



*Safeguards
7/8/67*

INTERNATIONAL ATOMIC ENERGY AGENCY

INTEROFFICE MEMORANDUM

~~CONFIDENTIAL~~

TO: Mr. A.D. McKnight
Inspector General

DATE 20 February 1967.

OUR REF.:

FROM: Ben Sanders *Sanders*

YOUR REF.:

SUBJECT: Safeguards tasks under Non-Proliferation

1. This is a first attempt to assess in concrete terms the magnitude of the task of safeguarding a non-proliferation agreement.

2. For a basis the Division of Nuclear Power and Reactors has supplied a list of all power and research reactors in the world, in operation, under construction and planned, and also all available data on reprocessing and fuel fabrication plants. An up-to-date list of all reactors is just coming out and will be sent to you as soon as it has been duplicated.

3. The assessment is influenced by two important elements of uncertainty: lacking an agreed text of the treaty we do not know which categories of countries it will cover, and - assuming that not all Governments involved will accede at once - we are also in the dark as to when various countries will submit their facilities to safeguards.

4. Therefore, I have tabulated - by number, power and year of availability - the reactor facilities of several categories of countries, in the following way:

- | | |
|--------------|---|
| Table I A:- | Reactor facilities in non-nuclear weapons states - excluding Euratom members; |
| Table I B:- | Reactor facilities in non-nuclear weapons states, members of Euratom; |
| Table II :- | Reactor facilities in nuclear weapons states that are presumed to be devoted only to peaceful uses; and |
| Table III :- | Reactor facilities in non-nuclear weapons states that are presumed not to be internationally assisted. |

DEF 18-6: NPT

5. In addition tables are attached for other facilities:-

Table VI :- Reprocessing plants in non-nuclear weapons countries; and

Table VII :- Fuel fabrication plants in non-nuclear weapons countries.

6. Notes on the tables listed above:-

- Tables I and III exclude the reactors at present under Agency safeguards, and any task connected with the reactors listed would therefore be in excess of present tasks.
- Table II includes three reactors in the UK and four in the US that are now under Agency safeguards but that are insignificant compared to the totals for those countries. It is not known with certainty for all nuclear weapons countries which reactors are used exclusively for peaceful purposes, and except where solid ground exists to assume that reactors are used for military purposes, all reactors are presumed to be "peaceful" and are included in the tabulation.
- Table III lists the reactors for which there is no information that they are or have been assisted in any way, whereas it may be assumed on the basis of technical specifications that the necessary material and know-how were nationally available. For the nuclear weapons countries it may be assumed that all reactors are the product exclusively of national resources and effort, except for some research reactors in France and the UK, for which it is known that enriched uranium or plutonium has been supplied by the US.
- Table VI is limited to reprocessing plants in non-nuclear weapons states because it is not known which of those in the nuclear weapons states - if any - are used exclusively for peaceful purposes.
- Table VII is limited to fuel fabrication plants in non-nuclear weapons states because ~~there~~ we have insufficient information about those in nuclear weapons states.

7. Summarizing the tables one finds the following figures:

	<u>1967</u>	<u>1968</u>	<u>1969</u>
a. Power reactors in non-nuclear weapons states outside Euratom	4	9	13
Research reactors in non-nuclear weapons states outside Euratom	40	43	44
Sub-total ..	<u>44</u>	<u>52</u>	<u>57</u>

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	<u>1967</u>	<u>1968</u>	<u>1969</u>
b. Power reactors in non-nuclear weapons states in Euratom ..	8	12	13
Research reactors in non-nuclear weapons states in Euratom ..	43	47	51
Sub-total	<u>51</u>	<u>59</u>	<u>64</u>
<u>a + b</u> ..	95	111	120
c. "Peaceful" power reactors in nuclear weapons states	44	46	50
Research reactors in nuclear weapons states	185	193	193
Sub-total	<u>229</u>	<u>240</u>	<u>243</u>
<u>TOTAL a + b + c</u>	<u>324</u>	<u>351</u>	<u>363</u>

