	Thomas K. Mills	-4708
D&D	Ralph R. Jaeger	-3275
Waste Management	Richard K. Blauvelt	-3698

UNITED STATES

MOUND (cont'd)

Fuel Cycle and Waste Management Activities:

Solid waste volume reduction with glass melter - TRU waste technology/record systems - TRU waste treatment/ liquid waste, incineration - tritium recovery from waste - D&D of Pu-238 facilities.

Major Facilities:

Glass Melter - Incinerator - Waste Treatment Facility - Combined Electrolysis Catalytic Exchange System (CECE) - Tritium Effluent Recovery System (ERS) - Hydrogen Isotope (Cryogenic Distillation) Separation System (HISS).

NRT

Nuclear Remediation Technologies

P.O. Box 85608

3550 General Atomics Court

San Diego, CA 92138

Tel: 619-455-3230

FTS: same

Fax: -3231

Verif.: -3381

President/CEO

Robert Burgoyne

-4122

V.P., Operations

S.P. Viani

-3232

Fuel Cycle and Waste Management Activities:

Nuclear and mixed waste site characterization - Soil and groundwater treatment - Process design - Transportation services and environmental engineering support.

ORNL

Oak Ridge National Laboratory	Tel:	615-576-5454
Martin Marietta Energy	FTS:	626-5454
Systems, Inc.	Twx:	810-572-1076
P.O. Box 2008	Fax:	626-2912
Oak Ridge, TN 37831	Verif:	624-6068

Director	Alvin Trivelpiece	626-2900
Div. Dir., Env./Health Protec. (Nucl. Chem. Waste)	Thomas H. Row	624-5974 (Fax)626-6616
Dir., Consolidated Fuel Reprocess. Program	William D. Burch	624-7065

Waste Management Activities:

Operate waste management facilities, including disposal - Develop TRU waste technology, including assay and package certification - Hazardous waste remedial actions - Sedimentary rock studies - Waste operations control center - UMTRA radiological survey - Environmental restoration and facilities upgrade - waste management R&D.

Major Facilities:

LLW Disposal/Storage Facilities - TRU Assay Facility - Tower Shielding Facility (fuel/waste cask drop tests) - TRU Storage/Certification Facilities - Liquid LLW processing/storage - Waste processing/disposal - Tumulus LLW Disposal Facility - Non-Radiological Waste-water Treatment Plant - Hazardous waste storage and packaging facility.

Fuel Cycle and Reprocessing Activities:

Develop reprocessing, remote systems, and safeguards technologies and facilities design optimizations.

Major Facilities:

Integrated Equipment Test Facility including Fuel Element Disassembly and Shearing Systems, Continuous Rotary Dissolver, Chemical Rack Systems, Advanced Integrated Maintenance System and Environmental Test Chamber.

UNITED STATES

PNL

Pacific Northwest Laboratory
Battelle Pacific Northwest
Laboratories
Battelle Boulevard
P.O. Box 999
Richland, WA 99352

Tel: 509-375-2121
FTS: same
Tlx: 15-2874
Fax: 509-376-3876
Verif: (recipient)

Director	William R. Wiley	375-2201
Waste Technology Center	Jack L. McElroy	376-6253
Process Applications	Harry C. Burkholder	376-3090
Waste Systems	Gary W. McNair	376-4435
Intn'l Program Support Off.	Don J. Bradley	376-0933
Reactor Technology Center	Bill D. Shipp	375-2921
Environ'l Mgt. Operations	Ralph W. Root	375-3888
Hanford RI/FS	Donald A. Kane	375-2333

Fuel Cycle and Waste Management Activities:

Waste systems integration (economic/contract analyses and implementation) - Commercial spent fuel management - Civilian nuclear waste treatment (HLW/TRU) - Monitored retrievable storage (MRS) - Materials characterization center (MCC) - International program support - NRC environmental studies on LLW and uranium mill tailing sites - Tuff repository and Performance Assessment Scientific Support (PASS) studies - HLW technology (SR, WV, Hanford) - TRU technology (TWSO, Hanford) - LLW technology (LLWMP, Hanford) - Remedial action planning and technology - Byproduct utilization - Transportation technology.

Major Facilities:

Hot and Cold Development Laboratories - Hot cells for Development and Pilot Scale Programs and Spent Fuel Characterization.

UNITED STATES

RFP

EG&G Rocky Flats, Inc.	Tel:	303-966-7000
Rocky Flats Plant	FTS:	320-7000
P.O. Box 464	Fax:	-4092
Golden, CO 80402-0464	Verif:	-2719

President	P. Warner	-4361
Waste Operations	H. H. Burlangame	-6013
Waste Minimization	Ann C. Ficklin	-4293
Technology Development	Ed R. Naimon	-7900

Fuel Cycle and Waste Management Activities:

Defense TRU waste technology - LLW technology development - Waste treatment facilities operations.

Major Facilities:

Solid Waste Reduction Facility - LLW Incinerators - TRU Waste Supercompaction (September 1990) - TRU Waste Assay -Liquid Waste Treatment and Fixation Facilities - Microwave Melting of Liquid Waste Treatment Sludges (1991).

ROCKETDYNE

Rockwell International Corporation	Tel:	818-700-8200
Atomics International Division	FTS:	same
Rocketdyne	Tlx:	69-8478
6633 Canoga Avenue	Fax:	818-710-2866
Canoga Park, CA 91303	Verif:	-2471

Director	D. Clark Gibbs	700-3303
Nuclear Products/Services	Robt. M. Musica	718-3355
Fuel Decladding	Thomas A. Moss	718-3326

Fuel Cycle and Waste Management Activities:

Decladding of fuels - Operation of Energy Technology and Engineering Center (ETEC) - Remote handling development - Large component fabrication.

Major Facilities:

Large Inert Hot Cell - ETEC.

UNITED STATES

SAIC

Science Applications International Corporation	Tel:	702-794-7000
Suite 407	FTS:	544-7000
101 Convention Center Drive	Fax:	-7008
Las Vegas, NV 89109	Verif:	-7780
Technical Project Officer	John H. Nelson	-7864

SNL

Sandia National Laboratories	Tel:	505-844-5678
P.O. Box 5800	FTS:	844-5678
Albuquerque, NM 87185-5800	Tlx:	16-9012
	Fax:	-7091
	Verif:	-8917
President	Al Narath	-7261
Exploratory Nucl. Power Dev.	A. W. Bill Snyder	-8203
Nuc. Waste Mgt./Transp.	Richard W. Lynch	-3763
Transp. Tech. Center	Joe Stiegler	845-8788
WIPP Scientific Support	Wendell D. Weart	-4855
Nucl. Regulatory Research	D.J. McClosky	846-0834
Yucca Mountain Project	Thomas O. Hunter	-9160

Fuel Cycle and Waste Management Activities:
Radioactive material transportation technology - Tuff repository support - Salt repository scientific support (WIPP) - Safety assessment of facilities for NRC - Advances in reactor technology.

Major Facilities:
Research reactors and numerous test facilities.

SRL/SRP (see WSRC)

UNITED STATES

WHC

Westinghouse Hanford Company	Tel:	509-376-7411
P.O. Box 1970	FTS:	444-7411
Richland, WA 99352	Fax:	-4668
	Verif:	-5777

President	John E. Nolan	-7803
Exec. Vice President	Roger C. Nichols	-5107
Vice Pres., Defense Prog.	Ronald J. Bliss	-6427
Chemical Processing	J. Roger Knight	-4527
Defense Waste Management	Hugh F. Daugherty	373-1599
Defense Reactor	Wallace G. Ruff	373-1123
Vice Pres., Engin./Devel.	Michael K. Korenko	-9992
Adv. Reactor Dev. Projects	Denny J. Newland	-5457
Projects	Carl M. Cox	-1580
Hanford W.V. Plant Project	Robert A. Smith	-8041
HWVP Technology	E. Tom Weber	-9181
Defense Waste Mgt. Projects	Michael A. Cahill	373-5360
Environmental Division	Ronald E. Lerch	-5556

Fuel Cycle and Waste Management Activities:

Fuel reprocessing (PUREX) - HLW tank storage - Cs/Sr recovery and encapsulation - HLW concentration and solidification - LLLW treatment and fixation - TMI support - TRU waste assay - Hanford waste disposal - D&D Hanford reactors and fuel cycle facilities - Breeder fuel development and fabrication - Spent fuel integrity in storage - Surplus facilities program - Solid waste disposal operations.

