PNL-9450-1
UC-721

378 6475

INTERNATIONAL NUCLEAR
WASTE MANAGEMENT FACT BOOK

I. W. Leigh

May 1994

Prepared for
the U.S. Department of Energy
Office of Environmental Management
Waste Management Office
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

PREVIOUS EDITION -- PNL-3594

PHIL. 10001
UO021

INTERNATIONAL NUCLEAR
WASTE MANAGEMENT CONTACT BOOK

L.W. 10001

10001

Prepared for
The U.S. Department of Energy
Office of Environmental Management
Waste Management Division
under Contract DE-AC05-78OR1-1330

Technical Report
Environmental Sciences

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 exists for a ready source of information concerning foreign nuclear waste management programs, facilities, and personnel. This Fact Book has been compiled to meet that need.

The information contained in the International Nuclear Waste Management 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; and proceedings of conferences and workshops. The data listed typically do not reflect any 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 are described here. Lack of space and the intent of the Fact Book limit the listed information to data primarily pertaining to the nuclear waste management area.

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

International Program Support Office
Pacific Northwest Laboratory
P.O. Box 999
Richland, WA 99352
Tel: 509-375-6507
Fax: 509-375-6417

PREFACE

As the U.S. Department of Energy (DOE) and DOE's predecessor, the U.S. Atomic Energy Commission (AEC), have been instrumental in the development of the nuclear power industry, it is fitting that they should also be instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program.

The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program.

The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program.

The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program. The DOE and AEC have been instrumental in the development of the nuclear power industry's safety program.

International Program Support, Inc.
Pacific Northwest Laboratory
501 5th Ave.
Richland, WA 99352
Tel. 509-371-6000
Fax 509-371-6100

CONTENTS

	<u>Page</u>
Preface	iii
Introduction	INTRO-1
National Summaries	
Argentina	AR-1
Australia	AS-1
Belarus	BO-1
Belgium	BE-1
Brazil	BR-1
Canada	CA-1
China (People's Republic of China)	CH-1
Finland	FI-1
France	FR-1
Germany	GE-1
India	IN-1
Italy	IT-1
Japan	JA-1
Korea (Republic of Korea)	KS-1
Netherlands	NL-1
Pakistan	PK-1

PNL-9450-1

Russia	RS-1
South Africa	SF-1
Spain	SP-1
Sweden	SW-1
Switzerland	SZ-1
Taiwan	TW-1
United Kingdom	UK-1
United States	US-1
International Agencies	
CEC (Commission of the European Communities)	INTL-1
IAEA (International Atomic Energy Agency)	INTL-4
ICRP (International Commission on Radiological Protection)	INTL-8
OECD Nuclear Energy Agency (NEA)	INTL-8
Nuclear Societies	INTL-13
Glossary - Organizations, Facilities	G-1
Technical and Other Terms	G-17

INTRODUCTION

INTRODUCTION

The International Nuclear Waste Management 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 in 24 countries, including the U.S., four multinational agencies, and 21 nuclear societies. This publication succeeds the previously issued International Nuclear Fuel Cycle Fact Book (PNL-3594), which appeared annually for 13 years. While the title is different, there are no substantial changes in the content.

The Fact Book is organized as follows:

- **National summaries**--a section for each country that summarizes nuclear policy, describes organizational relationships, and provides addresses and names of key personnel and information on facilities.
- **International agencies**--a section for each of the international agencies that has significant fuel cycle involvement and a listing of nuclear societies.
- **Glossary**--a list of abbreviations/acronyms of organizations, facilities, and technical and other terms.

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 U.S. to foreign countries, complete telephone numbers are listed, including country and city codes. Outside the U.S., 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. Because it is impossible to cover the various situations for calls originating outside the U.S., 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. Regional holidays are not included, although they may, no doubt, 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 circled, and some of the smaller towns are listed to assist as a reference when consulting a large-scale map.

PASSPORT/VISA

Requirements listed are those applicable to U.S. citizens.

SOURCES

Electric power capacity and production figures given for some countries were obtained from Energy Balances of OECD Countries 1991-1992; OECD/International Energy Agency, Paris, 1994, and Nuclear Energy Data, OECD/Nuclear Energy Agency, Paris, 1993.

Reactor Mix figures were obtained from "World List of Nuclear Power Plants as of 6/93," Nuclear News, 9/93.

TIME

The hours listed indicate the standard time difference between the country and Washington, D.C. A specific reference area/town is identified if more than one time zone exists in a given country. Please note: the stated time difference may be affected by applicable daylight savings time. Also, in some countries (where the seasons are reversed), the standard time period is listed instead of the time during which daylight savings time is in effect.

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 the DOE facility they wish to visit at least 45 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.

NATIONAL SUMMARIES

ARGENTINA

ARGENTINA

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Jun 20	Flag Day
Mar 31	Holy Thursday	Jul 9	Independence Day
Apr 1	Good Friday	Aug 15	Gen. San Martin
May 1	Labor Day	Oct 10	Columbus Day
May 25	Revolution Anniversary	Dec 8	Immaculate Conception
Jun 10	Sovereignty	Dec 25	Christmas

TIME

Standard Time Washington, D.C. (Buenos Aires) + 2 hours
Standard Time Period: 03/06 - 10/15/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. Business-related travel to Argentina currently does not require a visa; however, it is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S. \$ = .99 Peso
per Wall Street Journal, 01/31/94. 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: 54-1-777-4533/4
Fax: 54-1-777-0197

Science Counselor

Kenneth D. Cohen

Population	1993	33	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1993	14.3	GWe
		7%	nuclear
	1996	17.4	GWe
		9%	nuclear
	2000	20.1	GWe
		8%	nuclear

Electric Power Production	1993	51.2	TWh
		14%	nuclear
	1996	17%	nuclear
	2000	13%	nuclear

NUCLEAR POWER

Policy: Pressurized heavy water reactors (PHWR) with natural uranium and indigenous fuel cycle; currently government ownership and operation of all nuclear power plants - other options being evaluated; development of nuclear plants and services export capability.

Nuclear Power Capacity	1993	1.0	GWe
	1995	1.6	GWe
	2000	1.6	GWe

Reactor Mix	1991	HWR	2 (1974/84)
			1 (1996)

INDUSTRIAL FUEL CYCLE

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

Waste Management Strategy: Options for reprocessing spent fuel analyzed, including vitrification of HLW and disposal of HLW glass canisters in granite host-rock repository, but no decision made.

Disposal of reduced volumes of LLW and short-lived ILW in near-surface engineered facilities. No decision made yet on disposal of long-lived ILW.

Cumulative SF Arisings (HWR)	1993	1,900 tHM
	2000	3,300 tHM

Demonstration/Production Activities

- D₂O production (200 t/a): D₂O enrichment plant to start 1994.
- Uranium mining and milling (t/a): 1987- 100; 1993--130.
- Uranium enrichment (kg/a): Capacity being redefined.
- Conversion of yellowcake to UO₂: fabrication of UO₂ fuel (t/a): 1993--200; 1995--300.
- Fuel fabrication: Two of three planned fabrication lines produce 5,880 elements/year.

Major Milestones

• Dry SF Interim Storage (Embalse, Córdoba)	1993
• HLW Geologic Repository (under study)	
• MLW Interim Storage Plant (Ezeiza Atomic Center)	1995
• Atucha II, Nuclear Power Plant	1996
• MLW Near-Surface Engineered Disposal Facility	1998

INTERNATIONAL RELATIONSHIPS

Member of IAEA; has not signed non-proliferation treaty (NPT); Treaty of Tlatelolco has been signed and ratified. Quadripartite safeguards agreement signed and ratified.

ORGANIZATION

- **CNEA** (Comisión Nacional de Energía Atómica)--National Atomic Energy Commission--owns and operates all nuclear facilities.

CNEA (National Atomic Energy Commission)

Comisión Nacional de
Energía Atómica (CNEA)
Headquarters

Avenida del Libertador 8250
1429 Buenos Aires, Argentina

Tel: 54-1-704-1000
Fax: 54-1-704-2045

President
Regulatory Authority
Nuclear Fuel Cycle

Dr. Manuel A. Mondino
Dr. Dan J. Beninson
Roberto Cirimello

CNEA EZEIZA

Comisión Nacional de
Energía Atómica (CNEA)
Centro Atómico Ezeiza
1842 Ezeiza, Argentina

Tel: 54-1-480-0141
Fax: 54-1-480-0815

Location: 30 km southwest of Buenos Aires, near airport.

Deputy
Regulatory Affairs
LLW Radioactive Waste Mgmt.

Dr. Roberto Marquez
Pedro Sajaroff
Dr. Jaime Pahissa Campá

Facilities

- **Fuel fabrication:** the first of three planned fabrication lines started up 1982, second line 1985; produce 380 elements/yr for Atucha I and 5,500 elements/yr for Embalse; third line to produce Atucha II fuel elements.

(contd next page)

CNEA EZEIZA (contd)

- **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 once planned for late 1990s. Construction has been put on indefinite hold.

AUSTRALIA

AUSTRALIA

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Apr 25	ANZAC Day
Jan 26	Australia Day	Jun 7	Queen's Birthday
Apr 1	Good Friday	Oct 7	Labor Day
Apr 4	Easter Monday	Dec 25	Christmas
		Dec 26	Boxing Day

TIME

Standard Time Washington, D.C. (New South Wales) + 15 hours
Standard Time Period: 03/06 - 10/29/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 1.41 Australian Dollar
per Wall Street Journal, 01/31/94. 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
Canberra, A.C.T. 2600
Australia

Tel: 61-6-270-5000
Fax: 61-6-270-5970

Scientific Attaché

Zachary Z. Teich

Population	1992	17	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1992	34.5	GWe
	1995	36.3	GWe
	2000	37.9	GWe

Electric Power Production	1992	156.4	TWh
		79%	coal
		10%	hydro
		9%	gas
		2%	oil

NUCLEAR POWER

Policy: No nuclear power installed; none planned. Large uranium reserves; uranium currently produced for export. Government sponsors nuclear waste management 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 U.K. Memoranda of Understanding, covering SYNROC R&D, signed with China and the USSR/CIS.

Bilateral safeguards agreements (controlled use of Australian-derived uranium) with Japan, Republic of Korea, Philippines, U.S., Canada, U.K., France, Switzerland, Sweden, Finland, Egypt, Russia/CIS, and Euratom (EC).

ORGANISATION

- ANSTO--Australian Nuclear Science and Technology Organisation and Lucas Heights Research Laboratory

ANSTO - LUCAS HEIGHTS

Australian Nuclear Science
and Technology Organisation
New Illawarra Rd, Lucas Heights
Private Mail Bag 1
Menai NSW 2234
Australia

Tel: 61-2-717-3111
Fax: 61-2-543-5097

Location: Approx. 30 km SW of Sydney (taxi from Kingsford Smith International Airport).

Executive Director
Chairman
General Manager, Scientific
Environmental Science

Dr. Helen Garnet (A)
C. Ralph Ward-Ambler
Dr. Helen Garnett
Dr. Wally Zuik
Fax: 61-2-543-9260

Environmental Chemistry
Environmental Physics
Chemical Waste Engineering
Economical Impacts
Advanced Materials

Dr. Richard Lowson
Dr. Ian Ritchie
Dr. Des Levins
Dr. Peter Airey
Dr. Adam Jostsons
Tel: 61-2-717-3265
Fax: 61-2-543-7179

Materials Assessment
Waste Conditioning
Operations
Materials Science
Engineering
Nuclear Technology

Robert Harrison
Dr. E. R. Varice
Alan Ridal
Dr. C. J. Ball
Don. J. Mercer
George Malosh
Fax: 61-2-543-9263
Patrick Bull

Nuclear Services

(contd next page)

ANSTO - LUCAS HEIGHTS (contd)

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-1992.

Design Basis: 10 kg/h SYNROC; 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), upgraded in 1990.

- **SYNROC Glove Box Line**

Mission: Produce SYNROC containing actinides/⁹⁹Tc.

Process Scale: Hundreds of grams/batch.

History: Startup, 1984. Refurbished, 1991.

- **Hot-Cell Processing Line for SYNROC**

Mission: Produce SYNROC containing beta/gamma-active fission products.

Process Scale: Hundreds of grams/batch.

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.

(contd next page)

ANSTO - LUCAS HEIGHTS (contd)

Facilities (contd)

• **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. HIP/CIP.• **Engineering Plant Design Team** - with 3-D finite element stress analysis, HP/Apollo computers and CAD/CAM.ANU

Australian National University

P.O. Box 4

Canberra 2600, Australia

Tel: 61-6-249-4228

Fax: 61-6-249-5989

Director

Dr. Sue Kesson

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

BELARUS

BELARUS

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	May 1	Labor Day
Jan 7	Christmas (Orthodox)	May 9	Victory Day
Mar 8	Women's Day	Jul 27	Independence Day
Apr 18	Radunica	Nov 2	Memorial Day
		Dec 25	Christmas

TIME

Standard Time Washington, D.C.
Daylight Savings Time Period:

+ 8 hours
03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. In addition, a visa is currently required for a visit to Belarus. A visa is available, with certain prerequisites, at the Minsk airport upon entry into the country; however, it is advisable to obtain the visa prior to departure from the U.S. It is recommended to consult a travel agency for up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

Local currency, the Belarus Ruble (note of National Bank of Belarus), is only available upon entry into Belarus. Exchange rates cannot be quoted due to continuing fluctuations. Payment in U.S. currency is apparently acceptable in many places. It is strongly recommended to consult with the U.S. embassy for up-to-date information.

DIRECT DIALING

Individual numbers for direct dial to Belarus are complete as listed, after dialing international access code: 011. Country code is 7; listed local numbers include city code.

U.S. EMBASSY - MINSK

American Embassy	Tel:	7-0172-34-6537 or -7761
ul. Starovilenskaya 46		7-0172-31-5000
Minsk, Belarus	Fax:	7-0172-34-7853
Economic Section		George Krol

Population	1993	10	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1992	7.0	GWe
	2000	8.6	GWe
		0%	nuclear
	2005	9.3	GWe
		>8%	nuclear

Electric Power Production	1992	38.7	TWh
		55%	oil
		40%	gas
		<3%	coal/peat
		<2%	solids
		0%	nuclear
	2005	5%	nuclear

NUCLEAR POWER

Though Belarus currently produces no nuclear power, approximately 25% of its total electricity consumption is provided by nuclear power plants at Ignalina in Lithuania and Smolensk in Russia. Construction of a nuclear power plant at Minsk, with projected capacity of 2,000 MWe and planned additional capacity of 6,000 MWe, was halted in 1986 due to the events at Chernobyl. The current government has stated that nuclear power is a necessity in the future of Belarus.

Nuclear Power Capacity	2005	1.0	GWe
------------------------	------	-----	-----

Reactor Mix	2005	PWR	1 (2005)
-------------	------	-----	----------

INDUSTRIAL FUEL CYCLE

Policy: Because Belarus has no uranium natural resources, no uranium enrichment is foreseen, nor is fuel reprocessing.

Waste Management Strategy: A waste management concept and strategy for disposal of waste from the planned first Belarus NPP is now being developed. LLW generated during operation and from decommissioning of a research LWR (IPEP) was managed in accordance with known regulations in the former Soviet Union. This waste

was stored in an engineered structure in an underground facility near Sosny that is also used for spent radioactive sources. Spent fuel from decommissioning the research LWR was sent to Russia for reprocessing.

INTERNATIONAL RELATIONSHIPS

Member of IAEA; Belarus has signed and ratified the NPT in 1993.

ORGANIZATION

Government Responsibilities -- Nuclear Fuel Cycle/Waste Management

- **Ministry of Power Engineering**
 - controls all electric power production and its industrial consumption operates electric power network
 - provides and conducts the National Power Development Program
- **Gospromatomnadzor** (State Committee on Supervision of Industrial and Nuclear Safety--regulations, controls, licensing of nuclear installations.
- **Goscomchernobyl** (State Chernobyl Committee)--responsible for National Chernobyl Program.
- **Goscomecologija** (State Committee on Environment Protection)--regulations, inspections.

INDUSTRIAL/UNIVERSITY RESPONSIBILITIES

- **Bel NIPI Energoprom** (National Research and Design Institute)--develops technical policy for electric power/energy resources.
- **GSP POLESJE** (State Specialized Enterprise/State Chernobyl Committee)--decontamination of contaminated zone in southern Belarus.

- **IPEP** (Institute of Power Engineering Problems/Academy of Sciences)--waste management R&D and reactor physics/engineering.
- **IREP** (Institute of Radio-Ecological Problems/Academy of Sciences)--research related to radionuclide migration in biosphere, nuclear medicine, radiochemistry.
- **DD&PM** (Design Department & Pilot Manufacture/Academy of Sciences)--academic research association.

BEL NIPI ENERGOPROM

Belarus Research and Design
Institute of Power
Engineering Industry
ul. Romanovskaja sloboda 5A
220048 Minsk, Belarus

Tel: 7-0172-26-5277
Fax: 7-0172-26-5317

Director

Ivan P. Sporta

Function: Development of technical policy for electric power/energy resources and of electric power network installations.

GOSPROMATOMNADZOR

State Committee on Supervision
of Industrial/Nuclear Safety
ul. Chkalova 6
220039 Minsk, Belarus

Tel: 7-0172-24-4119
Fax: 7-0172-24-3700

Chairman
Nuc./Rad. Safety Inspection

Alexander B. Zujev
Peter V. Bulyga

Function: Responsible for regulations, control, and licensing of nuclear installations and radiation-emitting facilities.

GOSCOMCHERNOBYL

State Chernobyl Committee
ul. Lenin 14
220030 Minsk, Belarus

Tel: 7-0172-27-4987
Fax: 7-0172-29-3439

Chairman
Dep. Chairman, WM/Science/
R&D, Internatl. Relations

Ivan A. Kenik

Dr. Igor V. Rolevich
7-0172-27-0770

Board on Protective
Measures/D&D/WM

Dr. Gennady V. Antzypov
7-0172-27-0762

Function: Regulate, control, and finance the National Chernobyl Program; licensing of decontamination/waste management activities for area affected by the Chernobyl fallout.

GOSCOM ECOLOGIA

State Committee on
Environmental Protection
ul. Kollektornaja 10
220048 Minsk, Belarus

Tel: 7-0172-20-6691
Fax: 7-0172-20-5583

Chairman

Anatoly M. Dorofeev

Function: Regulatory and inspection authority.

GSP POLESJE

State Specialized
Enterprise "POLESJE"
ul. Karpovich 11
246017 Gomel, Belarus

Tel: 7-0172-53-1584
Fax: 7-0172-53-7486

Function: Decontamination of affected zone in southern Belarus; treatment and conditioning of waste generated as a result of decontamination.

IPEP

Institute of Power Engineering
Problems
Belarus Academy of Sciences
Sosny
220109 Minsk, Belarus

Tel: 7-0172-26-0698
Fax: 7-0172-26-3743

Director
Material Properties/
WM Technologies
Nuclear Reactor Physics

Prof. A. A. Mikhalevich
Dr. Alexandre J. Grevenkov
7-0172-46-7142
Dr. Igor A. Savushkin
7-0172-46-7434

Function: Waste management R&D - LLW/ILW immobilization, liquid LLW treatment, thermal/chemical processing of radioactive wood waste.

Facilities:

- Pilot Plant for LLW/ILW Immobilization
- Pilot Installations for LLLW Treatment/Conditioning

IREP

Institute of Radio-Ecological
Problems
Belarus Academy of Sciences
Sosny
220109 Minsk, Belarus

Tel: 7-0172-46-7253
Fax: 7-0172-46-7615

Director
Radiochemistry

Prof. George A. Sharovarov
Dr. Yuri P. Davydov

Function: R&D on radionuclide migration in biosphere, decontamination, conditioning of liquid LLW (generated after remediation of contaminated site), nuclear medicine, radiochemistry.

SOSNY (Academic Research Association)

ANTK Sosny
Belarus Academy of Sciences
Sosny
220109 Minsk, Belarus

Tel: 7-0172-46-7512
Fax: 7-0172-46-7615

Director General

Dr. Sergey E. Chigrinov

Location: 24 km southwest of Minsk, 2 km from Sosny settlement.

Function: Academic research association, includes IPEP, IREP, IRPCP, DD&PM. Former Nuclear Power Engineering Institute of the USSR Academy of Sciences (1965-1992).

DD & PM

Design Department
with Pilot Manufacture
Sosny
220109 Minsk, Belarus

Tel: 7-0172-46-7538
Fax: 7-0172-46-7403

Director

Dr. Vladimir A. Koslerov

Function: Design/production of pilot installations related to nuclear power plant, engineering, waste management technologies.

Specialized Enterprise "Sosny"

Tel: 7-0172-46-7539

Director

Victor B. Ivanov

Function: Spent nuclear materials storage in engineered shallow-ground facility.

BELGIUM

BELGIUM

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Jul 21	National Day
Apr 4	Easter	Aug 15	Assumption
May 1	Labor Day	Nov 1	All Saints
May 12	Ascension	Nov 15	Armistice
May 23	Pentecost	Dec 25	Christmas

TIME

Standard Time Washington, D.C.:

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 35.61 Franc

per Wall Street Journal, 01/31/94. Because 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

Economics Section

John L. Moran

Population	1992	9.5 million
------------	------	-------------

ENERGY

Electric Power Capacity	1992	14.1 GWe
		39% nuclear
	1995	15.1 GWe
		36% nuclear
	2000	16.1 GWe
		34% nuclear

Electric Power Production	1992	71.4 TWh
		61% nuclear
		26% coal
		10% gas
	1995	2% oil
		<1% hydro
	2000	54% nuclear
		54% nuclear

NUCLEAR POWER

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

Nuclear Power Capacity	1992	5.5 GWe
	2000	5.5 GWe

Reactor Mix	1993	PWR 7 (1975-85)
-------------	------	-----------------

INDUSTRIAL FUEL CYCLE

Policy: Well-rounded capability--uranium enrichment (share in Eurodif); MOX and UO_2 fuel fabrication; purchase of foreign reprocessing services; decision made to dismantle former Eurochemic reprocessing plant.

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

Cumulative SF Arisings (LWR)	1990	1,290 tU
	2000	3,000 tU

Major Milestones

- Selection/characterization of site for LLW disposal facility 1990-95
- Storage facility for waste from Belgian fuel reprocessed abroad 1994
- Safety assessment/feasibility report for demonstration of HLW disposal operations in proposed clay repository 1995
- Construction start of HLW repository 2025
- Disposal start of HLW 2030

INTERNATIONAL RELATIONSHIPS**DOE/SCK Agreement in the Field of Radioactive Waste Management**

Term: 01-19-81 to 01-19-94.

Scope: Final disposal in geologic formations; retrievable storage; waste processing; environmental effects; emphasis on technology information exchange.

Member of EC, IAEA, OECD/NEA; partnership in Eurodif uranium enrichment plant (France); Belgian URL at Mol is cosponsored by CEC.

ORGANIZATION

MINISTRY OF ECONOMIC AFFAIRS

PRIVATE
INTERESTS

— CEN/SCK—50%—>	BELGONUCLEAIRE	<—50%—
— ONDRAF/NIRAS —	BELGOPROCESS	
— 50% —————>	SYNATOM	<—————50%—

BELGONUCLEAIRE

Belgonucleaire S.A.
Avenue Ariane 2-4
1200 Brussels, Belgium

Tel: 32-2-774-0511
Fax: 32-2-774-0547

General Director

Georges Cornet

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

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

MOX Plant
Europalaan 20
2480 Dessel, Belgium

Tel: 32-14-33-0211
Fax: 32-14-31-7046

Manager

Jean Van Vliet

Function: Produce MOX fuels (35 t/a for LWR or 10 t/a for FBR).

BP

Belgoprocess
Gravenstraat 73
2480 Dessel, Belgium

Tel: 32-14-33-4111
Fax: 32-14-31-3012

[Brussels National Airport (Zaventem); then by rental car or train (1.5 h) to Mol.]

Managing Director
General Manager
Operations
Decommissioning
Safety

Robert Vandenplas
Jef Claes
Paul Luyckx
Lucien Teunckens
Jean Paul Deworm

Activities: Maintenance/dismantling of ex-Eurochemie reprocessing facilities and obsolete waste treatment facilities formerly belonging to CEN/SCK; treatment/conditioning of all categories of low-, medium-, and high-level waste; from 1986 to 1991 joint operation with WAK of Pamela vitrification plant, now being kept in standby for potential future vitrification of HLLW from WAK pilot reprocessing plant at Karlsruhe, Germany.

Owner: ONDRAF/NIRAS

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-line time, 87% through June 1983.
Plant now operated as needed.
- **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 in standby.

(contd next page)

BP (contd)

- **PAMELA HLLW Vitrification Plant** [built by FRG (see under WAK in GE Section) and operated by WAK/Belgoproprocess team]. In standby for future vitrification of HLLW from WAK pilot reprocessing plant at Karlsruhe.
- **LLW Treatment Facilities** (formerly of CEN/SCK)

Beta/Gamma Waste Incinerator: capacity of 100 kg/h solid waste and 40 l/h of organic liquids. Combustion temperature of 900°C. Overall mass reduction factor is 20; combustion efficiency > 99.9%; > 600 t of waste throughput since early 1960s. Planned shutdown 1994.

High-Temperature Slagging Incinerator: shutdown 1988.

Water Treatment Facility: capacity of > 200,000 m³/a; purification by flocculation; discharge of purified water to the river; conditioning of sludges into bitumen.

- **Low-Level Solid Waste Treatment Facility**
Startup expected in second half of 1994; new integrated facility, including reception of waste and buffer storage, size reduction unit; supercompaction, incineration at 900°C, supercompaction of ashes and cementation of all treated LLW.

FBFC (Fuel Fabrication Company)

FBFC International
Europalaan 12
2480 Dessel, Belgium

Tel: 32-14-33-1211
Fax: 32-14-31-5845

Managing Director
Plant Manager

Henri Potdeviu
Patrick Van denhove

Function: Fabrication of fuel assemblies for LWR (capacity: 300 t/a, uranium and MOX fuel). Belgian subsidiary of French-owned Société Franco-Belge de Fabrication de Combustibles.

MINISTRY OF ECONOMIC AFFAIRS

Ministry of Economic Affairs

Administration of Energy

Rue de Moi, 30

1040 Brussels, Belgium

Tel: 32-2-233-6111

Fax: 32-2-930-4138

MINISTRY OF PUBLIC HEALTH AND ENVIRONMENT

Ministère de la Santé Publique

et de l'Environnement

Quartier Vésale 2-3

1010 Brussels, Belgium

Tel: 32-2-210-4966

Fax: 32-2-210-4967

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

Organisme National des Déchets

Radioactifs et des Matières

Fissiles (ONDRAF/NIRAS)

Place Madou 1, B.P. 24

1030 Brussels, Belgium

Tel: 32-2-212-1011

Fax: 32-2-218-5165

Chairman, Board of Directors

Chair., Perm. Tech. Committee

General Manager

J. P. Poncelet

F. Deconinck

F. Decamps

Owner: Government.

Function: Define Belgian waste management policy and R&D requirements; responsible for transportation of radioactive materials, waste treatment, conditioning and interim storage, spent fuel AFR storage, waste disposal, fissile material storage.

The organization 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.

SCK/CEN (Nuclear Energy Research Center)

Studiecentrum voor Kernenergie
Centre d'Étude de l'Énergie
Nucléaire
Laboratories
Boeretang 200
2400 Mol, Belgium

Tel: 32-14-33-2111
Fax: 32-14-31-5021

Chairman of the Board
General Manager
Waste/Disposal
Decommissioning

Prof. Roger E. Van Geen
Carl M. Malbrain
Bernard Nerdael
Guy Collard

Owner: Government--Ministry of Economic Affairs.

Waste Management R&D: Geologic waste isolation in clay formations, waste treatment (decontamination and recycling of boric acid, removal of plutonium from waste generated by fuel fabrication, etc.), decommissioning (decontamination, dismantling, restoration) of nuclear facilities.

Facilities

- **BR3 Decommissioning Project**

Mission: Optimization of the decommissioning of PWRs; radiological, technical, and financial management of decommissioning, applied on an actual PWR; all components of a power plant and all techniques to be used in decommissioning.

Process: Internals are being dismantled; comparison of immediate and delayed decommissioning; optimum application.

(contd next page)

SCK/CEN (contd)• **HADES Underground Research Laboratory**

Mission: In-situ investigation to demonstrate the feasibility, construction, safety, and acceptability of disposal of ILW, TRU waste, and HLW in a deep clay formation.

Description: Access shaft to 230-m level, 2.65 m useful diameter; laboratory gallery, 3.5 m useful dia. by 30 m length; cast iron liner. Demo/test gallery: 3.5 m dia., concrete-lined, 65 m length for large-scale integrated tests.

Test Program: Migration of radionuclides and gas, near-field studies, thermohydraulic behavior, hydrogeochemistry of Boom clay and surrounding water-bearing formation, in-situ tests on waste package components, characterization and compatibility studies of conditioned HLW, performance studies, including shallow-land burial of LLW.

History: Laboratory operational, late 1984.

SYNATOM

SYNATOM S.A.

Avenue Marnix, 13
1050 Brussels, Belgium

Tel: 32-2-505-0711

Fax: 32-2-505-0790

Chairman, Board of Directors

Managing Director

General Manager

Fuel Reprocessing Service

F. Aerts

J. Laurent

Pierre Goldschmidt

Jean Danguy

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

Owners: Government/SNI (50%), Electrabel (50%).

BRAZIL

BRAZIL

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year	Sep	7	Independence
Feb	12-15	Carnival	Oct	12	N.S. Aparecida
Apr	1	Good Friday	Nov	2	All Souls
Apr	21	Tirdentes	Nov	15	Republic Proclamation
Jun	2	Corpus Christi	Dec	25	Christmas

TIME

Standard Time Washington, D.C. (Brasilia)

+ 2 hours

Standard Time Period:

03/06 - 10/15/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 458.65 Cruzeiro (Cz\$)

per Wall Street Journal, 01/31/94. Because 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

Science Counselor

Roy C. Simpkins

Population	1993	150 million
------------	------	-------------

ENERGY

Electric Power Capacity	1993	63 GWe
		1% nuclear
	1995	78 GWe
		1% nuclear
	2000	98 GWe
		1% nuclear
Electric Power Production	1993	220 TWh
		84% hydro/thermal
		11% coal/gas
		4% oil
		1% nuclear
	1995	1% nuclear
	2000	1% nuclear

NUCLEAR POWER

Policy: Complete nuclear industry with closed fuel cycle, based upon technology transfer from FRG and other countries.

Nuclear Power Capacity	1993	0.6 GWe
	2000	1.9 GWe

Reactor Mix	1993	PWR	1 (1984)
			2 (1997/04)

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

INDUSTRIAL FUEL CYCLE

Policy: Development of full commercial capability for closed fuel cycle--U mining and milling; conversion of U_3O_8 to UF_6 ; enrichment; UO_2 fuel fabrication; fuel reprocessing.

Waste Management Strategy: Not yet defined for HLW; near-surface disposal for LLW, including the Cs-137 waste from the Goiania accident (1987).

BRAZIL

PNL-9450-1

Cumulative SF Arisings (LWR)	1990	48 tU
	1995	162 tU
	2000	-412 tU

Demonstration/Production Activities

- Uranium mining and milling: 300 tU₃O₈/a--in operation.
- U₃O₈ to UF₆ conversion: (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 k SWU/a (1985); interrupted in 1993.
- 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 Analogue Studies - Pocos de Caldas Project**

Joint study by Sweden, Switzerland, U.K., and U.S. of migration of radionuclides from uranium ore deposits in Brazil.

Member of IAEA (has not signed NPT); dependence on nuclear technology transfer from other nations, principally from FRG. Quadripartite agreement signed in 1994 with Argentina, ABACC, and IAEA to implement full-scope safeguards.

ORGANIZATION

- **Federal Republic**--President (Executive), Bicameral National Congress (Legislative), and Supreme Federal Tribunal (Judiciary).
 - SAE (Strategic Business Secretariat)--subordinated to the President, responsible for the planning, execution, and control of nuclear power program.
 - **Eletrobrás** (Centrais Elétricas Brasileiras)--Planning/supervision of power plant construction and operation of transmission/distribution system. Established in 1961 to coordinate activities of state, municipal, and private utilities. Operates through regional subsidiaries, i.e., FURNAS. Also responsible for appropriate R&D.
- **ABACC** (Argentina/Brazil Agency for Accounting/Control of Nuclear Materials)--bilateral safeguards agency, established in 1994.
- **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.

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: 55-31-443-4744

Superintendent

Fernando Lomeiras

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

Botafofo ZC-82, CEP 22290

Rio de Janeiro, RJ, Brazil

Tel: 55-21-546-2232

Fax: 55-21-546-2379

President

Director, Nuclear Safety

Head, Waste Disposal

Marcio Costa

Laercia Vinnas

Ana Maria Xavier

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

IEN (Nuclear Engineering Institute)

Instituto de Engenharia Nuclear

Cidade Universitária

Ilha do Fundão

Caixa Postal 2186, CEP 20001

Rio de Janeiro, RJ, Brazil

Tel: 55-21-280-3113

Fax: 55-21-590-2692

Superintendent

Luiz Arieta

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:

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.

Facilities

- U_3O_8 - UF_6 conversion plant at Iperó (90 tU/a)
- SF reprocessing laboratory
- Small experimental gas centrifuge (uranium enrichment)
- Low-power PWR reactor
- 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: 55-21-442-9777

Fax: 55-21-442-2950

Director

Jose Marcos Godoy

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

Facilities

- Brazilian Secondary Standards Dosimetry Laboratory

CANADA

CANADA

MAJOR PUBLIC HOLIDAYS (1994)

Jan 3	New Year	Sep 5	Labor Day
Apr 1	Good Friday	Oct 10	Thanksgiving
May 18	Victoria Day	Nov 11	Remembrance Day
Jul 1	Canada Day	Dec 26	Christmas
Aug 1	Civic Day	Dec 27	Boxing Day

TIME

Time zones correspond to those in the United States.

Daylight Savings Time period:

04/24 - 10/30/94

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. \$ = 1.33 Canadian Dollar

per Wall Street Journal, 01/31/94. 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 three-digit area code plus seven-digit local number.

U.S. EMBASSY - OTTAWA

American Embassy
100 Wellington Street
Ottawa, ON
K1P 5T1 Canada

Tel: 613-238-5335
Fax: 613-238-5720

Science Counselor

Thomas J. Wajda

Population	1992	27.5	million
------------	------	------	---------

ENERGY

Electric Power Capacity	1992	104.5	GWe
		13%	nuclear
	1995	115.0	GWe
		14%	nuclear
	2000	117.2	GWe
		13%	nuclear

Electric Power Production	1992	501.5	TWh
		62%	hydro/geoth.
		17%	coal
		15%	nuclear
		3%	oil
		2%	gas
		1%	other
	1995	19%	nuclear
	2000	19%	nuclear

NUCLEAR POWER

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

Nuclear Power Capacity	1992	14.1	GWe
	1995	15.5	GWe
	2000	15.5	GWe

Reactor Mix	1993	PHWR	22 (1971-93)
-------------	------	------	--------------

INDUSTRIAL FUEL CYCLE

Policy: Interim storage of used fuel for decades, pending an environmental assessment and review of a concept for the disposal of nuclear fuel waste (review process of concept has started).

