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# Opening Pandora's Box? Nuclear-Powered Submarines and the Spread of Nuclear Weapons

AURORA PAPERS 8



Marie-France Desjardins  
Tariq Rauf

THE CANADIAN CENTRE FOR ARMS CONTROL AND DISARMAMENT

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**AURORA PAPERS 8**

**Opening Pandora's Box?  
Nuclear-Powered Submarines and the Spread of Nuclear Weapons**

*by  
Marie-France Desjardins and Tariq Rauf*

February, 1988  
(Revised June, 1988)

The Canadian Centre For Arms Control And Disarmament

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Marie-France Desjardins  
Tariq Rauf

February 19, 1988

## Table of Contents

Preface .....	1
Executive Summary .....	2
Sommaire .....	2
Introduction .....	3
<b>I. NON-PROLIFERATION AND INTERNATIONAL SAFEGUARDS .....</b>	<b>5</b>
<b>The Establishment of Safeguards .....</b>	<b>5</b>
<b>Safeguards Implementation .....</b>	<b>7</b>
<b>The NPT-IAEA Safeguards System .....</b>	<b>8</b>
<b>II. THE NON-PROLIFERATION TREATY RÉGIME .....</b>	<b>11</b>
<b>III. THE NPT "GREY AREA": THE NON-APPLICATION OF SAFEGUARDS     ON NON-PROSCRIBED MILITARY ACTIVITIES .....</b>	<b>13</b>
<b>Origins of the "Grey Area" .....</b>	<b>14</b>
<b>The Cut-Off of IAEA Safeguards Under Paragraph 14 (INFCIRC/153): ...</b>	<b>16</b>
<i>Scope .....</i>	<i>16</i>
<i>Implications .....</i>	<i>20</i>
<b>The Absence of IAEA Safeguards Under NPT Article III: .....</b>	<b>20</b>
<i>Scope .....</i>	<i>21</i>
<i>Implications .....</i>	<i>22</i>
<b>Non-Proscribed Military Activities .....</b>	<b>22</b>
<i>Nuclear Ship Propulsion .....</i>	<i>23</i>
<i>Military Research Reactors .....</i>	<i>23</i>
<i>Nuclear Propulsion of Space Vehicles .....</i>	<i>24</i>
<i>Armour-piercing Ordnance .....</i>	<i>24</i>
<i>Radiological Weapons .....</i>	<i>24</i>
<b>IV. CANADIAN USE OF NUCLEAR MATERIAL WITHOUT SAFEGUARDS     FOR SUBMARINE PROPULSION .....</b>	<b>25</b>
<b>Setting a Good Precedent?: .....</b>	<b>26</b>
<i>Paragraph 14 INFCIRC/164 (INFCIRC/153) .....</i>	<i>26</i>
<i>NPT Article III.2 .....</i>	<i>27</i>
<i>Bilateral Safeguards .....</i>	<i>27</i>
<b>Consequences for Canada's Non-Proliferation Diplomacy         and Nuclear Export Policy .....</b>	<b>30</b>
<b>Canadian Nuclear Cooperation Agreements and the         Acquisition of Nuclear Submarines and Fuel: .....</b>	<b>33</b>
<i>Canada - EURATOM Agreement .....</i>	<i>34</i>
<i>Canada - US Agreement .....</i>	<i>34</i>
<b>V. NON-APPLICATION OF SAFEGUARDS: THE CANADIAN PRECEDENT     AND THE IMPACT ON THE NON-PROLIFERATION RÉGIME .....</b>	<b>36</b>
<b>Cut-off of Safeguards Under INFCIRC/153 Paragraph 14 .....</b>	<b>36</b>
<b>Absence of Safeguards Under NPT Article III.2 .....</b>	<b>39</b>
CONCLUSION .....	39
NOTES .....	42
APPENDICES I, II, III, IV, V .....	52

## PREFACE

In mid-May 1987, a few weeks before the unveiling of Canada's new White Paper on Defence, the *Globe and Mail* carried an article from the Centre contending, among other arguments, that the proposed acquisition of nuclear-powered submarines by Canada could weaken the international nuclear non-proliferation régime and undermine Canada's credibility as a proponent of non-proliferation.

This argument initially encountered widespread scepticism. Defenders of the nuclear submarine programme argued – quite correctly – that Canada is completely within its legal rights under the 1968 Non-Proliferation Treaty (NPT) to acquire nuclear-powered submarines.

Such casual analysis, however, is fraught with danger, for, like an iceberg, what lies beneath the surface poses the greatest hazard. Reassured by the superficial legal argument, most defenders of the submarine programme have ignored or downplayed the more complex problems related to the *political* impact that acquiring nuclear submarines would have on the NPT and Canada's non-proliferation diplomacy.

In the summer of 1987, the Centre undertook a major research project to examine in greater detail the problem sketched out in the *Globe and Mail* article. In addition to a thorough review of the literature, the authors of this study canvassed specialists on non-proliferation and safeguards issues from around the world for their recollections and views on a wide range of questions relating to the issue of nuclear ship propulsion.

In February, 1988, the preliminary findings of this study were released and critical analysis of

them sought from various experts, both in Canada and abroad. The present study reflects the many valuable insights and comments received.

In publishing this study, we hope the issue may be better understood by both specialists and the attentive public. We also believe that the issue is important enough to warrant a place in the next formal review of the NPT, scheduled for 1990. Whether or not Canada will still be planning at that time to purchase nuclear-powered submarines, we also hope it will contribute to such a discussion at the review conference.