Major Facilities:

PUREX Reprocessing Plant - Plutonium Finishing Plant - Cs/Sr Encapsulation Plant - Fast Flux Test Facility (FFTF) - Fuel Cycle Plant (FCP previously FMEF) - Fuel Development Laboratories - N-Reactor - N-Reactor Fuel Fabrication Facilities.

UNITED STATES

WINCO

Westinghouse Idaho Nuclear Co., Inc.	Tel:	206-526-0111
Idaho Chemical Processing Plant	FTS:	583-0111
P.O. Box 4000	Twx:	910-977-5915
Idaho Falls, ID 83403	Fax:	583-3499
	Verif:	-3506

President	W.C. Moffitt	-0998
Production	L. F. Ermold	-4628
Technology	Bert R. Wheeler	-3373

Fuel Cycle and Waste Management Activities:
Operate associated spent fuel storage, fuel reprocessing, HLW tank storage, and HLLW calcining facilities.

Major Facilities:
Idaho Chemical Processing Plant (ICPP) - Fuel Reprocessing
Uranium Recovery HLLW Storage. Waste Calcining Facility
(WCF) and Remote Mockup - Wet and Dry Fuel Storage - Kr-85
Cryogenic Recovery.

WIPP

WIPP Project		
Westinghouse Electric Corporation	Tel:	505-887-8100
Advanced Energy Systems Division	FTS:	571-2100
P.O. Box 2078	Fax:	505-885-3276
Carlsbad, NM 88221	Verif:	885-8883

Westinghouse Mgr./Ops.	A. L. Trego	571-2200
------------------------	-------------	----------

Fuel Cycle and Waste Management Activities:
WIPP technical support, including design review, construction support, safety assurance, operational planning, quality assurance systems.

Major Facility: Waste Isolation Pilot Plant.

UNITED STATES

WSRC

Westinghouse Savannah River Co.	Tel:	803-725-6211
P.O. Box 616	FTS:	239-6211
Aiken, SC 29802	Twx:	669-1713
	Fax:	239-2033
		-1259 or -3626
	Verif:	-1720

Savannah River Site (SRS)		
V.P./Gen. Mgr., Operations	Ed W. Pottmeyer	-2701
Waste Mgt. Programs	Lucien Papouchado	-3320

Fuel Cycle and Waste Management Activities:

Operate fuel reprocessing facilities - Operate associated spent fuel storage, HLLW tank storage and treatment facilities - Operate LLW shallow-land burial grounds - Build and operate Defense Waste Processing Facility - Store mixed waste.

Major Facilities (existing and planned):

Reprocessing Plants - Canyon Mockup Shop - LLW Incinerator - HLW Tank Farm - Defense Waste Processing Facility (DWPF) - Hazardous Waste/Mixed Waste Processing Facility - Consolidated Incinerator Facility (hazardous, LLW, and mixed waste) - Transuranic Waste Facility, LLW Preparation Facility.

Savannah River Laboratory (SRL)

Vice Pres./Director	Richard T. Begley	803-725-3422
Defense Waste Processing	Dan L. McIntosh	-3113
Chemical Processing Tech.	Harry D. Harmon	-3701

Fuel Cycle and Waste Management Activities:

Fuel reprocessing R&D - HLW storage and solidification R&D - HLW form development and characterization - HLW packaging R&D - TRU technology development - LLW technology development - Defense HLW technology development.

Major Facilities:

HLW Vitrification Pilot Plant - HLW Tank Mockup - HLW Caves for Process Development.

UNITED STATES

WVNS

West Valley Nuclear Services, Inc.	Tel:	716-942-3235
P.O. Box 191	FTS:	473-3235
West Valley, NY 14171-0191	Fax:	-4376
	Verif:	-4267

President	Roy A. Thomas	-4344
Vice Pres./Dep. Proj. Mgr.	Joseph J. Buggy	-4200

Fuel Cycle and Waste Management Activities:
Demonstration of HLW vitrification - Supernatant treatment by ion-exchange - LLW treatment using cement solidification.

Major Facilities:
HLW Vitrification Facility - Integrated Radioactive Treatment System (HLW Supernatant processing, evaporation, remote cementation facility, product storage).

OTHER U.S. ORGANIZATIONS

EPA

Environmental Protection Agency	Tel:	202-382-2090
401 M Street S.W.	FTS:	382-2090
Washington, DC 20460	Tlx:	89-2758
	Fax:	382-7883
		-7884 or -7885
	Verif:	-2078

International Activities

Assistant Administrator	Timothy B. Atkeson	-4870
Multilat. Staff Director	Alan Sielen	-4875

Radiation Programs

Director	Richard Guimond	475-9600
Criteria and Standards	J. William Gunter	475-9603
Waste Mgt. Standards	Floyd L. Galpin	475-9633

Solid Waste

Director	Sylvia Lowrance	382-4627
Permit and State Programs	Matthew Hale	-4746

UNITED STATES

EPRI

Electric Power Research Institute	Tel:	415-855-2000
3412 Hillview Avenue	FTS:	same
P.O. Box 10412	Tlx:	82-977
Palo Alto, CA 94303	Fax:	855-2954
	Verif:	-2717

President	Richard Balzhiser	-2141
V.P./Director, Nuc. Power	John J. Taylor	-2030
LWR Fuel/Spent Fuel Storage	David Franklin	-2408
Low-Level Waste	Robert Shaw	-2026

Fuel Cycle and Waste Management Activities:

Direct assay of low-level radioactive waste - Spent fuel rod consolidation equipment - On-site demonstration of spent fuel storage in metal casks/concrete silo - Conceptual designs for LLW disposal sites - Demonstration of transportable spent fuel metal storage cask - Fuel performance during load-following, high-temperature operation and extended burnup - Fuel performance computer models.

NRC

U.S. Nuclear Regulatory Commission	Tel:	301-492-7000
Washington, DC 20555	FTS:	492-7000
	Tlx:	90-8142
	Fax:	492-0259 or 0260
	Verif:	-0262

Governmental and Public Affairs (GPA)

Director	Harold R. Denton	-1780
International Programs	James R. Shea	-0347
International Security (Export/Import Regulations)	Marvin R. Peterson	-0344
International Cooperation	Ronald D. Hauber	-0336

UNITED STATES

NRC (cont'd)

Nuclear Material Safety and Safeguards (NMSS)

Director	Robt. M. Bernero	-3352
HLW Management	Robt. E. Browning	-3404
LLW Mgt./Decommissioning	Richard L. Bangart	-3340
Safeguards/Transportation	Robt. F. Burnett	-3365
Indust./Medical Nucl. Safety	R. E. Cunningham	-3426

Nuclear Reactor Regulation (NRR)

Director	Thomas E. Murley	492-1270
Reactor Projects I/II	Steven A. Varga	-1403
Reactor Projects III/IV/V	Gary M. Holahan	-1353
Systems Technology	Ashok C. Thadani	-0884
Engineering Technology	James Richardson	-0821
Operational Events Assess.	Charles E. Rossi	-1163
Reactor Inspection/Safeguards	Brian K. Grimes	-0903
Rad. Protec./Emerg. Prepar.	Frank J. Congel	-1088
Performance/Quality Eval.	Jack W. Roe	-1004

Nuclear Regulatory Research (RES)

Director	Eric S. Beckjord	-3700
Engineering	Lawrence C. Shao	-3800
Safety Issues Resolution	Warren Minners	-3900
Systems Research	Brian Sheron	-3500
Regulatory Applications	Bill M. Morris	-3750

Regional Offices

Philadelphia	- Region I	William T. Russel	215-337-5299
Atlanta	- Region II	Stewart D. Ebnetter	404-331-5500
Chicago	- Region III	A. Bert Davis	708-790-5681
Dallas	- Region IV	Robert D. Martin	817-860-8225
San Fran.	- Region V	John B. Martin	415-943-3707

UNITED STATES

USGS

U.S. Geological Survey
410 National Center
12201 Sunrise Valley Drive
Reston, VA 22092

Tel: 703-648-4000
FTS: 959-4000
Tx: 160-443
Fax: -5295
Verif: -5235

Director	Dallas L. Peck	-7411
Asst. Dir./Eng. Geology	Eugene Roseboom	-4423
Nuclear Waste Hydrology		
HLW	Newell J. Trask	-5719
LLW	Peter R. Stevens	-5721
Toxic Waste (Acting)	Gail Mallard	-6872

Yucca Mountain Proj. (Denver Office)
Technical Proj. Officer Larry R. Hayes 776-0516

Fuel Cycle and Waste Management Activities:

Basic/applied research on hydrogeologic processes relevant to radioactive and toxic waste disposal - site characterization - geologic/hydrologic investigations to determine suitability of potential HLW repository site at Yucca Mountain - site investigations/research - consultant for EPA, DOE, DOD, Dept. of Agriculture, Bureaus of Land Mgt., of Mines, of Reclamation, and state agencies.