Waste Management Strategy: Geologic disposal of nuclear fuel waste and spent CANDU fuel in a crystalline rock repository. Disposal of LLW in engineered, shallow-ground facility.

CANADA

PNL-9450-1

Cumulative Used Fuel (PHWR)	1991	15,877 tU
	2000	17,271 tU

Major Milestone

- Public hearings by review panel on Nuclear Fuel Waste Management Disposal Concept (AECL-prepared EIS) 1994

INTERNATIONAL RELATIONSHIPS**DOE/AECL Agreement for Cooperation in Radioactive Waste Management**

Term: 09-08-76 to 09-29-96

Scope: Waste treatment, storage, geological disposal, transportation requirements, operational considerations; environment and safety; public acceptance issues; information exchange in radioactive waste management, geological disposal, waste form characterization, waste/used fuel storage, and intercomparison of performance assessment computer models and codes.

DOE/AECL Subsidiary Agreement # 2

Term: 09-30-91 to 09-29-96

Scope: Joint project to study the preparation/packaging of radioactive wastes/disposal in geologic formation; fundamental materials investigations; in-situ stress determination; SF dissolution model development; large block tracer test; laboratory and field tests of in-situ hydrochemical tool; Cigar Lake analogue study; actinide/fission product geochemistry; performance assessment technology exchange; multiple-well hydraulic test and field tracer test development.

Member of IAEA and OECD/NEA - Exchange agreements with the following agencies and countries: DOE/U.S.; SKB/Sweden; UKAEA/U.K.; PNC, JAERI/Japan; KAERI/Korea; TVO, IVO/Finland; CEA, ANDRA/France; ONDRAF/Belgium; ENRESA/Spain.

ORGANIZATION

- **AECB** (Atomic Energy Control Board)--federal nuclear control agency, answers to Parliament, responsible for health/safety regulation, compliance/licensing.
- **AECL** (Atomic Energy of Canada Limited)--Crown Corporation, answers to Parliament via Ministry of Natural Resources. R&D; design, engineering and sale of CANDU and research reactors; proprietary rights on CANDU Nuclear Steam Supply Systems; waste management R&D at Whiteshell and Chalk River laboratories.
- **OH** (Ontario Hydro)--provincial public utility. Owns/operates 20 CANDU nuclear power plants, 15,340 MWe total capacity; responsible for developing interim fuel storage/transport technologies.
- **HQ** (Hydro Quebec)--provincial public utility. Owns/operates Gentilly 2, a 600-MWe CANDU station.
- **NBEP** (New Brunswick Electric Power Commission)--provincial public utility. Owns/operates Point Lepreau Nuclear Generating Station, a 600-MWe CANDU.

**FEDERAL GOVERNMENT RESPONSIBILITIES--FUEL
CYCLE/WASTE MANAGEMENT****Ministry of Natural Resources Canada**

- Atomic Energy Control Board (AECB)
 - Regulations, Licensing, Compliance
- Atomic Energy of Canada, Limited (AECL)
 - AECL CANDU
 - Reactor Design, Engineering, Export, proprietary rights on CANDU Nuclear Steam Supply Systems
 - AECL Research (see CA-5)
- Natural Resources Canada
 - Geological Survey of Canada (GSC)
 - Information/Services Branch
 - Minerals/Continental Geoscience Branch
 - Sedimentary/Cordilleran Geoscience Branch
 - Geophysics/Marine Science Branch
 - Mineral/Energy Technology (MET)
 - Canadian Centre for Mineral/Energy Technology (CANMET)
 - Mining Research Laboratories
 - Sudbury Laboratory
 - Elliot Lake Laboratory
 - Canadian Mining Technology Laboratory
 - Mineral Sciences Laboratories
 - Radionuclide Recovery from Thorium Mill Tailings
 - Metals Technology Laboratories

**ATOMIC ENERGY OF CANADA LIMITED--
WASTE MANAGEMENT ORGANIZATION****AECL RESEARCH**

- **Whiteshell Laboratories (WL)**
 - **Environmental Sciences/Waste Management Program**
 - **Disposal Technology**
 - **Applied Geoscience**
 - **Environmental/Safety Assessment**
 - **Geotechnical Science/Engineering**
 - **Underground Research Laboratory**
 - **Environmental Technology**
 - **Environmental Science**
 - **Geochemistry Research**
 - **Fuel Waste Technology**
- **Chalk River Laboratories (CRL)**
 - **Waste Management Systems**
 - **Storage/Disposal**
 - **Waste Processing Technology**
 - **Health Sciences**
 - **Radiation Biology**
 - **Dosimetry Research**
 - **Environmental Research**
- **Head Office, Ottawa**
 - **Low-Level Radioactive Waste Management Office**
(operated by AECL Research on behalf of Natural Resources)

AECB

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

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

President
Director General,
Fuel Cycle/Materials Regulations
Wastes/Impacts Div.
Compliance Serv./Laboratory Div.
Radioisotopes/Transportation Div.
Uranium Facilities Div.
Director, Research/Safeguards
Safeguards/Security Div.
Director, Analysis/Assessment
Safety Evaluation (Analysis) Div.
Safety Evaluation (Engineering) Div.

Dr. René J. A. Lévesque

Murray Duncan
George C. Jack
Cait Maloney
Ross Brown
Tom Viglasky
Jim Harvie
John R. Coady
John Waddington
Peter Wigfull
Kurt Asmis

AECL

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

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

Chairman
President
President, AECL Research
Director, LLW Management

Agnes Bishop
Dr. Terry E. Rummeny
Dr. Robert W. Pollock

AECL-CRL

AECL Research
Chalk River Laboratories
Chalk River, ON
ROJ 1JO Canada

Tel: 613-584-3311
Fax: 613-589-4024

Health Sciences
Radiation Biology
Waste Management Systems
Public Affairs, Director

Dr. Richard V. Osborne
Dr. Norm E. Gentner
Dr. Don J. Cameron
John Macpherson

Facilities

- **WTC (Waste Treatment Center)**

Mission: Development and operation of processes for the treatment of LLW and ILW 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 prototype vault. Capacity of 2,000 m³ radwaste in drums or bales, when full to be covered with backfill, roofed with concrete, and mounded with earth. Waste can be retrieved from the IRUS vault until concrete cap is emplaced. Construction start, 1993.

AECL-WL

AECL Research
Whiteshell Laboratories
Pinawa, MB
ROE 1L0 Canada

Tel: 204-753-2311
Fax: 204-753-8404

Underground Research Laboratory

Tel: 204-345-8625
Fax: 204-345-8868

**V.P., Environmental Sciences/WM
Disposal Technology**
Applied Geoscience
Environmental/Safety Assessment
Geotech. Science/Engineering
URL, Mgr.
Environmental Technology
Environmental Science
Geochemistry Research
Fuel Waste Technology
Environmental Review Office
Government/Public Affairs

Dr. Collin J. Allan
Dr. Ken W. Dormuth
Cliff Davison
Dr. Alf Wikjord
Gary Simmons
Mitch Ohta
Dr. Keith Nuttall
Dr. Reto Zach
Dr. Peter Sargent
Lawrence Johnson
Barbara Gray
Mary Greber

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.

(contd next page)

AECL-WL (contd)

- **URL (Underground Research Laboratory)**, located about 20 km northeast of WL in the Lac du Bonnet granite batholith.
Mission: Operate facility ensuring compliance with regulatory standards and high level of safety/quality control; design and implement in-situ and laboratory experiments/engineering demonstrations to investigate relevant issues.
Design Basls: Access shaft and ventilation raised to 430-m depth with shaft stations at 130-m, 240-m, 300-m, and 420-m depths. Licensed radioactive sources and tracers may be used, but no radioactive wastes can be employed. A series of nine experiments is in progress on the 240- and 420-m levels and in the surrounding rock mass.
History: Underground access development complete in 1990; major experiments in solute transport, rock mass response, characterization method, and engineered sealing systems began in 1988.
- **IFTF (Immobilized Fuel Test Facility)**
Mission: Test the effects of water, heat, and pressure on used fuels, container materials, buffer, and rock in the presence of a radiation field.
Design Basls: A high-level radiation source is used in heated concrete canisters to provide a gamma radiation source. Pressure vessels adjacent to the source contain the material to be studied. Adjacent "warm cells" are available for experiments involving moderate levels of radiation.
History: First canister loaded, 8/1984.

(contd next page)

AECL-WL (contd)• **LBRMF (Large Block Radionuclide Migration Facility)**

Mission: Study the migration of reactive and nonreactive 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; 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: Joint migration experiment with U.S. DOE using uranine (tracer dye), ^{131}I , and ^{137}Cs has been completed and results published. Second experiment, using uranine, ^3H , ^{85}Sr , $^{95\text{m}}\text{Tc}$, ^{137}Cs , and ^{144}Ce has been completed; third experiment, using ^{85}Sr , ^{131}I , ^{137}Cs , ^{144}Ce , ^{152}Eu , ^{237}Np and ^{238}Pu has been carried out for PNC, Japan; colloid migration experiments are under way; migration experiments in fractures with simple, uniform geometries are planned in cooperation with LANL (U.S.).

NATURAL RESOURCES CANADA

Natural Resources Canada

Science and Technology

580 Booth Street

Ottawa, ON

K1A 0E4 Canada

Tel: 613-995-1240

Fax: 613-996-9094

Electricity Branch, Dir. General

Dr. R. W. Morrison
613-992-3370

Radioactive Waste/Radiation, Mgr.

Dr. Peter Brown
613-996-2395

NATURAL RESOURCES CANADA-CANMET

Natural Resources
Canada Centre for Mineral
and Energy Technology
555 Booth Street
Ottawa, ON
K1A 0G1 Canada

Tel: 613-995-4194
Fax: 613-996-9673

Policy Planning/Services, Dir. Gen.
Mineral Technology (A)
Waste Mgmt., Elliot Lake
Mining Research Laboratory

J. Ferron
Irwin Itzkovitch
T. Mottahed
J. E. Udd

NATURAL RESOURCES CANADA-GSC

Natural Resources
Geological Survey of Canada
601 Booth Street
Ottawa, ON
K1A 0E8 Canada

Tel: 613-992-5910
Fax: 613-995-3082

Assistant Deputy Minister
Chief Scientist

Dr. E. A. Babcock
Dr. Jim Franklin

OH

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

Tel: 416-592-5111
Fax: 416-592-4485

Nuclear Fuel Supply
Design/Development Div., Director
Nuclear Engineering
Radioactive Mtls. Management
Rad. Waste Storage/Disposal
Rad. Mtls. Transportation
SF Management/Decommissioning
Fuel Cycle, Isotope

E. G. Bazeley
Hugh S. Irvine
Don W. Souther
Dr. Peter Stevens-Guille
P. J. Armstrong
Joe F. Tanaka
Syed J. Naqvi
R. A. McEachran

RWOS (Radioactive Waste Operations Site)

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

Tel: 519-361-2673

Waste Operations

Keith Mombourquette
Tel: ext. 4844
Fax: 519-361-4345

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

Facilities

- **WVRF (Waste Volume Reduction Facility)**
Processing Equipment: Two-chamber pyrolysis incinerator with a capacity of 30 kg/h; box compactor with a compaction force of 2×10^6 N low force drum crusher. Startup, 1977 (box compactor replaced baler in 1993).

(contd next page)

OH (contd)• **LLW Storage Facilities**

- **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 each.

- **15 trenches**; reinforced concrete structures $\sim 3\text{ m}$ 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 $>15\text{ R/h}$, e.g., ion exchange resins, filters, and reactor core components; storage capacity ranges from 1 to 18 m^3 .

- **358 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. In-ground storage consists of 224 m^3 capacity tile holes and 134 in-ground containers. In-ground container capacity ranges from 2 to 18 m^3 (54 were added in 1993).

- **Paved area 4700 m^2** for storage of contaminated tooling in 6.1-m-long marine cargo containers stacked two high.

- **27 in-ground containers** with varying diameters/depths containing scrap heat exchangers; augered holes with crushed limestone backfill. Storage capacity ranges from 2 to 18 m^3 each.

Oil (contd)

2.1.1.1 Storage Facilities

- 2 above-ground - vapour - the bottom - waste with a total
oil content of 10% is stored in a storage container
with a storage capacity of 1000 m³ each.

- 12 in-bore, steel-welded storage containers - 2 in-bore
ground - stored for waste with total oil content of 10%
with a storage capacity range from 200 to 500 m³ each.

- 12 in-bore, steel-welded storage containers - 2 in-bore
ground - stored for waste with total oil content of 10%
with a storage capacity range from 200 to 500 m³ each.

- 12 in-bore, steel-welded storage containers - 2 in-bore
ground - stored for waste with total oil content of 10%
with a storage capacity range from 200 to 500 m³ each.

- 12 in-bore, steel-welded storage containers - 2 in-bore
ground - stored for waste with total oil content of 10%
with a storage capacity range from 200 to 500 m³ each.

- 12 in-bore, steel-welded storage containers - 2 in-bore
ground - stored for waste with total oil content of 10%
with a storage capacity range from 200 to 500 m³ each.

CHINA
(People's Republic of China)

CHINA

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1-2	New Year
Feb	10-11	Spring Festival
Mar	8	Women's Day
May	1	Labor Day
Jun	1	Children's Day
Oct	1-2	National Day

TIME

Standard Time Washington, D.C.

+ 13 hours

Daylight Savings Time Period:

04/03 - 09/03/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 8.7000 Renminbi
per Wall Street Journal, 01/31/94. 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
People's Republic of China

Tel: 86-1-532-3831
Fax: 86-1-532-3178

Science Counselor

Marco S. DiCapua

Population	1993	1.18	billion
------------	------	------	---------

ENERGY

Electric Power Capacity	1993	180	GWe
		<1%	nuclear
	1995	206	GWe
		<1%	nuclear
	2000	285	GWe
		<1%	nuclear

Electric Power Production	1993	815	TWh
		74%	coal
		18%	hydro
		8%	oil
		<1%	nuclear
	2000	<1%	nuclear

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	1993	0.3	GWe
	1995	2.1	GWe
	2000	6.0	GWe

Reactor Mix	1993	PWR	1 (1993)
		PWR	2 (1994)

Reactor Development PWR, HTGR, FBR, LTR

INDUSTRIAL FUEL CYCLE

Policy: Activities include uranium mining, milling, and diffusion enrichment; isotope separation; fuel fabrication; future spent fuel reprocessing.

Waste Management Strategy: Interim storage of spent fuel in pools for 5-8 years if <1,000 tU, in transport/storage casks if >1,000 tU; interim storage, reprocessing, vitrification, and disposal all to be at

one site, to be selected, located in northwest China or the Gobi Desert; final disposal in deep geologic formation; plan for a small pilot reprocessing plant, followed by a commercial-size facility, about 500 tU/a.

INTERNATIONAL RELATIONSHIPS

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

ORGANIZATION

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

BINE

Beijing Institute of
Nuclear Engineering
P.O. Box 840
Beijing 100840, PRC

Tel: 86-1-842-3311
Fax: 86-1-841-5067

Director
Director, Nuclear Waste Mgmt.
Director, International Affairs

Lin Guoming
Sun Donghui
Liu Dingjin

CIAE

China Institute of
Atomic Energy
P.O. Box 275
Beijing 102413, PRC

Tel: 86-1-935-7676
Fax: 86-1-935-7008

Honorary Director
Director
Director, Radiochemistry

Wang Chanchang
Sun Zuxun
Luo Shangeng

Function: Large comprehensive nuclear R&D institute. FBR development.

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

CNEIC

China Nuclear Energy
Industry Corporation
P.O. Box 822
Beijing 100037, PRC

Tel: 86-1-851-2211
Fax: 86-1-851-2393

General Manager

Zhou Yuanquan

Function: Import/export company for the nuclear industry.

CNNC

China National Nuclear Corporation
P.O. Box 2102
Beijing 100822, PRC

Tel: 86-1-851-2211
Fax: 86-1-851-2393

President
Nuclear Fuel Department
Nuclear Radiation Protection,
Environment/Health Department

Jiang Xingxiong
Wang Xiaoli

Zhu Zhiming

Conglomerate of over 200 enterprises and institutions. Plans to construct four regional final LLW/ILW disposal facilities in northwest (Gansu), east, south, and southwest China for waste from nuclear facilities, including Qinshan and Daya Bay nuclear power stations.

INET

Institute of Nuclear Energy Technology
Tsinghua University
P.O. Box 1021
Beijing 102201, PRC

Tel: 86-1-259-4533
Fax: 86-1-256-4177

Director
Dep. Director
Academic Committee Director

Prof. Wu Zongxin
Prof. Xu Yuanhui
Prof. Zhu Yongjun

Designed/built low-temperature reactor (5 MWth), which provides central heating for the institute's off-campus research facility.

NFC

Nuclear Fuel Complex
P.O. Box 508
Lanzhou 732850, PRC

Tel: 86-0931-841-7584
Fax:

Director

Liu Qizhao

NFF**Nuclear Fuel Fabrication**

P.O. Box 257
Chengdu, Yibin 610002

Tel: 86-0831-22-1811
Fax: 86-0831-22-3622

Function: Production of fuel for the 300 MWe PWR being built at Qinshan (near Shanghai) and the two 900 MWe PWRs at Daya Bay (near Hong Kong).

NNSA**National Nuclear Safety**

Administration
P.O. Box 8088
Beijing 100088, PRC

Tel: 86-1-225-8583
Fax: 86-1-225-7804

Director General
Chief Engineer
Dep. Chief Engineer

Huang Qitao
Li Zhiyu
Zhang Chonguan

Function: Responsible for standards/regulations, construction permits/operating licenses; monitoring plant operations; joint safety research with other nations. Cooperation with U.S. (NRC)

NPIC**Nuclear Power Institute of China**

P.O. Box 430
Chengdu 610041, PRC

Tel: 86-028-558-2199
Fax: 86-028-558-2223

Director

Zhao Chengknn

Function: Designing Qinshan II (600 MWe PWR); R&D on advanced PWRs.

CHINA

PNL-9450-1

SNERDI

Shanghai Nuclear Engineering
and Design Institute
29 Hongchao Road
Shanghai 200233, PRC

Tel: 86-021-436-4700
Fax: 86-021-439-0846

Director
Foreign Affairs

Gen Gen Quchang
Du Li

Function: Designing (300 MWe) PWRs for export; designed
Qinshan I.

FINLAND

FINLAND

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year
Jan	6	Epiphany
Apr	1	Good Friday
Apr	3-4	Easter
May	1	May Day
May	12	Ascension
Jun	24-25	Midsummer Eve/Day
Nov	5	All Saints
Dec	6	Independence Day
Dec	24-26	Christmas

TIME

Standard Time Washington, D.C.

+ 7 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 5.50 Markka (FIM)

per Wall Street Journal, 01/31/94. 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: 358-0-65-6846

Economic Section

Robert W. Boehme

Population	1992	5 million
------------	------	-----------

ENERGY

Electric Power Capacity	1992	12.6 GWe
		18% nuclear
	1995	13.6 GWe
		17% nuclear
	2000	15.5 GWe
		16% nuclear

Electric Power Production	1992	57.4 TWh
		34% nuclear
		26% hydro
		15% solids
		14% coal
		9% gas
		2% oil
	1995	29% nuclear
	2000	23% nuclear

NUCLEAR POWER

Nuclear Power Capacity	1992	2.3 GWe
	2000	2.3 GWe

Reactor Mix	1993	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 Russia).

Waste Management Strategy: Spent fuel from TVO's power plants will be stored for 40 years, then disposed of in crystalline bedrock; IVO returns spent fuel from its (Soviet-built) reactors to Russia. Operating wastes are conditioned, stored above ground, and disposed of in crystalline bedrock at the nuclear power station sites. Decommissioning wastes will be disposed of in extended operating waste repositories.

FINLAND

PNL-9450-1

Cumulative SF Arisings (LWR), tU
removed + cores

TVO

IVO

1990	450 + 177	330 + 75
2000	855 + 177	580 + 75

Major Milestones

• Complete LLW/ILW repository (IVO)	1997
• Complete SF repository site selection (TVO)	2000
• Complete SF repository (TVO)	2020

INTERNATIONAL RELATIONSHIPS

Member of IAEA and OECD/NEA; collaboration with Sweden, Canada, Denmark, Norway, and Switzerland in waste management studies. Purchase of fuel-cycle services: uranium from Canada, Australia, Niger, China, and Russia; uranium conversion/enrichment from Canada, France, Germany, Russia, and U.K.; fuel element fabrication from Sweden, Germany, and Russia; return of spent fuel to Russia (IVO).

ORGANIZATION

- **Council of State** (Cabinet of Ministers)--grants licenses.
- **Nuclear Energy Commission**--advisory organization for matters connected with the use of nuclear energy.
- **Advisory Committee on Nuclear Safety**--advisory organization.
- **KTM** (Ministry of Trade and Industry)--Energy Department, formulates energy policies, grants licenses.
- **STUK** (Finnish Centre for Radiation and Nuclear Safety)--regulatory authority which also conducts research, particularly related to transport of radionuclides in biosphere.
- **IVO** (government-owned power company)--operates two Soviet-built PWRs.
- **TVO** (power company)--operates two Swedish-built BWRs.

- **VTT** (Technical Research Centre of Finland)--nuclear research, including waste management R&D.
- **Geological Survey of Finland**--bedrock-related research.
- **University of Helsinki**--basic research on radiochemistry.
- **Helsinki University of Technology**--basic research.

ADVISORY COMMITTEE ON NUCLEAR SAFETY

Advisory Committee on Nuclear Safety

P.O. Box 14

Laippate 4

FIN-00881 Helsinki

Finland

Tel: 358-0-708-21

Fax: 358-0-708-2392

Chairman

Secretary-General

Prof. Jarl Forstén

Hannu 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

FIN-02150 Espoo, Finland

Tel: 358-0-469-31

Fax: 358-0-462-205

Director

Nuclear Waste Disposal

Prof. Veikko Lappalainen

Paavo Vnorela

R&D Activities: Geological studies for waste disposal in crystalline bedrock.

IVO (National Power Company)

Imatran Voima Oy
Rajatorpantie 8
FIN-01019 IVO, Finland

Tel: 358-0-508-1
Fax: 358-0-563-6823

President, CEO
Exec. VP, Generation
Director, Research
Nuclear Waste

Dr. Kalevi Numminen
Dr. Anders Palmgren
Prof. Pekka Salminen
Jussi Palmu

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

Owner: Government.

NEC

Nuclear Energy Commission
Pohjoinen Makasiinikatu 6
FIN-00130 Helsinki
Finland

Tel: 358-0-160-5222
Fax: 358-0-160-2695

Chairman
Secretary-General

Prof. Pekka Silvennoinen
Sakari Immonen

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

STUK

Finnish Centre for Radiation
and Nuclear Safety
P.O. Box 14
Laippatie 4
FIN-00881 Helsinki, Finland

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

Director
Nuclear Safety Department
Nuclear Fuel Cycle
Nuclear Waste

Prof. Antti Vuorinen
Jukka Laaksonen
Tero Varjoranta
Esko Ruokola

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

TVO (Industrial Power Company)

Teollisuuden Voima Oy
Annankatu 42C
FIN-00100 Helsinki, Finland

Tel: 358-0-6180-1
Fax: 358-0-6180-2570

Director
Director, Development
Nuclear Fuel
Nuclear Waste

Mauno Paavola
Ami Rastas
Ilkka Mikkola
Veijo Ryhänen

Function: Operate two nuclear power units (Swedish-built BWRs)
at Olkiluoto in Eurajoki, southwestern Finland; manage fuel procure-
ment and TVO-produced wastes.

Owners: 57% private, 43% public utilities/government-owned
companies.

(contd next page)

TVO (contd)**Facilities**

- **KPA-STORE** (Interim storage facility for spent nuclear fuel) - located at reactor site; three pools with total capacity of 1200 tU; construction completed 1987.
- **VLJ Repository** (Final repository for TVO's ILW/LLW) - located at reactor site; LLW and ILW packaged in metal drums/containers are buried in two silos 70-100 m deep; ILW silo has reinforced 0.6-m thick concrete liner; capacity 8400 m³; construction completed 12/1991.

VTT (Technical Research Centre of Finland)**VTT Energy**

Nuclear Energy

Tekniikantie 4C, Espoo

FIN-2044 VTT, Finland

Tel: 358-0-456-1

Fax: 358-0-456-5000

Nuclear Energy Research

Reactor Physics

Nuclear Waste Management

Prof. Lasse Mattila

Ms. Riitta Kurki-Rajamäki

Dr. Seppo Vuori

R&D Activities: Reactor physics, nuclear power plant safety analyses; safety analysis of final disposal of wastes in bedrock, including groundwater flow modeling.

VTT Chemical Technology

Environmental Technology

Physics Bldg.

Otakaari 3A, Espoo

FIN-02044 VTT, Finland

Tel: 358-0-456-1

Fax: 358-0-456-6390

Head

Nuclear Waste

Dr. Kari Larjava

Arto Muurinen

(contd next page)

VTT (contd)

R&D Activities: Dissolution of spent fuel and actinides; geochemical modeling; migration in barriers and bedrock; characterization of ILW forms.

VTT Communities/Infrastructure

Rock/Environmental Engineering

Betonimiehenkuja 1, Espoo

P.O. Box 19041

FIN-02044 VTT, Finland

Tel: 358-0-456-1

Fax: 358-0-467-7927

Head

Waste Disposal

Jukka Pöllä

Petteri Pitkänen

R&D Activities: Hydrogeological and geomechanical measurements, characterization and performance of bedrock and engineered barriers.

VTT Manufacturing Technology

Materials/Structural Integrity

Kemistintie 3, Espoo

P.O. Box 1704

FIN-02044 VTT, Finland

Tel: 358-0-456-1

Fax: 358-0-456-7002

Head

Nuc. Materials Research

Dr. Kari Törrönen

Pertti Aaltonen

R&D Activities: Corrosion of encapsulation materials in repository conditions.

UNIVERSITY OF HELSINKI

University of Helsinki
Department of Radiochemistry
P.O. Box 5, Unioninkatu 35
FIN-00014 UNIVERSITY OF
HELSINKI
Finland

Tel: 358-0-191-1
Fax: 358-0-191-7814

Director

Prof. Timo Jaakkola

R&D Activities: Waste treatment processes, migration of radio-nuclides, and radiochemical analysis.

HELSINKI UNIVERSITY OF TECHNOLOGY

Nuclear Engineering Laboratory
Rakentajaaukio 2C
FIN-02150 Espoo, Finland

Tel: 358-0-451-1
Fax: 358-0-451-4068

Nuclear Energy/
Advanced Energy Systems

Prof. Rainer Salomaa
Tel: 358-0-451-3199
Fax: 358-0-451-3195

100

FRANCE

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Jul 14	Bastille Day
Apr 4	Easter Monday	Aug 15	Assumption
May 1	Labor Day	Nov 1	All Saints
May 12	Ascension	Nov 11	Veterans Day
Jun 23	Pentecost	Dec 25	Christmas

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; in addition, a visa is currently required when traveling on an 'official' passport to France but not when a personal passport is used for the visit. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S. \$ = 5.88 Franc

per Wall Street Journal, 01/31/92. 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: 33-1-42-66-97-83

Science Counselor

Jerome J. Bosken

Population	1992	56 million
------------	------	------------

ENERGY

Electric Power Capacity	1992	105.7 GWe	
		55%	nuclear
	1995	107.5 GWe	
		54%	nuclear
	2000	118.3 GWe	
		54%	nuclear

Electric Power Production	1992	458.1 TWh	
		74%	nuclear
		15%	hydro/geoth.
		8%	coal
		2%	oil
		1%	gas
	1995	74%	nuclear
2000	74%	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 Capacity	1993	59.1 GWe
	1995	59.7 GWe
	2000	64.1 GWe

Reactor Mix	1993	GCR	1 (1972)
		PWR	54 (1972-93)
			4 (1995/99)
		LMFBR	1 (1974) ^(a)
			1 (1994)

(a) Initial criticality for SuperPhenix in 1986.

INDUSTRIAL FUEL CYCLE

Policy: Maintain full domestic fuel cycle capability and 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 or clay). LLW--immobilize in bitumen, concrete, or resin and dispose in engineered surface facility.

Cumulative (PWR)	1990	1993	2000
SF Arisings, tU	7,300	10,000	19,000

Industrial-Scale Activities

- Uranium mining and milling (tU/a): 1,710 (1993)
- Uranium enrichment (kSWU/a)
 - Eurodif, gaseous diffusion: 10,800
- Fuel fabrication (tHM/a)
 - UO₂: 1,600
 - MOX: 50 (LWR fuels)
- Spent fuel reprocessing (t/a)
 - Marcoule: 400 (U metal fuels)
 - La Hague: 1,200 (LWR fuels)

Major Milestones

- UP2-800 reprocessing plant (La Hague) 1994
- Melox (MOX fuel fabrication plant-Marcoule) 1995
- TRU disposal facility 2000
- Underground Research Laboratory (completion date uncertain)
- HLW (glass) disposal facility 2000

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

Term: 07-26-83 to 07-26-93 (extension in process)

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

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 Nuclear Transport, Ltd. (Transnucléaire).

ORGANIZATION

- **CEA** (Atomic Energy Commission)--controls practically all nuclear R&D.

Nuclear Research Centers: Cadarache, Fontenay-aux-Roses, Grenoble, Valrho, Saclay.

- **CEA INDUSTRY:** Industrial group concerned with all industrial fuel cycle activities in France.
 - **COGEMA** (CEA 89.2%): nuclear fuel cycle.
 - **COMURHEX** (COGEMA 100%): uranium conversion.
 - **EURODIF** (COGEMA 51.5%): commercial enrichment.
 - **SICN** (100%), **FRAGEMA** (50%), **FBFC** (49%), **COMMOX** (60%) - COGEMA subsidiaries: fuel fabrication.
 - **SGN, USSI** (COGEMA part subsidiary).
 - **TECHNICATOME** (CEA 90%): design, construction, operation of fuel cycle and/or waste facilities.
 - **STMI** (CEA 60%): waste management, decontamination, dismantling services.
 - **TRANSNUCLÉAIRE** (51% COGEMA): transport.
- **ANDRA** (National Waste Management Agency)--controls long-term waste management, disposal included.
- **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).

Minister of Industry, Telecommunication and Tourism

— ANDRA - Yves Kaluzny

— CEA HIGH COMMISSIONER - Robert Dautray

CHAIRMAN R&D

- Philippe Rouvillois

DEPUTY CHAIRMAN

- Yannick d'Escatha

CHAIRMAN INDUSTRY

- Philippe Rouvillois

CEA OPERATIONS UNITS

— DAM - Military Applications - Roger Baleras

— IPSN - Institut de Protection/de Sécurité Nucléaire -
Philippe Vesseron

— DSM - Direction des Sciences de la Matière -
Robert Aymar

— DSV - Direction des Sciences du Vivant - André Syrota

— DRN - Direction des Réacteurs Nucléaires -
Jacques Bouchard

— DCC - Direction du Cycle du Combustible -
Jean-Yves Barre

— DTA - Direction des Techniques Avancées -
Alain Bugat

— INSTN - Institut des Sciences et Techniques Nucléaires -
Yves Chelet

RESEARCH CENTERS

— CEN (see Page FR-6)

COGEMA

— La Hague Center

• Reprocessing (LWR)

• AVH - Vitrification

— Marcoule Center

• AVM - Vitrification

• Melox - MOX Fuel Fabrication

CEA

RESEARCH CENTERS (CEN)

- Cadarache - Michel Suscillon, Director
 - TRU Waste and LLW/ILW
 - Environmental
- Fontenay-aux-Roses - Alain Deblar, Director
 - Disposal R&D
 - MOX Fuel
 - TRU Waste and LLW/ILW
 - Engineered Barriers
 - Safety and Health Protection
- Grenoble - Jean-Pierre Leroux, Director
- Saclay - Eliane Loquet, Director
 - MOX Fuel Fabrication
 - TRU Waste and LLW/ILW Treatment
 - Engineered Barriers
- Valrho - Claude Vergne, Director
 - APM - Reprocessing (Metal)
 - 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
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

Henri-Edme Wallard
Armand Faussat
Yves Marque

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

Facilities**• Centre de la Manche**

B.P. 808
50448 Beaumont-Hague

Tel: 33-16-33-52-78-65

Mission: Disposal of ILW and LLW; capacity: 480,000 m³ (1988: 350,000 m³ in place; full and shut down in 1992, to be closed permanently in 1994).

• Centre de l'Aube

B.P. 7
10200 Soullaines-Dhuys

Tel: 33-16-25-92-33-00

Mission: Replace La Manche site as disposal facility for ILW/LLW; located 120 miles east of Paris, in the province Aube; covers about 250 acres and will accommodate 1,000,000 m³ of ILW/LLW over a period of 30 years.

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

Director
Managing Director, Geology
Waste Storage
Hydrogeology
Geotechnology

Jean Pierre Hugon
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)
31-33, Rue de la Federation
75752 Paris Cedex 15
France

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

Chairman
High Commissioner

Philippe Rouvillois
Robert Dautray

Function: Responsible for R&D related to all areas of the nuclear fuel cycle through activities of several operational units (scientific directorates), research centers, and wholly/partially owned industrial concerns.

CEA-IPSN (Institute for Nuclear Safety)

Institute 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
Dir., Nuc. Security Research
Dir., **Safety**
Safety Analysis
Dir., **Safeguards**
Health/Dosimetry
Environment/Installation
Research
Nuclear Materials

Philippe Vesseron
Michel Livolant
Daniel Queniat
Christian Devillers
Annie Sugier
R. Coulon (A)
Alain L'homme
A. Chalot
G. Déan

Function: Research and development in environmental
safeguards/security.

CEA/CEN-CA (Cadarache Nuclear Research Center)

Centre d'Etudes Nucléaires
de Cadarache

B.P. 1

13108 Saint Paul Lez Durance
France

Tel: 33-42-25-24-68

Fax: 33-42-25-45-45

Director

Michel Suscillon

Location: 65 km from Marseille-Marignane Airport (by car).

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

CEA/CEN-CA (contd)**Facilities**• **Solid Waste Treatment Pilot Plant (Prolxe, Elise)**

Mission: TRU solid waste reduction by cryogenic crushing; Pu recovery by acid leaching.

Design Capacity: Eight 100-liter drums/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.

• **LLW Incinerator**• **Resin Embedding Pilot Facility**• **Solvent Incinerator****CEA/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

Alain Debiar

CEA/CEN-G (Grenoble Nuclear Research Center)

Centre d'Etudes Nucléaires
de Grenoble

B.P. 85

38041 Grenoble Cedex
France

Tel: 33-76-97-41-11

Fax: 33-76-88-34-32

Director

Jean-Pierre Leroux

Facilities

- **Waste Resin Embedding Facility**

CEA/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: 33-1-69-08-79-90

Director

Eliane Loquet

Dir., Fuel Cycle (DCC)

Jean-Yves Barré

WM/Reproc. Program Coord.

