ANNEX A

SAFEGUARDS RELATED ARTICLES FROM THE STATUTE OF INTERNATIONAL ATOMIC ENERGY AGENCY AS AMENDED UP TO JUNE, 1973

THE STATUTE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY
AS AMENDED UP TO JUNE, 1973

ARTICLE II

Objectives

The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. It shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose.

The Safeguards functions are defined in the Statute under Articles 111, A5 and B2 which provide that:

IAEA and International Safeguards-IV.

ARTICLE III

Functions

A. The Agency is authorized:

5* To establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at his request or under its supervision or ***control*** are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that Sate's activities in the field of atomic energy,

and

B. In carrying out its functions, the Agency shall:

2. Establish control over the use of special fissionable materials received by the Agency, in order to ensure that these materials are used only for peaceful purposes.

ARTICLE XI

Agency Projects

F. Upon approving a project, the Agency shall enter into an agreement with the member or group of members submitting the project, which agreement shall:

4. Include undertakings by the member or group of members submitting the project: (a) that the assistance provided shall not be used in such a way as to further any military purpose; and (b) that the project shall be subject to the safeguards provided for in article X11, the relevant safeguards being specified in the agreement.

ARTICLE XII

Agency Safeguards

A. With respect to any Agency project, or other arrangement where the Agency is requested by the parties concerned to apply safeguards, the Agency shall have the following rights and responsibilities to the extent relevant to the project or arrangement:

1. To examine the design of specialized equipment and facilities, including nuclear reactors, and to approve it only from the view-point of assuring that it will not further any military purpose, that it complies with applicable health and safety standards, and that it will permit effective application of the safeguards provided for in this article;

2. To require the observance of any health and safety measures prescribed by the Agency;

3. To require the maintenance and production of operating records to assist in ensuring accountability for source and special fissionable materials used or produced in the project or arrangement:

4. To call for and receive progress reports;

5. To approve the means to be used for the chemical processing of irradiated materials solely to ensure that this chemical processing will not lend itself to diversion of materials for military purposes and will comply with applicable health and safety standards; to require that special fissionable materials recovered or produced as a by-product be used for peaceful purposes under continuing Agency safeguards for research or in reactors, existing or under construction, specified by the member or members concerned; and to require deposit with the Agency of any

excess of any special fissionable materials recovered or produced as a by-product over what is needed for the above- stated uses in order to prevent stockpiling of these materials, provided that thereafter at the request of the member or members concerned special fissionable materials so deposited with the Agency shall be returned promptly to the member or members concerned for use under the same provisions as stated above:

6. To send into the territory of the recipient State or States inspectors, designated by the Agency after consultation with the State or States concerned, who shall have access at all times to all places and data and to any person who by reason of his occupation deals with materials, equipment, or facilities which are required by this Statute to be safeguarded, as necessary to account for source and special fissionable materials supplied and fissionable products and to determine whether there is compliance with the undertaking against use in furtherance of any military purpose referred to in sub-paragraph F-4 of article XI, with the health and safety measures referred to in sub-paragraph A-2 of this article, and with any other conditions prescribed in the agreement between the Agency and the State or States concerned. Inspectors designated by the Agency shall be accompanied by representatives of the authorities of the State concerned, if that State so requests, provided that the inspectors shall not thereby be delayed or otherwise impeded in the exercise of their functions:

7. In the event of non-compliance and failure by the recipient State or States to take requested corrective steps within a reasonable time, to suspend or terminate assistance and withdraw any materials and equipment made available by the Agency or a member in furtherance of the project.

B. The Agency shall, as necessary, establish a staff of inspectors. The staff of inspectors shall have the responsibility of examining all operations conducted by the Agency itself to determine whether the Agency is complying with the health and safety measures prescribed by it for application to projects subject to its approval, supervision or control, and whether the Agency is taking adequate measures to prevent the source and special fissionable materials in its custody or used or produced in its own operations from being used in furtherance of any military purpose. The Agency shall take remedial action forthwith to correct any non-compliance or failure to take adequate measures.

c. The staff of inspectors shall also have the responsibility of obtaining and verifying the accounting referred to in sub-paragraph A-6 of this article and of determining whether there is compliance with the undertaking referred to in sub-paragraph F-4 of article XI, with ***the*** measures referred to in sub-paragraph A-2 of this article, and with all other conditions of the project prescribed in the agreement between the Agency and the State or States concerned. The inspectors shall report any non-compliance to the Director General who shall thereupon transmit the report to the Board of Governors. The Board shall call upon the recipient State or States to remedy forthwith any non-compliance which it finds to have occurred. The Board shall report the non-compliance to all members and to the Security Council and General Assembly of the United Nations. In the event of failure of the recipient State or States to take fully corrective action with a reasonable time, the Board may take one or both of the following measures: direct curtailment or suspension of assistance being provided by the Agency or by a member, and call for the return of materials and equipment made available to the recipient member or group of members. The Agency may also, in accordance with article XIX, suspend any non-complying member from the exercise of the privileges and rights of membership.

ANNEX B

LIST OF THE MEMBER STATES (IAEA)

APPENDIX VI

IAEA MEMBER NATIONS
JUNE 22, 1976

Afghanistan
Albania*
Algeria*
Argentina*
Australia
Austria
Bangladesh*
Belgium
Bolivia
Brazil*
Bulgaria
Burma*
Belorussian Soviet Socialist Republic*
Cambodia (Khmer Republic)
Cameroon
Canada
Chile*
Colombia
Costa Rica
Cuba*
Cyprus
Czechoslovak Socialist Republic
Denmark
Dominican Republic
Ecuador
Egypt, Arab Republic of
El Salvador
Ethiopia
Finland
France*
Gabon
German Democratic Republic
Germany, Federal Republic of
Ghana
Greece
Guatemala
Haiti
Holy See (Vatican City)
Hungary
Iceland
India*
Indonesia
Iran
Iraq
Ireland
Israel*
Italy
Ivory Coast
Jamaica
Japan
Jordan
Kenya
Korea, Democratic People's Republic of*
Korea, Republic of
Kuwait
Lebanon
Liberia
Libyan Arab Republic
Liechtenstein*
Luxembourg
Madagascar
Malaysia
Mali
Mauritius
Mexico
Monaco*
Mongolia
Morocco
Netherlands
New Zealand
Niger*
Nigeria
Norway
Pakistan*
Panama
Paraguay
Peru
Philippines
Poland
Portugal*
Qatar*

Romania
Saudi Arabia*
Senegal
Sierra Leone
Singapore
South Africa*
Spain*
Sri Lanka
Sudan
Sweden
Switzerland
Syrian Arab Republic
Thailand
Tunisia
Turkey
Uganda*
Ukranian Soviet Socialist Republic*
Union of Soviet Socialist Republics
United Arab Emirates*
United Kingdom of Great Britain and Northern Ireland
United Republic of Tanzania*
United States of America
Uruguay
Venezuela
Vietnam
Yugoslavia
Zaire, Republic of
Zambia*

* Member nations that are not party to NPT.

ANNEX C

DETAILED COSTS OF THE SAFEGUARDS PROGRAM

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table N.1

Item of expenditure	1973 Actual obligations	1976 Adjusted budget	Increase or (decrease) from 1976			1977 Estimate	1978 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	2 375 032	3 158 000	280 000	277 000	557 000	3 715 000	4 382 000
Consultants	39 873	21 000	600	20 400	21 000	42 000	47 000
Overtime	205	1 000	-	1 000	1 000	2 000	2 000
Temporary assistance	862	-	-	5 000	5 000	5 000	5 000
Sub-total	2 415 972	3 180000	280600	303 400	584000	3 764000	4 436 000
Common staff costs	709 100	917000	113500	86 500	200000	1 117000	1 316 000
Travel	350 638	410000	17400	87 600	105000	515000	610000
Meetings							
Conferences, symposia, seminars	36 659	-		30 000	30000	30000	55000
Technical committees. advisory groups	37 342	67000	3500	13 500	17000	84000	76 000
Representation and hospitality	9 323	8000	1 000	2 000	3000	11 000	12000
Scientific and technical contracts	143 902	490 000	10000	(14 000)	(4 000)	486000	550000
Scientific supplies and equipment	406 217	510000	41000	27 000	68000	578 000	543 000
Common services, supplies and equipment	44 226			-	-		
Transfer of costs:							
Linguistic services	122 072	75000	8000	73 000	81000	156000	148 000
Printing and publishing services	57 541	69000	6000	5 000	11 000	80000	90000
Data processing services	151 175	125000	13000	262 000	275000	400000	500000
Laboratory services	381 466	496000	72000	56 000	128000	624000	663000
Other: Legal services	96 000	96000	10000		10000	106000	112000
TOTAL	4961 633	6443000	576000 8.9%	932000 14.5%	1508000 23.4%	7 951 000	9 111 000

SUMMARY OF MANPOWER

Table N. 2

Grade of post	Number of established posts					
	1975 Adjusted	1976	1976 Adjusted	Change	1977	1978 Preliminary estimate
IG	1	1	1		1	1
D	2	3	3	1	4	4
P-5	19	24	24	4	28	30
P-4	33	36	36	5	41	48
P-3	35	33	33	1	34	36
P-2	11	5	5	(2)	3	3
Sub-total	101	102	102	9	111	122
GS	35	36	36	14	50	57
TOTAL	136	138	138	23	161	179

ANNEX D

AGENCY INFORMATION CIRCULAR/26, 30 **MARCH, 1961 (REF:** INFCIRC/26, 30 MARCH, 1961, IAEA, VIENNA, AUSTRIA

International Atomic Energy Agency

INFCIRC/26
30 March 1961
GENERAL Distr.
Original: ENGLISH

THE AGENCY'S SAFEGUARDS

On 31 January 1961 the Board of Governors approved the Agency's safeguards system, which is set forth in this document for the information **of all** Members.

Table of contents

I. INTRODUCTION

1. Under Article III. A. 5 of the Statute the Agency is authorized

> "to establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or, at the request of a State, to any of that State's activities in the field of atomic energy."

2. The principles and procedures established for the information and appropriate guidance of Member States as well as for the guidance of the Board itself in the administration of safeguards by the Agency, are based on the pertinent provisions of the Statute and enable:

(a) A State or group of States applying for assistance by or through the Agency to consider in advance the nature of the safeguards that the Agency would attach;

(b) The parties to a bilateral or multilateral arrangement, or a State, to determine how Agency safeguards might be applied to their activities if they so request; and

(c) The Board to determine readily what safeguards should be attached to Agency projects or applied to arrangements that the Agency has been requested to safeguard, and embodied in the relevant agreements.

3. Agency safeguards will be applied to materials and facilities voluntarily placed under Agency safeguards by a State or States. Where two or more States request the Agency to administer the safeguards provisions of an agreement between those States, the Agency will apply those provisions provided that they are consistent with the procedures laid down in this document. The administration of safeguards by the Agency under this paragraph shall be governed by an agreement pursuant to the Statute between the Agency and the State or States concerned which shall be made for a specified period.

4. This document specifies:

(a) The principles that are to be followed by the Agency in determining the safeguards that are to be attached and applied to various types of assistance, and

(b) The procedures to implement these principles.

The safeguards procedures cover the anticipated requirements by the Agency in the immediate future and relate only to research, test and power reactors with less than 100 megawatts thermal output, to the source and special fissionable material used and produced in these reactors and to small research and development facilities. Procedures covering other types of nuclear facilities will be developed as the probable need for them becomes evident. In regard to produced material, the safeguards provided for in this document relate only to first generation produced material.

5. The principles and procedures for the attachment and application of safeguards by the Agency which are set forth hereafter shall be subject to a general review after two years, in the light of the actual experience gained by the Agency as well as of the technological development which has taken place.

Ix. DEFINITIONS

6. "Agency" means the International Atomic Energy Agency.

7. “Statute" means the Statute of the Agency.

8. "Board" means the Board of Governors of the Agency.

9. "Director General" means the Director General of the Agency.

31 Agency safeguards will be applied to specialized equipment and non-nuclear materials to which Agency safeguards are attached and to facilities [3] incorporating these items.

IV. ATTACHMENT AND TERMINATION OF AGENCY SAFEGUARDS

A. Attachment to nuclear materials

32. (a) Agency safeguards will be attached to source material supplied by the Agency and to special fissionable material produced in or by the use of such material, except when the quantity of PN source material in a State, including the material supplied by the Agency, does not exceed:

(i) In the case of natural uranium or depleted uranium with a uranium-235 content of 0.5 per cent or greater - 10 metric tons;

(ii) In the case of depleted uranium with a uranium-235 content of less than 0. 5 per cent - 20 metric tons;

(iii) In the case of thorium - 20 metric tons.

(b) Agency safeguards will be attached to special fissionable material supplied by the Agency and to special fissionable material produced in or by the use of such material, except when the quantity of PN special fissionable material in a State, including the material supplied by the Agency, does not exceed 200 grams of plutonium, uranium -“23 3 or fully enriched uranium or its equivalent in the case of partially enriched uranium. [4] Safeguards will be applied in a nominal marine r when the amount of PN special fissionable material in a State does not exceed 1 000 grams [4] .

33. Agency safeguards will be attached to special fissionable material produced in a principal nuclear facility to which Agency safeguards are attached.

34. Agency safeguards will be attached to nuclear material processed or used in a principal nuclear facility to which Agency safeguards are attached.

35. Agency safeguards will be attached to all special fissionable material produced in a reactor to which Agency safeguards are not attached but which contains nuclear material to which Agency safeguards are attached, if such material permits the reactor to operate at , more than 200 per cent of the power at which it could operate without such material.

B. Attachment to facilities, equipment and non-nuclear material

36. Agency safeguards will be attached to principal nuclear facilities supplied or, in the opinion of the Board, substantially assisted by the Agency. Reactors which, after an inspection at initial criticality, are assessed by the Board to have a maximum calculated power for continuous operation of less than 3 thermal megawatts shall be exempted from such attachment provided that the total such power of reactors thus exempted in any State may not exceed 6 thermal megawatts.

37. Agency safeguards will be attached to specialized equipment and non-nuclear material supplied by the Agency, which in the opinion of the Board could substantially assist a principal nuclear facility, other than a reactor with a maximum calculated power for continuous operation of less than 3 thermal megawatts, or could in other ways further a military purpose, even when such specialized equipment or non-nuclear material is not in a principal nuclear facility. The Board may from time to time designate certain specific specialized equipment and non-nuclear material as being items which would be considered capable of substantially assisting a principal nuclear facility or in other ways of furthering a military purpose.

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[4] Equivalent amounts can be determined ‘from the equation in the Appendix. The equivalent amounts of plutonium and uranium-233 are the same as for fully enriched uranium.

10. "Nuclear material" means any source and/or special fissionable material as defined in Article XX of the Statute.

11. "Enrichment" means the percentage by weight of the isotope uranium-235 in the total uranium present.

12. "Depleted uranium" means uranium in which the percentage by weight of the isotope uranium -235 in the total uranium present is less than that occurring in natural uranium.

13. "Reactor" means any device that can be operated so as to maintain a controlled, self-sustaining fission chain reaction.

14. "Reactor facility" means a reactor including appurtenant facilities such as fuel storage or cooling facilities or other portions of the plant in which nuclear materials are handled or used.

15. "Principal nuclear facility" means reactor facilities, plants for processing special fissionable or irradiated source material, plants for separating the isotopes of uranium or isotopes of plutonium and such other facilities or plants which may be designated by the Board.

16. "Supplied or processed by the Agency" means supplied or processed by the Agency directly, or supplied or processed with the assistance of the Agency when, in the opinion of the Board, that assistance is of a substantial nature.

17. "Diversion" means the use by a recipient State of fissionable or other materials, facilities or equipment supplied by the Agency so as to further any military purpose or in violation of any other condition prescribed in the agreement between the Agency and the State concerning the use of such materials, facilities or equipment.

18. "Agency safeguards" means the measures pursuant to the Statute to prevent loss or diversion of materials, specialized equipment or principal nuclear facilities.

19. "Attachment" of safeguards" means the requirement to apply appropriate safeguard procedures.

