

Summary of allocation and utilization of regular budget resources in 1998	83
Extrabudgetary Programme Fund 1998 (resources and expenditures)	84
Technical co-operation disbursements by Agency Programme/Major Programme and region in 1998	85
Assessment of Safety Significant Events Team (ASSET) services, 1998	86
Engineering Safety Review Services (ESRS) related to site and external hazards, 1998	86
International Nuclear Event Scale (INES) ratings reported, 1998	86
International Peer Review Service (IPERS) on probabilistic safety analysis reviews, 1998	86
International Regulatory Review Team (IRRT) missions, 1998	86
Integrated Safety Assessment of Research Reactors (INSARR) missions, 1998	86
Operational Safety Review Team (OSART) missions, 1998	87
Radioactive Waste Safety Assessment services, 1998	87
Safety culture seminars, 1998	87
Number of States having significant nuclear activities at the end of 1996, 1997 and 1998	88
Situation on 31 December 1998 with respect to the conclusion of safeguards agreements between the Agency and non-nuclear-weapon States in connection with NPT	89
Situation on 31 December 1998 with respect to the conclusion of safeguards agreements between the Agency and States party to the Treaty of Tlatelolco	95
Agreements providing for safeguards, other than those in connection with NPT or the Treaty of Tlatelolco, approved by the Board of Governors as of 31 December 1998	97
Approximate quantities of material subject to Agency safeguards at the end of 1998	101
Number of facilities under safeguards or containing safeguarded material on 31 December 1998	101
Facilities under Agency safeguards or containing safeguarded material on 31 December 1998	102
Additional safeguards support provided by States	117
Main equipment and activities in support of safeguards	118
Conventions negotiated and adopted under the auspices of the Agency and for which the Director General is the depositary (status and relevant developments)	119
Co-ordinated Research Projects	120
Training courses, seminars and workshops in 1998	127
Publications issued in 1998	135

**SUMMARY OF ALLOCATION AND UTILIZATION OF REGULAR BUDGET RESOURCES
IN 1998**

Major Programme/Programme	1998	1998	1998 total expenditure		Unused (over- expended) budget (2)-(3) (5)
	budget GC(41)/10 (at AS 12.70) (1)	adjusted budget (at AS 12.40) (2)	Amount (3)	% of adjusted budget (3)/(2) (4)	
NUCLEAR POWER AND FUEL CYCLE					
Nuclear power	4 613 000	4 699 000	4 709 287	100.22%	(10 287)
Nuclear fuel cycle and waste technology	5 100 000	5 190 000	5 024 206	96.81%	165 794
Comparative assessment of energy sources	2 526 000	2 571 000	2 529 130	98.37%	41 870
Subtotal	12 239 000	12 460 000	12 262 623	98.42%	197 377
NUCLEAR APPLICATIONS					
Food and agriculture	10 495 000	10 677 000	10 527 534	98.60%	149 466
Human health	5 805 000	5 899 000	5 821 803	98.69%	77 197
Marine environment, water resources and industry	6 507 000	6 626 000	6 654 068	100.42%	(28 068)
Physical and chemical sciences	8 740 000	8 866 000	8 950 254	100.95%	(84 254)
Subtotal	31 547 000	32 068 000	31 953 659	99.64%	114 341
NUCLEAR, RADIATION AND WASTE SAFETY					
Nuclear safety	5 506 000	5 617 000	5 293 366	94.24%	323 634
Radiation safety	3 464 000	3 534 000	3 690 384	104.43%	(156 384)
Radioactive waste safety	1 870 000	1 908 000	1 920 118	100.64%	(12 118)
Co-ordination of safety activities	2 902 000	2 963 000	2 875 826	97.06%	87 174
Subtotal	13 742 000	14 022 000	13 779 694	98.27%	242 306
NUCLEAR VERIFICATION AND SECURITY OF MATERIAL					
Safeguards	78 585 000	80 254 000	80 341 851	100.11%	(87 851)
Security of material	542 000	553 000	464 718	84.04%	88 282
Subtotal	79 127 000	80 807 000	80 806 569	100.00%	431
MANAGEMENT OF TECHNICAL CO-OPERATION FOR DEVELOPMENT					
Management of technical co-operation for development	12 526 000	12 806 000	12 801 569	99.97%	4 431
Subtotal	12 526 000	12 806 000	12 801 569	99.97%	4 431
POLICY MAKING, CO-ORDINATION AND SUPPORT					
Executive management	4 886 000	4 992 000	4 744 537	95.04%	247 463
Policy making organs	6 926 000	7 078 000	6 849 975	96.78%	228 025
Legal activities, external relations and public information	7 153 000	7 301 000	6 641 181	90.96%	659 819
Administration	12 364 000	12 643 000	12 491 502	98.80%	151 498
General services	22 340 000	22 865 000	23 986 213	104.90%	(1 121 213)
Information management and support services	13 624 000	13 921 000	13 487 142	96.88%	433 858
Subtotal	67 293 000	68 800 000	68 200 550	99.13%	599 450
Agency's Programmes	216 474 000	220 963 000	219 804 664	99.48%	1 158 336
Plus: reimbursable work for others	4 896 000	5 004 000	5 546 725	110.85%	(542 725)
TOTAL regular budget	221 370 000	225 967 000	225 351 389	99.73%	615 611

EXTRABUDGETARY PROGRAMME FUND 1998 (RESOURCES AND EXPENDITURES)

Programme	Resources			Total Expenditure	Unused balance as at 31 December 1998 (3)-(4) (5)
	Unused balance as at 1 January 1998 (1)	Receipts (2)	Adjusted Budget (1)+(2) (3)		
Projects funded by individual Member States					
Nuclear power	288 036	66 467	354 503	120 956	233 547
Nuclear fuel cycle and waste technology	220 134	494 901	715 035	425 188	289 847
Comparative assessment of energy sources	138 430	210 000	348 430	212 327	136 103
Food and agriculture	1 239 346	832 452	2 071 798	1 342 376	729 422
Human health	308 893	120 213	429 106	121 893	307 213
Marine environment, water resources and industry	1 501 520	1 177 234	2 678 754	1 526 931	1 151 823
Physical and chemical sciences	100 490	9 349	109 839	82 841	26 998
Nuclear safety	1 057 463	2 019 172	3 076 635	1 467 037	1 609 598
Radiation safety	614 611	217 216	831 827	746 426	85 401
Radioactive waste safety	188 024	0	188 024	134 814	53 210
Co-ordination of safety activities	292 413	198 459	490 872	309 721	181 151
Safeguards	10 881 620	14 619 779	25 501 399	15 556 012	9 945 387
Security of material	1 078 863	371 079	1 449 942	1 025 160	424 782
Management of technical co-operation for development	285 735	204 670	490 405	328 270	162 135
Executive management	492 198	726 900	1 219 098	661 862	557 236
Legal activities, external relations and public information	628 382	957 504	1 585 886	962 293	623 593
Administration	111 371	48 000	159 371	121 151	38 220
Subtotal	19 427 529	22 273 395	41 700 924	25 145 258	16 555 666
Multi-funded projects					
Nuclear power	80 407	29 121	109 528	3 600	105 928
Nuclear fuel cycle and waste technology	10 075	85 697	95 772	70 057	25 715
Food and agriculture	127 907	160 252	288 159	120 283	167 876
Nuclear safety	412 227	203 441	615 668	514 410	101 258
Co-ordination of safety activities	0	54 299	54 299	0	54 299
Subtotal	630 616	532 810	1 163 426	708 350	455 076
International organizations					
Food and agriculture	190 839	1 850 114	2 040 953	1 817 853	223 100
Marine environment, water resources and industry	79 218	766 968	846 186	443 663	402 523
Executive management	138 322	1 885 000	2 023 322	1 996 939	26 383
Subtotal	408 379	4 502 082	4 910 461	4 258 455	652 006
Agency's programmes	20 466 524	27 308 287	47 774 811	30 112 063	17 662 748
FAO:					
AGRIS	0	867 656	867 656	813 488	54 168
Total Extrabudgetary Programme Fund	20 466 524	28 175 943	48 642 467	30 925 551	17 716 916

TECHNICAL CO-OPERATION DISBURSEMENTS BY AGENCY PROGRAMME/MAJOR PROGRAMME AND REGION IN 1998 (in thousands of dollars)

	Africa	Latin America	East Asia and Pacific	West Asia	Europe	Inter-regional	Total
Nuclear power	123.20	430.00	700.10	288.80	1 883.30	329.80	3 755.20
Nuclear fuel cycle and waste technology	379.20	228.50	457.00	2 162.20	1 069.60	391.70	4 688.20
Comparative assessment of energy sources	13.40	26.60	212.30	4.80	150.70	—	407.80
Food and agriculture	4 692.70	2 292.30	1 556.40	1 032.40	446.60	410.40	10 430.80
Human health	3 204.20	4 613.00	1 862.70	1 367.50	2 258.20	225.20	13 530.80
Marine environment, water resources and industry	1 559.30	1 075.30	1 026.90	454.50	2 822.90	60.90	6 999.80
Physical and chemical sciences	2 673.40	1 109.00	656.70	1 308.70	1 369.60	208.60	7 326.00
Nuclear safety	215.50	204.60	885.30	122.40	1 527.40	331.00	3 286.20
Radiation safety	1 423.20	1 397.90	972.30	891.10	2 474.00	1 101.30	8 259.80
Radioactive waste safety	132.30	162.10	21.50	34.00	580.40	81.60	1 011.90
Co-ordination of safety activities	405.40	14.50	95.50	73.70	589.80	54.80	1 233.70
Safeguards	—	18.60	—	—	—	—	18.60
Security of material	7.60	—	—	—	—	—	7.60
Management of technical co-operation for development	371.80	674.60	656.90	169.30	273.70	1 115.00	3 261.30
Policy making, co-ordination and support	9.00	3.80	2.60	19.50	216.10	52.00	303.00
	15 210.20	12 250.80	9 106.20	7 928.90	15 662.30	4 362.30	64 520.70

ASSESSMENT OF SAFETY SIGNIFICANT EVENTS TEAM (ASSET) SERVICES, 1998

Type	Country	Location/ nuclear power plant
S _A	Hungary	Paks
S	Ukraine	Chernobyl
S _A	Egypt	Cairo
S	Lithuania	Ignalina
S	United Kingdom	Hartlepool
S	Ukraine	South Ukraine
Z	Ukraine	Chernobyl
Z	Finland	Olkiluoto
Z	Romania	Cernavoda
Z	Kazakhstan	Aktau

S: ASSET seminar to present guidance for plant self-assessment.

S_A: ASSET seminar on analysis of the root causes of events.

Z: Peer review of self-assessment of plant operational events.

ENGINEERING SAFETY REVIEW SERVICES (ESRS) RELATED TO SITE AND EXTERNAL HAZARDS, 1998

Country	Site/plant	Service
Pakistan	Kanupp	SI
China	Lianyungang	SI
Russian Federation		EEPSA
Slovenia	Krško	EEPSA
Australia	Lucas Heights	S
Islamic Republic of Iran	Bushehr	SI-W
Indonesia	Muria	S
Armenia	Medzamor	SC-F
Romania	Cernavoda	S

EEPSA: External Events PSA Review/workshop.

S: Review of site investigations for all disciplines involved.

SC-F: Follow-up mission of previous reviews of seismic capacity and upgrades of systems, structures and components.

SI: Review of investigations for determining the seismic input parameters specific to the site.

SI-W: Review of investigations for determining the seismic input parameters specific to the site/workshop.

INTERNATIONAL NUCLEAR EVENT SCALE (INES) RATINGS REPORTED, 1998

Level	Description	Number reported
Below scale	Deviation	5
1	Anomaly	1
2	Incident	13
3	Serious incident	0
4-7	Accidents	0

INTERNATIONAL PEER REVIEW SERVICE (IPERS) ON PROBABILISTIC SAFETY ANALYSIS REVIEWS, 1998

Review type	Country	Location/ nuclear power plant
Fire PSA	Slovenia	Krško
Review PSAPRO software	Austria	
Internal event+fire+flood PSA	Czech Republic	Dukovany
Internal events PSA	Russian Federation	Novovoronezh 5
Internal events PSA	China	Daya Bay

INTERNATIONAL REGULATORY REVIEW TEAM (IRRT) MISSIONS, 1998

Type of mission	Country
Reduced scope	Romania
Reduced scope	Slovakia
Full scope	Ukraine
Full scope	Switzerland

INTEGRATED SAFETY ASSESSMENT OF RESEARCH REACTORS (INSARR) MISSIONS, 1998

Country	Type	Location/ nuclear power plant
Thailand	Review of PSAR for a new reactor	Bangkok
Indonesia	Review of operational safety issues	Serpong, near Jakarta

OPERATIONAL SAFETY REVIEW TEAM (OSART) MISSIONS, 1998

Type	Location/nuclear power plant	Plant type	Country
OSART	Paluel	PWR	France
Follow-up OSART	Beznau	PWR	Switzerland
Follow-up OSART	Bohunice	WWER	Slovakia
Follow-up OSART	Guangdong	PWR	China
OSART	Asco	PWR	Spain
Follow-up OSART	Dampierre	PWR	France
Follow-up OSART	Laguna Verde	BWR	Mexico
Preparatory visit	Chasnupp	PWR	Pakistan
Preparatory visit	Bugey	PWR	France
OSART	Golfech	PWR	France
Preparatory visit	Gösgen	PWR	Switzerland
OSART	BN-350, Aktau	FBR	Kazakhstan

RADIOACTIVE WASTE SAFETY ASSESSMENT SERVICES, 1998

Location	Type
Vaalputs, South Africa	Low level waste repository
Republic of Moldova	Low level waste repository

SAFETY CULTURE SEMINARS, 1998

Location	Country
Point Lepreau Nuclear Generating Station	Canada
Ignalina	Lithuania
National Nuclear Safety Administration, Beijing	China
KEPCO Nuclear Training Centre, Kori	Republic of Korea
Karachi Nuclear Power Plant	Pakistan
Eletronuclear, Rio de Janeiro, Angra	Brazil
Rovno Nuclear Power Plant	Ukraine

NUMBER OF STATES HAVING SIGNIFICANT NUCLEAR ACTIVITIES AT THE END OF 1996, 1997 AND 1998

	Number of States		
	1996	1997	1998
States with safeguards applied under NPT or NPT/Tlatelolco agreements	54 ^a	56 ^a	58 ^a
States with safeguards applied under Tlatelolco agreements	1	2	1
States with safeguards applied pursuant to other comprehensive safeguards agreements	3	1	0
States with safeguards applied under INFCIRC/66/Rev.2-type agreements ^b	5	4	4
Nuclear weapon States with safeguards applied under voluntary offer agreements	5	5	5
States without any safeguards agreement in force	1	1	1
Total number of States with significant nuclear activities^c	69	69	69

^a This excludes Iraq, where safeguards activities in 1998 continued to be subsumed under activities carried out pursuant to United Nations Security Council Resolution 687.

^b Some States with INFCIRC/66/Rev.2-type agreements under which the application of safeguards has not yet been suspended, although NPT or other comprehensive safeguards agreements have entered into force, are listed under NPT agreements only. Nuclear weapon States with INFCIRC/66/Rev.2-type agreements in force are not included. Safeguards are also applied to nuclear installations in Taiwan, China.

^c According to information available to the Agency for the year in question.

SITUATION ON 31 DECEMBER 1998 WITH RESPECT TO THE CONCLUSION OF SAFEGUARDS AGREEMENTS BETWEEN THE AGENCY AND NON-NUCLEAR-WEAPON STATES IN CONNECTION WITH NPT

Non-nuclear-weapon States which have signed, ratified, acceded to or succeeded to NPT ^a	Date of ratification, accession or succession ^a	Safeguards agreement with the Agency	INFCIRC
(1)	(2)	(3)	(4)
Afghanistan	4 February 1970	In force: 20 February 1978	257
Albania ^b	12 September 1990		
Algeria	12 January 1995	In force: 7 January 1997	531
Andorra	7 June 1996		
Angola	14 October 1996		
Antigua and Barbuda ^c	27 November 1968	In force: 9 September 1996	528
Argentina ^d	10 February 1995	In force: 18 March 1997	435/Mod.1
Armenia	15 July 1993	In force: 5 May 1994	455
Australia	23 January 1973	In force: 10 July 1974	217
Austria ^e	27 June 1969	Accession: 31 July 1996	193
Azerbaijan	22 September 1992	Signed: 6 November 1998	
Bahamas ^c	10 July 1973	In force: 12 September 1997	544
Bahrain	3 November 1988		
Bangladesh	31 August 1979	In force: 11 June 1982	301
Barbados ^c	21 February 1980	In force: 14 August 1996	527
Belarus	22 July 1993	In force: 2 August 1995	495
Belgium	2 May 1975	In force: 21 February 1977	193
Belize ^f	9 August 1985	In force: 21 January 1997	532
Benin	31 October 1972		
Bhutan	23 May 1985	In force: 24 October 1989	371
Bolivia ^c	26 May 1970	In force: 6 February 1995	465
Bosnia and Herzegovina ^g	15 August 1994	In force: 28 December 1973	204
Botswana	28 April 1969		
Brazil ^h	18 September 1998		
Brunei Darussalam	26 March 1985	In force: 4 November 1987	365
Bulgaria	5 September 1969	In force: 29 February 1972	178
Burkina Faso	3 March 1970		
Burundi	19 March 1971		
Cambodia	2 June 1972		
Cameroon	8 January 1969	Signed: 21 May 1992	
Canada	8 January 1969	In force: 21 February 1972	164
Cape Verde	24 October 1979		
Central African Republic	25 October 1970		
Chad	10 March 1971		
Chile ⁱ	25 May 1995	In force: 9 September 1996	476/Mod.1
Colombia ^j	8 April 1986		
Comoros	4 October 1995		
Congo	23 October 1978		
Costa Rica ^c	3 March 1970	In force: 22 November 1979	278
Côte d'Ivoire	6 March 1973	In force: 8 September 1983	309
Croatia	29 June 1992	In force: 19 January 1995	463
Cyprus	10 February 1970	In force: 26 January 1973	189
Czech Republic ^k	1 January 1993	In force: 11 September 1997	541
Democratic People's Republic of Korea	12 December 1985	In force: 10 April 1992	403
Democratic Republic of the Congo	4 August 1970	In force: 9 November 1972	183
Denmark ^l	3 January 1969	In force: 21 February 1977	193

SAFEGUARDS AGREEMENTS (cont.)