Guy Baudin

Facilities

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

CEA/CEN-VRH (Valrho Nuclear Research Center)

Centre d'Etudes Nucléaires
de la Vallée du Rhône

B.P. 171

30205 Bagnols-sur-CEze Cedex
Marcoule, France

Tel: 33-66-79-60-00

Fax: 33-66-79-66-17

(contd next page)

CEA/CEN-VRH (contd)

Director	Claude Vergne
Mgr., Reprocessing/HLW	Michele Viala
Deputy Mgr.	Claude Sombret
	33-66-79-63-62
Manager, HLW	Jean-Pierre Moncouyoux
	33-66-79-63-78
Decommissioning (DERD/VOIN)	Claude Lafaille

Facilities

- **APM** (Cogema-operated demonstration reprocessing plant for FBR, MOX and high-burnup fuels)
Mission: Develop technology for FBR, MOX and high-burnup 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.
History: Decommissioned, then dismantled in 1991.
- **PIVER II** - Vitrification of HLW from APM. (Delayed)
- **Hull Fusion Non-Radioactive Prototype** - Startup, 1984.
- **Hull Fusion Radioactive Facility in APM** - Startup, 1993.
- **PEV Prototype** (full-scale, non-radioactive R7/T7 vitrification process) - Startup, 1984.

COGEMA (Fuel Cycle Company)

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
Jean-Louis Ricaud

Cogema, Inc.
7401 Wisconsin Ave.
Bethesda, Maryland 20814-3416

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

President, CEO
V.P.-Market Development

Michael McMurphy
Frank A. Shallo

NUMATEC, Inc.
Subsidiary of Cogema, Inc.
7401 Wisconsin Ave.
Bethesda, Maryland 20814-3416

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

President

William Gallagher

COGEMA-LA HAGUE

Cogema, Centre de La Hague
B.P. 508
50105 Cherbourg Cedex
France

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

Director

Joël Pijsselman
33-33-03-60-01

(contd next page)

COGEMA-LA HAGUE (contd)

Fuel Cycle Program: Spent fuel reprocessing and HLW vitrification. 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.

Facilities

- **UP2 (Fuel Reprocessing Plant)**
Mission: Reprocess 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 (06/76) through 12/93 total HAO throughput was 4,091 tHM fuel from LWRs and 10 tHM from Phenix.
- **UP2-800 (Fuel Reprocessing Plant)**
Mission: Reprocess UO_2 and MOX fuels from French LWRs.
Design Basis: Progressive expansion of UP2 plant from 400 to 800 tHM/a of LWR fuel started in 1984, to be completed in 1994. Chop leach head-end, PUREX flowsheet, AVM vitrification process [R7 vitrification plant: rotary calciner, metallic melter; capacity, 600 m³/a HLW feed three lines - 60 liters/h HLW, 25 kg/h glass; canister dimensions: 42 cm dia x 1.3 m high (400 kg glass)].
Capacity: 800 tHM/a.
History: Startup, 1994; R7 startup, 1989.

(contd next page)

COGEMA-LA HAGUE (contd)

- **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 tHM/a.
History: Startup, 09/90. Throughput of 1,626 tHM as of 12/93.
- **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, 1989.

COGEMA-MARCOULE

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

Location: Approx. 70 km from Marseille-Marignane Airport (by train or car), near Avignon.

Director
Reprocessing Plant
AVM Manager

Hughes Delaunay
Maurice Mellano
Jean-Claude
Batailles-Lannes

Facilities

- **UP1 (Reprocessing Plant)**
Mission: Reprocess magnesium-clad natural uranium metal fuels from military reactors.
Design Basis: Mechanical declad; PUREX flowsheet; contact maintenance.
Capacity: 400 tU/a of reactor fuel (gas/graphite).
History: Startup, 1958; total gas/graphite power reactor fuels processed up to 12/93: 5,085 tU.

(contd next page)

COGEMA-MARCOULE (contd)• **AVM (Ateliers de Vitrification de Marcoule)**

Mission: Demonstrate AVM process: vitrify Marcoule UPl wastes.

Design Basis: Rotary calciner feeding an induction- heated metallic melter; nominal capacity 30-liters/h HLW 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, 06/78; as of 12/93, 2,145 glass canisters.

• **Incinerator**• **Bituminization Facility**• **Melox:** MOX fuel fabrication (120 tHM/a) - 1995.**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: 33-1-40-56-14-29

Director, Quality/Security

Jean Ohmann

ENSM (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

(contd next page)

ENSM (contd)

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

FBFC (Franco-Belge Company for Fuel Fabrication)

Société Franco-Belge de Fabrication
de Combustibles

Tour Fiat, Cedex 16
92084 Paris la Défense
France

Tel: 33-1-47-96-56-00
Fax: 33-1-47-96-56-03

Director General

Philippe Darmayan

Facilities

- **Fuel Fabrication Plant (Romans, France)**
Mission: Fabricate UO_2 fuels for power reactors.
Design Capacity: 750 tHM/a.
- **Fuel Fabrication Plant (Pierrelatte, France)**
Mission: Fabricate UO_2 fuels.
Design Capacity: 400 tHM/a.
- **Fuel Fabrication Plant (Dessel Belgium)**
Mission: Fabricate UO_2 fuels.
Design Capacity: 450 tHM/a.

GERMANY

Population	1993	79	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1993	118.5	GWe
		19%	nuclear
	1995	121.0	GWe
		18%	nuclear
	2000	126.2	GWe
		18%	nuclear

Electric Power Production	1993	533.3	TWh
		57%	coal
		30%	nuclear
		6%	gas
		3%	oil
		3%	hydro
		1%	solids
	1995	27%	nuclear
	2000	25%	nuclear

NUCLEAR POWER

Nuclear Power Capacity	1995	22.5	GWe
	1995	22.5	GWe
	2000	22.5	GWe

Reactor Mix	1993	PWR	14 (1972-89)
		BWR	7 (1975-85)

INDUSTRIAL FUEL CYCLE

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

Waste Management Strategy: Vitrification of HLW (by foreign plants) and interim storage of HLW glass; disposal of reprocessing wastes in future salt-dome repository; interim storage of ILW/LLW wastes; future disposal of reactor and decommissioning wastes in abandoned iron mine or salt repository.

Population	1993	79	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1993	118.5	GWe
		19%	nuclear
	1995	121.0	GWe
		18%	nuclear
	2000	126.2	GWe
		18%	nuclear

Electric Power Production	1993	533.3	TWh
		57%	coal
		30%	nuclear
		6%	gas
		3%	oil
		3%	hydro
		1%	solids
	1995	27%	nuclear
	2000	25%	nuclear

NUCLEAR POWER

Nuclear Power Capacity	1995	22.5	GWe
	1995	22.5	GWe
	2000	22.5	GWe

Reactor Mix	1993	PWR	14 (1972-89)
		BWR	7 (1975-85)

INDUSTRIAL FUEL CYCLE

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

Waste Management Strategy: Vitrification of HLW (by foreign plants) and interim storage of HLW glass; disposal of reprocessing wastes in future salt-dome repository; interim storage of ILW/LLW wastes; future disposal of reactor and decommissioning wastes in abandoned iron mine or salt repository.

GERMANY**PNL-9450-1**

Cumulative SF Arisings (LWR)	1990	3,800 tU
	2000	8,950 tU
Cumulative LLW/ILW Arisings	2000	160,000 m ³ conditioned, radioactive waste with negligible heat production
Cumulative Heat-Producing Waste Arisings	2000	2,800 m ³ conditioned, radioactive waste with heat production

Industrial-Scale Activities

- Fuel fabrication capacity
 - UO₂ fuel: 1500 tU/a
 - MOX fuel: 130 tHM/a-LWR/10 tHM/a-FBR fuel elem. (no operating license)
- AFR spent fuel storage capacity
 - 1,500 t, dry storage (Gorleben)
 - 1,500 t, dry storage (Ahaus)

Major Milestones

• Acceptance of HLW from Cogema/La Hague and BNFL/Sellafield	1994
• Konrad (iron mine) repository (date pending)	1997/98
• Gorleben repository, HLW	2010

INTERNATIONAL RELATIONSHIPS**DOE/BMFT Agreement for Cooperative Radioactive Waste Management Technology Exchange**

Term: 12-20-74 to 06-30-91 (In 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 with in-situ tests at Asse salt mine; U.S. observation of shaft drilling at the Gorleben repository site; cooperation in tests of transport/storage casks, and waste transportation studies.

Member of EC, IAEA, and OECD/NEA. Cooperative agreements and joint projects as well as commercial activities with numerous countries.

ORGANIZATION

- **Federal Government**

- Coordinate nuclear program
- Sponsor R&D
- Construct/operate radioactive waste disposal facilities
- Establish licensing requirements

- **States (Länder)**

- License nuclear installations
- Provide LLW interim storage

- **Utilities**

- Provide spent fuel/reactor waste storage, contract for reprocessing and waste treatment
- Pay for waste transport and disposal

**GOVERNMENT RESPONSIBILITIES--
NUCLEAR FUEL CYCLE/WASTE MGMT.****BMFT (Federal Ministry for Research and Technology)**

- Government Fuel Cycle/Waste Management
R&D Program Administration

GSF/IFT

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

KfK

- LWR Fuel Cycle Waste Treatment/Packaging R&D
- LWR SF Management Alternatives - R&D
- HLW Vitrification R&D
- Support Work - Geological/Direct Disposal of Waste

KFA

- Waste Treatment
- Support Work - LLL/ILW Disposal, including HTGR Fuel
Elements

BMW (Federal Ministry for Economics)**BGR**

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

GOVERNMENT RESPONSIBILITIES--**NUCLEAR FUEL CYCLE/WASTE MGMT. (cont'd)****BMU (Fed. Ministry-Environmental Protection/Reactor Safety)**

- Storage/Transp./Disposal of Rad. Wastes
- 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
- Morsleben LLW Disposal Facility (ERAM)

LÄNDER (State Governments)

- Licensing of Nuclear Installations

NMU (Lower Saxony Ministry of Environment)

- Licensing of Final Repositories (Konrad and Gorleben)
- Morsleben LLW Disposal Facility (ERAM)

INDUSTRIAL/UNIVERSITY RESPONSIBILITIES

DWK - Owned by Nuclear Utilities

- KEWA (DWK Subsidiary)
- WAK (DWK Subsidiary)

NUKEM - Owned by RWE

- LLW/TRU waste treatment R&D facility design
- R&D--SF packaging for disposal

GNS - Owned by Nuclear Utilities

- Waste treatment/conditioning
- Transportation of radioactive materials
- Shipping cask development
- Engineering/D&D services
- BLG (GNS Subsidiary)
 - Operation of Gorleben SF/LLW Storage Facilities
 - Construction of PKA
- BZA (GNS Subsidiary)
 - Operation of Ahaus SF Interim Storage Facility

NCS - Nuclear Cargo Service

- Transportation of radioactive materials (owned by Deutsche Bahn AG)

SBH - Owned by Siemens AG

- Fabrication of uranium/MOX fuels, including R&D/waste management

TUM - Technical University Munich

- Actinide Chemistry R&D

BAM (Federal Materials Research/Testing Institute)

Bundesanstalt für Materialforschung
und -prüfung (BAM)

Unter den Eichen 87
12205 Berlin, Germany

Tel: 49-30-8104-0
Fax: 49-30-811-5066

Function: Testing and evaluation of materials used in nuclear programs.

BFS (Federal Institute for Radiation Protection)

Bundesamt für Strahlenschutz
Postfach 10 01 49
38201 Salzgitter, Germany

Tel: 49-5341-188-0
Fax: 49-5341-188-188

Chief Executive
Vice-President

Prof. Dr. Alexander Kaul
H. Rösel

BFS, Department Nuclear
Waste Disposal/Transport
Bundesallee 100
38116 Braunschweig, Germany

Tel: 49-531-592-7601
Fax: 49-531-592-7614

Director

Prof. Dr. Helmut
Röthemeyer

Dir., Project Mgmt.
Dir., Waste Disposal/Safety
Radioactive Waste

Dr. Bruno Thomauske
Dr. Heinrich Illi
Dr. Peter W. Brennecke
49-531-592-7641

Geoscience
Radiology/Radiation Protection
System Analysis
Dir., Transport/Storage of
Rad. Mtls./Fuel Cycle

Dr. Gerhard Stier-Friedland
Dr. Dietrich Ehrlich
TBD
Prof. Dr. Wilhelm Collin

(contd next page)

BFS (contd)

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

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, 2010.
- **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, 1997/98.

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

Bundesanstalt für Geowissenschaften
und Rohstoffe

Stilleweg 2

Postfach 510153

30655 Hannover, Germany

Tel: 49-511-643-0

Fax: 49-511-643-2304

(contd next page)

BGR (contd)

Director, Engineering,
 Geology/Geotechniques
 Rock Mechanics
 Engineering Seismology
 Salt Mechanics
 Mining Rock Mechanics
 Salt Geology
 Numerical Modeling
 Hydrogeology
 Groundwater Geophysics

Prof. Dr. Michael Langer
 Prof. Dr. A. Pahl
 Dr. R. Lüdeling
 Dr. H. Albrecht
 Dr. D. Meister
 Dr. W. Jaritz
 Dr. Manfred Wallner
 Dr. H. Vierhuff
 Dr. W. Giesel

Function: Responsible to BMWI for all geological/geotechnical aspects related to planning, construction/operation of a final repository for radioactive wastes; conduct special research for BMU.

BMFT (Federal Ministry for Research and Technology)

Bundesministerium für Forschung
 und Technologie
 Heinemannstrasse 2
 Postfach 200240
 53175 Bonn, Germany

Tel: 49-228-591
 Fax: 49-228-59-3605

Minister, Science/Technology
 Director General, Energy
 Fuel Cycle/D&D

Dr. Paul Krüger
 Dr. Eckhard Lübbert
 Dr. Klaus Komorowski
 49-228-59-3759

Waste Mgmt./D&D/Fuel

Dr. Bernd Schillert
 49-228-59-3757

U Enrichment/Safeguards

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

Waste Disposal

Dr. Diethard Lummerzheim
 49-228-59-3762

Direct Disposal

Dr. Hans G. Riotte
 49-228-59-3761

Geological Disposal

W. Busch
 49-228-59-3764

Function: Responsible for R&D programs on fuel cycle and radioactive waste management.

**BMU (Federal Ministry for Environmental
Protection/Reactor Safety)**

Bundesministerium für Umwelt,
Naturschutz und Reaktorsicherheit

Kennedyallee 5
53175 Bonn, Germany

Tel: 49-228-305-0
Fax: 49-228-305-3225

Minister
Dir. Gen., Nuc. Installation
Safety/Radiation Protection/
Nuclear Fuel Cycle
Dir., Nuc. Installation Safety

Prof. Dr. Klaus Töpfer
Walter Hohlefelder

Director, Radiation Protection

Dr. Gast
49-228-305-2805

Director, Fuel Cycle

Dr. Gallas
49-228-305-2905

Policy

Dr. Arnolf Matting
49-228-305-2950

International Relations

Dr. Bröcking
49-228-305-2930

Fuel Supply

Christian Breest
49-228-305-2800

Reprocessing/Conditioning

Arno Ehret
49-228-305-2831

Treatment/Storage/Transp.

Dr. K. H. Berg
49-228-305-2821

Final Repository

Dr. Herbert Dreisvogl
49-228-305-2721

Chairman, Reactor Safety

Dr. Manfred Bloser
49-228-305-2951

Commission (RSK)
Chairman, Radiation Protection
Commission (SSK)

Prof. Dr. Adolf Birkhofer

Prof. Dr. Christian Steffen

Function: Responsible for storage, transportation, and disposal of radioactive wastes; supervision of state licensing procedures; federal standards for nuclear safety and radiation protection.

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

Deutsche Gesellschaft zum Bau
und Betrieb von Endlagern
für Abfallstoffe mbH

Woltorfer Strasse 74
31224 Peine, Germany

Tel: 49-5171-43-1
Fax: 49-5171-43-218

Managing Directors

Dr. Jürgen P. Lempert
Manfred Florl
Dr. Hans-Jürgen Krug
Wolfgang Schulz

49-5171-43-250

Project Gorleben, Mgr.

Project Konrad, Mgr.

Rüdiger Putzer
49-5171-43-310

Project-Related R&D, Mgr.

Hans-Jürgen Engelmann
49-5171-50-3370

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 and post-operational phases; design/construction of engineered barriers.

DWK (German Fuel Reprocessing Company)

Deutsche Gesellschaft für
Wiederaufarbeitung
von Kernbrennstoffen mbH

Baringstrasse 6
30022 Hannover, Germany

Tel: 49-511-3668-0
Fax: 49-511-3668-207

Manager

Bernd Zur Nedden

Function: Support KEWA and WAK; resolve issues from consequences of cancellation of reprocessing plant Wackersdorf and resulting transfer of site from "nuclear" to "industrial"; plan for decommissioning/dismantling of WAK pilot-scale reprocessing plant.

ERAM (LLW Repository)

Endlager für Radioaktive
Abfälle Morsleben
Am Schacht 105
39343 Morsleben, Germany

Tel: 49-39050-8-0
Fax: 49-39050-300

Manager

Dr. Klaus Ebel
49-39050-8-200

Function: Final repository for LLW of the former East Germany,
now operated by DBE under contract to BfS.

GNS (Company for Nuclear Service)

Gesellschaft für
Nuklear-Service mbH
Zweigertstrasse 28
45130 Essen, Germany

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

Managing Directors

Dr. Wolfgang Hawickhonst
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: Nuclear utilities.

(contd next page)

GNS (contd)**Facilities**

- **AFR Spent Fuel Storage Facilities** (Gorleben and Ahaus sites, operated by GNS subsidiaries, BLG, and BZA, respectively)
Design Basis: Dry storage in CASTOR casks - 400 casks (in 600 x 125 x 62-ft-high building).
Capacity: 1500 t each facility.
History: Startup of AFR at Gorleben has been delayed due to litigation. Ahaus went into operation in 1992.
- **PKA Pilot Fuel Conditioning Plant** (Gorleben)
Mission: Demonstration of SF conditioning and encapsulation to meet the requirements for interim storage and final disposal.
Design Basis: Hot cell with installations for rod consolidation, compaction of fuel assembly hardware, loading of canisters; maximum throughput 35 tHM/yr.
Milestone: Startup, 1996.

GRS (Company for Reactor Safety)

Gesellschaft für
Reaktorsicherheit mbH
Schwertnergasse 1
50667 Köln, 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 (Research Center for Environmental Sciences/
Institute for Underground Disposal)**

GSF - Forschungszentrum für Umwelt
und Gesundheit, GmbH
Institut für Tiellagerung
Theodor-Heuss-Strasse 4
P.O. Box 2163
38122 Braunschweig, Germany

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

Dir./IFT, Head/Disposal
Technology
Engineering Development
Geotechnology
Test Fields
Geophysics
Dir./IFT, Head/Disposal Safety

Prof. Dr. Klaus Kühn
49-531-8012-231
Alfred Beinlich
Manfred W. Schmidt
Tilmann Rothfuchs
Dr. Dieter Flach
Dr. Wernt Brewitz
49-531-8012-239

Safety Analysis
Chemical Waste
Geochemistry
Geology/Hydrogeology
Data Processing
Dir./Project Management

Dr. Richard Storck
Dr. Thomas Brasser
Dr. Hermann J. Gies
Dr. Konrad Klarr
Gert Ohme
Dr. Rolf Stippler
49-531-8012-220

ILW/HLW Projects
Direct Disposal Project
Asse Projects
Konrad/Gorleben Work
Test Dam Project
Long-Term Safety Projects
Administration/Infrastructure
Public Relations
Head/Mine Operations

Dr. Ingo Müller-Lyda
Jürgen Kunze
Vacant
Dr. Wolfgang Bode
Dr. Helmut Fleck
Dr. Peter Faber
Erwin Sölter
Rainer Gömmel
Klaus Dürr
49-531-8012-211
Helmut Kolditz

Technical Planning

(contd next page)

GSF/IFT (contd)

Waste Management R&D: Development/testing of techniques for safe, final geologic disposal of radioactive and chemical toxic wastes; acquisition of data for planning, construction, and operation of underground repositories. Safety analyses of long-term performance for the post-operational phase of underground repositories.

Schachtanlage Asse

38319 Remlingen, Germany

Tel: 49-5336-891

Mine Manager
Radiation Protection
Mine Survey

Volker Schauermann
Herbert Meyer
Dr. Gerd Hensel

Facilities

- **Asse 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.
Hlstory: Startup, 1967.
- **Mineralogical and Geochemical Laboratories** (Braunschweig)
- **Rock Mechanics Laboratory** (Braunschweig)

KEWA (Fuel Cycle Consulting Company)

KEWA Kernbrennstoff
Wiederaufarbeitungstechnik GmbH

Baringstr. 6
Postfach 3245
30032 Hannover, Germany

Tel: 49-511-3668-0
Fax: 49-511-3668-203

Tech./Managing Director

Ernst Robinson
49-511-3668-240

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

KFA (Jülich Research Center)

Forschungszentrum Jülich GmbH

Postfach 1913

52245 Jülich, Germany

Tel: 49-2461-61-0

Fax: 49-2461-61-5327

Director, Institute of
Chemical Technology (ICT)

TBD

Director, Institute of
Reactor Materials (IRW)
ILW/SF/HTGR Fuel DisposalProf. Dr. Hubertus Nickel
49-2461-61-3058Dr. Heiner Brücher
49-2461-61-6409

Waste Treatment (ZFK-DE)

Dr. Stephan R. Halaszovich
49-2461-61-5288

Quality Assurance (PKS)

Dr. Reinhard Odoj
49-2461-61-6190

Hot Cell Facility (GHZ)

Günter Pott
49-2461-61-3196**Function:** Develop advanced waste management technologies.

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.

KfK (Karlsruhe Nuclear Research Center)

Kernforschungszentrum

Karlsruhe GmbH

Postfach 3640

76021 Karlsruhe, 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.)

Director, Inst. for Hot Chem.

Hot Chemistry (IHCh)

Director, Institute for Nuc.

Waste Technology (INE)

Process Engineering

Prof. Klaus Ebert

49-7247-82-2400

Prof. Dr. Jä-ii Kim

49-7247-82-2230

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

WAK Decommissioning

Walter Müller-Dietsche

49-7247-82-4050

Program Management

"Entsorgung" (PTE)

Dr. Klaus-Detlef Closs

49-7247-82-5790

(contd next page)

KfK (contd)**Facilities**• **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); in standby.

• **Ceramic Melter**

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.

NMU (Lower Saxony Ministry of Environment)

Niedersächsisches Umweltministerium

Archivstrasse 2

Postfach 41 07

30041 Hannover, Germany

Tel: 49-511-104-0

Fax: 49-511-104-3399

Minister

Dir., Nucl.Energy/Rad.Protection

Final Repositories

Monika Griefahn

Klaus-Dieter Becherer

Dr. Klaus-Arno Beckers

49-511-104-3550

NFC (WM/Reprocessing/SF)

Dr. Dietmar A. Kopp

49-511-104-3503

Function: State authority for licensing of nuclear facilities in Lower Saxony, including planned repositories at Gorleben and Konrad.

NUKEM

NUKEM GmbH
Industriestrasse 13
P.O. Box 1313
63754 Alzenau, Germany

Tel: 49-6023-91-01
Fax: 49-6023-91-1222

Managing Directors

L. Aumüller, H. A. Pirk
H. W. Binzel,
Dr. P. Schmidt
O. Pfahls
Dr. H. Keese
H. Hüscherlath
Dr. P.G. Maurer
Dr. W. Hoffmann
Dr. E. Wehner

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

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.

DETEC

Decommissioning Technologies, GmbH
Industriestrasse 13
63755 Alzenau, Germany

Tel: 49-6023-91-04
Fax: 49-6023-91-1222

Managing Directors

Gerwin Rasche
Dr. Erwin Wehner

Function: Provide services for D&D, engineering, remote handling systems.

SBH

Siemens AG Brennelementewerk Hanau

Postfach 110060

63434 Hanau, Germany

Tel: 49-6181-58-0

Fax: 49-6181-58-3502

Production Manager

Jürgen Krellmann

49-6181-58-4599

Chemistry/Waste Management

Dr. F.-W. Ledebrock

49-6181-58-4169

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

Facilities• **Fuel Fabrication Plants**Capacity UO_2 - 1500 tHM/a LWR fuel.

MOX - 130 tHM/a LWR fuel or 10 tHM/a FBR fuel
(plant constructed, no operating license)

TUM (Technical University Munich)

Technische Universität München

Institut für Radiochemie

Walther-Meißner-Strasse 3

85748 Garching b. München

Germany

Tel: 49-89-3209-220

Fax: 49-89-3209-2204

Director

Prof. Franz Baumgärtner

VKTA (Nuclear Engineering/Analytics Company)

Verein für Kernverfahrenstechnik
und Analytik Rossendorf e.V.

Postfach 511019
01314 Dresden, Germany

Tel: 49-351-591-3350
Fax: 49-351-460-5812

General Manager

Prof. Dr. Wolf Häfele
49-351-591-2350

Waste Treatment

Dr. Frank Schumann
49-351-591-2671

Nuc. Analytics

Dr. H. Steinkopf
49-351-591-2290

Radioactive Preparation

Dr. K. Jantsch

Activities: Decommissioning nuclear facilities of the former Central Institute for Nuclear Research (ZfK Rossendorf): zero power reactors, RFR research reactor (10 MW), and special radioisotope production facilities; waste treatment/nuclear services; nuclear/chemical analyses; assessment of industrial/mining wastes; radioisotope production.

Facilities

- **ABÜS (Waste treatment plant)**
Laboratory- and pilot-scale R&D of LLW/HLW treatment processes: volume reduction (evaporation, press compaction, solidification); conditioning, using novel (remote) handling techniques (2 hot cells). Completed in 1991; hot operation in 1996.
- **SWA (Waste water processing/treatment plant)**
Treatment consisting of mechanical filtration, ion exchange for low-salt wastes, and evaporation for high-salt wastes and wastes containing boric acid.
- **Radioisotope Production Facilities**

WAK (Fuel Reprocessing Company)

Wiederaufarbeitungsanlage Karlsruhe

Betriebsgesellschaft mbH

Postfach 1263

76339 Eggenstein-Leopoldshafen

Germany

Tel: 49-7247-2881

Fax: 49-7247-4755

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

Chief Executive

R. Heere

49-7247-88-2201

Technical Oversight

Horst P. Wiese

49-7247-88-2118

Plant Manager

Dr. Martin Weishaupt

49-7247-88-2298

Decommissioning

Dr. Klaus Eiben

49-7247-88-2117

Waste Conditioning/Transport

Dr. Joachim Fleisch

49-7247-88-2230

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, 0.175 tHM/d.

History: On-line from 09/71 to early 1980, when it was shut down for dissolver replacement; operation resumed 10/82; total throughput to 12/90, approx. 210 tHM (130 tHM from LWR fuel); shut down 12/31/90, decommissioning/dismantling plans in progress.

(contd next page)

WAK (contd)

- **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 of 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 August 1991: 910 m³ waste vitrified, 2,180 canisters filled; tanks now empty, plant in standby condition.

INDIA

INDIA

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year	Jun	20	Muharram
Jan	26	Republic Day	Aug	15	Independence Day
Mar	13-15	Ramadan	Aug	29	Jonashtami
Mar	26	Holi	Oct	2	Gandhi's Birthday
Apr	1	Good Friday	Oct	13	Dashera
May	5	Buddha Purima	Nov	2	Festival of Lights
May 22-23		Sacrifice Feast	Nov	18	Guru Nanak's B'day
Jun	10	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 U.S.; 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. \$ = 31.13 Rupee

per Wall Street Journal, 01/31/94. 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 India are complete as listed, after dialing international access code: 011. Country code is 91; listed local numbers include city code.

U.S. EMBASSY - NEW DELHI

American Embassy
Shanti Path
Chanakyapuri 110021
New Delhi, India

Tel: 91-11-687-2028
Fax: 91-11-687-6033

Science Counselor

Dr. Paul C. Maxwell

Population	1992	819	million
------------	------	-----	---------

ENERGY

Electric Power Capacity	1992	69	GWe
		<3%	nuclear
	1997	100	GWe
		<3%	nuclear

Electric Power Production	1992	302.7	TWh
		76%	coal
		22%	hydro
		<3%	nuclear
	1997	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.

Due to resource and technical problems, it is doubtful that 1997 nuclear power forecasts (end of 8th five-year plan) can be met, including the commissioning of the 500 MWe FBR by the year 2000.

Nuclear Power Capacity	1993	1.7	GWe
	1995	2.2	GWe
	2000	3.5	GWe

Reactor Mix	1993	BWR	2 (1969)
		HWR	7 (1973-93)
			7 (1994-01)

Reactor Development	1985	FBR	12-15 MWe test unit
	2000	FBR	500 MWe commercial

INDUSTRIAL FUEL CYCLE

Policy: Achieve self-sufficiency in CANDU-type and LWR fuel cycle--uranium mining and milling, conversion to UO₂, 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 $\text{UO}_2\text{-PuO}_2$.

Waste Management Strategy: Vitrification of HLW, interim storage for at least 20 years and geologic disposal in a crystalline rock formation; disposal of LLW and short-lived ILW in near-surface engineered facilities; disposal of long-lived ILW will be in a deep geological repository.

Cumulative Spent Fuel Arisings (LWR/HWR)	1990 2000	1,580 tU 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):	1993	719
• Uranium mining and milling (t/a):	1985 1988	130 170
• UO_2 fuel fabrication (t/a):	1984 2000	210 1,500
• Fuel reprocessing (t/a):		
Trombay pilot plant	1962	30
Tarapur plant	1982	100
Kalpakkam plant	1992/93	100
• HLW vitrification: Tarapur (1985)		

Major Milestones

• Interim Storage Plant - Tarapur	1990
• Interim Storage/Waste Immobilization Plant - Kalpakkam	1993

INTERNATIONAL RELATIONSHIPS

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

India has not signed the 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).

India has agreements with several countries on various aspects of the nuclear fuel cycle. Among them, signed in mid-1990, agreements with Vietnam (pilot plant for monazite processing supplied by India) and Cuba (Cuban scientists being trained in nuclear power generation in India) for expanded cooperation in nuclear energy.

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 R&D

— Atomic Research Center (Trombay)

- Fuel Cycle R&D
- Waste Management R&D

BARC

Bhabha Atomic Research
Centre, Trombay
Bombay 400 085, India

Tel: 91-22-551-4910 or
91-22-551-8700
Fax: 91-22-556-0750

Director
Director, Nuclear Safety Group
Waste Management Division
Central. WM Facil., Kalpakkam
Radiol. Protection Division
Director, Chem. Engineering Group

Dr. A. N. Prasad
V. N. Meckoni
M. T. Samuel
R. V. Amalraj
K. G. Vohra
B. K. Garg

Activities: BARC has five test reactors; radiochemistry and isotope laboratories; an isotope production and processing unit; pilot plants for production of heavy water, zirconium, and titanium; a thorium plant; a uranium metal plant; a pilot-scale 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**

Startup: construction, 1981; hot operation, 1990.

- **Experimental Uranium Enrichment Facility**

DAE

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

Minister, Science/Technology

Atomic Energy Commission (AEC)

Tel: 91-22-202-2543 or
91-22-202-6823
Fax: 91-22-204-8476

Chairman

Dr. Rajagopala
Chidambaram

Secretary

K. V. Mahadeva Rao

Atomic Energy Regulation Board (AERB)

Chairman

A. Gopalakrishnan

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

Dr. Placid Rodriguez

Located near Madras power station.

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

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 deep geologic 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 in 1985.

Design Basis: PUREX process, with a separate line for FBTR mixed-carbide fuels; capacity, originally 0.5 tHM/d for PHWR fuels, now increased to 200 tHM/a; cold operation, 1991.

- **WIP (Waste Immobilization Plant)-Kalpakkam**

Construction startup, 1983; commissioning, 1993.

- **ISF (Interim Storage Facility)-Kalpakkam**

NFC

Nuclear Fuel Complex
Hyderabad, India

Facilities

- **Fuel Fabrication Plant**

Initial throughput of 50 t/a increased 1990 to 350 t/a; expected to go to 600 t/a.

NSC

Nuclear Science Center
New Delhi, India

Function: Established through the University Grants Commission to encourage nuclear research outside of government-sponsored work. The facility below is only available to university researchers.

Facilities

- **Pelletron Accelerator Facility**

Commissioned early in 1991. Housed in 100-foot-high tower, can accelerate atoms up to 16 MeV.

TAPS

Tarapur Atomic Power Station
Tarapur, Maharashtra, India

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

Facilities

- **PREFRE (Fuel Reprocessing Plant) - Tarapur**

Mission: Reprocess natural and low-enriched UO_2 fuels.

Design Basis: Chop-leach head-end; PUREX flowsheet; contact maintenance; capacity, 150 tHM/a.

History: Construction completed, 1975; hot operation, 12/1982.

- **WIP (Waste Immobilization Plant)**

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, 1990.

(contd next page)

TAPS (contd)

- **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 vitrified HLW from Tarapur and Trombay.
History: Completion, 1990.
- **ILW Bituminization Plant**
- **Polymerization Facility**
- **Pilot (hot cell-sized) Mox Fuel Fabrication Facility (1990)**

ITALY

ITALY

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year
Jan	6	Epiphany
Apr	4	Easter
Apr	25	Liberation Day
May	1	Labor Day
Aug	15	Assumption
Nov	1	All Saints Day
Dec	8	Immaculate Conception
Dec	25-26	Christmas

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 1688.96 Lira

per Wall Street Journal, 01/31/94. 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: 39-6-4674-2275
Fax: 39-6-4674-2663

Science Counselor

Gregory J. Dunn

Population	1992	58.0	million
------------	------	------	---------

ENERGY

Electric Power Capacity	1992	61.9	GWe
	1995	68.6	GWe
	2000	80.6	GWe

Electric Power Production	1992	222.7	TWh
		52%	oil
		19%	hydro
		16%	gas
		11%	coal
		2%	geothermal

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.

INDUSTRIAL FUEL CYCLE

Waste Management Strategy: Spent fuel from previous nuclear power plant operations is being reprocessed abroad; vitrified HLW will be returned, starting in 1995; canisters will be temporarily stored until a final repository is available (clay formations are being considered); dry storage on site is also presently considered. No site for disposal of LLW/ILW has been selected.

Cumulative SF Arisings	1990	342	tU LWR
		1,353	tU GCR

INTERNATIONAL RELATIONSHIPS

Member of EC, IAEA, and OECD/NEA; CEC Joint Research Center establishment is located in Northern Italy at Ispra.

ORGANIZATION

- ENEA (Agency for New Technologies, Energy and Environment)--safety and regulatory; nuclear R&D (principally at Casaccia, Saluggia and Trisaia).
- ANPA (National Agency for Environmental Protection)--inspection/control and health/environment protection.
- ENI--government-owned oil and energy holding company.
- Nucleco--company jointly owned by ENEA/ENI; LLW/ILW management (except disposal).
- CIPE (Interministerial Committee for Economic Planning)--designated regions where nuclear plants were to be located.
- FN (Fabrizazioni Nucleari)--fuel fabrication/development.
- ENEL--state-owned power utility.