Not surprisingly, the present study has raised a number of questions that require further consideration. For instance, it was learned that very little research has been carried out on the record of bilateral safeguards arrangements. Given the Canadian government's decision to employ a bilateral safeguards agreement with the supplier-country for its nuclear submarine programme, and the fact that it is holding this up as a model for others, a greater appreciation of how bilateral safeguards arrangements have worked out in practice would be very useful. Then there is the whole question of how international safeguards could be applied to nuclear submarine programmes in non-nuclear weapon states were there the political will to follow such a route. These and other questions raised in this paper will require further research.

John M. Lamb  
Executive Director  
June 1988



## EXECUTIVE SUMMARY

Since the release of Canada's White Paper on Defence in June 1987 announcing the planned purchase of a fleet of nuclear-powered submarines, questions have been raised in the arms control community about the effects such an action would have on the global nuclear non-proliferation régime and on Canada's own non-proliferation policy.

The questions stem from the fact that the enriched uranium used to fuel nuclear submarines would not be subject to international verification. This would be the first instance in which a non-nuclear weapon state party to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) would avoid the Treaty's verification of compliance system based on safeguards, or on-site inspections, administered by the International Atomic Energy Agency (IAEA).

The authors make the case that for Canada, or any other non-nuclear weapon state party to the NPT, to avoid IAEA safeguards on any part of its nuclear programme would be an impediment to the Agency's ability to carry out its NPT-related verification task – to ensure no fissionable material is being diverted toward the production of nuclear weapons. Any denial of the Agency's capability to apply NPT-related safeguards will lead to a loss of confidence in

the Treaty régime. With the last NPT review conference scheduled for 1990, before the Treaty expires in 1995, and given other challenges, any weakening of IAEA safeguards can only serve to undermine the non-proliferation régime and detract from the chances for its survival.

Even though the paper recognizes that the NPT is silent on the question of formally requiring the application of IAEA safeguards on such activities as nuclear-powered submarines, Canada would be breaking a twenty year old taboo against exploiting a "grey area" or weakness in the Treaty. Such a course of action would not only damage the international non-proliferation régime but would also be in clear contradiction with Canada's own longstanding non-proliferation policy requiring comprehensive IAEA safeguards.

The only truly responsible option for Canada would be to find a way to involve the IAEA directly in a system under which the Agency would be able to apply safeguards (or inspect) Canada's naval nuclear propulsion programme, thus setting the standard for involving the Agency in applying safeguards on such activities and serving as the only proper example for other states to follow.

## SOMMAIRE

L'acquisition d'une flotte de sous-marins à propulsion nucléaire par le Canada, annoncée en juin 1987 lors de la parution de Livre blanc sur la défense, a soulevé plusieurs questions quant aux implications que pourraient avoir une telle décision sur le régime international de non-prolifération des armes nucléaires et la politique canadienne à cet égard.

Le problème soulevé par la décision canadienne tient du fait que l'uranium enrichi servant de combustible aux réacteurs des sous-

marins ne sera pas soumis aux vérifications internationales. Fait unique dans l'histoire du Traité de non-prolifération des armes nucléaires de 1968, un État non-nucléaire signataire du Traité échappera au système de vérification garant du respect du Traité, système basé sur des mesures de sauvegarde ou d'inspections réalisées par l'Agence internationale de l'énergie atomique (AIEA).

Les auteurs de la présente étude affirment que si le Canada ou tout autre État non-nucléaire

signataire du Traité évite les vérifications de l'Agence sur une partie de leur programme nucléaire, cela empêchera l'Agence de poursuivre adéquatement sa tâche de vérification conférée par le Traité, à savoir de s'assurer qu'aucune matière fissile n'est détournée à la fabrication d'armes nucléaires. Toute démarche de la sorte aura pour effet de diminuer la confiance dans le régime international de non-prolifération sous-jacent au Traité. Considérant que le Traité expire en 1995 -une dernière conférence de révision est prévue en 1990- et compte tenu des défis importants auxquels fait face le régime, tout affaiblissement des vérifications de l'Agence ne servirait qu'à saper le régime international et affecter ses chances de survie.

Même si l'étude reconnaît que le Traité n'oblige pas les vérifications de l'Agence sur ce

type d'activités -puisque'il est silencieux sur le sujet- le Canada ne fera en fait qu'utiliser une faiblesse (ou "zone grise") du Traité qui, depuis vingt ans et jusqu'à présent, était restée inexploitée. Une telle démarche de la part du Canada aura non seulement pour effet de miner le régime international mais contredira aussi sa propre politique en matière de non-prolifération exigeant les vérifications complètes de l'Agence.

La seule option d'un Canada responsable serait d'impliquer l'Agence dans le développement d'un système de vérification par lequel cette dernière pourrait vérifier la matière fissile servant à la propulsion des sous-marins du programme naval canadien. En agissant ainsi le Canada définirait une nouvelle norme qui pourrait servir de modèle à quiconque se proposera de suivre son exemple.

## INTRODUCTION

In an effort to curb the spread of nuclear weapons to additional countries, the international community has devised and come to rely upon a régime made up of the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and a system of verification, or safeguards, administered by the Vienna-based International Atomic Energy Agency (IAEA). The central purpose of this safeguards system is to verify that non-nuclear weapon states (NNWS) party to the Treaty are living up to their commitment that nuclear materials in their possession are not being used for the production of nuclear weapons.

Thus far, this has meant that IAEA safeguards have been applied to *all* nuclear material in use in *all* NNWS party to the Treaty, since none of these states has ever before availed itself of a safeguards-related "grey area" in the Treaty régime whereby safeguards are not explicitly called for on fissionable material used in military activities not specifically proscribed by the Treaty.

This study examines the origins, scope and implications of this safeguards-related "grey

area," since, after its recent decision to acquire 10 to 12 nuclear-powered submarines,<sup>1</sup> the Canadian government has asserted its determination not to subject to IAEA safeguards the fissionable material used to fuel Canada's proposed nuclear submarine fleet. This course of action has educed, for the first time, questions about whether removing nuclear material from IAEA safeguards would harm the current international non-proliferation régime. The two most significant questions in this regard pertain to continuing confidence in the efficacy of the IAEA safeguards, or verification system, and the increased prospects of diverting without detection unsafeguarded fissionable material to the manufacture of nuclear weapons.