or, in other words:-

- if all "peaceful" reactors in the world were to come under Agency safeguards this would mean the addition to the present number of:-
in 1967: 317* - in 1968: 344* - in 1969: 356*;
- if all reactors in non-nuclear weapons countries were to come under Agency safeguards this would mean the addition to the present number of:-
in 1967: 95 - in 1968: 111 - in 1969: 120;
- if only internationally assisted reactors of the non-nuclear weapons countries were to come under Agency safeguards, this would mean the addition to the present number of:-
in 1967: 88 - in 1968: 104 - in 1969: 113;
- if all reactors of the non-nuclear weapons countries excluding Euratom, were to come under Agency safeguards, this would mean the addition to the present number of:-
in 1967: 44 - in 1968: 52 - in 1969: 57; and
- if only internationally assisted reactors of the non-nuclear weapons countries, excluding Euratom, were to come under Agency safeguards, this would mean the addition to the present number of:-
in 1967: 38 - in 1968: 46 - in 1969: 51.

* The 7 reactors now under safeguards in the UK and US have been deducted from these totals.

8. For reprocessing and fuel fabrication facilities* the total numbers are:-

All non-nuclear states :- in 1967:19 - in 1968:21 - in 1969:24.

All non-nuclear states
excluding Euratom :- in 1967:11 - in 1968:11 - in 1969:13.

9. With the help of the information given by the Reactor Division, on number, type, power and year of availability of facilities I have tried to calculate for 1967, 1968 and 1969 the manpower that would be needed to apply safeguards. For this purpose some general assumptions were made:-

- a. that safeguards would be limited to non-nuclear weapons states;
- b. that all states involved would have acceded to the treaty during any of the three years considered; and
- c. that all states involved would have submitted to safeguards all their nuclear facilities in any of those three years.

10. In the light of the afore-mentioned assumptions, the manpower that is thought to be needed is given as follows:-

- in Table IV : for power reactors;
- in Table V : for research reactors;
- in Table VI : for reprocessing plants; and
- in Table VII : for fuel fabrication facilities.

Summarizing these tables one finds the following figures:-

	<u>1967</u>	<u>1968</u>	<u>1969</u>
a. Manpower needed to safeguard power reactors in non-nuclear weapons states outside Euratom	2.9	8.7	17.1
Manpower needed to safeguard research reactors in non-nuclear weapons states outside Euratom	3.25	3.25	3.25
Sub-total ..	<u>6.15</u>	<u>11.95</u>	<u>20.35</u>

* Given the limited information on the latter, the same number for fuel fabrication facilities as is assumed to apply for 1968 is also taken for 1967 and 1969.

	1967	1968	1969
b. Manpower needed to safeguard power reactors in non-nuclear weapons states in Euratom	3.9	7.1	8.1
Manpower needed to safeguard research reactors in non-nuclear weapons states in Euratom	3.15	3.75	3.75
Sub-total ..	7.05	10.85	11.85
c. Manpower needed to safeguard other facilities in non-nuclear weapons states outside Euratom	13.1	13.2	23.2
Sub-total non-nuclear weapons states outside Euratom (a + c)	19.25	25.15	43.55
d. Manpower needed to safeguard other facilities in non-nuclear weapons states in Euratom	14.4	14.8	19.8
Sub-total non-nuclear weapons states in Euratom (b + d)	21.45	25.65	31.65
TOTAL manpower all nuclear facilities all non-nuclear weapons states (a - d)	40.70	50.80	75.20

The numbers above do not take account of some reductions that might be possible as a result of establishing regional or resident inspectors' offices (see Tables IV and V, especially column i. and e. respectively).

11. Notes on para. 10 and Tables IV - VII:-

General:

- The figures represent additions to present workload in the area of implementation only*. They do not take account of a gradual increase of safeguards tasks foreseen in the draft Budget for 1968 and catered for in the requested Manning Table for that year. They are net additions.
- The estimates are based on a level of quality and intensity of implementation above that maintained at present, but below "maximum". For instance, the frequency of inspections foreseen is about 70% of the maximum, or about twice the present figure.

* The administration will grow considerably and the records system must be extended. It is estimated that at least four more professionals and two clerks will be needed, to run the logistics of the operation. This leaves out of account increased legal and external liaison work, as well as liaison with governing bodies.