**ENEA (Agency for New
Technologies, Energy & Environment)**

Ente per le Nuove Tecnologie,
l'Energia e l'Ambiente
Viale Regina Margherita 125
00198 Rome, Italy

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

President
Director General
Director, Energy Dept.
Director, Fusion
Dir., D&D/WM
Asst. Dir., SF/WM

Prof. Nicolo Caribbo
Dr. Fabio Pistella
Dr. Sergio Garribba
Dr. Roberto Andreani
Dr. Franco Pozzi
Dr. Piero Risoluti

(contd next page)

ENEA (contd)

Function: Direct basic and applied research on energy and environment (mostly non-nuclear). Current nuclear-related work includes cooperation in international programs and is carried out in three departments: Fusion, Innovative Reactors, and Fuel Cycle Plant Dismantling.

Activities - Dismantling: Decommission facilities, including removal of stored nuclear material. **Tasks:** conditioning of liquid/solid radioactive wastes stored at the Eurex (Saluggia) and Itrec (Trisaia) plants and the Casaccia Center; removal (foreign reprocessing being considered) of spent fuel from reprocessing pilot plants; decontamination and dismantling of plants and laboratories, including plutonium oxide fuel fabrication laboratory.

Owner: Government.

ENEL (National Electric Energy Agency)

Ente Nazionale per
l'Energia Elettrica
Casella Postale 386
Via Giovan Battista Martini 3
00198 Rome, Italy

Tel: 39-6-8509-1
Fax: 39-6-8509-3370

Chairman

Franzo Viezzoli

Government agency, responsible for all electric power production.

FN

Fabricazioni Nucleari
P.O. Box 16
15062 Bosco Marengo (AL)
Italy

Tel: 39-131-7571
Fax: 39-131-757250

Chairman

Dr. P. Venditti

Function: Fabrication and development of special oxide nuclear fuels and special ceramic materials.

Owner: ENEA (95%); AGIP, Fiat (5%)

NUCLECO

Nucleco
Via Anguillarese 351
00060 Rome, Italy

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

Chairman

Dr. P. Venditti

Function: Treat and dispose of LLW/ILW from hospitals, laboratories, industrial establishments, and nuclear plants; eventual plans include decommissioning work on nuclear installations.

Owner: ENEA (40%); AGIP (60%).

JAPAN

JAPAN

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Sep 15	Respect for Aged
Jan 15	Adult's Day	Sep 23	Autumnal Equinox
Feb 11	Nat'l Foundation	Oct 10	Sports Day
Mar 20	Vernal Equinox	Nov 3	Culture Day
Apr 29	Greenery Day	Nov 23	Labor Thanksgiving
May 3	Constitution	Dec 23	Emperor's Birthday
May 5	Children's Day	Dec 29-	
		Jan 3	Govt. Off Season

TIME

Standard Time Washington, D.C.

+ 14 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 108.48 Yen

per Wall Street Journal, 01/31/94. Because 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: 81-3-3224-5000
Fax: 81-3-3505-1862

Science Minister-Counselor

Michael A. Michaud
Tel: 81-3-4334-5500
Fax: 81-3-3224-5229

DOE Representative

Milton A. Eaton
Tel: 81-3-3224-5444/78
Fax: 81-3-3224-5769

Population	1992	126 million
------------	------	-------------

ENERGY

Electric Power Capacity	1992	178 GWe
		19% nuclear
	1995	195 GWe
		20% nuclear
	2000	223 GWe
		21% nuclear

Electric Power Production	1992	888.3 TWh
		31% oil
		25% nuclear
		20% gas
		15% coal
	9% hydro	
	1995	31% nuclear
2000	35% 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 Capacity	1992	33.9 GWe
	1995	39.6 GWe
	2000	47.5 GWe

Reactor Mix	1993	GCR	1 (1966)
		HWR	1 (1979)
		BWR	24 (1970-93)
			4 (1994-97)
		PWR	20 (1970-93)
			3 (1994-97)
	FBR	1 (1994)	

Reactor Development	HWR (ATR), LMFBF, HTGR
---------------------	------------------------

INDUSTRIAL FUEL CYCLE

Policy: Obtain ownership of foreign uranium resources; develop complete fuel cycle capability (enrichment, reprocessing, and waste treatment; buy foreign reprocessing services until domestic capacity is available); 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 - dispose in engineered structures in shallow-land facility and at sea, if politically feasible.

Cumulative SF Arisings (LWR)	1990	7,500 tU
	1995	12,400 tU

Industrial-Scale Activities (Capacity)

• Uranium mining and conversion (tUF ₆ /a):		200
• Uranium reconversion (tU/a):		1,028
• Uranium enrichment (tSWU/a):	1981	50
	1988	250
	2000	3,000
• Fuel fabrication		
- UO ₂ for LWR (tU/a):	1987	2,495
- MOX for FBR (t/a):	1988	6
- MOX for ATR (t/a):	1988	10
	1993	50
• Reprocessing (t/a):	1981	210
	2000	1,010

Major Milestones

- ♦ Storage facility for vitrified HLW from COGEMA/BNFL 1995
- ♦ Fuel reprocessing plant (Rokkasho-mura)
 - SF storage 1995
 - reprocessing operation 1999
- ♦ Selection of demonstration site for in-situ test with HLW disposal package >2000
- ♦ FBR fuel reprocessing pilot plant operation >2000
- ♦ Startup of HLW disposal site >2000
- ♦ Experimental ocean disposal of LLW TBD

INTERNATIONAL RELATIONSHIPS**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 on information exchange of HLW and TRU waste conditioning technology.

Member of IAEA and OECD/NEA; cooperative agreements with Australia (SYNROC development), Canada, China, France, U.K.

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

PARTIAL PNC ORGANIZATION**President—Board of Directors**

- Technology Management Division
- Policy Planning Division
- Safety 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
- Nuclear Material Control Division
- Fuel Cycle Training Coordination Office
- Oarai Engineering Center
 - Technology Development Division
 - Health/Safety 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 Division
 - Nuclear Waste Treatment 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 Radioisotopes
- Nuclear Safety Research Center
 - Department of Reactor Safety Research
 - Department of Fuel Safety Research
 - Department of Reactor Fuel Examination
 - Department of Environmental Safety Research
 - Environmental Radioactivity
 - Radioactive Waste Management
 - Airborne Waste—Environmental Safety

AEB

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

Tel: 81-3-3581-1686 or
81-3-3581-5271
Fax: 81-3-3592-1239

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

Hiroto Ishida
Toshio Okazaki
Haruo Suzuki
Takaschi Kisaka
Yasutaka Moriguchi
Takayuki Shirao

Function: Provide support to the Atomic Energy Commission (AEC).

AEC

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

Tel: 81-3-3581-2585 or
81-3-3581-5271
Fax: 81-3-3581-5198

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

Satsuki Eda
Dr. Akira Oyama

Function: Formulate national policy on nuclear energy R&D and utilization; advise Prime Minister.

CRIEPI

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

Tel: 81-3-3201-6601
Fax: 81-3-3287-2880

President

Susumu Yoda

(contd next page)

CRIEPI (contd)

Function: Provide R&D support for utilities.

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

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

Tel: 81-3-3480-2111
Fax: 81-3-3488-6697

Function: Laboratory under CRIEPI.

GIRIO

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

Tel: 81-727-51-8351
Fax: 81-727-51-6945

Director, 4th Department
Nuclear Waste Program

Dr. Ryoza 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: 81-3-3258-1111
Fax: 81-3-3258-6218

President
Gen. Mgr., Nuc. Power Systems Div.
Sr. Chief Engineer
Nuclear Power Development

Tsutomu Kanai
Tsutomu Hayashi
Atou Shimozato
Ryoichi Kondo

(contd next page)

HITACHI (contd)

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

Hitachi Engineering Co., Ltd.

2-1 Saiwai-cho, 3-chome

Hitachi-shi, Ibaraki-ken, 317

Japan

Tel: 81-294-24-1111

Fax: 81-294-22-8987

President

Akira Sakai

Nuc. Power Plant Construction

Kiyoshi Shimizu

Nuc. Fuel Project

Yasuo Hirose

Nuc. Fuel Cycle Project

Sadatoshi Inoue

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

IHI

Ishikawajima-Harima

Heavy Industries Co., Ltd.

Shin-Ohtemachi Bldg.

2-1, Ohtemachi 2-chome

Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-3244-5111

Fax: 81-3-3286-2440

President

Kousaku Inaba

Executive Vice President

Makio Amano

Gen. Mgr., Nucl. Power Sales

Hiroshi Tomioka

IHI Research Institute

Yokohama Branch

1, Shin-nakaharacho, Isogo-ku

Yokohama 235, Japan

Tel: 81-45-751-1231

Fax: 81-45-753-9564

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: 81-3-3592-2111
Fax: 81-3-3580-6107

President
Vice President
Vice President
Exec. Director, International

Shozo Shimomura
Masaji Yoshikawa
Eiichi Tsuji
Hirofumi Satake

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, northeast of Tokyo, near the ocean; these sites can be reached by train from Tokyo to the city of Mito, then by taxi; the 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

Japan Atomic Energy Research Institute
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

Yoshihiko Kaneko

JAERI: TOKAI

Japan Atomic Energy Research Institute
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

Shojiro Matsuura
Hiroyuki Takahashi
Michio Ichikawa
Tatsuo Kondo

Facilities

- **WASTEF** (glove box and hot cell facilities)
Mission: HLW safety evaluations.
History: Cold Startup: 1981; Hot, 1982.
 - **STEM** (Simulation Test for Environmental Radionuclide Migration)
Mission: Safety evaluation for land disposal of LLW.
History: Startup, 1983.
 - **NUCEF**
Facility to conduct research on safety of SF reprocessing and treatment of radioactive wastes to support licensing review by STA on reprocessing plant being constructed by JNFL.
- STACY** (Static Experimental Critical Facility)
- TRACY** (Transient Experimental Critical Facility)
- Experimental Facility for TRU** (research on separation/recovery of TRU)

JGC

JGC Corporation
Nuclear and Advanced Technology
New Ohtemachi Bldg.
2-1 Ohtemachi 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-3279-5441
Fax: 81-3-3273-8050

President
Exec. Vice President
General Manager, Director
Deputy General Manager

Dr. Eiji Watanabe
Dr. Takao Nakajima
Dr. Hiroshi Kuribayashi
Keisuke Okazaki

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. Projects

Yasuhiro Moriya

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

Facilities**• Demonstration Incineration Plant**

Mission: Simultaneously melt combustible and noncombustible wastes.

Design Basis: 100 kg/h at 1500°C. LLW combustion technology licensed from Belgonucleaire SA.

(contd next page)

JGC (contd)• **Contaminated Liquid Waste Recycle Plant****Mission:** Recovery of clean water from LLLW for re-use.**Design Basis:** 75 liter/min.; filtration; reverse osmosis; active carbon bed adsorption; chelate resin adsorption; ion-exchange adsorption; evaporation.JNFL

Japan Nuclear Fuel Limited
1-12-15 Honcho, Aomori-shi
Aomori 030, Japan

Tel: 81-177-73-7171
Fax: 81-177-31-1551

President
Vice Presidents

Kiyoshi Nozawa
Tetsuo Hirasawa
Kiyoshi Fuseya
Hiroshi Takashina
Hideto Kamekawa

Function: Construct/operate facilities for **uranium enrichment, fuel reprocessing, and LLW disposal** in the Oishitai area of Rokkasho-mura.

Owner: Japanese utilities (10).

JNFL Tokyo Branch Office

Daiichi Seimei Bldg.
2-10 Hirakawa-cho 1-chome
Chiyoda-ku, Tokyo, Japan

Tel: 81-3-3239-6521
Fax: 81-3-3239-6479

Rokkasho Works Construction Office

504-22 Aza Notsuke, Oaza Obuchi
Rokkasho-mura, Kamikita-gun
Aomori-ken, Japan

Tel: 81-175-72-3311
Fax: 81-175-72-3228

Managing Director/Gen. Manager

Yuuta Suzuki

(contd next page)

JNFL (contd)

Facilities

- **Uranium Enrichment Plant** (at Oishitai, Rokkasho-mura).
Mission: Enrich uranium for Japanese utilities to establish indigenous nuclear fuel cycle (cost: U.S. \$1.38 billion).
Capacity: 150 tSWU/a initially; 1500 tSWU/a final capacity.
History: Initial startup, 1992; 1500 tSWU/a ~2000.
- **LLW Disposal Facility** (at Oishitai, Rokkasho-mura).
Mission: Dispose of Japanese utilities-generated LLW (cost: U.S. \$1.23 billion).
Capacity: Approximately 1 million drums initially, final capacity equivalent to 3 million drums.
History: Startup, 12/1992.
- **Fuel Reprocessing Plant** (at Iyasaki, Kamikita-gun, Rokkasho-mura).
Mission: Reprocess Japanese fuels.
Design Basis: 800 tHM/a; 3000 tU storage pool; HLW vitrification/storage, partial design by SGN, France, construction start 1992, operations 1995.
Milestone: SF storage, 1995; FRP startup, 1999.

KOBE STEEL

Kobe Steel, Ltd.

No. 3-18, Wakinohamacho

1-chome

Chuoh-ku, Kobe 651, Japan

Fax: 81-78-251-1551

Fax: 81-78-232-3459

General Manager

Mech. Eng. Research Lab. (MERL)

Nuclear Engineering

Toru Abe

Takao Mizguchi

Fumiaki Komatsu

Function: Manufacture SF transportation/storage casks; 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: 81-3-3501-1511
Fax: 81-3-3501-0643 or
81-3-3501-0644

Minister
V. Minister
International Affairs

Hiroshi Kumagai
Hideaki Kumano
Sozaburo Okamatsu

MITI/ANRE

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

Tel: 81-3-3501-1511
Fax: 81-3-3501-0643 or
81-3-3501-0644

Director-General
Dep. Director-General
Dep. Dir.-Gen., Nucl. Energy
Dir., Nuclear Industry
Dir., Internatl. Nuc. Affairs

Tomio Tsutsumi
Yasuo Hayashi
Tohru Namiki
Hideo Matsui
Reiji Nagase

MMC

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

Tel: 81-3-3213-2111
Fax: 81-3-3215-2435

Vice President
Gen. Mgr., Nuc. Energy
Gen. Mgr., Tech. Planning Dept.
Gen. Mgr., Nuc. Resources
Development/Waste Mgmt.

Dr. Yuumi Akimoto
Eiji Yagi
Dr. Tamotsu Ishii
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: 81-3-3580-3311
Fax: 81-3-3581-9470

Minister
Director General, Disarmament/
Scientific Affairs
Director, Nuclear Energy
Deputy Director

Tsutomu Hata
Akira Hayashi
Yukiya Amano
Yoshifumi Okamura

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

Hiromichi Matsudaira

Function: Attached to the Science & 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
Science and Technology Agency
2-1, Kasumigaseki 2-chome
Chiyoda-ku, Tokyo 100, Japan

Tel: 81-3-3581-5271
Fax: 81-3-3581-0774

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.

Isamu Sasaya
Hisaharu Dosho
Itsuro Misumi
Kimihiro Oda
Mitsuo Hayashi
Kiyoshi Honma
Kaoru Naito
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: 81-3-3581-5271
Fax: 81-3-3581-0774

Chairman

Yasumasa Togo

Function: Responsible for carrying out national policy for safety and security of nuclear energy, its utilization, and related R&D; 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: 81-3-3586-3311
Fax: 81-3-3583-6386

President
Exec. Vice Presidents

Takao Ishiwatari
Mitsuo Taguchi, Hiroshi
Ohishi

Exec. Dir., Nuc. Fuel/Reprocess.
Exec. Dir., WM
Exec. Deputy Directors, WM

Hiroyoshi Kurihara
Masao Yamamoto
Yoshiro Asakura, Dr. Aiji
Yamato

Deputy Director, WM
Coordination
Conditioning Research
Isolat'n Syst. Research
International Project
Geoscience Research
Dir., Fuel Cycle Develop.
Dir., Fuel Cycle Engineering
Dir., International
Deputy Dir., International
International Cooperation

Kouichi Tasurumaki
Tomohiro Asami
Yasumasa Ando
Dr. Noriaki Sasaki
Hideki Sakuma
Dr. Minoru Yamakawa
Hidechiyo Kashiwara
Naomi Tsunoda
Tadatomo Yamaguchi
Takao Yagi
Dr. Takashi Kano

U.S. DOE Tech. Representative

Jim Scott
81-3-3586-3311

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

Masayori Tsutsumi

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
Gen. Mgr., Waste Management
Director, Fuels/Materials

Kiminori Shiba
Yuji Enokido
Masami Katsuragawa

Facilities

- **Incinerator**

Mission: Burn solid LLW.

Design Basis: Three chambers--pyrolysis, combustion, afterburning.

- **WDF (Waste Dismantling Facility)**

Mission: Condition large contaminated equipment; develop D&D technology.

Design Basis: Capacity to condition 5.5 t/a.

History: Hot startup, 1984.

PNC: TOKAI

PNC Tokai Works
4-33 Muramatsu
Tokai-mura, Naka-gun
Ibaraki-ken 319-11, Japan

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

(contd next page)

PNC: TOKAI (contd)

Director	Kenji Miyahara
Deputy Directors	Nobuyuki Sasao
	Kei Nakata, Yasumasa Oki
Dir., Reprocessing Plant	Osamu Yamamura
Dir., Technology Dev. Coord'n	Hisataka Ando
Dir., Health/Safety	Naoyuki Sakurai
Dir., Waste Technology Devel.	Sumio Masuda
HLW Technology	Jin Ouchi
LLW Technology	Yoshio Nakanishi
Geological Isolation Tech.	Tadashi Mano
Dir., Waste Plants Operation	Takao Akiyama
Dir., Reprocess. Tech. Devel.	Koichi Onichi
Dir., Nuc. Fuel Tech. Devel.	Yoichiro Kishimoto

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, 09/77; 509 tU spent fuel processed through 12/90.

• 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 05/89.

(contd next page)

PNC: TOKAI (contd)

- **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, 04/88.
- **EDF (Engineering Demonstration Facility)**
Mission: Nonradioactive, full-scale and/or engineering mockup tests of processes and equipment for FBR spent fuel reprocessing.
History: Startup, 04/82.
- **ETF (Engineering Test Facility)**
Mission: Develop engineering test of HLW vitrification and ceramic melter technologies.
Design Basis: Joule-heated melter.
History: Startup, 02/80.
- **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, 09/82.
- **KRF - Krypton Recovery Facility (pilot plant)**
Mission: Demonstrate ⁸⁵Kr recovery from Tokai-mura reprocessing plant off-gas.
Design Basis: Cryogenic distillation and pressurized cylinder storage.
History: Hot test, 03/88; operation, 04/88.
- **Bitumization Demonstration Facility**
Mission: Immobilize LLLW concentrate.
Design Basis: 200 liter/h.

(contd next page)

PNC: TOKAI (contd)

- **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: Incineration of combustibles/chloride-containing wastes; mechanical volume reduction.
History: Operation startup, 1987.
- **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 start, 1988; cold test, 1992.
Milestone: Hot test, 1994.
- **Recycle Equipment Test Facility**
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)**
Mission: Demonstrate FBR fuel reprocessing and HLW solidification.
Design Basis: 120 kg MOX/d (12 t/a).
Milestone: Hot operation, 1997.

RWMC

Radioactive Waste Management Center
Mori Building #15

8-10, Toranomon 2-chome
Minato-ku, Tokyo 105, Japan

Tel: 81-3-3504-1081
Fax: 81-3-3504-1297

President
Executive Director

Toshio Fukuda
Takashi Tsusuki

Function: R&D on safe and effective treatment and disposal techniques for radioactives wastes.

Owners: Japanese industry, MITI and STA.

STA

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

Tel: 81-3-3581-5271
Fax: 81-3-3592-1239

Minister, Science/Technology
Vice Minister
Deputy Minister
Director-General, AEB
Dep. Director-General, AEB
Dir., Policy Division, AEB
Director-General, NSB
Dep. Director-General, NSB

Satsuki Eda
Takuya Hirano
Kenichi Murakami
Hiroto Ishida
Toshio Okazaki
Haruo Suzuki
Isamu Sasaya
Shobu Kudo

Function: Established as an extra-ministerial agency of the Prime Minister's office for comprehensive administration and 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 (SOUTH)

KOREA

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1-2	New Year
Feb	9-11	Lunar New Year
Mar	1	Independence
Apr	5	Arbor Day
May	5	Children's Day
May	24	Buddha's Birthday
Jun	6	Memorial Day
Jul	17	Constitution Day
Aug	15	National Day
Sep	19-20	Chusok (Thanksgiving)
Oct	3	National Foundation Day
Dec	25	Christmas

TIME

Standard Time Washington, D.C.

+ 14 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 808.10 Won (W)

per Wall Street Journal, 01/31/94. 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, Republic of Korea

Tel: 82-2-397-4114
Fax: 82-2-738-8845

Science Counselor

F. Ken Crosher

Population	1993	44	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1993	27.7	GWe
		28%	nuclear
	1995	30.0	GWe
		29%	nuclear
	2000	32.0	GWe
		45%	nuclear

Electric Power Production	1993	144	TWh
		40%	nuclear
		~30%	coal
		~25%	oil
		5%	hydro
	1995	40%	nuclear
	2000	40%	nuclear

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	1993	7.6	GWe
	1995	8.6	GWe
	2000	13.5	GWe

Reactor Mix	1993	PWR	8 (1978-89)
			4 (1995-99)
			1 (1983)
			1 (1997)
		HWR	

Reactor Development (feasibility studies)	Advanced PWR
---	--------------

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" on reprocessing and recycle of Pu for FBR, CANDU, and LWR.

Waste Management Strategy: LLW/ILW repository to be constructed by mid-1990s with emphasis on engineered barriers; candidate sites have been identified, but final decision is pending; utility surcharge of 2 mil/kWh to fund waste management; extended storage (~60 years) of SF planned, in AR and AFR facilities; no decision has been made on reprocessing or disposal of SF/HLW.

Cumulative SF Arisings	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 UO_2 --100 tU/a.
- UO_2 fuel fabrication pilot plant--10 tU/a.
- UO_2 fuel fabrication--200 tU/a. Startup, 1989.

Major Milestones

- LLW disposal site (500,000 drums) 1996

INTERNATIONAL RELATIONSHIPS

Member of IAEA; agreement with U.S. for peaceful nuclear cooperation.

ORGANIZATION

Deputy Prime Minister ---- Atomic Energy Commission (AEC)

- Ministry of Trade, Industry and Energy (MTIE)
 - Electric Power Bureau (EPB)
 - Korea Electric Power Corporation (KEPCO)
 - Korea Power Engineering Company (KOPEC)
 - Korea Electric Power Operating Service Company, Ltd. (KEPOS)
 - Korea Heavy Industries/Construction Co. (KHIC)
 - Korea Nuclear Fuel Company, Ltd. (KNFC)
- Ministry of Science and Technology (MOST)
 - Atomic Energy Office (AEO)
 - Nuclear Policy Office (NPO)
 - Nuclear Policy Division
 - Nuclear R&D Division
 - Atomic Energy International Cooperation Division
 - Nuclear Safety Office (NSO)
 - Nuclear Licensing Division
 - Nuclear Inspection/Enforcement Division
 - Radiation Safety Division
 - Nuclear Control Division
 - Korea Advanced Institute of Science/Technology (KAIST)
 - Korea Atomic Energy Research Institute (KAERI)
 - Korea Institute of Nuclear Safety (KINS)
 - Korea Institute of Geology, Mining and Materials (KIGAM)
 - Korea Institute of Energy Research (KIER)

AEO

Atomic Energy Office
Ministry of Science and Tech.
1 Chungang-dong, Kyonggi-do
Kwacheon 171-11
Republic of Korea

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

Asst.Minister, AEO
Director General, NPO
Dir., Nuclear Policy
Dir., Nuclear R&D
Dir., Internatl. Cooperation
Director General, NSO
Dir., Nuclear Licensing
Dir., Nuc. Inspection/Enforcement
Dir., Radiation Safety
Dir., Nuclear Control

Jae Hee Hong
Hae Sool Chin
Young Wan Kwon
Tae Whan Kim
Man Ki Lee
Seung Koo Lee
Sang Sik Kang
Yung Il Yu
Seong Su Yu
Dong Dae Sul

Function: License nuclear power plants and fuel cycle facilities;
manage nuclear waste fund; sponsor nuclear R&D.

AEC

Atomic Energy Commission
1, Chungang-dong
Kwacheon 171-11
Republic of Korea

Tel: 82-2-503-7646
Fax: 82-2-507-0558

Chairman: Deputy Prime Minister Jae Suk Chung

Function: Decision-making body for policies regarding nuclear energy; R&D plan for nuclear fuel and nuclear energy applications; always chaired by Deputy Prime Minister; ministers of MOST and MTIE and president of KEPCO are required members.

EPB

Electric Power Bureau
Ministry of Trade, Industry
and Energy
Kwacheon 171-11
Republic of Korea

Tel: 82-2-503-9638
Fax: 82-2-503-9649

Dir. General, Nuclear Power

Chang Woo Rho

Function: Establish plans and policies on energy and resources, in coordination with MOST and AEO; manage nuclear fuel acquisition.

KAERI

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

Tel: 82-42-868-2000
Fax: 82-42-868-2702

President

Dr. Jae In Shin
82-42-868-2121

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

Byung Ku Kim

In Soon Chang
Hun Hwee Park
Seung Gi Ro
Chang Guy Park
Hyun Soo Park

Function: Develop 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
373-1 Kusong-dong, Yusong-gu
Taejon 305-701, ROK

Tel: 82-42-869-2114
Fax: 82-42-869-2210/
-2220

President
Nuclear Engineering

Dr. Soun Soon Chun
Prof. Kun Jai Lee

Function: Research-oriented graduate school, conducting advanced research and development.

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
Vice President
Gen. Mgr., Nuc. Safety/Tech.

Chong Hun Lee
Dae Yong Choi
Chang Saeng Shim

Function: Develop power resources; generate/transmit electricity (operates all nuclear and conventional power plants in Korea); responsible to the government (MER).

KIER

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

Tel: 82-42-868-9700
Fax: 82-42-868-9734

President

Dr. Jung Moo Auh

Function: Development of energy technologies and exploitation of energy.

KINS

Korea Institute of Nuclear
Safety Technology
P.O. Box 7
Daeduk-Danji, Taejon
Republic of Korea

Tel: 82-42-868-2601
Fax: 82-42-868-1700

President
Vice President
Dir., Safety Review
Director, Safety Inspection
Director, Standards Development

Yong Kyu Lim
Suk Hyung Moon
Young Soo Eun
Won Ki Shin
Sung Nyun Kim

Function: Independent regulatory organization (established 1990)
to develop technical standards for nuclear safety.

KIGAM

Korean Institute of Geology,
Mining and Materials
30 Gajung-dong
Yusong-gu, Taejon
Republic of Korea

Tel: 82-42-868-3114
Fax: 82-42-861-9720

President

Dong Hak Kim

Function: Development and utilization of resources.

KOREA

PNL-9450-1

KNFC

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

Tel: 82-42-868-1000
Fax: 82-42-868-2380

President

Chang Suk Lee

Function: Develop domestic nuclear fuel fabrication.

Owners: KEPCO (95%); KAERI (5%).

Facilities

- Fuel Fabrication Plant, Daeduk site, 200 tU/a.

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

Ki Oak Chang

Function: Architect-engineering services for nuclear and conventional power plants.

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
Asst.Minister, AEO
Director General, NPO
Dir., Nuclear Policy
Dir., Nuclear R&D
Dir., Internatl. Cooperation
Director General, NSO
Dir., Nuclear Licensing
Dir., Nuc. Inspection/Enforcement
Dir., Radiation Safety
Dir., Nuclear Control

Si Joong Kim
Young Sung Han
Jae Hee Hong
Hae Sool Chin
Young Wan Kwon
Tae Whan Kim
Man Ki Lee
Seung Koo Lee
Sang Sik Kang
Yung Il Yu
Seong Su Yu
Dong Dae Sul

Function: Authority over virtually all scientific and technological efforts in Korea.

MTIE

Ministry of Trade, Industry
and Energy
1, Chungang-dong
Kwacheon, Kyonggi-do
Republic of Korea

Tel: 82-2-503-9641
Fax: 82-2-503-9649

Minister
Vice Minister
Director General, EPB

Tak Soo Kim
Dong Hoon Lee
Chang Woo Rho

Function: Lead government agency in power development and resource utilization.

NETHERLANDS

NETHERLANDS

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year
Apr	1	Good Friday
Apr	3-4	Easter
Apr	30	Queen's Birthday
May	5	Liberation Day
May	12	Ascension
May	22-23	Pentecost
Dec	25-26	Christmas

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 1.94 Guilder (Fl.)

per Wall Street Journal, 01/31/94. Because 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 E The Hague
Netherlands

Tel: 31-70-310-9209

Fax: 31-70-361-4688

Economic Section

Daniel T. Fantozzi

Population	1992	15 million
------------	------	------------

ENERGY

Electric Power Capacity	1992	17.4 GWe
		3% nuclear
	1995	19.8 GWe
		3% nuclear
	2000	20.1 GWe
		3% nuclear

Electric Power Production	1992	77.2 TWh
		56% gas
		33% coal
		5% nuclear
		4% oil
	1995	2% solids
		5% nuclear
		4% nuclear

NUCLEAR POWER

Policy: Expansion of nuclear capacity is on indefinite hold as a consequence of events at Chernobyl.

Nuclear Power Capacity	1992	0.5 GWe
	1995	0.5 GWe
	2000	0.5 GWe

Reactor Mix	1993	BWR 1 (1969)
		PWR 1 (1973)

INDUSTRIAL FUEL CYCLE

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

Waste Management Strategy: Utilize single centralized waste collection service; extend interim storage of all wastes (50-100 years) until decisions are made regarding disposal; 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 subseabed disposal; feasibility of disposal within international or bilateral framework is also being explored.

Cumulative SF Arisings (LWR)	1990	228 tU
	2000	369 tU

INTERNATIONAL RELATIONSHIPS

Member of EC, IAEA, and OECD/NEA.

ORGANIZATION

- **Government**--Ministries of Economic Affairs; Housing, Physical Planning/ Environment; and Social Affairs/Employment 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.

Major Milestone

- Interim Storage Center 1994

COVRA (Central Organization for Radioactive Waste)

Centrale Organisatie Voor
Radioactief Afval
Spanjeweg 1, P.O. Box 34
4453 ZG s'-Heerenbroek
Netherlands

Tel: 31-1196-13900
Fax: 31-1196-13950

Director
Radiation Protection
Waste Storage/Transportation

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

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

Facilities

- Interim storage center (located in Borsele)--for all radioactive wastes; scheduled to be fully operational in 1994.

ECN (Netherlands Energy Research Center)

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).

(contd next page)

ECN (contd)**Research Center****Managing Director**Prof. Dr. H. H. van den
Kroonenberg**Nuclear Energy Research**

Dr. A. M. Versteegh

Nuc. Waste/Geologic Disposal

L. H. Vons

Safety Assessment

Dr. J. Prij

Radionuclide Migration

Dr. A. van Dalen

Actinide Burning

Dr. A. Abrahams

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

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

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

C. Staudt

Deep Subsurface Dept.

Dr. H. M. van Montfrans

**KEMA (Research/Testing Electrochemical
Materials Company)**

N.V. Tot Keuring van Elektro-
technische Materialen Arnhem
Utrechtseweg 310
Postbus 9035
6800 ET Arnhem, Netherlands

Tel: 31-85-569111
Fax: 31-85-515606

R&D Division
Nuc. Research Program
Quality Assurance
High-Level Waste
Aqueous Waste Mgmt.

Dr. A. H. M. Verkooijen
J. B. W. Kanij
Dr. H. A. W. Cornelissen
Dr. F. J. J. G. Janssen
J. L. Matteman

Function: Research and consulting development; services for utilities; waste management R&D; characterization, quality assurance, volume reduction, and storage of radioactive wastes.

MINISTRY OF ECONOMIC AFFAIRS

Ministerie van Economische Zaken
Postbus 20101
2500 EC Gravenhage, Netherlands

Tel: 31-70-3798911
Fax: 31-70-3796358

Dir. Electricity/Nuclear Energy

Radioactive Waste

H.F.G. Geyzers
31-70-3796471
J. N. A. Ernst
31-70-3797849

**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: 31-70-3174174

Fax: 31-70-3175017

Director, Rad. Protection

Dr. C. M. Plug/

R.J.P. Cornet

Radioactive Waste

Dr. A. Cornelissen

MINISTRY OF SOCIAL AFFAIRS AND EMPLOYMENT

Ministry of Social Affairs
and Employment

Postbus 90801
2509 LV The Hague, Netherlands

Tel: 31-70-3335549

Fax: 31-70-3334018

Nuclear Safety

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. P. Glasbergen

31-30-743397

PAKISTAN

PAKISTAN

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year	Aug	14	Independence
Feb	12	Start of Ramadan	Aug	21	Prophet's Birthday
Mar	13-15	Ramadan	Sep	6	Defense of Pakistan
Mar	23	Pakistan Day	Sep	11	Death of Quaid-i-Azam
May	1	May Day	Nov	9	Iqbal Day
May	21-23	Sacrifice Feast	Dec	25	Quaid-i-Azam Birthday
Jul	4	Bank Holiday	Dec	31	Bank Holiday

TIME

Standard Time Washington, D.C.
Work week:

+ 10 hours
Sunday - Thursday

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 30.13 Rupee
per Wall Street Journal, 01/31/94. 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
Diplomatic Enclave, Ramna 5
P.O. Box 1048
Islamabad, Pakistan

Tel: 92-51-82-6161
Fax: 92-51-21-4222

Economics/Science Officer

Richard Middleton

Population	1992	100	million
------------	------	-----	---------

ENERGY

Electric Power Capacity	1992	13.7	GWe
		1.5%	nuclear
	2000	13.8	GWe
		<1%	nuclear

Electric Power Production	1992	54.3	TWh
		64%	gas/oil
		34%	hydro
		>1%	nuclear
		<1%	coal

NUCLEAR POWER

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

Nuclear Power Capacity	1992	0.1	GWe
	2000	0.1	GWe

Reactor Mix	1993	HWR	1 (1972)
		HWR	1 (1999)

INDUSTRIAL FUEL CYCLE

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

Cumulative SF Arisings	1993	170	tU
	2000	440	tU

INTERNATIONAL RELATIONSHIPS

Member of IAEA; agreement with U.S. and other nations on peaceful nuclear cooperation; has not signed nonproliferation treaty.

ORGANIZATION

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

PAEC

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

Tel: 92-51-81-9030-9
Fax: 92-51-82-4908

Chairman
Secretary
Waste Management

Ishfaq Ahmad
Muhammad Azfal
Raze ur-Rehman

Function: Advocate increased nuclear energy generation to overcome serious energy shortages in a country substantially lacking in natural energy resources. In an effort to accelerate Pakistan's overall economic development, the Commission also promotes the use of nuclear technologies in other areas, such as enhancing agricultural production and for medical diagnosis/therapy.

(contd next page)

PAEC (contd)**Facilities^(a)**

- **Fuel Fabrication Plant** at Kundian - manufacturing fuel for KANUPP since 1978; located near the Chashma site, where SGN was to build a 50-100 tU/a spent fuel reprocessing plant (project started in 1974, halted in 1977).
- **A. Q. Khan Research Laboratory** at Kahuta - provides nuclear training and R&D on centrifuge enrichment.
- **Centrifuge Enrichment Plant** at Kahuta - 1000 centrifuges operational at startup, in 1984, with potential of additional 2000-3000 units; facility not under international safeguards.