*The most important concern regarding Canada's decision to become the first NNWS party to the NPT to acquire nuclear-powered attack submarines (SSNs), and to have nuclear material without safeguards in its possession, relates to verification of Treaty compliance. What would be the impact of breaking the long established practice of the IAEA of verifying all fissile*

material in the entire nuclear programmes of all NPT-signatory non-nuclear weapon states? Will Canada's proposed removal of nuclear material, possibly weapon grade, from safeguards undermine the IAEA's capacity to verify, and hence to reassure the international community, that no nuclear material has been diverted to the manufacture of nuclear weapons?

Another important concern relates to the possible diversion of fissionable material to the production of nuclear weapons in the absence of IAEA safeguards. The concern here is not that Canada itself has any intention of diverting fissile material to the production of nuclear weapons but that less scrupulous countries might, at some point, adopt the precedent created by Canada and then divert some portion of the material without safeguards to the production of nuclear weapons.

Apart from the impact Canada's action could have on the NPT régime, the study also addresses the implications for Canadian non-proliferation diplomacy and nuclear export policies. Canada has played a leading role in the development of the NPT régime and has imposed one of the strictest safeguards systems in the world on its own nuclear trade. By leading the way in exploiting what is arguably a loophole, or weakness, in the NPT régime, however, Canada could jeopardize not only its credibility in non-proliferation matters, but also the effectiveness of its diplomacy in this field.

Whether Canada maintains its present course or a subsequent government cancels the nuclear submarine programme, the issue of the use of fissionable material in "non-proscribed" military activities outside of IAEA safeguards represents an important future challenge to the NPT régime. Canada is not alone in its interest in naval nuclear propulsion. Countries both inside and outside the NPT system, including Argentina, Brazil, India, Italy, Japan, Pakistan, and West Germany, have all either previously considered or are currently looking into obtaining nuclear-powered submarines. India, a non-signatory to the NPT, has already "leased" a nuclear submarine from the USSR.<sup>2</sup>

As well, it needs to be noted that there are several other non-proscribed military activities besides the operation of nuclear submarines that could be used to justify acquiring fissionable material free of safeguards.

Although this study considers the question of nuclear powered submarines and the spread of nuclear weapons in the context of Canada's SSN acquisition programme, the findings, however, are uniformly applicable to all NNWS party to the NPT that seek to follow in Canada's footsteps in exempting from safeguards nuclear material for use in military activities not banned by the NPT. A central argument of this study, therefore, is that given the significance of the question of exempting fissionable material from IAEA safeguards for use in non-proscribed military activities, the matter must be taken up by the international community without delay.

As observed above, *the issue raised by Canada's decision to acquire nuclear-powered submarines is, basically, a verification problem relating to the IAEA's system of safeguards* upon which the international community relies to reassure itself that nuclear materials are not being diverted clandestinely to the production of nuclear weapons. In view of this, Chapter I considers, in some detail, the establishment, evolution and workings of the international safeguards system.

An appreciation of the shape and character of the NPT régime is essential to a complete understanding of the problem addressed in this study. Accordingly, the second chapter examines the current non-proliferation régime: what the system attempts to do, its importance, its effectiveness and the threats it faces.

Chapter III outlines the origin and scope of the "grey area" in the Non-Proliferation Treaty that could enable Canada to acquire fissionable material without safeguards. The chapter will assess the implications of exploiting this weakness in the NPT régime, in particular, the two routes for the acquisition of nuclear material opened by the "grey area." This section will

also look at the possibilities for the diversion of fissionable material without safeguards into weapon production.

The possibility of Canada creating a "good" precedent, as has been claimed by Canadian officials, will be addressed in Chapter IV, as well as the potential implications for Canada's nuclear export policy and non-proliferation diplomacy. Also included, under the heading "Canadian use of nuclear material without safeguards for submarine propulsion," will be a discussion on the nature and status of the various nuclear cooperation agreements between Canada, the US, and Euratom, as there are legal problems associated with Canada's acquiring nuclear-powered submarines and fuel.

In Chapter V, the potential implications of removing enriched uranium from international safeguards will be discussed in terms of the effective working of the NPT-IAEA, the nuclear non-proliferation régime and its future prospects.

The conclusion summarizes the legal and technical arguments and assesses the political implications for both the NPT régime and Canada's non-proliferation diplomacy. Consideration is then given to what lies ahead, in particular, the nature of the challenges facing the NPT régime as we approach the 1990 NPT review conference, and the choices confronting Canada in respect to these challenges – policy recommendations will also be suggested in this context.

## I. NON-PROLIFERATION AND INTERNATIONAL SAFEGUARDS

### The Establishment of Safeguards

Since the dawn of the nuclear era, military use of nuclear energy has been of major concern to the international community. Paradoxically, the first to raise the issue were the three countries most advanced in the military use of the atom, namely, the United States, the United Kingdom and Canada. Recognizing, however, that nuclear energy could have immense potential for humanitarian and industrial purposes, the leaders of the three Western countries announced their willingness to share information on atomic energy with other countries "just as soon as effective enforceable safeguards against its use for destructive purposes can be devised."<sup>3</sup>

This "Agreed Declaration on Atomic Energy" of 15 November 1945 was the first commitment ever undertaken to apply international safeguards to ensure the peaceful use of the atom. It called upon the United Nations to set up a Commission to make specific proposals for, *inter alia*, "...effective safeguards by way of inspection and other means to protect complying states against the hazards of violations and evasions."<sup>4</sup>