- It is assumed that, whereas techniques will improve and experience increase, resulting in a higher level of efficiency in safeguards on installations producing or containing significant quantities of special fissionable material, simplifications will be adopted for the implementation of safeguards to small facilities (e.g. the omission, for most research reactors, of the requirement to submit operating reports).
- As in the "cost paper" (GOV/1115) the concept of "normalized safeguards unit" (NSU) has been used to express the manpower needs. This is the workload represented by each facility, or group of facilities, expressed in numbers, or fractions, of one (professional) man/year (roughly 200 working days).
- The basis for the workload is the maximum permissible annual inspection frequency tabulated in the Agency's Safeguards System (1965) - (INFCIRC/66, para. 57), modified on the one hand by the assumption that the actual average inspection frequency will be about 70% of that number, and on the other hand by the need for headquarters' preparation, analysis, reporting and development.

Tables IV and V:

- The inspection frequency is determined by facility inventory, annual throughput or maximum potential annual production of special fissionable material, whichever is the largest. For most power reactors now in operation or under construction inventory or throughput are unknown to us, and we only know approximate electrical output. Therefore the potential annual production of special fissionable material has been chosen as the criterium for inspection frequency. To derive production figures from output data the Reactor Division has advised following the general assumption that for the reactor types involved the average Pu outputs (i.e. kg Pu/year installed MWe) are:

BWR	-	0.3
PWR	-	0.35
GCR	-	0.5
D ₂ O	-	0.5

Whenever additional data were available, these have been taken into account. In some cases it has been possible to apply by analogy data existing for facilities already under safeguards.

- Estimates of reductions in workload due to the outposting of resident inspectors*, are based on the assumption that such residence will permit a minimum of personnel to make frequent brief inspection visits to a facility that should be inspected on ten or more separate occasions per annum, and will therefore to an average reduce the time spent on each facility by the amount it would otherwise have been necessary and possible to remain there for five such separate visits (given the time any non-resident inspector can reasonably be expected to stay away from Headquarters) multiplied by the number of such non-resident inspectors that would be required over the number of

* For the purpose of this paper, a resident inspector is an inspector assigned exclusively to safeguard one nuclear facility or a group of facilities that are geographically closely associated.

resident inspectors.* It is also assumed that with increased experience resulting from close association with a facility, the time to be spent on safeguarding it will be reduced, or alternatively, the quality of the operation enhanced.

Table VI: Assumptions used in calculating manpower in connection with reprocessing plants:

- pilot plants have an annual throughput of 5 kgs.;
- plants with an annual throughput of 60 kgs. call for continuous inspection;
- inspections of industrial scale plants are normally made by teams of 5 or more inspectors;
- inspections of pilot plants are normally made by teams of 3 inspectors;
- the average inspection frequency of plants with a capacity of < 5 but > 60 will be:-

annual throughput > 5 but < 10	=	4
annual throughput > 10 but < 20	=	6
annual throughput > 20 but < 30	=	8
annual throughput > 30 but < 40	=	10
annual throughput > 40 but < 60	=	12

Table VII:

- For fuel fabrication plants few data are available. Those now known to exist or to be under construction in non-nuclear weapons states are divided into three groups, partly on the basis of a semi-informed guess; as completion date the median year 1968 is chosen. The frequency of inspection is assumed to be determined by the - again assumed - annual throughput.

12. The calculations made in this note ignore mines, stocks and transport. Stocks will probably be small, to start with, and if so they can be safeguarded along with facilities without significant impact on over-all workload. It is assumed that in a few years simple devices will have been developed to safeguard storage areas between inspection visits. Transport has also been left aside, although this may eventually become a factor to consider.

* So if there is one resident inspector and without resident inspection two inspectors would have had to spend five periods of four weeks each inspecting the facility, the savings in time would be 5×4 weeks $\times \frac{2}{1} = 40$ weeks.

13. The above represents a preliminary estimate hampered by a lack of definite knowledge. Within these limitations it shows the need for early action. If a non-proliferation agreement should be concluded in 1967 and the Agency were to be asked right away to assume safeguards responsibility to a limited group of states - for instance the non-nuclear states excepting those in Euratom - this would more than double the present safeguards task. Safeguarding facilities in 1968 would represent 25% more work again - but by then it is possible that all or some of the Euratom countries have acceded to the treaty. If one assumes that by 1969 all non-nuclear weapons states have ratified, the implementation alone would account for almost seven times that now foreseen for 1967.