PINSTECH

Pakistan Institute of
Science & Technology
P.O. Nilore
Islamabad, Pakistan

Tel: 92-51-84-7601-9
Fax:

Director

I. H. Qureshi

Function: Fuel cycle R&D activities, including analytical chemistry, nuclear materials, metallurgy, fuel development, digital electronics, control instrumentation, and computational physics; basic research facilities are open to scientists/engineers from universities as well as research organizations.

(contd next page)

(a) Based on publicly available information, organizational responsibility and specific location of some facilities cannot be identified with certainty; e.g., some reports appear to discuss the same facility, but their location is referred to variously at Kahuta, Rawalpindi or Islamabad which are relatively close to each other.

PINSTECH (contd)**Facilities^(a)**

- **CNS** - Center for Nuclear Studies - offers a Master's course in nuclear engineering, and fulfills training requirements in health physics, nuclear medicine, instrumentation, and basic nuclear orientation.

PARR-1 - research reactor, designed for highly-enriched (90% uranium) fuel, commissioned in 1965, is being raised from 5 MWt to 9 MWt and converted to low-enriched (20%) fuel in 1990.

PARR-2 - training reactor, 27 kW, designed and built in collaboration with the Chinese Institute of Atomic Energy (Beijing), went critical in late 1989.

Reprocessing Plant, lab scale; non-radioactive startup, 1982.

- **CTC** - Computer Training Center - established in collaboration with a consortium of universities.

(a) Based on publicly available information, organizational responsibility and specific location of some facilities cannot be identified with certainty; e.g., some reports appear to discuss the same facility, but their location is referred to variously at Kahuta, Rawalpindi or Islamabad which are relatively close to each other.

RUSSIA

RUSSIA

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1-2	New Year
Jan	7	Christmas (Orthodox)
Mar	8	International Women's Day
May	1-2	Spring/Labor Day
May	9	Victory Day
June	12	Independence
Oct	9	Constitution
Nov	7	October Revolution

TIME

Standard Time Washington, D.C. (Moscow) + 8 hours
Daylight Savings Time Period: 03/27 - 09/24/94

PASSPORT/VISA

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

CURRENCY EXCHANGE RATE

Local currency, the Russian Ruble, is only available upon entry into Russia. Exchange rates cannot be quoted due to continuing fluctuations. Payment in U.S. currency is apparently now prohibited. It is strongly recommended to consult with the U.S. embassy for up-to-date information.

DIRECT DIALING

Individual numbers for direct dial to Russia are complete as listed, after dialing international access code: 011. Country code is 7; listed local numbers include city code.

U.S. EMBASSY - MOSCOW

American Embassy
Novinskiy Bul'var 19/23

Tel: 7-095-252-2451/
-2459

Moscow, Russian Federation

Fax: 7-095-956-4261

Science Counselor

Vladimir P. Sambaiew

Population	1992	150 million
------------	------	-------------

ENERGY

Electric Power Capacity	1992	212 GWe
		12% nuclear
	2000	245 GWe
		10% nuclear
	2005	270 GWe
		11% nuclear

Electric Power Production	1992	1066 TWh
		43% gas
		21% coal
		15% hydro/geoth.
		12% nuclear
		9% oil

NUCLEAR POWER

Policy: Major program to develop nuclear power to avoid transport of fossil fuels from east of the Ural Mountains to the more densely populated western areas.

Nuclear Power Capacity	1993	20.2 GWe
	2000	25.0 GWe
	2005	36.5 GWe

Reactor Mix	1993	LGR	11 (1974-90)
		PWR	13 (1972-93)
		FBR	1 (1981)

Reactor Development	advanced PWRs (VVER-500, VVER-1000, VVER-600), LGRs (MKER-800), LMFBRS
---------------------	--

INDUSTRIAL FUEL CYCLE

Policy: Complete domestic fuel cycle capability, including enrichment, fuel fabrication (UO₂ and MOX), and reprocessing; complete fuel cycle services, including SF storage and LLW/ILW disposal; shift to PWRs (since Chernobyl accident in 1986).

Waste Management Strategy: Spent nuclear fuels from PWRs are stored 3-10 years, followed by reprocessing to recycle fissile materials and separate a number of other specific radionuclides for beneficial uses and different disposition; HLW is vitrified for disposal in a future geologic repository; HLW partitioning processes are being developed to recover most long-lived radionuclides. SF from RBMK (Soviet acronym for light-water-cooled, graphite-moderated) reactors is stored, pending decision on ultimate disposition.

Liquid LLW from nuclear reactor operations is currently evaporated, incorporated into bitumen or cement, and stored and/or disposed of at disposal facilities at each reactor station. 36 other, regional facilities exist for medical, industrial, and radioactive waste disposal. Efforts are underway to decrease liquid LLW volumes and to recycle them in water and reactant circuits.

Solid LLW, compacted at each nuclear power station, is stored/disposed of at reactor sites; regional burial facilities are being considered to minimize transportation-related risks.

INTERNATIONAL RELATIONSHIPS

DOE/MAPI

Agreement on Scientific and Technical Cooperation in the Field of Peaceful Uses of Atomic Energy

Term: 05-25-90 to 05-24-95 (initiated 1973)

Scope: Technology information exchange.

DOE/MAPI

Memorandum of Cooperation in the Fields of Environmental Restoration and Waste Management

Term: 09-18-90 to 09-17-95

Scope: Technology information exchange related to policy and practices; evaluation of problems in environmental remediation, D&D of facilities and materials; R&D; analysis/investigations of waste partitioning; vitrification, and geologic disposal of radioactive wastes.

Member of IAEA and WANO.

GOSATOMNADZOR**(Russian Federal Authority for Nuclear/Radiation Safety)****GOSATOMNADZOR**

Taganskaya Str. 34
109147 Moscow
Russia

Tel: 7-095-272-3911

Fax: 7-095-278-8090

Chairman
Deputy Chairman
Administration

Yuri G. Vichnevsky
Yuri N. Zubkov
Valentin A. Rekunov

Function: Supervision of all safety aspects of Russian nuclear industry.

KHLOPIN

Research Production Association
V. G. Khlopin Radium Institute
2nd Murinski ave. 28
194021 St. Petersburg
Russia

Tel: 7-812-247-5737

Fax: 7-812-534-7752

Director-General

Prof. Alexander I.
Karelin

Deputy Directors

Dr. Evgeny B. Anderson
Dr. A. A. Rimsky-
Korsakov

Laboratory Manager

Dr. Valeriy N.
Romanovskiy
7-812-247-6522

Chief Scientist

Dr. Leonard N. Lasarev

Activities: Development of SF treatment (reprocessing, thermal decladding, meltdown of hulls), improved HLW partitioning, waste immobilization, off-gas treatment, ^{85}Kr storage, waste disposal, geo-chemistry, studies on solidified waste properties; environmental remediation, protection and monitoring.

(contd next page)

KHILOPIN (contd)**Facilities**

- **Ecology Laboratory** (located 90 km from St. Petersburg in Sosnovo Bor)
Studies conducted on ecological aftermath of Chernobyl; impact of radionuclides, assessment of dose/risk; methods for monitoring radioactivity in the environment.
- **Reprocessing Research & Development Facility**
Mission: Develop LWR fuel reprocessing technology.
Design Basis: Chop-leach head-end; PUREX flowsheet; capacity, 3 kg/d uranium.
History: Startup, 1973.

KURCHATOV

Russian Scientific Centre
Kurchatov Institute
Kurchatov Square 1
123182 Moscow, Russia

Tel: 7-095-196-7300
Fax: 7-095-196-2073

President

Acad. Evgeniy P.
Velikhov

Vice-President

Acad. Nicolai N.
Ponomarev-Stepnoy

Nuclear Safety

Ilya V. Elkin
Yuri P. Buzulukov

Function: Nuclear power research; R&D on LLW/ILW.

ORGANIZATION**Nuclear Program Control**

- **MINATOM RF** (Ministry for Atomic Energy, Russian Federation)--civilian and defense nuclear fuel cycle; waste management; successor to MAPI (Ministry of Atomic Power and Industry).
- **Ministry for Ecology and Natural Resources of the Russian Federation.**
- **GOSATOMNADZOR** (Russian Federal Authority for Nuclear and Radiation Safety).

Research and Development

- **All-Russian Scientific Research Institute for Inorganic Materials**, Moscow-- reprocessing, solidification, and disposal of HLW; properties of solid waste forms).
- **All-Russian Scientific Research Institute for Nuclear Power Plants**, Moscow--reprocessing/disposal of NPP radioactive wastes.
- **Institute of Physical Chemistry**, Moscow, (branch of the Russian Academy of Sciences)--radionuclide migration; waste form properties.
- **Kurchatov Institute** (Russian Scientific Centre), Moscow-- nuclear power R&D.
- **RPA V. G. Khlopin Radium Institute**, St. Petersburg--reprocessing, HLW partitioning/solidification, solid waste form properties, off-gases, waste storage/disposal, environmental remediation.
- **Scientific Research Institute of Chemical Engineering**, Ekaterinburg-- vitrification/bitumenization pilot plants.

- **VNIPIET** (All-Russian Design and Research Association for Energy Technology), St. Petersburg--design of SF reprocessing facilities, SF transportation/storage.

**ALL-RUSSIAN SCIENTIFIC RESEARCH
INSTITUTE FOR INORGANIC MATERIALS**

All-Russian Scientific Research
Institute for Inorganic Materials

Rogov Str. 5a
123060 Moscow, Russia

Tel: 7-095-377-0104
Fax: 7-095-376-8333

Director
Deputy Director

Dr. Mikhail I. Solonin
Dr. Anatoliy C. Mamaev

Function: R&D on SF reprocessing, radioactive waste processing/solidification (bitumenization/vitrification, etc.), off-gases.

**ALL-RUSSIAN SCIENTIFIC RESEARCH
INSTITUTE FOR NUCLEAR POWER PLANTS**

All-Russian Scientific Research
Institute for Nuclear Power Plants

Ferganskaya Str. 25
109507 Moscow, Russia

Tel: 7-095-376-1550
Fax: 7-095-376-8333

Director General
Department Head

Prof. A. Armen Abagyan
Leonid P. Khanyanov

Function: Processing and disposal of NPP radioactive wastes; decontamination of equipment/facilities; emergency situation studies.

MAYAK

Production Association 'MAYAK'

Leninstr. 31

454065 Chelyabinsk-65

Russian Federation

Tel: 7-351-513-1659

Fax: 7-351-513-3826

Director

Chief Engineer

Dir., Radiochemical Plant

Chief Engineer, Radiochem. Plant

Victor Fetisov

Alexander P. Suslov

Vladimir K. Sazhnov

Evgeniy G. Dzekun

Location: Near city of Kyshtym.

Function: Nuclear complex with multitude of activities and facilities, including radiochemical processing, weapon materials production reactors, isotope production, special waste storage, and burial sites; produced first Soviet weapons-grade plutonium.

Facilities

- **Power Reactor Fuel Reprocessing Plant**

Design Basis: Started reprocessing VVER-440 reactor fuel in 1976, with about 2000 tU reprocessed to 1989.

- **Fully Radioactive HLW Vitrification Plant**

Design Basis: Single-stage joule-heated ceramic melter with a feed rate of 500-liter/h; about 160 t of HLW phosphate glass was produced from 1987-1988; melter was shut down due to electrode problems; similar melter was modified and started operation in 6/1991. As of 4/1992, 50 MCi of HLW have been incorporated into phosphate glass.

MINATOM

Ministry for Atomic Energy
of the Russian Federation
Staromonetny per.26
109180 Moscow, Russia

Tel: 7-095-233-1718
Fax: 7-095-230-2420

Minister
First Deputy Minister
Deputy Ministers

Viktor N. Mikhailov
Vitaly F. Kononov
Nikolai N. Egorov
Yuri I. Tychkov
Alexander G. Meskov
Alexander Usanov
Evgeny Reshetnikov
Victor A. Sidorenkov
Alexander G. Makarov
Mikhail N. Ryzhov

International Relations

Function: Manages all aspects of nuclear power industry.
Established 1/92 on an interim basis; successor to MAPI, the former
USSR Ministry of Atomic Power and Industry.

MINING/CHEMICAL ENTERPRISE

Mining and Chemical
Enterprise
Lenin Str. 53
660033 Krasnoyarsk-33
Russia

Tel: 7-391-232-1251
Fax: 7-391-232-0374

Director
Chief Engineer
Dep. Chief Engineer
Dir., Radiochemical Plant
Chief Eng., Radiochemistry

Valeriy A. Lebedev
Yuri S. Volzhanin
Yuri A. Revenko
Gennadi A. Demidov
Yuri P. Sorokin

Function: SF reprocessing, waste management, underground
disposal.

MINISTRY FOR ECOLOGY/NATURAL RESOURCES

Ministry for Ecology and
Natural Resources

B. Gruzinskaya Str. 4/6
123812 GSP Moscow, Russia

Tel: 7-095-252-2305

Fax: 7-095-254-8283

Minister

Victor I.

Danilov-Danilyan

Deputy Minister

Nikolai G. Rybalskiy

Function: Responsible for control and standardization of releases containing radionuclides.

RADON

Research Production
Association RADON
7th Rostovski per. 2/14
119121 Moscow, Russia

Tel: 7-095-248-1911

Fax: 7-095-248-1941

Director-General
Vice Director-General
Specialist

Dr. Igor A. Sobolev
Dr. Sergey A. Dimitriev
Dr. A. P. Kobelyev

Function: Research-and-production association; disposal of institutional radioactive/hazardous waste, R&D on waste treatment/conditioning, engineering design/support services, environmental protection services, special accident-related emergency services/investigations.

Facilities

- **Sergiev Posad Disposal Site** (formerly Zagorsk, located 75 km NE of Moscow)
Largest facility (ca. 170 acres) with capacity for 3500 m³ (including 500 m³ liquids) waste per year (capacity at 15 other facilities <1000 m³/a each); waste from scientific, industrial, medical, and other producers; waste characteristics similar to reactor waste, including spent radiation sources, liquid concentrates, combustible

(cont next page)

RADON (contd)

liquids, highly active research reactor core components (with short-lived nuclides and limited alpha emitters); treatment/conditioning of wastes is by compaction, combustion, cementation, bitumenization, vitrification, and special immobilization in metal matrix; disposal is in engineered concrete in-ground structures.

**SCIENTIFIC RESEARCH INSTITUTE
OF CHEMICAL ENGINEERING**

Scientific Research Institute
of Chemical Engineering
Griboyedov Str. 32
620010 Ekaterinburg
Russia

Tel: 7-347-227-4303
Fax: 7-343-227-5505

Facilities

- **KS-KT-100** (cold pilot plant-HLW vitrification)
Mission: Develop waste vitrification technology.
Design Basis: Fluid bed calciner; in-crucible melter (two-stage process); capacity, 100 liters/h HLLW, 20 kg/h glass; 160-180 kg glass/batch; product, phosphate glass in crucibles.
History: Startup, ca. 1975.

VNIPIET**(All Russian Design/Research Association)**

VNIPIET
All-Russian Association
Savushkin Str. 82
197228 St. Petersburg
Russia

Tel: 7-812-239-0134
Fax: 7-812-239-1898

Director-General

Prof. Vladimir A.
Kurnosov

Chief Engineer
Dep. Chief Engineer

Valentin M. Simanovsky
Dr. Vasily M. Dubrovsky

Function: Design plants/facilities for SF reprocessing, waste processing, storage/disposal; SF transport/storage; decontamination.

SOUTH AFRICA

SOUTH AFRICA

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	May 31	Republic Day
Apr 1	Good Friday	Oct 10	Kruger Day
Apr 6	Founder's Day	Dec 16	Day of the Vow
Apr 8	Family Day	Dec 25	Christmas
May 1	Worker's Day	Dec 26	Day of Goodwill
May 12	Ascension		

TIME

Standard Time Washington, D.C.

+ 7 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 3.42 Rand

per Wall Street Journal, 01/31/94. 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. EMBASSY - PRETORIA

American Embassy
877 Pretorius St.
P.O. Box 9536
Pretoria, South Africa

Tel: 27-12-342-1048
Fax: 27-12-342-2244

Economic Affairs Counselor

J. Michael Cleverley

Population	1993	39	million
------------	------	----	---------

ENERGY

Electric Power Capacity	1993	33.2	GWe
		6%	nuclear
	1995	34.1	GWe
		5%	nuclear
	2000	37.9	GWe
		5%	nuclear

Electric Power Production	1993	154	TWh
		94%	coal
		<5%	nuclear
		1%	other
		<1%	hydro
	1995	6%	nuclear
	2000	6%	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 Capacity	1993	1.8	GWe
	2000	1.8	GWe

Reactor Mix	1993	PWR	2 (1984/85)
-------------	------	-----	-------------

INDUSTRIAL FUEL CYCLE

Waste Management Strategy: Interim storage of reactor LLW/ILW at the reactor, followed by disposal at two shallow-land disposal facilities; interim storage of spent fuel for ~40 years; plans for disposal not defined.

Cumulative SF Arisings (LWR)	1990	180	tU
	2000	520	tU

Major Milestones

- Dry SF storage facility (Vaalputs)

1994

INTERNATIONAL RELATIONSHIPS

Member of IAEA.

ORGANIZATION

Ministry of Mineral and Energy Affairs

- Atomic Energy Corporation (AEC)
 - Pelindaba Site
 - 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
- National Energy Council (NEC)
- Council for Nuclear Safety (CNS)
 - Independent Regulatory Licensing Agency

Eskom

- Electricity Production

AEC**Atomic Energy Corporation
of South Africa Ltd.**

P.O. Box 582
Pretoria 0001, South Africa

Tel: 27-12-316-4911

Fax: 27-12-316-3111

Chief Executive Officer
Senior General Managers:

Nucl. Fuel Production
Technology Development
Engineering
Business Development
Sr. Mgr., Nuc. Waste Tech.

Dr. Waldo E. Stumpf

P. J. Venter
K. F. Fouche
L. S. Snyders
Dr. A. G. M. Jackson
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; fuel fabrication.

Facilities

- **Pelindaba Site**

Mission: Perform nuclear R&D; operate research reactor, isotope production line, food irradiation facility; manufacture fuel; operate LLW treatment/shallow-land disposal facilities.

- **Vaalputs National LLW
Disposal Facility**

Private Bag X7
Springbok 8240, South Africa

Tel: 27-251-22832

Fax: 27-251-81220

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

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

(contd next page)

AEC (contd)• **Valindaba Uranium Enrichment and Conversion Plants**

Mission: Perform enrichment R&D; operate semi-commercial conversion and enrichment plants. Pilot-scale operations shut down in 1990.

Design Basis: 300,000 SWU/a enrichment - 700 tU/a conversion.

CNS

Council for Nuclear Safety

P.O.B. 7106

Hennopsmeer 0046, South Africa

Tel: 27-12-663-5500

Fax: 27-12-663-5513

Chairman

Vice-Chairman

Exec. Officer

General Manager

Prof. J. B. Martin

Dr. D. Reitmann

B. C. Winkler

J. Leaver

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

ESKOM

ESKOM

P.O. Box 1091

Johannesburg 2000

South Africa

Tel: 27-11-800-8111

Fax: 27-11-800-4390

Chief Executive/COB

Chairman, Electricity Council

Exec. Dir., Technology

A. J. Morgan

Dr. John B. Maree

Alex Ham

Function: Provide electricity for public use.

SPAIN

SPAIN

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	Oct 12	Columbus Day
Jan 6	Epiphany	Dec 6	Constitution Day
Mar 31	Holy Thursday	Dec 8	Immaculate Conception
Apr 1	Good Friday	Dec 25	Christmas
May 1	Labor Day		

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; in addition, a visa is currently required for travel to Spain, unless a personal passport is used for the visit. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S. \$ = 139.86 Peseta

per Wall Street Journal, 01/31/94. Because 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
Serrano 75
28006 Madrid, Spain

Tel: 34-1-577-4000
Fax: 34-1-577-5735

Science Attaché

Helen B. Lane

Population	1992	39 million
------------	------	------------

ENERGY

Electric Power Capacity	1992	44.1 GWe
		16% nuclear
	1995	45.7 GWe
		15% nuclear
	2000	51.1 GWe
		14% nuclear

Electric Power Production	1992	156.5 TWh
		42% coal
		36% nuclear
		12% hydro
		9% oil
	1995	1% other
		27% nuclear
		23% 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 (confirmed 1991).

Nuclear Power Capacity	1992	7.0 GWe
	2000	7.0 GWe

Reactor Mix	1993	PWR	7 (1969-88)
		BWR	2 (1971-85)

INDUSTRIAL FUEL CYCLE

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

Waste Management Strategy: Store spent fuels at the reactor sites for at least 10 years; reracking in some reactor pools and dry storage in dual-purpose casks planned to provide additional capacity until geologic repository is ready to receive HLW (SF); granite, salt, and clay are being considered as host rock for repository; shallow-land burial of LLW in fully engineered facility at El Cabril, province of Córdoba (in operation since 10/92).

Cumulative SF Arisings (LWR)	1990	950 tU
	1995	1,800 tU
	2000	2,800 tU

Industrial-Scale Activities (Capacity)

- U mining/milling: 270 tU/a
- U enrichment: 11.1% interest in Eurodif
- Fuel fabrication: 200 tU/a
- Intermediate SF storage: 3,000 tU

INTERNATIONAL RELATIONSHIPS**DOE/Empresa Agreement in the Field of Radioactive Waste Management**

Term: 12/16/92 - 12/16/97

Scope: Exchange of technology for management of radioactive wastes, i.e., characterization of geologic formations; preparation/packaging; disposal; surface/subsurface storage; performance and transportation assessments; mutually agreed topics associated with management of radioactive waste.

Member of EC, IAEA, and OECD/NEA.

CIEMAT (Energy Research Center)

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

Tel: 34-1-346-6000/01
Fax: 34-1-346-6005

President
General Director
Dir., Nuc. Technology

Luis María Atienza Serna
José Angel Azuara Solís
Manuel Montes Ponce
de León

Dir., Rad. Protection
Waste Management

Francisco Mingot Buades
Armando Uriarte

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

Facilities

- Juan Vigon National Nuclear Energy Center, Madrid

CSN (Council of Nuclear Safety)

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

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

President
Commissioners

Donato Fuejo Lago
Enrique Echávarri Lozano
Fabio Sarmiento Almeida
Rafael Caro Manso
Eduardo González Gómez

Function: Independent body, responsible to Parliament, with regulatory powers on nuclear safety and radiation protection matters.

ENRESA (National Waste Management Company)

Empresa Nacional de Residuos
Radiactivos S.A.

Emilio Vargas, 7
E-28043 Madrid, Spain

Tel: 34-1-519-5255
Fax: 34-1-519-5268

President

Juan M. Kindelán
34-1-279-2667

Director General

Alberto López García
34-1-279-2858

Director, Engineering
International Relations

Aurelio M. Ulibarri
Valentín González
34-1-519-5314

Function: Provide waste management services and disposal facilities to all Spanish nuclear companies and radwaste producers; responsible to the Ministry of Industry and Energy; funded by CIEMAT (80%) and the National Institute of Industry (20%).

Facilities

- **LLW Surface Storage Facility**, El Cabril, Córdoba

ENUSA (National Fuel Cycle Company)

Empresa Nacional
del Uranio S.A.

Santiago Rusinol 12
E-28040 Madrid, Spain

Tel: 34-1-347-4200
Fax: 34-1-347-4215

President

Alfredo Llorenze Legaz

Function: Supply fuel cycle services except waste management and disposal (uranium mining and milling, fuel fabrication) to Spanish nuclear power plants.

Facilities

- **LWR Fuel Fabrication Plant**
Commissioned late 1985.
Capacity: 200 tU/a, can be expanded to 500 tU/a.

MINISTRY OF INDUSTRY AND ENERGY

Minister

José Claudio
Aranzadi Martinez

Secretary General,
Energy/Mineral Resources
Director General, Energy

Luis Maria Atienza Serna
María Luisa Huidobro
y Arriba

SWEDEN

SWEDEN

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year
Jan	6	Epiphany
Apr	1	Good Friday
Apr	4	Easter Monday
May	1	Labor Day
May	12	Ascension
May	23	Pentecost Monday
Jun	24-25	Midsummer
Nov	1	All Saints
Dec	24-26	Christmas

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 7.86 Krona (SEK)

per Wall Street Journal, 01/31/94. Because 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
100 00 Stockholm, Sweden

Tel: 46-8-783-5300
Fax: 46-8-661-1964

Economic Section

Kenneth H. Kolb

Population	1992	8.7 million
------------	------	-------------

ENERGY

Electric Power Capacity	1992	33.7 GWe
		30% nuclear
	1995	34.8 GWe
		29% nuclear
	2000	35.2 GWe
		29% nuclear

Electric Power Production	1992	145.7 TWh
		51% hydro
		44% nuclear
		2% coal
		2% oil
	1% solids	
	1995	46% nuclear
	2000	48% nuclear

NUCLEAR POWER

Policy: Phase out all nuclear plants by the year 2010 at the latest; changing this policy will require a new decision by Parliament.

Nuclear Power Capacity	1992	9.9 GWe
	2000	9.9 GWe

Reactor Mix	1993	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 future decommissioning of nuclear power plants are paid by fees collected from the nuclear utilities.

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.

Cumulative SF Arisings (LWR)	1993	2,560 tU
	2010	7,800 tU
Cumulative Waste Arisings (conditioned and encapsulated - ready for disposal)	2020	
	SF	5,600 canisters
	TRU	6,000 m ³
	Reactor waste	95,000 m ³
	" core comp.	19,000 m ³
	D&D	113,000 m ³

Industrial-Scale Activities

- LWR fuel fabrication: 400 tU/a.

Major Milestones (SF Repository)

- Start characterization of three candidate sites 1992
- Start-up underground Hard Rock Laboratory 1994
- Perform detailed investigations of two sites 1996
- Submit license application 2003
- Start repository construction 2010
- Start repository operation 2020

INTERNATIONAL RELATIONSHIPS**DOE/SKB Agreement for Cooperation in Waste Management**

Term: 07-01-77 to 09-09-95

Scope: Preparation and packaging of waste forms; storage, field and laboratory testing; geologic disposal; safety and environment, institutional and public relations issues. 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, EC, 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.

- **Licensing Responsibilities**

- SKI (Swedish Nuclear Power Inspectorate)--licensing for construction/operations of nuclear facilities; administers waste management fund collected from nuclear utilities; oversees back-end fuel cycle activities.
- 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).

CHALMERS (TECHNICAL UNIVERSITY)

Chalmers Tekniska Högskola
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
Pipersgatan 27
112 28 Stockholm, Sweden

Tel: 46-8-654-06-80
Fax: 46-8-652-16-07

Manager

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: 46-8-665-2800
Fax: 46-8-782-9528

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

Hydrogeology

Leif Carlsson

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

Sten Bjurström
46-8-665-2803

Vice President

Per-Eric Ahlström
46-8-665-2834

Systems/Facilities, Director

Hans Forsström
46-8-665-2838

Director, R&D/Safety Anal.

Tönis Papp
46-8-665-2832

Geoscience

Lars Olof Ericsson
46-8-665-2801

Chemistry

Fred Karlsson
46-8-665-2830

Design & Engineered Barriers

Christer Svemar
46-8-665-2811

Material Sciences

Lars Werme
46-8-665-2825

International Relations

Torsten Eng
46-8-665-2833

Nuc. WM Int'l Consult. Services

Bo Gustafsson
46-8-665-2816

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 SF and other long-lived wastes can be disposed of safely and permanently; provide transportation of SF outside reactor sites.

Owners: Utilities.

SKB (contd)**Facilities**

- **CLAB** (Central Storage for Spent Fuel, located at Simpevarp adjacent to Oskarshamn Power Station)
Mission: AFR storage facility.
Design Capacity: Initially, 3000 t; being upgraded to 5000 t.
History: Startup construction, 05/80; startup operation, 1985.
- **SFR** (Swedish Final 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 high-activity ILW; conventional tunnel rooms for LLW; low-activity ILW is in concrete-walled "hot-cells" in tunnels; 1-km-long tunnels leading to repository to be plugged with concrete.
Capacity: 90,000 m³.
History: Phase-1 construction startup, 1983; operation startup, 1988; Phase-2 operations startup, late 1990s.

• **Äspö Hard Rock Laboratory**

SKB Development/Äspö Hard Rock Laboratory

Project Office

Box 5864

102 48 Stockholm, Sweden

Tel: 46-8-665-2831

Fax: 46-8-665-5719

Project Manager

Göran Bäckblom

SKB Äspö Hard Rock Laboratory

Site Office, P1 300

570 93 Figeholm, Sweden

Tel: 46-491-82000

Fax: 46-491-82005

Site Manager

Olle Zellman

Underground research laboratory (located on Äspö Island at Simpevarp) under construction; startup/operation 1994.

SKI (Nuclear Power Inspectorate)

Statens Kärnkraftinspektion
Box 27 106
102 52 Stockholm, Sweden

Tel: 46-8-665-44-00
Fax: 46-8-661-90-86

Director
Waste Management

Lars-Olof Högberg
Soeren Norrby

Function: Responsible for licensing nuclear facilities; administers waste management fund collected from nuclear utilities; oversees back-end fuel cycle activities.

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, Head (A)

Gunnar Bengtsson
Gunnar Johansson

Function: Responsible for establishing and enforcing radiation protection regulations.

STUDSVIK RADWASTE AB

Studsvik Radwaste AB
611 82 Nyköping, Sweden

Tel: 46-155-210-00
Fax: 46-155-630-44

Director

Olle Andersson

Function: Nuclear waste R&D and services to support Swedish power programs (contract research) on LLW and ILW treatment, D&D techniques, SF leaching, biosphere migration, dose calculations.

Owner: Vattenfall (via Studsvik AB).

PNL-9450-1

SWEDEN

VATTENFALL

Vattensfall
162 87 Vaellingby
Sweden

Tel: 46-8-739-50-00
Fax: 46-8-737-01-70

President
Nuclear Power

Carl-Eric Nyquist
Stig Sandklef

Function: Operate the power distribution grid in Sweden; produce power (owner of Ringhals Nuclear Power Plants).

SWEDEN

PM 5:00-1

MATERIAL

1st 44-6-738-20-00
2nd 44-6-737-61-70

Material
Material
Material

1st 44-6-738-20-00
2nd 44-6-737-61-70

Material
Material

Material
Material
Material

SWITZERLAND

SWITZERLAND

MAJOR PUBLIC HOLIDAYS (1994)

Jan	1	New Year
Apr	1	Good Friday
Apr	3-4	Easter
May	1	Labor Day
May	12	Ascension
Jun	22-23	Pentecost
Jun	5	Corpus Christi
Aug	1	National Day
Dec	25-26	Christmas

TIME

Standard Time Washington, D.C.

+ 6 hours

Daylight Savings Time Period:

03/27 - 09/24/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S.; 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. \$ = 1.45 Franc

per Wall Street Journal, 01/31/94. Because 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
Jubiläumstrasse 93
3001 Bern, Switzerland

Tel: 41-31-357-7011
Fax: 41-31-357-7344

Population	1992	7 million
------------	------	-----------

ENERGY

Electric Power Capacity	1992	15.5 GWe
		19% nuclear
	1995	15.8 GWe
		20% nuclear
	2000	17.0 GWe
		19% nuclear

Electric Power Production	1992	57.8 TWh
		57% hydro/geoth.
		41% nuclear
		1% oil
		1% other
	1995	39% nuclear
	2000	36% nuclear

NUCLEAR POWER

Policy: Federal government is in favor of nuclear power, but local opposition has delayed its expansion.

Nuclear Power Capacity	1992	3.0 GWe
	2000	3.0 GWe

Reactor Mix	1994	BWR	2 (1972/84)
		PWR	3 (1969-79)

INDUSTRIAL FUEL CYCLE

Policy: Purchase most services from other countries, including reprocessing of spent fuels; recycle Pn to LWRs or FBRs.

Waste Management Strategy: Develop two waste repositories: a horizontally accessed rock cavern in a host rock with considerable overburden for LLW/ILW, and a deep repository in crystalline rock or sedimentary formations for HLW glass and unprocessed SF elements and alpha wastes; interim storage of all waste at common center until repositories available; ocean-dumping of LLW discontinued in 1982.

Cumulative SF
Arisings (LWR)

1990	1,090 tU
2000	2,000 tU

Cumulative Waste Arisings*	LLW/ (Planning basis: after 40-yr operation at 3 GWe)	D&D W	135,000 or 135,000 m ³
		LLW/ILW	15,000 or 10,000 m ³
		HLW glass	500 or 160 m ³

* Two scenarios considered: complete reprocessing (left column) or no reprocessing (right column) after the year 2000.

Major Milestones

- Initial receipt of HLW glass from COGEMA (France) >1996
- Intermediate-depth repository for LLW/ILW >2003
- Geologic repository for HLW, SF, and alpha wastes >2020

INTERNATIONAL RELATIONSHIPS

DOE/NAGRA Agreement for Cooperation in Radioactive Waste Management

Term: 04-19-85 to 09-22-96

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; information exchange and direct cooperation, particularly concerning Grimsel Pass URL activities.

Member of IAEA and OECD/NEA; cooperative agreements with SKB/Sweden, CEA/France, Euratom/EC, ONDRAF/Belgium, PNC/Japan, BfS, BMFT, GSF, and BGR/Germany, 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 Institut--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)
5232 Villingen, Switzerland

Tel: 41-56-98-28-53
Fax: 41-56-99-39-07

Waste Management Section

Dr. Auguste Zurkinden

Function: Licensing and inspection of nuclear installations.

**NAGRA/CEDRA/CISRA (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 (Cédra)

or

Società cooperativa nazionale per
l'immagazzinamento di scorie radioattive (Cisra)

Hardstrasse 73
5430 Wettingen, Switzerland

Tel: 41-56-37-11-11
Fax: 41-56-37-12-07

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. Emil Kowalski

Function: Provide for safe disposal of radioactive wastes produced
by the Swiss nuclear industry; funded by utilities and government.

Facilities

- **URL at Grimsel Pass**--operational since 1984 (tests/experiments
in crystalline rock).

PSI

Paul Scherrer Institut
Würenlingen/Villigen
5232 Villigen, Switzerland

Tel: 41-56-99-2111
Fax: 41-56-98-2327

Director
Manager, Waste Mgmt. Proj.

Prof. Meinrad Eberle
Dr. J. Hadermann

Function: Federal (Department of Interior) institute for reactor and nuclear R&D.

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 analogue studies; hydrological studies; sorption constants on different rocks; immobilization of LLW/ILW in cement; leaching rates on LLW/ILW forms; and long-term corrosion tests on waste package materials.

Facilities

- Hot Cells, radioactive laboratories, incinerator.

- ADA (Acid Digestion Plant) for TRU wastes.

Design Basis: Carbonization/digestion in H_2SO_4/HNO_3 at 150°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: 41-56-20-31-11
Fax: 41-56-20-37-58

Director

Dr. Hans R. Lutz
41-56-20-38-55

Tech. Project Manager

Dr. C. Vuilleumier

Function: Provide interim storage for spent fuel, HLW, LLW, and ILW; the facility was voter-approved in 1989 and will be managed by the local council and the nuclear utilities; construction is expected to take at least two years (startup in 1995) and to cost about U.S. \$350 million; organization is a consortium of Swiss nuclear utilities.