INTERNATIONAL AGENCIES

INTERNATIONAL

CEC

Commission of the European
Communities

200 Rue de la Loi
1049 Brussels, Belgium

Tel: 32-2-235-1111

Fax: 32-2-236-2006

Vice-President for Industrial
Affairs, Information Tech-
nologies, Research/Science,
Joint Research Centres

Filippo Naria Pandolfi

Director General, Science/R&D

Paolo Fasella

Director, Nuclear R&D

Sergio Finzi

Division, Fuel Cycle

Serge Orłowski

Division, Nuclear Plant Safety

Emilio Lopez Menchero

Division, Radiological Protection

Georg Gerber

Director General, JRCs

Jean-Pierre Contzen

MEMBER STATES - EUROPEAN ECONOMIC COMMUNITY (EEC)

Belgium

Greece

Netherlands

Denmark

Italy

Portugal

France

Ireland

Spain

Germany (FRG)

Luxembourg

United Kingdom

FUNCTION

Executive body for the European Communities (combined
Euratom, Coal and Steel, Common Market).

FUEL CYCLE PROGRAM ADMINISTRATION

R&D Programs:

- **Direct action**--fully funded by CEC (by a tax on Member States), conducted by Joint Research Centre establishments at Ispra (Italy) and Karlsruhe (FRG).
- **Shared-cost action**--coordinated by Division Fuel Cycle, Brussels, and partly funded by CEC under cost-sharing contracts, conducted by research centers, universities, and industries in the Member States.

INTL.1

INTERNATIONAL

Cooperation with the U.S.:

DOE/CEC UMBRELLA AGREEMENT FOR WASTE MANAGEMENT EXCHANGE

Term: 10-6-82 to 10-6-92.

Scope: Characterization of waste forms; disposal in geologic
formations.

Emphasis: R&D.

CEC-JRC: ISPRA

CEC Joint Research Center

Ispra Establishment

21020 Ispra (Varese)

Italy

Tel: 39-332-789-111

Fax: 39-332-789-001

Location: Northern Italy; may be reached by air travel to Milan,
ground transport to Ispra, about 50 km.

Waste Management Programs

Francesco Girardi

Waste Management R&D: R&D in treatment and storage of
radioactive waste. TRU wastes--volume reduction and actinide
separation; waste disposal--risk analysis, nuclide migration, and
waste form properties.

CEC-JRC: KARLSRUHE

Karlsruhe Establishment

(European Institute for

Transuranium Elements)

Postfach 2266

7500 Karlsruhe

Federal Republic of Germany

Tel: 49-7247-841

Fax:

Tlx: 7825483 EU D

Director

Jacobus van Geel

Function: Basic research in the transuranium elements, especially
plutonium, reactor fuels development.

Fuel Cycle R&D: Plutonium conversion and plutonium fuels,
characterization of waste forms, notably spent fuel when
considered as a waste.

INTL.2

INTERNATIONAL

CMEA

Council for Mutual Economic Assistance
Prospekt Kalinina 56
121205 Moscow
USSR

MEMBER STATES

Bulgaria	Hungary	USSR
Cuba	Mongolia	Yugoslavia
Czechoslovakia	Poland	Vietnam
Germany/DR	Rumania	

FUNCTION

Promote economic and industrial cooperation among the Member States with centrally-controlled economies.

ORGANIZATION

- **Standing Commission on the Use of Atomic Energy for Peaceful Purposes**--reviews national waste management R&D programs and defines areas for additional cooperation.

IAEA

International Atomic Energy
Agency

P.O. Box 200
1400 Vienna, Austria

Tel: 43-222-2360
Fax: 43-1-2345-64

Director General
Dep. Dir. Gen., Nuc.Energy/Safety
Dir., Nuc. Fuel Cycle/Waste Mgt.
Head, Waste Management
Waste Mgt. U.S. Staff
Head, Nuc. Mtls./Fuel Cycle
Technology
Dep. Dir. Gen., Safeguards
Dep. Dir. Gen., Tech. Cooperation
Dep. Dir. Gen., Research/Isotopes
Dep. Dir. Gen., Administration

Hans Blix
Boris Semenov
Jia-Luo Zhu
Donald E. Saire
Dave J. Squires

Alexander Nechaev
Jon Jennekens
bin Muslim Noramly
Maurizio Zifferero
William J. Dirks

INTL.3

INTERNATIONAL

IAEA (contd)

MEMBER STATES

113 nations (U.N. members, including the U.S.).

FUNCTION

Develop the peaceful use of atomic energy: safeguards, nuclear safety and standards, information exchange, and technical cooperation and assistance.

Intergovernmental organization, established 1957, directed by a Board of Governors (composed of representatives from 34 member states) and a General Conference (consisting of the entire membership).

WASTE MANAGEMENT ACTIVITIES

- Collection, review and dissemination of technical, scientific, and regulatory information in the area of:
 - handling, treatment, storage, and conditioning of waste, including uranium mill tailings
 - decontamination and decommissioning of nuclear facilities
 - underground disposal of waste
 - assessment of environmental consequences due to effluent discharges and other releases of radionuclides.
- Development of internationally acceptable guidelines, standards, and codes of practice for use by national authorities.
- Protection of the environment by fulfilling responsibilities under international conventions.
- Promotion and sponsorship of research work and development of data and technology in promising areas.
- Technical cooperation, assistance, and training to Member States upon request.

INTERNATIONAL

U.S. Mission to IAEA (UNVIE)

Obersteingasse 11
1190 Vienna
Austria

Tel: 43-222-36-3152
Fax:
Tx: 11-4634 USEMB

Waste Management

Dr. Maurice Katz

ICRP

International Commission on Radiological Protection

Clifton Avenue
Sutton, Surrey SM2 5PU
United Kingdom

Tel: 44-1-642-4680
Fax:
Tx: 895 1244 ICRPG

Chairman, Main Commission
Scientific Secretary
Committee Chairman,
Radiation Effects

Dr. D. Beninson
Dr. Hylron Smith

Dr. A. C. Upton

FUNCTION

Provide principles of radiation protection as a basis for each country to use in establishing technical codes of practice.

OECD

Organisation for Economic Co-Operation and Development

2, Rue André-Pascal
F-75775 Paris Cedex 16
France

Tel: 33-1-45-24-82-00
Fax: 33-1-45-24-85-00

Secretary General
Dep. Secretary General
Dep. Secretary General

Jean Claude Paye
Robert A. Cornell
Pierre Vinde

U.S. OECD Mission
19 rue Franqueville
75016 Paris, France

Tel: 33-1-45-24-74-77
Fax: 33-1-45-24-74-80

DOE Representative

Frank J. Goldner
33-1-45-24-74-24

INTL.5

INTERNATIONAL

OECD/NEA

OECD Nuclear Energy Agency
38 Boulevard Suchet
75016 Paris, France

Tel: 33-1-45-24-82-00
Fax: 33-1-45-24-96-24

Director General	Kunihiko Uematsu 33-1-45-24-96-60
Deputy Director General	Pierre Strohl 33-1-45-24-96-50
Deputy Dir., Safety/Regulation	Klaus Stadie 33-1-45-24-96-54
Radiation Protection/Waste Mgt.	Jean-Pierre Olivier 33-1-45-24-96-95
Deputy Dir, Science/Info Proc.	Johnny Rosen 33-1-45-24-96-62

NEA Data Bank
Bâtiment 445
91191 Gif-sur-Yvette Cedex
France

Tel: 33-1-69-08-49-12
Fax: 33-1-69-41-39-65

MEMBER STATES

Australia	France	Japan	Sweden
Austria	Germany/FR	Luxembourg	Switzerland
Belgium	Greece	Netherlands	Turkey
Canada	Iceland	Norway	United Kingdom
Denmark	Ireland	Portugal	United States
Finland	Italy	Spain	

FUNCTION

Promote orderly development of peaceful uses of nuclear energy through cooperation among Member States. Initiate, encourage, and coordinate cooperative work in the following areas: reactor and nuclear fuel cycle studies, radiation protection and waste management, nuclear safety, regulatory matters, and nuclear data collection.