Non-nuclear-weapon States which have signed, ratified, acceded to or succeeded to NPT ^a (1)	Date of ratification, accession or succession ^a (2)	Safeguards agreement with the Agency (3)	INFCIRC (4)
Djibouti	16 October 1996		
Dominica ^f	10 August 1984	In force: 3 May 1996	513
Dominican Republic ^c	24 July 1971	In force: 11 October 1973	201
Ecuador ^c	7 March 1969	In force: 10 March 1975	231
Egypt	26 February 1981	In force: 30 June 1982	302
El Salvador ^c	11 July 1972	In force: 22 April 1975	232
Equatorial Guinea	1 November 1984	Approved by the Board, June 1986	
Eritrea	16 March 1995		
Estonia	7 January 1992	In force: 24 November 1997	547
Ethiopia	5 February 1970	In force: 2 December 1977	261
Fiji	14 July 1972	In force: 22 March 1973	192
Finland ^m	5 February 1969	Accession: 1 October 1995	193
Gabon	19 February 1974	Signed: 3 December 1979	
Gambia	12 May 1975	In force: 8 August 1978	277
Georgia	7 March 1994	Signed: 29 September 1997	
Germany ⁿ	2 May 1975	In force: 21 February 1977	193
Ghana	4 May 1970	In force: 17 February 1975	226
Greece ^o	11 March 1970	Accession: 17 December 1981	193
Grenada ^c	19 August 1974	In force: 23 July 1996	525
Guatemala ^c	22 September 1970	In force: 1 February 1982	299
Guinea	29 April 1985		
Guinea-Bissau	20 August 1976		
Guyana ^c	19 October 1993	In force: 23 May 1997	543
Haiti ^c	2 June 1970	Signed: 6 January 1975	
Holy See	25 February 1971	In force: 1 August 1972	187
Honduras ^c	16 May 1973	In force: 18 April 1975	235
Hungary	27 May 1969	In force: 30 March 1972	174
Iceland	18 July 1969	In force: 16 October 1974	215
Indonesia	12 July 1979	In force: 14 July 1980	283
Iran, Islamic Republic of	2 February 1970	In force: 15 May 1974	214
Iraq	29 October 1969	In force: 29 February 1972	172
Ireland	1 July 1968	In force: 21 February 1977	193
Italy	2 May 1975	In force: 21 February 1977	193
Jamaica ^c	5 March 1970	In force: 6 November 1978	265
Japan	8 June 1976	In force: 2 December 1977	255
Jordan	11 February 1970	In force: 21 February 1978	258
Kazakhstan	14 February 1994	In force: 11 August 1995	504
Kenya	11 June 1970		
Kiribati	18 April 1985	In force: 19 December 1990	390
Korea, Republic of	23 April 1975	In force: 14 November 1975	236
Kuwait	17 November 1989		
Kyrgyzstan	5 July 1994	Signed: 18 March 1998	
Lao People's Democratic Republic	20 February 1970	Signed: 22 November 1991	
Latvia	31 January 1992	In force: 21 December 1993	434
Lebanon	15 July 1970	In force: 5 March 1973	191
Lesotho	20 May 1970	In force: 12 June 1973	199

SAFEGUARDS AGREEMENTS (cont.)

Non-nuclear-weapon States which have signed, ratified, accessed to or succeeded to NPT ^a (1)	Date of ratification, accession or succession ^a (2)	Safeguards agreement with the Agency (3)	INFCIRC (4)
Liberia	5 March 1970		
Libyan Arab Jamahiriya	26 May 1975	In force: 8 July 1980	282
Liechtenstein	20 April 1978	In force: 4 October 1979	275
Lithuania	23 September 1991	In force: 15 October 1992	413
Luxembourg	2 May 1975	In force: 21 February 1977	193
Madagascar	8 October 1970	In force: 14 June 1973	200
Malawi	18 February 1986	In force: 3 August 1992	409
Malaysia	5 March 1970	In force: 29 February 1972	182
Maldives	7 April 1970	In force: 2 October 1977	253
Mali	10 February 1970		
Malta	6 February 1970	In force: 13 November 1990	387
Marshall Islands	30 January 1995		
Mauritania	26 October 1993		
Mauritius	8 April 1969	In force: 31 January 1973	190
Mexico ^c	21 January 1969	In force: 14 September 1973	197
Micronesia, Federated States of	14 April 1995		
Monaco	13 March 1995	In force: 13 June 1996	524
Mongolia	14 May 1969	In force: 5 September 1972	188
Morocco	27 November 1970	In force: 18 February 1975	228
Mozambique	4 September 1990		
Myanmar	2 December 1992	In force: 20 April 1995	477
Namibia	2 October 1992	In force: 15 April 1998	551
Nauru	7 June 1982	In force: 13 April 1984	317
Nepal	5 January 1970	In force: 22 June 1972	186
Netherlands ^p	2 May 1975	In force: 21 February 1977	193
New Zealand ^q	10 September 1969	In force: 29 February 1972	185
Nicaragua ^c	6 March 1973	In force: 29 December 1976	246
Niger	9 October 1992		
Nigeria	27 September 1968	In force: 29 February 1988	358
Norway	5 February 1969	In force: 1 March 1972	177
Oman	23 January 1997		
Palau, Republic of	14 April 1995		
Panama ^{c,r}	13 January 1977	Signed : 22 December 1988	
Papua New Guinea	13 January 1982	In force: 13 October 1983	312
Paraguay ^c	4 February 1970	In force: 20 March 1979	279
Peru ^c	3 March 1970	In force: 1 August 1979	273
Philippines	5 October 1972	In force: 16 October 1974	216
Poland	12 June 1969	In force: 11 October 1972	179
Portugal ^s	15 December 1977	Accession: 1 July 1986	193
Qatar	3 April 1989		
Republic of Moldova	11 October 1994	Signed: 14 June 1996	
Romania	4 February 1970	In force: 27 October 1972	180
Rwanda	20 May 1975		
St. Kitts and Nevis ^f	22 March 1993	In force: 7 May 1996	514
St. Lucia ^f	28 December 1979	In force: 2 February 1990	379
St. Vincent and the Grenadines ^f	6 November 1984	In force: 8 January 1992	400

SAFEGUARDS AGREEMENTS (cont.)

Non-nuclear-weapon States which have signed, ratified, acceded to or succeeded to NPT ^a (1)	Date of ratification, accession or succession ^a (2)	Safeguards agreement with the Agency (3)	INFCIRC (4)
Samoa	17 March 1975	In force: 22 January 1979	268
San Marino	10 August 1970	In force: 21 September 1998	575
São Tomé and Príncipe	20 July 1983		
Saudi Arabia	3 October 1988		
Senegal	17 December 1970	In force: 14 January 1980	276
Seychelles	12 March 1985		
Sierra Leone	26 February 1975	Signed: 10 November 1977	
Singapore	10 March 1976	In force: 18 October 1977	259
Slovakia ^t	1 January 1993	In force: 3 March 1972	173
Slovenia	7 April 1992	In force: 1 August 1997	538
Solomon Islands	17 June 1981	In force: 17 June 1993	420
Somalia	5 March 1970		
South Africa	10 July 1991	In force: 16 September 1991	394
Spain	5 November 1987	Accession: 5 April 1989	193
Sri Lanka	5 March 1979	In force: 6 August 1984	320
Sudan	31 October 1973	In force: 7 January 1977	245
Suriname ^c	30 June 1976	In force: 2 February 1979	269
Swaziland	11 December 1969	In force: 28 July 1975	227
Sweden ^u	9 January 1970	Accession: 1 June 1995	193
Switzerland	9 March 1977	In force: 6 September 1978	264
Syrian Arab Republic	24 September 1969	In force: 18 May 1992	407
Tajikistan	17 January 1997		
Thailand	7 December 1972	In force: 16 May 1974	241
The Former Yugoslav Republic of Macedonia	30 March 1995		
Togo	26 February 1970	Signed: 29 November 1990	
Tonga	7 July 1971	In force: 18 November 1993	426
Trinidad and Tobago ^c	30 October 1986	In force: 4 November 1992	414
Tunisia	26 February 1970	In force: 13 March 1990	381
Turkey	17 April 1980	In force: 1 September 1981	295
Turkmenistan	29 September 1994		
Tuvalu	19 January 1979	In force: 15 March 1991	391
Uganda	20 October 1982		
Ukraine	5 December 1994	In force: 22 January 1998	550
United Arab Emirates	26 September 1995		
United Republic of Tanzania	31 May 1991	Signed: 26 August 1992	
Uruguay ^c	31 August 1970	In force: 17 September 1976	157
Uzbekistan	7 May 1992	In force: 8 October 1994	508
Vanuatu	24 August 1995		
Venezuela ^c	25 September 1975	In force: 11 March 1982	300
Viet Nam	14 June 1982	In force: 23 February 1990	376
Yemen, Republic of	1 June 1979		
Yugoslavia ^v , Federal Republic of	4 March 1970	In force: 28 December 1973	204
Zambia	15 May 1991	In force: 22 September 1994	456
Zimbabwe	26 September 1991	In force: 26 June 1995	483

- ^a The information in columns (1) and (2) was provided to the Agency by depositary governments of NPT, and an entry in column (1) does not imply the expression of any opinion on the part of the Secretariat concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers. The table does not contain information relating to the participation of Taiwan, China, in NPT.
- ^b A sui generis comprehensive safeguards agreement with Albania entered into force on 25 March 1988 (INFCIRC/359).
- ^c The relevant safeguards agreement refers to both NPT and the Treaty of Tlatelolco.
- ^d An exchange of letters has taken place between Argentina and the Agency confirming that the safeguards agreement concluded between Argentina, Brazil, ABACC and the Agency for the application of safeguards which entered into force on 4 March 1994 (INFCIRC/435) satisfies the requirements of Argentina under Article III of the NPT to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.
- ^e The application of safeguards in Austria under the NPT safeguards agreement INFCIRC/156, in force since 23 July 1972, was suspended on 31 July 1996, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Austria had acceded, entered into force for Austria.
- ^f An exchange of letters has taken place between this State and the Agency confirming that the NPT safeguards agreement concluded with the State satisfies the obligations of the State under Article 13 of the Treaty of Tlatelolco to conclude a safeguards agreement with the Agency.
- ^g The NPT safeguards agreement concluded with the Socialist Federal Republic of Yugoslavia (INFCIRC/204), which entered into force on 28 December 1973, continues to be applied in Bosnia and Herzegovina to the extent relevant to the territory of Bosnia and Herzegovina.
- ^h The Board of Governors has concluded that the agreement between Argentina, Brazil, the ABACC and the Agency for the application of safeguards which entered into force on 4 March 1994 (INFCIRC/435) is compatible with the Treaty of Tlatelolco and the NPT.
- ⁱ An exchange of letters has taken place between this State and the Agency confirming that the safeguards agreement concluded with the State pursuant to the Treaty of Tlatelolco satisfies the requirements of the obligations of the State under Article III of the NPT to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.
- ^j A comprehensive safeguards agreement with Colombia concluded pursuant to the Treaty of Tlatelolco entered into force on 22 December 1982 (INFCIRC/306).
- ^k The NPT safeguards agreement concluded with the Czechoslovak Socialist Republic (INFCIRC/173), which entered into force on 3 March 1972, continued to be applied in the Czech Republic to the extent relevant to the territory of the Czech Republic until 11 September 1997, on which date the NPT safeguards agreement concluded with the Czech Republic entered into force.
- ^l The NPT safeguards agreement with Denmark (INFCIRC/176), in force since 1 March 1972, has been replaced by the agreement of 5 April 1973 between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency (INFCIRC/193) but still applies to the Faroe Islands. Upon Greenland's secession from EURATOM as of 31 January 1985, the Agreement between the Agency and Denmark (INFCIRC/176) re-entered into force as to Greenland.
- ^m The application of safeguards in Finland under the NPT safeguards agreement INFCIRC/155, in force since 9 February 1972, was suspended on 1 October 1995, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Finland had acceded, entered into force for Finland.
- ⁿ The NPT safeguards agreement of 7 March 1972 concluded with the German Democratic Republic (INFCIRC/181) is no longer in force with effect from 3 October 1990, on which date the German Democratic Republic acceded to the Federal Republic of Germany.
- ^o The application of safeguards in Greece under the NPT safeguards agreement INFCIRC/166, provisionally in force since 1 March 1972, was suspended on 17 December 1981, on which date Greece acceded to the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency.
- ^p An agreement had also been concluded in respect of the Netherlands Antilles (INFCIRC/229). This agreement entered into force on 5 June 1975.
- ^q The NPT safeguards agreement with New Zealand (INFCIRC/185) also applies to Cook Islands, Niue and Tokelau.
- ^r A comprehensive safeguards agreement with Panama concluded pursuant to the Treaty of Tlatelolco entered into force on 23 March 1984 (INFCIRC/316).
- ^s The application of safeguards in Portugal under the NPT safeguards agreement INFCIRC/272, in force since 14 June 1979, was suspended on 1 July 1986, on which date Portugal acceded to the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency.
- ^t The NPT safeguards agreement concluded with the Czechoslovak Socialist Republic (INFCIRC/173), which entered into force on 3 March 1972, continues to be applied in Slovakia to the extent relevant to the territory of Slovakia. A new NPT safeguards agreement concluded with Slovakia was approved by the Board of Governors on 14 September 1998.

- ^u The application of safeguards in Sweden under the NPT safeguards agreement INFCIRC/234, in force since 14 April 1975, was suspended on 1 June 1995, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Sweden had acceded, entered into force for Sweden.
- ^v The NPT safeguards agreement concluded with the Socialist Federal Republic of Yugoslavia (INFCIRC/204), which entered into force on 28 December 1973, continues to be applied in the Federal Republic of Yugoslavia to the extent relevant to the territory of the Federal Republic of Yugoslavia.

SITUATION ON 31 DECEMBER 1998 WITH RESPECT TO THE CONCLUSION OF SAFEGUARDS AGREEMENTS BETWEEN THE AGENCY AND STATES PARTY TO THE TREATY OF TLATELOLCO^a

States party to the Treaty of Tlatelolco (1)	Date of becoming a party to the Treaty of Tlatelolco (2)	Safeguards agreement with the Agency (3)	INFCIRC (4)
Antigua and Barbuda ^b	11 October 1983	In force: 9 September 1996	528
Argentina ^c	18 January 1994	In force: 18 March 1997	435/Mod.1
Bahamas ^b	26 April 1977	In force: 12 September 1997	544
Barbados ^b	25 April 1969	In force: 14 August 1996	527
Belize ^d	4 November 1994	In force: 18 March 1997	532/Mod.1
Bolivia ^b	18 February 1969	In force: 6 February 1995	465
Brazil ^c	30 May 1994	In force: 10 June 1997	435/Mod.2
Chile	18 January 1994	In force: 5 April 1995	476
Colombia	6 September 1972	In force: 22 December 1982	306
Costa Rica ^b	25 August 1969	In force: 22 November 1979	278
Dominica ^d	25 August 1993	In force: 10 June 1997	513/Mod.1
Dominican Republic ^b	14 June 1968	In force: 11 October 1973	201
Ecuador ^b	11 February 1969	In force: 10 March 1975	231
El Salvador ^b	22 April 1968	In force: 22 April 1975	232
Grenada ^b	20 June 1975	In force: 23 July 1996	525
Guatemala ^b	6 February 1970	In force: 1 February 1982	299
Guyana ^b	6 May 1996	In force: 23 May 1997	543
Haiti ^b	23 May 1969	Signed: 6 January 1975	
Honduras ^b	23 September 1968	In force: 18 April 1975	235
Jamaica ^b	26 June 1969	In force: 6 November 1978	265
Mexico ^{b,c}	20 September 1967	In force: 14 September 1973	197
Nicaragua ^b	24 October 1968	In force: 29 December 1976	246
Panama ^f	11 June 1971	In force: 23 March 1984	316
Paraguay ^b	19 March 1969	In force: 20 March 1979	279
Peru ^b	4 March 1969	In force: 1 August 1979	273
St. Kitts and Nevis ^d	14 February 1997	In force: 18 March 1997	514/Mod.1
St. Lucia ^d	2 June 1995	In force: 12 June 1996	379/Mod.1
St. Vincent and the Grenadines ^d	11 May 1992	In force: 18 March 1997	400/Mod.1
Suriname ^b	10 June 1977	In force: 2 February 1979	269
Trinidad and Tobago ^b	27 June 1975	In force: 4 November 1992	414
Uruguay ^b	20 August 1968	In force: 17 September 1976	157
Venezuela ^b	23 March 1970	In force: 11 March 1982	300
In addition, there are the following safeguards agreements with States party to Additional Protocol I to the Treaty ^g :			
	France	Approved by the Board, March 1998	
	Netherlands ^b	In force: 5 June 1975	229
	United Kingdom	Approved by the Board, Sep.1992	
	United States of America	In force: 6 April 1989	366

- ^a The information in columns (1) and (2) was provided by Mexico as depositary of the Treaty of Tlatelolco. In addition to the States listed in column (1), Cuba signed the Treaty on 25 March 1995.
- ^b The relevant safeguards agreement refers to both the Treaty of Tlatelolco and the NPT.
- ^c An exchange of letters has taken place between this State and the Agency confirming that the safeguards agreement concluded between Argentina, Brazil, ABACC and the Agency for the application of safeguards which entered into force on 4 March 1994 (INFCIRC/435) satisfies the requirements of this State under Article 13 of the Treaty of Tlatelolco to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.
- ^d An exchange of letters has taken place between this State and the Agency confirming that the NPT safeguards agreement concluded with the State satisfies the obligations of the State under Article 13 of the Treaty of Tlatelolco to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.
- ^e The application of safeguards under an agreement with Mexico in connection with the Treaty of Tlatelolco which entered into force on 6 September 1968 (INFCIRC/118) was suspended after the conclusion of an agreement with Mexico in connection with both the Treaty of Tlatelolco and NPT (INFCIRC/197).
- ^f A safeguards agreement pursuant to both the Treaty of Tlatelolco and NPT has been concluded with Panama; the agreement has not yet entered into force.
- ^g Additional Protocol I refers to States outside Latin America and the Caribbean which have de jure or de facto jurisdiction over territories which lie within the limits of the geographical zone established in the Treaty.