20. "Application of safeguards" to materials or facilities means the implementation of appropriate safeguards procedures.

21. "PN [1] material" and "PN facility" mean materials and facilities:

(a) Supplied by the Agency or to which Agency safeguards are otherwise attached;

(b) Placed under Agency safeguards by agreement with the State or States concerned;

(c) Allocated by a State for peaceful purposes exclusively, provided the State concerned voluntarily sends the Agency notification thereof in connection with Agency safeguards; or

(d) Supplied from a source external to a State under an agreement that they shall not be used to further a military purpose or otherwise safeguarded in that State by other organizations or States, provided that all parties concerned shall have voluntarily notified the Agency in connection with Agency safeguards of the material or facilities supplied or otherwise safeguarded in the State so that the Agency can take account thereof.

[1] This abbreviation means "peaceful nuclear".

31 Agency safeguards will be applied to specialized equipment and non-nuclear materials to which Agency safeguards are attached and to facilities 3] incorporating these items.

Iv. ATTACHMENT AND TERMINATION OF AGENCY SAFEGUARDS

A. Attachment to nuclear materials

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(i) In the case of natural uranium or depleted uranium with a uranium-235 content of O. 5 per cent or greater - 10 metric tons;

(ii) In the case of depleted uranium with a uranium-235 content of less than O. 5 per cent -20 metric tons;

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(b) Agency safeguards will be attached to special fissionable material supplied by the Agency and to special fissionable material produced in or by the use of such material, except when the quantity of PN special fissionable material in a State, including the material supplied by the Agency, does not exceed 200 grams of plutonium, uranium-"233 or fully enriched uranium or its equivalent in the case of partially enriched uranium. [4] Safeguards will be applied in a nominal manner when the amount of PN special fissionable material in a State does not exceed 1 000 grams [4] .

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35. Agency safeguards will be attached to all special fissionable material produced in a reactor to which Agency safeguards are not attached but which contains nuclear material to which Agency safeguards are attached, if such material permits the reactor to operate at more than 200 per cent of the power at which it could operate without such material.

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[4] Equivalent amounts can be determined from the equation in the Appendix. The equivalent amounts of plutonium and uranium-233 are the same as for fully enriched uranium.

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IV. ATTACHMENT AND TERMINATION OF AGENCY SAFEGUARDS

A. Attachment to nuclear materials

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(iii) In the case of thorium - 20 metric tons.

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[4] Equivalent amounts can be determined from the equation in the Appendix. The equivalent amounts of plutonium and uranium-233 are the same as for fully enriched uranium.

facilities already approved under the project agreement, the State will advise the Agency accordingly and submit such designs for examination and approval together with any information that the Agency may request.

43. The Agency shall make its decision about approval of these designs as expeditiously as possible after the submission of the information by the State.

(c) Procedure for agreement of the records system

44. The State shall agree with the Agency a plan for the system of records for each facility and material to which Agency safeguards are to be applied. A draft of this plan shall be submitted by the State in sufficient time to permit review by the Agency and adoption by the State of an agreed system before the records need to be u seal. Any changes in this plan shall similarly be agreed with the Agency.

45. The records shal1 include operating records for nuclear facilities, as well as accounting records of material and equipment, to which Agency safeguards are applied.

46, All records shall be retained for at least two years.

(d) Procedure for submission of reports

(i) General considerations

47. The State shall agree with the Agency a plan for the system of reports for each facility and material to which Agency safeguards are to be applied. A draft of this plan shall be submitted by the State in sufficient time to permit review by the Agency and adoption by the State of the agreed plan before the first report is required to be submitted.

(ii) Routine reports

48. The State shall submit the following routine reports to the Agency:

(a) Operating reports showing the use that has been made of the facility and the material in the facility since the last report and as far as possible the program of work which is going to be carried out in the facility and with the material; and

(b) Accounting reports showing the. receipt, issue and location of the material to which Agency safeguards are applied.

49* The State shall submit the first routine report at the time of the first operation of the facility under Agency safeguards or at the time when material to which Agency safeguards are attached is first received at the facility.

50. At the request of the Agency the State shall submit amplifications or elucidations of routine reports referred to in paragraph 48 above, in the event of unusual circumstances as determined by the Agency.

(iii) Special reports

51. The State shall notify the Agency within forty-eight hours by the most expeditious means available:

(a) If any unusual incident occurs, involving an actual or potential loss, destruction or damage of any facility or material to which Agency safeguards are applied; or

(b) If materia1 is lost or unaccounted for in quantities that exceed those normal operating losses or unaccounted-for quantities that are accepted by the Agency to be characteristic of the facility involved.

52. The State shall submit to the Agency a report at least two weeks before:

(a) Any proposed transfer or other transaction that will result in a change in the quantity of materials to which Agency safeguards are applied in the State, or a significant change in any facility or complex of facilities considered as a unit for this purpose by agreement with the Agency; and

(b) Any proposed major change in the planned future program as reported in the routine reports.

53. The State shall submit any additional special reports requested by the Agency concerning matters referred to in paragraphs 51 and 52 above.

(e) Procedure for inspections

(i) Routine inspections

54. The Agency may make routine inspections of the facility and material to which Agency safeguards are applied, beginning at a time specified in the project agreement.

55. Inspections will include the examination of the facility to ensure that it is constructed in accordance with the approved design, and the testing of any equipment or instruments that are to be used to measure material in the facility to which Agency safeguards are to be applied. The testing of instruments and equipment shall be carried out only to the extent necessary to test their proper functioning, without reference to their design.

56. Routine inspections after the facility is in operation shall normally include:

(a) Examination of the facility and/or material to which Agency safeguards **are** applied;

(b) Audit of reports and records;

(c) Verification of the amounts of material to which Agency safeguards are applied, by physical inspection, measurement and sampling; and

(d) Examination and testing of the measurement instruments,

57. If the Agency considers that all the routine inspections that are authorized are not required, fewer inspections may be carried out.

(ii) Special inspections

58. If an examination of the special reports made under paragraphs 51 and 52 above indicates the need for a special inspection, the Agency is entitled to carry out such an inspection, to investigate the occurrence.

59. In the event of unforeseen circumstances requiring immediate action, a special inspection may be made provided that a report shall be made to the Board on the circumstances leading to such inspection.

(f) Nominal safeguards

60. If the quantities of PN special fissionable material in the State are such that material supplied by the Agency qualifies for the application of safeguards in a nominal reamer as specified in sub-paragraph 32(b) above the following shall apply:

(a) Only one routine report shall be required each year regarding the material and the facilities which are processing, using, or storing such material;

(b) No routine inspections shall be carried out; and

(c) Special reports will be submitted and special inspections performed as necessary.

B. Additional procedures for application to reactor facilities

(a) Introduction

61. The following additional provisions apply to reactor facilities. In the present procedures only reactors below 100 thermal megawatts are considered.

(b) Frequency of routine reports

62. The frequency of routine reports for a facility shall normally be twice a year. The actual frequency for a given facility shall be determined in relation to the frequency of inspection of that facility.

(c) Frequency of routine inspections

63. Routine inspections shall be made to each facility to which safeguards are applied except those subject only to nominal safeguards.

64. The number of inspections will be kept to a minimum consistent with the effective application of safeguards.

65. The frequency of inspection of a reactor facility shall take into account the following considerations:

(a) The possession by the State or States of an irradiated fuel reprocessing facility;

(b) The nature of the reactor facility;

(c) The nature of the nuclear material used or produced in the reactor facility; and

(d) The amount of nuclear material used or produced in the reactor facility.

In the light of these considerations, routine inspections shall be conducted at such a frequency that in the interval between inspections the total possible error in the measurement of the quantity of nuclear material used or produced by the reactor facility [5] cannot amount to more than O. 2 kilograms of plutonium, uranium-233 or fully enriched uranium-235 or their equivalents. The maximum frequency of routine inspections for a reactor facility shall be as shown in the table below. The first column of this table indicates the annual usage [6] or the maximum potential production of plutonium, uranium-233 or uranium-235 expressed in equivalent kilograms, and the second column indicates the corresponding inspection frequencies.

[51 For the purposes of this document "the total possible error in the measurement of the quantity of nuclear material used or produced by the reactor facility" shall mean one standard deviation of the measurement.

[6] Annual usage is the equivalent yearly throughput or inventory, whichever is larger, and "equivalent" is used in the sense in which it is used in paragraph 32 above and in the Appendix.

Frequency of routine inspections 7]

Annual usage or maximum potential production of Pu, uranium-233 or uranium-235 (Equivalent kilograms)	Maximum number of routine inspections per year
From 0.2 to 1	None (Nominal safeguards)
More than 1 up to 5	1
More than 5 up to 10	2
More than 10 up to 15	3
More than 15 up to 20	4
More than 20 up to 25	5
More than 25 up to 30	6

The appropriate number of routine inspections will be stated in each project agreement and provision made therein for changes in case of changed conditions.

c . Additional procedures for application to research and development facilities other than reactor facilities

66. In this paragraph the only research and development facilities that are provided for are those in a State which possesses PN special fissionable material in quantities that qualify, in accordance with sub-paragraph 32(b) above, for the application of safeguards in a nominal manner. For such facilities the application shall be limited to that shown in paragraph 60 above.

[7] Examples of the application of the principle illustrated in the above table are given in the following table; they are calculated on the basis of typical operating conditions at the reactor facility:

Illustrative frequencies of routine inspection

Type of reactor facility	Design power	Enrichment of fuel (per cent)	Number of routine inspections per year
Homogeneous research	50 KW	20	None, subject to the provisions of paragraphs 32 and 36 above
Heavy water research	3 MW	Natural	
Pool research	1 MW	20	
Pool research	2 MW	90	
Graphite moderated research	4 MW	Natural	1
Test or large research	30 MW	20	2
Pressurized water **power**	40 MWT	**4**	2
Boiling water power	58 MWT	4.2	2
Test or large research	20 MW	90	4
Graphite moderated power	100 MWT	Natural	6

APPENDIX

Equivalent amounts of enriched uranium

1. The amount of partially enriched uranium that is equivalent to 200 grams of fully enriched uranium, is given by the equation:

$$\text{Amount of uranium in kilograms} = \frac{0.2}{\frac{(\text{Enrichment})^2}{(100)^2}}$$

2. The amount of partially enriched uranium equivalent to x kilograms of fully enriched uranium can be determined by substituting x for the figure O. 2 in the equation in paragraph 1 above.

ANNEX E

INFORMATION CIRCULAR 66/REV.2

THE AGENCY'S SAFEGUARDS SYSTEM (1965, AS PROVISIONALLY EXTENDED IN 1966 AND 1968)

16 September 1968

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, AUSTRIA

SELECTED PARAGRAPHS

I. GENERAL CONSIDERATIONS

B. GENERAL PRINCIPLES OF THE AGENCY's SAFEGUARDS

9. Bearing in mind Article II of the Statute, the Agency shall implement safeguards in a manner designed to avoid hampering a State's economic or technological development.

10. The safeguards procedures set forth in this document shall be implemented in a manner designed to be consistent with prudent management practices required for the economic and safe conduct of nuclear activities,

11. In no case shall the Agency request a State to stop the construction or operation of any principal nuclear facility to which the Agency's safeguards procedures extend, except by explicit decision of the Board.

12. The State or States concerned and the Director General shall hold consultations regarding the application of the present document.

13. In implementing safeguards, the Agency shall take every precaution to protect commercial and industrial secrets. No member of the Agency's staff shall disclose, except to the Director General and to such other members of the staff as the Director General may authorize to have such information by reason of their official duties in connection with safeguards. any commercial or industrial secret or any other confidential information

coming to his knowledge by reason of the implementation of safeguards by the Agency.

4. The Agency shall not publish or communicate to any State, organization or person any information obtained by it in connection with the implementation of safeguards,except that:

(a) Specific **information relating to such implementation in a State** may be given **to** the Board **and to such Agency staff members as require such knowledge by reason of their official duties** in connection with safeguards, but only to the extent necessary for the Agency to fulfill its safeguards responsibilities.

(b) Summarized lists of items being safeguarded by **the** Agency may be published upon **decision of the Board and**

‘(c) Additional **information may be published** upon decision of the Board and if all States directly concerned agree.”

PRINCIPLES OF IMPLEMENTATION

16. In the light of Article XII.A.5 of the Statute, it is desirable that safeguards agreements should provide for the continuation of safeguards, subject to the provisions of this document, with respect to produced special fissionable material and to **any materials substituted therefor.**

17. The principal factors to be considered by the Board in determining the relevance of particular provisions of this document to various types of materials and facilities shall be the form, scope and amount of the assistance supplied, the character of each individual project and the degree to which such assistance could further any military purpose. The related safeguards agreement shall take account of all pertinent circumstances at the time of its conclusion.'"

III. SAFEGUARDS PROCEDURES

A. GENERAL PROCEDURES
INTRODUCTION

29 The safeguards procedures set forth below shall be followed, as far as relevant, with respect to safeguarded nuclear materials, whether they are being produced, processed or used in any principal nuclear facility or are *outside* any such facility. These procedures also extend to facilities containing or to contain such materials, including principal nuclear facilities to which the criteria in paragraph 19(d) apply."

30. The Agency shall review the design of principal nuclear facilities, for the sole purpose of satisfying itself that a facility will permit the effective application of safeguards.

31. The design review of a principal. nuclear facility shall take place at as early a stage as possible. In particular, such review shall be carried out in the case of:

"(a) An Agency project, before the project is approved;

"(b) A bilateral or multilateral arrangement under which the responsibility for administering safeguards is to be transferred to the Agency, or an activity unilaterally submitted by a State, before the Agency assumes safeguards responsibilities with respect to the facility:

"(c) A transfer of safeguarded nuclear material to a principal nuclear facility whose design has not previously been reviewed, before such transfer takes place and

"(d) A significant modification of a principal nuclear facility whose design has previously been reviewed, before such modification is undertaken.

32. To enable the Agency to perform the required design review, the State shall submit to it relevant design information sufficient for the purpose, including information on such basic characteristics of the principal nuclear facility as may bear on the Agency's safeguards procedures. The Agency shall require only the minimum amount of information and data consistent with carrying out its responsibility under this section. It shall complete the review promptly after the submission of this information by the State and shall notify the latter of its conclusions without delay."