14. In fact it would appear that under present conditions any planning should be directed at 1969. In the first place it will take time for a significant number of countries to complete the formalities not only of ratification but also of negotiating safeguards agreements and actually placing facilities under safeguards. It is unlikely, therefore, that the Agency would be asked right away to implement the treaty. But also it would not be ready. Planning, the development of procedures, recruitment of new staff, training, technical preparation, the organization of the operation, administrative arrangements and all necessary negotiations are likely to take at least 1¹/₂ years, and more likely two. By then the nuclear effort of the countries involved will have proliferated enormously, and the urgency of applying safeguards - and effective safeguards at that - will be immense. Obviously, therefore, the needs that are relevant now are those for 1969, and it would be realistic to start planning for that moment right away, lest our means should lag irrecoverably behind our needs.

c.c. Mr. Nakićenović
Mr. Rubinstein
DSI File

BSanders/jf

TABLE I

REACTOR FACILITIES IN NON NUCLEAR WEAPONS STATES - NOT SO FAR UNDER AGENCY SAFEGUARDS

DECLASSIFIED
Authority NND 76120

Country	Power Reactors						Research Reactors						Total Numbers		
	1967		1968		1969		1967		1968		1969		1967	1968	1969
A.	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	KW(th)	No.	KW(th)	No.	KW(th)			
<u>Outside Euratom</u>															
Bulgaria	-	-	-	-	-	-	1	1,000	1	1,000	1	1,000	1	1	1
Canada	2	225.5	2	225.5	2	225.5	7	281,010 +	7	281,010	7	281,010	9	9	9
Colombia	-	-	-	-	-	-	1	10	1	10	1	10	1	1	1
Czech.S.R.	-	-	1	150.0	1	150.0	1	2,000	1	5,000	1	5,000	1	2	2
Denmark	-	-	-	-	-	-	2	5,000	2	5,000	2	5,000	2	2	2
Ghana	-	-	-	-	-	-	-	-	1	2,000	1	2,000	-	1	1
Hungary	-	-	-	-	-	-	1	2,000	1	5,000	1	5,000	1	1	1
India	-	-	1	380.0	2	580.0	3	41,000	3	41,000	3	41,000	3	4	5
Indonesia	-	-	-	-	-	-	1	100	2	2,100	2	2,100	1	2	2
Iraq	-	-	-	-	-	-	1	2,000	1	2,000	1	2,000	1	1	1
Israel	-	-	-	-	-	-	1	24,000	1	24,000	1	24,000	1	1	1
Korea	-	-	-	-	-	-	1	100	1	100	1	100	1	1	1
Pakistan	-	-	-	-	1	125.0	-	-	-	-	-	-	-	-	1
Poland	-	-	-	-	-	-	3	2,000 +	3	2,000+	3	2,000	3	3	3
Romania	-	-	-	-	-	-	1	3,000	1	5,000	1	5,000	1	1	1
Subtotals 15	2	225.5	4	755.5	6	1080.5	24	363,220	26	375,220	26	375,220	26	30	32

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Reactor Facilities in Non-Nuclear Weapon States - cont.