TAIWAN

TAIWAN

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1-3	Commemoration Day	Sep 28	Confucius Birth
Feb 12	Lunar New Year	Oct 10	National Day
Mar 29	Youth Day	Oct 25	Taiwan Restoration
Apr 4	Women/Children's Day	Oct 31	Ch. Kai-Shek's Birth
Apr 5	Tomb Sweeping Day	Nov 12	Sun Yat-Sen's Birth
Jun 13	Dragon Boat Fest	Dec 25	Constitution Day
Sep 20	Mid-Autumn Day	Dec 26	Constitution Day

TIME

Standard Time Washington, D.C.

+ 13 hours

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. In addition, a visa is recommended for a visit to Taiwan, although short-term visas are available under certain conditions. Most travel agencies can provide up-to-date information concerning requirements.

CURRENCY EXCHANGE RATE

1 U.S. \$ = 26.42 Taiwan Dollar
per Wall Street Journal, 01/31/94. 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, Taiwan

Tel: 886-2-709-2000
Fax: 886-2-702-7675

Science Officer

Della Knox-Bennett

Population	1993	21 million
------------	------	------------

ENERGY

Electric Power Capacity	1993	19.3 GWe 27% nuclear
-------------------------	------	-------------------------

Electric Power Production	1993	105.8 TWh 35% coal 32% nuclear 16% oil 10% other 7% hydro
---------------------------	------	--

NUCLEAR POWER

Policy: Plan for nuclear power to meet rapidly growing demand for electric energy; continue with nuclear power at about 1/3 of total electricity.

Nuclear Power Plant Capacity	1993	4.9 GWe
	1995	4.9 GWe
	2000	6.7 GWe

Reactor Mix	1993	BWR 4 (1978-83) PWR 2 (1984/85)
-------------	------	------------------------------------

INDUSTRIAL FUEL CYCLE

Policy: Purchase fuel materials and enrichment; develop indigenous fuel production capability: UF_6 conversion; UO_2 pellet preparation; fuel hardware fabrication; fuel assembly.

Waste Management Strategy: Evaluating spent fuel/HLW interim storage options; may reprocess (in other countries); maximize existing SF pool storage capacity by reracking; build MRS facility at existing reactor site for interim storage until final disposal in geologic repository; LLW stored in National Waste Storage Facility on nearby Orchid Island; LLW/ILW will eventually be disposed of on the sea floor, if internationally acceptable, or in a shallow-land facility.

Cumulative SF Arisings (LWR)	1990	1,140 tU
	2000	2,600 tU

Major Milestones

LLW Disposal Facility

- Selection of site/method 1994
- Site characterization, engineering, design and licensing 1998
- Completion, start of operation 2002

HLW Disposal Facilities

- Commission MRS at Chinshan reactor site 1999
- Geologic repository site selection 2016
- Commission final repository 2032

ORGANIZATION

- **TAIPOWER** (Taiwan Power Company) - operation of nuclear power plants (owned by the government); country's only electric utility.
- **AEC** (Atomic Energy Council) - regulatory functions; **RWA** (Radwaste Administration) - radwaste disposal.
- **INER** (Institute of Nuclear Energy Research) - nuclear R&D.

AEC

Atomic Energy Council
67, Lane 144
Keelung Road, Section 4
Taipei 10772, Taiwan

Tel: 886-2-363-4180
Fax: 886-2-363-5377

Chairman
Sr. Vice Chairman
Vice Chairman
Director, Radwaste Admin.

Dr. Y. Y. Hsu
Prof. Thomas K.C. Liu
Dr. Adrian M. C. Wang
Dr. Chao-Ming Tsai
Tel: 886-2-964-7401
Fax: 886-2-964-7464

Dir., Planning

S. T. Chiou
886-2-362-8567

Dir., Rad. Protection

W. L. Chen
886-2-362-6189

Dir., Nuc. Regulations

T. T. Huang
886-2-362-8571

Dir., Nuc. Technology

Yi-Bin Chen

INER

Institute of Nuclear Energy
Research
P.O. Box 3
Lung-Tan 32500, Taiwan

Tel: 886-2-365-1717
Fax: 886-2-471-1064

Director
Dep. Directors

Dr. Der-Yu Hsia
Dr. Song-Feng Wang
Dr. Ging-Shung Yu
Dr. Gang Ting
Dr. Yuan-Ching Chou
Dr. D. S. Lee
Dr. Li-Fu Lin
Dr. S. T. Su

Nuc. Engineering
Nuc. Instrumentation
Nuc. Fuel/Matls. Research
Health Physics

Fuel Cycle R&D: Solvent extraction technology; yellowcake conversion to UO_2 ; cement and thermoplastic waste forms for reactor wastes; HLW conditioning processes; burial of LLW.

TAIPOWER

Taiwan Power Company
17F, 242 Roosevelt Rd., Sec. 3
Taipei 107, Taiwan

Tel: 886-2-365-1234
Fax: 886-2-396-8593

Chairman
President
Vice President
Dir., Nuc. Engineering

C. C. Chang
S. M. Chang
M. C. Tsai
Victor Y.C. Liao
886-2-367-7969

Dir., Nuc. Operation

S. J. Tsuei
886-2-367-7126

Dir., Nuc. Safety

A. H. Jeng
886-2-367-7341

UNITED KINGDOM

UNITED KINGDOM

MAJOR PUBLIC HOLIDAYS (1994)

Jan 1	New Year	May 23	Spring Holiday
Apr 1	Good Friday	Jun 12	Queen's Birthday
Apr 4	Easter Monday	Aug 29	Summer Holiday
May 2	Bank Holiday	Dec 25	Christmas
		Dec 26	Boxing Day

TIME

Standard Time Washington, D.C.

+ 5 hours

Daylight Savings Time Period:

03/27 - 10/22/94

PASSPORT/VISA

A passport is needed to depart and re-enter the U.S. 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. \$ = 0.66 Pound

per Wall Street Journal, 01/31/94. Because 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

London W1A 1AE, United Kingdom

Tel: 44-71-499-9000

Fax: 44-71-409-1637

Science Counselor

Jeffrey T. Lutz

Population	1992	60 million
------------	------	------------

ENERGY

Electric Power Capacity	1992	74.5 GWe
		16% nuclear
	1995	76.9 GWe
		17% nuclear
	2000	82.4 GWe
		15% nuclear

Electric Power Production	1992	325.2 TWh
		62% coal
		24% nuclear
		9% oil
		3% gas
	1995	2% hydro
		27% nuclear
		2000 25% nuclear

NUCLEAR POWER

Policy: Continue nuclear power as a significant element of total electricity production; substantially based, to date, on gas-cooled reactors, but now diversifying to PWRs; eventual active FBR pursuit expected.

Nuclear Power Capacity	1992	12.0 GWe
	1995	13.0 GWe
	2000	12.0 GWe

Reactor Mix	1993	GCR	20 (1956-72)
		AGR	14 (1976-89)
		FBR	1 (1976)
		PWR	1 (1994)

Reactor Development	PWRs; future LMFBR development.
---------------------	---------------------------------

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/AGR 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 50 years before disposal; shallow-land burial of LLW currently; future deep-land disposal of LLW and ILW.

Cumulative SF Arisings (AGR)	1990	1,300 tU
	2000	3,250 tU

Industrial-Scale Activities (Capacity)

- Uranium conversion (Springfields)
 - UF_6 production: 9,000 t/a
 - UO_2 conversion: 10,000 t/a
- Uranium enrichment (Capenhurst)
 - centrifuge plant: 800 tSWU/a
- Fuel fabrication
 - Springfields
 - U metal (Magnox): 1,300 tU/a
 - AGR/LWR fuels: 300 t/a
 - Sellafield
 - MOX fuels capacity, 1992: 6 t/a (LWR)
- Fuel reprocessing
 - Magnox fuels (Sellafield): up to 1500 t/a
 - UO_2 fuels (THORP, " "): 1200 t/a (1992)
 - FBR fuels (PFR, Dounreay): 50 kgHM/d
- HLW vitrification
 - Sellafield Vitrification Plant, radioactive operation, 1990

INTERNATIONAL RELATIONSHIPS

**DOE/UKAEA Agreement in the Field of Decommissioning
Nuclear Facilities**

Term: 03-01-85 to 03-01-93

Scope: Techniques used, schedules, costs, manpower, radiation exposures, and waste arisings relevant to decommissioning projects (U.S./Shippingport Station - U.K./Windscale AGR); treatment, packaging, storage, transportation, disposal methods, and costs for wastes arising from the decommissioning operations; emphasis on exchange of technical information, specialists, samples, materials, instruments, and testing equipment.

**DOE/UKAEA 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; geologic disposal; transportation; storage; environment/safety and public acceptance issues; performance assessment; packaging; emphasis on 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.

HMIP (Her Majesty's Inspectorate of Pollution): regulation of effluent discharges to the environment.

- **BNFL (British Nuclear Fuels plc):** commercial fuel cycle and engineering services for domestic and foreign customers.
- **NIREX ("private limited"/government-owned company):** LLW and ILW disposal in deep repository.
- **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.

**NUCLEAR FUEL CYCLE/WASTE MANAGEMENT
ORGANIZATION****National Government**

- Department of Environment (DoE)
 - H.M. Inspectorate of Pollution (HMIP)
 - Radioactive WM Advisory Committee (RWMAC)
 - Building Research Establishment (BRE)
- Department of Health/Social Services
 - National Radiological Protection Board (NRPB)
- Department of Trade and Industry (DTI)
 - 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 Res. Establishment (AWE)
- Ministry of Agriculture, Fisheries and Food (MAFF)
 - Fisheries Laboratories

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)
 - Springfield's
 - Fuel Fabrication
 - UO₂ Production
 - Uranium Conversion
 - Capenhurst
 - Uranium Enrichment
- AEA Technology
 - Decommissioning and Radwaste
 - Environment & Energy
 - Fuel Services
 - Fusion
 - Industrial Technology
 - Safety & Reliability
 - Reactor Services
- NIREX

AEA

AEA Technology
Corporate Headquarters
11 Charles II Street
London SW1Y 4QP
United Kingdom

Tel: 44-71-389-6565
Fax: 44-71-389-6841

Chairman
Dep. Chairman/Chief Exec.
Managing Dir., Nuc. Bus. Group
Managing Dir., Ind. Bus. Group
Managing Dir., Site Operations
Chief Technologist, Nuclear

Sir Anthony Cleaver
Brian L. Eyre
Dr. Derek Pooley
R. Stuart Nelson
Graeme G. E. Low
Dr. Ron H. Flowers

Government-owned nuclear research and applications 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 D&R

AEA Decommissioning and
Radwaste
Winfrith Technology Center
Dorchester, Dorset DT2 8DH
United Kingdom

Tel: 44-305-20-2066
Fax: 44-305-20-2500

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.

AEA E&E

AEA Environment & Energy
Harwell Laboratory
Oxfordshire OX11 0RA
United Kingdom

Tel: 44-235-43-5530
Fax: 44-235-43-4361

Chief Executive
Head, Business Development

Dr. J. Rae
Dr. A. E. J. Eggleton

Activities: R&D and consulting services to industry and regulatory bodies covering pollution control technology, waste management, and regional and global environmental impacts.

Facilities

- **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 1/3-scale unit 1982-84; startup (full scale), 1986.

AEA FS

AEA Fuel Services
AEA Technology Dounreay
Caithness KW14 7TZ
United Kingdom

Tel: 44-847-6-2121
Ext. 674
Fax: 44-847-6-2121
Ext. 666

Chief Executive
Head, Business Development

Owen Pugh
Dr. Robert Anderson

Activities: Fuel reprocessing, special fuel manufacturing and testing, laser enrichment, waste conditioning, R&D in radioactive equipment and safeguards.

(contd next page)

AEA FS (contd)**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 US \$8.84 million).

- **Marshall Laboratory** (Fuel-processing research, opened in 1986).

AEA FUSION

Culham Laboratory
Culham, Abingdon
Oxfordshire OX14 3DB
United Kingdom

Tel: 44-235-46-3556
Fax: 44-235-46-3256

Chief Executive
Head, Business Development

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 IT

AEA Industrial Technology
Harwell Laboratory
Oxfordshire OX11 0RA
United Kingdom

Tel: 44-235-43-2138
Fax: 44-235-43-2064

Chief Executive
Head, Business Development

Dr. Chris Wright
Dr. Steve J. Curl

Function: Provide advanced technology to the process, manufacturing electronics, defense, and aerospace industries; process technology and plant design; instrumentation and control; materials technology and manufacture; structural assessments; advanced computing; laser applications; and computational fluid dynamics.

AEA RS

AEA Reactor Services
Risley, Warrington
Cheshire WA3 6AS
United Kingdom

Tel: 44-925-25-3019
Fax: 44-925-25-2196

Chief Executive
Head, Business Development

Dr. Tony Broomfield
Dr. Neil M. Irvine

Activities: Fast/thermal reactor technology; management of FR program and participation in international FR programs, especially the European FR; design and operational techniques for thermal reactors aimed at improving economies of existing plants and design of new plants.

AEA S&R

AEA Safety and Reliability
Wigshaw Lane, Culcheth
Warrington WA3 6AT
United Kingdom

Tel: 44-925-25-4241
Fax: 44-925-25-4535

Chief Executive
Head, Business Development

Dr. Geoff Ballard
Anthony 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, manufacturing, and engineering companies.

AWE

Atomic Weapons Establishment
Aldermaston, Reading RG7 4PR
United Kingdom

Tel: 44-73-56-4111
Fax:

Waste Management

S. Hunter

BGS

British Geological Survey
Nicker Hill, Keyworth
Nottingham, NG12 5GG
United Kingdom

Tel: 44-60-77-6111
Fax: 44-60-77-6602

Director

Dr. P. J. Cook

UNITED KINGDOM**PNL-9450-1****BNFL**

British Nuclear Fuels plc
Risley, Warrington
Cheshire WA3 6AS
United Kingdom

Tel: 44-925-83-2502
Fax: 44-925-82-2711
Ver: 44-925-83-2369

Location: About 20 miles by car from Manchester International Airport, or by train from London to Warrington (approx. 3 hours), then 6 miles by car to Risley.

Chairman

John Guinness
44-925-83-5000

Chief Exec. Officer

N. L. Chamberlain
44-925-83-5006

Dep. Chief Exec. Officer
Dir., International Group
Dir., Engineering Group
Dir., U.K. Group

Dr. Greg G. Butler
Graham Watts
Ken G. Jackson
Graham Smith

BNFL, Inc.

1776 I Street NW
Washington, DC 20006

Tel: 202-785-2635
Fax: 202-785-4037

President

R. "Landy" Langley

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: SELLAFIELD

British Nuclear Fuels plc
Sellafield, Seascale
Cumbria CA20 1PG
United Kingdom

Tel: 44-9402-8333
Fax: 44-9467-28987

Location: From London-Euston Station to Carlisle Station by train ca. 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 ca. 3 hours.

Dir., Magnox Reprocessing
Dir., THORP Division
Dir., Waste Mgmt./Decom. Div.
Dir., Reactor Division

Grahame K. Smith
44-9402-74245
Dave Bonser
A. D. Evans

Function: Provide spent fuel management services, including storage, reprocessing and waste management; transport of SF/wastes and complete fuel cycle services.

Facilities

- **B205 (Magnox Fuel Reprocessing Plant)**
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; shut down after a contamination release incident.
- **Magnox Fuel Handling Plant**
 - Storage/decaning of Magnox fuel.
 - Storage/dismantling of AGR fuel.

(contd next page)

BNFL: SELLAFIELD (contd)

- **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.
History: Startup, 2/1994.
- **Drigg Waste Disposal Facility** (300-acre site, 4 miles from Sellafield)
Mission: LLW disposal.
Design Basis: Shallow-land disposal in clay-based trenches and recently, in concrete vaults.
Capacity: 650,000 m³ LLW disposed of through 1989.
- **MOX Fuel Fabrication Facilities**
 - Pilot plant, capacity--7 t/a
 - Production plants, capacity--120 t/a; startup, 1995.
- **Vitrification Plant**
Mission: Solidify Sellafield HLW.
Design Basis: AVM process; product, borosilicate glass blocks.
Capacity: 250-300 t/a glass.
History: Startup, 1990.
- **WTC** (Waste Treatment Complex)
Mission: Prepare TRU waste for disposal; underground refurbishment to include supercompaction.
Milestone: Startup, 1995
- **EP-1 and EP-2**
Mission: Encapsulate ILW in cement matrix in 500-liter drums.
Capacity: 13 500-liter drums/d (EP-1); 20 500-l drums/d (EP-2).
History: Startup EP-1, 1990.
Milestone: Startup EP-2, 1994.
- **EARP** (Enhanced Actinide Removal Plant)
Mission: Remove actinides from liquid effluents by ultra-filtration and flocculation.
Capacity: 1000 m³/d.
Milestone: Startup, 1994.

BNFL: SPRINGFIELDS

British Nuclear Fuels plc
Springfields Works
Salwick, Preston
Lancashire PR4 0XJ
United Kingdom

Tel: 44-772-72-8262
Fax: 44-772-72-5607

Director, Fuel Division

Dr. R. Smith

Function: Supply fuel for U.K. reactors; UF_6 conversion to UO_2 powder/pellets production; fabricate PWR fuel; provide 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: 44-927-894040
Fax:

Asst. Dir., Geotech./Struc. Eng.
Seabed Disposal
Continental Disposal
Geotech. Division

Dr. J. B. Menzies
T. Freeman
Ms. C. M. Cooling
R. M. C. Driscoll

Waste Management R&D: Emplacement engineering and related activities; rock mechanics.

HMIP

H.M. Inspectorate of Pollution
Department of the Environment
Romney House, 43 Marsham Street
London SW1P 3PY
United Kingdom

Tel: 44-71-276-3000
Fax: 44-71-276-8100

Chief Executive

Dr. David Slater
44-71-276-8080

Director, Regulatory Systems Div.

Dr. Alan Duncan
44-71-276-8129

Research

Dr. Steven Brown

Waste Management Responsibility: Administer U.K. waste management programs; fund and coordinate waste treatment and waste isolation R&D at Harwell, BGS, and NRPB; regulate discharge of radioactive materials to the environment.

IOS

Institute of Oceanographic Sciences
Brook Road, Wormley, Godalming
Surrey GU8 5UB
United Kingdom

Tel: 44-42-879-4141
Fax:

Director

Dr. C. Summershayes

Function: Model radionuclide transport in the ocean.

MAFF

Ministry of Agriculture,
Fisheries and Food
Ergon House, Room 231
c/o Nobel House
17 Smith Square
London SW1P 3JR, U.K.

Tel: 44-71-238-6170
Fax: 44-71-238-6215

Chief Inspector

J. C. Sherlock

Function: Regulate, jointly with HMIP, management of waste prior to disposal.

MAFF Fisheries Laboratory

Pakefield Road
Lowestoft, Suffolk NR33 OHT
United Kingdom

Tel: 44-502-562244
Fax:

Director, Research

D. J. Garrod

NII

Nuclear Installations Inspectorate
Baynards House
1 Chepstow Place
Westbourne Grove
London W2 4TF, U.K.

Tel: 44-71-243-6000
Fax: 44-71-727-4116

Chief Inspector/Nuc.Installations

Sam Harbison

Function: Licensing of nuclear facilities.

NIREX

U.K. Nirex Ltd.
Curie Avenue, Harwell
Didcot, Oxon OX11 ORH
United Kingdom

Tel: 44-235-83-5153/
-3009
Fax: 44-235-83-1239

Managing Director
Technical/Projects

P. Tom McInerney
H. Beale

Function: Commission/manage research and development to propose (to the government) a site suitable for a deep repository for LLW/ILW; construct and operate the repository; continue necessary R&D on long-term waste emplacement.

Owners: BNFL (42.5%), Nuclear Electric plc (42.5%), Scottish Nuclear Ltd. (7.5), and UKAEA (7.5%) are partners in the "private limited" company. One special share, having absolute power of veto, is held by the Secretary of State for Energy.

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: Independent board, established in 1970 as a result of the Radiological Protection Act, members appointed by the Health Ministry; advice to governmental/industrial organizations on radiological protection matters and standards; contract research to improve radiological protection; some technical services.

UNITED STATES

MAJOR PUBLIC HOLIDAYS (1994)

Jan. 1	New Year	Sep. 5	Labor Day
Jan. 17	M. L. King Day	Oct. 10	Columbus Day
Feb. 21	Presidents Day	Nov. 11	Veterans Day
May 30	Memorial Day	Nov. 24	Thanksgiving
July 4	Independence	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	NE - 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, contractor, or site to be visited at least 30 days before the proposed visit. In certain cases, in lieu of form IA-473, a DOE Operations Office (site specific) form may be used but must be submitted within the same time frame. The request to visit must be based on prior arrangements with appropriate DOE or DOE contractor staff.

Population	1990	248	million
------------	------	-----	---------

ENERGY

Electric Power Capacity	1992	740	GWe
		13%	nuclear
	1995	755	GWe
		13%	nuclear
	2000	789	GWe
		13%	nuclear

Electric Power Production	1992	3271	TWh
		53%	coal
		20%	nuclear
		13%	gas
		9%	hydro./geotherm
		3%	oil
	1995	19%	nuclear
	2000	18%	nuclear

NUCLEAR POWER

Policy: Construction and operation of nuclear power stations is by private and public utilities under close regulatory control by the Nuclear Regulatory Commission (NRC) and state Public Review Commissions; R&D emphasizes increased inherent LWR safety and small, modular reactor concepts.

Nuclear Power Capacity	1992	99	GWe
	1995	101	GWe
	2000	104	GWe

Reactor Mix	1993	PWR	71 (1970-90)
			2 (1994)
		BWR	37 (1969-90)

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; spent fuel reprocessing is determined by the nuclear industry, which has elected not to reprocess because of economic considerations; disposal of spent fuel and HLW will be implemented in the future. 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; a private enrichment enterprise is being started.

Waste Management Strategy: Disposal of U.S. commercial spent fuel in a geologic repository is planned, after interim storage at reactor sites and possibly after interim storage in a monitored retrievable storage (MRS) facility; small amounts of existing commercial HLW and all defense HLW will be vitrified and disposed of in the SF repository; the Nuclear Waste Policy Act (NWPA) of 1982 and its 1987 amendments (NWPAA) mandate start of spent fuel acceptance in 1998 by the government for eventual disposal; short-lived LLW is disposed of in regional near-surface disposal facilities; states and regional compacts of states are developing new commercial LLW disposal facilities; demonstration of defense transuranic (TRU) waste disposal is planned in a geologic repository in a salt formation.

Cumulative Spent Fuel Arisings	1993	27,800 tHM
	1995	31,400 tHM
	2000	40,400 tHM

Major Milestones

- Demonstration start of disposal of defense TRU waste at Waste Isolation Pilot Plant (WIPP) TBD
- Candidate site identified for MRS facility TBD
- States/compacts must have civilian LLW disposal capability or manage their own LLW 1994
- States not having LLW disposal capability must take title to all LLW produced within their state 1996
- Startup of MRS facility with limited SF acceptance 1998
- Start construction of geologic repository for commercial SF/HLW 2004
- Startup of repository for spent fuel and HLW 2010
- Start of study on need for second repository for SF/HLW 2007-2010
- Environmental cleanup of DOE sites complete 2019

INTERNATIONAL RELATIONSHIPS

Member of OECD/NEA and IAEA. Bilateral agreements for cooperation (extension of several agreements in process) Canada, CEC, China, Germany, France, Japan, Spain, Sweden, Switzerland, Russia and the U.K; a brief outline of DOE agreements, primarily related to waste management, is provided in the appropriate section of other countries in this report. 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 wastes generated by its federal activities and for disposal of all HLW, SF, TRU waste, and greater-than-class-C LLW; responsible for ensuring availability of adequate technology for safe and efficient management of nuclear wastes from both civilian and federal activities.
- **HQ** (Headquarters) - Provides policy, guidance, and funding for nuclear waste management, including environmental restoration and fuel cycle programs. Specific responsibilities are divided among the following offices:
 - **EM** (Office of Environmental Management) - Environmental cleanup, compliance, technology development, transportation, and waste management activities for DOE sites identified in the Environmental Restoration & Waste Management Five-Year Plan.
 - **RW** (Office of Civilian Radioactive Waste Management) - After-reactor interim storage, transportation, and disposal of spent nuclear fuel and HLW; development of an MRS facility.
 - **PO** (Office of International Research and Development Policy, Assistant Secretary for Policy, Planning and Program Evaluation) - Coordination of DOE's international activities.
 - **OP** (Operations Office) - Implementation of HQ policy and directives at DOE sites, issuing orders to specific sites; directing efforts of DOE contractors.
 - **Contractors** - Management and operations of DOE facilities in accordance with HQ and OP guidance and orders; national R&D laboratories.

(cont'd next page)

ORGANIZATIONS (contd)

- **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 hazard-ous materials transport, including radioactive materials.
- **EPA** (Environmental Protection Agency) - Establishment and enforcement of general standards for protection of the environment.
- **NRC** (Nuclear Regulatory Commission) - Issuance of regulations, licenses, and enforcement for commercial nuclear activities and disposal of spent fuel and HLW, in compliance with general environmental standards issued by the EPA; through agreements with states that so desire, delegation of licensing selected types of nuclear facilities.

DOE (DEPARTMENT OF ENERGY) PARTIAL ORGANIZATION

Secretary

Deputy Secretary

Under Secretary

- EM - Office of Environmental Management
- RW - Office of Civilian Radioactive Waste Management
 - YMPO
- PO - Office of International Research and Development Policy, Assistant Secretary for Policy, Planning and Program Evaluation
- Other Offices
- Operations Offices
 - AL - Albuquerque
 - LANL - MOUND - RFP - SNL - WIPP
 - COO - Chicago
 - ANL - BNL - BCO
 - ID - Idaho
 - INEL - WINCO - WVNS
 - NV - Nevada
 - OR - Oak Ridge
 - ORNL
 - OAK - Oakland Operations Office
 - ETEC - LLNL
 - RL - Richland
 - PNL - WHC
 - SR - Savannah River
 - WSRC

**NRC (NUCLEAR REGULATORY COMMISSION) PARTIAL
ORGANIZATION****Chairman
Commissioners****Executive Director for Operations****OIP - Office of Internatl. Programs****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)**

UNITED STATES

PNL-9450-1

DOE-Headquarters

U.S. Department of Energy	Tel:	202-586-5000
Forrestal Building	Fax:	-5049
Washington, DC 20585	Verif:	-5100

U.S. Department of Energy	Tel:	301-903-4511
Germantown	Fax:	-3888
Washington, DC 20545	Verif:	-5465

Secretary	Hazel R. O'Leary	202-586-6210
-----------	------------------	--------------

Office of Environmental Management

EM-1	Assist. Secretary	Thomas P. Grumbly	202-586-7710
	Deputy		-7709
EM-10	Plan./Resource		
	Mgmt.	Ken Glozer	-1665
EM-20	Envir. QA/QC	Randal S. Scott	-8754
EM-30	Waste Operations	Jill E. Lytle	-0370
EM-32	Eastern WM Op.	Joseph A. Coleman	301-903-7410
EM-33	Program Support	James A. Turi	-7147
EM-34	WIPP	Mark W. Frei	-7201
EM-35	Western WM Op.	Lawrence H. Harmon	-7105
EM-36	Hanford WM Op.	James Antizzo (A)	-7170
EM-40	Envir. Restoration	John Bavblitz (A)	202-586-6331
EM-42	Eastern Area	James J. Fiore	301-903-8141
EM-43	Program Support	William Wisenbaker	-8105
EM-44	Northwestern Area	Sally M. Robison	-8161
EM-45	Southwestern Area	Ralph G. Lightner	-8180
EM-50	Tech. Development	Clyde W. Frank	202-586-6382
EM-52	Institutional/		
	Tech. Integration	Susan M. Prestwich	-7924
EM-523	Intnl. Tech. Exch.	Dave W. Geiser	-7640
EM-54	Research/		
	Development	Steven C.T. Lien	-7911
EM-55	Dem. Test./Eval.	William C. Schutte	-8490
EM-60	Facility Transition	Hills W. Bixby	202-586-5151

(contd next page)

DOE-HQ (contd)**Office of Civilian Radioactive Waste Management**

RW-1	Director	Daniel H. Dreyfus	202-586-6842
RW-2	Dep. Director	Lake Barrett	-6850
RW-3	Quality Assurance	Donald G. Horton	-8858
RW-4	Strategic Plng/Intnl.	Jerome D. Saltzman (A)	-1252
RW-5	External Relations	Jerome D. Saltzman	-2277
RW-10	Prog/Resource Mgmt	Samuel Rouso	-9116
RW-20	Geol. Disposal YMPO	Robert M. Nelson (As noted below)	702-794-7920
RW-30	Systems/Compliance	Dwight E. Shelor	202-586-9896
RW-40	Storage/Transport	Ronald A. Milner	-9694

Yucca Mountain Site Characterization

Project Office (YMPO)	Tel:	702-794-7900
Phase 2, Suite 200	Fax:	-7907
101 Convention Ctr. Dr.	Verif:	-7919
Las Vegas, NV 89109		

Manager	Robert M. Nelson (A)	702-794-5170
Dep. Proj. Mgr.	J. Russell Dyer	-7986
Scientific Programs	Susan B. Jones	-7613
Eng./Field Operations	William S. Simecka	-7933
Env., Health/Safety	Wendy R. Dixon	-7947
Suitability/Licensing	Steve J. Brocoum	202-586-5355

Office of Policy, Planning and Program Evaluation

PO-1	Assistant Secretary	Susan F. Tierney	202-586-4640
PO-7	D.A.S. Intl. Affairs	Richard H. Williamson	-5493
PO-70	Intnl. R&D Policy	Harold Jaffe	-6770

DOE OPERATIONS OFFICESALBUQUERQUE OPERATIONS OFFICE (AL)

U.S. Department of Energy	Tel:	505-845-4154
Albuquerque Operations Office	Fax:	-6058
P.O. Box 5400	Verif:	-6319
Albuquerque, NM 87115		

Manager	Bruce G. Twining	845-6049
Environment/Spec. Proj.	Ronald D. Hanson	-6210
Uranium Mill Tailings	Albert Chernoff	-6134

DOE Rocky Flats Office (Denver Site)

Rocky Flats Plant	Tel:	303-966-7000
P.O. Box 464	Fax:	-4092
Golden, CO 80402-0464	Verif:	-2719

Manager	Robert M. Nelson, Jr.	966-2025
Dep. Manager	David P. Simonson	-2025
Dir., Env. Restoration	Richard Schassburger (A)	-4888

WIPP

Waste Isolation Pilot Plant	Tel:	505-887-8100
P.O. Box 2078	Fax:	-0707
Carlsbad, NM 88221-3090	Verif:	-8110

Manager (DOE)	George E. Dials	234-7300
WM Center (SNL)	Dori E. Ellis	848-0780
WIPP Sci. PM (SNL)	Wendell D. Weart	848-0788
Operating Contractor		
Mgr (WEC)	Carl M. Cox	234-8202

Fuel Cycle and Waste Management Activities: WIPP construction technical support, including design review, construction, safety assurance, operational planning, and quality assurance systems.

Function: Demonstrate defense transuranic waste disposal in a deep salt formation; if successfully demonstrated, WIPP will become a repository for this type of defense waste.

CHICAGO OPERATIONS OFFICE (COO)

U.S. Department of Energy		
Chicago Operations Office	Tel:	708-252-2001
9800 South Cass Avenue	Fax:	-2343
Argonne, IL 60439	Verif:	-2209
Manager	Cherri J. Langenfeld	252-2110
WM/Tech. Devel.	Joel C. Haugen	-2093
Envir. Restoration	Jay Hunze	-2428
Technical Support	Antanas Bindokas	-2692

IDAHO OPERATIONS OFFICE (ID)

U.S. Department of Energy		
Idaho Operations Office	Tel:	208-526-0111
850 Energy Drive	Fax:	-1184
Idaho Falls, ID 83401-1563	Verif:	(recipient)
Manager	John M. Wilczynski	526-1322
Deputy Manager	Ed L. Wilmot	-1324
Assistant Manager	Thomas F. Burns, Jr.	-7653
Program Execution	Robert M. Stallman	-1995
SF Program	Michael J. Bonkoski	-1412
R&D	Neil S. Burrell	-1984
Environmental Restoration	Lisa A. Green	-0417
Waste Management	Joel T. Case	-6795
W. Valley Proj. (NY Site)	Thomas J. Rowland	716-942-4313
Process Technology	W. Stephen Ketola	716-942-4314

NEVADA OPERATIONS OFFICE (NV)

U.S. Department of Energy		
Nevada Operations Office	Tel:	702-295-1212
P.O. Box 98518	Fax:	-1371
Las Vegas, NV 89193-8518	Verif:	-1369
Manager	Nick C. Aquilina	295-3211
Environmental Protection	Don Elle	-1146

OAK RIDGE OPERATIONS OFFICE (OR)

U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831

Tel: 615-576-5454
Fax: -1063
Verif: -1058

Manager
Dir., Energy Programs
Dep. AM Energy R&D
Laboratory Operations
Fusion/Nuclear Tech.
Waste Oper. Branch
Dir., WM/Tech. Dev.

Joe La Grone 576-4444
Thomas Jelinek -0710
Ronald Hultgren -4523
Connor Matthews -1373
Martha J. Kass -0717
Doug Underwood -5973
Larry Radcliffe -9212

OAKLAND OPERATION OFFICE (OAK)

U.S. Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, CA 94612

Tel: 510-637-1640
Fax: -2001
Verif: -1585

Manager, WM
Envir. Safety/Support
Environmental Radiation
Rad. Safety

Donald Pearman 637-1800
Daniel Nakahara -1840
Edward Ballard -1594
Ralph Kopenhaver -1597

RICHLAND (HANFORD) OPERATIONS OFFICE (RL)

U.S. Department of Energy
 Richland Operations Office
 825 Jadwin Avenue
 P.O. Box 550
 Richland, WA 99352

Tel: 509-376-7411
 Fax: -6540
 Verif: -7317

Manager	John D. Wagoner	509-376-7395
Deputy Manager	Ron A. Izatt	-4216
Performance Assessment	R. Pierre Saget	-2611
Env. Assurance/Permits/Policy	Steve H. Wisness (A)	-6798
AM, Technical Support	John J. Keating	-7387
Planning/Integration	William A. Rutherford	2-2500
Quality/Safety/Health	Richard A. Holten	-7461
Laboratory Management	Joseph J. Sutey	2-4005
Technology Development	TBD	
AM, Envir. Restoration	James D. Bauer	-6628
Environmental Restoration	Roger D. Freeberg	-7277
Environmental Remediation	Julie K. Erickson	-3603
Project Management	Larry C. Williams	-4131
AM, Waste Management	John R. Hunter	-7434
Nuclear Materials	James L. Daily (A)	-7721
Transition	James E. Mecca	-7471
Waste Management	June M. Hennig	-1366
Solid Waste/Transportation	Rudolph F. Guercia	-5494
Tank Waste Remediation	Thomas R. Sheridan (A)	-7591

SAVANNAH RIVER OPERATIONS OFFICE (SR)

U.S. Department of Energy
 Savannah River Operations Office
 P.O. Box A
 Aiken, SC 29801

Tel: 803-725-6211
 Fax: -2033
 -1259

Manager	Mario Fiori	725-2277
AM, EM/Solid Waste	Tom F. Heenan	-8074
Deputy Assistant Manager	Jessie M. Roberson	-8571
Dir., Solid Waste	Michael G. O'Rear	-5541
Dir., EM	TBD	-3966
Director, D&D	Richard D. Lynch	-8924
PM/TPO, OTD	James A. Wright	557-0558

DOE CONTRACTORSANL

Argonne National Laboratory	Tel:	708-252-2000
9700 South Cass Avenue	Fax:	-2343
Argonne, IL 60439		-2206
	Verif:	-2209

Director	Alan Schriesheim	252-3872
Waste Mgmt.	James E. Helt	-7335
Separations Science/Tech.	George Vandegrift	-4513
Pyroprocessing	James J. Laidler	-4479
Special Projects	Charles E. Klotz	-6385
ANL-West (ID)	Charles E. Till	208-533-7000

Fuel Cycle and Waste Management Activities: Remedial action for formerly used AEC sites (FUSRAP) and for surplus facilities management program (SFMP); D&D of ANL-East (Argonne, IL) contaminated facilities; mixed waste treatment and disposal, ground-water treatment; LLW/TRU waste technology; TRUEX process development; pyrometallurgical and pyrochemical fuel reprocessing, electrowinning; Environmental Restoration and Waste Management; applied R&D program support for EM; SARP review; Civilian Radioactive Waste, socioeconomic impact assessment, transportation planning, spent fuel and waste glass performance, interaction of waste package with repository environment, instrumentation development.