ANNEX F

A LIST OF THE AGREEMENTS PROVIDING FOR SAFEGUARDS OTHER THAN THOSE IN CONNECTION WITH NPT. APPROVED BY THE BOARD OF GOVERNORS AS OF DECEMBER 1975

Ref. : The Annual Report for 1975, GC(xx)565, International Atomic Energy Agency, Vienna, Austria, July, 1976

Agreements providing for safeguards other than those
in connection with NPT,
approved by the Board as of 31 December 1975

Party(ies)[a]	Subject	Entry into force	INFCIRC
Project Agreements			
Argentina	Siemens SUR-100	13 Mar 1970	143
	RAEP Reactor	2 Dec 1964	62
Chile	Herald Reactor	19 Dec 1969	137
Finland[b]	FiR-1 Reactor	30 Dec 1960	24
	FINN sub-critical assembly	30 Jul 1963	53
Greece[b]	GRR-1 Reactor	1 Mar 1972	163
Indonesia	Additional core-load for Triga Reactor	19 Dec 1969	136
Iran[b]	UTRR Reactor	10 May 1967	97
Japan	JRR-3	24 Mar 1959	3
Mexico[b]	TRIGA-III Reactor	18 Dec 1963	52
	Siemens SUR-100	21 Dec 1971	162
	Laguna Verde Nuclear Power Plant	12 Feb 1974	203
Pakistan	PRR Reactor	5 Mar 1962	34
	Booster rods for KANUPP	17 Jun 1968	116
Philippines[b]	PRR-1 Reactor	28 Sep 1966	88
Republic of South Viet-Nam	VNR-1 Reactor	16 Oct 1967	106
Romania[b]	TRIGA Reactor	30 Mar 1973	206
Spain	Coral I Reactor	23 Jun 1967	99
Turkey	Sub-critical assembly	17 May 1974	212
Uruguay	URR Reactor	24 Sep 1965	67
Venezuela	RV-1 Reactor	7 Nov 1975	
Yugoslavia[b]	TRIGA-II	4 Oct 1961	32
	KRSKO Nulcear Power Plant	14 Jun 1974	213
Zaire[b]	TRICO Reactor	27 Jun 1962	37
Transfer Agreements (Agreements for transfer of safeguards under bilateral co-operation agreements between the indicated Parties)			
Argentina/United States of America		25 Jul 1969	130
Australia[b]/United States of America		26 Sep 1966	91
Australia[b]/Japan		28 Jul 1972	170/Corr. 1
Austria[b]/United States of America		24 Jan 1970	152
Brazil/United States of America		20 Sep 1972	110/Mod. 1
Canada/Japan		12 Nov 1969	85/Mod. 1
Canada[b]/India		30 Sep 1971	211
China, Republic of/United States of America		6 Dec 1971	158
Colombia/United States of America		9 Dec 1970	144
France/Japan		22 Sep 1972	171
France/Korea, Republic of[b]		22 Sep 1975	
India/United States of America		27 Jan 1971	154
Indonesia/United States of America		6 Dec 1967	109
Iran[b]/United States of America		20 Aug 1969	127
Israel/United States of America		4 Apr 1975	

Party(ies)[a]	Subject	Entry into force?	INFCIRC
Japan / United States of America		10 Jul 1968	119
Japan/ United Kingdom		15 Oct 1968	125
Korea, Republic of/ United States of America		19 Mar 1973	11 l/Mod. 1
Pakistan/Canada		17 Oct 1969	135
Philippines[b]/United States of America		19 Jul 1968	120
Portugal/United States of America		19 Jul 1969	131
South Africa/United States of America		28 Jun 1974	98
Spain/ United States of America		28 Jun 1974	92
Sweden[b]/United States of America		1 Mar 1972	165
Switzerland/United States of America		28 Feb 1972	161
Turkey /United States of America		5 Jun 1969	123
Venezuela/United States of America		27 Mar 1968	122
Unilateral submissions			
Argentina	Atucha Power Reactor Facility	3 Oct 1972	168
	Nuclear material	23 Oct 1973	202
	Embalse Power Reactor Facility	6 Dec 1974	224
Chile	Nuclear material	31 Dec 1974	
China, Republic of	Taiwan Research Reactor Facility	13 Oct 1969	133
Mexico[b]	All nuclear activities	6 Sep 1968	118
Panama[c]	All nuclear activities		
Spain	Nuclear material	19 Nov 1974	218
	Nuclear material	18 Jun 1975	221
Switzerland	Nuclear material		
United Kingdom	Certain nuclear activities	14 Dec 1972	175

a/ An entry in this column does not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country or territory or of its authorities s,. or concerning the delimitation of its frontiers.

b/ Application of Agency safeguards under this agreement has been suspended as the State has concluded an agreement in connection with NPT.

c/ At present Panama has no significant nuclear activities. The Agreement is concluded under Article 13 of the Treat:' for the Prohibition of Nuclear Weapons in Latin America.

ANNEX G

A LIST OF BILATERAL AGREEMENTS FOR COOPERATION

APPENDIX III

AGREEMENTS FOR COOPERATION IN THE CIVIL USES OF ATOMIC ENERGY

(AS OF NOVEMBER 1, 1975)

A. Bilateral with individual countries:

Country	Scope	Effective date	Termination date
Argentina	Research and power	July 25, 1969	July 24, 1999
Australia	Research and power	May 28, 1957	May 27, 1997
Austria	Research and power	Jan. 24, 1970	Jan. 23, 2014
Brazil	Research and power	Sept. 20, 1972	Sept. 19, 2002
Canada	Research and power	July 21, 1955	July 13, 1980
China, Rep. of	Research and power	June 22, 1972	June 21,2014
Colombia	Research	Mar. 29, 1963	Mar. 28, 1977
Finland	Research and power	July 7, 1970	July 6, 2000
Greece (note a)	Research	Aug. 4, 1955	Aug. 3, 1974
India	Power (Tarapur)	Oct. 25, 1963	Oct. 24, 1993
Indonesia	Research	Sept. 21, 1960	Sept. 20, 1980
Iran	Research	Apr. 27, 1959	Apr. 26, 1979
Ireland	Research	July 9, 1958	July 8, 1978
Israel	Research	July 12, 1955	Apr.- 11, 1977
Italy	Research and power	Apr. 15, 1958	Apr. 14, 1978
Japan	Research and power	July 10, 1968	July 9, 2003
Korea	Research and power	Mar. 19, 1973	Mar. 18, 2014
Norway	Research and power	June 8, 1967	June 7, 1997
Philippines	Research and power	July 19, 1968	July 18, 1998
Portugal	Research and power	June 26, 1974	June 25, 2014
South Africa	Research and power	Aug. 22, 1957	Aug. 21, 2007
Spain	Research and power	June 28, 1974	June 27, 2014
Sweden	Research and power	Sept. 15, 1966	Sept. 14, 1996
Switzerland	Research and power	Aug. 8, 1966	Aug. 7, 1996
Thailand	Research and power	June 27, 1974	June 26, 2014
Turkey	Research	June 10, 1955	June 9, 1981
United Kingdom	Research and power	July 21, 1955	July 20, 1976
United Kingdom	Power	July 15, 1966	July 14, 1976
Venezuela	Research and power	Feb. 9, 1960	Feb. 8, 1980
Vietnam	Research	July 1, 1959	June 30, 1979

~/Superseding research and power agreement in abeyance; U.S. material covered by IAEA (NPT) safeguards.

B. Bilaterals with international organizations

Organization	Scope	Effective date	Termination date
European Atomic Energy Community (EURATOM)	Joint nuclear power program	Feb. 18, 1959	Dec. 31, 1985
EURATOM	Additional agreement to joint nuclear power program	July 25, 1960	Dec. 31, 1995
International Atomic Energy Agency (IAEA)	supply of materials, etc.	Aug. 7, 1959	Aug. 6, 2014

ANNEX H

A LIST OF U. 5..-IAEA TRILATERAL SAFEGUARDS AGREEMENT

APPENDIX III

U.S.-IAEA TRILATERAL SAFEGUARDS AGREEMENTS FOR APPLICATION OF IAEA SAFEGUARDS TO U.S.-SUPPLIED MATERIALS

Third party	Effective date	Termination date (note a)
Argentina	7/25/69	AC
Australia (suspended 7/10/74) (note b)	9/26/66	AC
Austria (suspended 7/23/72) (note b)	1/24/70	AC
Brazil (amended 9/20/72)	10/31/68	AC
China, Republic of	12/ 6/71	AC
Colombia	12/ 9/70	AC
Denmark (suspended 3/1/72) (note b)	2/29/68	AC
India	1/27/71	AC
Indonesia	12/ 6/67	AC
Iran (suspended 5/15/74) (note b	8/20/69	AC
Israel	6/15/66	AC
Japan	7/10/68	Ac
Korea (amended 3/19/73)	1/ 5/68	AC
Philippine (suspended 10/16/74) (note b)	7/19/68	AC
Portugal	7/19/69	AC
South Africa (amended 6/28/74)	7/26/67	AC
Spain (amended 6/28/74)	12/ 9/66	AC
Sweden	3/ 1/72	AC
Switzerland	2/18/72	AC
Turkey	6/ 5/69	AC
Venezuela	3/27/68	AC

~/AC indicates termination on same date *as* agreement for co-operation.

~/Suspended in view of NPT safeguards agreements with IAEA.

ANNEX I

INFORMATION CIRCULAR /153

THE STRUCTURE AND CONTENTS OF AGREEMENTS BETWEEN THE AGENCY AND STATES REQUIRED IN CONNECTION WITH THE TREATY ON NON-PROLIFERATION OF NUCLEAR WEAPONS

IAEA

SELECTED PARAGRAPHS

"1. **The Agreement should contain, in accordance with Article III.1 of the Treaty on the Non-Proliferation of Nuclear Weapons**[1], **an undertaking by the State to accept safeguards, in accordance with the terms of the Agreement, on all source or special fissionable material in all peaceful nuclear activities** within its territory, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices."

IMPLEMENTATION OF SAFEGUARDS

4. (Add texts of ¶H)

4. **The Agreement should provide that** safeguards shall be implemented in a manner designed:

(a) To avoid hampering the economic and technological development of the State or international cooperation in the field of peaceful nuclear **activities, including international exchange of** ***nuclear material***[2];

(b) To avoid undue interference in the State's peaceful nuclear activities, and in particular in the operation of facilities; and

(c) To be consistent with prudent management practices required for the economic and safe conduct of nuclear activities.

"5. ..the Agency shall take every precaution to protect commercial and industrial secrets and other confidential information coming to its knowledge in the implementation of the Agreement. The Agency shall not publish or communicate to any State, organization or person any information obtained by it in connection with the inplementation of the Agreement, except that specific information relating to such implementation in the State may be given to the Board of Governors and to such Agency staff members as require such knowledge by reason of their official duties in connection with safeguards, but only to the extent necessary for the Agency to fulfill its responsibilities in implementing the Agreement. Summarized information on nuclear material being safeguarded by the Agency under the Agreement may be published upon decision of the Board if the States directly concerned agree."

6. The Agreement should provide that in implementing safeguards pursuant thereto the Agency shall take full account of technological developments in the field of safeguards, and shall make every effort to ensure optimum cost-effectiveness and the application of the principle of safeguarding effectively the flow of nuclear material subject to safeguards under the Agreement by use of instruments and other techniques at certain strategic points to the extent that present or future technology permits. In order to ensure optimum cost-effectiveness, use should be made, for example, of such means as:

"(a) Containment as a means of defining material balance areas for accounting purposes:

"(b) Statistical techniques and random sampling in evaluating the flow of nuclear material: and

"(c) Concentration of verification procedures on those stages in the nuclear fuel cycle involving the production. processing, use or storage of nuclear material from which nuclear weapons or other nuclear explosive devices could readily be made, and minimization of verification procedures in respect of other nuclear material, on condition that this does not hamper the Agency in applying safeguards under the Agreement."'

"7. The Agreement should provide that the State shall establish and maintain a system of accounting for and control of all nuclear material subject to safeguards under the Agreement, and that such safeguards shall be applied in such a manner as to enable the Agency to verify, in ascertaining that there has been no diversion of nuclear material from peaceful uses to nuclear weapons or other nuclear explosive devices, findings of the State's system. The Agency's verification shall include, inter alia. independent measurements and observations conducted by the Agency in accordance with the procedures specified in Part II below. The Agency, in its verification, shall take due account of the technical effectiveness of the State's system,"

"8. The Agreement should provide that to ensure the effective implementation of safeguards thereunder the Agency shall be provided, in accordance with the provisions set out in Part II below with information concerning nuclear material subject to safeguards under the Agreement and the features of facilities relevant to safeguarding such material. The Agency shall require only the minimum amount of information and data consistent with carrying out its responsibilities under the Agreement. Information pertaining to facilities shall be the minimum necessary for safeguarding nuclear material subject to safeguards under the Agreement. in examining design information, the Agency shall, at the request of the State, be prepared to examine on premises of the State design information which the State regards as being of particular sensitivity. Such information would not have to be physically transmitted to the Agency provided that it remained available for ready further examination by the Agency on premises of the State."

"18. The Agreement should provide that if the Board, upon report of the Director General, decides that an action by the State is essential and urgent in order to ensure verification that nuclear material subject to safeguards under the Agreement is not diverted to nuclear weapons or other nuclear explosive devices the Board shall be able to call upon the State to take the required action without delay, irrespective of whether procedures for the settlement of a dispute have been invoked.

"19. The Agreement should provide that if the Board upon examination of relevant information reported to it by the Director General finds that the Agency is not able to verify that there has been no diversion of nuclear material required to be safeguarded under the Agreement to nuclear weapons or other nuclear explosive devices, it may make the reports provided for in paragraph C of Article XII of the Statute and may also take, where applicable, the other measures provided for in that paragraph. In taking such action the Board shall take account of the degree of assurance provided by the safeguards measures that have been applied and shall afford the State every reasonable opportunity to furnish the Board with any necessary reassurance.

"20. The Agreement should provide that the parties thereto shall, at the request of either, consult about any question arising out of the interpretation or application thereof.

"21. The Agreement should provide that the State shall have the right to request that any question arising out of the interpretation or application thereof be considered by the Board; and that the State shall be invited by the Board to participate in the discussion of any such question by the Board.

"22. The Agreement should provide that any dispute arising out of the interpretation or application thereof except a dispute with regard to a finding by the Board under paragraph 19 above or an action taken by the Board pursuant to such a finding which is not settled by negotiation or another procedure agreed to by the parties should, on the request of either party, be submitted to an arbitrator, and the two arbitrators so designed would elect a third, who would be the Chairman. If, within 30 days of the request for arbitration, either party has not designed an arbitrator, either party to the dispute may request the President of the International Court of Justice to appoint an arbitrator. The same procedure would apply if, within 30 days of the designation or appointment of the second arbitrator, the third arbitrator had not been elected. A majority of the members of the arbitral tribunal would constitute a quorum, and all decisions would require the concurrence of two arbitrators. The arbitral procedure would be fixed by the tribunal. The decision of the tribunal would be binding on both parties.

PART II

OBJECTIVES OF SAFEGUARDS

"28. The Agreement should provide that the objective of safeguards is the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection.

"29. To this end the Agreement should provide for the use of material accountancy as a safeguards measure of fundamental importance, with containment and surveillance as important complementary measures.

"30. The Agreement should provide that the technical conclusion of the Agency's verification activities shall he a statement, in respect of each material balance area, of the amount of material unaccounted for over a specific period, giving the limits of accuracy of the amounts stated.'"

DESIGN INFORMATION

General

42. Pursuant to paragraph 8 above, the Agreement should stipulate that design information in respect of existing facilities shall be provided to the Agency during the discussion of the Subsidiary Arrangements, and that the time limits for the provision of such information in respect of new facilities shall be specified in the Subsidiary Arrangements. It should further be stipulated that such information shall be provided as early as possible before nuclear material is introduced into a new facility.

43. The Agreement should specify that the design information in respect of each facility to be made available to the Agency shall include, when applicable:

(a) Identification of the facility, stating its general character, purpose, nominal capacity and geographic location, and the name and address to be used for routine business purposes;

(b) Description of the general arrangement of the facility with reference, to the extent feasible, to the form, location and flow of nuclear material and to the general layout of important items of equipment which use, produce or process nuclear material;

(c) Description of features of the facility relating to material accountancy, containment and surveillance; and

(d) Description of the existing and proposed procedures at the facility for nuclear material accountancy and control, with special reference to material balance areas established by the operator, measurements of flow and procedures for physical inventory taking.

44. The Agreement should further provide that other information relevant to the application of safeguards shall be made available to the Agency in respect of each facility, in particular on organizational responsibility for material accountancy and control. It should also be provided that the State shall make available to the Agency supplementary information on the health and safety procedures which the Agency shall observe and with which the inspectors shall comply at the facility.

45. The Agreement should stipulate that design information in respect of a modification relevant for safeguards purposes shall be provided for examination sufficiently in advance for the safeguards procedures to be adjusted when necessary.

"'46. The Agreement should provide **that the design information made available to the Agency shall be used for the following purposes:**

" (a) To **identify the features of facilities and nuclear material relevant to the application of safeguards to nuclear material in sufficient detail to facilitate verification.**

"(b) To determine material balance areas to be used for Agency accounting purposes and to select those strategic points which are key measurement points and which will be used to determine the nuclear material flows and inventories: in determining such material balance areas the Agency shall, inter alia, use the following criteria;

"(i) The size of the material balance area should be related to the accuracy with which the material balance can be established

"(ii) In determining the material **balance area advantage should be taken of any opportunity to use containment and Surveillance to help ensure the completeness of flow** measurements and thereby simplify the application of safeguards and concentrate measurement efforts at key measurement points;

"(iii) A number of material balance areas in use at a facility or at distinct **sites may be-combined** in one **material balance area to be used for Agency accounting**

purposes when the Agency determines that this is consistent with its verification requirements: and

"(iv) If the State so requests, a special material balance area around a process step involving commercially sensitive information may be established*

"(c) To establish the nominal timing and procedures for taking of physical inventory for Agency accounting purposes:

"(d) To establish the records and reports requirements and records evaluation procedures:

"(e) To establish requirements and procedures for verification of the quantity and location of nuclear material and

"(f) To select appropriate combinations of containment and surveillance methods and techniques and the strategic points at which they are to be applied.