Country	Power Reactors						Research Reactors						Total Numbers		
	1967		1968		1969		1967		1968		1969		1967	1968	1969
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	KW(th)	No.	KW(th)	No.	KW(th)			
<u>Brought forward</u>	2	225.5	4	755.5	6	1080.5	24	363,220	26	375,220	26	375,220	26	30	3
Spain	-	-	2	403.0	3	843.0	3	3,020	3	3,020	3	3,020	3	5	
Sweden	1	9.0	2	149.0	2	149.0	5	30,700+	5	30,700+	5	30,700+	6	7	
Switzerland	1	7.5	1	7.5	2	357.5	4	21,000+	5	21,000+	5	21,000+	5	6	
UAR	-	-	-	-	-	-	1	2,000	1	2,000	1	2,000	1	1	
Venezuela	-	-	-	-	-	-	1	3,000	1	3,000	1	3,000	1	1	
Yugoslavia	-	-	-	-	-	-	2	10,000	2	10,000	2	10,000	2	2	
Subtotal, NON EURATOM -NON Nuclear Weapons Countries 20 <u>B.</u>	4	242.0	9	1315.0	13	2430.0	40	432,940+	43	444,940+	44	444,940	44	52	5
<u>Non-Nuclear Weapon Countries in EURATOM</u>															
Belgium	1	10.5	1	10.5	1	10.5	4	67,000	5	67,150	5	67,150	5		
Germany	4	315.2	7	890.2	8	990.2	21	52,675+	23	53,775	25	53,775	25	30	3
Italy	3	536.0	3	536.0	3	536.0	12	17,420	13	55,000	14	55,000	15	16	1
Netherlands	-	-	1	47.0	1	47.0	6	31,110	6	31,110	7	31,120	6	7	
Subtotal Euratom (4)	8	861.7	12	1483.7	13	1583.7	43	168,205	47	207,035	51	237,045	51	59	6
Total Non-Nuclear Incl. Euratom (24)	12	1103.7	21	2798.7	26	4013.7	83	601,145	90	651,975	94	681,985	95	111	12

DECLASSIFIED
Authority NND 76/20

REACTOR FACILITIES IN NUCLEAR WEAPONS STATES ^{1/} PRESUMED DEVOTED ONLY TO PEACEFUL USE

Country	Power Reactors						Research Reactors						Total Numbers		
	1967		1968		1969		1967		1968		1969		1967	1968	1969
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	KW(th)	No.	KW(th)	No.	KW(th)			
France	1	266.0	2	339.0	2	339.0	27	143,355	28	143,455	28	143,455	28	30	30
USSR	8	932.25	8	932.25	8	932.25	22	209,552	27	408,552	27	408,552	30	35	35
UK ^{2/}	13	4057.6	14	4647.6	15	5237.6	24	79,938	24	79,938	24	79,938	37	38	39
US	22	2918.2	23	3633.2	25	5055.4	112	1,035,000	114	1,056,000	114	1,056,000	134	137	139
TOTAL (4)	44	8174.05	47	9552.05	50	11564.25	185	1,467,845	193	1,687,945	193	1,687,945	229	240	243

^{1/} No details available on China [People's Republic]

^{2/} On UK it is not known which reactors are used for military/peaceful purposes

TABLE III

REACTOR FACILITIES IN NON-NUCLEAR WEAPONS STATES THAT ARE PRESUMABLY NOT INTERNATIONALLY ASSISTED

Country	Power Reactors						Research Reactors						Total Numbers		
	1967 No. MW(e)		1968 No. MW(e)		1969 No. MW(e)		1967 No. KW(th)		1968 No. KW(th)		1969 No. KW(th)		1967	1968	1969
<u>Outside Euratom</u>															
Canada	2	225.5	2	225.5	2	225.5	3	240,000	3	240,000	3	240,000	5	5	5
Sweden	1	9.0	1	9.0	1	9.0	-	-	-	-	-	-	1	1	1
Subtotal (2)	3	234.5	3	234.5	3	234.5	3	240,000	3	240,000	3	240,000	6	6	6
<u>EURATOM</u>															
Belgium (1)	-	-	-	-	-	-	1	10,000	1	10,000	1	10,000	1	1	1
TOTAL (3)	3	234.5	3	234.5	3	234.5	4	250,000	4	250,000	4	250,000	7	7	7

TABLE IV

MANPOWER NEEDED TO SAFEGUARD NON-NUCLEAR WEAPONS STATES - (POWER REACTORS)