Over the next six years, discussions on safeguards took place at the newly created

United Nations Atomic Energy Commission (UNAEC).<sup>5</sup> The main concept guiding the UNAEC discussion came from a US proposal to establish an International Atomic Development Authority that would own, operate and control the future use and development of atomic energy. This suggestion, outlined on 14 June 1946 and known as the Baruch Plan grew out of a belief that complete international ownership of atomic energy was required because "[t]he necessary intensity of control cannot be achieved solely through inspection or other forms of external supervision."<sup>6</sup> This judgement was tied to the view that to be effective the Authority must have the same level of expertise in all areas of nuclear activity as the operators of the nuclear facilities themselves. Thus, went the reasoning, in order for the Authority to be in a position to provide positive assurances that no unlawful or military nuclear activity was taking place, it needed to exercise full ownership and operational control over all sensitive nuclear activities and items.

The Soviet Union objected to such a system of control on grounds of national sovereignty, and also maintained that before devising a system limiting the production of nuclear weapons

the question of their prohibition and destruction should first be resolved.<sup>7</sup> The detonation of the Soviet Union's first nuclear device in 1949 further limited the possibility of international ownership of atomic energy.

With no progress having been achieved after more than six years of its existence, the UNAEC was finally dissolved in 1952.<sup>8</sup> From then on, the effort to prevent the use of atomic energy for military purposes focussed on limiting the number of nuclear weapon states (NWS).

Following the failure of the UNAEC, the next major step to ensure the peaceful use of atomic energy was taken on 8 December 1953 when US President Eisenhower submitted his "Atoms for Peace" proposal at the United Nations. Calling for the establishment of an international agency that would encourage the peaceful use of atomic energy while playing an active part in controlling nuclear material, the underlying assumption of this programme was that if dissemination of nuclear technology could not be stopped, it could at least be controlled.

In contrast to the arrangement proposed under the Baruch Plan, the International Atomic Energy Agency (IAEA) envisioned in the "Atoms for Peace" speech would have operational rather than ownership rights over atomic energy. It would merely collect, store and protect fissionable material acquired from the contributions of "[t]he governments principally involved."<sup>9</sup> In the words of Eisenhower "[t]he more important responsibility of this Atomic Energy Agency would be to devise methods whereby the fissionable material would be allocated to serve the peaceful pursuits of mankind."<sup>10</sup> After three years of discussions, this approach finally met acceptance and the Statute of the International Atomic Energy Agency (IAEA) was approved on 23 October 1956.<sup>11</sup> As defined in the Statute, the IAEA has two 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.<sup>12</sup>

In order to implement the latter objective, namely, preventing further "military" use of atomic energy, the Agency was authorized:

To establish and administer safeguards 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.<sup>13</sup>

In view of the earlier failures to regulate the peaceful uses of atomic energy, such as the Baruch Plan, international acceptance of the Agency was considered to be an extraordinary achievement. The IAEA's Statute recognized, *inter alia*, the right and the responsibility of the Agency to examine the design of nuclear facilities, to require the production and maintenance of records on the use and movement of nuclear material, and to carry out on-site inspections to verify compliance.<sup>14</sup> Agreement on Agency-administered on-site inspection was considered a major accomplishment, in that, for the first time states had voluntarily agreed to relinquish some of their national sovereignty in the interest of a multinational system of control.

But, despite the major accomplishment of agreement on the principle of safeguards, the new multilateral system to control the peaceful uses of atomic energy was not without flaws. The Statute contained an important weakness – safeguards were not mandatory or universally applicable. Under the provisions of the Statute, Agency safeguards would come into force on three occasions: i) when an IAEA member state requested and received nuclear assistance

from or through the Agency; ii) when member states specifically requested Agency safeguards on their nuclear activities; and iii) when states party to bilateral or multilateral nuclear cooperation arrangements requested safeguards. As one author described it:

The IAEA Statute does not require any member of the Agency to submit to safeguards...nor does it require that states make their international assistance or transfers subject to the recipient's acceptance of such controls. In short, the Statute merely creates a framework for controls within which member states can decide whether to submit and, if so, to what controls.<sup>15</sup>

Looking back at the historical record of the IAEA's Statute, it appears that the framework of controls outlined in the Statute reflected the maximum scope for safeguards implementation acceptable at the time. At the beginning, the Statute's principal proponent and drafter, the US, proposed that the states' obligation to accept Agency safeguards would not be by virtue of their membership in the IAEA, but would depend on whether they were receiving the Agency's assistance for their nuclear activities. Obviously, because the most advanced nuclear states, namely, the US, the USSR and the UK would not need nor ask for the Agency's assistance, they would not be required to submit their nuclear activities to IAEA safeguards. In fact, it was only in the last stage of negotiations on the Statute that an amendment was adopted to include the voluntary submission to safeguards.<sup>16</sup>

### **Safeguards Implementation**

Following its establishment in 1957, the first few years of the Agency's operation saw few real opportunities for the implementation of safeguards. Not only were nuclear power programmes slow to develop but, in view of the Agency's inexperience in this area, the principal suppliers of nuclear material and technology had already entered into bilateral agreements under

which they themselves administered safeguards.<sup>17</sup> Moreover, until the mid-1960s, the Soviet attitude toward the development of an international safeguards system was one of opposition rather than of cooperation.<sup>18</sup> Consequently, the Agency's "First Safeguards Document," INFCIRC/26<sup>19</sup> was only accepted on 30 March 1961.

As Soviet attitudes toward safeguards evolved,<sup>20</sup> and with the implementation of a new US policy calling for the transfer to the IAEA of all safeguards responsibilities, the Agency's Safeguards Document was revised and improved on the basis of past experience. The new system known-as "The Agency's Safeguards System" or INFCIRC/66 (1965) was extended in June 1966 (INFCIRC/66/Rev.1) to include reprocessing plants, and in June 1968 (INFCIRC/66/Rev.2) to include conversion and fabrication plants.