INTERNATIONAL

ACTIVITIES

- Workshops, technical meetings, symposia, and publications.
- Joint R&D programs.
- Data Bank.

U.S. PARTICIPATION IN WASTE MANAGEMENT ACTIVITIES

- Radioactive Waste Management Committee (RWMC)
 - **Performance Assessment Advisory Group (PAAG):**
Initiated in 1985 to provide a broad forum for discussion of performance assessment and to advise the RWMC on technical aspects of system performance assessments.
 - **Coordinating Group on Site Evaluation and Design of Experiments for Radioactive Waste Disposal (SEDE):**
Established in 1990, after disbanding the Advisory Group on In-Situ Research and Investigations for Geological Disposal (ISAG).
 - **Probabilistic System Assessment Code (PSAC) User Group:** Taken over by the NEA from Canada in 1985, it provides a broad forum for discussion and development of probabilistic safety assessment codes and reports to the RWMC on the technical aspects of such codes.
 - **Geochemical Modelling and Data Group (GMDG):**
Created in 1988 to advise the RWMC on the collection and use of thermodynamic data to be used in performance assessment programs, particularly the Thermochemical Data Base (TDB).
 - **Joint Technical Committee of the Stripa Project (Stripa Mine test program)**
Participants: Canada, Finland, Japan, Sweden, Switzerland, United Kingdom, United States.
Term: 5-1-80 to 1-1-87 for Phases 1 & 2; 7-1-86 to 12-31-91 for Phase 3.
Scope: In-situ investigations in fractured hard rock.

INTERNATIONAL

RWMC (contd)

- **Liaison Committee for Co-operative Program on Decommissioning**
Participants: Belgium, Canada, France, Germany, Italy, Japan, Spain, Sweden, United Kingdom, United States.
Term: 1985-1990.
Scope: Exchange of scientific and technical information concerning nuclear installation decommissioning projects.

- **Joint Technical Committee of the Alligator Rivers Analogue Project**
Participants: Australia, Japan, Sweden, United Kingdom, United States.
Term: 9-1-87 to 9-1-90.
Scope: Research on natural analogues in uranium ore bodies for long-term prediction of radionuclide transport.

- Committee on Radiation Protection and Public Health (CRPPH)
 - **Exec. Group: Coordinated Research and Environmental Surveillance Programme (CRESP) related to sea disposal of radioactive waste.**
Participants: Belgium, Canada, Denmark, France, FRG, Italy, Japan, Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States, IAEA. IMO is an associate member.
Term: 1981-1990.
Scope: Investigations into the oceanographic and biological characteristics of the northeast Atlantic disposal site and related scientific work. Extended to cover land-based discharges as of 1987.

INTERNATIONAL

- Committee for Tech./Econ. Studies on Nuclear Energy Development and Fuel Cycle (NDC or FCC)
 - Assess, review and evaluate technical and economic implications related to the nuclear fuel cycle.
 - Participants: Open to NEA members, IEA, IAEA, CEC.
 - Term: 10-26-77 - unspecified
 - Scope: Present government and scientific communities with competent and reliable information, based on a very wide field of expertise and matured in international debate, in support of policy discussions.

INTERNATIONAL

NEA ORGANIZATION

Director General
Kunihiko Uematsu

Dep. Dir. General
Pierre Strohl

--Legal Affairs
P. Reyners

--Safety and Regulation
Klaus Stadie

--Radiation Protection/Waste Mgmt
Jean-Pierre Olivier
Oswaldo Ilari
Bertrand Ruegger
Claes Thegerström
Christer Wiktorsson
Dan Galson (U.S. Staff)

--Nuclear Safety
G. Donald McPherson

--Committees

- **CRPPH - Radiation Protection/Public Health**
- **RWMC - Radioactive Waste Management**
- **CSNI - Safety of Nuclear Installations**

--Nuclear Development
G. Stevens

- **NDC - Committee for Tech./Econ. Studies
on Nucl. Ener. Devel. and Fuel Cycle (FCC)**

--Science and Information Processing
J. Rosen

--(Data Bank)

- **NEACRP - Reactor Physics**
- **NEANDC - Nuclear Data**

INTERNATIONAL

NUCLEAR SOCIETIES

AUSTRALIA

Australian Nuclear Association
P.O. Box 445
Sutherland, N.S.W. 2232
Australia

BELGIUM

Forum Nucléaire Belge (ASBL)
Place du Champ de Mars
5 Bte 9
1050 Bruxelles
Belgium

Tel: 32-2-512-29-80
Fax: 32-2-640-79-40

Belgian Nuclear Society (BNS)
Ravensteinstreet 3
1000 Brussels
Belgium

Tel: 32-2-513-97-00

CANADA

Canadian Nuclear Association (CNA)
111 Elizabeth Street
Toronto, Ontario M5G 1P7
Canada

Tel: 416-977-6152
Fax: 416-979-8356

Canadian Nuclear Society (CNS)
111 Elizabeth Street
Toronto, Ontario M5G 1P7
Canada

Tel: 416-977-7620
Fax: 416-979-8356

CHINA/PR

Chinese Nuclear Society (CNS)
P.O. Box 2125
Beijing 100822
China

Tel: 86-1-2211-4343
Tlx: 222315 FACNCCN

INTERNATIONAL

DENMARK

Danish Nuclear Society (DKS)
Vester Farimagsgade 31
DK-1606 Copenhagen V
Denmark
Tel: 45-1-15-65-65

EUROPE

European Nuclear Society (ENS)
P.O. Box 5032
3001 Berne
Switzerland
Tel: 41-31-21-61-11
Fax: 41-31-22-92-03

Forum Atomique Europeen (FORATOM)
1 St. Albans St.
London SW1Y 4SL
United Kingdom
Tel: 44-1-930-6888
Fax: 44-1-839-3274

FINLAND

Finnish Nuclear Society (ATS)
Suomen Atomiteknillinen Seura-
Atomtekniska Sällskapet i Finland r.y.
c/o Technical Research Centre of
Finland Nuclear Eng. Laboratory
P.O. Box 112
01601 Vantaa
Finland
Tel: 358-0-508-2426
Fax: 358-0-708-2210

FRANCE

Forum Atomique Français
48 Rue de la Procession
75715 Paris
France
Tel: 33-1-45-67-07-70
Fax: 33-1-40-65-92-29

Section Française de l'ANS
c/o Framatome
Tour Fiat, Cedex 16
92084 Paris la Défense
France
Tel: 33-1-47-96-04-78
Fax:

INTERNATIONAL

FRANCE (cont'd)

Société Française d'Énergie
Nucléaire (SFEN)
48 Rue de la Procession
75015 Paris
France

Tel: 33-1-45-67-07-70
Fax: 33-1-40-65-92-29

World Association of Nuclear Operators
(WANO)
35.avenue de Friedland
75008 Paris
France

Tel: 33-1-40-42-30-78
Fax: 33-1-40-42-92-77

GERMANY/FR

Deutsches Atomforum e.V. (DAtF)
Heussallee 10
5300 Bonn
Federal Republic of Germany

Tel: 49-228-507-0
Fax: 49-228-507-219

Kerntechnische Gesellschaft e.V.
(KTG) (Nuclear Society)
Heussallee 10
5300 Bonn 1
Federal Republic of Germany

Tel: 49-228-507-259
Fax:
Tlx: 8869444 DATF D

GREECE

Hellenic Nuclear Society
NRC/Demokritos
15310 Aghia Paraskevi
Attiki, Greece

Tel: 30-1-651-3111
Fax: 30-1-651-9180

ITALY

ANS Sezione Locale Italiana
c/o Ansaldo S.p.A.
Pianna Carignano 2
16128 Genoa
Italy

Tel: 39-10-28551
Fax:
Tlx: 216596 ansald i

INTERNATIONAL

ITALY (cont'd)

Forum Italiano dell-Energia
Nucleare (FIEN)
Via Paisiello 26-28
00198 Rome
Italy Tel: 39-6-844-2587

Società Nucleare Italiana (SNI)
c/o Facoltà di Ingegneria
Viale Risorgimento 2
40136 Bologna
Italy Tel: 39-51-644-3401
Fax: 39-51-644-3411

JAPAN

Atomic Energy Society of Japan (AESJ)
1-1-13, Shimbashi
Minato-ku, Tokyo
Japan 105 Tel: 81-3-508-1261
Fax: 81-3-581-6128

