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THE IMPACT OF ENERGY ON STRATEGY

THE NON-PROLIFERATION TREATY AND SAFEGUARDS: A NEW HEAD FOR
NUCLEAR CONTROVERSY HYDRA

by

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THE NON-PROLIFERATION TREATY AND SAFEGUARDS: A NEW HEAD FOR
NUCLEAR CONTROVERSY HYDRA

INTRODUCTION

1. The 1968 Non-Proliferation Treaty was intended to limit the proliferation of nuclear weapons by freezing the number of nuclear weapon nations at five. These states which became known as the nuclear club include the USA, the Soviet Union, Great Britain, France, and the People's Republic of China. The Treaty makes no provision for the limitation or reduction of nuclear arms nor does it guarantee protection against nuclear threat or attack on non-nuclear weapon states. The question of guarantee did receive attention in the UN Security Council but was merely passed as a resolution noting the "intention" of "certain powers" to meet the aid-to-the-victim obligation.

2. The Non-Proliferation Treaty also states: "Each nuclear-weapon state party to this treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly' and not in any way to assist, encourage, or induce any non-nuclear weapon state to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices." (Ref 26).

3. The phrase "other nuclear explosive devices" was inserted in the Treaty because the disarmament conference was aware that certain non-nuclear states wanted to develop such devices for peaceful purposes, such as the excavation of harbours and canals and the recovery of underground fuel - and non-fuel minerals. (Ref 26).

4. The Treaty further states that each state party undertakes not to provide:

- a. "source or special fissionable material"; or
- b. "equipment or material especially designed for the processing of special fissionable material, to any non-nuclear weapon state for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by the Treaty." (Ref 26).

5. The safeguards required by the Treaty are outlined in the IAEA* document: The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty in the Non-Proliferation of Nuclear Weapons.

6. The world considered the Treaty and its safeguard arrangements as a significant breakthrough in limiting the spread of nuclear weapons and a step towards disarmament and the arrest of the arms race. It was thought that the world would therefore be a more stable and secure place in which to live. Even today some hold the Treaty as the demonstration of good will, and desire for peace, equality, and justice which led to SALT (Strategic Arms Limitation Talks), MBFR (Mutual and Balanced Force Reduction), CSCE (Conference on Security and Cooperation in Europe) and the ABM (Anti-Ballistic Missile) Treaty. This euphoria was soon tarnished as it became evident that not all nations were willing to sign and/or ratify the Treaty.

* IAEA - International Atomic Energy Agency.

7. According to the 1973 SIPRI (Stockholm International Peace Research Institute) Yearbook of World Armament and Disarmament, 33 countries will have nuclear power reactors by 1977. Of these, five are nuclear weapon states. Of the remaining, 28 states, sixteen have not yet ratified the NPT. Seven of the sixteen states have failed even to sign the Treaty. More than half of the threshold - nuclear-weapon-nations that will have nuclear reactors are keeping open their option for developing nuclear weapons. Notable amongst those nations which have not even signed the Treaty are France, the People's Republic of China (both nuclear weapon states), Saudi Arabia, South Africa, Argentina, and Israel. Those which have signed but not ratified include Japan, the Federal Republic of Germany, the United Arab Republic, South Korea, Italy, Kuwait, and Turkey. Nations which have either signed, ratified or both are listed at Annex A.

8. Various reasons were voiced against becoming party to the Treaty and its safeguard arrangements:

- a. inability to freely formulate and pursue national objectives and foreign policy;
- b. infringement on national sovereignty arising from safeguard arrangements such as on-site inspection and the provision of nuclear material inventory data to the IAEA or other agencies such as Euratom;
- c. lack of guarantee of protection against nuclear threat or attack on non-nuclear weapon states;
- d. mistrust of the intentions of nuclear weapon states and the fear of clandestine nuclear weapon programmes in non-nuclear weapon states;

- e. the prestige and political influence conferred by the possession or ability to construct nuclear weapons (presently denied to non-nuclear weapon states);
- f. the concern of non-nuclear weapon states with the apparent lack of success in limiting strategic arms and arresting advancement in strategic arms technology;
- g. the desire to profit from the peaceful uses of nuclear explosive devices; and
- h. need for a viable deterrent against superior conventional military forces.