AGREEMENTS PROVIDING FOR SAFEGUARDS, OTHER THAN THOSE IN CONNECTION WITH NPT OR THE TREATY OF TLATELOLCO, APPROVED BY THE BOARD OF GOVERNORS AS OF 31 DECEMBER 1998^a

Party(ies) ^b	Subject	Entry into force	INFCIRC
(While the Agency is a party to each of the following agreements, only the State(s) party to them is (are) listed.)			
(i) Project agreements			
Argentina ^c	Siemens SUR-100	13 March 1970	143
	RAEP reactor	2 December 1964	62
Chile ^d	Herald reactor	19 December 1969	137
Colombia ^d	Fuel for research reactor	17 June 1994	460
Democratic Republic of the Congo ^e	TRICO reactor	27 June 1962	37
	Fuel for research reactor	20 September 1990	389
Finland ^e	FIR-1 reactor	30 December 1960	24
	FINN subcritical assembly	30 July 1963	53
Ghana ^e	Research reactor and fuel therefor	14 October 1994	468
Greece ^e	GRR-1 reactor	1 March 1972	163
Indonesia ^e	Additional core-load for TRIGA reactor	19 December 1969	136
	Supply of enriched uranium	15 January 1993	453
	Supply of enriched uranium	15 January 1993	454
Iran, Islamic Republic of ^e	UTRR reactor	10 May 1967	97
Jamaica ^e	Fuel for research reactor	25 January 1984	315
Japan ^e	JRR-3	24 March 1959	3
Malaysia ^e	TRIGA-II reactor	22 September 1980	287
Mexico ^e	TRIGA-III reactor	18 December 1963	52
	Siemens SUR-100	21 December 1971	162
	Laguna Verde Nuclear Power Plant	12 February 1974	203
Morocco ^e	Fuel for research reactor	2 December 1983	313
Nigeria ^e	Research reactor and fuel therefor	29 August 1996	526
Pakistan	PRR reactor	5 March 1962	34
	Booster rods for KANUPP	17 June 1968	116
Peru ^e	Research reactor and fuel therefor	9 May 1978	266
Philippines ^e	PRR-1 reactor	28 September 1966	88
Romania ^e	TRIGA reactor	30 March 1973	206
	Experimental fuel elements	1 July 1983	307
Slovenia ^e	TRIGA-II reactor	4 October 1961	32
	Krško Nuclear Power Plant	14 June 1974	213
Spain ^e	Coral-I reactor	23 June 1967	99
Syrian Arab Republic ^e	Miniature neutron source reactor and enriched uranium	18 May 1992	408
Thailand ^e	Fuel for research reactor	30 September 1986	342
Turkey ^e	Subcritical assembly	17 May 1974	212
Uruguay ^e	URR reactor	24 September 1965	67
Venezuela ^e	RV-1 reactor	7 November 1975	238
Viet Nam ^e	Fuel for research reactor	1 July 1983	308

SAFEGUARDS AGREEMENTS (cont.)

Party(ies) ^b	Subject	Entry into force	INFCIRC
(ii) Unilateral submissions			
Algeria	Nur research reactor ^h	9 April 1990	361
	Es Salam research reactor ^h	2 June 1992	401
Argentina	Atucha Power Reactor Facility ^f	3 October 1972	168
	Nuclear material ^f	23 October 1973	202
	Embalse Power Reactor Facility ^f	6 December 1974	224
	Equipment and nuclear material ^f	22 July 1977	250
	Nuclear material, material, equipment and facilities ^f	22 July 1977	251
	Atucha II Nuclear Power Plant ^f	15 July 1981	294
	Heavy water plant ^f	14 October 1981	296
	Heavy water ^f	14 October 1981	297
Chile	Nuclear material ^g	31 December 1974	256
	Nuclear material ^g	22 September 1982	304
	Nuclear material ^g	18 September 1987	350
Cuba	Nuclear power plant and nuclear material	5 May 1980	281
	Zero power nuclear reactor and fuel therefor	7 October 1983	311
Democratic People's Republic of Korea	Research reactor and nuclear material therefor ^h	20 July 1977	252
India	Nuclear material, material and facilities	17 November 1977	260
	Nuclear power station	27 September 1988	360
	Nuclear material	11 October 1989	374
	All nuclear material subject to safeguards under INFCIRC/154	1 March 1994	433*
Pakistan	Nuclear material	2 March 1977	248
	Miniature neutron source reactor	10 September 1991	393
	Nuclear power reactor	24 February 1993	418
Spain	Nuclear material ^h	18 June 1975	221
	Vandellos Nuclear Power Plant ^h	11 May 1981	292
	Specified nuclear facilities ^h	11 May 1981	291**
United Kingdom	Nuclear material	14 December 1972	175
Viet Nam	Research reactor and fuel therefor ^h	12 June 1981	293

* Amended in 1994 to cover nuclear material supplied for use in the Tarapur Atomic Power Station (TAPS) which material is required by the supplier to be subject to safeguards. The amendment entered into force on 12 September 1994 (INFCIRC/433/Mod.1).

** Amended in 1985 to cover specified nuclear facilities. The amendment entered into force on 8 November 1985 (INFCIRC/291/Mod.1/Corr.1).

SAFEGUARDS AGREEMENTS (cont.)

Party(ies) ^b	Subject	Entry into force	INFCIRC
(iii) Agreements concluded with nuclear weapon States on the basis of voluntary offers			
China	Nuclear material in facilities selected from list of facilities provided by China	18 September 1989	369
France	Nuclear material in facilities submitted to safeguards	12 September 1981	290
Russian Federation	Nuclear material in facilities selected from list of facilities provided by the Russian Federation	10 June 1985	327
United Kingdom	Nuclear material in facilities designated by the Agency	14 August 1978	263
United States of America	Nuclear material in facilities designated by the Agency	9 December 1980	288
(iv) Other comprehensive safeguards agreements			
Albania	All nuclear material and facilities	25 March 1988	359
Argentina/Brazil	All nuclear material in all nuclear activities	4 March 1994	435
(v) Other safeguards agreements			
Argentina ^f /United States of America ⁱ		25 July 1969	130
Austria ^h /United States of America		24 January 1970	152
Brazil/Germany ^h		26 February 1976	237
Brazil ^f /United States of America ⁱ		31 October 1968	110
Colombia/United States of America		9 December 1970	144
India/Canada ^h		30 September 1971	211
Iran, Islamic Republic of ^h /United States of America		20 August 1969	127
Israel/United States of America		4 April 1975	249
Japan ^h /Canada ^h		20 June 1966	85
Japan ^h /France		22 September 1972	171
Korea, Republic of/United States of America		5 January 1968	111
Korea, Republic of ^h /France		22 September 1975	233
Pakistan/Canada		17 October 1969	135
Pakistan/France		18 March 1976	239
Philippines ^h /United States of America		19 July 1968	120
Portugal ^h /United States of America ⁱ		19 July 1969	131
South Africa/United States of America		26 July 1967	98
South Africa/France		5 January 1977	244
Spain/Germany ^h		29 September 1982	305
Spain ^h /United States of America ⁱ		9 December 1966	92
Spain/Canada ^h		10 February 1977	247
Sweden ^h /United States of America		1 March 1972	165
Switzerland ^h /United States of America ⁱ		28 February 1972	161
Turkey ^h /United States of America ⁱ		5 June 1969	123
Venezuela ^h /United States of America ⁱ		27 March 1968	122

- (vi) The Agency also applies safeguards under two agreements (INFCIRC/133 and INFCIRC/158) to the nuclear facilities in Taiwan, China. Pursuant to the decision adopted by the Board of Governors on 9 December 1971 that the Government of the People's Republic of China is the only government which has the right to represent China in the Agency, the relations between the Agency and the authorities in Taiwan, China, are non-governmental. The agreements are implemented by the Agency on that basis.

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- ^a Safeguards agreements pursuant to the South Pacific Nuclear Weapon Free Zone Treaty (Rarotonga Treaty) are not separately listed with this compilation since the Treaty requires that safeguards by the Agency will be applied pursuant to safeguards agreements equivalent in scope and effect to an agreement required in connection with the NPT on the basis of the material reproduced in INFCIRC/153 (Corrected). As of 31 December 1997, all 11 States Party to the Treaty (Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Solomon Islands, Tuvalu and Samoa) were covered by safeguards agreements concluded pursuant to NPT.
- ^b An entry in this column does not imply the expression of any opinion whatsoever on the part of the Agency concerning the legal status of any country or territory or of its authorities or concerning the delimitation of its frontiers.
- ^c Agency safeguards required by this project agreement are implemented pursuant to the comprehensive safeguards agreement concluded between Argentina, Brazil, the ABACC and the Agency (INFCIRC/435).
- ^d Agency safeguards required by this project agreement are implemented pursuant to a safeguards agreement in connection with the Treaty of Tlatelolco covering the State indicated.
- ^e Agency safeguards required by this (these) project agreement(s) are implemented pursuant to an agreement in connection with NPT covering the State indicated.
- ^f Application of Agency safeguards under this agreement has been suspended in the State indicated. Safeguards are applied pursuant to the comprehensive safeguards agreement concluded between Argentina, Brazil, the ABACC and the Agency (INFCIRC/435).
- ^g Application of Agency safeguards under this agreement has been suspended in the State indicated as the State has concluded an agreement in connection with the Treaty of Tlatelolco.
- ^h Application of Agency safeguards under this agreement has been suspended in the State indicated as the State has concluded an agreement in connection with NPT.
- ⁱ Application of Agency safeguards under this agreement has been suspended in the USA in order to comply with a provision of INFCIRC/228.

APPROXIMATE QUANTITIES OF MATERIAL SUBJECT TO AGENCY SAFEGUARDS AT THE END OF 1998

Type of material	Quantity of material (t)			
	Comprehensive safeguards agreements ^a	INFCIRC/66 ^b	Nuclear weapon States	Quantity in SQs
Nuclear material				
Plutonium ^c contained in irradiated fuel	464.9	25.1	102.9	74 111
Separated plutonium outside reactor cores	12.7	0.1	49.7	7 797
Recycled plutonium in fuel elements in reactor cores	6.8	0.4	0	905
HEU (equal to or greater than 20% ²³⁵ U)	11.3	0.1	10.0	604
LEU (less than 20% ²³⁵ U)	39 981	2 597	6 905	13 682
Source material ^d (natural or depleted uranium and thorium)	77 089	1 505	12 028	6 759
Non-nuclear material^e				
Heavy water	0	528	0	26
Total significant quantities				103 883

^a Covering safeguards agreements pursuant to NPT and/or Treaty of Tlatelolco and other comprehensive safeguards agreements.

^b Excluding installations in nuclear weapon States; including installations in Taiwan, China.

^c The quantity includes an estimated 87 t (10 852 SQ) of plutonium in irradiated fuel, which is not yet reported to the Agency under the reporting procedures agreed to (the non-reported plutonium is contained in irradiated fuel assemblies to which item accountancy and C/S measures are applied).

^d This table does not include material within the terms of subparagraphs 34(a) and (b) of INFCIRC/153 (Corrected).

^e Non-nuclear material subject to Agency safeguards under INFCIRC/66/Rev.2-type agreements.

NUMBER OF FACILITIES UNDER SAFEGUARDS OR CONTAINING SAFEGUARDED MATERIAL ON 31 DECEMBER 1998

Facility type	Number of facilities (number of installations)			
	Comprehensive safeguards agreements ^a	INFCIRC/66 ^b	Nuclear weapon States	Total
Power reactors	184 (221)	11 (14)	1 (1)	196 (236)
Research reactors and critical assemblies	148 (160)	8 (8)	1 (1)	157 (169)
Conversion plants	12 (12)	1 (1)	0 (0)	13 (13)
Fuel fabrication plants	40 (42)	4 (4)	0 (0)	44 (46)
Reprocessing plants	5 (5)	1 (1)	0 (0)	6 (6)
Enrichment plants	11 (11)	0 (0)	3 (3)	14 (14)
Separate storage facilities	58 (59)	3 (3)	8 (8)	69 (70)
Other facilities	74 (80)	1 (1)	1 (1)	76 (82)
Subtotals	532 (590)	29 (32)	14 (14)	575 (636)
Other locations	318 (417)	3 (31)	0 (0)	321 (448)
Non-nuclear installations	0 (0)	1 (1)	0 (0)	1 (1)
Totals	850 (1007)	33 (64)	14 (14)	897 (1085)

^a Covering safeguards agreements pursuant to NPT and/or Treaty of Tlatelolco and other comprehensive safeguards agreements; excludes locations in Iraq.

^b Excluding installations in nuclear weapon States; including installations in Taiwan, China.