Serving as the basis for the Agency "to readily determine what provisions should be included in agreements relating to safeguards and how to interpret such provisions,"<sup>21</sup> INFCIRC/66 was "designed to facilitate and standardize as far as possible the content of safeguards agreements with the IAEA."<sup>22</sup> As described in Paragraph I A(2), and in accordance with the IAEA's Statute from which it draws its legal basis, the principal purpose of the Document was to establish a system of controls to enable the Agency to ensure, so far as it was able, that assistance provided by it or at its request or under its supervision or control was *not used in such a way as to further any military purpose*. The Agency's assistance under INFCIRC/66, among other things, included safeguards on nuclear material, equipment and facilities.

Although by the mid-1960s the IAEA was already acquiring considerable experience in the actual implementation of safeguards, and by 1968 had safeguards agreements in force in twenty-seven member states,<sup>23</sup> the agreement on a nuclear non-proliferation treaty in the same year led to the establishment of a new system of IAEA-administered safeguards applicable to all signatory non-nuclear weapon states.

### The NPT-IAEA Safeguards System

The inspiration for the Non-Proliferation Treaty is generally credited to Ireland, which in 1958 submitted to the UN General Assembly a resolution calling for the establishment of an *ad hoc* committee "to study the dangers inherent in the further dissemination of nuclear weapons."<sup>24</sup> Although the resolution did not deal specifically with what has come to be known as horizontal nuclear proliferation,\* it recognized that "the danger now exists that an increase in the number of States possessing nuclear weapons may occur."<sup>25</sup>

Despite this early alarm and the adoption over the following years of a number of similar UN resolutions, it was only in 1965 that the title "Non-Proliferation of Nuclear Weapons" was endorsed in a resolution at the General Assembly calling on the Eighteen Nation Disarmament Committee (ENDC) to elaborate the main principles for such a treaty.<sup>26</sup> In the same year, the Soviet Union and the United States each submitted separate first drafts of a treaty. From then on the negotiations intensified and a scant two years later the superpowers presented two almost identical drafts. These were followed by identical drafts in August 1967. After further revisions at the ENDC, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was approved at the United Nations on 12 June 1968 and opened for signature on 1 July 1968. (See Appendix I for the text of the Treaty.)

The slow progress toward agreement on the NPT may be explained by a number of factors. During much of the 1960s, one prominent feature seems to have been the US interest in creating a multilateral nuclear-armed naval force, consisting primarily of surface vessels for NATO.<sup>27</sup> Although the US would have retained a veto over any decision to launch the nuclear weapons, the Soviet Union feared that this so-called Multi-Lateral Force (MLF) was, in effect, simply a way for the West to provide

West Germany with nuclear weapons. Thus, it was only when the idea of an MLF was abandoned in late 1966 that real progress toward a non-proliferation treaty began to be made.<sup>28</sup>

By that time the need for a non-proliferation treaty was becoming increasingly pressing. In 1966, no less than thirteen non-nuclear weapon states were operating or planning to construct large nuclear power reactors<sup>29</sup> with an estimated annual plutonium production (outside the nuclear weapon states) of some 8,000 kilograms.<sup>30</sup> Considering that the fabrication of one nuclear bomb requires only about 8 kilograms of plutonium, the problem of preventing the diversion of this material into the production of weapons was recognized with growing urgency, especially since many of the countries involved were not planning to pursue their nuclear programmes with the help of the IAEA and, consequently, were not necessarily obliged to accept Agency safeguards.

Thus, when the NPT entered into force, it was widely regarded as a major step toward ensuring the peaceful uses of nuclear energy. Under the provisions of Articles I and II, nuclear-weapon states (NWS) party to the Treaty undertook not to transfer nuclear weapons or control over them, or to assist, encourage, or induce any non-nuclear weapon state (NNWS) to manufacture or acquire such weapons. Non-nuclear weapon states, for their part, undertook not to accept the transfer of or control over such weapons, nor to manufacture or receive any assistance in the manufacture of nuclear weapons or nuclear explosive devices.

Furthermore, in order to verify the obligations assumed under the Treaty, Article III.2 required all states party to the Treaty to refrain from providing source or special fissionable material to any NNWS for peaceful purposes without the imposition of IAEA safeguards.<sup>31</sup> All NNWS were required to accept safeguards on all source or special fissionable material in

\* Horizontal proliferation refers to an increase in the number of states possessing nuclear weapons. Vertical proliferation refers to the growth in the nuclear arsenals of the five nuclear weapon states.

all peaceful nuclear activities within their territory, under their jurisdiction, or carried out under their control elsewhere (Article III.1).

Although the Treaty included no reciprocal undertaking to accept safeguards by nuclear-weapon states, the provision outlined above (Article III.1) was considered a significant improvement over the Statute of the Agency. Under the Statute, the IAEA could apply its safeguards only on items (such as facilities, equipment or material) provided by the Agency, or formally placed under its responsibility. The NPT, on the other hand, created the requirement of the signatory NNWS to accept mandatory Agency safeguards.

The safeguards required by the NPT, however, were to be quite different than the previous ones applied in conjunction with the IAEA Statute. In contrast to the earlier Agency Safeguards System (INFCIRC/66/Rev.2), which was concerned with the application of safeguards on specific nuclear facilities, equipment and material, the NPT charged the IAEA to apply safeguards only to the nuclear material.