9. Any hope that remained in the spirit of an already emasculated Non-Proliferation Treaty was shattered when a complacent world awoke to the fact that India had exploded a subterranean nuclear device in the Rajasthan desert on the eighteenth of May of this year. The detonation of this 10 to 15 kiloton nuclear device made India the sixth nuclear weapon state. India stated that its explosion was for peaceful purposes and that it intended to explode more such devices so that it could acquire nuclear stimulation technology for the recovery of fuel and non-fuel minerals. Two other factors may, however, be surmised as to her reasons; her political weakness (the international prestige conferred by being a nuclear weapon state could have advantageous and stabilizing domestic political results) and the growth of China's nuclear programme. Recent reports from India indicate that she may even develop a hydrogen weapon. This development confirms beyond a doubt that the NPT circle has been totally broken.

PEACEFUL USES OF ATOMIC ENERGY: NUCLEAR EXPLOSION DEVICES

10. "While the NPT is very specific about excluding the making of any nuclear device as a part of peaceful application of nuclear energy, existing IAEA safeguard agreements are vague enough not to exclude the making of peaceful nuclear devices. In fact a non-NPT country could conceivably make a peaceful nuclear device within the safeguard agreements and with the knowledge of the IAEA. To accomplish this, the country would only have to notify the IAEA ahead of time that it planned to divert certain spent fuel containing plutonium to make a "peaceful" nuclear device. All the IAEA could require would be inspections of the diverted material and the nuclear device."* Although Canada had specified in its bilateral agreement of 1956[†] with India that nuclear material could be used for "peaceful purposes" only, India's interpretation of these words did not exclude the construction of peaceful nuclear explosive devices. Canada's plans to construct nuclear reactors in Argentina and South Korea, both non-NPT countries, must now be re-examined. The rhetoric exercised by India demonstrates the frailty of any such bilateral agreement or the NPT if countries are intent upon developing a nuclear device capability.

11. Nuclear weapon or explosive device technology is no longer the secret possessed only by few states. The information is available in unclassified form. In addition the nuclear materials (enriched uranium and plutonium 239) needed for the construction of nuclear weapons are becoming more readily available and increasingly so as nuclear power production expands on a world basis. Nuclear weapons are constructed of either

* Source: Weekly Energy Report, June 10, 1974

† No international machinery to limit the proliferation of nuclear weapons nor complimentary safeguard arrangements existed in 1956. Any such agreements were necessarily of a bilateral nature.

highly enriched uranium (at least 95 per cent U235) or plutonium 239. The enrichment facilities required to amass enough U235 put this beyond the reach of most non-nuclear weapon states. However, the acquisition of Pu 239 from spent reactor fuel rods or clandestine diversion is not so impossible.

12. Only 5 to 10 kilograms of Pu 239 are required to construct a weapon with an explosive power equivalent to 20 kilotons of TNT. The Nagasaki and Hiroshima bombs were of the 20 kiloton range. India, for example, has been able to produce about 100 kilograms of safeguard-free plutonium from its CIRRUS reactor. Even if safeguards could be stringently exercised (and the political will would have to exist to achieve this), plutonium losses in the reprocessing of spent reactor fuel* of the order of less than 0.2 to 0.5 per cent would be almost technologically impossible to recognize. Considering the global commitment to nuclear power production, the difference between 0.2 and 0.5 per cent for an estimated plutonium production of about 750 tons by the year 2000 would be enough to construct nearly 350 Nagasaki-size weapons. Table 1 lists rough projections of plutonium production capacities for non-nuclear weapon states during the period 1975-1980. The impact of process losses is alarmingly evident. It would be difficult to determine if any of these process losses were clandestinely diverted to nuclear weapon programmes.

13. Plutonium inventory discrepancies already exist. The size of these discrepancies, MUF (material unaccounted for), is not known but there is good reason to believe it is significant. Material diversion could occur at the reprocessing plants or during transportation to and from the reprocessing plants. Thus any non-nuclear weapon nation or for that matter extremist/terrorist groups intent on blackmail could proceed with the construction of nuclear weapons.

* plutonium 239 is a by-product of nuclear reactors and is present in spent reactor fuel. Large quantities of Pu 239 will also be produced in breeder reactors.

SAFEGUARD PROBLEMS, IMPROVEMENTS AND SOLUTIONS

14. Special attention has been focused on the diversion/theft dilemma in the USA. Both the GAO (General Accounting Office) and USAEC's (United States Atomic Energy Commission) Directorate of Licensing have pointed out weaknesses and improvements in the method of safeguarding nuclear materials. A report prepared by the USAEC's Directorate of Licensing and released late in April by Sen Abraham Ribicoff (D. Conn.)* suggests that "the concept of a periodic measure of material balance around large flows and inventories in the current concepts of MUF and LEMUF⁺ be abandoned as a basis for safeguards". The report advocates:

- a. adoption of philosophy of "double contingency in measurement", with two independent individuals making redundant measurements;
- b. The consideration of safeguards as an organization function, with safeguards activities as the "primary activity", if not the sole activity, "of at least one organizational position of authority in all groups which are involved in SNM (special nuclear materials)";
- c. etc.