FACILITIES UNDER AGENCY SAFEGUARDS OR CONTAINING SAFEGUARDED MATERIAL ON 31 DECEMBER 1998

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Power reactors				
Argentina	Atucha NPP	1	Lima	—
	Embalse NPP	1	Embalse	—
Armenia	Armenia NPP	2	Medzamor	—
Belgium	BR3-Mol	1	Mol	x
	DOEL-1	2	Doel	x
	DOEL-3	1	Doel	x
	DOEL-4	1	Doel	x
	Tihange-1	1	Tihange	x
	Tihange-2	1	Tihange	x
	Tihange-3	1	Tihange	x
Brazil	Admiral Alvaro Alberto	1	Angra dos Reis	x
Bulgaria	Kozloduy-I	2	Kozloduy	x
	Kozloduy-II	2	Kozloduy	x
	Kozloduy-III	2	Kozloduy	x
Canada	Bruce A	4	Tiverton	x
	Bruce B	4	Tiverton	x
	Darlington N.G.S.	4	Bowmanville	x
	Gentilly-2	1	Gentilly	x
	Pickering G.S.	8	Pickering	x
	Point Lepreau G.S.	1	Point Lepreau	x
China	QSNPP	1	Hai Yan	x
Cuba	Juragua	2	Juragua	x
Czech Republic	EDU-1	2	Dukovany	x
	EDU-2	2	Dukovany	x
	Temelin	2	Temelin	—
Democratic People's Republic of Korea	Nyongbyon-1	1	Nyongbyon	—
Finland	Loviisa	2	Loviisa	—
	OL 1	1	Olkiluoto	—
	OL 2	1	Olkiluoto	—
Germany	AVR	1	Jülich	—
	KWG Grohnde	1	Grohnde	x
	GKN-2	1	Neckarwestheim	x
	RWE Biblis-A	1	Biblis	x
	RWE Biblis-B	1	Biblis	x
	KBR Brokdorf	1	Brokdorf	x
	KKB Brunsbüttel	1	Brunsbüttel	x
	KKE Emsland	1	Lingen	x
	KKG Grafenrheinfeld	1	Grafenrheinfeld	x
	KKI Isar-Ohu	1	Ohu bei Landshut	x
	KKI Isar-2	1	Essenbach	x
	KKK Krümmel	1	Geesthacht	x
	RWE Mühlheim-Kärlich	1	Mühlheim-Kärlich	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Germany (cont.)	GKN Neckarwestheim	1	Neckarwestheim	x
	KWO Obrigheim	1	Obrigheim	x
	KKP Philippsburg-1	1	Philippsburg	x
	KKP Philippsburg-2	1	Philippsburg	x
	KRB II Gundremmingen B	1	Gundremmingen	x
	KRB II Gundremmingen C	1	Gundremmingen	x
	KKS Stade	1	Stade	x
	KKU Unterweser	1	Unterweser	x
	KWW Würgassen	1	Würgassen	x
	HKG-THTR 300	1	Hamm	—
	KKW Greifswald 1	2	Lubmin	—
	KKW Greifswald 2	2	Lubmin	—
	KKW Greifswald 3	1	Lubmin	—
	KKW Rheinsberg	1	Rheinsberg	x
	Hungary	PAKS-I	2	Paks
PAKS-II		2	Paks	x
India	RAPS	2	Rajasthan	x
	TAPS	2	Tarapur	x
Italy	ENEL-Latina	1	Borgo-Sabatino	x
	ENEL-Caorso	1	Caorso	x
	ENEL-Trino	1	Trino-Vercellese	x
Japan	Fugen	1	Tsuruga-shi, Fukui-ken	x
	Fukushima Dai-Ichi-1	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ichi-2	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ichi-3	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ichi-4	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ichi-5	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ichi-6	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ni-1	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ni-2	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ni-3	1	Futaba-gun, Fukushima-ken	x
	Fukushima Dai-Ni-4	1	Futaba-gun, Fukushima-ken	x
	Genkai-1	1	Higashimatsura-gun, Saga-ken	x
	Genkai-2	1	Higashimatsura-gun, Saga-ken	x
	Genkai-3	1	Higashimatsura-gun, Saga-ken	x
	Genkai-4	1	Higashimatsura-gun, Saga-ken	x
	Hamaoka-1	1	Ogasa-gun, Shizuoka-ken	x
	Hamaoka-2	1	Ogasa-gun, Shizuoka-ken	x
	Hamaoka-3	1	Ogasa-gun, Shizuoka-ken	x
	Hamaoka-4	1	Ogasa-gun, Shizuoka-ken	x
	Ikata-1	1	Nishiuwa-gun, Ehime-ken	x
	Ikata-2	1	Nishiuwa-gun, Ehime-ken	x
	Ikata-3	1	Nishiuwa-gun, Ehime-ken	x
	Joyo	1	Higashi-gun, Ibaraki-ken	x
	Kashiwazaki-1	1	Kashiwazaki-shi, Niigata-ken	x
	Kashiwazaki-2	1	Kashiwazaki-shi, Niigata-ken	x
	Kashiwazaki-3	1	Kashiwazaki-shi, Niigata-ken	x
	Kashiwazaki-4	1	Kashiwazaki-shi, Niigata-ken	x
	Kashiwazaki-5	1	Kashiwazaki-shi, Niigata-ken	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force	
Japan (cont.)	Kashiwazaki-6	1	Kashiwazaki-shi, Niigata-ken	x	
	Kashiwazaki-7	1	Kashiwazaki-shi, Niigata-ken	x	
	Mihama-1	1	Mikata-gun, Fukui-ken	x	
	Mihama-2	1	Mikata-gun, Fukui-ken	x	
	Mihama-3	1	Mikata-gun, Fukui-ken	x	
	Monju	1	Tsuruga-shi, Fukui-ken	x	
	Ohi-1 and 2	2	Ohi-gun, Fukui-ken	x	
	Ohi-3	1	Ohi-gun, Fukui-ken	x	
	Ohi-4	1	Ohi-gun, Fukui-ken	x	
	Onagawa-1	1	Oshika-gun, Miyaki-ken	x	
	Onagawa-2	1	Oshika-gun, Miyaki-ken	x	
	Sendai-1	1	Sendai-shi, Kagashima-ken	x	
	Sendai-2	1	Sendai-shi, Kagashima-ken	x	
	Shika	1	Hakui-gun, Ishikawa-ken	x	
	Shimane-1	1	Yatsuka-gun, Shimane-ken	x	
	Shimane-2	1	Yatsuka-gun, Shimane-ken	x	
	Takahama-1	1	Ohi-gun, Fukui-ken	x	
	Takahama-2	1	Ohi-gun, Fukui-ken	x	
	Takahama-3	1	Ohi-gun, Fukui-ken	x	
	Takahama-4	1	Ohi-gun, Fukui-ken	x	
	Tokai-1	1	Tokai-Mura, Ibaraki-ken	x	
	Tokai-2	1	Tokai-Mura, Ibaraki-ken	x	
	Tomari-1	1	Fururu-gun, Hokkaido	x	
	Tomari-2	1	Fururu-gun, Hokkaido	x	
	Tsuruga-1	1	Tsuruga-shi, Fukui-ken	x	
	Tsuruga-2	1	Tsuruga-shi, Fukui-ken	x	
	Kazakhstan	BN-350	1	Aktau	—
	Korea, Republic of	Kori-1	1	Pusan	x
		Kori-2	1	Pusan	x
		Kori-3	1	Pusan	x
Kori-4		1	Pusan	x	
Ulchin-1		1	Ulchin	x	
Ulchin-2		1	Ulchin	x	
Ulchin-3		1	Ulchin	x	
Ulchin-4		1	Ulchin	—	
Wolsong-1		1	Kyongju	x	
Wolsong-2		1	Kyongju	—	
Wolsong-3		1	Kyongju	x	
Wolsong-4		1	Kyongju	—	
Younggwang-1		1	Younggwang	x	
Younggwang-2		1	Younggwang	x	
Younggwang-3		1	Younggwang	x	
Younggwang-4		1	Younggwang	x	
Lithuania	Ignalina NPP	2	Visaginas	—	
Mexico	Laguna Verde 1	1	Alto Lucero	x	
	Laguna Verde 2	1	Alto Lucero	x	
Netherlands	Borssele	1	Borssele	x	
	Dodewaard NPP	1	Dodewaard	x	

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Pakistan	KANUPP	1	Karachi	x
	Chasnupp-1	1	Kundian	—
Philippines	PNPP-1	1	Morong, Bataan	x
Romania	Cernavoda-1	1	Cernavoda	—
Slovakia	A1	1	Bohunice	x
	EMO-1	2	Mochovce	—
	V-1	2	Bohunice	x
	V-2	2	Bohunice	x
Slovenia	Krško	1	Krško	x
South Africa	Koeberg-1	1	Cape Town	x
	Koeberg-2	1	Cape Town	x
Spain	Almaraz-1	1	Almaraz	—
	Almaraz-2	1	Almaraz	—
	Asco-1	1	Asco	—
	Asco-2	1	Asco	—
	Cofrentes	1	Cofrentes	—
	José Cabrera	1	Almonazid de Zorita	—
	Santa María de Garona	1	Santa María de Garona	—
	Trillo-1	1	Trillo	—
	Vandellos 1	1	Vandellos	—
	Vandellos 2	1	Vandellos	—
Sweden	Barsebäck 1	1	Malmö	—
	Barsebäck 2	1	Malmö	—
	Forsmark 1	1	Uppsala	—
	Forsmark 2	1	Uppsala	—
	Forsmark 3	1	Uppsala	—
	Oskarshamn 1	1	Oskarshamn	—
	Oskarshamn 2	1	Oskarshamn	—
	Oskarshamn 3	1	Oskarshamn	—
	Ringhals 1	1	Göteborg	—
	Ringhals 2	1	Göteborg	—
	Ringhals 3	1	Göteborg	—
	Ringhals 4	1	Göteborg	—
	Switzerland	KKB Beznau I	1	Beznau
KKB Beznau II		1	Beznau	x
KKG Gösgen		1	Gösgen-Däniken	x
KKL Leibstadt		1	Leibstadt	x
KKM Mühleberg		1	Mühleberg	x
Ukraine	Chernobyl NPP	3	Chernobyl	—
	Khmelnitski 1	1	Neteshin	—
	Rovno 1 and 2	2	Kuznetsovsk	—
	Rovno 3	1	Kuznetsovsk	—
	South Ukraine 1	1	Yuzhnoukrainsk	—
	South Ukraine 2	1	Yuzhnoukrainsk	—
	South Ukraine 3	1	Yuzhnoukrainsk	—
	Zaporozhe 1	1	Energodar	—

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Ukraine (cont.)	Zaporozhe 2	1	Energodar	—
	Zaporozhe 3	1	Energodar	—
	Zaporozhe 4	1	Energodar	—
	Zaporozhe 5	1	Energodar	—
	Zaporozhe 6	1	Energodar	—

Research reactors and critical assemblies

Algeria	NUR Reactor	1	Algiers	x
	Es Salam research reactor	1	Ain Oussera	—
Argentina	Argentine reactor-1	1	Constituyentes	—
	Argentine reactor-3	1	Ezeiza	—
	Argentine reactor-4	1	Rosario	—
	Argentine reactor-6	1	Bariloche	—
	Argentine reactor-0	1	Córdoba	—
	Argentine reactor-8	1	Pilcaniyeu	—
Australia	HIFAR	1	Lucas Heights	x
	MOATA	1	Lucas Heights	x
Austria	ASTRA	1	Seibersdorf	—
	Siemens Argonaut Reactor	1	Graz	—
	Triga II	1	Vienna	—
Bangladesh	Atomic Energy Research Est.	1	Dhaka	x
Belarus	Sosny	1	Minsk	—
Belgium	BR1-CEN	1	Mol	x
	BR2-CEN-BRO2	2	Mol	x
	CEN-Venus	1	Mol	x
	Thetis	1	Gent	x
Brazil	IEA-R1	1	São Paulo	—
	RIEN-1 Argonaut RR	1	Rio de Janeiro	—
	IPR-RI-CDTN	1	Belo Horizonte	x
	IPEN Critical assembly	1	São Paulo	—
	Subcritical assembly	1	Recife	—
Bulgaria	IRT-2000	1	Sofia	x
Canada	Biology, Chemistry, Physics	2	Chalk River	x
	McMaster	1	Hamilton	x
	NRU	1	Chalk River	x
	NRX	1	Chalk River	x
	Slowpoke-AECL	1	Ottawa	x
	Slowpoke-Dalhousie Univ.	1	Halifax	x
	Slowpoke-Ecole Polytechnique	1	Montreal	x
	Slowpoke-Kingston	1	Kingston	x
	Slowpoke-Saskatchewan	1	Saskatoon	x
	Slowpoke-Univ. of Toronto	1	Toronto	x
	Slowpoke-Univ. of Alberta	1	Edmonton	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Chile	La Reina	1	Santiago	x
	Lo Aguirre	1	Santiago	x
China	HWRR	1	Beijing	x
Colombia	IAN-R1	1	Bogotá	x
Czech Republic	LR-O	1	Řež	x
	Univ. Training Reactor VR-1P	1	Prague	x
	VVR-S	1	Řež	x
Democratic People's Republic of Korea	Critical Assembly	1	Bungang-Ri, Nyongbyon	x
	IRT	1	Bungang-Ri, Nyongbyon	x
Democratic Republic of the Congo	Triga II	1	Kinshasa	x
Denmark	DR-1	1	Roskilde	x
	DR-3	1	Roskilde	x
Egypt	RR-I	1	Inshas	x
	MPR	1	Inshas	—
Finland	FIR 1	1	Otaniemi	—
Germany	BER-2	1	Berlin	x
	FH-Furtwangen	1	Furtwangen	x
	FRF-2	1	Frankfurt	x
	FRM	1	Garching	x
	GKSS-FRG1&FRG2	2	Geesthacht	x
	KFA-FRJ2	1	Jülich	x
	SUR 100	1	Bremen	x
	SUR 100	1	Hannover	x
	SUR 100	1	Kiel	x
	SUR 100	1	Hamburg	x
	SUR 100	1	Ulm	x
	SUR 100	1	Stuttgart	x
	SUR 100	1	Berlin	x
	SUR 100	1	Aachen	x
	Tech. Univ. AKR	1	Dresden	x
	Tech. Hochschule ZLR	1	Zittau	x
	Triga	1	Mainz	x
MHH-Triga	1	Hannover	x	
DKFZ-Triga	1	Heidelberg	x	
VKT research reactor	1	Rosendorf	x	
Ghana	GHARR-1	1	Legon-Accra	x
Greece	GRR-1	1	Attiki	x
Hungary	Training reactor	1	Budapest	x
	WWR-S M 10	1	Budapest	x
Indonesia	Gama	1	Yogyakarta	x
	MPR-30	1	Serpong	x
	PPTN	1	Bandung	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Iran, Islamic Republic of	TRR	1	Tehran	x
	HWZPR	1	Esfahan	x
	MNSR	1	Esfahan	x
Israel	IRR-1	1	Soreq	x
Italy	AGN-201	1	Palermo	x
	Poltec.	1	Milan	x
	RTS-1	1	San Piero a Grado	x
	TAPIRO	1	Santa Maria di Galeria	x
	Triga-RC1	1	Santa Maria di Galeria	x
	Triga-2	1	Pavia	x
Jamaica	Centre for Nuclear Sciences	1	Kingston	x
Japan	DCA	1	Oarai-machi, Ibaraki-ken	x
	FCA	1	Tokai-Mura, Ibaraki-ken	x
	HTR	1	Kawasaki-shi, Kanagawa-ken	x
	HTTR	1	Higashi-gun, Ibaraki-ken	x
	JMTR	1	Higashi-gun, Ibaraki-ken	x
	JMTRCA	1	Higashi-gun, Ibaraki-ken	x
	JRR-2	1	Tokai-Mura, Ibaraki-ken	x
	JRR-3	1	Tokai-Mura, Ibaraki-ken	x
	JRR-4	1	Tokai-Mura, Ibaraki-ken	x
	Kinki University reactor	1	Higashiosaka-shi, Osaka-fu	x
	KUCA	3	Osaka	x
	KUR	1	Sennan-gun, Osaka	x
	Musashi reactor	1	Kawasaki-shi, Kanagawa-ken	x
	NCA	1	Kawasaki-shi	x
	NSRR	1	Tokai-Mura, Ibaraki-ken	x
	Rikkyo University R.R.	1	Nagasaka, Kanagawa-ken	x
	TCA	1	Tokai-Mura, Ibaraki-ken	x
	TODAI	1	Tokai-Mura, Ibaraki-ken	x
	TTR	1	Kawasaki-shi, Kanagawa-ken	x
VHTRC	1	Tokai-Mura, Ibaraki-ken	x	
Kazakhstan	Kurchatov test reactor	3	Semipalatinsk	—
	WWR-K	1	Almaty	—
Korea, Republic of	Triga II and III	2	Seoul	x
	Kyunghee Univ.	1	Suwoon	x
	Hanaro	1	Taejon	x
Latvia	IRT	1	Riga	x
Libyan Arab Jamahiriya	IRT reactor	1	Tajura	x
Malaysia	Puspati	1	Bangi, Selangor	x
Mexico	Triga Mark III	1	Ocoyoacac	x
Netherlands	HOR	1	Delft	x
	HFR	1	Petten	x
	LFR	1	Petten	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Norway	HBWR-Halden	1	Halden	x
	JEEP-II	1	Kjeller	x
Pakistan	PARR-1	1	Rawalpindi	x
	PARR-2	1	Rawalpindi	x
Peru	RP-0	1	Lima	x
	RP-1O	1	Lima	x
Philippines	PRR-1	1	Quezon City, Diliman	x
Poland	Agata and Anna	2	Świerk	x
	Ewa	1	Świerk	x
	Maria	1	Świerk	x
Portugal	RPI	1	Sacavem	x
Romania	Triga II	1	Pitești Colibași	x
	VVR-S	2	Magurele	x
Slovenia	Triga II	1	Ljubljana	x
South Africa	SAFARI-1	1	Pelindaba	x
Sweden	Studsvik RR	2	Studsvik	—
Switzerland	AGN 211P	1	Basel	x
	Crocus	1	Lausanne	x
	Proteus	1	Würenlingen	x
	Saphir	1	Würenlingen	x
Syrian Arab Republic	MNSR	1	Damascus	x
Thailand	TRR-1	1	Bangkok	x
Turkey	Çekmece Nuclear Research and Training Centre	1	Istanbul	x
	ITU-TRR Triga Mark II	1	Istanbul	x
Ukraine	Kiev RR	1	Kiev	—
	IR-100 RR	1	Sevastopol	—
Uruguay	Centro Investigaciones Nucleares	1	Montevideo	x
Uzbekistan	Photon	1	Tashkent	—
	WWR-SM	1	Tashkent	—
Venezuela	RV-I	1	Altos de Pipe	x
Viet Nam	Da Lat Research Reactor	1	Da Lat, Lam Dong	x
Yugoslavia Fed. Rep. of	RA-RB	2	Vinča	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Conversion plants, including pilot plants				
Argentina	UF ₆ production facility		Pilcaniyeu	—
	UO ₂ conversion plant		Córdoba	—
Canada	CAMECO		Port Hope	x
Chile	Lab. exper. de conversión		Santiago	x
Japan	JCO conv. plant		Tokai-Mura, Ibaraki-ken	x
	Ningyo R&D		Tomata-gun, Okayama-ken	x
	PCDF		Tokai-Mura, Ibaraki-ken	x
Mexico	Fuel fabrication pilot plant		Salazar	x
Romania	UO ₂ powder fabrication plant		Feldioara	—
South Africa	Conversion plant		Pelindaba	x
	HEU-UF ₆ production plant		Pelindaba	x
Sweden	Ranstad Mineral		Ranstad	—
Fuel fabrication plants, including pilot plants				
Argentina	Experimental plant		Constituyentes	—
	Fuel fabrication plant		Ezeiza	—
	Fuel fabrication plant		Constituyentes	—
Belgium	BN-MOX		Dessel	x
	FBFC		Dessel	x
	FBFC MOX		Dessel	—
Brazil	Fuel fabrication plant		Resende	—
	Fuel tech. co-ord. unit		São Paulo	—
Canada	CRNL fuel fabrication		Chalk River	x
	Fuel fabrication facility		Chalk River	x
	GEC, Inc.		Toronto	x
	GEC, Inc.		Peterborough	x
	Zircatec		Port Hope	x
Chile	UMF		Santiago	—
Democratic People's Republic of Korea	Nuclear fuel fabrication plant		Nyongbyon	—
Denmark	Metallurgy		Roskilde	x
Egypt	FMPP		Inshas	—
Germany	Adv. Nuclear Fuels		Lingen	x
	NUKEM		Wolfgang	x
	Siemens Uran (two units)		Hanau	x
	Siemens MOX		Hanau	x
India	Ceramic fuel fab. assembly area		Hyderabad	x
	EFFP-NFC		Hyderabad	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Indonesia	Experimental fuel element installation (IEBE)		Serpong	x
	Research reactor fuel element production installation (IPEBRR)		Serpong	x
Iran, Islamic Rep. of	Fuel fabrication lab.		Esfahan	—
Italy	Fabnuc		Bosco Marengo	x
Japan	JNF		Yokosuka-shi, Kanagawa-ken	x
	MNF		Tokai-Mura, Ibaraki-ken	x
	NFI (Kumatori-1)		Sennan-gun, Osaka	x
	NFI (Kumatori-2)		Sennan-gun, Osaka	x
	NFI Tokai		Tokai-Mura, Ibaraki-ken	x
	PFPF		Tokai-Mura, Ibaraki-ken	x
	PFPF		Tokai-Mura, Ibaraki-ken	x
Kazakhstan	Ulbinski Metallurgical Works		Kamenogorsk	—
Korea, Republic of	CANDU fuel fabrication plant		Taejon	x
	KNFFP		Taejon	x
Romania	Romfuel		Pitești Colibasi	x
South Africa	MTR fuel fabrication		Pelindaba	x
	LEU fuel fabrication		Pelindaba	x
Spain	ENUSA fuel fabrication plant		Juzbado	—
Sweden	ABB		Västeras	—