a. Country	b. 1967	c. W.Res. Insp.	d. 1968	e. Total b and d	f. W.Res. Insp.	g. 1969- 70	h. Total b, d and g	i. W.Res. Insp.	j. 1970- 73	k. Total b,d g and j	l. W.Res. Insp.	Remarks
Belgium	0.2	-(.2)*	-	0.2	-(.2)*	1	1.2	1	1	2.2	1.6	Residence in Belgium or U.K. combined w. the Netherlands.
Canada	1.3	1	-	1.3	1	-	1.3	1	5	6.3	4.0	Residence combined w. U.S.
China	-	-	-	-	-	-	-	-	1	1.0	0.5	Combined w. residence in () pan.
Bulgaria	-	-	-	-	-	-	-	-	1	1.0	1.0	
Czechoslovak S.R.	-	-	0.8	0.8	-(.8)*	-	0.8	-(.8)*	-	0.8	-(.8)*	
Finland	-	-	-	-	-	-	-	-	2	2.0	1.0	Combined w. Residence in Sweden
Germany	1.7	-(1.7)*	2.9	4.6	3	-	4.6	3	-	4.6	3.0	
Hungary	-	-	-	-	-	-	-	-	1	1.0	1.0	
India	-	-	1.0	1.0	-(1)*	1	2.0	1	2	4.0	2.0	Residence combined with Pakistan.
Italy	2.0	1	-	2.0	1	-	2.0	1	-	2.0	1.0	
Japan	1.2	-(1.2)*	1.0	2.2	1.5	2	4.2	2.5	1	5.2	3.5	Residence combined with China
Netherlands	-	-	0.3	0.3	0.3	-	0.3	0.3	-	0.3	0.3	Combined with Residence () Belgium or U.K.
Pakistan	-	-	0.5	0.5	-(.5)*	0.5	1.0	1.0	-	0.1	0.1	Combined with residence in India
Spain	-	-	1.5	1.5	1	3	4.5	3.0	4	8.5	5.0	
Sweden	.2	-	1.0	1.2	-(1.2)*	1	2.2	1.5	1	3.2	3.0	Residence combined w. Finland
Switzerland	.2	-	-	0.2	-(1.2)*	1	1.2	1.0	4	5.2	3.0	
TOTALS	6.8	2(+3.1)*	9.0	15.8	7.8(+3.9)*	9.5	25.3	16.3(+.8)*	23	48.3	21.7	

Figures in brackets indicate where no resident inspection is feasible and consequently no reduction. They must be added in the relevant columns to the totals for resident inspectors.

MANPOWER NEEDED TO SAFEGUARD NON-NUCLEAR WEAPON STATES - (RESEARCH REACTORS)

a. Country	b. 1967	c. W. Res. Insp. and/or combined with Sgds. on Power Reactors	d. 1968	e. Total b and d	f. W. Res. Insp. and/or combined with Sgds. on Power Reactors	g. Remarks
Belgium	.5	Total W.P.R.: .7	.05	.55	Total W. P.R.: 7	
Bulgaria	.1	-	-	.1	-	
Canada	1.6	Total W. P.R.: 2.9; W. Res. Insp.: 2 of which for Res. reactors: 1	-	1.6	Total W. P.R.: 2.9; W. Res. Insp.: 2 of which for Res. Reactors: 1	
Czechoslovak S.R.	.1	-	-	.1	Total W. P.R.: .9	
Germany	1.3	Total W. P.R.: 3; W. Res. Insp.: 2 of which for Res. Reactors: 1	.25	1.55	Total W. P.R.: 4.15; W. Res. Insp.: 3.5 of which for Res. Reactors 1.1	Res. Insp. required soonest
Ghana	.1	-	-	.1	-	
Hungary	.1	-	-	.1	-	
India	.25	-	-	.25	Total W.P.R.: 1.25; w. Res. Insp. 1 of which for Res. Reactors: .25	Res. Insp. in 1968 warranted in connec- tion with reprocessing
Iraq	.1	-	-	.1	-	
Israel	.3	-	-	.3	-	Addition to exist commitment
Italy	.75	Total W. P.R.: 2.75; W. Res. Insp. 1.5 of which for Res. Reactors: .5	.25	1.0	Total W. P.R. 3; W. Res. Insp. 2 of which for Res. Reactors; 1	Res. Insp. in 1967 warranted in connectio with reprocessing
Netherlands	.6	-	.05	.65	Total W. P.R. .95; W. Res. Insp. .6? of which for Res. Reactors .3	Res. Insp. in Belgium warranted in connectio with fuel fab. and reprocessing

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cont. Manpower needed to Safeguard Non-Nuclear Weapon States - (Research Reactors)