15. The recommendations of the report are extensive and also include the development of plausible diversion scenarios and periodic exercises by say the CIA and FBI to test the vulnerability of fuel cycle activities and the efficacy of response to such diversion.

* chairman of the Subcommittee on Executive Reorganization, Senate Committee on Government Operations.

+ limit of error in material unaccounted for.

16. The GAO and the USAEC consider that the potential harm to the public from an illicit nuclear weapon is greater than any plausible power plant accident and that regulations to prevent such illicit acquisition are "entirely inadequate to meet the threat".

17. Thus the world has a right to be anxious about the dangerous consequences of an expanded civilian nuclear power programme. Since India's detonation on the eighteenth of May only several months have passed. During that short period of time the United States has offered reactors to Israel and Egypt (two traditionally hostile nations separated only by a tenuous cease-fire agreement and hopes of settlement at a yet-to-be convened Geneva peace conference), India has indicated it would exchange nuclear know-how with Argentina (both are non-NPT nations), and Iran has sealed an agreement with France to exchange reactors for oil (The Shah has both announced and denied an intention to build nuclear weapons*).

REMARKS

18. It is a disquieting world in which we live. Dr. K. Subrahmanyam, director of the Institute for Defence Studies and Analysis in New Delhi, has argued that the proliferation of nuclear weapons may have positive effects on the international system by reducing the political and military advantage conferred by the possession of nuclear weapons (Ref 4). It might be that the US offered both Egypt and Israel nuclear aid to pre-empt any overtures by India.

19. Perhaps the only solution to iron-clad safeguards is that a nuclear weapon state with sufficient political, economic,

* That such an intention should even be denied by the Shah who has both signed and ratified the NPT certainly puts the last nail in the NPT coffin.

diplomatic and military leverage to enforce safeguards and the spirit of the NPT be allowed to participate in international nuclear technology agreements. Only the USA is capable of assuming that role. Neither the USSR, Japan, the UK or France have the industrial base or leverage to do this. While the USSR in particular may not enjoy the prospect of a US reactor monopoly in the world, its interests in keeping the nuclear club from expanding further may force it to accept this situation.

20. The US could exact that any nation not already possessing nuclear technology receiving such aid ship spent reactor fuel rods to American reprocessing facilities. Reprocessed fuel and core re-loads would be provided as sealed fuel rods.

21. Another solution would be to locate both the reactor and fuel cycle activities such as enrichment and reprocessing in one central location such as a "nuclear park". Inventory control would be more effective and there would be no need to transport spent and reprocessed fuel over long distances. The transportation of such fuel is highly vulnerable to malevolent diversion.

22. In addition to the diversion of nuclear weapon material for the construction of bombs, terrorist or extremist groups could sabotage nuclear power stations. They could also exercise blackmail by threatening such action or by diversion of radioactive wastes and other radioactive isotopes. Intelligence about the activities of these groups must be extensive and always current.

23. Although the preceding discussion paints a picture of gloom for the nuclear industry, the expansion of nuclear power need not be retarded or arrested if effective methods of nuclear weapon material management are instituted on national and international levels. It must be noted, however, that this will not be any easy task.

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TABLE 1

ROUGH PROJECTIONS OF PLUTONIUM PRODUCTION CAPACITIES, SELECTED
NON-NUCLEAR-WEAPON STATES: 1975-80

Country	Estimated installed nuclear capacity 1975-80 (Mwe)*		Estimated plutonium production capacity 1975-80** (kg per year)	
	from	to	from	to
West Germany	5,000	20,000	1,000	4,000
Japan	5,000	20,000	1,000	4,000
Canada	2,500	6,000	600	1,500
Sweden	2,500	4,000	500	800
Italy	1,400	5,000	300	1,000
Spain	2,000	5,000	400	1,000
Switzerland	1,000	3,000	200	600
India	1,200	2,000	300	500
Israel			10	
Other	5,000	15,000	1,000	3,000
Rounded total	26,000	80,000	6,000	17,000
United States	50,000	120,000	10,000	25,000

*Megawatts of electric generating capacity

**Based on 0.2 kg plutonium per Mwe per year for light water reactors and a higher figure for natural uranium reactors. Note that additional time must be allowed for extraction of plutonium.

SOURCE: Victor Gilinsky, 'Bombs and Electricity,' *Environment*, vol 14, no 7, September 1972

ANNEX A

TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

List of Signatures and Ratifications

as of March 14, 1974

- Sources:
1. Department of External Affairs, Ottawa, Canada.
 2. Reference 23.

TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

List of Signatures and Ratifications

as of March 14, 1974

COUNTRY	DATE OF SIGNATURE			DATE OF RATIFICATION		
	London	Moscow	Washington	London	Moscow	Washington
Afghanistan	1. 7.68	1. 7.68	1. 7.68	5. 3.70	5. 2.70	4. 2.70
Australia	27. 2.70	27. 2.70	27. 2.70	23. 1.73	23. 1.73	23. 1.73
Austria	1. 7.68	1. 7.68	1. 7.68	27. 6.69	27. 6.69	27. 6.69
Barbados			1. 7.68			
Belgium	20. 8.68	20. 8.68	20. 8.68			
Bolivia			1. 7.68			26. 5.70
Botswana			1. 7.68	28. 4.69		
Bulgaria	1. 7.68	1. 7.68	1. 7.68	3.11.69	18. 9.69	5. 9.69
Burundi					acceded 19. 3.71	
Cameroon		18. 7.68	17. 7.68			8. 1.69
Canada	23. 7.68	29. 7.68	23. 7.68	8. 1.69	8. 1.69	8. 1.69
Central Africa Republic						25.10.70
Ceylon (Sri Lanka)	1. 7.68	1. 7.68	1. 7.68			
Chad		1. 7.68			11. 3.71	
China (Taiwan)			1. 7.68			27. 1.70
Columbia			1. 7.68			
Zaire						
Congo (Kinshasa)	17. 9.68	26. 7.68	22. 7.68			4. 8.70
Costa Rica			1. 7.68			3. 3.70
Cyprus	1. 7.68	1. 7.68	1. 7.68	5. 3.70	10. 2.70	16. 2.70
Czechoslovakia	1. 7.68	1. 7.68	1. 7.68	22. 7.69	22. 7.69	22. 7.69
Dahomey			1. 7.58			31.10.72

COUNTRY	DATE OF SIGNATURE			DATE OF RATIFICATION		
	London	Moscow	Washington	London	Moscow	Washington
Denmark	1. 7.68	1. 7.68	1. 7.68	3. 1.69	3. 1.69	3. 1.69
Dominican Republic	1. 7.68		1. 7.68			24. 7.71
Ecuador			9. 7.68			7. 3.69
El Salvador			1. 7.68			11. 7.72
Ethiopia	5. 9.68	5. 9.68	5. 9.68	5. 3.70	5. 2.70	5. 3.70
Fiji					Adhesion 29. 8.72	
Finland	1. 7.68	1. 7.68	1. 7.68	5. 2.69	5. 2.69	5. 2.69
Gabon						14. 2.74
Gambia, The	4. 9.68	24. 9.68	20. 9.68			
Germany (East)		1. 7.68			31.10.69	
Germany (F.R.)	28.11.69	28.11.69	28.11.69			
Ghana	24. 7.68	1. 7.68	1. 7.68	4. 5.70	11. 5.70	5. 5.70
Greece		1. 7.68	1. 7.68			11. 3.70
Guatemala			26. 7.68	22. 9.70		22. 9.70
Haiti			1. 7.68			2. 6.70
Holy See				acceded 25. 2.71		acceded 25. 2.71
Honduras			1. 7.68			16. 5.73
Hungary	1. 7.68	1. 7.68	1. 7.68	27. 5.69	27. 5.69	27. 5.69
Iceland	1. 7.68	1. 7.68	1. 7.68	18. 7.69	18. 7.69	18. 7.69
Indonesia	2. 3.70	2. 3.70	2. 3.70			
Iran	1. 7.68	1. 7.68	1. 7.68	5. 3.70	10. 2.70	2. 2.70
Iraq		1. 7.68			29.10.69	
Irish Republic	4. 7.68	1. 7.68	1. 7.68	4. 7.68	2. 7.68	1. 7.68
Italy	28. 1.69	28. 1.69	28. 1.69			
Ivory Coast			1. 7.68			6. 3.73
Jamaica	14. 4.69	14. 4.69	14. 4.69	5. 3.70	5. 3.70	5. 3.70
Japan	3. 2.70	3. 2.70	3. 2.70			