"It should further be provided that the results of the examination of the desire information shall be included in the Subsidiary Arrangements."

PURPOSE OF INSPECTIONS

72. The Agreement should provide that the Agency may make routine inspections in order to:

"(a) Verify that reports are consistent with records:

"(b) Verify the location, identify, quantity and composition of all nuclear material subject to safeguards under the Agreement and

"(c) Verify information on the possible causes of material unaccounted for, shipper/receiver differences and uncertainties in the book inventory."

INSPECTIONS
Access for Inspections

"76...(c) For the purposes specified in paragraph 72 above the Agency's inspectors shall have access only to the strategic points specified in the Subsidiary Arrangements and to the records maintained pursuant to paragraphs 51-58; and

"(d)In the event of the State concluding that any unusual circumstances require extended limitations on access by the Agency, the State and the Agency shall promptly make arrangements with a view to enabling the Agency to discharge its safeguards responsibilities in the light of these limitations. The Director General shall report each such arrangement to the Board."

"78. The Agreement should provide that the number, intensity, duration and timing of routine inspections shall be kept to the minimum consistent with the effective implementation of the safeguards procedures set forth therein, and that the Agency shall make the optimum and most economical use of available inspection resources.

"79. The Agreement should provide that in the case of facilities and material balance areas outside facilities with a content or annual throughput, whichever is greater, of nuclear material not exceeding five effective kilograms, routine inspections shall not exceed one per year. For other facilities the number, intensity, duration, timing and mode of inspections shall be determined on the basis that in the maximum or limiting case the inspection regime shall be no more intensive than is necessary and sufficient to maintain continuity of knowledge of the flow and inventory of nuclear material.

"80. The Agreement should provide that the maximum routine inspection effort in respect of facilities with a content or annual throughput of nuclear material exceeding five effective kilograms shall be determined as follows:

"(a) For reactors and sealed stores, the maximum total of routine inspection per year shall be determined by allowing one sixth of a man-year of inspection for each such facility in the State:

"(b) For other facilities involving plutonium of uranium enriched to more than 5%, the maximum total of routine inspection per year shall be determined by allowing for each such facility 3o X /Ė man–days of inspection per year, where .E is the inventory or annual throughput of nuclear material, whichever is greater, expressed in effective kilograms. The maximum established for any such facility shall not. however. be less than 1.5 man-years of inspection: and

"(c) For all other facilities, the maximum total of routine inspection per year shall be determined by allowing for each such facility one third of a man-year of inspection plus 0.4 X E man-days of inspection per year, where E is the inventory or annual throughput of nuclear material, Whichever is greater, expressed in effective kilograms.

"The Agreement should further provide that the Agency and the State may agree to amend the maximum figures specified in this paragraph upon determination by the Board that such amendment is reasonable.

"81. Subject to paragraphs 78-80 above the criteria to be used for determining the actual number, intensity, duration, timing and mode of routine inspections of any facility shall include*

'(a) The form of nuclear material, in particular, whether the material is in bulk form or contained in a number of separate items: its chemical composition and, in the case of uranium, whether it is of low or high enrichment: and its accessibility:

'(b) The effectiveness of the State's accounting and control system, including the extent to which the operators of facilities are functionally independent of the State's accounting and control system: the extent to which the measures specified in paragraph 32 above have been implemented by the State: the promptness of reports submitted to the Agency; their consistency with the Agency's independent verification: and the amount and accuracy of the material unaccounted for, as verified by the Agency;

"(c) Characteristics of the State's nuclear fuel cycle, in particular, the number and types of facilities containing nuclear material subject to safeguards, the characteristics of such facilities relevant to safeguards, notably the degree of containment* the extent to which the design of such facilities facilitates verification of the flow and inventory of nuclear material; and the extent to which information from different material balance areas can be correlated

"**(d)** International interdependence, in particular, the extent to which nuclear **material is received from or sent to other States for use or Processing; any verification activity by the Agency in connection therewith; and the extent to which the State's nuclear activities are interrelated with those of other States: and**

"(e) Technical **developments in** the field of safeguards? including the use of statistical techniques and random sampling in evaluating the flow of nuclear material."

ANNEX J

OUTLINE OF THE SAFEGUARDS TECHNICAL MANUAL

Outline of Safeguards Technical Manual

Part A Safeguards Objectives, Criteria and Requirements

Part B Nuclear Activities and Facilities

Part C Inspections

Part D Evaluation of the Information

Chapter 1	Objectives
Chapter 2	Evaluation of the information provided by the State
Chapter 3	Evaluation of the information collected in the inspections
Chapter 4	Evaluation of the information provided by the analytical services
Chapter 5	Evaluation of the information provided by the State, inspections and analytical services for an MBA
Chapter 6	Evaluation of the information provided by the State, inspections and analytical services for a group of interrelated MBA's
Chapter 7	Basic design and operational features of the Agency's system for storage, retrieval and processing of the information

Part II Methods and Techniques

Chapter 1	Classification of nuclear materials, measuring conditions, and measurement methods
Chapter 2	Standard reference materials
Chapter 3	Methods for weight and volume measurement
Chapter 4	Methods of sampling
Chapter 5	Analytical methods of measurement of nuclear material
Chapter 6	Methods of non-destructive analysis of nuclear material
Chapter 7	Methods of using isotopic composition
Chapter 8	Measurement accuracy for different combinations of materials, conditions and methods
Chapter. 9	Methods of containment
Chapter 10	Methods of surveillance
Chapter 11	Methods of identification of nuclear materials

Part F Statistical Concepts and Techniques

Chapter 1	Basic concepts
Chapter 2	Random number tables
Chapter 3	Graphical representations
Chapter 4	Estimation of parameters
Chapter 5	Tests of significance
Chapter 6	Paired comparison techniques
Chapter 7	Attribute tests
Chapter 8	Cumulative sum techniques
Chapter 9	Sequential sampling
Chapter 10	Error evaluation

ANNEX K

IAEA SAFEGUARDS TECHNICAL MANUAL
INTRODUCTION
PART A

SAFEGUARDS OBJECTIVES, CRITERIA AND REQUIREMENTS
Section on Significant Quantities

"5. '..3. Significant Quantities

"The expression 'Significant quantities' is understood as quantities of nuclear material which are of importance for the manufacture of nuclear weapons or other nuclear explosive devices. The only guidelines to define the quantities which are of safeguards importance are the quantities of nuclear material required to manufacture a single nuclear explosive or the quantity needed to produce by appropriate conversion the material required to manufacture such an explosive.

"The amounts of material required for the manufacture of one nuclear explosive have been estimated in one study (4) to be 25 kilograms of uranium containing 90 to 95 percent uranium-235 or 8 kilograms of plutonium containing 95 percent plutonium-239. These amounts are related to fast critical masses, and experiments with fast critical assemblies provide information regarding the relative amounts of other isotopes required to manufacture a nuclear explosive. Examples of some bare spherical critical masses are 52 kg of uranium containing 94 percent of the 235 isotope 16.5 kg of uranium containing 98 percent of the 233 isotope: 17 kg of plutonium (95 percent Pu-239 and 4.5% Pu-240) and 19.5 kg of plutonium (76 percent of Pu-239, 20 percent Pu-240) and 3 percent

Pu-241). Measurements of reactivity contributions made in fast critical facilities indicate similar reactivity coefficients for Pu--239 and U-233 and a reactivity coefficient for Pu--240 intermediate between those of Pu-239 and U-235. The critical masses noted above are significantly less when reflecting material is used. For example, the critical spherical mass of 94 percent U-235 is about 18 kg when surrounded by a 7-inch thick reflector of natural uranium and about 26 kg when surrounded by a 1.74-inch thick reflector (5).

"For uranium containing less than 90 to 95 percent U-235 the weight of contained U-235 in a critical mass increases gradually as the enrichment is decreased down to an enrichment of approximately 20 percent, with the specific critical mass weights depending upon the amount and type of reflector material. Below enrichments of about 20 percent the weights of critical masses increase very rapidly with about 680 kg of uranium (100 kg contained U-235) being required for a 'critical mass of 16 percent U-235 with a 3-inch natural uranium reflector (5).

"Based upon the above considerations the quantities of nuclear material required for the manufacture of a single nuclear explosive device, for material types not requiring enrichment or irradiation, are taken by the IAEA to be 8 kg of plutonium for all types of plutonium for which the isotopic concentration of PU-238 does not exceed 80 percent: and for uranium in which the combined weights of the U-233 and U-235 isotopes equal or exceed 20 percent of the total uranium weight, 8 kg of contained U-233 and U-235 when the U-233

isotopic concentration is the larger of the two and 25 kg of contained U-235 when the U-235 isotopic concentration is the larger.

"For uranium containing less than 20 percent concentration of the U-233 and U-235 isotopes and for thorium either isotopic enrichment or irradiation **in a reactor is considered to be required to produce material from which nuclear explosive devices could be manufactured. In general, quantities larger than** 25 kg of contained U-235 by a factor of 2 to 4 would be required to produce the material from which a single nuclear explosive device could be manufactured. For example, to produce by isotopic enrichment 25 kg of uranium of 90% enrichment, assuming a tails assay of 0.003%, would require about 6 tons of natural uranium containing about 43 kg of U-735. If depleted uranium (assay 0.004% were used as feed for isotopic enrichment about 25 tons of feed, containing about 100 kg contained U-235 would be needed to produce 25 kg of 90% enriched uranium. If natural uranium were to be irradiated in a reactor to produce plutonium at a relatively low burn-up level (approximately 600 to 800 megawatt-days/ton of uranium which results typically in about 0.5 kg of plutonium per ton of uranium) about 16 tons of natural uranium containing about 120 kg of U-235 would he needed to produce 8 kg of plutonium.

"These values indicate the order of magnitude of the quantity of material required to manufacture a device. Therefore, in the case of States having a sizable scale nuclear activity, the IAEA would have to conclude on the non-diversion of a very small fraction of the State'; inventory of nuclear **material.**

"5.1.3 Detection Probability and Confidence' Level

"Neither INFCIRC/66/Rev.2 nor INFCIRC/153 mentions the concepts of degree of certitude of detection and degree of certitude of not concluding that a diversion has taken place when it has not. The IAEA interprets that these concepts, which are usually expressed by the statistical terms 'probability of detection' and 'confidence level of detection', are implicit in these two documents.

"Experts **from Member States have recommended that the IAEA use values between 90 and 99% for both. In most cases this will be 95%.**

ANNEX L

THE IAEA ANNUAL REPORT FOR 1975, SECTION ON SAFEGUARDS

General

125. The Review conference of the Parties to the Treaty on the Non - Proliferation of Nuclear Weapons, which met from 5 to 30 May, expressed strong supper t for effective Agency safeguards. The Conference paid special attention to export policies, standard and universal application of the Agency's safeguards, improvement of methods and techniques and safeguards instruments and the physical protection of nuclear material against forcible seizure.

126. The Director General has set up a Standing Advisory Group on safeguards implementation to provide advice on technical aspects of Agency safeguards. The Group held its first meeting in December 1975 and began its examination of verification procedures and safeguards practices.

127. The Board has taken a number of steps to clarify the scope and duration of safeguards agreements concluded outside the framework of NPT and of safeguards requirements in connection with the transfer of scientific and technological information. These steps have been reflected in recent agreements.

128. The Agency has also helped Member States to set up their national systems of accounting for, and control of, nuclear material and has given training to staff who are responsible for submitting accounting information to the Agency under safeguards agreements in connection with NPT.

129. The part of the safeguards information handling system which deals with reports received from States' systems of accounting and control on nuclear material subject to safeguards under NPT, is now handling reports from some States party to NPT and is being tested for the remainder.

130. The Agency convened the third symposium on the safeguarding of nuclear material in October 1975. The symposium reviewed the ''state of the art" in safeguards methods, techniques and instrumentation and it attracted wide participation.

Implementation of Agency safeguards

131. At the end of 1975 the Agency had safeguards agreements in force with 64 States. The Board had also approved agreements with 17 further States, which are awaiting entry into force.

132. Of the agreements in force 44 were with States party to NPT and 23 of these States "have significant nuclear activities (see Table 8 at the end of this section). In addition, safeguards were being applied in 20 States under 11 project agreements, 21 safeguards transfer agreements and eight unilateral submission agreements (see Table 9).

133. During 1975 the Board approved:

(a) In connection with NPT, safeguards agreements with Afghanistan, Ethiopia, Gabon, Japan, the Republic of Korea, Sudan, Sweden and Tonga;

(b) In connection with both NPT and the Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty), safeguards agreements with El Salvador and Honduras;

(c) A Safeguards Transfer Agreement between the Agency, Israel and the United States of America;

(d) A Safeguards Agreement between the Agency, France and the Republic of Korea;

(e) An agreement with Argentina for the application of safeguards to the Embalse Power Reactor Facility; and

(f) Two agreements with Spain and Switzerland respectively for the application of safeguards to nuclear material.

.134. The negotiation of agreements to implement the offers of the United Kingdom and the United States in connection with the application of safeguards in those two States had entered the final stage.

1350 The Agency's records showed the following quantities of nuclear material to be under Agency safeguards:

	1970	1971	1972	1973	1974	1975
Plutonium (kg)						
(a) Contained in irradiated fuels						6661
(b) In other forms						2374
(C) Total	770	1 726	2 900	4730	6300	9035
Enriched uranium						
(a) Total element (tonnes)	243	522	1 178	1 865	2305	3 096
(b) Fissile content (tonnes)	6.1	11.2	26.0	43.0	53,0	66.7
Source material (tonnes)	1 146	1 200	2 145	3370	3910	4440

136. During 1975 the Agency carried out 515 inspections in 39 States (216 in connection with NPT), compared with 474 inspections (165 in connection with NPT) in 38 States during the preceding year. Of the 515 inspections, 214 were made of power plants, 104 of bulk fuel plants and 197 of other facilities including research reactors.

137. Inspectors are being trained in the use of recently introduced non-destructive analytical instruments and techniques and this has improved further the quality of verification.

138. By the end of 1975 the compilation of individual I 'Safeguards Implementation Practices" enabling the Agency to achieve consistency of inspection procedure in respect of all facilities where nuclear material was being safeguarded, was well underway. [10]

1390 A list of nuclear installations under Agency safeguards or containing material safeguarded under arrangements approved by the Board is given in Table 10. The breakdown on 31 December 1975 compared to 30 June of the same year is as follows:

[10] See **also** document GC(XIX)544, para. 141.

Facilities	NPT		Non-NPT	
	30 June	31 December	30 June	31 December
Nuclear power stations	18	18	25	~[11]
Research reactors and critical facilities	47	47	56	56
Conversion plants, fabrication plants and fuel reprocessing plants	7	7	22	22
Other separate accountability areas[12]	47	47	93	93

Safeguards development

140. An Advisory Group on States Systems of Accounting for and Control of Nuclear Material met at Brno, Czechoslovakia, in July 1975 and extended the work of the panel held in Tokyo in November 1973 [13].

141. An advisory group which met in April 1975 prepared a revised set of recommendations [14] to help Member States to minimize the risk of sabotage in nuclear facilities or theft of nuclear material. The Secretariat is studying the legal instruments that might be appropriate for ensuring physical protection of nuclear material, particularly when it is transported internationally.

142. The construction of the Safeguards Analytical Laboratory at Seibersdorf was completed in November 1975 and work on certain categories of samples was expected to begin early in the new year.

143. In March 1975 an advisory group helped to draw up guidelines for the development of safeguards techniques during the next five years. During the year, containment and surveillance systems have been further refined, particular attention being paid to optical devices, instruments to monitor the movement of material in nuclear plants and techniques for sealing. There has also been further progress in techniques for non-destructive measurement of the fissile material content of fuel assemblies and irradiated fuel.