Japan Atomic Industrial
Forum (JAIF)
6th Floor, Toshin Bldg.
1-1-13, Shimbashi 1-Chome
Minato-ku, Tokyo
Japan 105 Tel: 81-3-508-2411
Fax: 81-3-508-2094

World Association of Nuclear
Operators (WANO)
c/o Komae Institute
Central Research Institute of
Electric Power Industry
2-11-1 Iwato-Kita
Komae-shi, Tokyo
Japan Tel: 81-3-480-4809
Tlx: 2422382

KOREA

Korea Atomic Industrial
Forum, Inc. (KAIF)
Yeouuido P.O. Box 1021
Seoul 150-610, Korea Tel: 82-2-785-2570
Fax: 82-2-785-3975

INTERNATIONAL

KOREA (cont'd)

Korean Nuclear Society (KNS)
Cheong Ryang P.O. Box 7
Seoul 130-650, Korea Tel: 82-2-972-2081

NETHERLANDS

Nederlands Atoomforum
Sceveningse Weg 112
The Hague
Netherlands Tel: 31-70-5145-81

Netherlands Nuclear Society
c/o N.V. Kema
Utrechtsweg 310
6812 AR Arnhem
Netherlands Tel: 31-85-5624-91
Fax: 31-85-4582-79

SPAIN

Forum Atómico Español
Boix y Morer, 6
28003 Madrid
Spain Tel: 34-1-253-63-03
Fax: 43420 FAE E
Tlx: 43420 FAE E

Sociedad Nuclear Española (SNE)
(Spanish Nuclear Society)
Pinar, 6, bis
28006 Madrid
Spain Tel: 34-1-431-86-17
Fax: 211634 INGBO
Tlx: 211634 INGBO

SWEDEN

Swedish Atomic Forum (SAFO)
Box 1704
111 87 Stockholm
Sweden Tel: 46-8-85-5740
Fax: 46-8-85-3366

INTERNATIONAL

SWEDEN (cont'd)

Föreningen Kärnteknik
(Nuclear Society)
Box 1419
111 84 Stockholm
Sweden

Tel: 46-8-613-80-00

SWITZERLAND

Schweizerische Vereinigung für
Atomenergie (SVA)
(Association for Atomic Energy)
Postfach 2613
3001 Bern
Switzerland

Tel: 4-31-22-58-82

Fax: 4-31-22-92-03

Schweizerische Gesellschaft der
Kernfachleute (Nuclear Society)
c/o Paul Scherrer Institute
5503 Würenlingen
Switzerland

Tel: 41-56-99-21-11

Fax: 41-56-98-23-27

UNITED KINGDOM

British Nuclear Energy Society
(BNES)
1-7 Great George Street
London SW1P 3AA
United Kingdom

Tel: 44-1-630-0726

Fax:

Tlx: 264476

British Nuclear Forum (BNF)
1 St. Alban's Street
London SW1Y 4SL
United Kingdom

Tel: 44-1-930-6888

Fax:

Tlx: 264476

Institution of Nuclear Engineers (INE)
1 Penerley Road
London SE6 2LQ
United Kingdom

Tel: 44-1-698-1500

Fax:

Tlx: 8812093 neutron g

INTERNATIONAL

UNITED KINGDOM (cont'd)

World Association of Nuclear
Operators (WANO)
Chelsea Chambers
262a Fulham Rd.
London SW10 9EL
United Kingdom

Tel: 44-1-352-3617
Fax: 44-1-351-9678

UNITED STATES

American Nuclear Society (ANS)
555 North Kensington Avenue
La Grange Park, Illinois 60525

Tel: 312-352-6611
Fax: 312-352-0499

U.S. Council for Energy Awareness
(Atomic Industrial Forum)
7101 Wisconsin Avenue
Bethesda, MD 20814

Tel: 301-654-0910
Fax: 301-654-0910
Tlx: 710 824 9602

World Association of Nuclear
Operators (WANO)
Suite 1500
1100 Circle 75 Parkway
Atlanta, GA 30339-3064

Tel: 404-953-7602
Fax: 404-953-7549

USSR

The Soviet Nuclear Society
c/o The I. V. Kurchatov Institute
for Atomic Energy
Kurchatov Square
123182 Moscow
USSR

World Association of Nuclear
Operators (WANO)
c/o All Union Institute for Nuclear
Power Plant Operation
Fergankaya 25
Moscow 109507
USSR

Tel: 70-95-377-01-04
Fax: 70-95-376-08-97

INTERNATIONAL

YUGOSLAVIA

**The Professional Section of ETAN
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INTL.18

ORGANIZATIONS, FACILITIES, AND TECHNICAL TERMS

APPENDIX
ORGANIZATIONS, FACILITIES, AND
TECHNICAL TERMS

ORGANIZATIONS AND FACILITIES

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A	
AEA	AEA Technology UK.6
ADA	Acid digestion plant SZ.4
AEB	Atomic Energy Bureau JA.8
 KS.4
AEC	Atomic Energy Commission IN.5
 JA.8
 KS.4
AEC	Atomic Energy Council TW.2
AECB	Atomic Energy Control Board CA.6
AECL	Atomic Energy of Canada Limited CA.6
AERB	Atomic Energy Regulation Board IN.6
AERE	Atomic Energy Research Establishment UK.13
AESJ	Atomic Energy Society of Japan INTL.13
AGHFC	Alpha-Gamma Hot-cell Facility US.14
AGIP	Nuclear fuel company IT.3
AMOS	Waste treatment/interim storage project SW.9
ANDRA	Agence Nationale pour la Gestion des Déchets Radioactifs FR.7
ANL	Argonne National Laboratory US.13
ANS	American Nuclear Society INTL.16
ANSTO	Australian Nuclear Science and Technology Organization AS.2
ANU	Australian National University AS.3
APM	Reprocessing plant FR.11
ASBL	Forum Nucléaire Belge INTL.10
ASSE	Salt dome repository GE.15
ATS	Finnish Nuclear Society INTL.11
AVH	Ateliers de Vitrification de La Hague FR.6
AVM	Ateliers de Vitrification de Marcoule FR.14
AWRE	Atomic Weapons Research Establishment UK.10
B	
3205	Reprocessing facility UK.13
3AM	Bundesanstalt für Materialforschung und -prüfung GE.8
3ARC	Bhabha Atomic Research Centre IN.4
3EATE	Reprocessing facility GE.18
3ES	Waste materials studies US.16
3EW	Bundesamt für Energiewirtschaft SZ.3
3IS	Bundesamt für Strahlenschutz GE.8

BGR	Bundesanstalt für Geowissenschaften und Rohstoffe	GE.9
BGS	British Geological Survey	UK.10
BITF	Borehole Instrumentation Test Facility . . .	CA.8
BMFT	Bundesministerium für Forschung und Technologie	GE.10
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit	GE.10
BNES	British Nuclear Energy Society	INTL.15
BNF	British Nuclear Forum	INTL.15
BNFL	British Nuclear Fuels plc	UK.11
BNL	Brookhaven National Laboratory	US.15
BNS	Belgian Nuclear Society	INTL.10
BRE	Building Research Establishment	UK.15
BRGM	Bureau de Recherches Géologiques et Minières	FR.8
C		
CAMECO	Mining and energy corporation	CA.9
CANMET	Center for Mineral and Energy Technology	CA.10
Casaccia	ENEA nucl. research center	IT.4
CDTN	Centro de Desenvolvimento de Tecnologia Nuclear de Nuclebras	BR.3
CEA	Commissariat a l'Énergie Atomique	FR.8
CEC	Commission of the European Communities	INTL.1
CECE	Combined Electrolysis Catalytic Exchange System	US.18
CEDRA	Société Coopérative Nationale pour l'Entreposage de Déchets Radioactifs . . .	SZ.4
CEN	Nuclear research center	FR.9
CEN-CA	Centre d'Études Nucléaires de Cadarache	FR.9
CEN-FaR	Centre d'Études Nucléaires de Fontenay-aux-Roses	FR.10
CEN-G	Centre d'Études Nucléaires de Grenoble .	FR.10
CEN- VALRHO	Centre d'Études Nucléaires de la Vallée du Rhône	FR.10
CEN-S	Centre d'Études Nucléaires de Saclay	FR.11
CEN/SCK	Centre d'Études de l'Énergie Nucléaire/ Studiecentrum voor Kernenergie	BE.4
CeTA	Center for Advanced Technologies	IT.3
CHALMERS	Chalmers Technical University	SW.4