Chemical reprocessing plants, including pilot plants

Democratic People's Republic of Korea	Radiochemical Laboratory		Bungang-Ri, Nyongbyon	—
Germany	WAK		Eggenstein-Leopoldshafen	x
India	PREFRE		Tarapur	x
Italy	EURE		Saluggia	x
	ITREC-Trisaia		Rotondella	x
Japan	Tokai reprocessing plant		Tokai-Mura, Ibaraki-ken	x

In addition, the following R&D facilities and locations are associated with reprocessing technology:

<i>Argentina</i>	<i>Fission products div.</i>		<i>Ezeira</i>	—
<i>Brazil</i>	<i>Reprocessing project</i>		<i>São Paulo</i>	—
<i>Indonesia</i>	<i>RMI</i>		<i>Serpong</i>	—
<i>Japan</i>	<i>SCF</i>		<i>Tokai-Mura, Ibaraki-ken</i>	x
	<i>JAERI Tokai R&D</i>		<i>Tokai-Mura, Ibaraki-ken</i>	x
	<i>PNC Tokai R&D</i>		<i>Tokai-Mura, Ibaraki-ken</i>	x
	<i>Sumitomi Met. Mining</i>		<i>Tokai-Mura, Ibaraki-ken</i>	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Enrichment plants, including pilot plants				
Argentina	Pilcaniyeu enrichment plant		Pilcaniyeu	—
Brazil	Enrichment plant (first cascade)		Resende	—
	Enrichment laboratory		Ipero	—
	Uranium enrichment pilot plant		São Paulo	—
	Laser spectroscopy lab.		San jose dos Campos	—
China	Shaanxi		Han Zhang	—
Germany	UTA-1		Gronau	x
Japan	Uranium Enrichment Plant		Tomata-gun, Okayama-ken	x
	Rokkasho Enrichment Plant		Kamikita-gun, Aomori-ken	x
Netherlands	URENCO		Almelo	x
South Africa	Semi-commercial enrichment plant		Pelindaba	x
	MLIS enrichment plant		Valindaba	—
United Kingdom	URENCO E22		Capenhurst	x
	URENCO A3 plant		Capenhurst	—
<i>In addition, the following R&D facilities and locations are associated with enrichment technology:</i>				
Brazil	UF ₆ laboratory		Belo Horizonte	—
Germany	Urenco		Jülich	—
Japan	Asahi Chemical Industry		Hyuga-shi, Miyazaki-ken	x
	Communication Equipment Works		Tokai-Mura, Ibaraki-ken	x
	Hitachi laboratory		Hitachi-shi, Ibaraki-ken	x
	JAERI Tokai R&D		Tokai-Mura, Ibaraki-ken	x
	PNC Tokai R&D		Tokai-Mura, Ibaraki-ken	x
	Toshiba R&D Centre		Kawasaki-shi, Kanagawa-ken	x
Netherlands	Urenco		Almelo	x
	Ultra-centrifuge		Almelo	—
Separate storage facilities				
Argentina	Central store		Ezeiza	—
	Central store		Constituyentes	—
	Nuclear material store		Constituyentes	—
Australia	Vault storage		Lucas Heights	x
Belgium	Belgoprocess		Dessel	x
	Elbel		Beveren	—
	Wet Store		Tihange	—
Brazil	Aramar stores (2 units)		Ipero	—
	UF ₆ production facility		São Paulo	—
Bulgaria	Long term storage		Kozloduy	x
Canada	Nuclear material		Chalk River	x
	Spent fuel canister store		Chalk River	x
	Douglas Point dry storage		Tiverton	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
	Gentilly-1		Gentilly	x
	Spent fuel storage		Chalk River	x
	AECL Research		Pinawa	x
	PUFDSF		Pickering	x
Czech Republic	Storage Škoda		Bolevec	x
	HLW store		Řež	—
	ISFS Dukovany		Dukovany	—
Democratic People's Republic of Korea	Nuclear fuel storage		Bungang-Ri, Nyongbyon	—
Denmark	Risø Store		Roskilde	x
	Risø Waste		Roskilde	—
Finland	TVO-KPA store		Olkiluoto	—
France	Cogéma UP2 and UP3		La Hague	x
Germany	Bundeslager		Wolfgang	—
	ANF UF ₆ Lager		Lingen	x
	KFA AVR BL		Jülich	—
	KFA AVR		Jülich	x
	BZA-Ahaus		Ahaus	—
	NCS-Lagerhalle		Hanau	—
	Energiewerke Nord GmbH		Lubmin	x
	Energiewerke Nord-ZLN		Lubmin	—
	Transportbehälterlager		Gorleben	—
	TR Halle 87		Rosendorf	—
	Kernmateriallager		Rosendorf	—
Hungary	Central radionuclide store		Budapest	x
	MVDS		Paks	—
India	AFR		Tarapur	x
Indonesia	TC and ISFSF		Serpong	—
Italy	Compes. deposito		Saluggia	x
	Essor nuclear plant		Ispra	—
	Essor storage		Ispra	x
	Research centre		Ispra	—
Japan	KUFFS		Kyoto	x
	Fukushima Dai-Ichi SFS		Futaba-gun, Fukushima-ken	—
	N. S. Mutsu		Mutsu-shi, Aomori-ken	x
	RCTS		Kamikita-gun, Aomori-ken	—
	RSFS		Kamikita-gun, Aomori-ken	x
Kazakhstan	Ulbinski Thorium Storage		Kamenogorsk	—
Netherlands	Covra Store		Vlissingen	—
Pakistan	Hawks Bay depot		Karachi	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Portugal	Inst. de Armazenagem		Sacavem	x
Russian Federation	Mashinostroitel'nyi Zavod		Ehlektrostal	—
Slovakia	AFRS		Bohunice	x
South Africa	Waste storage		Pelindaba	—
	Bulk storage facility		Pelindaba	x
	HEU storage vault		Pelindaba	x
	Thabana pipe store		Pelindaba	x
Spain	CIEM		Madrid	—
Sweden	Central long term storage		Oskarshamn	—
Ukraine	Chernobyl storage		Chernobyl	—
United Kingdom	Thorp R&S		Sellafield	x
	Special nuclear material store 9		Sellafield	x
	Thorp Plutonium Store		Sellafield	—
United States of America	Pu storage vault		Hanford, WA	—
	Y-12 plant		Oak Ridge, TN	x
	Vault		Golden, CO	—

Other facilities

Algeria	UDEC		Draria	—
	Es Salam reactor		Ain Oussera	—
Argentina	Alpha facility		Constituyentes	—
	Experimental UO ₂ plant		Cordoba	—
	Enriched uranium lab.		Ezeiza	—
	Fission products div.		Ezeiza	—
	Fuel fabrication plant		Ezeiza	—
	Uranium powder fab. plant		Constituyentes	—
	Triple Altura Lab.		Ezeiza	—
Australia	Research Lab.		Lucas Heights	x
Belgium	IRMM-Geel		Geel	x
	CEN-Labo		Mol	x
	CEN-Waste		Dessel	—
	I.R.E.		Fleurus	x
	CEN-lab. Pu		Mol	x
Brazil	Isotope laboratory		São Paulo	—
	Nuclear material lab.		Ipero	—
	Safeguards store		São Paulo	x
Czech Republic	Nuclear Fuel Inst. (UJP)		Zbraslav	x
	Research Laboratories		Řež	x
Democratic People's Republic of Korea	Subcritical assembly		Pyongyang	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Germany	KFA-heisse Zellen		Jülich	x
	KFK-heisse Zellen		Eggenstein-Leopoldshafen	x
	KFK-IHCH		Eggenstein-Leopoldshafen	x
	Siemens heisse Zellen		Karlstein	x
	KFA Lab.		Jülich	x
	Transuran		Eggenstein-Leopoldshafen	x
	VKT. Tec. ZTR		Rosendorf	x
Hungary	Institute of Isotopes		Budapest	x
Indonesia	RMI		Serpong	—
Iran, Islamic Republic of	LWSCR		Esfahan	x
	GSCR		Esfahan	—
Italy	CNEN-LAB. PU.		Santa Maria di Galeria	x
Japan	JAERI-Oarai R&D		Higashi-gun, Ibaraki-ken	x
	JAERI-Tokai R&D		Tokai-Mura, Ibaraki-ken	x
	Kumatori R&D		Sennan-gun, Osaka	x
	Mitsui Iwakuni-Ohtake		Kuga-gun, Yamaguchi	x
	Mitsui Toatsu		Takai-shi, Osaka-fu	x
	NDC Fuel Hot Lab.		Tokai-Mura, Ibaraki-ken	x
	NDC fuel laboratories		Tokai-Mura, Ibaraki-ken	x
	NERL, University of Tokyo		Tokai-Mura, Ibaraki-ken	x
	NFD		Higashi-gun, Ibaraki-ken	x
	NFI Tokai-2		Tokai-Mura, Ibaraki-ken	x
	NRF Neutron Radiation Facility		Tsukuba-shi, Ibaraki-ken	x
	PNC FMF		Higashi-gun, Ibaraki-ken	x
	PNC IRAF		Higashi-gun, Ibaraki-ken	x
	PNC-Oarai R&D		Higashi-gun, Ibaraki-ken	x
	PNC-Tokai R&D		Tokai-Mura, Ibaraki-ken	x
	SCF		Tokai-Mura, Ibaraki-ken	x
	Showa-Kawasaki		Kawasaki-shi, Kanagawa-ken	x
Sumitomo-Chiba		Sodegaura-shi, Chiba-ken	x	
Uranium Material Laboratory		Higashi-gun, Ibaraki-ken	x	
Korea, Republic of	PIEF		Daejeon	x
	Acrylonitrile plant		Ulsan	—
	DFDF		Taejon	—
	HFFL		Taejon	x
	IMEF		Taejon	x
Netherlands	ECN and JRC		Petten	x
Norway	Research laboratories		Kjeller	x
Poland	Institute for Nuclear Chemistry and Engineering		Warsaw	—
	Institute of Nuclear Research		Świerk	x
South Africa	Decommissioned pilot enrichment plant		Pelindaba	x
	Decontamination and waste recovery		Pelindaba	—
	Hot Cell Complex		Pelindaba	x
	NU and DU metals plant		Pelindaba	x

SAFEGUARDED FACILITIES (cont.)

State ^a	Abbreviated name of facility	Number of reactor units	Location	Subsidiary arrangements in force
Switzerland	EIR		Würenlingen	x
	CERN		Geneva	x
Turkey	Nuclear fuel pilot plant		Istanbul	x
Ukraine	Chernobyl unit 4		Chernobyl	—
	Khmelnitski FF Storage		Neteshin	—
	KHFTI		Kharkov	—
	Rovno FF Storage		Kuznetsovsk	—
	South Ukraine Storage		Yuzhnoukrainsk	—
	Zaporozhe FF Storage		Energodar	—
	Sevastopol subcritical assembly		Sevastopol	—
United States of America	B&W NNFD		Lynchburg, VA	—

Non-nuclear installations

Cuba	Storage of equipment		Prov. Havana	—
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^a An entry in this column does not imply the expression of any opinion whatsoever on the part of the Agency concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

Note: The Agency was also applying safeguards in Taiwan, China, at six power reactors, five research reactors/critical assemblies, one uranium pilot conversion plant, two fuel fabrication plants, one storage facility and one R&D facility.

Locations in Iraq containing nuclear material which are under the responsibility of the IAEA Action Team under United Nations Security Council Resolution 687

Location C	In the vicinity of Al Tuwaitha
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ADDITIONAL SAFEGUARDS SUPPORT PROVIDED BY STATES

States and organizations representing groups of States having formal support programmes	States having R&D contracts and test programmes
Argentina	Argentina
Australia	Austria
Belgium	Latvia
Canada	Pakistan
EURATOM	Russian Federation
Finland	
France	
Germany	
Hungary	
Japan	
Republic of Korea	
Netherlands	
Russian Federation	
Sweden	
United Kingdom	
United States of America	

MAIN EQUIPMENT AND ACTIVITIES IN SUPPORT OF SAFEGUARDS

	1997	1998
Gamma ray measurement systems	Total in inventory	
Low resolution systems (assay probes)	78	78
High resolution systems (analysers)	43	42
Portable multichannel analysers	263	304
Detectors	629	759
Neutron measurement systems		
Detection heads for active neutron measurements	29	30
Detection heads for passive neutron measurements	32	34
Neutron coincidence counting electronics	92	102
Spent fuel measurement systems		
Cerenkov glow viewing devices	87	97
Spent fuel radiation measuring systems	143	165
Irradiated fuel measuring electronics	67	77
Other measurement systems		
Physical properties devices	134	147
Optical surveillance systems		
Photo cameras	943	891
Video single camera systems	402	456
Video multiple camera systems	30	65
Video review stations	81	86
Seals		
In situ verifiable seals	1 350	1 327
Radiation monitoring systems	57	74
Activities		
Metal cap seals issued	18 200	18 600
Metal cap seals verified	18 140	19 301
Shipment of equipment and supplies	618	554
Hand carried transport of equipment and supplies	552	656
Shipment of reference material and chemicals to facilities	161	170
Shipment of inspection samples, radioactive material standards and contaminated items to the Safeguards Analytical Laboratory	243	202
Procurement actions	1 908	1 707

CONVENTIONS NEGOTIATED AND ADOPTED UNDER THE AUSPICES OF THE AGENCY AND FOR WHICH THE DIRECTOR GENERAL IS THE DEPOSITARY (STATUS AND RELEVANT DEVELOPMENTS)

Agreement on the Privileges and Immunities of the IAEA (reproduced in document INFCIRC/9/Rev. 1). In 1998, two States adhered to the Agreement. By the end of the year, there were 67 Parties.

Vienna Convention on Civil Liability for Nuclear Damage (reproduced in document INFCIRC/500). Entered into force on 12 November 1977. In 1998, 3 States adhered to the Convention. By the end of the year, there were 31 Parties.

Convention on the Physical Protection of Nuclear Material (reproduced in INFCIRC/274/Rev.1). Entered into force on 8 February 1987. In 1998, 4 States adhered to the Convention. By the end of the year, there were 63 Parties.

Convention on Early Notification of a Nuclear Accident (reproduced in INFCIRC/335). Entered into force on 27 October 1986. In 1998, 2 States adhered to the Convention. By the end of the year, there were 82 Parties.

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (reproduced in INFCIRC/336). Entered into force on 26 February 1987. In 1998, 2 States adhered to the Convention. By the end of the year, there were 77 Parties.

Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (reproduced in INFCIRC/402). Entered into force on 27 April 1992. Its status remained unchanged during 1998, with 20 Parties.

Convention on Nuclear Safety (reproduced in INFCIRC/449). Entered into force on 24 October 1996. In 1998, 7 States adhered to the Convention. By the end of the year, there were 49 Parties.

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (reproduced in INFCIRC/546). Opened for signature on 29 September 1997. In 1998, 5 States adhered to the Convention. By the end of the year, there were 5 Contracting States and 37 Signatories.

Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (reproduced in INFCIRC/566). Opened for signature on 29 September 1997. In 1998, 1 State adhered to the Protocol. By the end of 1998, there was 1 Contracting State and 14 Signatories.

Convention on Supplementary Compensation for Nuclear Damage (reproduced in INFCIRC/567). Opened for signature on 29 September 1997. In 1998, 4 States signed the Convention. By the end of 1998, there were 13 Signatories.

Extension of the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) (reproduced in INFCIRC/377). Entered into force on 4 April 1995. In 1998, 3 States adhered to the Extension. By the end of the year, there were 24 Parties.

Second Agreement to Extend the 1987 Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA). Entered into force on 12 June 1997. In 1998, 4 States adhered to the Agreement. By the end of the year, there were 17 Parties.

Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA (RSA). In 1998, 1 State concluded the Agreement. By the end of the year, there were 88 States that concluded RSA Agreements.

Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL). Opened for signature on 25 September 1998. By the end of the year, there were 12 Signatories.

CO-ORDINATED RESEARCH PROJECTS

(with year of start and completion)

Nuclear power		
Case studies to assess and compare different energy sources in sustainable energy and electricity supply strategies	1996	2001
Assuring the structural integrity of the reactor pressure vessel	1996	1999
Nuclear power plant outage coding system	1998	2001
Design and evaluation of heat utilization systems for the high temperature engineering test reactor (HTTR)	1993	1999
Thermohydraulic relationships for advanced water cooled reactors	1994	1999
Evaluation of high temperature gas cooled reactor performance	1997	2002
Intercomparison of analysis methods for seismically isolated nuclear structures	1996	2000
Harmonization and validation of fast reactor thermomechanical and thermohydraulic codes and relations using experimental data	1996	1999
Potential of thorium based fuel cycles to constrain plutonium and to reduce long term waste toxicities	1995	1999
Use of a thorium based fuel cycle in accelerator driven systems (ADS) to incinerate plutonium and to reduce long term waste toxicities	1996	1999
Intercomparison of techniques for pressure tube inspection and diagnostics	1998	2001
Establishment of a thermophysical properties database for LWRs and HWRs	1998	2002
Optimization of the coupling of nuclear reactors and desalination systems	1998	2003
Nuclear fuel cycle and waste technology		
Treatment of liquid effluent from uranium mines and mills during and after operation (post-decommissioning/rehabilitation)	1996	1999
Stress corrosion cracking of zirconium alloy fuel cladding	1994	1999
Hydrogen and hydride induced degradation of the mechanical and physical properties of zirconium based alloys	1998	2002
High temperature on-line monitoring of water chemistry and corrosion	1995	1999
Modelling of transport of radioactive substances in the primary circuit of water cooled reactors	1996	2000
Spent fuel performance assessment and research	1997	2002
Corrosion of research reactor aluminium clad spent fuel in water	1995	2000
Evaluation of the safety, environmental and non-proliferation aspects of partitioning and transmutation of actinides and fission products	1994	1998
Chemical durability and performance assessment of spent fuel and high level waste forms under simulated repository conditions	1998	2002
Combined methods of liquid radioactive waste treatment	1997	2001
Long term behaviour of low and intermediate level waste packages under repository conditions	1997	2002
Extrapolation of short term observations to time periods for isolation of long lived radioactive waste	1995	1999

CO-ORDINATED RESEARCH PROJECTS (cont.)