Apparently, this change in scope of the application of safeguards had become necessary because the earlier system of safeguards was perceived by some states to have evolved as "...a police system whose powers of search are quite unrestricted," and "[i]t has often been said that it requires an inspector behind every facility operator."<sup>32</sup> As one former IAEA official recalled:

When the NPT began to emerge from the Geneva negotiations (1965-68), it became likely that the entire nuclear industry of countries such as FR [the Federal Republic of] Germany would eventually move under IAEA safeguards. This spurred research into ways of making those safeguards less 'burdensome' and 'intrusive'....<sup>33</sup>

The new requirements for safeguards assigned to the IAEA under the NPT put a great deal of pressure on the Agency. On the one hand, "it was necessary to devise a system which would cover the flow of nuclear material

through the entire fuel cycle of the country accepting NPT safeguards as well as international transfers of nuclear material between facilities in different countries."<sup>34</sup> On the other hand, time constraints were important, since Article III of the NPT also required the signatory NNWS to commence negotiations with the Agency within 180 days of the date of entry into force of the Treaty and to conclude a safeguards agreement within 18 months (Article III.4). Furthermore, it seems that "[t]he challenge was much more than a technical one, since many key countries had made it clear that their willingness to accept the treaty would depend heavily on the nature of the new safeguards arrangements."<sup>35</sup>

In order to meet this challenge, the IAEA's Board of Governors invited all members of the Agency to participate in an *ad hoc* Safeguards Committee to advise it on the content of the safeguards agreement necessary to meet the obligations assigned to the Agency under Article III of the NPT. The Safeguards Committee, composed of representatives of more than fifty countries, met in Vienna and held over eighty meetings between June 1970 and March 1971. In March 1971, the Committee agreed upon a document that was approved by the Board of Governors. The document, entitled "The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons," and better known as INFCIRC/153, was formally adopted by the Agency in February 1972 as the prototype for all of its NPT-related mandatory safeguards agreements with signatory non-nuclear weapon states.<sup>36</sup>

Because the NPT explicitly provides for the application of safeguards on *nuclear material in all peaceful uses*, "for the exclusive purpose of verification of the fulfillment of...[the] obligations assumed under...[the] Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other explosive devices,"<sup>37</sup> the Safeguards Committee defined the technical aim of safeguards as "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.”<sup>38</sup> The starting point for the application of safeguards under the new document (INFCIRC/153) is set at that stage in the nuclear fuel cycle when nuclear material reaches “a composition and purity suitable for fuel fabrication” or for use in an enrichment facility.<sup>39</sup> (See Appendix II for a simplified flow diagram of the nuclear fuel cycle.)

One of the most important changes in the new safeguards system was that states were obliged to establish and maintain a system of accounting for and control of nuclear material (paragraph 7). Thus, under INFCIRC/153, NPT signatory NNWS are obliged to maintain records on all movements of nuclear material, in addition to inventory reports based on actual physical measurements. The records and reports provided by the state to the IAEA are verified for accuracy through three broad categories of actual on-site inspections – *ad hoc*, routine and special inspections. IAEA inspections are intended to identify whether any fissionable material is unaccounted for and consequently to provide a means of both deterring and detecting any diversion to weapon purposes.<sup>40</sup>

In order to enable the IAEA to apply safeguards on fissionable material, the Agency must be supplied with a minimum of design information on the nuclear facilities. This information contributes to determining “material balance areas” to account for the nuclear material: all nuclear material entering or exiting these areas is measured at selected “key measurement” and “strategic points”, and the reports the states provide to the Agency account for the movement of the material through each of these areas.<sup>41</sup> Measures of containment and surveillance, which include the installation of tamper-resistant seals on containers in storage and/or automatic cameras, in addition to other technical means, are an integral part of the application of safeguards.

These help reduce the chances of moving nuclear material without detection.

Under INFCIRC/153, finally, the technical and administrative procedures designed to implement safeguards agreements concerning design review, records requirements, reporting requirements and inspections are laid out in Subsidiary Arrangements. These arrangements have been standardized and include a general part applicable to all nuclear activities of the state concerned and Facility Attachments which detail specific safeguards-related procedures for each nuclear facility.

In comparison to its predecessor INFCIRC/66/Rev.2, INFCIRC/153 is considered a much more detailed safeguards system. Since INFCIRC/66 was designed to be used for a different type of safeguards arrangement (including for instance materials, facilities and equipment), it is said to have been drafted more as a set of general guidelines and, therefore, lacking certain important features, such as the practical objective to be achieved, the technical guidelines to describe what constitutes an effective inspection, and the criteria for the technical determination of what constitutes a diversion of material, among others.<sup>42</sup> In contrast, INFCIRC/153, for example, provided the quantification of its technical objectives: what constitutes a significant quantity of nuclear material and timely detection, for instance, have been assigned specific numerical values.<sup>43</sup> INFCIRC/153 is also considered a better arrangement than INFCIRC/66 because it deals with other matters “which must also be covered in safeguards agreements, such as the consequences of non-compliance with the agreement, finance, liability, or settlement of disputes.”<sup>44</sup> Finally, the new system is also said to have provided “the Agency with increased rights and opportunities...[and]...clarified the Agency’s authority and the principles on which safeguards should be conducted.”<sup>45</sup>

Despite these improvements, however, the new system (INFCIRC/153) cannot necessarily be said to constitute an overall strengthening of safeguards. Indeed, “[i]n a few respects,

INFCIRC/66/Rev.2 provides the basis for more extensive and effective safeguards....<sup>46</sup> For instance, INFCIRC/66/Rev.2 "authorizes safeguards on plant and equipment as well as nuclear material; [and]...also permits much higher frequencies of inspection and more untrammelled access than the model NPT safeguards [INFCIRC/153] agreements."<sup>47</sup>

As previously mentioned, one of the reasons for some of these changes was that many states felt the earlier safeguards were too intrusive and had stated their preference for a less burdensome system. Another reason could be that INFCIRC/153 was the result of negotiations between many states with significantly different opinions and goals. As one author described it:

Practically all interested IAEA members were represented (including some that had not yet committed themselves to [the] NPT, and might not do so if they considered the Committee's report unacceptable): (1) the nuclear-weapon states, interested primarily in effective safeguards which should not, however, interfere with their nuclear trade; (2) the advanced non-nuclear-weapon states, against whom the controls would primarily be directed, interested in rules that would not inhibit the development of their technology; (3) the Euratom states, interested in a system that would permit the preservation and utilization of as much as possible of

the special control system of their regional organization; (4) other non-nuclear-weapon states, interested both in effectiveness and in protecting their sovereignty against intrusions unwarranted by their minor nuclear programs; (5) all states, interested in preventing the costs of the control system from burgeoning unduly; and finally (6) the IAEA Secretariat, concerned that the instruments it is to negotiate for the Agency be coherent and that the prescribed limitations not be inconsistent with the implementation of the responsibilities to be laid on the Agency.<sup>48</sup>

This cross-section of parties represented in the drafting of the NPT's safeguards system was important for the acceptance of a truly international non-proliferation régime. However, as will be discussed in this paper, the fact that INFCIRC/153 is derived from the NPT and, of less significance, because so many states participated in its drafting, may have contributed to creating one of the most significant weaknesses in the régime, namely, a loophole allowing for the "non-application of safeguards" under certain specified circumstances. Before looking at this issue, though, it is important to fully understand the role of the NPT-IAEA régime in controlling the further spread of nuclear weapons, as well as the limits of and the threats to the non-proliferation régime.

## II. THE NON-PROLIFERATION TREATY RÉGIME

Since its entry into force in March 1970, the Non-Proliferation Treaty and its associated verification régime based on IAEA safeguards, have been considered the centrepiece of the global non-proliferation effort.<sup>49</sup>

To date the NPT has been signed by 132 non-nuclear weapon states and three of the five nuclear-weapon states, for a total of 135 parties. (See Appendix III.) Since coming into force eighteen years ago, no contravention of IAEA safeguards, and no violation of the Treaty's main provision (that of the non-acquisition of nuclear

weapons by signatory NNWS), has ever been registered. As well, no signatory state has ever withdrawn from its commitments to the NPT – (under Article X, a state can withdraw from the NPT on three months notice, provided extraordinary events have jeopardized its supreme interests).

Although its past record may suggest that the NPT-IAEA régime has been extremely successful, it should not be overlooked that the régime is somewhat fragile and its future uncertain.

Without doubt, one of the most important

weaknesses of the régime lies in its lack of universal adherence. In addition to two of the five nuclear weapon states, France and China, a number of non-nuclear weapon states including Argentina, Brazil, India, Israel, Pakistan and South Africa have refused to sign the Treaty. Not long after its ratification, its incompleteness was dramatically confirmed when, in 1974, India conducted what it referred to as a "peaceful" nuclear explosion. The world was shocked. For the first time, technology for nuclear explosives had been acquired indigenously by a Third World country.

This together with an increased demand for independent nuclear fuel fabrication technology, following the oil crisis in the early 1970s, led to a reevaluation of the NPT régime. Some of the Treaty's strongest defenders, the US and the USSR, for instance, demanded that signatory nuclear supplier states require comprehensive or full-scope IAEA safeguards for any nuclear cooperation with non-nuclear weapon states involving sensitive material and/or technology. But, since this proposal did not garner much support, the USSR declared that it would apply such a policy only when all of the other nuclear suppliers would do so as well.<sup>50</sup> At present, only Australia, Canada, Sweden and the United States require full-scope safeguards as a condition for their nuclear transfers. In fact, the only Treaty reinforcement "agreement" that emerged from this period was the elaboration of a code of conduct – the Nuclear Suppliers' Guidelines of 1978 – for the supplier nations,<sup>51</sup> in which the principal suppliers agreed to always require IAEA safeguards on the transfer of sensitive technology (such as enrichment and reprocessing facilities), thus also extending safeguards on the transfer of such items to non-signatory states.

Despite this extension of safeguards, which reinforced the non-proliferation régime, the NPT-IAEA marriage is still considered by many as somewhat weak. In fact, it is often argued that further proliferation is only a question of time, with controls over the transfer of nuclear technology and materials serving only to slow

the process.

This pessimistic view of proliferation comes from an awareness that because the technological know-how for building a first-generation nuclear weapon is already widespread, and the technological infrastructure sufficiently developed in many non-nuclear weapon states, the last important barrier to weapon production lies in the acquisition of fissionable material. Highly enriched uranium (HEU) and plutonium, the two materials most commonly used to fabricate nuclear weapons have never been easily available but the technology to fabricate them is rapidly spreading.<sup>52</sup> Furthermore, the NPT-IAEA system is powerless to prevent states from acquiring the technology, much less to stop them from using it for any unlawful purpose.

While it is true that the NPT-IAEA régime cannot prevent states from acquiring the capability to develop atomic weapons, this does not imply that the Treaty régime itself has failed in any significant way or that it will decline in importance. On the contrary, it may be argued that as nuclear technology develops and spreads,<sup>53</sup> the NPT-IAEA régime will have an even more important role to play. This can be better understood by looking at a state's motivations to go nuclear.