CIEMAT	Centro de Investigaciones Energeticas, Medio Ambientales y Tecnologicas	SP.3
CIPE	Interministerial Council for Economic Planning	IT.2
CLAB	Central storage for spent fuel	SW.6
CLIMAX	Spent fuel test facility	US.17
CMEA	Council for Mutual Economic Assistance	INTL.3
CNA	Canadian Nuclear Association	INTL.10
CNEA	Comision Nacional de Energia Atomica . . .	AR.2
CNNC	China National Nuclear Corporation	CH.3
CNEC	China Nuclear Energy Corporation	CH.2
CNEN	Comissão Nacional de Energia Nuclear . . .	BR.3
CNS	Canadian Nuclear Society	INTL.10
CNS	Chinese Nuclear Society	INTL.10
COGEMA	Compagnie Generale des Matières Nucléaires	FR.12
COMMOX	COGEMA subsidiary	FR.4
COMURHEX	Uranium conversion company	FR.4
COVRA	Centrale Organisatie Voor Radioactief Afval	NL.2
CPF	Chemical Processing Facility	JA.20
CRESP	Coordinated Research and Environmental Surveillance Program (NEA)	INTL.8
CRIEPI	Central Research Institute of Electric Power Industry	JA.8
CRNL	Chalk River Nuclear Laboratories	CA.6
CRPPH	Committee on Radiation Protection and Public Health (NEA)	INTL.8
CSN	Consejo de Seguridad Nuclear	SP.3
CSNI	Committee, Safety of Nucl. Installations .	INTL.9
CSPN	Superior Council for Nuclear Policy	BR.2

D

DAE	Department of Atomic Energy	IN.5
DAM	Direction des Applications Militaires	FR.15
DAMN	Nuclear materials research	FR.5
DAiF	Deutsches Atomforum e.V.	INTL.12
DBE	Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH	GE.11
DEN	Department of Energy	UK.4, 5
DES	Department of Education and Science . . .	UK.4
DgD	Decommissioning research	FR.5
DgED	Waste management research	FR.5
DgN	Nuclear R&D	FR.5

DgV	Diversification research	FR.5
DHI	Deutsches Hydrographisches Institut . . .	GE.12
DISP	Directorate for Nuclear Safety and Health Protection	IT2
DKS	Danish Nuclear Society	INTL.11
DOE	Department of Energy	US.7
DOE	Department of the Environment	UK.15
DOI	Department of Interior	US.4
DOT	Department of Transportation	US.4
DP	DOE-Defense Programs	US.3
DPN	Nuclear propulsion research	FR.5
Drigg	Waste disposal facility	UK.14
DWPF	Defense Waste Processing Facility	US.25
DWK	Deutsche Gesellschaft für Wiederaufar- beitung von Kernbrennstoffen mbH . . .	GE.12

E

EARP	Enhanced Actinide Removal Plant	UK.14
EBES	Belgian utility	BE.8
EBR-II	Experimental Breeder Reactor No. 2	US.14
EC	European Communities	INTL.2
ECN	Stichting Energieonderzoek Centrum Nederland	NL.3
EdF	Electricité de France	FR.4
EDF	Engineering Demonstration Facility	JA.19
EEC	European Economic Community	INTL.1
Electrobas	Construction/operation company	BR.3
EM	DOE Environmental Restoration & Waste Management	US.3
EMR	Energy, Mines and Resources	CA.10
ENEA	Energia Nucleare e Delle Energie Alternative	IT.3
ENEL	Ente Nazionale per l'Energia Elettrica	IT.6
ENI	Ente Nazionale Idrocarburi	IT.6
ENRESA	Empresa Nacional de Residuos Radioactivos	SP.4
ENS	European Nuclear Society	INTL.11
ENUSA	Empresa Nacional del Uranio S.A.	SP.4
EP-1, 2	Waste treatment facilities	UK.14
EPA	Environmental Protection Agency	US.26
EPB	Electric Power Bureau	KS.4
EPRI	Electric Power Research Institute	US.27
ERS	Effluent Recovery System	US.18
ESKOM	South African company	SF.4
ETEC	Energy Technology and Engineering Center	US.21

ETF	Engineering Test Facility	JA.20
EUREX	Fuel reprocessing pilot plant	IT.4
Eurobitum	Bituminization plant	BE.4
EURODIF	Commercial enrichment company	FR.4
Eurowatt	Solvent treatment hot pilot plant	BE.4
Euro-		
wetcomb	Acid digestion hot pilot plant	BE.4
Ezeiza	Argentine atomic center	AR.3

F

FBFC	Société Franco-Belge de Fabrication de Combustibles (Belgium and France) . . .	BE.6 FR.15
FCP	Fuel Cycle Plant	US.23
FEPC	Federation of Electric Power Companies . .	JA.3
FFTF	Fast Flux Test Facility	US.23
FIEN	Forum Italiano dell-Energia Nucleare . .	INTL.13
FIPS	Closed HLLW vitrification facility	GE.16
FMEF	Fuels Materials Examination Facility	US.23
FLK	Radioactive slagging incinerator	BE.5
F.O.	DOE Field/Operations offices	US.4
FORATOM	Forum Atomique Europeen	INTL.11
FRAGEMA	COGEMA subsidiary	FR.4
FRG	Federal Republic of Germany	GE.1
FUSRAP	Remedial action program	US.13

G

GA	General Atomics	US.15
GIRIO	Govt. Indus. Research Inst., Osaka	JA.9
GKAE	State Committee on the Utilization of Atomic Energy	UR.4
GMDG	Geochemical Modelling and Data Group	INTL.7
GNS	Gesellschaft für Nuklear-Service mbH . .	GE.13
Gorleben	Repository site	GE.9
Gouriqua	Research site	SF.3
GPA	Governmental and Public Affairs	US.6
GRS	Gesellschaft für Reaktorsicherheit mbH	GE.14
GSC	Geological Survey of Canada	CA.10
GSF/IFT	Gesellschaft für Strahlen- und Umweltfor- schung mbH/Institut für Tieflagerung .	GE.14

H

HADES	Underground research laboratory	BE.6
HAZWRAP	Hazardous Waste Remedial Action Program	US.13
HDB	Waste treatment project	GE.17

HERMES	<u>Head-End Research Facility on Mockup</u> <u>Engineering Scale</u>	BE.5
HFEF	Hot Fuel Examination Facility	US.14
HISS	Hydrogen Isotope Separation System	US.18
HITACHI	Hitachi, Ltd	JA.9
HMIP	H.M. Inspectorate of Pollution	UK.4
HQ	DOE-Headquarters	US.3
HSE	Health and Safety Executive	UK.4
HTA/HBK	HTGR fuel cycle project	GE.16
HTF	Hydrostatic Test Facility	CA.8

I

IAE	Institute of Atomic Energy	CH.3
IAEA	International Atomic Energy Agency . . .	INTL.3
ICPP	Idaho Chemical Processing Plant	US.24
ICRP	International Commission on Radiological Protection	INTL.5
ICT	Institute of Chemical Technology	GE.16
IE	DOE-Intl. Affairs/Energy Emergencies . . .	US.3
IEN	Instituto de Engenharia Nuclear	BR.4
IFEC	Fuel element fabrication facility	IT.5
IFTF	Immobilized Fuel Test Facility	CA.8
IGCAR	Indira Ghandi Centre for Atomic Research	IN.6
IHI	Ishikawajima-Harima Heavy Industries . . .	JA.10
IMO	Intl. Maritime Organization	INTL.8
INB	Industrias Nucleares do Brasil	BR.3
INE	Institute for Nucl. Waste Technology . . .	GE.17
INE	Institution of for Nucl. Engineers	INTL.15
INEL	Idaho National Engineering Laboratory . .	US.16
INER	Institute of Nuclear Energy Research	TW.2
INET	Institute of Nuclear Energy Technology . .	CH.3
INTERCOM	Belgian utility	BE.8
IOS	Institute of Oceanographic Sciences	UK.16
IPEN	Instituto de Pesquisas Energeticas e Nucleares	BR.5
IPSN	CEA-Institut de Protection et de Sûreté Nucléaire	FR.8
IRCh	Institute for Radiochemistry	GE.17
IRD	Instituto de Radioproteção e Dosimetria .	BR.5
IRUS	Intrusion Resistant Underground Structure	CA.7
IRW	Institute of Reactor Materials	GE.16
ISAG	In-Situ Research/Investigations for Geologic Disposal Advisory Group	INTL.7
ISF	Interim Storage Facility	IN.7