144. The cost of research and technical contracts awarded during 1975 amounted to $699790, of which 15% was contributed by the Agency and the remainder by the institutes or Governments concerned. A coordinated research programme for setting up a bank of correlated isotopic data was started with Member States and EURATOM. The data bank will be used to develop isotopic correlation techniques and to apply them as a means of verification of burn-up production of fissile material and reprocessing input analysis.

145. Volume E of the Agency's safeguards technical manual was released for production in 1975.

[11] The basis for this number has been changed since 1975; it now relates only to nuclear power stations that have been subject to inspection during the year under review, whether or not they have started operation.

[12] Contiguous minor locations where very small amounts of nuclear materials are kept have been grouped together.

[13] See document GC(XVIII)/525, para.165.

(14) Document INFCIRC/225.

Table 8

Situation on 31 December 1975 with respect to the signature of, ratification of, or accession to, NPT by non-nuclear-weapon States, and the conclusion of safeguards agreements between the Agency and these States in connection with NPT

Non-nuclear-weapon States which have signed, ratified or acceded to NPT[a] (1)	Date of ratification or accessional (2)	Safeguards agreement with the Agency (3)
Afghanistan	4 February 1970	Approved by the Board
Australia	23 January 1973	In force: 10 July 1974
Austria	28 June 1969	In force: 23 July 1972
Bahamas	10 July 1973	
Barbados		Under negotiation
Belgium	2 May 1975	Signed: 5 April 1973
Benin	31 October 1972	
Bolivia	26 May 1970	Signed: 23 August 1974
Botswana	28 April 1969	Under negotiation
Bulgaria	5 September 1969	[n force: 29 February 1972
Burundi	19 March 1971	Under negotiation
Cambodia	2 June 1972	
Canada	8 January 1969	In force: 21 February 1972
Central African Republic	25 October 1970	
Chad	10 March 1971	
China, Republic of	27 January 1970	Negotiations discontinued
Colombia		
Costa Rica	3 March 1970	Signed: 12 July 1973
Cyprus	16 February 1970	In force: 26 January 1973
Czechoslovakia	22 July 1969	In force: 3 March 1972
Democratic Yemen		
Denmark	3 January 1969	In force: 1 March 1972
Dominican Republic	24 July 1971	In force: 11 October 1973
Ecuador	7 March 1969	In force: 10 March 1975
Egypt		
El Salvador	11 July 1972	In force: 22 April 1975
Ethiopia	5 February 1970	Approved by the Board
Fiji	14 July 1972	In force: 22 March 1973
Finland	5 February 1969	In force: 9 February 1972
Gabon	19 February 1974	Approved by the Board
Gambia	12 May 1975	
German Democratic Republic	31 October 1969	In force: 7 March 1972
Germany, Federal Republic of	2 May 1975	Signed: 5 April 1973
Ghana	5 May 1970	In force: 17 February 1975
Greece	11 March 1970	Provisionally in force: 1 March 1972
Grenada	19 August 1974	Under negotiation
Guatemala	22 September 1970	Under negotiation
Haiti	2 June 1970	Signed: 6 January 1975
Holy See	25 February 1971	In force: 1 August 1972
Honduras	16 May 1973	In force: 18 April 1975
Hungary	27 May 1969	In force: 30 March 1972
Iceland	18 July 1969	In force: 16 October 1974
Indonesia		
Iran	2 February 1970	In force: 15 May 1974
Iraq	29 October 1969	In force: 29 February 1972
Ireland	1 July 1968	In force: 29 February 1972
Italy	2 May 1975	Signed: 5 April 1973
Ivory Coast	6 March 1973	
Jamaica	5 March 1970	Under negotiation
Japan		Approved by the Board
Jordan	11 February 1970	Signed: 5 December 1974
Kenya	11 July 1970	Under negotiation
Korea, Republic of	23 April 1975	In force: 14 November 1975
Kuwait		
Laos	20 February 1970	Under negotiation

(1)	(2)	(3)
Lebanon	15 July 1970	In force: 5 March 1973
Lesotho	20 May 1970	In force: 12 June 1973
Liberia	5 March 1970	
Libyan Arab Republic	26 May 1975	
Luxembourg	2 May 1975	Signed: 5 April 1973
Madagascar	8 October 1970	In force: 14 June 1973
Malaysia	5 March 1970	In force: 29 February 1972
Maldives	7 April 1970	Under negotiation
Mali	5 March 1970	Under negotiation
Malta	6 February 1970	Under negotiation
Mauritius	28 April 1969	In force: 31 January 1973
Mexico	21 January 1969	In force: 14 September 1973
Mongolia	14 May 1969	In force: 5 September 1972
Morocco	30 November 1970	In force: 18 February 1975
Nepal	5 January 1970	In force: 22 June 1972
Netherlands b/	2 May 1975	Signed: 5 April 1973
New Zealand	10 September 1969	In force: 29 February 1972
Nicaragua	6 March 1973	Signed: 28 February 1975
Nigeria	27 September 1968	Under negotiation
Norway	5 February 1969	In force: 1 March 1972
Panama		
Paraguay	4 February 1970	
Peru	3 March 1970	Under negotiation
Philippines	5 October 1972	In force: 16 October 1974
Poland	12 June 1969	In force: 11 October 1972
Republic of South Viet-Nam	10 September 1971	In force: 9 January 1974
Romania	4 February 1970	In force: 27 October 1972
Rwanda	20 May 1975	
San Marino	10 August 1970	Under negotiation
Senegal	17 December 1970	
Sierra Leone	26 February 1975	Under negotiation
Singapore		Under negotiation
Somalia	5 March 1970	Under negotiation
Sri Lanka		
Sudan	31 October 1973	Signed: 26 February 1975
Surinam b/		In force: 5 June 1975
Swaziland	11 December 1969	In force: 28 July 1975
Sweden	9 January 1970	In force: 14 April 1975
Switzerland		Under negotiation
Syrian Arab Republic	24 September 1969	
Thailand	7 December 1972	In force: 16 May 1974
Togo	26 February 1970	
Tonga	7 July 1971	Approved by the Board
Trinidad and Tobago		
Tunisia	26 February 1970	Under negotiation
Turkey		
United Republic of Cameroon	8 January 1969	
Upper Volta	3 March 1970	
Uruguay	31 August 1970	Signed: 24 September 1971
Venezuela	26 September 1975	
Western Samoa	18 March 1975	
Yemen Arab Republic		
Yugoslavia	3 March 1970	In force: 28 December 1973
Zaire	4 August 1970	In force: 9 November 1972

a/ The information reproduced in columns (1) and (2) was provided to the Agency by the 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.

b/ Agreements have also been concluded in respect of the Netherlands Antilles and Surinam, under NPT and Additional Protocol I to the Treaty for the Prohibition of Nuclear Weapons in Latin America. These agreements entered into force on 5 June 1975. By letter of 29 November 1975, the Prime Minister of Surinam, which attained independence on 25 November 1975, informed the Secretary-General of the United Nations that his Government acknowledged that treaty rights and obligations of the Government of the Kingdom of the Netherlands in respect of Surinam were succeeded to by the Republic of Surinam upon independence and that it was desired that it be presumed that each treaty has been legally succeeded to by the Republic of Surinam and that action be based upon this presumption until a decision was reached that it should be regarded as having lapsed.

Table 10

Nuclear installations under Agency safeguards or containing safeguarded material under agreements approved by the Board of Governorsa/

A. Research reactors and critical facilities

State[b/]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Argentina	RA-O	Cordoba	Tank	0.00	x
	RA-1	Constituyentes	Argonaut	0.12	x
	RA-2	Constituyentes	Argonaut	0.03	x
	RA-3	Ezeiza	Pool-tank	5.00	x
	RA-4	Rosario	Solid-homogeneous	0.00	x
Australia[c/]	HIFAR	Lucas Heights. N.S.W.	Tank	11.00	x
	MOATA	Lucas Heights, N.S.W.	Argonaut	0.01	x
	CF	Lucas Heights, N.S.W.	Critical Facility	0.00	x
Austria[c/]	SAR	Graz	Argonaut	0.00	x
	TRIGA-VIENNA	Vienna	Triga II	0.25	x
	ASTRA	Seibersdorf	Pool	12.00	x
Brazil	IEA-R1	Sao Paulo	Pool	5.00	x
	IPR-R1	Belo Horizonte	Triga I	0.10	x
	RIEN.1	Rio de Janeiro	Argonaut	0.01	x
Bulgaria[c/]	IRT-2000	Sofia	Pool	2.00	x
Canada[s/]	NRX	Chalk River, Ont.	NRX	30.00	x
	NRU	Chalk River, Ont.	NRU	125.00	x
	WR-1	Pinawa, Manitoba	Organic-cooled	60.00	x
	McMaster	Hamilton, Ont.	Pool-type	2.5	x
	Slowpoke - Toronto	Univ. of Toronto	Pool-type"	0.00	x
	Slowpoke - Ottawa	Ottawa, Ont.	Pool-type	0.02	x
	PTR	Chalk River, Ont.	Pool-type	0.00	x
	ZED-2	Chalk River, Ont.	Pool-type	0.00	x
	ZEEP	Chalk River, Ont.	Tank	0.00	x
Chile	Herald	Santiago	Herald	5.00	x
China, Republic of	THOR	Hsin-chu	Pool	1.00	x
	TRR	Huaitzupu	NRX	40.00	x
	ZPRL	Lung-Tan	Pool	0.01	x
	THAR	Hsin-chu	Argonaut	0.01	x
	MER	Hsin-chu	Mobile Educational Reactor	0.00	x
Colombia	IAN-R1	Bogota	Pool-type	0.02	x
Czechoslovakia[c/]	SR-O	Vochov	Critical Facility	0.00	x
	VVR-S	Rez	Tank	4.00	x
	TR-O	Rez	Critical Facility	0.00	
Denmark[d/]	DR-1	Risø	Homogeneous	0.00	x
	DR-3	Risø	Tank	10.00	x
Finland[c/]	FiR-1	Otaniemi	Triga II	0.25	x
German Democratic Republic[c/]	WWR-S(M)	Rossendorf	Tank	6.00	x
	RRR and RAKE	Rossendorf	Critical Facility	0.00	x
Greece[c/]	GRR-1	Athens	Pool	5.00	x

State[b]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Hungary[c]	WWR-SM	Budapest	Tank	5.00	x
	ZR-4 and ZR-6	Budapest	Critical Facility	0.00	x
	Training reactor	Budapest	Pool	0.01	x
Indonesia	PRAB (TRIGA H)	Bandung	Triga H	1.00	x
Iran[c]	TSPRR	Teheran	Pool	5.00	x
Iraq[c]	IRT-2000	Baghdad	Pool	2.00	x
Israel	IRR-1	Soreq	Pool	5.00	x
Japan	AHCF	Tokai-Mura	Critical Facility	0.00	x
	DCA	Oarai-Machi	Critical Facility	0.00	x
	FCA	Tokai-Mura	Critical Facility	0.01	x
	HTR	Kawasaki-shi	Pool	0.10	x
	JMTR	Oarai-Machi	Tank	50.00	x
	JMTR-CA	Oarai-Machi	Critical Facility	0.00	x
	JPDR	Tokai-Mura	Boiling-water	90.00	x
	JRR-2	Tokai-Mura	Tank	10.00	x
	JRR-3	Tokai-Mura	Tank	10.00	x
	JRR-4	Tokai-Mura	Pool	1.00	x
	Kinki University	Kowakai	UTR-B	0.00	x
	KUR	Kumatori-cho	Pool	5.00	x
	KUCA	Kumatori -cho	Critical Facility	0.00	x
	NSRR	Tokai-Mura	Triga (pulse)	0.3	
	Musashi College of Technology	Kawasaki-shi	Triga 11	0.10	x
	NAIG-CA	Kawasaki-shi	Critical Facility	0.00	x
	Rikkyo University	Nagasaka	Triga II	0.10	x
	SHCA	Tokai-Mura	Critical Facility	0.00	x
	TCA	Tokai-Mura	Critical Facility	0.00	x
	TODAI	Tokai-Mura	Fast Neutron Source Reactor	0.002	x
	TTR	Kawasaki -shi	Pool	0.10	x
	"Mutsu" (Nuclear Ship)	Minato-Machi Mutsu	PWR	36.00	x
	JOYO	Oarai	EBR	50.00	
Korea, Republic of[c]	KRR - TRIGA II	Seoul	Triga II	0.10	x
	KRR - TRIGA III	Seoul	Triga 111	2.00	x
Mexico[c]	Centro Nuclear de Mexico	Ocoyoacac	Triga 111	1.00	x
	Training reactor facility	Mexico City	SUR-1OO	0.00	x
Norway[c]	JEEP-II	Kjeller	Tank	2.00	x
	HBWR	Halden	HBWR	25.00	x
Pakistan	PARR	Rawalpindi	Pool	5.00	x
Philippine[c]	PRR-1	Diliman, Quezon City	Pool	1.00	x
Poland[c]	EWA	Swierk	Tank	8.00	x
	Anna and Agata	Swierk	Critical Facility	0.00	x
	Maria	Swierk	Tank	30.00	x
Portugal	RPI	Sacavem	Tank	1.00	x
Romania[c]	VVR-S	Margurele	Tank	10.00	x
South Africa	SAFARI-1	Pelindaba	Tank	20.00	x

State[b/]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Spain	JEN-1 and JEN-2	Madrid	Pool	3.00	x
	CORAL-1	Madrid	Fast Critical Facility	0.00	x
	ARBI	Bilbao	Argonaut	0.01	x
	ARGOS	Barcelona	Argonaut	0.01	x
Sweden[c/]	R2 and R2-O	Studsvik	Tank and Pool	50.00	x
	KRITZ and R-O	Studsvik	Critical Facility	0.00	x
Switzerland	Proteus	Würenlingen	Critical Facility	0.00	x
	Saphir	Würenlingen	Pool	5.00	x
	Diorit	Würenlingen	HW	30.00	x
	Crocus	Lausanne	Pool	0.00	x
	AGN201P	Geneva	Solid homogeneous	0.00	x
	AGN211P	Basel	Pool	0.00	x
Thailand[c/]	TRR-1	Bangkok	Pool	1.00	x
Turkey	TR-1	Istanbul	Pool	1.00	x
United Kingdom	Zebra	Winfrith	Critical Facility	0.00	x
Uruguay[c/]	RUDI	Montevideo	Lockheed	0.10	
Yugoslavia[c/]	Triga II	Ljubljana	Triga II	0.25	x
	RA and RB	Vinca	Heavy-water Critical Facility	6.5	x
Zaire[c/]	Triga	Kinshasa	Triga 11	1.00	x