Anthropogenic analogues for geological disposal of high level and long lived radioactive waste	1998	2002
New methods and techniques for optimization of decontamination for maintenance or decommissioning	1994	1998
Decommissioning techniques for research reactors	1997	2002
Site characterization techniques used in environmental restoration activities	1995	1999
Comparative assessment of energy sources		
Case studies to assess and compare different energy sources in sustainable energy and electricity supply strategies	1997	1999
Formulation of approaches to compare the potential impacts of waste from electricity generation technologies (FACTS)	1997	2001
Comparative health and environmental impacts of nuclear and other energy systems	1994	1998
Food and agriculture		
Use of nuclear techniques for optimizing fertilizer applications under irrigated wheat to increase the efficient use of fertilizers and consequently reduce environmental pollution	1993	1998
Use of nuclear and related techniques in the management of nutrients and water in rainfed arid and semi-arid areas for increasing crop production	1998	2002
Use of nuclear techniques for developing integrated nutrient and water management practices for agroforestry systems	1998	2004
Use of nuclear and related techniques for evaluating the agronomic effectiveness of phosphate fertilizers, in particular rock phosphates	1993	1998
Use of irradiated sewage sludge to increase soil fertility and crop yields and to preserve the environment	1995	1999
Use of isotope techniques in studies on the management of organic matter and nutrient turnover for increased, sustainable agricultural production and environmental preservation	1996	2001
Assessment of soil erosion through the use of caesium-137 and related techniques as a basis for soil conservation, sustainable production and environmental protection	1996	2001
Induced mutations in connection with biotechnology for crop improvement in Latin America	1993	1998
Induced mutations for sesame improvement	1993	1998
Induced mutations and other advanced technology for the production of crop mutants suitable for environmentally sustainable agriculture	1993	1998
In vitro techniques for the selection of radiation induced mutants adapted to adverse environmental conditions	1993	1998
Radioactively labelled DNA probes for crop improvement	1994	1999
Improvement of new and traditional industrial crops by induced mutations and related biotechnology	1994	1999

CO-ORDINATED RESEARCH PROJECTS (cont.)

Cellular biology and biotechnology, including mutation techniques for creation of new useful banana genotypes	1994	1999
Genetic improvement of underutilized and neglected crops in low income food deficit countries through irradiation and related techniques	1998	2003
Development of feed supplementation strategies for improving the productivity of dairy cattle on smallholder farms in Africa	1993	1998
Use of immunoassay methods for improved diagnosis of trypanosomosis and monitoring of tsetse and trypanosomosis control programmes in Africa	1993	1999
Use of radioimmunoassay and related techniques to identify ways of improving artificial insemination programmes for cattle reared under tropical and subtropical conditions	1994	1999
Use of immunoassay technologies for the diagnosis and control of foot and mouth disease in South East Asia	1994	1999
Use of nuclear and colorimetric techniques for measuring microbial protein supply from local feed resources in ruminant animals	1996	2001
Rinderpest seromonitoring and surveillance in Africa using immunoassay technologies	1997	1999
Development and validation of standardized methods for using polymerase chain reaction and related molecular technologies for rapid and improved animal disease diagnosis	1997	2001
Monitoring of contagious bovine pleuropneumonia in Africa using enzyme immunoassays	1997	2002
Use of nuclear and related techniques to develop simple tannin assays for predicting and improving the safety and efficiency of feeding ruminants on tanniniferous tree foliage	1998	2003
Assessment of the effectiveness of vaccination strategies against Newcastle Disease and Gumboro Disease using immunoassay based technologies for increasing farmyard poultry production in Africa	1998	2004
Evaluation of insect population suppression by irradiated lepidoptera and their progeny	1992	1998
Development of female medfly attractant systems for trapping and sterility assessment	1993	1998
Medfly mating behaviour studies under field cage conditions	1993	1999
Improved attractants for enhancing the efficiency of tsetse fly suppression operations and barriers systems used in tsetse control/eradication campaigns	1994	1999
Enhancement of the sterile insect technique (SIT) through genetic transformation of arthropods using nuclear techniques	1994	2000
Molecular and genetic approaches to develop sexing strains for field application in fruit fly SIT programmes	1994	2000
Automation in tsetse mass rearing for use in sterile insect technique programmes	1994	2000
Application of genetics to improve the SIT for tsetse control/eradication	1997	2002
Impact of long term pesticide usage on soil properties using radiotracer techniques	1995	1999
Use of nuclear and related techniques in studies of the agroecological effects resulting from the use of pesticides in Central America	1993	1998
Use of nuclear and immunochemical methods for pesticide analysis	1993	1998

CO-ORDINATED RESEARCH PROJECTS (cont.)

Validation of thin layer chromatographic screening methods for pesticide residue analysis (in vegetables)	1996	2001
Standardized methods to verify absorbed dose in irradiated fresh and dried fruits, and tree nuts in trade	1994	1998
Determination of the profiles of human bacterial pathogens in foods for export by the introduction of quality assured microbiological assays	1998	2002
Irradiation as a public health intervention measure to control foodborne diseases (cysticercosis/taeniasis and <i>Vibrio</i> infections) in Latin America and the Caribbean	1993	1998
Public acceptance and market development of irradiated food in Asia and the Pacific	1995	1998
Human health		
Local production and evaluation of primary reagents for the radioimmunoassay of alpha fetoprotein	1997	2000
Diagnosis of genetic disorders using radionuclide based molecular methods	1995	1998
Molecular typing of mycobacteria strains in multi-drug resistant tuberculosis	1997	2000
Genotype/phenotype correlation in thalassemia and muscular dystrophy	1998	2000
Diagnosis and followup of prostatic cancer by radioimmunoassay	1996	1998
Standardization of iodine-131 treatment for hyperthyroidism with an intent to optimize radiation dose and treatment response (RCA)	1995	2000
Efficacy and toxicity of samarium-153 radiopharmaceuticals in the treatment of painful skeletal metastases	1996	1999
Diagnosis and management of patients with 'unexplained' back pain using bone single photon emission computer tomography	1997	2000
Study of the relationship between vesicoureteral reflux, pyelonephritis and renal scarring in children with urinary tract infection using nuclear medicine techniques	1997	2001
Nuclear imaging for infection and inflammation	1996	1999
Evaluation of technetium-99m based radiopharmaceuticals in the diagnosis and management of breast cancer patients	1997	2000
Research and certification of quality control and preventive maintenance of instruments in nuclear medicine centres (Asia and the Pacific)	1993	1998
Research and certification of quality control and preventive maintenance of instruments in nuclear medicine centres in Latin America	1995	1998
Validation of personal computer interface with gamma cameras and software for data processing of clinical studies (related to ARCAL)	1995	1998
Development and validation of an Internet based clinical and technical study communication system for nuclear medicine	1998	2002
Radiation responsiveness criteria for human tumours as determinant for therapeutic modality planning	1993	1998
Modern techniques in brachytherapy of cancer with special reference to the developing countries	1993	1999
Clinical application of radiosensitizers in cancer radiotherapy	1994	2001

CO-ORDINATED RESEARCH PROJECTS (cont.)

Randomized clinical trial of radiotherapy combined with Mitomycin C in the treatment of advanced head and neck tumours	1994	2003
Quality assurance in radiotherapy for Latin America	1995	1998
Use of radiotherapy in advanced cancers	1995	2001
Regional hyperthermia combined with radiotherapy for locally advanced cancers	1997	2002
Aspects of radiobiology applicable in clinical radiotherapy: Increase of the number of fractions per week	1998	2005
Characterization and evaluation of high dose dosimetry techniques for quality assurance in radiation processing	1995	1999
Development of a quality assurance programme for Secondary Standard Dosimetry Laboratories (SSDLs)	1996	1999
Development of a quality assurance programme for radiation therapy dosimetry in developing countries	1995	2000
Dose determination with plane parallel ionization chambers in therapeutic electron and photon beams	1996	1999
Development of a Code of Practice for dose determination in photon, electron and proton beams based on measurement standards of absorbed dose to water	1997	2000
Electron paramagnetic resonance biodosimetry	1998	2000
Application of stable isotope tracer methods to studies of amino acid, protein, and energy metabolism in malnourished populations of developing countries	1993	1998
Comparative international studies of osteoporosis using isotope techniques	1994	2000
Development and application of isotopic techniques in studies of vitamin A nutrition	1995	1999
Isotopic evaluations of maternal and child nutrition to help prevent stunting	1996	1999
Isotopic evaluations in infant growth monitoring	1998	2000
Application of nuclear techniques in the prevention of degenerative diseases (obesity and non-insulin dependent diabetes) in ageing	1998	2001
Reference Asian Man Project (Phase 2): Ingestion and organ content of trace elements of importance in radiological protection (RCA)	1995	2000
Applied research on air pollution using nuclear related analytical techniques in the Asia and Pacific Region (RCA)	1995	1998
Assessment of levels and health effects of airborne particulate matter in mining, metal refining and metal working industries using nuclear and related analytical techniques	1996	2000
Validation and application of plants as biomonitors of trace element atmospheric pollution, analysed by nuclear and related techniques	1997	2002
Marine environment, water resources and industry		
Use of radiation processing to prepare biomaterials for applications in medicine	1995	1999
Improvement of physical properties of radiation vulcanized natural rubber latex (RCA)	1998	2000
Radiation processing of indigenous natural polymers (RCA)	1995	1999
Radiotracer technology for engineering unit operation studies and unit process optimization	1998	2001

CO-ORDINATED RESEARCH PROJECTS (cont.)

Use of radiation processing for sterilization or decontamination of pharmaceuticals and pharmaceutical raw materials	1998	2000
Irradiation treatment of water, wastewater and sludge	1995	1999
Validation of protocols for corrosion and deposit evaluation in pipes by radiography	1997	2000
Physical and chemical sciences		
Development of agents for imaging CNS receptor based on technetium-99m	1996	1999
Technetium-99m labelled peptides for imaging peripheral receptors	1996	1999
Development of kits for radioimmunoassays of tumour markers	1997	2000
Optimization of production and quality control of therapeutic radionuclides and radiopharmaceuticals	1994	1998
Optimization of synthesis and quality control procedures for iodine-123 and fluorine-18 labelled peptides	1996	1999
Validation of nuclear techniques for the analysis of precious and rare metals in mineral concentrates	1996	1999
Nuclear analytical techniques in archaeological investigations	1996	1999
Establishment of an international reference data library of nuclear activation cross-sections	1993	1998
Development of a reference input parameter library for nuclear model calculations of nuclear data (Phase I: starter file)	1994	1998
Development of a reference charged particle cross-section database for medical radioisotope production	1995	1998
Atomic and plasma wall interaction data for fusion reactor divertor modelling	1995	2000
Compilation and evaluation of photonuclear data for applications	1996	1999
Fission product yield data required for transmutation of minor actinide nuclear waste	1997	2001
Charge exchange cross-section data for fusion plasma studies	1997	2002
Plasma material interaction data for mixed plasma facing materials in fusion reactors	1997	2002
Nuclear model parameter testing for nuclear data evaluation (Reference input parameter library: Phase II)	1998	2002
Update of X and gamma ray decay data standards for detector calibration	1998	2002
Specialized software utilities for gamma ray spectrometry	1996	2000
Bulk hydrogen analysis using neutrons	1997	2000
Development of computer based troubleshooting tools and instruments	1996	2000
Application of MeV ion beams for the development and characterization of semiconductor materials	1997	2000
Analysis of research reactor transients	1995	1999
WIMS-D library update	1998	2000
Engineering, industrial and environmental applications of plasma physics and fusion technologies	1996	1999
Comparison of compact toroidal configurations	1998	2002

CO-ORDINATED RESEARCH PROJECTS (cont.)

Nuclear safety		
Development of methodologies for optimization of surveillance testing and maintenance of safety related equipment at nuclear power plants	1996	1999
Investigation of methodologies for incident analysis	1997	2000
Round robin exercise of WWER-440 reactor pressure vessel weld metal irradiation embrittlement and annealing	1996	1999
Management of ageing of in-containment instrumentation and control cables	1992	1998
Application of non-destructive testing and in-service inspection to research reactors	1995	1998
Safety of RBMK nuclear power plants in relation to external events	1997	2000
Validation of accident and safety analysis methodology	1995	1999
Radiation safety		
Intercomparison for individual monitoring of external exposure from photon radiation	1996	2000
Intercomparison and biokinetic model validation of radionuclide intake assessment	1997	2000
Development of relevant accident data for quantifying risks associated with the transport of radioactive material	1994	1998
Development of a radiological basis for the transport safety requirements for low specific activity materials and surface contaminated objects	1997	2001
Accident severity during air transport of radioactive material	1998	2001
Regional personal dosimetry intercomparison	1996	1998
Limitations of radioepidemiological assessments for stochastic radiation effects, in relation to radiation protection	1994	1998
Cytogenetic biodosimetry	1998	2000
Radiation protection in diagnostic radiology in Asia and the Far East	1994	1998
Radiation protection in diagnostic radiology in Eastern European countries	1994	1998
Radioactive waste safety		
Biosphere Modelling and Assessment methods (BIOMASS)	1996	2002
Improvement of safety assessment methodologies for near surface disposal facilities for radioactive waste	1997	2000
Formulation of approaches to compare the potential impacts of wastes from electricity generation technologies	1997	2000

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998

Nuclear power	
Regional workshop on upgrading and modernization of instrumentation and control of WWER 440/213 nuclear power plants	Czech Republic
Regional workshop on the organization and management of the technical support for nuclear power plant operation	Slovakia
Regional workshop on flaw discrimination and sizing methods and techniques	Spain
Regional workshop on on-line testing of nuclear plant temperature and pressure instrumentation and other critical plant equipment	Slovakia
Regional workshop on planning and management support for nuclear power plant personnel systematic approach to training based programmes	Hungary
Regional workshop on ageing and life management of nuclear power plants	Finland
Interregional course on training and qualification of nuclear power plant personnel and management responsibilities	Germany; Spain
International seminar on nuclear power in developing countries: Its potential role and strategies for its deployment	India
Regional course on nuclear power plant maintenance	Hungary; Spain
Regional workshop on optimization of nuclear power plant maintenance	India
Regional course on modernization of instrumentation and control in nuclear power plants	Germany
Regional East Asia and Pacific workshop on co-operation among the RCA Member States in the region on nuclear power planning and implementation	Rep. of Korea
Nuclear fuel cycle and waste technology	
Interregional course on spatial data integration for uranium exploration, resource assessment and environmental studies	Slovenia
Interregional course on decontamination and decommissioning of research reactors and other small nuclear facilities	USA
Regional course on quality assurance in fuel fabrication	France
Regional workshop on implementation of the WWER version of the TRANSURANUS code and safety criteria	Bulgaria
National workshop on quality assurance of nuclear fuel	China
Regional workshop on planning and management of decommissioning for WWER reactors	Austria; Japan
Regional workshop on the use and management of the Agency's sealed radiation sources registry	South Africa
Regional course on the management of radioactive waste from the medical use of radionuclides	Tunisia
Regional workshop to formulate guidance on management of radioactive waste from nuclear applications and guidance on consumer products containing radioactive substances	Nigeria
Comparative assessment of energy sources	
Interregional course on electric system expansion planning (WASP-IV/DECPAC)	USA
Regional course on economic analyses of nuclear electricity generation costs and comparison with other energy sources	Philippines
Regional course on comparative assessment of nuclear power and other energy sources in support of sustainable energy development	Rep. of Korea

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

National seminar on the use of the DECADES tools for the comparative assessment of energy sources	Israel
National workshop on the use of the DECADES tools for the comparative assessment of energy sources	Egypt
National seminar on the comparative assessment of options and strategies for electricity generation	China
Workshop on enhanced electricity system planning	Portugal
Seminar on the future energy outlook	Headquarters
Regional course on externalities associated with electricity generation: Concepts and estimation	Rep. of Korea
Regional workshop on the analysis of the economic and financial aspects of nuclear power programmes using the Agency's FINPLAN model	Croatia
Food and agriculture	
FAO/IAEA workshop on the use of nuclear techniques for developing sustainable soil, water and nutrient management practices	France
FAO/IAEA advanced regional workshop on quality assurance for nitrogen-15 analysis	Uruguay
FAO/IAEA workshop on external quality assurance for nitrogen-15 analyses by optical emission spectrometry	Mexico
FAO/IAEA in-country workshop for the interregional project on sustainable utilisation of saline groundwater and wastelands for plant production	Morocco; Tunisia
FAO/IAEA national course on the use of nuclear techniques in studies of soil fertility, fertilizers and water management	Guatemala
FAO/IAEA national course/workshop on the use of nuclear techniques to evaluate the dynamics of nutrients and water in cropping and tillage systems	Venezuela
FAO/IAEA course on water and soil sampling, analytical techniques and use of neutron moisture probes	Pakistan
FAO/IAEA course on hydrological studies on the project site, with particular reference to isotopic techniques	Pakistan
FAO/IAEA course on nuclear and related techniques used in the study of soil physical, chemical and biological parameters and the effects of salinity and plant growth on these parameters	Pakistan
FAO/IAEA regional course for West Asia on the use of nuclear techniques in water and nutrient management practices	Syrian Arab Republic
FAO/IAEA third co-ordination workshop for East Asia and the Pacific on nuclear techniques for the promotion of agroforestry systems	Malaysia
FAO/IAEA second co-ordination workshop for Latin America on plant nutrition, soil and water management (ARCAL XXII)	Chile
FAO/IAEA group fellowship training on water use efficiency (AFRA III)	Agency's Laboratories, Seibersdorf
Selection methods for drought tolerance in cereals and legumes	South Africa
Regional AFRA workshop to review results of experiments	Egypt