IST	Improved Sand Trench	CA.7
ITREC	Fuel reprocessing pilot plant	IT.5
IVET-1	Cold vitrification pilot plant	IT.5
IVET-2	Hot vitrification pilot plant	IT.5
IVEX	HLW vitrification plant	IT.5
IVO	Imatran Voima Oy	FI.3

J

JAERI	Japan Atomic Energy Research Institute	JA.10
JAIF	Japan Atomic Industrial Forum	INTL.13
JET	Joint European Torus	UK.8
JGC	JGC Corporation	JA.12
JNFI	Japan Nuclear Fuel Industries Company	JA.13
JNFS	Japan Nuclear Fuel Service Co., Ltd.	JA.14
JPDR	Japan Power Demonstration Reactor	JA.7
JRC	Joint Research Center (CEC)	INTL.2

K

KAERI	Korea Atomic Energy Research Institute	KS.5
KAIF	Korea Atomic Industrial Forum	INTL.13
KAIST	Korea Advanced Institute of Science/Tech	KS.6
KALPAKKAM	Fuel reprocessing plant	IN.6
KASAM	Consultative committee for nucl. waste management	SW.3
KEMA	N.V. Tot Keuring van Electrotechnische Materialen Arnhem	NL.4
KEMAKTA	Kemakta Konsult AB	SW.4
KEPCO	Korea Electric Power Corporation	KS.6
KEWA	Kernbrennstoff Wiederaufarbeitungstechnik GmbH	GE.15
KFA	Kernforschungsanlage Jülich	GE.16
KfK	Kernforschungszentrum Karlsruhe	GE.17
KIER	Korea Institute of Energy and Resources	KS.5
KNFC	Korea Nuclear Fuel Co., Ltd	KS.6
KNS	Korean Nuclear Society	INTL.14
KNSTI	Korea Nucl. Safety Tech. Institute	KS.7
KOBE	Kobe Steel, Ltd.	JA.14
KOLAR	Waste disposal research station	IN.7
Konrad	Iron mine repository	GE.9
KOPEC	Korea Power Engineering Co., Inc.	KS.7
KPA-STORE	Spent nuclear fuel storage facility	FI.5
KRF	Krypton recovery pilot plant	JA.20
KS-KT-100	Cold vitrification pilot plant	UR.5
KTG	Kerntechnische Gesellschaft e.V.	INTL.12
KTH	Royal Institute of Technology	SW.4

L		
LA HAGUE	COGEMA, Centre de la Hague	FR.12
LANL	Los Alamos National Laboratory	US.16
LBRMF	Large Block Radionuclide Migr. Facility . .	CA.9
LLNL	Lawrence Livermore National Lab	US.17
LLWMP	LLW Management Program	US.20

M		
MAFF	Ministry of Agriculture, Fish. and Food .	UK.16
MAPS	Madras Atomic Power Station	IN.7
MCC	Materials Characterization Center	US.20
MELOX	MOX fuel fabrication plant	FR.15
MER	Ministry of Energy and Resources	KS.7
MERL	Mechanical Engineering Research Laboratory	JA.14
MILLI	Fuel reprocessing hot cell facility	GE.18
MINKA	U/Pu hot glove boxes	GE.18
MIO	Materials Integration Office	US.9
MITI	Ministry of Intl. Trade & Industry	JA.15
MMC	Mitsubishi Metal Corporation	JA.15
MOD	Ministry of Defense	UK.4
MOFA	Ministry of Foreign Affairs	JA.15
MOST	Ministry of Science and Technology	KS.8
MRS	Monitored Retrievable Storage	US.2
MTR	Materials Test Reactor	US.16

N		
NAGRA	Nationale Genossenschaft für die Lagerung Radioaktiver Abfälle	SZ.4
NDC	NEA Technical/Economic study	INTL.9
NE	DOE-Nuclear Energy	US.3
NEA	Nuclear Energy Agency (OECD)	INTL.6
NEACRP	NEA-Committee on Reactor Physics . . .	INTL.9
NEANDC	NEA-Nuclear Data Committee	INTL.9
NERC	National Environment Research Council .	UK.4
NERSA	Groupement Centrale Nucléaire Européene à Neutrons Rapides	FR.4
NII	Nuclear Installations Inspectorate	UK.16
NIREX	UK Nirex Ltd.	UK.17
NIRS	National Inst. of Radiological Sciences . . .	JA.16
NMSS	Nuclear Material Safety and Safeguards . .	US.6
NNSA	National Nuclear Safety Administration . .	CH.4
NNWSI	Nevada Nucl. Waste Storage Investigation	US.16
NRC	Nuclear Regulatory Commission	US.27

NRPB	National Radiological Protection Board .	UK.17
NRR	Nuclear Reactor Regulation	US.6
NRT	Nuclear Remediation Technologies	US.18
NSB	National Safety Board	JA.16
NSC	Nuclear Safety Commission	JA.16
NTS	Nevada Test Site	US.17
NUCLECO	Italian company	IT.7
NUKEM	Nuclear fuel services company	GE.19
NUMATEC	COGEMA Inc. subsidiary	FR.12
NWPA	Nuclear Waste Policy Act	US.2
NWPAA	Nucl. Waste Policy Amendments Act	US.2
O		
OARAI	JAERI-Oarai research establishment	JA.11
OARAI	PNC-Oarai engineering center	JA.18
OECD	Organisation for Economic Cooperation and Development	INTL.5
OH	Ontario Hydro	CA.11
OMRE	Experimental/research reactor	US.16
ONDRAF/ NIRAS	Organisme National de Déchets Radioactifs et des Matières Fissiles	BE.7
OPLA	National research program	NL.2
ORNL	Oak Ridge National Laboratory	US.19
OTSP	Office of Transp. Systems and Planning . .	US.14
OWTD	Office of Waste Tech. Development	US.14
P		
PAAG	Performance Assessment Advisory Group	INTL.7
PAEC	Pakistan Atomic Energy Commission	PK.2
PAMELA	Vitrification pilot plant	BE.4 /GE.21
PASS	Performance Assessment Scientific Support	US.20
PASSAT	Filter test facility	GE.18
Pelindaba	National Nuclear Research Ctr	SF.3
PEV	Prototype vitrification facility	FR.11
PFR	Reprocessing plant	UK.9
PINSTECH	Institute of Science/Technology	PK.2
PIVER	Hot pilot plant - vitrification	FR.11
PIVER II	HLW vitrification facility	FR.15
PKA	Pilot fuel conditioning plant	GE.13
PKS	Quality assurance project	GE.16
PNC	Power Reactor and Nuclear Fuel Development Corporation	JA.17
PNL	Pacific Northwest Laboratory	US.20

PREPP	Processing Experimental Pilot Plant	US.16
PREFRE	Fuel reprocessing plant	IN.8
PSAC	Probabilistic System Assessment Code (NEA)	INTL.7
PSI	Paul Scherrer Institute	SZ.4
PSENTT	Professional Section of ETAN for Nuclear Technique and Technology . .	INTL.17
PUTE	Fuel reprocessing facility	GE.18
PWA	Waste management project	GE.17
PWTF	Pu-contaminated Waste Treatment Facility	JA.20
PWSF	Pu-contaminated Waste Storage Facility	JA.21

R

R7	Vitrification plant	FR.13
RES	Nuclear Regulatory Research	US.6
RFP	Rocky Flats Plant	US.21
RIVM	Rijksinstituut voor Volksgezondheid en Milieuhygiene	NL.5
RLWTF	Radioactive Liquid Waste Treatment Facility	US.14
RMC	Radioactive Waste Management Center . .	JA.21
RSK	Reaktor Sicherheitskommission	GE.6
RTP	Repository Technology Program	US.9
RW	DOE-Office of Civilian Radioactive Waste Mgt.	US.3
RWOS	Radioactive Waste Operations Site	CA.11
RWMAC	Rad. Waste Management Advisory Committee	UK.4
RWMC	Rad. Waste Mgt. Committee (NEA) . . .	INTL.7
RWMC	Radioactive Waste Management Complex .	US.16