Major Facilities:

ANL-East (Argonne, IL): High-Level Hot-Cell Facilities; Large Gamma Radiation Facility; Alpha-Gamma Hot-Cell Facility (AGHCF).

ANL-West (Idaho Falls, ID): 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); Fuel Cycle Facility (FCF).

BCO

Battelle - Columbus Operations
505 King Avenue
Columbus, OH 43201

Tel: 614-424-6424
Fax: -5601
Verif: numbers below

Environmental Systems and Technology Division

VP/General Manager	W.J. Madia	424-7359
Technical Operations	G.J. Kovacs	-7937
Nuclear Safety	R.S. Denning	-7412
Environmental Restoration	J. Means	-5442
Systems Management	C.P. Nunn	-5482
Process Safety/Risk Mgmt.	W.W. Simmons	-3242
D&D	K.C. Brog	-4385

Fuel Cycle and Waste Management Activities: Site survey/characterization; waste packaging; disposal technology; transportation; performance assessment; safety analysis reports; environmental/socioeconomic assessments; decontamination and decommissioning; systems integration; quality assurance; licensing; nuclear engineering/technology; policy support; institutional interactions; communications and outreach; safety and training; regulatory compliance.

Hazardous Chemical and Mixed Waste Activities: Transportation; risk assessment; modeling; regulation; waste management; policy support; regulatory compliance.

BNL

Brookhaven National Laboratory Tel: 516-282-2123
Associated Universities, Inc. Fax: -3000
Upton, NY 11973 Verif: -2547

Director N. P. Samios 282-2772
LLW/HLW Peter Colombo -3045

Fuel Cycle and Waste Management Activities: Waste stabilization/solidification processes; mixed waste form performance criteria and testing protocol; subterranean waste confinement barriers; performance and risk assessment; geochemistry of contaminated soils and sediments; materials characterization and evaluation.

Major Facilities: Hot and Cold Development Laboratories; CO-60 Gamma Irradiation Facility; National Synchrotron Light Source; Alternating Gradient Synchrotron; High Flux Beam Reactor; Scanning Transmission Electron Microscope.

ETEC

Energy Technology Engineering Center Tel: 818-586-5326
Rockwell International Fax: -5118
P.O. Box 7930 Verif: -5326
Canoga Park, CA 91309-7930

General Manager D. Clark Gibbs 586-5326
Program Manager Bruce B. Gillies -5301
Tech. PM G. Subbaraman -5625

Fuel Cycle and Waste Management Activities: Decontamination and decommissioning (D&D) of structures (test reactors and hot cells) and open sites; D&D technology development; liquid metal (sodium and NaK) waste destruction; characterization and final remediation surveys; pathway analysis models; statistical treatment of survey data for regulatory compliance; statistical/computational code for estimating and displaying spatial contaminant distribution.

Major Facilities: Radioactive Materials Disposal Facility (RMDF).

INEL

Idaho National Engineering Laboratory
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415

Tel: 208-526-0111
Fax: -8339
Verif: (recipient)

General Manager	Earl Fray	526-9671
Environmental		
Restoration/WM	Jim McAnally	-1014
Power Reactor Program	Jim Okeson	-4419
Waste Technology		
Development	Ken Merrill	-0797

Fuel Cycle and Waste Management Activities: National LLW technology; D&D operation of SWEPP for TRU waste; LLW disposal operation; cask systems development; SF cask transport and testing; treatment and disposal of hazardous and mixed wastes; pollution prevention; WIPP support activities; remediation and treatment of buried TRU waste.

Major Facilities: Radioactive Waste Management Complex (RWMC); Waste Experimental Reduction Facility (WERF); Stored Waste Examination Pilot Plant (SWEPP) for TRU wastes; Test Area North Spent Fuel Storage Area (TAN); Advanced Test Reactor (ATR); Transuranic Storage Area.

LANL

Los Alamos National Laboratory
University of California
P.O. Box 1663
Los Alamos, NM 87545

Tel: 505-667-5061
Fax: -1754
Verif: -5113

Director
Director, Envir. Mgmt.
PM, EM

Siegfried S. Hecker 667-5101
Thomas Baca -2211
Jong Jansen 665-6295

PM, WM
Group Leader, WM
PM, Nuc. Tech./
Reconfiguration

TBD
Anthony Drypoleer 667-7391
Paul Cunningham -9807

Fuel Cycle and Waste Management Activities: Fundamental studies of waste materials (BES); migration from LLW (BES); D&D of various site facilities; HLW disposal site characterization (RW).

Major Facilities: Waste Disposal Field Experimental Facility; Controlled Air Incinerator Facility; Size Reduction Facility; TRU Waste Assay Systems; Advanced Testing Line for Actinide Separations (ATLAS).

LLNL

Lawrence Livermore National
Laboratory

University of California
P.O. Box 808
Livermore, CA 94550

Tel: 510-422-1100
Fax: 423-1997
Verif: 423-0672

Director
Dir., YMSCP
Energy Director

C. Bruce Tanner (A) 422-4169
Willis L. Clarke 423-4571
David E. Baldwin -1415

Fuel Cycle and Waste Management Activities: SNM disposition; waste form characterization; near-field environment characterization (geochemistry, geohydrology, geomechanics); engineered barrier system (EBS) concept development; scientific bases for waste package design; EBS materials selection and characterization; EBS performance analysis; international programs (spent fuel, introduced materials, natural analogs).

Major Facility: Large Block Test at Fran Ridge-Yucca Mountain, Nevada.

MOUND

EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, OH 45343-3000

Tel: 513-865-4020
Fax: -3742
Verif: -3575

General Manager
Tritium Technology
D&D
Waste Management

Jack L. Clark 865-3576
Eric T. Kirk -4842
Ralph R. Jaeger -3275
James F. Griffin -3097

(contd next page)

MOUND (contd)

Fuel Cycle and Waste Management Activities: Mixed waste treatment with glass melter; TRU waste technology/record systems; tritium recovery from scrap; D&D of ^{238}Pu facilities.

Major Facilities: Glass Melter; Liquid Radioactive Waste Treatment Facility; Combined Electrolysis Catalytic Exchange System (CECE); Tritium Effluent Recovery System (ERS); Hydrogen Isotope (Cryogenic Distillation) Separation System (HISS); Tritium Aqueous Waste Recovery System (TAWRS).

ORNL

Oak Ridge National Laboratory
Martin Marietta Energy
Systems, Inc.
P.O. Box 2008
Oak Ridge, TN 37831

Tel: 615-576-5454
Fax: -2912
Verif: -6068

Director	Alvin Trivelpiece	6-2900
Dir., WM/Remedial Action	Gene McNeese	4-7456
Dir., Robotics/Process Systems	Joe Heindon	-7065
Dir., OCRWM Programs	Ronald Pope	-6461
Dir., Env. Tech. Devel.	Tony Malinauskas	6-1092

Waste Management Activities: Operate waste management facilities, including disposal; develop LLW & TRU waste treatment technology, including assay and package certification; hazardous waste remedial actions; waste operations control center; UMTRA radiological survey; environmental restoration and facilities upgrade; waste management R&D.

Major Facilities: LLW disposal/storage facilities; Waste Examination Assay Facility (WEAF); 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 Wastewater Treatment Plant; hazardous waste storage and packaging facility.

(contd next page)

ORNL (contd)

Fuel Cycle and Reprocessing Activities: Develop reprocessing, remote systems, 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.

PNL

Pacific Northwest Laboratory
Battelle, Pacific Northwest
Laboratories

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99352

Tel: 509-375-2121
Fax: 376-3876
Verif: (recipient)

Director	William R. Wiley	5-2201
Engineering Technology	Bill D. Shipp	5-2921
Waste Treatment		
Technology	Richard A. Brouns	2-2219
Waste Process		
Engineering	Charles R. Allen	6-1712
Waste Systems	Gary W. McNair	5-6537
Intl. Program Support	Sue J. Mitchell	5-6479
Matls./Chem. Sciences	Walter W. Laity	5-2780
Earth/Envir. Science	Michael J. Graham	6-8314
Industrial Programs	J. Adrian Roberts	5-2614
EM Programs	Joseph D. Spencer	5-4331
Environmental Operations	Mark S. Hanson	5-6812
Envir. Tech. R&D	Steve C. Slate	5-3903
Tank Waste Remediation	Walter J. Apley	2-4664

(contd next page)

PNL (contd)

Fuel Cycle and Waste Management Activities: Waste storage and transportation; LLW, HLW, mixed, and TRU waste characterization and treatment; waste tank remediation; international program support in waste management/environmental remediation; radioisotope separation and use; damaged spent fuel stabilization; in-situ treatment and barriers for contaminated sites; disposal performance assessment; reactor safety and advanced design; integration of geologic disposal systems; management of surplus plutonium; D&D planning and technologies; assessment of past radioactive releases; environmental information systems; public involvement processes; risk management tools and health effects; analysis of environmental regulations; and integrated environmental planning and management approaches.

Major Facilities: Hot and cold analysis laboratories and development laboratories. Hot cells for pilot scale programs. Facilities for large-scale demonstrations and major basic science research.

RFP

Rocky Flats Plant
EG&G Rocky Flats, Inc.
P.O. Box 464
Golden, CO 80402-0464

Tel: 303-966-7000
Fax: -7183
Verif: -2272

General Manager
Waste Operations
Waste Minimization
Technology Development

H. P. Mann 966-4361
R. V. Morgan -6012
A. L. Schubert -6595
T. L. Rising -4725

Fuel Cycle and Waste Management Activities: Defense TRU waste technology; LLW technology development; waste treatment facilities operations, TRU/LLW minimization technology.

Major Facilities: Solid Waste Reduction Facility; TRU Waste Supercompaction; TRU Waste Assay; Liquid Waste Treatment and Fixation Facilities; Microwave Melting of Liquid Waste Treatment Sludges.

SNL

Sandia National Laboratory
P.O. Box 5800
Albuquerque, NM 87185-5800

Tel: 505-844-5678
Fax: -1068
Verif: -8917

President	Al Narath	4-7261
VP, Energy & Environment	Dan Hartley	5-9488
Energy & Environ.	Thomas O. Hunter	4-3763
Envir. & Transportation	Joan Woodard	5-9917
Nuclear Waste Mgmt.	Dori Ellis	848-0780
Nuclear Energy Technology	Nestor Ortiz	4-0577
Reactor Engineering	Jim Rice	5-7301

Fuel Cycle and Waste Management Activities: ER/WM technology development, radioactive waste management (Yucca Mountain, WIPP, Greater Confinement Disposal, LLW), waste management strategic planning, reactor safety, new production reactor, reactor engineering technology.

Major Facilities: Research reactors and numerous test facilities.

SRS

Westinghouse Savannah River
Company (WSRC)
Savannah River, TE
P.O. Box 616
Aiken, SC 29802

Tel: 803-725-6211
Fax: -1660
-2978
Verif: -5331

VP/General Manager	Norm F. Boyter	952-7193
Solid Waste/Environ. Rest.		
Deputy General Manager	Gale K. Hovey	2-7189
Solid Waste	Hugh F. Daugherty	557-6305
Environmental Restoration	A.M. (Sam) Schwartzman	644-6841
Transition, D&D	Dennis A. Stevenson	-5021
Program Management	Clay B. Jones	952-7917
VP/Gen. Manager	Austin B. Scott	725-2585
HLW Tech. Director, HLW	Harry D. Harmon	725-3887
HL Liquid Waste	G. Todd Wright	557-1527
DWPF	David B. Amerine	557-1050

Fuel Cycle and Waste Management Activities: Operate fuel reprocessing facilities and associated spent fuel storage, HLLW tank storage, and treatment facilities for defense waste; operate LLW shallow-land burial grounds; start up and operate DWPF; store mixed waste; site remediation.

Major Facilities (existing and planned): Defense 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.

(contd next page)

SRS (contd)**Savannah River Technology Center**

Westinghouse Savannah River

Company (WSRC)

Savannah River, TE

Building 773A

Aiken, SC 29808

Fax: 803-725-1660

Verif: -2304

Vice President/Director

WM/Environment

TPM, OTD

Inter. Prog. Coord.

Crispin W. Thiessen (A) 725-3422

Lucien M. Padouchado -3701

John L. Steele -1830

Bruce G. Kitchen -5331

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; mixed/hazardous waste technology development; groundwater remediation technology development.

Major Facilities: HLW Vitrification Pilot Plant; HLW Tank Mockup; HLW Caves for Process Development; Groundwater Remediation Demonstration; Bioremediation Demonstration; MLLW Vitrification.

TRWTRW Environmental Safety
Systems Inc.2650 Park Tower Drive
Vienna, VA 22180Tel: 703-204-8500
Fax: -8580

President/General Mgr.	Roland L. Robertson	204-8600
Asst. Gen. Mgr. Operations	Ray W. Godman	-8605
Asst. Gen. Mgr. Systems	Arthur S. Kubo	-8680
Asst. Gen. Mgr. NV	L. Dale Foust	702-794-1804
	Fax:	-1843

Function: Management and Operating Contractor (M&O) for the DOE Office of Civilian Radioactive Waste Management (OCRWM); supports OCRWM through systems engineering, design, development, and technical direction of the Civilian Radioactive Waste Management System. The OCRWM mission is permanent disposal of the nation's spent nuclear fuel and HLW in a manner that protects the health and safety of the public and the quality of the environment.

WHC

Westinghouse Hanford Company	Tel:	509-376-7411
P.O. Box 1970	Fax:	-4668
Richland, WA 99352	Verif:	-5777

President	A. LaMar Trego	376-7803
Dir., President's Office	Ronald E. Lerch	-5107
Exec. VP, TWRS	William T. Alumkal	373-3563
VP, Transition Projects	Ronald J. Bliss	376-6427
VP, Solid Waste	Henry E. McGuire	376-1400
Dir., Spent Fuel	John C. Fulton	373-5823

Fuel Cycle and Waste Management Activities: Hanford Site operating contractor; HLW tank storage; Cs/Sr recovery and encapsulation; HLW concentration and solidification; liquid LLW treatment and fixation; TRU waste assay; Hanford waste disposal; breeder fuel development and fabrication; spent fuel storage; solid waste disposal operations.

Major Facilities: Plutonium Finishing Plant; Fast Flux Test Facility (shut down); Fuel Development Laboratories; PUREX Plant (shut down 1992); UO₃ Plant; B Plant; Tank Farms.

WINCO

Westinghouse Idaho Nuclear
Company, Inc.
P.O. Box 4000
Idaho Falls, ID 83415-3201

Tel: 208-526-0111
Fax: -7146
Verif: (recipient)

President	William C. Moffitt	526-0998
VP/Director, Applied Technology	Len F. Ermold	-4628
VP/Manager Operations	Steve M. Halupa	-9003

Fuel Cycle and Waste Management Activities: Receive and store spent nuclear fuel from Navy and other DOE sources, including characterization and technology development for final disposal; manage and process liquid and solid LLW and HLW (including necessary technology development) for final disposal.

Major Facilities: Fluorinel and Storage Facility (FAST), New Waste Calcining Facility (NWCF), Liquid Effluent Treatment and Disposal (LET&D) facility, Remote Analytical Laboratory (RAL), Idaho Research Center (IRC), and Fuel Processing Facility (FPF) - not yet complete.

WVNS

West Valley Nuclear Services Co., Inc.
P.O. Box 191
10282 Rock Springs Road
West Valley, NY 14171-0191

Tel: 716-942-3235
Fax: -4246
Verif: -4750

President	William G. Poulson	-4344
VP/Deputy Project Mgr.	James L. Little	-4570

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 (supernatant processing, evaporation, remote cementation facility, product storage).

OTHER U.S. ORGANIZATIONSEPA

Environmental Protection Agency	Tel:	202-260-2090
401 M Street S.W.	Fax:	-7883
Washington, DC 20460	Verif:	-2078

International Activities

Assistant Administrator	Dr. Alan D. Hecht	260-4870
Multilat. Staff Dir.	Pat Koshel	-0797

Radiation Programs

Director	Margo T. Oge	233-9320
Criteria Stnds.	J. William Gunter	-9290
Waste Management	Lawrence Weinstock	-9310

Solid Waste

Director	Michael H. Shapiro	260-4627
Dep. Dir., State Programs	Matthew Hale	703-308-8404

Function: Establish and enforce standards for protection related to radioactive and hazardous waste.

EPRI

Electric Power Research Institute		
3412 Hillview Avenue	Tel:	415-855-2000
P.O. Box 10412	Fax:	-2800
Palo Alto, CA 94303	Verif:	-2674

President	Richard Balzhiser	855-2141
VP/Director, Nuc. Power	John J. Taylor	-2030
Fuel Performance Stor./Disp.	Rosa Yang	-2481
Low-Level Waste	Christopher J. Wood	-2379
Fuel Cycle	Robert Williams	-2064

(contd next page)

EPRI (contd)

Fuel Cycle and Waste Management Activities: Spent fuel rod consolidation study; cooperative on-site demonstration of spent fuel storage in metal casks/concrete silos; conceptual designs for LLW disposal sites; demonstration of transportable spent fuel metal storage casks; spent fuel storage and transportation studies; fuel failures, fuel cladding corrosion, high-temperature operation and extended burnup; fuel performance computer models; HLW repository performance assessment.

NRC

U.S. Nuclear Regulatory Commission
Washington, DC 20555

Tel: 301-492-7000
Fax: 504-2260
Verif: -2262

Chairman	Ivan Selin	504-1759
Commissioner	Kenneth C. Rogers	-1855
Commissioner	Forrest J. Remick	-1820
Commissioner	E. Gail de Planque	-1800
Commissioner	Vacant	

Office of International Programs (OIP)

Director	Carlton R. Stoiber	504-1780
Bilat. Cooperation/Asst.	James R. Shea	-2336
Non-Prolif./Exp./Multilat. Rel.	Ronald D. Hauber	-2344

Office of Nuclear Material Safety and Safeguards (NMSS)

Director	Robert M. Bernero	415-7800
Fuel Cycle Safety/Safeguards	Robert F. Burnett	-7212
Indust./Medical Nuc. Safety	Carl J. Paperiello	-7264
Waste Management	Malcolm R. Knapp	-7437

(contd next page)

NRC (contd)**Office of Nuclear Reactor Regulation (NRR)**

Director	William Russell	301-504-1270
Reactor Projects I/II	Steven A. Varga	-1403
Reactor Projects III/IV/V	Jack W. Roe	-1354
Adv. Reactors/ License Renewal	Dennis M. Crutchfield	-1199
Operating Reactor Support	Brian K. Grimes	-1163
Systems Safety/Analysis	Vacant	-2884
Reactor Insp./Licensee Perform.	Charles E. Rossi	-2903
Reactor Controls/Human Factors	Bruce A. Boger	-1004
Radiation Safety/Safeguards	Frank J. Congel	-1088

Office of Nuclear Regulatory Research (RES)

Director	Eric S. Beckjord	492-3700
Engineering	Lawrence C. Shao	-3800
Safety Issues Resolution	Warren Minners	-3900
Systems Research	Brian Sheron	-3500
Regulatory Applications	Bill M. Morris	-3750

Function: Issue regulations and licenses and enforce them for commercial nuclear activities and disposal of spent fuel and HLW, in compliance with general environmental standards issued by the EPA; carry out R&D to support regulatory function.

Regional Offices

Philadelphia - Region I	Thomas T. Martin	215-337-5299
Atlanta - Region II	Stewart D. Ebnetter	404-331-5500
Chicago - Region III	John B. Martin	708-829-9657
Dallas - Region IV	Robert D. Martin	817-860-8225

NWTRB

U.S. Nuclear Waste Technical

Review Board

1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Tel: 703-235-4473
Fax: -4495
Verif: -4473

Chairman

Executive Director

Dir., External Affairs

John E. Cantlon

William D. Barnard

Paula N. Alford

Function: Established by Congress in the Nuclear Waste Policy Amendments Act of 1987 to provide independent review of DOE's technical and scientific program for the disposal of commercial spent nuclear fuel and defense HLW. At full complement, eleven members serve on the Board; all are appointed by the President.

ONWN

Office of the Nuclear

Waste Negotiator

1823 Jefferson Place, N.W.
Washington, DC 20036

Tel: 202-634-6244
Fax: -6251
Verif: -6244

Office of the Nuclear Waste Negotiator

3050 North Lakeharbor Lane

Suite 100

Boise, Idaho 83703

Tel: 208-334-9876
Fax: -9880
Verif: -9876

Negotiator

Deputy Negotiator

Science Advisor

Richard H. Stallings

Robert Mussler

Dr. Robert Liimatainen

Function: Established by the Nuclear Waste Policy Amendments Act of 1987 as an independent executive agency of the federal government to identify a state or Indian tribe willing to host an MRS facility or permanent repository for HLW. Authorized to negotiate with interested potential hosts to determine the terms and conditions under which they would agree to serve as host to put such agreement in the form of legislation and submit it to Congress for enactment into law.

USGS

U.S. Geological Survey
410 National Center
12201 Sunrise Valley Drive
Reston, VA 22092

Tel: 703-648-4000
Fax: -5295
Verif: -5235

Director
Asst. Dir./Eng. Geology
Nuclear Waste Hydrology
HLW
LLW
Toxic Waste

Gordon P. Eaton 648-7411
James F. Devine -4423
Newell J. Trask -5719
Peter R. Stevens -5721
Gail Mallard -6872

YMP TPO (Denver Office) Larry R. Hayes 303-776-0516

Fuel Cycle and Waste Management Activities: Basic/applied research on hydrogeologic processes relevant to radioactive and toxic waste disposal; geologic/hydrologic investigations to determine suitability of potential HLW repository site at Yucca Mountain; site investigations/research at DOE and DOD installations and EPA Superfund sites; consultant for EPA, DOE, DOD, Dept. of Agriculture (DOA), Bureaus of Land Management (BLM), Mines (BOM), and Reclamation (BOR), and state agencies.

INTERNATIONAL AGENCIES

CECCommission of the European
Communities200 Rue de la Loi
1049 Brussels, BelgiumTel: 32-2-299-1111
Fax: 32-2-295-0138 or
-0139, -0140Commissioner for Science,
Research and Development,
Joint Research Centres
Director-General, Science/R&D
Director-General, JRCs, Deputy
Director-General, Science/R&D
Director, Energy R&TDAntonio Ruberti
Paolo FasellaHendrik Tent
Herbert J. Allgeier
32-2-295-4055
Werner Balz (A)
32-2-295-4055

Division, Fuel Cycle & Safety

R&D Program RWM
Safety Studies
Waste Form R&D
Disposal Studies
URLsNicolo Cadelli
Nicolo Cadelli
Michel Hugon
Henning von Maravic
Bertus HaijinkR&D Program D&D Nuc.
InstallationsRainer Simou
32-2-295-6623Division, Radiological Protection
Director-General, Environment, Nuclear
Safety & Civil Protection
Director, Nuclear Safety, Industry/
Environment, Civil Protection

Jaak Sinnaeve

TBD

Edward Bennett
32-2-295-2251Division, Radiation Protection
Division, Envir. Monitoring
Director, Euratom SafeguardsHans Eriskat
George Fraser
Wilhelm Gmelin
32-72-32-211

Dir. Gen., Euratom Supply Agency

Michael Goppel
32-2-295-7894

(contd next page)

CEC (contd)**MEMBER STATES - EUROPEAN COMMUNITY (EC)**

Belgium	Greece	Netherlands
Denmark	Italy	Portugal
France	Ireland	Spain
Germany	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 (through tax on Member States); conducted by Joint Research Centre establishments at Ispra (Italy) and Karlsruhe (Germany).
- **Shared-cost action**--coordinated and partly (50%) funded by CEC HQ under cost-sharing contracts; conducted by research centers, universities, and industries in the Member States:
 - Decommissioning of Nuclear Installations
 - Radioactive Waste Management and Disposal
 - Remote Handling in Hazardous Nuclear Environment - Robotics

Cooperation Programs

Participation/support in joint project with various nations and/or other international organizations.

DOE/CEC Agreement for Waste Management**Technology Exchange**

Term: 10-6-82 to 10-6-92

Scope: Characterization of waste forms; disposal in geologic formations; emphasis on R&D.

CEC-JRC: ISPRA

CEC Joint Research Center
Ispra Establishment
21020 Ispra (Varese)
Italy

Tel: 39-332-78-9111
Fax: 39-332-78-9045

Location: Northern Italy; may be reached by air travel to Milan, ground transport to Ispra, about 50 km.

Safety Technology
Nuclear Fuel Cycle R&D

H. Holtbecker
H. Dworschak

Waste Management R&D: R&D in treatment and storage of radioactive wastes; volume reduction and conditioning TRU wastes; actinide separation; nuclide assay in wastes.

CEC-JRC: KARLSRUHE

Karlsruhe Joint Research Centre
(European Institute for
Transuranium Elements)
Postfach 2266
76125 Karlsruhe
Federal Republic of Germany

Tel: 49-7247-841
Fax: 49-7247-95-1590

Director

Dr. Jacques van Geel

Location: On the site of the German Nuclear Research Center KfK in Linkenheim, near Karlsruhe.

Function: Basic research in the transuranium elements, especially plutonium; reactor fuels development; R&D on actinide partitioning and transmutation.

Fuel Cycle R&D: Plutonium conversion and plutonium fuels.

Waste Management R&D: Characterization of vitreous HLW forms and SF when considered as waste.

Safeguards R&D: Fissile material solution analyses.

IAEA

International Atomic Energy

Agency

Wagramer Strasse 5

P.O. Box 100

1400 Vienna, Austria

Tel: 43-1-2360-00

Tel: 43-1-2360-ext.

Fax: 43-1-2345-64

Director-General

Hans Blix -1111

Dep. Dir.-Gen. Nuc. Energy/Safety

Boris Semenov -2600

Dir. Nuc. Fuel Cycle/Waste Mgmt.

Robert Baschwitz -2650

Head, Waste Management

Donald E. Saire -2674

Waste Mgmt./U.S. Staff

Candace Y. Chan -2607

John R. Wiley -6097

RADWASS Program

Ernst Warnecke -2676

Head, Nuc. Mtls./Fuel Cycle Tech.

Norubu Oi -2766

Dep. Dir.-Gen. Safeguards

Bruno Pellaud -1800

Dep. Dir.-Gen. Tech. Cooperation

Jijui Qian -2300

Dep. Dir.-Gen. Research/Isotopes

Sueo Machi -1600

Dep. Dir.-Gen. Administration

David B. Waller -1020

MEMBER STATES

120 nations (U.N. members, including the U.S.).

FUNCTION

Autonomous intergovernmental organization established in 1957 in accordance with a decision of the General Assembly of the United Nations; authorized to foster research and development in the peaceful uses of nuclear energy and exchange of scientific and technical information; establish and administer safeguards against the diversion to military purposes of nuclear materials intended for use in civil nuclear programs; and to establish or administer health and safety standards.

IAEA (contd)**WASTE MANAGEMENT ACTIVITIES**

- ♦ Collect, prepare, review, and disseminate technical and scientific information on
 - planning of waste management systems and programs
 - handling, treatment, storage, and conditioning of waste, including uranium mill tailings
 - disposal of waste
 - assessment of the radiological and environmental consequences of waste management
 - decontamination and decommissioning of nuclear facilities
 - environmental restoration
- ♦ Develop and promote international consensus documents (Safety Fundamentals, Standards, Guidelines, and Practices) in all areas of radioactive waste management - implemented through the Radioactive Waste Safety Standards Programs: RADWASS
- ♦ Provide direct assistance to Member States through the
 - Waste Management Advisory Program - WAMAP - focused on developing nuclear programs
 - Waste Management Assessment and Technical Review Program - WATRP - an international peer review service for developed programs
- ♦ Serve as scientific and technical body for international conventions (e.g., London Convention) and multinational projects (i.e., International Arctic Seas Assessment Program - IASAP)
- ♦ Assist in and facilitate international/multinational projects (e.g., UNDP and UNEP)

(contd next page)

IAEA (contd)

- Promote and sponsor research work and development of data and technologies through Technical Assistance Projects and Coordinated Research Projects.

U.S. Mission to IAEA (UNVIE)

Obersteinergasse 11
1190 Vienna, Austria

Tel: 43-222-36-3152
Fax: 43-1-364-1585

Nuclear Policy
Nuclear Technology
Safeguards
Science Attaché

Michael J. Lawrence
Bruce Cooper
Marvin Peterson
Lisa Hilliard

PARTIAL IAEA ORGANIZATION

Director General	- Hans Blix
— Dep. Dir. Gen. Safeguards	- Bruno Pellaud
— Dep. Dir. Gen. Tech. Cooperation	- Jihui Qian
— Dep. Dir. Gen. Research/ Isotopes	- Sueo Machi
— Dep. Dir. Gen. Nuc. Energy/Safety	- Boris Semenov
— Dir., Nuclear Fuel Cycle/WM	- Robert Baschwitz
— <u>Waste Management</u>	- Donald E. Saire
— Predisposal	- Vladimir Tsyplenkov
— Disposal	- Arnold Bonne
— D&D	- Mike Larala
— Rad./Env. Effects	- Gordon Linsley
— RADWASS/WATRP	- Ernst Warnecke
— <u>Nuc. Mtls./FC Tech.</u>	- Noboru Oi
— Raw Materials	- Mohamad Tachid
— Fuel Tech/Perform.	- Georgi Sukhanov
— SF Management	- Feret Takats
— Dir., Nuclear Safety	- Morris Rosen
— Dir., Nuclear Power	- Poong-Eil Juhn
— Dir., Sci/Tech. Information	- Joyce Amenta

ICRP

International Commission
on Radiological Protection
Clifton Avenue
Sutton, Surrey SM2 5PU
United Kingdom

Tel: 44-81-642-4680
Fax:

Chairman, Main Commission
Scientific Secretary

Prof. Roger Clarke
Dr. Hyton Smith

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
Dep. Secretary General

Jean Claude Paye
Robert A. Cornell
Pierre Vinde
M. Taniguchi

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

Peter Paul Jodoin
33-1-45-24-74-24

OECD/NEA

OECD Nuclear Energy Agency

le Seine Saint Germain

12, boulevard des Isles

92130 Issy-les-Moulineaux, France

Tel: 33-1-45-24-11-12

Fax: 33-1-45-24-11-10

Director General

Kunihiko Uematsu

33-1-45-24-10-00

Deputy Director General

Samuel Thompson

33-1-45-24-10-02

Deputy Dir., Safety/Regulation

33-1-45-24-10-04

Radiation Protection/Waste Mgmt.

Jean-Pierre Olivier

33-1-45-24-10-40

Nuclear Safety

Giani Frescura

33-1-45-24-10-50

Deputy Dir., Science/Technology

Philippe Savelli

33-1-45-24-10-06

NEA Data Bank

Nigel Tubbs

Nuclear Development

Geoffrey Stevens

33-1-45-24-10-60

MEMBER STATES

Australia

Austria

Belgium

Canada

Denmark

Finland

France

Germany

Greece

Iceland

Ireland

Italy

Japan

Luxembourg

Netherlands

Norway

Portugal

S. Korea

Spain

Sweden

Switzerland

Turkey

U.K.

U.S.

(contd next page)

OECD/NEA (contd)

FUNCTION

Promote orderly development of peaceful uses of nuclear energy through cooperation among Member States. Initiate, encourage, and coordinate cooperative work in reactor and nuclear fuel cycle studies, radiation protection and waste management, nuclear safety, regulatory matters, and nuclear data collection.

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) - Established in 1975; composed of senior experts and government representatives from Member Countries; responsible for national policy, regulation, and program development/implementation; information exchange and discussion forum on waste management policy, regulatory, technical and scientific issues; participation of CEC and IAEA.
- 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, forum for discussions of site characterization issues and promotion of specific studies in this area.

(contd next page)

OECD/NEA (contd)

- **Probabilistic System Assessment Group (PSAG)** - Initiated in 1985; provides a broad forum for discussion and development of probabilistic safety assessment codes; sponsors code intercomparison exercises; reports to the RWMC on the technical aspects of such codes.

- **Liaison Committee for Cooperative Program on Decommissioning**

Participants: Belgium, Canada, France, Germany, Italy, Japan, Spain, Sweden, U.K., U.S.

Term: 1990-1995 (Phase 2).

Scope: Exchange of scientific and technical information concerning nuclear installation decommissioning projects.

- **Committee on Radiation Protection and Public Health (CRPPH)**

- **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, U.K., U.S., IAEA; IMO is an associate member.

Term: 1981-1995.

Scope: Investigate oceanographic and biological characteristics of the northeast Atlantic disposal site and perform related scientific work; as of 1987, extended to cover land-based discharges.

- **Committee for Tech./Econ. Studies on Nuclear Energy Development and Fuel Cycle (NDC)**

- 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: Provide governments and scientific communities with competent and reliable information, based on a very wide field of expertise and matured in international debate, to assist in policy discussions.