COUNTRY	DATE OF SIGNATURE			DATE OF RATIFICATION		
	London	Moscow	Washington	London	Moscow	Washington
Jordan			10. 7.68			11. 2.70
Kenya			1. 7.68		11. 6.70	
Khmer						acceded 2. 6.72
Korea (south) Rep.			1. 7.68			
Kuwait	22. 8.68	15. 8.68	15. 8.68			
Laos	1. 7.68	1. 7.68	1. 7.68	5. 3.70	20. 2.70	5. 3.70
Lebanon	1. 7.68	1. 7.68	1. 7.68	15. 7.70	15. 7.70	20.11.70
Lesotho			9. 7.68			20. 5.70
Liberia			1. 7.68			5. 3.70
Libya	18. 7.68	23. 7.68	19. 7.68		15. 7.70	
Luxembourg	14. 8.68	14. 8.68	14. 8.68			
Malagasy Republic			22. 8.68			8. 10.70
Malaysia	1. 7.68	1. 7.68	1. 7.68	5. 3.70	5. 3.70	5. 3.70
Maldives Republic			11. 9.68			7. 4.70
Mali		15. 7.69	14. 7.69		10. 2.70	5. 3.70
Malta			17. 4.69			6. 2.70
Mauritania			?			
Mauritius			1. 7.68	14. 4.69	25. 4.69	8. 4.69
Mexico	26. 7.68	26. 7.68	26. 7.68	21. 1.69	21. 1.69	21. 1.69
Mongolia		1. 7.68			14. 5.69	
Morocco	1. 7.68	1. 7.68	1. 7.68	30.11.70	27.11.70	16.12.70
Nepal	1. 7.68	1. 7.68	1. 7.68	3. 2.70	9. 1.70	5. 1.70
Netherlands	20. 8.68	20. 8.68	20. 8.68			
New Zealand	1. 7.68	1. 7.68	1. 7.68	10. 9.69	10. 9.69	10. 9.69
Nicaragua	1. 7.68		1. 7.68			6. 3.73
Nigeria	1. 7.68	1. 7.68	1. 7.68	27. 9.68	14.10.68	7.10.68
Norway	1. 7.68	1. 7.68	1. 7.68	5. 2.69	5. 2.69	5. 2.69
Panama			1. 7.68			

COUNTRY	DATE OF SIGNATURE			DATE OF RATIFICATION		
	London	Moscow	Washington	London	Moscow	Washington
Paraguay			1. 7.68	5. 3.70		4. 2.70
Peru			1. 7.68			3. 3.70
Philippines	1. 7.68	18. 7.68	1. 7.68	16.10.72	20.10.72	5.10.72
Poland	1. 7.68	1. 7.68	1. 7.68	12. 6.69	12. 6.69	12. 6.69
Rumania	1. 7.68	1. 7.68	1. 7.68	4. 2.70	4. 2.70	4. 2.70
San Marino	29. 7.68	21.11.68	1. 7.68	10. 8.70	20. 8.70	31. 8.70
Senegal	26. 7.68	1. 7.68	1. 7.68	15. 1.71	17.12.70	22.12.70
Singapore	5. 2.70	5. 2.70	5. 2.70			
Somali Republic	1. 7.68	1. 7.68	1. 7.68	5. 3.70		12.11.70
Southern Yemen		14.11.68				
Sudan		24.12.68			22.11.73	31.10.73
Swaziland	24. 6.69			11.12.69	12. 1.70	16.12.69
Sweden	19. 8.68	19. 8.68	19. 8.68	9. 1.70	9. 1.70	9. 1.70
Switzerland	27.11.69	27.11.69	27.11.69			
Syria		1. 7.68	1. 7.68		24. 9.69	
Thailand				acceded 7. 12.72		
Togo			1. 7.68			26. 2.70
Tonga				bound 7. 7.71		
Trinidad & Tobago	22. 8.68		20. 8.68			
Tunisia	1. 7.68	1. 7.68	1. 7.68	26. 2.70	26. 2.70	26. 2.70
Turkey	28. 1.69	28. 1.69	28. 1.69			
U.S.S.R.	1. 7.68	1. 7.68	1. 7.68	5. 3.70	5. 3.70	5. 3.70
U.A.R.	1. 7.68	1. 7.68				
United Kingdom	1. 7.68	1. 7.68	1. 7.68	27.11.68	29.11.68	27.11.68
U.S.A.	1. 7.68	1. 7.68	1. 7.68	5. 3.70	5. 3.70	5. 3.70
Upper Volta		11. 8.69	25.11.68			3. 3.70
Uruguay			1. 7.68			31. 8.70
Venezuela			1. 7.68			

COUNTRY	DATE OF SIGNATURE			DATE OF RATIFICATION		
	London	Moscow	Washington	London	Moscow	Washington
Viet-Nam (South)			1. 7.68			10. 9.71
Yemen A.R.		23. 9.68				
Yugoslavia	10. 7.68	10. 7.68	10. 7.68	5. 3.70	5. 3.70	4. 3.70