S

SAFO	Swedish Atomic Forum	INTL.14
SAIC	Science Applications Int'l Corp.	US.22
Saluggia	ENEA nuclear research center	IT.4
SBH	Siemens Brennelementewerk Hanau	GE.19
SCUA	State Committee on the Utilization of Atomic Energy	UR.4
SEDE	Site Evaluation and Design of Experiments for Radioactive Waste Disposal (NEA)	INTL.7
SEDM	Nuclear waste isolation department	US.14
SFEN	Société Française d'Énergie Nucléaire .	INTL.12
SFMP	Surplus Facilities Management Program . .	US.13

SFR	LLW/ILW subseabed repository	SW.6
SGAB	Sveriges Geologiska AB	SW.5
SGN	Société Générale pour les Techniques Nouvelles	FR.16
SICN	COGEMA subsidiary	FR.4
SKB	Svensk Kärnbränslehantering AB	SW.5
SKI	Statens Kärnkraftinspektion	SW.7
SKN	Statens Kärnbränsle Nämnd	SW.8
SNE	Sociedad Nuclear Española	INTL.14
SNI	Belgian utility	BE.8
SNI	Società Nucleare Italiana	INTL.13
SNIA		
TECHINT	Italian company	IT.7
SNL	Sandia National Laboratories	US.22
SPD	Sodium Process Demonstration Facility . .	US.14
SR	Savannah River	US.20
SRL	Savannah River Laboratory	US.22
SRP	Savannah River Plant	US.22
SRS	Savannah River Site	US.25
SSI	Statens Straalskyddsinstitut	SW.8
SSK	Strahlenschutzkommission	GE.6
SSSF	Solid Storage Surveillance Facility	IN.8
STA	Science and Technology Agency	JA.22
STE3	Liquid waste treatment facility	FR.13
STEM	Simulation Test Facility for Environmental Radionuclide Migration .	JA.12
STMI	Nuclear services company	FR.4
STRIPA	NEA project	SW.7, INTL.7
STUDSVIK	Studsvik Energiteknik AB	SW.8
STUK	Finnish Center for Radiation and Nuclear Safety	FI.4
SVA	Schweizerische Vereinigung für Atomenergie	INTL.15
SWEPP	Stored Waste Examination Pilot Plant . . .	US.16
SYNATOM	Belgian company	BE.8
<i>T</i>		
T7	Vitrification plant	FR.13
TAIPOWER	Taiwan Power Company	TW.3
TAN	Test Area North	US.16
Tarapur	Atomic power station	IN.7
TDB	Thermochemical Data Base (NEA)	INTL.7
TECHNI-		
CATOME	Nuclear fuel cycle services company	FR.4
TEKO	Cold semi-works facility	GE.21
THORP	Thermal Oxide Reprocessing Plant	UK.13

TMI	Three Mile Island Reactor	US.16
TN	Transnucléaire	FR.16
TOKAI	JAERI-Tokai research establishment	JA.11
TOKAI	PNC-Tokai Works	JA.18
TPO	Transportation Program Office	US.9
TRANS- NUCLÉAIRE	Nuclear transport company	FR.4
TREAT	Transient Reactor Test Facility	US.14
Trisaia	ENEA nuclear fuel services company	IT.5
Trombay	Fuel reprocessing plant	IN.5
TRUEX	TRU waste technology	US.13
TUM	Technische Universität München	GE.20
TVF	Tokai Vitrification Facility	JA.21
TVO	Teollisuuden Voima Oy	FI.4
TWSO	TRU Waste System Office	US.20

U

UNERG	Belgian utility	BE.8
UNVIE	U.S. Mission to IAEA	INTL.5
UP1	Fuel reprocessing plant	FR.14
UP2	Fuel reprocessing plant	FR.13
UP2-800	Fuel reprocessing plant	FR.13
UP3	Fuel reprocessing plant	FR.13
URENCO	Uranium enrichment consortium	NL.1
URL	Underground Research Laboratory	CA.8 /SZ.4
USGS	U.S. Geological Survey	US.29
USSI	COGEMA subsidiary	FR.4
USSR	Union of Soviet Socialists Republic	UR.1

V

Vaalputs	LLW disposal facility	SF.3
Valindaba	U enrichment and conversion plants	SF.3
VLJ	LLW/ILW repository	FI.5
VTT	Technical Research Center of Finland	FI.5

W

WAK	Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH	GE.20
WANO	World Association of Nuclear Operators	UR.2, INTL.12, 13, 16
WASTEF	Glove box and hot cell facilities	JA.12
WCF	Waste Calcining Facility	US.24
WDF	Waste Dismantling Facility	JA.18
WERF	Waste Environmental Reduction Facility	US.16

WHC	Westinghouse Hanford Company	US.23
WINCO	Westinghouse Idaho National Company . .	US.24
WIP	Waste Immobilization Plant	IN.5, 7, 8
WIPP	Waste Isolation Pilot Plant	US.24
WNRE	Whiteshell Nuclear Research Establishment	CA.7
WSRC	Westinghouse Savannah River Co.	US.25
WTC	Waste Treatment Center	CA.7
WV	West Valley	US.20
WVNS	West Valley Nuclear Services	US.26
WVRF	Waste Volume Reduction Facility	CA.11

Y

YMPO	Yucca Mountain Project Office	US.12
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Z

ZFK-DE	Waste treatment project	GE.16
ZPPR	Zero Power Plutonium Reactor	US.14
ZWILAG	Zwischenlager Würenlingen AG	SZ.5

TECHNICAL TERMS

/a	per annum
AFR	Away-From-Reactor
AGR	Advanced gas-cooled reactor
AR	At-Reactor
ATR	Advanced Thermal Reactor
BWR	Boiling water reactor
CANDU	Canadian deuterium uranium reactor
CEO	Chief Executive Officer
COB	Chairman of the Board
/d	per day
D&D	Decontamination and Decommissioning
DOG	Dissolver Off-Gas
FBR	Fast breeder reactor
FBTR	Fast Breeder Test Reactor
FRP	Fuel Reprocessing Plant
GCHWR	Gas-cooled, heavy water moderated reactor
GCR	Gas-cooled, graphite moderated reactor
GSP	Gel-supported precipitation
GWd	GigaWatt day
GWe	10 ⁹ watts of electricity (1000 MWe)
/h	per hour
HAO	Head-end oxide
HAWC	High Acid Waste Content
HEPA	High Efficiency Particulate Absolute
HLLW	High-Level Liquid Waste
HLW	High-Level Waste
HTGR	High-temperature, gas-cooled reactor
HTR	High-Temperature Reactor
HWLWR	Heavy Water moderated, Light Water cooled Reactor (same as LWCHW)
HWR	Heavy-water reactor
ILW	Intermediate-Level Waste
kg/h	kilograms per hour
kgHM	kilograms Heavy Metal
kgU	kilograms Uranium

kPa	kiloPascal
kW	kiloWatt
l/h	liters per hour
LEU	Low Enriched Uranium
LGR	Light-water cooled, graphite moderated reactor
LHGW	Low Heat Generating Waste
LLLW	Low-Level Liquid Waste
LLW	Low-Level Waste
LMFBR	Liquid Metal Fast Breeder Reactor
LWCHW	Light-water-cooled heavy-water-moderated reactor (same as HWLWR)
LWR	Light Water Reactor
MLW	Medium-Level Waste (same as intermediate-level)
MOX	Mixed (plutonium/uranium) oxide
MTR	Materials Test Reactor
MTIHM	Metric Tons Initial Heavy Metal
MTU	Mega Tons Uranium
MW	MegaWatts
MWd/t	MegaWatt days per ton
MWe	MegaWatts electric
MWt	MegaWatts thermal
NPT	Non-Proliferation Treaty
PFR	Prototype Fast Reactor
PHWR	Pressurized heavy water reactor
PLWR	Pressurized Light Water Reactor
Pu	Plutonium
PUREX	Pu/U redox extraction process
PWR	Pressurized water reactor
QUAD	10 ¹⁵ BTU
R&D	Research and Development
SBR	Fast breeder reactor (european acronym)
SF	Spent fuel
SS	Stainless Steel
SWU	Separative Work (U enrichment)
SYNROC	Synthetic rock (for waste immobilization)
t	Metric tons
Th/U	Thorium/Uranium
tHM	Metric tons Heavy Metal

THTR	Thorium High-Temperature Reactor
TRU	Transuranic
tU	Metric tons Uranium
TWh	TeraWatt hour (million megawatt hours)
U	Uranium
UF ₆	Uranium hexafluoride
UO ₂	Uranium dioxide
VOG	Vessel Off-Gas