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Regional course on basic mutation and in vitro culture techniques for the improvement of vegetatively propagated crops for sustainable crop production in Africa	South Africa
Second working group on rice multi-location trials	Uruguay
Third regional workshop on improving animal production through the application of feed supplementation strategies and immunoassay techniques	Viet Nam
FAO/IAEA/PARC subregional workshop on emergency preparedness and the surveillance of rinderpest in East Africa	Uganda
Regional workshop on external quality assurance for progesterone radioimmunoassay	Zambia
FAO/IAEA workshop on emergency preparedness and disease surveillance for southern Africa	Zimbabwe
Task force meeting on strategies for future sustainability of the applications of progesterone RIA for improving livestock production in developing Member States	Headquarters
Seminar on feasibility assessment for fruit fly eradication using the sterile insect technique	South Africa
National course on integrated area wide control of fruit flies	Thailand
Group course on plant quarantine procedures against fruit flies for quarantine inspectors and supervisors	Peru
Group course on integrated control of fruit flies, with emphasis on the sterile insect technique	Peru
Second national workshop on advances in research support for national fruit fly programme	Argentina
FAO/IEAEA/SIDA workshop on implementation of quality assurance and quality control measures in residue analysis laboratories	Hungary
Human health	
Seminar on nuclear medicine: The global perspectives	Germany
Seminar on upgrading and distribution of gamma cameras in developing countries	Germany
Regional course for nuclear medicine technologists on diagnostic and therapeutic applications of radionuclide methods	Uruguay
Regional course for nuclear medicine physicians	Hungary
Regional course on advanced molecular biology techniques for Latin America on the diagnosis of Chagas' disease and leishmaniasis	Brazil
Regional course on serological markers for hepatitis infection and its sequel	Chile
Regional course on assessing viability of myocardium using nuclear medicine techniques	Australia
Regional course on the production of basic reagents for radioimmunoassay of tumour markers and optimal diagnostic uses of the assay	Zimbabwe
Regional course on molecular biology techniques and radionuclide tracers in the control of malaria and tuberculosis	Kenya
Regional workshop on the treatment of thyroid cancer with iodine-131	Pakistan
Regional course for tumour marker assay	Pakistan

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Regional workshop on scintimammography techniques	India
Regional course on nuclear cardiology	Singapore
National course on radioimmunoassay	Zambia
National course on advanced radioimmunoassay techniques	Sudan
National course on radioimmunoassay	Dem. Rep. of the Congo
Regional course on quality control and preventive maintenance of radiotherapy equipment	Jordan
Regional workshop on repair and maintenance of MEDISO gamma cameras and associated computer systems	Zambia
Regional workshop on preventive maintenance and quality control of gamma camera computer systems	Ukraine
Regional workshop on the quality control of single and multi-head single photon emission computer tomography systems	Mexico
Regional workshop on upgrading of analogue gamma camera with personal computers and relevant clinical software	Kazakhstan
Regional workshop on servicing and maintenance of medical linear accelerators	Egypt
Regional course on recommended systems for upgrading gamma cameras	Mexico
Regional course on treatment planning techniques and quality assurance (AFRA)	South Africa
Regional course on quality assurance in radiation oncology	Ghana
Regional course for therapeutic radiographers in clinical quality assurance (RCA)	Singapore
Regional workshop on radiotherapeutic management of head and neck tumours (AFRA)	Cameroon
Regional workshop on mould room techniques (AFRA)	Tunisia
Regional course for therapeutic radiographers in clinical quality assurance (ARCAL XXIV)	Colombia
Regional course on radiation sterilization of tissue grafts (RCA)	Philippines
Regional course on intracavitary brachytherapy	Brazil
Regional course on clinical quality assurance for radiotherapy technicians (ARCAL)	Dominican Rep.
Regional course on intraluminal and interstitial brachytherapy (RCA)	India
Workshop on self-assessment review and public awareness in tissue banking	Malaysia
Regional course for radiotherapy technicians in clinical quality assurance (ARCAL)	Brazil
Regional course on clinical and physical aspects of quality assurance in radiation oncology	Ghana
National course on quality assurance in radiation therapy dosimetry	China
Regional course on dosimetry and treatment planning of radiotherapy treatments	Mexico
Regional course on implementation of the ARCAL XXX protocol for quality assurance in radiotherapy (physical aspects)	Cuba
Monitoring radionuclides in food and the environment	Austria; Germany
Group training fellowship on radiochemical analysis of strontium-90 and actinides in environmental samples	Austria
Marine environment, water resources and industry	
Course on organochlorides and organophosphates	Malaysia
Course on chlorinated pesticides	Côte d'Ivoire

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Course on trace metals	Côte d'Ivoire
Course on pesticides for MEDPOL countries	Monaco
Course on trace metals for MEDPOL countries	Monaco
IAEA/PAGES-ISOMAP workshop on reconstructing the isotopic composition of past precipitation from continental archives	Headquarters
Workshop on the use of isotopes in Caspian Sea investigations	Headquarters
Interregional course on analytical techniques and quality assurance in environmental isotope techniques	Headquarters
Workshop for AFRA specialized teams	Tunisia
Regional course on technical quality management of an isotope hydrology laboratory	Headquarters
Regional workshop on training personnel in the safe operation of radiation facilities (AFRA)	Egypt
Regional workshop on radiation treatment of wastewater and drinking water (RCA)	China
Regional workshop to assess national in-service inspection needs and priorities and establish appropriate programmes and methods (AFRA)	Kenya
Regional workshop on the fabrication of non-destructive testing test pieces (RCA)	Japan
Regional workshop and course on condition monitoring of civil engineering concrete structures (AFRA)	Tunisia
Regional workshop and course on in-service inspection in the petroleum industry (RCA)	Indonesia
Regional course on radioisotope sealed source and radiotracer applications in the oil and gas industries (RCA)	Malaysia
Regional course on design, calibration and quality control of nucleonic gauges (RCA)	Viet Nam
Physical and chemical sciences	
National course on gamma ray spectrometric survey in mineral resource assessment and environmental monitoring	Portugal
Regional workshop on electronics for research reactors (ARCAL)	Argentina
National course on repair and maintenance of switch mode power supplies used in personal computers and monitors	Zambia
Regional workshop on nuclear instrumentation in Africa	Kenya
Regional course on troubleshooting, maintenance and repair of analog nuclear systems and quality control of nuclear instruments	Tunisia
Regional course on personal computer interfacing of nuclear instruments	Ghana
Workshop on industrial and environmental applications of nuclear analytical methods	Austria
Workshop on performance of portable X ray fluorescence and gamma spectroscopy systems	Austria
Regional workshop on measurements of reactor physics parameters (AFRA)	Egypt
Regional course on research reactor instrumentation technology and trends (AFRA)	Nigeria
Regional course on quality control in hospital radiopharmacy	Ghana
Workshop on production of technetium-99m radiopharmaceuticals based on human albumin and immunoglobulin (RLA)	Cuba
Course on preparation of radiopharmaceuticals based on fluorine-18 and iodine-123 (RLA)	Argentina
Workshop on quality assurance and quality control in analytical laboratories I (RLA)	Mexico

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Workshop on quality assurance and quality control in analytical laboratories II (RLA) Uruguay

Nuclear safety

Interregional course on operator regulator interface for nuclear power plants USA

Interregional course on advances in monitoring, assessment and enhancement of the operational safety of nuclear power plants USA

Regional course on regulatory aspects of safety documentation of research reactors Czech Republic

Interregional course on safety in the operation of research reactors for operators USA

Regional workshop on human factors in nuclear safety Slovenia

Regional workshop on modelling of external hazards in probabilistic safety analysis Russian Federation

Regional workshop on format and content of the safety analysis report Bulgaria

Regional workshop on safety analysis of plant modifications Slovenia

Regional workshop on analytical methods and computational tools for nuclear power plant safety assessment Russian Federation

Regional workshop on application of plant simulators and analysis for validating EOPs Romania

Regional workshop on monitoring operational performance through operating experience Czech Republic

Regional workshop on operational safety performance indicators Slovenia

Regional workshop on severe accident management Slovenia

Regional course on regulatory control of nuclear power plants Germany

Regional workshop on regulatory review of plant safety analysis reports Slovakia

Regional workshop on regulatory use of probabilistic safety analysis methods Finland

Regional workshop on radiation protection issues in nuclear power plants Slovenia

Regional workshop on establishment of training programmes for the regulatory staff Finland

Regional workshop on decommissioning Slovenia

Regional workshop on training the trainers in nuclear safety Rep. of Korea

Regional workshop on operating organization and self-assessment of safety culture Rep. of Korea

Regional workshop on operating experience feedback China

Regional management workshop on operational and safety issues of nuclear power plants China

Regional workshop on definition and maintenance of the safe operating envelope Canada

Regional workshop on operational experience feedback and self-assessment of operational safety Pakistan

Regional workshop on maintenance optimization India

Radiation safety

Regional basic professional course on radiation protection India; Morocco

Regional basic professional course on radiation protection and nuclear safety Argentina

National course on radiation protection Albania; Ethiopia

Regional seminar on approaches and practices in strengthening radiation protection and waste management infrastructures in Eastern European countries Slovakia

Regional course on techniques for external and internal dose assessment China

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Regional workshop on radiation protection in mining and milling	Zambia
Regional (Europe) workshop on the implementation and management of the 'as low as reasonably achievable' concept in nuclear power plant operation	Headquarters
National training course on radiation protection for medical personnel	Bosnia and Herzegovina
National workshop on radiation protection in radiodiagnostics, radiotherapy and nuclear medicine	Uzbekistan
Regional course on radiation protection and safety in medicine: Protection against occupational, medical and public exposure	India
National course on radiation protection and quality assurance in diagnostic radiology and safety in therapy	Latvia
Regional workshop on notification, authorization, inspection and enforcement	Thailand
Regional course on notification, authorization, inspection and enforcement	Australia; Cuba; South Africa
Regional combined workshop on the Regulatory Authority Information System (RAIS) and implementation of a regulatory programme	Lebanon
National workshop on the system of authorization and inspection of radiation sources for regulators	Viet Nam
Regional workshop on the Regulatory Authority Information System (RAIS)	Slovakia
Regional course on notification, registration, licensing and control of radiation sources	Belarus
National course on industrial radiography	The Former Yugoslav Rep. of Macedonia
National course on radiation protection in the medical use of radiation and radionuclides	Cyprus
Regional course on safe transport of radioactive materials	Germany
Regional workshop on emergency planning and preparedness	South Africa
Regional workshop on assistance in case of a nuclear accident or radiological emergency	China
Regional West Asia group training on medical emergencies in case of radiological emergencies	France
Regional course on medical education and interregional harmonization programme for nuclear accident preparedness – Echo II	Russian Federation
Regional course on medical education and interregional harmonization programme for nuclear accident preparedness – Echo III	Republic of Moldova
Regional course on medical education and interregional harmonization programme for nuclear accident preparedness – Echo IV	Estonia
Regional course on medical education and interregional harmonization programme for nuclear accident preparedness – Echo V	Ukraine
Regional train the trainers workshop on planning and preparedness, accident assessment and response to reactor accidents	Belarus; Slovakia
Regional workshop on the accident classification scheme	Headquarters
Regional workshop on the application of indirect methods for individual dosimetry of internally deposited radionuclides	Japan

TRAINING COURSES, SEMINARS AND WORKSHOPS IN 1998 (cont.)

Regional course on design, implementation and management of national individual monitoring service	Germany
Regional seminar on exchange of experience among thermoluminescent dosimeter RADOS users in the Baltic region	Lithuania
Regional workshop on external occupational dosimetry systems	Brazil
Radioactive waste safety	
Regional course on operational safety for near surface disposal facilities	United Kingdom
Regional workshop on analytical procedures for foodstuff contamination	Egypt
Regional workshop on environmental radiation measurements using spectrometric methods	USA
Safeguards	
Safeguards traineeship programme for junior professionals	Headquarters
Seminar on nuclear science and technology for diplomats	Headquarters
International course on State's System of Accounting and Control of Nuclear Material	Russian Federation
Regional course on State's System of Accounting and Control of Nuclear Material	Brazil
Technical workshop on safeguards, verification technologies and other related experiences	Headquarters
International seminar on safeguards information reporting and processing	Vienna
Security of material	
Regional course on physical protection of nuclear facilities and materials	Argentina; China
Workshop on nuclear export/import controls	Headquarters
Workshop on familiarization of safeguards activities and non-destructive analysis measurement techniques	Belarus
IAEA/WCO/INTERPOL course on nuclear smuggling	Headquarters
Management, co-ordination and support	
Seminar on information security issues	Headquarters

PUBLICATIONS ISSUED IN 1998

Nuclear power

Nuclear desalination of sea water	Proceedings Series
Nuclear fuel cycle and reactor strategies: Adjusting to new realities	Proceedings Series
Choosing the nuclear power option: Factors to be considered	Special publication
Decommissioning of nuclear facilities other than reactors	Technical Reports Series No. 386
Design measures to facilitate implementation of safeguards at future water cooled reactors	Technical Reports Series No. 392
Energy, electricity and nuclear power estimates for the period up to 2020: July 1998 edition	Reference Data Series No. 1
Nuclear power reactors in the world: April 1998 edition	Reference Data Series No. 2
Country nuclear power profiles	IAEA-CNPP
Advances in fast reactor technology	IAEA-TECDOC-1015
Modernization of instrumentation and control in nuclear power plants	IAEA-TECDOC-1016
Design measures for prevention and mitigation of severe accidents at advanced water cooled reactors	IAEA-TECDOC-1020
Selection, competency development and assessment of nuclear power plant managers	IAEA-TECDOC-1024
Energy and nuclear power planning study for Pakistan (covering the period 1993–2023)	IAEA-TECDOC-1030
Influence of high dose irradiation on core structural and fuel materials in advanced reactors	IAEA-TECDOC-1039
Technologies for gas cooled reactor decommissioning, fuel storage and waste disposal	IAEA-TECDOC-1043
Nuclear power plant organization and staffing for improved performance: Lessons learned	IAEA-TECDOC-1052
Technologies for improving the availability and reliability of current and future water cooled nuclear power plants	IAEA-TECDOC-1054
Nuclear heat applications: Design aspects and operating experience	IAEA-TECDOC-1056
Good practices with respect to the development and use of nuclear power plant procedures	IAEA-TECDOC-1058
Options identification programme for demonstration of nuclear desalination	IAEA-TECDOC-898
Potential for nuclear desalination as a source of low cost potable water in North Africa	IAEA-TECDOC-917
Planning for environmental restoration of uranium mining and milling sites in Central and Eastern Europe	IAEA-TECDOC-982
Advances in heavy water reactor technology	IAEA-TECDOC-984
Accelerator driven systems: Energy generation and transmutation of nuclear waste	IAEA-TECDOC-985
High temperature gas cooled reactor technology development	IAEA-TECDOC-988
Selection, specification, design and use of various nuclear power plant training simulators	IAEA-TECDOC-995
Introduction of small and medium reactors in developing countries	IAEA-TECDOC-999

PUBLICATIONS ISSUED IN 1998 (cont.)

Nuclear fuel cycle and waste technology

Interim storage of radioactive waste packages	Technical Reports Series No. 390
Review of fuel failures in water cooled reactors	Technical Reports Series No. 388
Safe handling and storage of plutonium	Safety Reports Series No. 9
Spent fuel management: Current status and prospects 1997	IAEA-TECDOC-1006
Durability of spent nuclear fuels and facility components in wet storage	IAEA-TECDOC-1012
Implementation of burnup credit in spent fuel management systems	IAEA-TECDOC-1013
Characterization of radioactively contaminated sites for remediation purposes	IAEA-TECDOC-1017
Technical, institutional and economic factors important for developing a multinational radioactive waste repository	IAEA-TECDOC-1021
New methods and techniques for decontamination in maintenance or decommissioning operations	IAEA-TECDOC-1022
Factors for formulating strategies for environmental restoration	IAEA-TECDOC-1032
Critical review of uranium resources and production capability to 2020	IAEA-TECDOC-1033
Classification of uranium reserves/resources	IAEA-TECDOC-1035
Advances in fuel pellet technology for improved performance at high burnup	IAEA-TECDOC-1036
Management of small quantities of radioactive waste	IAEA-TECDOC-1041
Poolside inspection, repair and reconstitution of LWR fuel elements	IAEA-TECDOC-1050
Management of radioactive waste from molybdenum-99 production	IAEA-TECDOC-1051
Guidebook on good practices in the management of uranium mining and mill operations and the preparation for their closure	IAEA-TECDOC-1059

Comparative assessment of energy sources

Guidelines for integrated risk assessment and management in large industrial areas	IAEA-TECDOC-994
DECADES tools user's manual for version 1.0	DECADES Project Document No. 3

Food and agriculture

Towards livestock disease diagnosis and control in the 21st century	Proceedings Series
Combination processes for food irradiation	Panel Proceedings Series
Evaluation of genetically altered medflies for use in sterile insect technique programmes	Panel Proceedings Series
Research and development on procedures to stabilize acaricides in livestock dips	IAEA-TECDOC-983
Management of nutrients and water in rainfed arid and semi-arid areas	IAEA-TECDOC-1026
Improving yield and nitrogen fixation of grain legumes in the tropics and subtropics of Asia	IAEA-TECDOC-1027
Use of caesium-137 in the study of soil erosion and sedimentation	IAEA-TECDOC-1028
Use of nuclear techniques in the management of nitrogen fixation by trees to enhance fertility of fragile tropical soils	IAEA-TECDOC-1053
Application of DNA based marker mutations for improvement of cereals and sexually reproduced crops	IAEA-TECDOC-1010

PUBLICATIONS ISSUED IN 1998 (cont.)