PARTIAL NEA ORGANIZATION

Director General

Kunihiko Uematsu

Dep. Dir. General

Samuel Thompson

Safety and RegulationRadiation Protection/Waste Management

Jean-Pierre Olivier

Oswaldo Ilari

Bertrand Ruëgger

Christer Wiktorsson

Edward Patera

Claudio Pescatore

- CRPPH - Committee for Radiation Protection/
Public Health
- RWMC - Radioactive Waste Management
Committee

Nuclear Safety

Giani Frescura

Jacques Royen

- CSNI - Committee for Safety of Nuclear Installations
- CNRA - Committee for Nuclear Regulatory Activities

Nuclear Development

Geoffrey Stevens

James Joosten

Pierre Girouard

- NDC - Committee for Technical/Economic Studies on
Nuclear Energy Development/Fuel Cycle

Science and Information Processing

Philippe Savelli

Nigel Tubbs

- NSC - Nuclear Science Committee

NUCLEAR SOCIETIES

AUSTRALIA

Australian Nuclear Association (ANA)

P.O. Box 445

Sutherland, N.S.W. 2232

Australia

Tel: 61-2-528-8529

Fax: 61-2-543-9263

BELGIUM

Forum Nucléaire Belge (ASBL)

Avenue Lloyd George 7

1050 Brussels, Belgium

Tel: 32-2-647-22-92

Fax: 32-2-647-04-54

Belgian Nuclear Society (BNS)

Ravensteinstreet 3

1000 Brussels, Belgium

Tel: 32-2-774-0511

Tel: 32-2-774-0547

CANADA

Canadian Nuclear Association (CNA)

144 Front St. West, Suite 725

Toronto, Ontario M5J 2L7

Canada

Tel: 416-977-6152

Fax: 416-979-8356

Canadian Nuclear Society (CNS)

144 Front St. West, Suite 725

Toronto, Ontario M5J 2L7

Canada

Tel: 416-977-7620

Fax: 416-979-8356

CHINA

Chinese Nuclear Society (CNS)

P.O. Box 2125

Beijing 100822, China/PR

Tel: 86-1-801-2211

Fax: 86-1-867-188

CIS

Nuclear Society International
Kurchatov Square
123182 Moscow
Russian Federation

Tel: 7-95-196-2073
Fax: 7-95-943-0074

World Association of Nuclear
Operators (WANO)
c/o State Institute for Nuclear
Power Plant Operation
Fergankaya 25
109507 Moscow
Russian Federation

Tel: 7-95-377-0104
Fax: 7-95-376-0897

EUROPE

European Nuclear Society (ENS)
P.O. Box 5032
3001 Bern, Switzerland

Tel: 41-31-320-6111
Fax: 41-31-382-4466

Forum Atomique Européen (FORATOM)
22 Buckingham Gate
London SW1E 6LB
United Kingdom

Tel: 44-71-828-0116
Fax: 44-71-931-0646

FINLAND

Finnish Nuclear Society (ATS)
Loennrotinkatu 37
00180 Helsinki 18, Finland

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

FRANCE

Forum Atomique Français
48, rue de la Procession
75015 Paris, France

Tel: 33-1-45-67-07-70
Fax: 33-1-40-65-92-29

Section Française de l'ANS (SFANS)
c/o Framatome
Tour Fiat, Cedex 16
92084 Paris la Défense
France

Tel: 33-1-47-96-14-14
Fax: 33-1-47-96-30-31

Société Française d'Energie
Nucléaire (SFEN)
48, rue de la Procession
75015 Paris, France

Tel: 33-1-44-49-60-00
Fax: 33-1-44-49-60-11

World Association of Nuclear
Operators (WANO)
39, Avenue de Friedland
75008 Paris, France

Tel: 33-1-40-42-30-78
Fax: 33-1-40-42-92-77

GERMANY

Deutsches Atomforum e.V. (DAtF)
Heussallee 10
53113 Bonn 1, Germany

Tel: 49-228-507-0
Fax: 49-228-507-219

Kerntechnische Gesellschaft e.V.
(KTG)
Heussallee 10
53113 Bonn 1, Germany

Tel: 49-228-50-7259
Fax: 49-228-50-7219

ITALY

ANS Sezione Locale Italiana
c/o Ansaldo S.p.A.
C.so Perrone 25
16161 Genoa, Italy

Tel: 39-10-655-8505
Fax: 39-10-655-8816

Forum Italiano dell'Energia
Nucleare (FIEN)
Palazzo Taverna
Via di Monte Giordano, 36
00186 Rome, Italy

Tel: 39-6-689-3091
Fax: 39-6-8528-2591

Società Nucleare Italiana (SNI)
Facolta di Ingegneria
Viale Risorgimento 2
40136 Bologna, Italy

Tel: 39-51-644-3400
Fax: 39-51-644-3411

JAPAN

Atomic Energy Society of Japan (AESJ)
1-1-13, Shimbashi
Minato-ku, Tokyo 105, Japan

Tel: 81-3-508-1261
Fax: 81-3-581-6128

Japan Atomic Industrial
Forum (JAIF)
6th Floor, Toshin Bldg.
1-13, Shimbashi
Minato-ku, Tokyo 105, Japan

Tel: 81-3-508-2411
Fax: 81-3-508-2094

World Association of Nuclear
Operators (WANO)
c/o Komae Institute, CRIEPI
2-11-1 Iwato-Kita
Komae-shi, Tokyo, Japan

Tel: 81-3-480-4809
Fax: 81-3-480-5379

KOREA

Korea Atomic Industrial
Forum, Inc. (KAIF)
Yeoeuido P.O. Box 1021
Seoul 150-610, Korea

Tel: 82-2-785-2570
Fax: 82-2-785-3975

Korean Nuclear Society (KNS)
No. 21, Yeoeuido-dong
Youngdungpo-Ku Box 109
Seoul 150-610, Korea

Tel: 82-2-786-5975
Fax: 82-2-786-5975

NETHERLANDS

Nederlands Atoomforum
P.O. Box 1
1775 ZG Petten
Netherlands

Tel: 31-2246-4082
Fax: 31-2246-3490

Netherlands Nuclear Society
c/o N.V. Kema
Utrechtsweg 310
6812 AR Arnhem
Netherlands

Tel: 31-85-56-2491
Fax: 31-85-45-8279

SPAIN

Forum Atómico Español
Boix y Morer, 6
28003 Madrid, Spain

Tel: 34-12-553-63-03
Fax: 34-12-535-08-82

Sociedad Nuclear Española (SNE)
Campoamor 17
28004 Madrid, Spain

Tel: 34-1-308-6318
Fax: 34-1-308-6344

SWEDEN

Swedish Atomic Forum (SAFO)

Box 1704

111 87 Stockholm, Sweden

Tel: 46-8-790-04-95

Fax: 46-8-10-78-28

Föreningen Kärnteknik (FK)

Box 1419

111 84 Stockholm, Sweden

Tel: 46-8-613-81-46

Fax: 46-8-796-71-02

SWITZERLAND

Schweizerische Vereinigung für

Atomenergie (SVA)

Postfach 5032

3001 Bern, Switzerland

Tel: 4-31-22-58-82

Fax: 4-31-22-92-03

Schweizerische Gesellschaft der

Kernfachleute (SGK)

c/o Paul Scherrer Institute

5232 Villigen-PSI

Switzerland

Tel: 41-56-99-2692

Fax: 41-56-98-2327

UNITED KINGDOM

British Nuclear Energy Society

(BNES)

1-7 Great George Street

London SW1P 3AA

United Kingdom

Tel: 44-71-222-7722

Fax: 44-71-222-7500

British Nuclear Forum (BNF)

22 Buckingham Gate

London SW1E 6LB

United Kingdom

Tel: 44-71-828-0116

Fax: 44-71-828-0110

(contd next page)

UNITED KINGDOM (contd)

Institution of Nuclear Engineers

(INuE)

Allan House

1 Penerley Road, Catford

London SE6 2LQ

United Kingdom

Tel: 44-81-698-1500

Fax: 44-81-695-6409

World Association of Nuclear

Operators (WANO)

Chelsea Chambers

262a Fulham Rd.

London SW10 9EL

United Kingdom

Tel: 44-71-352-3617

Fax: 44-71-351-9678

UNITED STATES

American Nuclear Society (ANS)

555 North Kensington Avenue

La Grange Park, IL 60525

Tel: 312-708-6611

Fax: 312-708-0499

Nuclear Energy Institute

Suite 400, 1776 I Street NW

Washington, DC 20006-2495

Tel: 202-739-8000

Fax: 202-785-4019

World Association of Nuclear

Operators (WANO)

Suite 1500

1100 Circle 75 Parkway

Atlanta, GA 30339-3064

Tel: 404-953-7602

Fax: 404-953-7549

YUGOSLAVIA

Professional Section of ETAN

for Nuclear Technique and

Technology (ETAN-NDE)

c/o Institut Jozef Stefan

Jamova 39

61000 Ljubljana, Yugoslavia

Tel: 38-61-371-321

Fax: 38-61-219-365

UNITED KINGDOM (cont.)

Institute of Patent Engineers
(London)
Allington
17, Abchurch Lane, London
1, London EC4N 3JF
London Telephone
44-01-581-1301
44-01-581-5500
Tele
Fax

World Association of Writers
(London) (WAW)
Charles Lamb
25, Abchurch Lane
1, London EC4N 3JF
London Telephone
44-01-581-5617
44-01-581-5678
Tele
Fax

UNITED STATES

Western Union Telegraph
(WU)
555 North Washington Avenue
1, Chicago, Ill. 60610
312-586-4111
312-586-4133
Tele
Fax

Western Union Telegraph
(WU)
2000 W. 17th Street NW
Washington, D.C. 20006-2025
202-336-6000
202-336-6019
Tele
Fax

World Association of Writers
(WAW)
2000 W. 17th Street
1100, Chicago, Ill. 60610
Chicago, Ill. 60610-2024
404-587-1612
404-587-1613
Tele
Fax

YUGOSLAVIA

Engineering Section of ETAS
for Western European and
Technology (ETAS-WRO)
for Western European
1, Belgrade
11000 Belgrade, Yugoslavia
38-01-519-367
38-01-519-367
Tele
Fax

GLOSSARY

**ORGANIZATIONS, FACILITIES
TECHNICAL AND OTHER TERMS**

ORGANIZATIONS AND FACILITIESPageA

ABÜS	Waste treatment plant	GE-21
ADA	Acid digestion plant	SZ-5
AEA	Atomic Energy Authority	UK-4
AEB	Atomic Energy Bureau	JA-4
AEC	Atomic Energy Commission	IN-6
		JA-4
		KS-3
		SF-2
		TW-2
AEC	Atomic Energy Commission (now DOE)	US-14
AEC	Atomic Energy Corporation	SF-2
AEC	Atomic Energy Council	TW-2
AECB	Atomic Energy Control Board	CA-3
AECL	Atomic Energy of Canada Limited ...	CA-2
AEO	Atomic Energy Office	KS-3
AERB	Atomic Energy Regulation Board	IN-6
AESJ	Atomic Energy Society of Japan	INTL-16
AGIP	Nuclear fuel company	IT-4
ANA	Australien Nuclear Association	INTL-13
ANDRA	Agence Nationale pour la Gestion des Déchets Radioactifs	CA-2
		FR-4
ANL	Argonne National Laboratory	US-6
ANPA	National Agency for Environmental Protection	IT-2
ANRE	Agency of Natural Resources & Energy	JA-15
ANS	American Nuclear Society	INTL-15
ANSTO	Australian Nuclear Science and Technology Organization	AS-2
ANU	Australian National University	AS-4
APM	Demonstration Reprocessing plant ...	FR-6
Äspö	Hard rock laboratory	SW-7
ASBL	Forum Nucléaire Belge	INTL-13
Asse	Salt dome repository	GE-3

ATLAS	Advanced Testing Line for Actinide Separation	US-18
ATS	Finnish Nuclear Society	INTL-14
AVH	Ateliers de Vitrification de La Hague	FR-5
AVM	Ateliers de Vitrification de Marcoule	FR-5
AWE	Atomic Weapons Establishment	UK-5

B

B205	Reprocessing facility	UK-13
BAM	Bundesanstalt für Materialforschung und -prüfung	GE-7
BARC	Bhabha Atomic Research Centre	IN-5
BCO	Battelle - Columbus Operations	US-6
BEATE	Reprocessing facility	GE-18
Bel Nipi Energoprom	National Research/Design Institute	BO-2
BES	Basic Energy studies	US-18
BEW	Bundesamt für Energiewirtschaft	SZ-3
BfS	Bundesamt für Strahlenschutz	GE-5
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe	GE-4
BGS	British Geological Survey	UK-4
BITF	Borehole Instrumentation Test Facility	CA-8
BINE	Beijing Institute of Nuclear Engineering	CH-2
BLM	Bureau of Land Management	US-33
BMFT	Bundesministerium für Forschung und Technologie	GE-3
BMU	Bundesministerium für Umwelt, Naturschutz Reaktorsicherheit	GE-5
BMW	Ministry for Economic Affairs	GE-8
BNES	British Nuclear Energy Society	INTL-18
BNF	British Nuclear Forum	INTL-18
BNFL	British Nuclear Fuels plc	UK-14
BNL	Brookhaven National Laboratory	US-6
BNS	Belgian Nuclear Society	INTL-13
BOM	Bureau of Mines	US-33
BOR	Bureau of Reclamation	US-33
BP	Belgoprocess	BE-4

PNL-9450-1

BRE	Building Research Establishment	UK-5
BRGM	Bureau de Recherches Géologiques et Minières	FR-8

C

CANMET	Canadian Center for Mineral & Energy Technology	CA-4
Casaccia	ENEA nuclear research center	IT-2
CDTN	Centro de Desenvolvimento de Tecnologia Nuclear de Nuclebras ..	BR-3
CEA	Commissariat à l'Énergie Atomique ..	FR-3
CEC	Commission of the European Communities	INTL-1
CECE	Combined Electrolysis Catalytic Exchange System	US-20
Cédra	Société coopérative nationale pour l'entreposage de déchets radioactifs	SZ-4
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-11
CEN-S	Centre d'Études Nucléaires de Saclay .	FR-11
CEN/SCK	Studiecentrum voor Kernenergie/ Centre d'Études de l'Énergie Nucléaire	BE-7
CEN-VRH	Centre d'Études Nucléaires de la Vallée du Rhône	FR-11
CHALMERS	Technical University	SW-4
CIAE	China Institute of Atomic Energy	CH-2
CIEMAT	Centro de Investigaciones Energéticas, Medio Ambientales y Tecnológicas .	SP-3
Cisra	Società cooperativa nazionale per l'immagazzinamento di scorie radioattive	SZ-4
CIPE	Interministerial Committee for Economic Planning	IT-2
CIS	Commonwealth of Independent States	INTL-14
CLAB	Central storage for spent fuel	SW-7

CNA	Canadian Nuclear Association	INTL-13
CNEA	Comision Nacional de Energia Atomica	AR-3
CNEIC	Chinese Nuclear Energy Industry Corporation	CH-3
CNEN	Comissão Nacional de Energia Nuclear	BR-3
CNNC	China National Nuclear Corporation	CH-2
CNRA	Committee for Nuclear Regulatory Activities	INTL-12
CNS	Canadian Nuclear Society	INTL-13
CNS	Chinese Nuclear Society	INTL-13
CNS	Conncil for Nuclear Safety	SF-2
CNS	Center for Nuclear Studies	PK-4
COGEMA	Compagnie Generale des Matières Nucléaires	FR-3
COMMOX	COGEMA subsidiary	FR-4
COMURHEX	Uranium conversion company	FR-4
COVRA	Centrale Organisatie Voor Radioactief Afval	NL-2
CPF	Chemical Processing Facility	JA-21
CRESP	Coordinated Research and Environmental Surveillance Programme (NEA)	INTL-11
CRIEPI	Central Research Institute of Electric Power Industry	JA-4
CRL	Chalk River Laboratories	CA-5
CRPPH	Committee on Radiation Protection and Public Health (NEA)	INTL-11
CSN	Consejo de Seguridad Nuclear	SP-3
CSNI	Committee for Safety of Nuclear Installations	INTL-12
CTC	Computer Training Center	PK-4

D

DAE	Department of Atomic Energy	IN-6
DAM	Direction des Applications Militaires	FR-5
DAtF	Deutsches Atomforum	INTL-15

PNL-9450-1

DBE	Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH	GE-5
DD&PM	Design Department/Pilot Manufacture	BO-3
DEN	Department of Energy	UK-5
DOA	Department of Agriculture	US-33
DOE	Department of Energy	US-2
DoE	Department of the Environment	UK-3
DOI	Department of Interior	US-5
DOT	Department of Transportation	US-5
Drigg	Waste disposal facility	UK-6
DWK	Deutsche Gesellschaft für Wiederaufarbeitung von Kernbrennstoffen ...	GE-6
DWPF	Defense Waste Processing Facility	US-24

E

EARP	Enhanced Actinide Removal Plant ...	UK-14
EBR-II	Experimental Breeder Reactor No. 2 ..	US-14
EC	European Community	INTL-2
ECN	Stichting Energieonderzoek Centrum Nederland	NL-2
EdF	Electricité de France	FR-4
EdF	Engineering Demonstration Facility ..	JA-21
EM	DOE Environmental Management ...	US-4
ENEA	Ente per le Nuove Technologie, l'Energia l'Ambiente	IT-2
ENEL	Ente Nazionale per l'Energia Elettrica	IT-2
ENI	Ente Nazionale Idrocarburi	IT-2
ENRESA	Empresa Nacional de Residuos Radioactivos	SP-4
ENS	European Nuclear Society	INTL-14
ENSM	Ecole Nationale Supérieure des Mines de Paris	FR-16
ENUSA	Empresa Nacional del Uranio	SP-4
EP-1, 2	Waste treatment facilities	UK-14
EPA	Environmental Protection Agency	US-5
EPB	Electric Power Bureau	KS-3
EPRI	Electric Power Research Institute	US-29
ERAM	Endlager für Radioaktive Abfälle Morsleben	GE-5

ERS	Effluent Recovery System	US-20
ESKOM	South African utility	SF-2
ETAN-NDE	Professional Section of ETAN for Nuclear Technique and Technology	INTL-19
ETF	Engineering Test Facility	JA-21
EUREX	Fuel reprocessing pilot plant	IT-3
Eurobitum	Bituminization plant	BE-4
EURODIF	Commercial enrichment company	FR-2
Eurowatt	Solvent treatment hot pilot plant	BE-4
Ezeiza	Argentine atomic center	AR-2

F

FBFC	Société Franco-Belge de Fabrication de Combustibles (Belgium and France)	BE-5 FR-4
FIEN	Forum Italiano dell'Energia Nucleare	INTL-16
FK	Föreningen Kärnteknik	INTL-18
FN	Fabricazioni Nucleari	IT-2
FORATOM	Forum Atomique Européen	INTL-14
FRAGEMA	COGEMA subsidiary	FR-4
FRG	Federal Republic of Germany	GE-3
FURNAS	Subsidiary of Electrobrás	BR-3
FUSRAP	Remedial action program	US-14

G

GHZ	Hot cell facility	GE-16
GIRIO	Government Industrial Research Institute	JA-8
GNS	Gesellschaft für Nuklear-Service	GE-6
Gorleben	Repository site	GE-2
Gosatomnadzor	Russian Federal Authority for Nuclear Radiation/Safety	RS-3
Goscomchernobyl	State Chernobyl Committee	BO-2
Goscomecologija	State Committee on Environment Protection	BO-2

PNL-9450-1

Gospromatomnadzor

	State Committee on Supervision of Industrial and Nuclear Safety	BO-2
GRS	Gesellschaft für Reaktorsicherheit ..	GE-13
GSC	Geological Survey of Canada	CA-4
GSF/IT	Forschungszentrum für Umwelt und Gesundheit	GE-4
GSP POLESJE	State Specialized Enterprise/ State Chernobyl Committee	BO-2

H

HADES	Underground Research Laboratory ..	BE-8
HFEF	Hot Fuel Examination Facility	US-14
HISS	Hydrogen Isotope Separation System	US-20
HITACHI	Hitachi, Ltd	JA-8
HMIP	H.M. Inspectorate of Pollution	UK-4
HQ	DOE-Headquarters	US-4
HSE	Health and Safety Executive	UK-5
HSK	Nuclear Safety Inspectorate	SZ-3

I

IAEA	International Atomic Energy Agency	INTL-4
ICRP	International Commission on Radiological Protection	INTL-8
ICT	Institute of Chemical Technology	GE-16
IEN	Instituto de Engenharia Nuclear	BR-3
IFTF	Immobilized Fuel Test Facility	CA-9
IGCAR	Indira Ghandi Centre for Atomic Research	IN-7
IHI	Ishikawajima-Harima Heavy Industries	JA-9
IMO	International Maritime Organization ..	INTL-11
INB	Industrias Nucleares do Brasil	BR-3
INE	Institute for Nuclear Waste Technology	GE-17
INEL	Idaho National Engineering Laboratory	US-6

INER	Institute of Nuclear Energy Research	TW-2
INET	Institute of Nuclear Energy Technology	CH-2
INuCE	Institution of Nuclear Engineers	INTL-19
IOS	Institute of Oceanographic Sciences ..	UK-4
IPEN	Instituto de Pesquisas Energeticas e Nucleares	BR-3
IPEP	Institute of Power Engineering Problems	BO-1
IPSN	CEA-Institut de Protection et de Sûreté Nucléaire	FR-5
IRD	Instituto de Radioproteção e Dosimetria	BR-3
IREP	Institute of Radio-Ecological Problems	BO-3
IRUS	Intrusion Resistant Underground Structure	CA-7
IRW	Institute of Reactor Materials	GE-16
ISF	Interim Storage Facility	IN-8
IVO	Imatran Voima Oy	FI-1

J

JAERI	Japan Atomic Energy Research Institute	JA-4
JAIF	Japan Atomic Industrial Forum	INTL-16
JET	Joint European Torus	UK-9
JGC	JGC Corporation	JA-12
JNFL	Japan Nuclear Fuel Ltd.	JA-4
JPDR	Japan Power Demonstration Reactor	JA-6
JRC	Joint Research Center (CEC)	INTL-3

K

KAERI	Korea Atomic Energy Research Institute	KS-3
KAIF	Korea Atomic Industrial Forum	INTL-17
KAIST	Korea Advanced Institute of Science/Technology	KS-3
KALPAKKAM	Fuel reprocessing laboratory	IN-2
KANUPP	Karachi Nuclear Power Plant	PK-3

PNL-9450-1

KEMA	N.V. Tot Keuring van Electro-technische Materialen Arnhem	NL-5
KEMAKTA	Kemakta Konsult	SW-4
KEPCO	Korea Electric Power Corporation ...	KS-3
KEWA	Kernbrennstoff Wiederaufarbeitungstechnik GmbH	GE-6
KFA	Kernforschungszentrum Jülich	GE-4
KfK	Kernforschungszentrum Karlsruhe ...	GE-4
Khlopin	Khlopin Radium Institute	RS-3
KIER	Korea Institute of Energy and Resources	KS-3
KINS	Korea Institute of Nuclear Safety Technology	KS-3
KNFC	Korea Nuclear Fuel Co.	KS-3
KNS	Korean Nuclear Society	INTL-17
KOBE	Kobe Steel, Ltd.	JA-14
KOLAR	Waste disposal research station	IN-7
Konrad	(Iron mine) repository site	GE-2
KOPEC	Korea Power Engineering Co.	KS-3
KPA-STORE	Spent nuclear fuel storage facility	FI-6
KRF	Krypton recovery pilot plant	JA-21
KS-KT-100	Cold pilot vitrification plant	RS-10
KTG	Kerntechnische Gesellschaft	INTL-15
KTH	Royal Institute of Technology	SW-4
Kurchatov	Russian Kurchatov Institute	RS-3

L

LAube	Disposal Facility	FR-7
LA HAGUE	COGEMA, Centre de la Hague	FR-2
La Manche	Disposal Facility	FR-7
LANL	Los Alamos National Laboratory	US-6
LBRMF	Large Block Radionuclide Migration Facility	CA-10
LLNL	Lawrence Livermore National Laboratory	US-6

M

M&O	Management and Operating Contractor	US-26
MAFF	Ministry of Agriculture, Fisheries and Food	UK-4

MAPI	Ministry of Atomic Power and Industry	RS-2
MAPS	Madras Atomic Power Station	IN-8
Mayak	Production Association	RS-7
MET	Mineral/Energy Technology	CA-4
MINATOM	Ministry for Atomic Energy of the Russian Federation	RS-3
MITI	Ministry of International Trade & Industry	JA-4
MMC	Mitsubishi Metal Corporation	JA-15
MOD	Ministry of Defense	UK-5
MOFA	Ministry of Foreign Affairs	JA-16
MONJU	Japanese LMFBR	JA-3
MOST	Ministry of Science and Technology	KS-2
MRS	Monitored Retrievable Storage	US-2

N

Nagra	Nationale Genossenschaft für die Lagerung Radioaktiver Abfälle	SZ-2
NCS	Nuclear Cargo Service	GE-6
NDC	NEA Technical/Economic Studies	INTL-11
NEA	Nuclear Energy Agency (OECD)	INTL-9
NEC	National Energy Council	SF-2
NERC	National Environment Research Council	UK-5
NERSA	Groupement Centrale Nucléaire Européenne à Neutrons Rapides	FR-4
NFC	Nuclear Fuel Complex	IN-8
		CH-4
NFF	Nuclear Fuel Fabrication	CH-5
NII	Nuclear Installations Inspectorate	UK-4
NIREX	UK Nirex Ltd.	UK-4
NIRAS	Nationale Instelling voor Radioactief Afval en Splijtstoffen	BE-3
NIRS	National Institute of Radiological Sciences	JA-4
NMSS	Nuclear Material Safety and Safeguards	US-7
NMU	Niedersächsisches Umweltministerium	GE-5
NNSA	National Nuclear Safety Administration	CH-2
NPO	Waste Management Organization	KS-3

PNL-9450-1

NRC	Nuclear Regulatory Commission	US-1
NRPB	National Radiological Protection Board	UK-4
NRR	NRC Office of Nuclear Reactor Regulation	US-7
NSB	National Safety Bureau	JA-4
NSC	Nuclear Safety Commission	JA-4
NUCLECO	Waste Management Services company	IT-2
NUKEM	Nuclear fuel services company	GE-6
NUMATEC	COGEMA Inc. subsidiary	FR-13
NWCF	New Waste Calcining Facility	US-8
NWPA	Nuclear Waste Policy Act	US-2
NWPAA	Nuclear Waste Policy Amendments Act	US-2
NWTRB	Nuclear Waste Technical Review Board	US-32

O

OCRWM	DOE Office of Civilian Radioactive Waste Management	US-20
OECD	Organisation for Economic Coopera- tion and Development	INTL-8
OH	Ontario Hydro	CA-3
OIP	NRC Office of International Programs	US-7
ONDRAF	Organisme National de Déchets Radioactifs et des Matières Fissiles	BE-2
ONWN	Office of the U.S. Nuclear Waste Negotiator	US-32
OPLA	National research program	NL-2
ORNL	Oak Ridge National Laboratory	US-6

P

PAAG	Performance Assessment Advisory Group	INTL-10
PAEC	Pakistan Atomic Energy Commission .	PK-2
PAMELA	Vitrification pilot plant	GE-18
PARR-1, 2	Research/Training reactors	PK-4
Pelindaba	National Nuclear Research Center ...	SF-2
PEV	Prototype vitrification facility	FR-12

PFR	Reprocessing plant	UK-2
Phenix	French FBR	FR-4
PINSTECH	Pakistan Institute of Science/ Technology	PK-2
PIVER	Hot pilot plant - vitrification	FR-12
PIVER II	HLW vitrification facility	FR-12
PKA	Pilot fuel conditioning plant	GE-6
PKS	Quality assurance project	GE-16
PNC	Power Reactor and Nuclear Fuel Development Corporation	JA-3
PNL	Pacific Northwest Laboratory	US-6
PREFRE	Fuel reprocessing plant	IN-9
PSAG	Probabilistic System Assessment Group (NEA)	INTL-11
PSI	Paul Scherrer Institute	SZ-3
PWSF	Pu-contaminated Waste Storage Facility	JA-22
PWTF	Pu-contaminated Waste Treatment Facility	JA-22

R

RADWASS	Radioactive Waste Safety Standards ..	INTL-4
RES	NRC Office of Nuclear Regulatory Research	US-7
RF	Russian Federation	RS-3
RFP	Rocky Flats Plant	US-6
RIVM	Rijksinstituut voor Volksgezondheid en Milieuhygiene	NL-6
RLWTF	Radioactive Liquid Waste Treatment Facility	US-14
RMDF	Radioactive Materials Disposal Facility	US-16
RPA	Research Production Association	RS-3
RSK	Reaktor Sicherheitskommission	GE-5
RW	DOE-Office of Civilian Radioactive Waste Management	US-4
RWMAC	Rad. Waste Management Advisory Committee	UK-5
RWMC	Radioactive Waste Management Center	JA-23

PNL-9450-1

RWMC	Rad. Waste Management Committee (NEA)	INTL-10
RWMC	Radioactive Waste Management Complex	US-17
RWOS	Radioactive Waste Operations Site ...	CA-12

S

SAE	Strategic Business Secretariat	BR-3
SAFO	Swedish Atomic Forum	INTL-18
Saluggia	ENEA nuclear research center	IT-2
SBH	Siemens Brennelementewerk Hanau ..	GE-6
SCK/CEN	Studiecentrum voor Kernenergie/ Centre d'Études de l'Énergie Nucléaire	BE-7
SEDE	Site Evaluation and Design of Experiments for Radioactive Waste Disposal (NEA)	INTL-10
SFANS	Section Française d'Énergie Nucléaire	INTL-15
SFEN	Société Française d'Énergie Nucléaire	INTL-15
SFMP	Surplus Facilities Management Program	US-14
SFR	Swedish Final Repository	SW-7
SGAB	Sveriges Geologiska	SW-5
SGK	Schweizerische Gesellschaft der Kernfachleute	INTL-18
SGN	Société Générale pour les Techniques Nouvelles	FR-4
SICN	COGEMA subsidiary	FR-4
SKB	Svensk Kärnbränslehantering	SW-3
SKI	Statens Kärnkraftinspektion	SW-3
SNE	Sociedad Nuclear Española	INTL-17
SNI	Belgian utility	BE-8
SNI	Società Nucleare Italiana	INTL-16
SNL	Sandia National Laboratories	US-6
SPD	Sodium Process Demonstration Facility	US-14
SRS	Savannah River Site	US-24
SSI	Statens Straalskyddsinstitut	SW-3
SSK	Strahlenschutzkommission	GE-5
SSSF	Solid Storage Surveillance Facility	IN-10
STA	Science and Technology Agency	JA-4

STE3	Liquid waste treatment facility	FR-15
STEM	Simulation Test Facility for Environmental Radionuclide Migration ...	JA-11
STMI	Nuclear services company	FR-4
STUDSVIK	Studsvik Energiteknik	SW-8
STUK	Finnish Center for Radiation and Nuclear Safety	FI-2
SuperPhenix	European FBR	FR-1
SVA	Schweizerische Vereinigung für Atomenergie	INTL-18
SWA	Waste water treatment plant	GE-21
SWEPP	Stored Waste Examination Pilot Plant	US-17
SYNATOM	Belgian company	BE-3

T

TAIPOWER	Taiwan Power Company	TW-2
TAN	Test Area North	US-17
TAPS	Tarapur Atomic Power Station	IN-9
TAWRS	Tritium Aqueous Waste Recovery System	US-20
TECHNI-CATOME	Nuclear fuel cycle services company ..	FR-4
THORP	Thermal Oxide Reprocessing Plant ...	UK-2
TN	Transnucléaire	FR-18
TREAT	Transient Reactor Test Facility	US-14
Trisaia	ENEA nuclear fuel services company	IT-2
Trombay	Fuel reprocessing plant	IN-2
TRUEX	TRU waste technology	US-14
TRW	TRW Environmental Safety Systems ..	US-27
TUM	Technische Universität München	GE-6
TVF	Tokai Vitrification Facility	JA-22
TVO	Teollisuuden Voima Oy	FI-1
TWRS	Tank Waste Remediation System	US-27

U

UKAEA	UK Atomic Energy Authority	UK-3
UNVIE	U.S. Mission to IAEA	INTL-6
UPI	Fuel reprocessing plant	FR-14

PNL-9450-1

UP2	Fuel reprocessing plant	FR-3
UP2-800	Fuel reprocessing plant	FR-3
UP3	Fuel reprocessing plant	FR-3
URENCO	Uranium enrichment consortium	NL-1
URL	Underground Research Laboratory ..	CA-8
USGS	U.S. Geological Survey	US-5
USSI	COGEMA subsidiary	FR-4

V

Vaalputs	LLW disposal facility	SF-2
Valindaba	U enrichment and conversion plants ..	SF-2
VKTA	Verein für Kernverfahrenstechnik und Analytik Rossendorf	GE-21
VLJ	LLW/ILW repository	FI-6
VNIPIET	All Russian Design/Research Association	RS-3
VTT	Technical Research Centre of Finland	FI-2

W

WAK	Wiederaufarbeitungsanlage Karlsruhe	GE-6
WAMAP	Waste Management Advisory Program	INTL-5
WANO	World Association of Nuclear Operators	INTL-14
WASTEF	Glove box and hot cell facilities	JA-11
WATRP	International peer review program	INTL-5
WDF	Waste Dismantling Facility	JA-19
WEAF	Waste Examination Assay Facility	US-20
WEC	Westinghouse Electric Company	US-10
WERF	Waste Environmental Reduction Facility	US-17
WHC	Westinghouse Hanford Company	US-6
WINCO	Westinghouse Idaho National Company	US-6
WIP	Waste Immobilization Plant	IN-5
WIPP	Waste Isolation Pilot Plant	US-3
WL	Whitshell Laboratories	CA-5
WSRC	Westinghouse Savannah River Co. ...	US-6
WTC	Waste Treatment Center	CA-7

WTC	Waste Treatment Complex	UK-14
WVNS	West Valley Nuclear Services	US-6
WVRF	Waste Volume Reduction Facility	CA-12

Y

YMP	Yucca Mountain Project	US-33
YMPO	Yucca Mountain Project Office	US-6
YMSCP	Yucca Mountain Site Characterization Project	US-19

Z

ZFK-DE	Waste treatment project	GE-16
ZPPR	Zero Power Plutonium Reactor	US-14
ZWILAG	Zwischenlager Würenlingen AG	SZ-6

TECHNICAL AND OTHER TERMS

(A)	Acting
/a	per annum
Acad	Academian
AS	Assistant Secretary
AFR	Away-from-reactor
AGR	Advanced gas-cooled reactor
AR	At-reactor
ATR	Advanced thermal reactor
BWR	Boiling water reactor
CAD	Computer aided design
CAM	Computer aided manufacturing
CANDU	Canadian deuterium uranium reactor
CEO	Chief Executive Officer
CIP	Cold isostatic pressing
COB	Chairman of the Board
COO	Chief Operating Officer
CTC	Computer training center
/d	per day
DAM	Deputy Assistant Manager
DAS	Deputy Assistant Secretary
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
HIP	Hot isostatic pressing
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
LTR	Low-temperature district heating reactor
LMFBR	Liquid metal fast breeder reactor
LWCHW	Light-water-cooled heavy-water-moderated reactor (same as HWLWR)
LWR	Light water reactor
m	meter
MEV	Million electron volts
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

PNL-9450-1

NPT	Non-Proliferation Treaty
OTD	Office of Technical Development
PFR	Prototype fast reactor
PHWR	Pressurized heavy water reactor
PLWR	Pressurized light water reactor
PM	Program manager
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 ton
TD	Technical development
Th/U	Thorium/uranium
tHM	Metric tons heavy metal
THTR	Thorium high-temperature reactor
TPO	Technical program officer
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