B. Nuclear power stations

State[b]	Name of power station	Location	Type	Capacity Mw(e)	In operation
Argentina	Atucha Nuclear Power Station	Atucha	PHWR	319	x
	Cordoba Nuclear Power Station	Rio Tercero	Candu	600	
Austria[c]	Tullnerfeld	Tullnerfeld	PWR	700	-
Bulgaria[c]	Kozloduy I	Kozloduy	PWR	880	x
Canada[c]	Pickering (4 units)	Pickering, Ontario	Candu	2032	x
	NPD	Ralphton, Ontario	Candu	22	x
	Gentilly	Gentilly, Quebec	Candu	250	x
	DPGS	Kincardine, Ontario	Candu	208	x
	Bruce I	Douglas Point, Ontario	Candu	750	
China, Republic of	FNPS-1	Ching-San	BWR	636	
Czechoslovakia[c]	A1	Bohunice	HWGC	143	x
Finland[c]	Loviisa	Loviisa	PWR	880	-
German Democratic Republic[c]	Rheinsberg PWR	Rheinsberg	PWR	80	x
	Bruno Leuschner PWR	Greifswald	PWR	880	x
India	Tarapur - TAPS	Tarapur	BWR	380	x
	Rajasthan - RAPS	Rajasthan	Candu	400	x (for 200)
Japan	Tokai	Tokai-Mura	Magnox	154	x
	Tsuruga	Tsuruga	BWR	357	x
	Mihama-1	Mihama-Fukai	PWR	340	x
	Mihama-2	Mihama-Fukai	PWR	500	x
	Fukushima-1	Okuma-Fukushima	BWR	460	x
	Fukushima-2	Okuma-Fukushima	BWR	784	x
	Fukushima-3	Okuma-Fukushima	BWR	784	x
	Fukushima-5	Fukushima	BWR	784	
	Shimane	Kashima-cho	BWR	460	x
	Hamaoka 1	Hamaoka	BWR	540	x
	Takahama-1	Takahama	PWR	826	x
	Takahama-2	Takahama	PWR	826	x
	Genkai-1	Kyushu	PWR	559	x
	Mihama-3	Mihama-Fukui	PWR	826	
Korea[c]	Kori-1	Kori	PWR	564	
Mexico[c]	Laguna Verde Power Station	Laguna Verde, Vera Cruz	BWR	650	
Pakistan	KANUPP	Karachi	Candu	125	x
Spain	José Cabrera	Almonacid de Zorita	PWR	153	x
	Santa Maria de Garona	Province de Burgos	BWR	440	x
Sweden[c]	Oskarshamn I	Oskarshamn	BWR	440	x
	Oskarshamn II	Oskarshamn	BWR	580	x
	Ringhals I	Near Göteborg	BWR	760	x
	Ringhals II	Near Göteborg	PWR	830	x
	Barsebäck I	Near Malmö	BWR	580	x
Switzerland	Mühleberg	Mühleberg	BWR	306	x
	Beznau I	Beznau	PWR	350	x
	Beznau II	Beznau	PWR	350	x

C. Conversion plants, fabrication plants and chemical reprocessing plants including pilot plants

Argentina	Pilot Fuel Fabrication Plant, Constituyentes[e/] Scrap Reprocessing Plant, Buenos Aires[e/]
Brazil	Fabrication Facility, Metallurgy Department, Instituto de Energia Atomica, São Paulo
Canada[c/]	Eldorado Nuclear Limited Port Hope Refinery Westinghouse Fuel Fabrication Plant Canadian General Electric Pelletizing Facility Canadian General Electric Fuel Fabrication Plant
China, Republic of	INER Pilot Fuel Reprocessing Plant[e/] INER Fuel Fabrication Plant
Denmark[q/]	Metallurgy Department, Risø[e/]
India	Nuclear Fuel Complex - NFC (Enriched Uranium Conversion and Fabrication Plant), Hyderabad
Japan	Power Reactor & Nuclear Fuel Development, Reprocessing Plant Nuclear Fuel Industries Ltd. (Kumatori-1) Sumitomo Metal Mining Co. Ltd. (Tokai-1) Mitsubishi Atomic Power Industries (Ohmiya-1) Japan Nuclear Fuel Co. Ltd. Mitsubishi Nuclear Fuel Co. Ltd. Power Reactor and Nuclear Fuel Development Co. (Tokai) Pilot Fuel Fabrication Plants and Conversion Plants: Mitsubishi Atomic Power Industries (Ohmiya-2)[e/] Nuclear Fuel Industries Ltd. (Kumatori-2)[e/] Nuclear Fuel Industries Ltd. (Ohi)[e/] Nuclear Fuel Industries Ltd. (Takeyama-2)[e/] Sumitomo Metal Mining Co. Ltd. (Tokai-2)[e/] Mitsubishi Metal Co.[e/] Sumitomo Metal Mining Co. Ltd. (Central)[e/]
Norway[r/]	Fuel Element Pilot Production Plant, Kjeller[e/]
Spain	Pilot Reprocessing Plant, Juan Vigon Research Centre, Madrid[e/] Metallurgical Plant, Juan Vigon Research Centre, Madrid[e/]
Sweden[d]	ASEA-ATOM , Conversion and Fabrication Plant, Vasteras

D. Other accountability areas covering more than one effective kilogram of nuclear material

Australia[c/]	Research Laboratory. Lucas Heights
Canada[c/]	Chalk River Nuclear Laboratories
Czechoslovakia[c/]	Research Laboratories, Rez
German Democratic Republic[c/]	Miscellaneous Locations combined in one material balance area
Hungary[c/]	Institute of Isotopes
Japan	Tokyo University (Tokai)
Poland[s/]	Institute of Nuclear Research, Swierk Miscellaneous Locations combined in one material balance area
Sweden[c/]	Central Hot Laboratory, Studsvik Laboratories and storages, Studsvik (except for KRITZ and RO) Miscellaneous Locations combined in one material balance area
Switzerland	Federal Institute of Reactor Research, Würenlingen
United Kingdom	Zebra Storage Facility, Winfrith Windscale Storage Facility, Windscale
United States of America	Argonne National Laboratory

a/ The nuclear installations that will be covered by the Safeguards Agreement in connection with NPT, signed with EURATOM and the non-nuclear-weapon States members of EURATOM on 5 April 1973~ are not listed here.

b/ An entry in this column does not imply the expression of any opinion whatsoever 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.

c/ NPT Safeguards Agreement.

d/ Denmark joined EURATOM on 1 January 1973 and has signed the Agreement with EURATOM and its non-nuclear-weapon member States; however, Agency safeguards are presently applied in this State under the NPT Safeguards Agreement which Denmark had concluded with the Agency prior to joining EURATOM.

e/ Pilot plant.

ANNEX M

OUTLINE OF REGIONAL NUCLEAR FUEL CYCLE CENTER SUMMARY REPORT

RFCC STUDY PROJECT

SUMMARY REPORT

OUTLINE

		**Approximate number of manuscript pages
VOLUME I – SUMMARY		
	Foreword – credits	
1.	Introduction	15 pp.
	1.1 Problems in completion of the back-end of the nuclear fuel cycle.	
	1.2 Presentation of the RFCC concept.	
	1.3 Description of the economic analytical approach-modelling, programming and characteristic data.	
	1.4 Value and limitations of characteristic data.	
	1.5 Other factors related to the RFCC concept – description of the associated studies.	
2*	Economic Studies and other Areas of Research for the RFCC (Summaries of Associated Studies)	155 pp.
	2.1 Presentation of alternative fuel cycle strategies.	
	2.2 Discussion of results.	
	2.3 Constraints and other considerations- sensitivity	
	2.4 Institutional and Legal	
	2.5 Organization and Administration.	
	2.6 Financial	
	2.7 Health, Safety and Environment	
	2.8 Materials Control	
	2.9 Public Acceptance	
3*	Conclusions and Recommendations	
Appendix		15 pp.
	Organization of the RFCC Study	
Index		
	Vol. I total :	185 pp.

**To be determined after consultation with the groups concerned.

VOLUME II BACKGROUND

4.	Introduction	20 pp.	
	4.1 Scope of the Study - methods of work		
	4.2 Brief description of contents of Volume **II**		
	4.3 Relationship to contents of **Volume I**		
5.	Analytical Methodology	45 pp.	
	5.1. Description of mathematical models and computer programme.		
	5.2 Assumptions, constraints and other factors related to the processes and operations.		
	5.3 Economic and cost evaluations - investments and schedules.		
	5.4 Correlation between mathematical models and process flow models - other testing of models.		
6.	Process Flow Models - Characteristic operation-s and Cost Data		
	6.1. Power Generation - Spent Fuel Data	30 pp.	
	6.2 Spent Fuel Storage	10 pp.	
	6.3 Fuel Reprocessing	60 pp.	
	6.4 Waste Management	60 pp.	260 pp,
	6.5 Mixed-Oxide Fuel Element Fabrication	60 pp.	
	6.6 Radioactive Material Transport	25 pp.	
	6.7 *Summary*- synthesis of back-end **of fuel cycle**	15 pp.	
7.	Associated Studies		
	7.1 Institutional and Legal	60 pp.	
	7.2 **Organization and Administration**	60 pp.	
	7.3 **Financial**	35 pp.	
	7.4 **Health, Safety and Environment**	45 pp.	
	7.5 **Materials Control** Process Controls	20 pp.	
	7.6 " " Safeguards	35 pp.	355 pp.
	7.7 " " Physical Security	**35 pp.**	
	7.8 **Public Acceptance**	**30** pp.	
	7.9 **Summary**	**15 pp.**	
Appendices		**20** pp.	
	Vol. II **Total :**	880 pp	
Glossary	**Vols. I and II Total:**	865 pp.	
Index			

REGIONAL NUCLEAR FUEL CYCLE CENTERS
IAEA STUDY PROJECT
SEPTEMBER 1976

The concept of regional fuel cycle centers has attracted wide interest as a possible approach towards meeting the fuel cycle requirements of many countries. Because of the many potential advantages, this concept has been endorsed by the Member States in discussions at the General Conference of the International Atomic Energy Agency and at the General Assembly of the United Nations. Accordingly, the International Atomic Energy Agency, in 1975, initiated a detailed study of the RFCC concept.

It should be emphasized that the immediate aim of the Agency's Study is to assist the Member States in evaluating the relative merits of the RFCC approach to establishing fuel cycle facilities. As there is likely to be a substantial shortage of fuel reprocessing capacity during the next ten years, it is imperative that the Member States are able to take decisions as to how long they should plan to store the spent fuel, and find answers to difficult and elusive questions as to whether they should adopt an interim thermal reactor mixed -oxide fuel strategy, and what value plutonium is likely to have for use as recycle fuel in thermal reactors or in fast breeders.

As the nuclear energy field is one in which long-range planning is vital, e. g. one needs to allow for an 8-12 years lead time for the construction and commissioning of a fuel reprocessing plant after a decision to build has been taken, the study is based on the premise that Governments would, regardless of the Agency Study, be assessing the potential of the various fuel cycle strategies in the light of their respective situations. The Study, therefore, is being pursued with a view to assisting Member States with their own evaluation and decision-making processes.

The RFCC concept is based on multinational cooperation in planning and setting up the fuel cycle facilities in a phased manner in relation to the other alternative options – (1) of each country setting up its own purely national facilities; and (2) of countries looking towards reliance on commercial services being available from existing or expanded facilities in the countries which currently have the necessary technical capability in view of their long-standing experience in all major phases of the nuclear field.

As the RFCC concept envisages multinational partnership in fuel cycle activities, it would provide a new dimension of assurance that proliferation of small fuel reprocessing plants would be avoided, and that the safeguards functions of the Agency, as also contemplated under the NPT, would be further facilitated and complemented. Co-location of the spent fuel management and plutonium recycle facilities would also have the advantage of minimizing the risks associated with the storage and shipment of plutonium as related to physical security.

The Agency Study is presently concerned mainly with what is referred to as the "back-end" of the fuel cycle because that is the portion that can be considered as problematic at present. Alternative choices need to be

examined now in regard to management of the spent fuel from the current generation of reactors. The Member States desiring to pursue a significant power programme will have to do extensive and comprehensive analysis and planning in this area so as to select the most appropriate strategy for their needs for the period 10-30 years from now. A regional multinational framework for evaluating the options and reaching conclusions on the various strategy alternatives could offer substantial advantages. The Agency study effort can provide some assistance to any group of interested Member States even as provisional results from this study become available and specific case studies could also be taken up if so desired.

As the Study has progressed, it has become apparent that the variation in the cost of transport of spent fuel. as related to varying shipment distance to the possible location of an RFCC, particularly in situations where sea transport is involved, would not be very significant in relation to the total fuel cycle cost. Hence, when considering regional groupings it is not necessary that such groupings be restricted in a narrow geographical sense, but cooperation between those potential participants who are likely to have similar plans for the development of their nuclear programmed could be envisaged.

It has also become evident that the technological and financial resources that would be required to implement the establishment of such a fuel cycle center would be such that one or more partners would have to be those who are in a position to supply the technical know -how and industrial support and are able to arrange for at least part of the financial resources required. Hence, potential participants need not think only in terms of establishing entirely new facilities as existing or planned national facilities could readily be utilized as the core for a multinational fuel cycle center.

Study Project - Programme Activities

The Study Project is divided into the following three main areas, as shown in Figure:

(1) Mathematical modelling, computer programming, and analysis of alternative strategies;

(2) Development of characteristic operations and cost data for use in the model.

(3) Preparation of associated studies to provide evaluative factors and guidance relevant to the implementation of the fuel cycle center concept. This would cover institutional and legal; organizational and administrative; financial; health, safety and environmental, materials control (including physical security and safeguards); and public acceptance aspects.

For each element of the Study it has proven helpful to have one or two lead consultants work directly with the RFCC Project staff in the preparation of working documents and related background information. This preliminary input is then reviewed and revised by a group of consultants from selected Member States, and the process is repeated if considered necessary, on a broader basis to ensure full development of the

material related to that programme element. The following table shows the number of meetings already held and planned through the end of August, together with an indication of the Member States who are assisting the Agency's study effort through their experts.

PROJECT ELEMENT	MEETINGS: Held	Planned	PARTICIPATING MEMBER STATES
Mathematical Modelling	1	2	FRG, India, Sweden, USA
Fuel Reprocessing	2	3	France, FRG, Spain, Sweden, UK, USA
Waste Management	1	2	Belgium, France, FRG, India, Japan, UK, **USA**
MOX Fuel Fabrication	1	2	**France, FRG, Italy, Japan, UK, USA**
Fuel Storage		1	**Austria, Canada, France, FRG, Japan, Sweden, UK, USA**
Fuel Transport	1	1	**Austria, France, FRG, Japan, Sweden, UK, USA**
Legal-Institutional	6	1	**Australia, Austria, Belgium, Finland, France, FRG, Japan, Korea, Pakistan, Philippines. Spain, Sweden, Switzerland, UK, USA, Yugoslavia**
Organization and Administrative			
Financial			
Health, Safety and Environment			
Safeguards			
Physical Security		1	**FRG, India, Sweden, USSR, UK, USA**
Process Control			
Public Acceptance			

Mathematical Modelling and Economic Analysis of Alternative Strategies

One of the important criteria to be used in evaluating the merits of RFCC is the overall cost of spent fuel management using integrated regional facilities as compared with costs using local (national) facilities for fuel reprocessing and refabrication, taking into account the possibility of long term storage of the spent fuel without reprocessing. The primary objective of the mathematical modelling effort is to provide a methodology for analyzing possible strategies for spent fuel management. This objective is being met by development of computer programmed which describe the material flows, facility construction criteria, and capital and operating costs for the facilities used to treat the spent fuel resulting from nuclear 'power plant operation. The computer programmed use a combination of simulation and optimization approaches to the economic analysis. Many of the fuel cycle steps, such as spent fuel discharges, storage at the reactor and transport to the RFCC, are described purely in simulation modelling; others such as inventory storage at the RFCC and construction and operation of reprocessing plants are subjected to optimization modelling to determine the relative economic tradeoff between provision for spent fuel storage and addition of reprocessing capacity.

It is intended that the developed methodology be sufficiently general, flexible and easily usable that it could be used by interested Member States to evaluate the economics of spent fuel management in their particular situation. In addition, it can be used to rapidly and easily investigate the sensitivity of RFCC economic results to variations in any of the critical input data.

Simulation Model -

This model represents an attempt to describe, or "simulate", the flows of spent fuel through the various transport, storage and reprocessing facilities, to permit calculation of costs resulting from construction and operation of those facilities. The description includes facilities for plutonium storage, conversion, and mixed-oxide fuel fabrication, and facilities for waste storage, treatment, and disposal. An important distinguishing feature of this model is that the user makes all decisions regarding spent fuel inventory storage times and reprocessing plant addition schedules. By using the programme to analyze a number of possible strategies, the planner can obtain results useful in selecting the most appropriate plan for particular conditions. The user specifies a selected plan for adding all major facilities, such as fuel reprocessing plants and mixed-oxide fuel fabrication plants. The model will then determine the storage capacity needed for spent fuel inventory in advance of reprocessing. Given the facility expansion plan, spent fuel storage plan and the cost data for all facilities, the simulation model will determine the extent to which

the facilities are utilized, and the total cost of the planned strategy, including credits for recovered uranium and plutonium.