Use of novel DNA fingerprinting techniques for the detection and characterization of genetic variation in vegetatively propagated crops	IAEA-TECDOC-1047
Plant breeding and genetics newsletter	Nos 1, 2
Animal production and health newsletter	Nos 28, 29
Diagnosis and epidemiology of animal diseases in Latin America	IAEA-TECDOC-1055
Genetic engineering technology for the improvement of the sterile insect technique	IAEA-TECDOC-993
The South American fruit fly <i>Anastrepha fraterculus</i> (Wied): Advances in artificial rearing, taxonomic status and biological studies	IAEA-TECDOC-1064
Insect and pest control newsletter	Nos 51, 52
Use of isotopic tracers in studies of herbicide performance on grasses and sedges	IAEA-TECDOC-1003

Human health

In vitro radionuclide techniques in medical diagnosis	IAEA-TECDOC-1001
Quality assurance in radiotherapy	IAEA-TECDOC-989
Design and implementation of a radiotherapy programme: Clinical, medical physics, radiation protection and safety aspects	IAEA-TECDOC-1040
SSDL newsletter	Nos 37–39

Marine environment, water resources and industry

Isotope techniques in the study of environmental change	Proceedings Series
Radiation technology for conservation of the environment	IAEA-TECDOC-1023
Application of isotope techniques to investigate groundwater pollution	IAEA-TECDOC-1046
Stability and stabilization of polymers under irradiation	IAEA-TECDOC-1062

Physical and chemical sciences

CINDA 98: Supplement to CINDA 97	Miscellaneous publication
Nuclear research reactors in the world: December 1997 edition	Reference Data Series No. 3
Fusion energy 1996	Proceedings Series
CIAMDA 98	Miscellaneous publication
Directory of cyclotrons used for radionuclide production in Member States	IAEA-TECDOC-1007
Directory of nuclear research reactors	Miscellaneous publication
Preparation, quality control and clinical evaluation of monoclonal antibodies for scintigraphy	IAEA-TECDOC-1008
Modern trends in radiopharmaceuticals for diagnosis and therapy	IAEA-TECDOC-1029
Application of personal computers to enhance operation and management of research reactors	IAEA-TECDOC-1004
Intercomparison of gamma ray analysis software	IAEA-TECDOC-1011
Handbook for calculations of nuclear reaction data: Reference input parameter library	IAEA-TECDOC-1034
Software for nuclear spectrometry	IAEA-TECDOC-1049
Nuclear data for neutron therapy: Status and future needs	IAEA-TECDOC-992

PUBLICATIONS ISSUED IN 1998 (cont.)

Technical basis for the ITER detailed design report: Cost review and safety analysis	IAEA/ITEREDA/DS/13
Database for accelerator based analytical techniques (on diskette)	
CINDA 98 (Index to literature and computer files on microscopic neutron data) Periodicals Bulletin on atomic and molecular data for fusion, No. 54/55	Annual publication
CIAMDA 98 (Computer Index to Atomic and Molecular Collision Data) atomic and plasma-material interaction data for fusion, Vols. 7A and 8	Annual publication
Nuclear data newsletter	Nos 25, 26
Index to IAEA nuclear data services	IAEA-NDS-0
XMuDat: Photon attenuation data on personal computers	IAEA-NDS-195
EPDL97: The Evaluated Photon Data Library, 1997 version	IAEA-NDS-196
MENDL-2P: Proton reaction data library for nuclear activation (Medium Energy Nuclear Data Library)	IAEA-NDS-204
EXFOR, Experimental Nuclear Reaction Cross-Section Library (CD-ROM)	IAEA-NDS-CD-01
RIPL, Reference Input Parameters Library (CD-ROM)	IAEA-NDS-CD-02
FENDL-2, Fusion Evaluated Nuclear Data Library (CD-ROM)	IAEA-NDS-CD-03
ENDF: Five comprehensive evaluated nuclear data libraries (CD-ROM)	IAEA-NDS-CD-04
Nuclear data for neutron therapy: Status and future needs	IAEA-TECDOC-992
Handbook for calculations of nuclear reaction data: Reference input parameter library	IAEA-TECDOC-1034
Co-ordination of the international network of nuclear structure and decay data evaluators	INDC(NDS)-363
Summary report of a meeting on 'Measurement, Calculation and Evaluation of Photon Production Data'	INDC(NDS)-375
Handbook of nuclear data for safeguards	INDC(NDS)-376
Summary report of a meeting on 'Technical Aspects of Atomic and Molecular Data Processing and Exchange'	INDC(NDS)-377
Summary report of a meeting on 'Preparation of the Proposal for a Co-ordinated Research Project to Update X- and Gamma-Ray Decay Data Standards for Detector Calibration'	INDC(NDS)-378
Progress in fission product nuclear data	INDC(NDS)-379
The CENDL-2.1 Library: neutron data library for MCNP	INDC(NDS)-381
The WIMSLIB Library: Neutron data library for WIMS-D	INDC(NDS)-382
Summary report of a meeting on 'Co-ordination of the Nuclear Reaction Data Centres'	INDC(NDS)-383
Summary report of a meeting on 'Compilation and Evaluation of Photonuclear Data for Applications'	INDC(NDS)-384
Critically assessed electron impact excitation cross-sections for He	INDC(NDS)-385
Nuclear data libraries and on-line services	INDC(NDS)-387
Summary report of a meeting on 'Development of Reference Charged Particle Cross-Section Database for Medical Radioisotope Production'	INDC(NDS)-388
Analysis of low and medium energy physics records in databases	INDC(NDS)-391

PUBLICATIONS ISSUED IN 1998 (cont.)

Nuclear safety	
Examples of safety culture practices	Safety Reports Series No. 1
Equipment qualification in operational nuclear power plants: Upgrading, preserving and reviewing	Safety Reports Series No. 3
Safety issues for advanced protection, control and human-machine interface systems in operating nuclear power plants	Safety Reports Series No. 6
Preparation of fire hazard analyses for nuclear power plants	Safety Reports Series No. 8
Treatment of internal fires in probabilistic safety assessment for nuclear power plants	Safety Reports Series No. 10
Developing safety culture in nuclear activities. Practical suggestions to assist progress	Safety Reports Series No. 11
Evaluation of the safety of operating nuclear power plants built to earlier standards. A common basis for judgement	Safety Reports Series No. 12
Review of the methods used for leak rate measurements for WWER-440/230 confinements and WWER-440/213 containments	IAEA-EBP-WWER-10
Methodology for qualification of in-service inspection systems for WWER nuclear power plants	IAEA-EBP-WWER-II
IAEA/NEA Incident Reporting System (IRS) reporting guidelines	Miscellaneous publication
Nuclear safety review for the year 1997	IAEA/NSR/1997
Approaches relating to decommissioning	PDRP-2
Guidelines for the review of research reactor safety	IAEA-SVS-01
Organization and conduct of IAEA fire safety reviews at nuclear power plants	IAEA-SVS-02
Guidelines for integrated risk assessment and management in large industrial areas	IAEA-TECDOC-994
Use of PSA level 2 analysis for improving containment performance	IAEA-TECDOC-1002
Upgrading of fire safety in nuclear power plants	IAEA-TECDOC-1014
OSART programme highlights 1995–1996	IAEA-TECDOC-1018
Use of computers to enhance nuclear power plant diagnosis and operator response	IAEA-TECDOC-1019
Assessment and management of ageing of major nuclear power plant components important to safety: Concrete containment buildings	IAEA-TECDOC-1025
Topical issues in nuclear, radiation and radioactive waste safety. Contributed papers	IAEA-TECDOC-1031
Assessment and management of ageing of major nuclear power plant components important to safety. CANDU pressure tubes	IAEA-TECDOC-1037
Safety analysis of nuclear power plants during low power and shutdown conditions	IAEA-TECDOC-1042
Generic safety issues for nuclear power plants with light water reactors and measures taken for their resolution	IAEA-TECDOC-1044
Collection and classification of human reliability data for use in probabilistic safety assessments	IAEA-TECDOC-1048
Radiation safety	
Accidental overexposure of radiotherapy patients in San José, Costa Rica	Miscellaneous publication
The radiological accident in Tammiku	Miscellaneous publication

PUBLICATIONS ISSUED IN 1998 (cont.)

The radiological accident in the reprocessing plant at Tomsk	Miscellaneous publication
The radiological situation at the atolls of Mururoa and Fangataufa: Executive summary	Miscellaneous publication
Low doses of ionizing radiation: Biological effects and regulatory control. Invited papers and discussions	Proceedings Series
Radiological conditions at Bikini Atoll: Prospects for resettlement	Radiological Assessment Reports Series
The radiological situation at the atolls of Mururoa and Fangataufa: Main report	Radiological Assessment Reports Series
The radiological situation at the atolls of Mururoa and Fangataufa: Summary report	Radiological Assessment Reports Series
Diagnosis and treatment of radiation injuries	Safety Reports Series No. 2
Planning the medical response to radiological accidents	Safety Reports Series No. 4
Health surveillance of persons occupationally exposed to ionizing radiation: Guidance for occupational physicians	Safety Reports Series No. 5
Lessons learned from accidents in industrial radiography	Safety Reports Series No. 7
Goiânia, ten years later	IAEA-GOCP
The radiological situation at the atolls of Mururoa and Fangataufa. Proceedings of a conference held in Vienna, 30 June–3 July 1998	IAEA-MFCP
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 1. Radionuclide concentrations measured in the terrestrial environment of the atolls	IAEA-MFTR-1
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 2. Radionuclide concentrations measured in the aquatic environment of the atolls	IAEA-MFTR-2
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 3. Inventory of radionuclides underground at the atolls	IAEA-MFTR-3
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 4. Releases to the biosphere of radionuclides from underground nuclear weapon tests at the atolls	IAEA-MFTR-4
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 5. Transport of radioactive material within the marine environment	IAEA-MFTR-5
The radiological situation at the atolls of Mururoa and Fangataufa. Technical report. Volume 6. Doses due to radioactive materials present in the environment or released from the atolls	IAEA-MFTR-6
National competent authorities responsible for approvals and authorizations in respect of the transport of radioactive material, List No. 29 (1998 edition)	IAEA-NCAL-29
Health effects and medical surveillance	IAEA-PRTM-3
Compilation of anatomical, physiological and metabolic characteristics for a Reference Asian Man. Volume 1	IAEA-TECDOC-1005
Compilation of anatomical, physiological and metabolic characteristics for a Reference Asian Man. Volume 2: Country reports	IAEA-TECDOC-1005
Dosimetric and medical aspects of the radiological accident in Goiânia in 1997	IAEA-TECDOC-1009

PUBLICATIONS ISSUED IN 1998 (cont.)

Directory of national competent authorities' approval certificates for package design, special form material and shipment of radioactive material	IAEA-TECDOC-1038
Safety of radiation sources and security of radioactive materials: Contributed papers	IAEA-TECDOC-1045

Radioactive waste safety

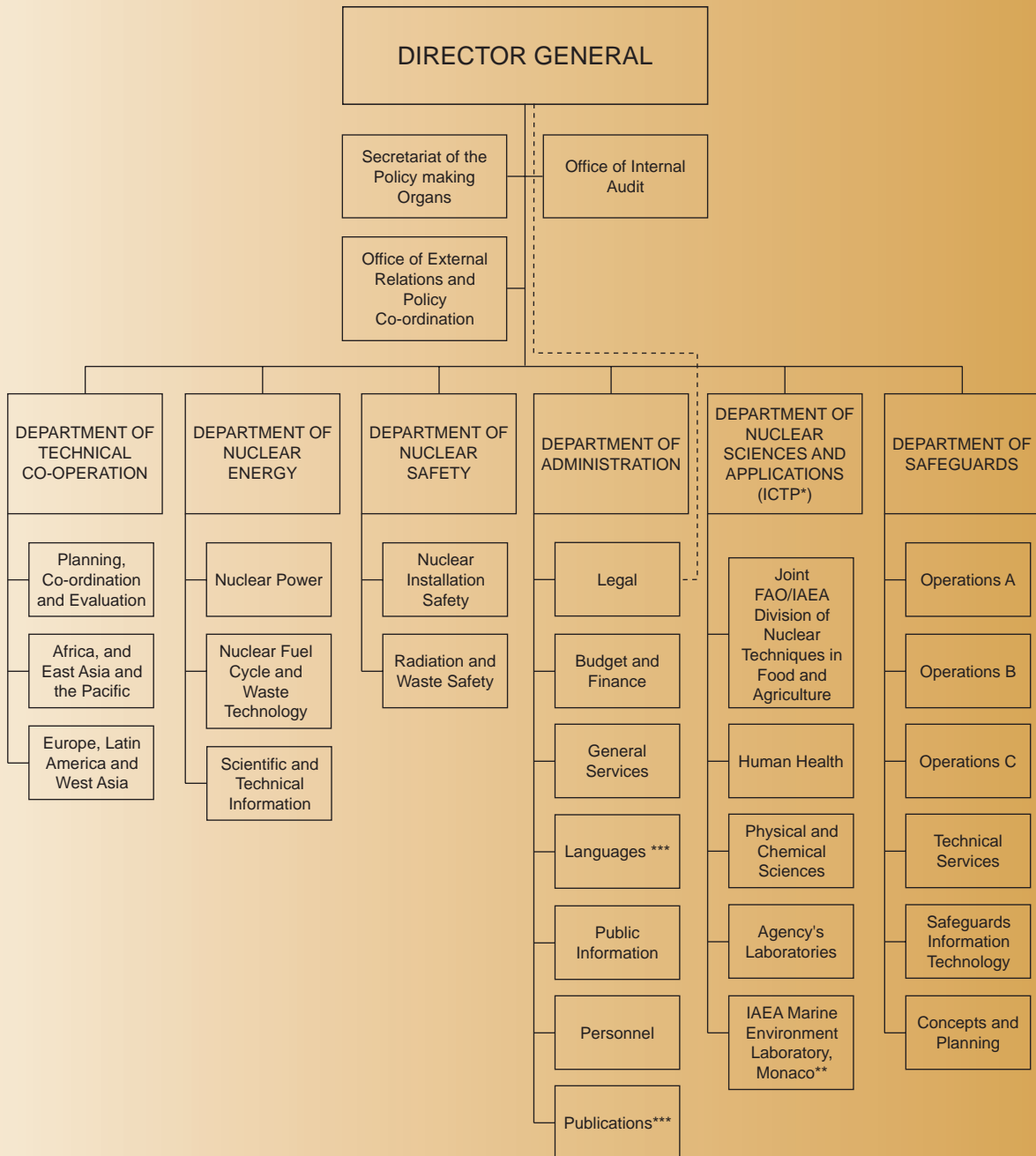
Radiological conditions at the Semipalatinsk test site, Kazakhstan. Preliminary assessment and recommendations for further study	Radiological Assessment Reports Series
Radiological conditions of the Western Kara Sea: Assessment of the radiological impact of the dumping of radioactive waste in the Arctic Sea	Radiological Assessment Reports Series
Application of radiation protection principles to the cleanup of contaminated areas. Interim report for comment	IAEA-TECDOC-987
Clearance of materials resulting from the use of radionuclides in medicine, industry and research	IAEA-TECDOC-1000

ABBREVIATIONS

ABACC	Brazilian–Argentine Agency for Accounting and Control of Nuclear Materials
AFRA	African Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
AGRIS	Agricultural Information System
ARCAL	Regional Co-operative Arrangements for the Promotion of Nuclear Science and Technology in Latin America
BWR	Boiling water reactor
CRP	Co-ordinated Research Project
CTBTO	Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization
EURATOM	European Atomic Energy Community
FAO	Food and Agriculture Organization of the United Nations
FORATOM	Forum atomique européen
HWR	Heavy water reactor
IAEA-MEL	IAEA Marine Environment Laboratory
ICTP	International Centre for Theoretical Physics
IIASA	International Institute for Applied Systems Analysis
ILO	International Labour Organisation
IMO	International Maritime Organization
INDC	International Nuclear Data Committee
IOC	Intergovernmental Oceanographic Commission (UNESCO)
ISO	International Organization for Standardization
LWR	Light water reactor
NEA	Nuclear Energy Agency of the OECD
OECD	Organisation for Economic Co-operation and Development
OLADE	Organización Latinoamericana de Energía
OPANAL	Organismo para la Proscripción de las Armas Nucleares en América Latina y el Caribe
PAHO	Pan American Health Organization/WHO
PHWR	Pressurized heavy water reactor
PWR	Pressurized water reactor
RAF	Regional Africa
RAS	Regional East Asia and Pacific
RAW	Regional West Asia
RBMK	Light boiling water cooled graphite moderated pressure tube reactor (former USSR)
RCA	Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
SQ	Significant quantity
t HM	tonnes heavy metal
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
WCO	World Customs Organization
WEC	World Energy Council
WHO	World Health Organization
WTO	World Trade Organization
WWER	Water cooled and moderated energy reactor (former USSR)

ORGANIZATIONAL CHART

(as of 31 December 1998)



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** With the participation of UNEP and IOC.

*** A Division of Conference and Document Services, composed of the Conference Service Section, the Division of Languages and the Division of Publications, was created, upon the appointment of a new Director, on 1 April 1999.