Authority NND 76120

a. Country	b. 1967	c. W. Res.Insp. and/or combined with Sgds. on Power Reactors	d. 1968	e. Total b and d	f. W. Res.Insp. and/or combined with Sgds. on Power Reactors	g. Remarks
Poland	.2	-	-	.2	-	
Romania	.1	-	-	.1	-	
U.A.R.	.1	-	-	.1	-	
Yugoslavia	.2	-	-	.2	-	Addition to existing commitment
	6.40	2.5 (+2.8) = 5.30	0.6	7.00	3.65 (+1.85)	TOTAL 5.50

REPROCESSING PLANTS IN NON-NUCLEAR WEAPONS STATES

Country	Name	Capacity T/year	Throughput kg Pu/year	1967	1968 NSU	1969
Argentina			Pilot Plant	.1	.2	.2
Belgium	Eurochemic Mol	100	200-400	5.0	5.0	5.0
		6	12- 20	.6	.6	.6
Germany	Karlsruhe	40	80-200			5.0
	Karlsruhe		Pilot Plant		.2	.2
	Jülich		Pilot Plant		.2	.2
India	Trombay	30	60-100	5.0	5.0	5.0
	Madras	200		-	-	5.0
Italy	Rotondella	18	35-50	1.0	1.0	1.0
	Saluggia	5	10-20	.6	.6	.6
Japan	AFC	300		-	-	5.0
Norway	Kjeller		Pilot Plant	.2	.2	.2
Spain	Madrid		Pilot Plant	.2	.2	.2
Switzerland	Würenlingen		Pilot Plant	.2	.2	.2
TOTALS				12.9	13.4	28.4
Without Euratom facilities				5.7	5.8	15.8

E VII

FUEL FABRICATION PLANTS IN NON-NUCLEAR WEAPONS STATES (1968)

Country	Type/Plant	NSU
Argentina	Pilot Plant	.1
Belgium	Throughput 30 kg.	1.0
Brazil	Pilot Plant	.1
Canada	Ind. size plant	5.0
Germany	Ind. size plant	5.0
Italy	Throughput 30 kg.	1.0
Japan	Throughput 30 kg.	1.0
Netherlands	Pilot Plant	.2
S. Africa	Pilot Plant	.2
Sweden	Throughput 30 kg.	1.0
	TOTAL	14.6
	Without Euratom facilities	7.4

TABLE I

REACTOR FACILITIES IN NON NUCLEAR WEAPONS STATES - NOT SO FAR UNDER AGENCY SAFEGUARDS

Country	Power Reactors						Research Reactors						Total Numbers			
	1967		1968		1969		1967		1968		1969		1967	1968	1969	
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	KW(th)	No.	KW(th)	No.	KW(th)				
outside Euratom																
Bulgaria	-	-	-	-	-	-	1	1,000	1	1,000	1	1,000	1	1	1	
Canada	2	225.5	2	225.5	2	225.5	7	281,010 +	7	281,010	7	281,010	9	9	9	
Colombia	-	-	-	-	-	-	1	10	1	10	1	10	1	1	1	
Czech.S.R.	-	-	1	150.0	1	150.0	1	2,000	1	5,000	1	5,000	1	2	2	
Denmark	-	-	-	-	-	-	2	5,000	2	5,000	2	5,000	2	2	2	
Ghana	-	-	-	-	-	-	-	-	1	2,000	1	2,000	-	1	1	
Hungary	-	-	-	-	-	-	1	2,000	1	5,000	1	5,000	1	1	1	
India	-	-	1	380.0	2	580.0	3	41,000	3	41,000	3	41,000	3	4	5	
Indonesia	-	-	-	-	-	-	1	100	2	2,100	2	2,100	1	2	2	
Iraq	-	-	-	-	-	-	1	2,000	1	2,000	1	2,000	1	1	1	
Israel	-	-	-	-	-	-	1	24,000	1	24,000	1	24,000	1	1	1	
Korea	-	-	-	-	-	-	1	100	1	100	1	100	1	1	1	
Pakistan	-	-	-	-	1	125.0	-	-	-	-	-	-	-	-	1	
Poland	-	-	-	-	-	-	3	2,000 +	3	2,000+	3	2,000	3	3	3	
Romania	-	-	-	-	-	-	1	3,000	1	5,000	1	5,000	1	1	1	
subtotals	15	2	225.5	4	755.5	6	1080.5	24	363,220	26	375,220	26	375,220	26	30	32

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