Output from the simulation model will include the capital investment schedule for the RFCC facilities, the annual expenditures for operations, the average cost per unit of spent fuel discharged from the reactors, and the total present-worth cost of the plan. The annual revenue received by the RFCC for services provided will also be computed. In addition, the computer programme will print out a complete, detailed report on the annual quantities of materials at each stage of the spent fuel management cycle.

Use of this model is not limited to the RFCC concept; it can be used also to analyze strategies involving national facilities, in order to make cost comparisons between RFCC and national strategies. Further, the user has the option of specifying that the fuel is to be stored for several decades before reprocessing plants are introduced.

It should be apparent that, although the simulation model has no inherent optimization capability, it is very useful for making comparisons between different strategies of interest to fuel cycle planners, and for making sensitivity studies involving data uncertainties. Also, the cash flow data generated by this calculation can be used as the basis for financial analysis of fuel cycle strategies.

Optimization Model-

This model represents an attempt to determine the economic optimum schedule for reprocessing plant capacity expansion, considering spent fuel discharge rates, economies of scale of larger size reprocessing plants and the added cost of interim storage facilities needed to accumulate an operating inventory for the larger plants. The planner provides various capital and operating cost data for the several possible sizes of reprocessing plants, as well as capital and operating cost data for interim storage facilities. The optimization model then determines the lowest cost strategy, from among the many feasible strategies, for spent fuel storage and reprocessing, including the cost credits for recovered uranium and plutonium.

The optimization method employed is "backward dynamic programming' [1]. This technique has the ability to select the optimum reprocessing plant expansion schedule over the planning horizon, by examining a finite number of feasible conditions, or "states", that can possibly exist in each year of the planning horizon. A "state" of the system is characterized by a discrete reprocessing capacity and a discrete amount of spent fuel in inventory storage. The dynamic programming procedure finds the schedule of reprocessing capacity and inventory storage levels which leads to the lowest cost, when present-worth discounted over the @arming horizon.

Current Status -

Both ‘of the computer models described above have been programmed in preliminary form and are used on the Agency computer. Further work is required on the mixed oxide fuel fabrication model and the waste management model, and this will be completed in the near future.

Illustrative strategies are being analyzed with the models, for the purpose of examining the effects of different schedules for reprocessing capacity expansion and to determine the sensitivity of results to various cost uncertainties, nuclear power capacity growth rates, etc. Results from these test problems will provide guidance to select more realistic strategies for further examination.

Participation by Member States

These computer models require input data describing the nuclear power capacity projected to be installed in each country serviced by the RFCC, through the year 2000. The Member States currently provide such data on planned capacity expansions, which may extend through the mid -1980's. These data are published by the Agency in the annual bulletin "Power Reactors in Member States". It would be useful if the Member States could also periodically supply updated projections of nuclear capacity through the year 2000, supplementing the presently supplied information on planned capacity.

The Member States could assist the Agency in suggesting meaningful regional groupings and reprocessing strategies to be analyzed in detail with the computer models. Continuing participation by the Member States during this phase of the economic studies would ensure that the results obtained are for realistic conditions and that the studies are carried out in a manner useful to the Member States. At the same time, the Member States would obtain experience with the analysis techniques and computer programmed used by the Agency, thus facilitating their own use of these tools for planning purposes.

Development of Characteristic Operations and Cost Data

The Agency is making studies in six technical areas, as shown in Figure 1, to provide input data to the modelling analysis of alternative strategies. These studies cover the major activities involved in the "back-end" of the fuel cycle, namely:

1. Power plant discharges of spent fuel;
2. Spent fuel storage;
3. Spent fuel reprocessing;
4. Waste management;
5. Mixed oxide fuel fabrication;
6. Radioactive material transportation.

Each of these areas is the subject of a detailed examination by Agency staff and expert consultants. These studies will identify the important operating characteristics of facilities needed in each area, characteristics which are unique to RFCC implementation, important cost data and sensitivities to size and scale of operation, lead times for facility construction, staffing requirements, etc. At this time, costs are very uncertain in all areas of spent fuel management. Very few of these facilities have been built as individual units, and none have been built in the RFCC context. Therefore, there is little base of cost experience comparable to that for nuclear power plants or front-end fuel cycle facilities. One of the goals of the Agency studies will be to determine the probable range of costs for each of the various plants needed for spent fuel

management. These ranges can then be used in the computer codes to determine whether important economic comparisons lead to different conclusions, depending on which value of costs is used. It is expected that further cost studies may be needed in some areas, in which there is high sensitivity to cost uncertainties.

Associated Studies Relating to Regional Centers

The Agency is also preparing associated studies in six areas related to the development and implementation of the regional nuclear fuel cycle center concept, as shown in Figure 1. These studies cover some of those aspects that would have to be considered by Member States contemplating use of the RFCC approach, namely:

1. institutional and legal aspects;
2. Organization and administrative aspects;
3. Financial considerations;
4. Health, safety and environmental aspects;
5. Materials control considerations;
6. Public acceptance considerations.

Each of these areas is being examined by Agency staff and expert consultants to identify the important factors, understandings and approaches needed by potential participants in implementing regional centers, as well as the constraints that would apply in the analysis of alternative fuel cycle strategies. More specifically, these studies have the following scope and objectives:

Institutional and Legal Study -

To present possible institutional arrangements and legal considerations essential to the successful implementation and operation of regional centers, taking into account past industrial experience and arrangements for other multinational ventures. A preliminary report entitled "Institutional-Legal Framework Aspects", RFCC/2, has been issued;
Organization and Administrative Study.

To develop those factors and requirements essential to the everyday operation of regional centers, especially considerations of staffing, training of technical and supervisory personnel, provisions for technical support, industrial backup, etc;

Financial Study -

To examine pertinent methodologies for financial analysis and accounting considerations, and to explore possible approaches to joint financing of multinational activities;

Health, Safety and Environment Study -

To develop considerations and requirements in those areas pertinent to the RFCC approach, especially with regard to safety standards, siting criteria, radioactive waste and effluent control, and other related health and safety matters;

Materials Control Study -

To present those aspects related to the control of nuclear materials in three areas, i. e. safeguards, physical security and process ***controls.*** The safeguards and physical security portions of the Study cover the specific advantages and other attributes that would accrue due to co-location of the spent fuel management and plutonium storage and recycle facilities operated on a multinational partnership basis. The process controls portion of the Study deals more specifically with those considerations relating to nuclear material flows including reprocessing campaigns, losses of product, accountability and inventory, product swap, etc. , that would be of interest to the participants;

Public Acceptance Study -

To examine those aspects of multinational operation of regional fuel cycle centers related to public acceptance of the RFCC approach, especially in the areas of siting, radioactive effluent control and radio-active waste management.

Preparation of Summary Report

Work on the various programme elements of the Study has proceeded at a somewhat non-uniform pace depending on the availability of experts and technical and economic data. However, it is expected that with continuing assistance from, and interest of, the Member States, it will be possible to meet the original objective of preparing a summary report on the RFCC concept, together with illustrative analyses of alternative fuel cycle strategies in time for presentation at the Conference on Nuclear Power and its Fuel Cycle to be held in Salzburg in May 1977.

ANNEX *O*

TREATY OF ROME, CHAPTER VII, ARTICLES 77-85

(b) by a person or undertaking and an international organisation or a national of a third State, where the material is processed, converted or shaped outside the Community and then returned to the original person or undertaking; or

(c) by a person or undertaking and an international organisation or a national of a third State, where the material is processed, converted or shaped inside the Community and is then returned either to the original organisation or national or to any other consignee likewise *outside the* Community designated by such organisation or national.

The persons and undertakings concerned shall, however, notify the Agency of the existence of such commitments and, as soon as the contracts are signed, of the quantities of material involved in the movements. The Commission may prevent the commitments referred to in subparagraph (b) from being undertaken if it considers that the conversion or shaping cannot be carried out efficiently and safely and without the loss of material to the detriment of the Community.

The materials to which such commitments relate shall be subject in the territories of the Member States to the safeguards laid down in Chapter Vii. The provisions of Chapter VIII shall not, however, be applicable to special fissile materials covered by the commitments rcferred to in subparagraph (c).

Article 76

On the initiative of a Member State or of the Commission, and particularly if unforeseen circumstances create a situation of general shortage, the Council may, acting unanimously on a proposal from the Commission and after consulting the Assembly, amend the

provisions of this Chapter. The Commission shall inquire into any request made by a Member State.

Seven years after the entry into force of this Treaty, the Council may confirm these provisions in their entirety. Failing confirmation, new provisions relating to the subject matter of this Chapter shall be adopted in accordance with the procedure laid down in the preceding paragraph.

CHAPTER VII

SAFEGUARDS

Article 77

In accordance with the provisions of this Chapter, the Commission shall satisfy itself that, in the territories of Member States,

(a) ores, source materials and special fissile materials are not diverted from their intended uses as declared by the users;

(b) the provisions relating to supply and any particular safeguarding obligations assumed by the Community under an agreement concluded with a third State or an international organisation are complied with.

Article 78

Anyone setting up or operating an installation for the production, separation or other use of source materials or special fissile materials or for the processing of irradiated nuclear fuels shall

declare to the Commission the basic technical characteristics of the installations, to the extent that knowledge of these characteristics is necessary for the attainment of the objectives set out in Article 77.

The Commission must approve the techniques to be used for the chemical processing of irradiated materials, to the extent necessary to attain the objectives set out in Article 77.

Article 79

The Commission shall require that operating records be kept and produced in order to permit accounting for ores, source materials and special fissile materials used or produced. The samc requirement shall apply in the case of the transport of source materials and special fissile materials.

Those subject to such requirements shall notify the authorities of the Member State concerned of any communications they make to the Commission pursuant to Article 78 **and to the first paragraph of this Article.**

The nature and the extent of the requirements referred to in the first paragraph of this Article shall be defined in a regulation made by the Commission **and approved by the** Council.

Article 80

The Commission may require that any excess special fissile materials recovered or obtained as by-products and not actually being used or ready for use shall be deposited with the Agency or in other stores which are or can be supervised by the Commission.

Special fissile materials deposited in this way must be returned forthwith to those concerned at their request.

Article 81

The Commission may send inspectors into the territories of Member States. Before sending an inspector on his first assignment in the territory of a Member State, the Commission shall consult the State concerned; such consultation shall suffice to cover all future assignments of this inspector.

On presentation of a document establishing their authority, inspectors shall at all times have access to all places and data and to all persons who, by reason of their occupation, deal with materials, equipment or installations subject to the safeguards provided for in this Chapter, to the extent necessary in order to apply such safeguards to ores, source materials and special fissile materials and to ensure compliance with the provisions of Article 77. Should the State concerned so request, inspectors appointed by the Commission shall be accompanied by representatives of the authorities of that State; however, the inspectors shall not thereby be delayed or otherwise impeded in the performance of their duties.

If the carrying out of an inspection is opposed, the Commission shall apply to the President of the Court of Justice for an order to ensure that the inspection be carried out compulsorily. The President of the Court of Justice shall give a decision within three days.

If there is danger in delay, the Commission may itself issue a written order, in the form of a decision, to proceed with the inspection This order shall be submitted without delay to the President of the Court of Justice for subsequent approval.

After the order or decision has been issued, the authorities of the State concerned shall ensure that the inspectors have access to the places specified in the order or decision.

Article 82

Inspectors shall be recruited by the Commission.

They shall be responsible for obtaining and verifying the records referred to in Article 79. They shall report any infringement to the Commission.

The Commission may **issue** a directive calling upon the Member State concerned to take, **by a** time limit set by the Commission, all 'measures necessary to bring such infringement to an end; it shall inform the Council thereof.

If the Member State does not comply with the Commission directive by the time limit set, the Commission or any Member State concerned may, in derogation from Articles 141 and 142, refer the matter to the **Court of Justice** direct.

Article 83

f. In the event of an infringement on **the part** of persons or undertakings of the obligations imposed on them by this Chapter, the Commission may impose sanctions on such persons or undertakings.

These sanctions shall be, in order of severity:

(a) a warning;

(b) the withdrawal of special benefits such ***as*** financial or technical assistance;

(c) the placing of the undertaking for a period not exceeding four months under the administration of a person or board appointed by common accord **of the** Commission and the State having jurisdiction over the undertaking;

(d) total or partial withdrawal of source materials or special fissile materials.

2.Decisions taken by the Commission in implementation of paragraph 1 and requiring the surrender of materials shall be enforce-

able. They may be enforced in the territories of Member States in accordance with Article 164.

By way of derogation from Article 157, appeals brought before the Court of **Justice against** decisions **of** the Commission which impose any of the sanctions provided for in paragraph 1 shall have suspensory effect. The Court of Justice may, however, on application by the Commission or by any Member State concerned. order that the decision be enforced forthwith.

There shall be an appropriate legal procedure to ensure the protection of interests that have been prejudiced.

3. **The Commission may make any recommendations to Member States concerning laws or regulations which are designed to ensure compliance in their territories with the obligations arising under this Chapter.**

4. Member States shall ensure that sanctions are enforced and, where necessary, that the infringements arc remedied by those committing them.

Article Article 84

In the application of the safeguards, no discrimination shall be made on grounds of the use for which ores, **source materials and special fissile materials arc intended.**

The scope of and procedure for the safeguards and the powers of the bodies responsible for their application shall be confined to the attainment of the objectives set out in this chapter.

The Safeguards may not extend to materials intended to meet defence requirements which are in the course of being specially

processed for this purpose or which, after being so processed, are, in accordance with an operational plan, placed or stored in a military establishment.

Article 85

Where new circumstances so require, the procedures for applying the safeguards laid down in this Chapter may, at the request of a Member State or of the commission, be adapted by the Council, acting unanimously on a proposal from the Commission and after consulting the Assembly. The Commission shall examine any such request made by a Member State.

CHAPTER VIII

PROPERTY OWNERSHIP

Article 86

Special fissile materials shall be the property of the Community.

The Community's right of ownership shall extend to all special fissile materials which are produced or imported by a Member State, a person or an undertaking and are subject to the safeguards provided for in Chapter VII.

Article 87

Member States, persons or undertakings shall have the unlimited right of use and consumption of special fissile materials which have

properly come into their possession, subject to the obligations imposed on them by this Treaty, in particular those relating to safeguards, the right of option conferred on the Agency and health and safety.

Article 88

The Agency shall keep a special account in the name of the Community, called "Special Fissile Materials Financial Account".

Article 89

f. In the Special Fissile Materials Financial Account:

(a) the value of special fissile materials left in the possession of or put at the disposal of a Member State, person or undertaking shall be credited to the Community and debited to that Member State, person or undertaking;

(b) the value of special fissile materials which are produced or imported by a Member State, person or undertaking and become the property of the Community shall be debited to the Community and credited to that Member State, person or undertaking. A similar entry shall be made when a Member State, person or undertaking restores to the Community special fissile materials previously left in the possession of or put at the disposal of that State, person or undertaking.

2. Variations in value affecting the quantities of special fissile material shall be expressed for accounting purposes in such a way as not to give rise to any loss or gain to the Community. Any loss or gain shall be borne by or accrue to the holder.

ANNEX P

EURATOM, GENERAL BUDGET FOR EXPENDITURES RELATED TO SAFEGUARDS (1977)

COMMISSION OF THE EUROPEAN COMMUNITIES

PRELIMINARY DRAFT

General budget of the European Communities for the financial year 1977

VOLUME 7

SECTION III • COMMISSION

General Introduction

CHAPTER 34 EXPENDITURE RELATING TO SAFEGUARDS

Σ = 732,000 ua + JRC research @ 1.6 mua for period '77-'80 (1.7 in '80)

ARTICLE 340 ON-THE-SPOT INSPECTIONS AND OTHER MISSIONS

1. Legal basis and description of the operation

(a) Legal basis

Chapter VII of the EAEC Treaty; Commission Regulations No 7 and 8 on *safeguards;* external **obligations which the Commission has assumed in respect of non-member countries and international organizations, especially the Verification " Agreement concluded with the IAEA in Vienna.**

(b) Description of the operation

(a) **In** accordance with Article **77 of the *EAEC* Treaty, the Commission shall satisfy itself that, in the territories of the Member States:**

- **proper use is being made of nuclear materials,**
- **that the obligations assumed by the Commission in respect of non-member** countries (e.g., cooperation agreement with the United States) and international organizations (e.g., Verification ***Agreement*** **with the Agency in Vienna) are complied with,**

(b) In accordance with Article 81 of the EAEC Treaty, the Commission shall inspect all nuclear installations on Community territory which form part of the fuel cycle from the mining stage through to the reprocessing and enrichment stage. This is an on-going operation.

2. Type of expenditure

Operating costs.

3. Method of calculation and explanation of changes

(a) Method of calculation

Anticipated number of days for mission x daily allowances x average travelling expenses x additional expenses (e.g., hire of offices on the spot plus sundry expenses and if necessary the hire of cars) = overall cost = appropriation requested.

(b) Explanation of changes.

1975 Commitments	220.827 u.a.
1976 Appropriations	270.000 u.a.
1977 Request	302.000 u.a.

The increase of some 12% over the 1976 appropriation reflects the additional expenditure arising from the implementation of the Verification Agreement concluded with the IAEA in Vienna.

ARTICLE 341 COST OF TRAINING PERIODS

1. Legal basis and description of the operation

(a) Legal basis

As for Article 340,

(b) Description of the operation

Information and general and specialized vocational training:

- Courses and periods of training for Commission inspectors (at the seat in Luxembourg and at the JRC, in particular Ispra),
- Information and training periods with State and intentional organizations and institutions both within and outside the Community (e.g., USA and IAEA) which are competent in the matter of safeguards in order that inspectors can keep permanently abreast of the latest methods in this field.
- In accordance with basic Euratom standards - issued on 12 February 1959, 5 March 1962 and 17 October 1967 by the Council as Directives - the inspectors must have sufficient knowledge to be able to discern and pinpoint hazards and keep abreast of scientific progress in the field of health protection. It is therefore important that newly-recruited inspectors in particular should take part in specialized courses either at the JRC or at the national centres in the Member States.

2. Type of expenditure

Operating costs.

3* Method of calculation and explanation of changes

(a) Method of calculation

Number of participants involved in the training period and on the courses x (daily allowance x number of days' training + average traveling expenses + enrollment. expenses) = total cost = appropriation requested.

(b) Explanation

1975 Commitments	:	11.659 u.a.
1976 Appropriations	:	15.000 u.a.
1977 Request	:	22.000 u.a.

The increase in appropriations over 1976 is due to the high level of staff participation, especially of newly-recruited inspectors, in training schemes devoted to the use of new methods for inspecting nuclear installations. It is also to allow training periods to be organized for 15 inspectors on the subject of health protection.

ARTICLE 342 SAMPLING AND ANALYSIS

1. Legal basis and description of the operation

(a) Legal basis

As for Article 340.

(b) Description of the operation

Sampling and analysis in the Community's nuclear installations. The need for this arises from the application of safeguards on a physical and chemical basis, especially destructive methods. The analysis work itself is generally carried out at specialized installations such as the JRC (e.g., CBNM) or national research centres which have to be paid for such work.

2, Type of expenditure

Technical operating costs.

3. Method of calculation and explanation of changes

(a) Method of calculation

Cost of the material + cost of sampling + packaging cost + transport cost + insurance cost + cost of analysis x number of samples = total cost = appropriation requested.

(b) Explanation of changes

1975 Commitments	77.334 u.a.
1976 Appropriations	150.000 u.a.
1977 Request	174.000 u.a.

Since the Commission is bound by the Treaty to inspect the nuclear installations of the Community by carrying out sampling operations the amount requested reflects the increased obligations arising from the entry into force of the Verification Agreement and the inspections which have to be carried out on the territory of the new Member States. These new inspections have led to an increase in the work-load of about 16% over the 1976 financial year.

ARTICLE 343: SCIENTIFIC AND TECHNICAL WORK AND EQUIPMENT

1. Legal basis and description of the operation

(a) Legal basis

Same as for Article 340.

(b) Description of the operation

- Acquisition, maintenance and replacement of technical equipment (including spare parts and accessories) which are indispensable to compliance with the obligations laid down in Chapter VII of the Euratom Treaty and of the Commission's "external commitments" towards non-member countries and international organizations are to be safeguarded in accordance with the provisions laid down in Articles 77 and 81 of the Euratom Treaty.

- Scientific and technical work involved in the design, research, development and application of a large number of techniques for the measurement and supervision of fissile materials in accordance with the provisions laid down in Article 77 of the Euratom Treaty.

2. Type of expenditure

Technical operating costs.

3. Method of calculation and explanation of changes

(a) Method of calculation

- Purchase price of new material (equipment, instruments, apparatus) + maintenance and repair of existing material = total cost = appropriation requested.

- The benefits are calculated according to the nature of each application; prices always vary for reasons such as:

  - market sensitivity to price fluctuations,

  - very complex and therefore costly projects.

(b) Explanation of changes

1975 Commitments	138.317 u.a.
1976 Appropriations	150.000 u.a.
1977 Request	**186.000 u.a.**

Following the entry into force of the Verification Agreement and in anticipation of the provisions of the new Regulation concerning new methods of inspection, inspectors must be provided with the most up-to-date and efficient equipment possible. This leads to an increase in the volume of scientific equipment purchased and means that the equipment must be continually adapted to suit technical requirements.

Consequently, the percentage increase in 1977 will be 24% over the appropriations for the preceding budget year.

ARTICLE 344: EXPENDITURE ON FORMAL AND INFORMAL MEETINGS

1. Legal basis and description of the operation

(a) **Legal basis**

As for Article 340.

(b) Description of the operation

In accordance with the provisions of Article 77 of the Euratom Treaty, the Commission must satisfy itself that, in the territories of Member States:

- proper use is being made of nuclear materials,
- **that the obligations assumed by the Commission towards** non-member countries and international organizations are complied with.

Accordingly, the Commission must either take part in or *organize* the following meetings:

- meetings relating to the implementation of the Verification Agreement concluded with the IAEA: 20 meetings planned,
- meetings *on* the procedures for drawing up physical inventories and for the use of equipment, seals, etc: 5 meetings planned,
- meetings of the Advisory Committee on **Safeguards: 2 meetings planned.**

2. Type of expenditure

Technical operating costs.

3. Method of calculation and explanation of changes

(a) Method of calculation

Number of experts x (daily allowances x number of days present + average traveling expenses) = total cost = appropriation requested.

(b) Explanation of changes,

- Commitments	1975	**5.695 u.a.**
- Appropriations	1976	25.000 u.a.
- Request	1977	26.000 u.a.

The appropriation requested for 1977 remains entirely within the normal limits of price increases.

ARTICLE 345 - EXPENDITURE ON HEALTH CHECKS AS PART OF THE MEASURES FOR PROTECTING THE HEALTH OF STAFF EXPOSED TO RADIATION

1. Legal basis and description of the operation

(a) Legal basis

EAEC Treaty (Chapter III - Articles 31 and 33)
National laws on "basic standards".

(b) Ascription of the operation

Any person exposed in the course of his work to radiation must be protected against the attendant dangers. This applies in general especially to persons who work in nuclear installations and to the Commission inspectors who carry out the safeguard checks in accordance with the provisions of Article 77 of the Euratom Treaty.

2. Type of expenditure

JRC scientific activities.

3. Method of calculation and explanation of changes

(a) Method of calculation

(Number of inspectors x cost of the various activities assigned to each inspector) + cost of the exceptional allowances in case of irradiation + requisite equipment for this operation + any administrative costs (for example; administration) = total cost.

(b) Explanation of changes

- Commitments 1975 20.000 u.a. (transfer)
- Appropriations 1976 20.000 u.a.
- Request 1977 22.000 u.a.

This income takes account of the normal trend *in the costs* **for** these operations.

PROTOCOL

Article 1

This Protocol amplifies certain provisions of the Agreement and, in particular, specifics the conditions and means according to which co-operation in the application of the safeguards provided for Under the Agreement shall be implemented in such a way as to avoid unnecessary duplication of the Community's safeguards activities.

Article 2

The Community shall collect the information on facilities and on nuclear material outside facilities to be provided to the Agency under the Agreement on the basis of the agreed indicative questionnaire annexed to the Subsidiary Arrangements.

Article 3

The Agency and the Community shall carry out jointly the examination of design information provided for in Article 46(a) to (f) of the Agreement and shall include the agreed results thereof in the Subsidiary Arrangements. The verification of design information provided for in Article 48 of the Agreement shall be carried out by the Agency in co-operation with the Community.

Article 4

When providing the Agency with the information referred to in Article 2 of this Protocol, the Community shall also transmit information on the inspection methods which it proposes to use and the complete proposals, including estimates of inspection efforts for the routine inspection activities, for Attachments to the Subsidiary Arrangements for facilities and material balance areas outside facilities.

Article 5

The preparation of the Attachments to the Subsidiary Arrangements shall be performed together by the Community and the Agency.

Article 6

The Community shall collect the reports from the operators, keep centralised accounts on the basis of these reports and proceed with the technical and accounting control and analysis of the information received.

Article 7

Upon completion of the tasks referred to in Article 6 of this Protocol the Community shall, on a monthly basis, produce and provide the Agency with the inventory change reports within the time limits specified in the Subsidiary Arrangements.

Article 8

Further, the Community shall transmit to the Agency the material balance reports and physical inventory listings with frequency depending 011 the frequency of physical inventory taking as specified in the Subsidiary Arrangements.

Article 9

The form and format of reports referred to in Articles 7 and 8 of this Protocol, as agreed between the Agency and the Community, shall be specified in the Subsidiary Arrangcmcnts.

Article 10

The routine inspection activities of the Community and of the Agency, including the inspections referred to in Article 84 of the Agreement, for the purposes of the Agreement, shall be coordinated pursuant to the provisions of Articles 11 to 23 of this Protocol.

Article 11

Subject to Articles 79 and 80 of the Agreement, in determining the actual number, intensity, duration, timing and mode of the Agency inspections in respect of each facility, account shall be taken of the inspection effort carried out by the Community in the framework of its multinational system of safeguards pursuant to the provisions of this Protocol.

Article 12

Inspection efforts under the Agreement for each facility shall be determined by the use of the criteria of Article 81 of the Agreement. Such criteria shall be implemented by using the rules and methods set forth in the Subsidiary Arrangements which have been used for the calculation of the inspection efforts in respect of specific examples attached to the Subsidiary Arrangements. These rules and methods shall be reviewed from time to time, pursuant to Article 7 of the Agreement, to take into account new technological developments in the field of safeguards and experience gained.

Article 13

Such inspection efforts, expressed as agreed estimates of the actual inspection efforts to be applied, shall be set out in the Subsidiary Arrangements together with relevant descriptions of verification approaches and scopes of inspections to be carried out by the Community and by the Agency. These inspection efforts shall constitute, under normal operating conditions and under the conditions set out below, the actual maximum inspection efforts at the facility under the Agreement;

(a) The continued validity of the information on Community safeguards provided for in Article 32 of the Agreement, as specified in the Subsidiary Arrangements;

(b) The continued validity of the information provided to the Agency in accordance with Article 2 of this Protocol;

(c) The continued provision by the-Community of the reports pursuant to Articles GO and 61, 63 to 65 and 67 to 69 of the Agreement, as specified in the Subsidiary Arrangements;

(d) The continued application of the co-ordination arrangements for inspections pursuant to Articles 10 to 23 of this Protocol, as specified in the Subsidiary Arrangements; and

(e) The application by the Community of its inspection effort with respect to the facility, as specified in the Subsidiary Arrangements, pursuant to this Article.

Article 14

(a) Subject to the conditions of Article 13 of this Protocol, the Agency inspections shall be carried out simultaneously with the inspection activities of the Community. Agency inspectors shall be present during the performance of certain of the Community inspections,

(b) " Subject to the provisions of paragraph (a), whenever the Agency can achieve the purposes of its routine inspections set out in the Agreement, the Agency inspectors shall implement the provision of Articles 74 and 75 of the Agreement through the observation of the inspection activities of the Community inspector. provided, however, that:

than through the observation of the inspection activities of the Community inspectors, which can be foreseen, these shall be specified in the Subsidiary Arrangements; and

(ii) in the course of an inspection, Agency inspectors may carry out inspection activities other than through the observation of the inspection activities of the Community inspectors where they find this to be essential and urgent, if the Agency could not otherwise achieve the purposes of its routine inspections and this was unforeseeable.

Article 15

The general scheduling and planning of the Community inspections under the Agreement shall be established by the Community in co-operation with the Agency.

Article 16

Arrangements for the presence of Agency inspectors during the performance of certain of the Community inspections shall be agreed in advance by the Agency and the Community for each type of facility, and to the extent necessary, for individual facilities.

Article 17

In order to enable the Agency to decide, based on requirements for statistical sampling, as to its presence at a particular Community inspection, the Community shall provide the Agency with an advance statement of the numbers, types and contents of items to be inspected according to the information available to the Community from the operator of the facility.

Article 18

Technical procedures in general for each type of facility and, to the extent necessary, for individual facilities, shall be agreed in advance by the Agency and the Community, in particular with respect to:

(a) The determination of techniques for random selection of statistical samples; and

(b) The checking and identification of standards.

Article 19

The co-ordination arrangements for each type of facility set out in the Subsidiary Arrangements shall serve as a basis for the co-ordination arrangements to be specified in each Facility Attachment.

Article 20

The specific co-ordination actions on matters specified in the Facility Attachments pursuant to Article 19 of this Protocol shall be taken between Community and Agency officials designated for that purpose.

Article 21

The Community shall transmit to the Agency its working papers for those inspections at which Agency inspectors were present and inspection reports for all other Community inspections performed under the Agreement.

Article 22

The samples of nuclear material for tile Agency shall be drawn from the same randomly selected batches of items as for the Community and shall be taken together with Community samples, except when the maintenance of or reduction to the lowest practical level of the Agency inspection effort requires independent sampling by the Agency, as agreed in advance and specified in the Subsidiary Arrangements.

Article 23

The frequencies of physical inventories to be taken by facility operators and to be verified for safeguards purposes will be in accordance with those laid down as guidelines in the Subsidiary Arrangements. If additional activities under the Agreement in relation to physical inventories are considered to be essential, they will be discussed in the Liaison Committee provided for in Article 25 of this Protocol and agreed before implementation.

Article 24

Whenever the Agency can achieve the purposes of its ad hoc inspections set out in the Agreement through observation of the inspection activities of Community inspectors, it shall do so.

Article 25

(a) With a view to facilitating the application of the Agreement and of this Protocol, a Liaison Committee shall be established, composed of representatives of the Community and of the Agency.

(b) The Committee shall meet at least once a year:

(i) To review, in particular, the performance of the co-ordination arrangements provided for in this Protocol, including agreed estimates of inspection efforts;

(ii) To examine the development of safeguards methods and techniques; and

(iii) To consider any questions which have been referred to it by the periodic meetings referred to in paragraph (c).

(c) The Committee shall meet periodically at a lower' level to discuss, in particular and to the extent necessary, for individual facilities, the operation of the co-ordination arrangements provided for in this Protocol, including, in the light of technical and operational developments, up-dating of agreed estimates of inspection efforts with respect to changes in throughput, inventory and facility operational programmed, and the application of inspection procedures in different types of routine inspection activities and, in general terms, statistical sampling requirements. Any questions which could not be settled would be referred to the meetings mentioned in paragraph (b).

(d) Without prejudice to urgent actions which might be required under the Agreement, should problems arise in the application of Article 13 of this Protocol, in particular when the Agency considered that the conditions specified therein had not been met, the Committee would meet as soon as possible at the suitable level in order to assess the situation and to discuss the' measures to be taken. If a problem could not be settled, the Committee may make appropriate proposals to the Parties, in particular with the view to modifying the estimates of inspection efforts for routine inspection activities.

(e) The Committee shall elaborate proposals, as necessary, with respect to questions which require the agreement of the Parties.

ANNEX R

LIST OF REFERENCES

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