It is generally acknowledged that the major impulse to develop nuclear weapons is prompted by national security considerations. Obviously, a perceived threat from a neighbour's nuclear activities can have a dramatic impact on the decision. A strong non-proliferation régime buttressed by an effective verification system – one that provides confidence in the peaceful nature of the nuclear programmes of other NPT signatory states and also guarantees early detection of any Treaty-related wrongdoing – goes a long way in reassuring states about their security environment. The present NPT-IAEA régime provides precisely this kind of confidence. Indeed, although the verification task of the IAEA has been narrowly defined in the NPT-IAEA safeguards document, INFCIRC/153, as ascertaining that fissionable material in use

in the peaceful activities of the NNWS signatories is not diverted to making explosive devices, it has actually meant ensuring that no production of nuclear weapons is taking place in any of these states. This confidence in the obligations and purposes of the Treaty is of the greatest importance in reinforcing states' commitment to the NPT régime and, accordingly, in reinforcing consensus on a truly international non-proliferation régime.

While the importance of the NPT-IAEA régime in controlling or slowing down proliferation cannot be overstated, its future remains uncertain. The NPT has a lifetime of twenty five years, with expiry due in 1995,<sup>54</sup> and whether international consensus is achieved to renew it for a further term remains to be determined.

It is noteworthy to recall that the Treaty has always been considered a bargain between the nuclear weapon states and the non-nuclear weapon states. In return for the signatory NNWS renouncing their right to acquire nuclear weapons and accepting IAEA safeguards, the nuclear weapon states were required to end the nuclear arms race (Article VI) and to cease nuclear test explosions (Preamble). As well, all states party to the Treaty were to facilitate the fullest possible cooperation on the peaceful uses of nuclear energy (Article IV.2). NNWS' discontent with the lack of progress in relation to these provisions has been increasing since the Treaty's entry into force.

### III. THE NPT "GREY AREA": THE NON-APPLICATION OF SAFEGUARDS ON NON-PROSCRIBED MILITARY ACTIVITIES

Despite the success of the NPT-IAEA régime and the significance it has acquired over the years, the Treaty itself is not free of weaknesses. Indeed, while Agency safeguards are a fundamental element of the NPT régime, safeguards are not mandatory on all nuclear activities in signatory non-nuclear weapon states. This stems from the fact that the Treaty neither prohibits nor calls for the application of safeguards on fissionable material used in military nuclear activities

Since 1970, the Treaty has been re-examined at Review Conferences in 1975, 1980 and 1985. In the absence of meaningful progress in nuclear arms control and disarmament, many of the non-nuclear weapon states have in the past charged the nuclear-weapon states with not living up to their obligations under Article VI of the Treaty. The 1980 conference, in fact, actually failed to reach agreement on a consensus document largely over dissatisfaction with the superpowers' arms control efforts and the following conference in 1985 barely managed to agree on a final declaration. The last review conference before the expiry of the Treaty in 1995 is scheduled for 1990 and a positive outcome is not yet guaranteed.

The NPT-IAEA also faces other challenges. A group of "second-tier" nuclear suppliers is emerging,<sup>55</sup> among them, Argentina, Brazil, India, Israel and South Africa. These states are acquiring or already have acquired the capability to produce fissionable material and other nuclear items for export, and they do not necessarily require strict safeguards on their nuclear transfers. Also of concern are the nuclear activities of certain non-NPT signatory states that are widely suspected to be engaged in military nuclear research, possibly including the development of nuclear weapons.

While these problems are usually considered the most significant threats to the continuation of the NPT-IAEA régime, a new problem not heretofore recognized may soon arise.

not specifically proscribed by the Treaty.

The NPT (Article II) only specifically prohibits nuclear weapons and nuclear explosive devices of all types, and its provisions (under Article III.1) calling for the application of Agency safeguards require only that these be imposed on fissionable material in use in *peaceful* nuclear activities. Since the Treaty specifically prohibits only nuclear weapons and other nuclear explosive devices, and assigns to

the IAEA the obligation of applying safeguards on source or special nuclear material used for peaceful activities only, it creates a "grey area" where everything that is not explicitly proscribed by the Treaty and is not a peaceful nuclear activity is indirectly exempted from safeguards.

This chapter considers the origins of the NPT "grey area" and the scope and implications of the two possibilities it opens for the non-application of safeguards on what are called non-proscribed military activities.

### Origins of the NPT "Grey Area"

Since the first attempts to ensure the peaceful uses of nuclear energy, the fine distinction between peaceful and military uses has been evident. By inference, it has been difficult to draw the line between what should be subject to and what should be exempted from safeguards. In fact, as one expert has noted "...if the peaceful uses of atomic energy could be safely isolated, there would probably have been no need to create a special organization to deal with just one new means of generating power."<sup>56</sup> Hence, the international régime to ensure the peaceful uses of atomic energy that has developed over the years has always suffered from a problem of definition and interpretation. The Non-Proliferation Treaty itself is no exception to this.

As noted above, the NPT does not specifically prevent a NNWS from using nuclear material for non-proscribed military purposes outside the scope of Agency safeguards. At the same time, the IAEA's Statute leaves no doubt about the fact that the Agency's function concerning the application of safeguards is to ensure that there is no furtherance of *any* military purpose. Although this does not necessarily mean that non-explosive military activities under the NPT are in breach of the Statute, (because the NPT has assigned the IAEA the supervision of only peaceful nuclear activities), it does suggest that a significant weakness has been introduced into the international safeguards régime.

According to David Fischer, a former Assistant Director General for External Relations at

the IAEA, the inclusion at all of the (non-nuclear weapon) military option in the NPT was "...chiefly at the insistence of some industrial countries, in particular Italy, which at that time envisaged using a nuclear-powered engine in a naval supply ship."<sup>57</sup> Underlying the insistence of these countries that non-explosive military activities be exempted from safeguards could have been that by the late 1960s prospects looked bright for applying nuclear propulsion to ocean-going vessels, such as nuclear-powered submarines and surface ships.<sup>58</sup> In other words, these countries probably wanted to preserve intact an option for the future development and application of nuclear ship propulsion technology for military platforms, and consequently were opposed to imposing any treaty-related restrictions on it.<sup>59</sup>

The superpowers' thinking on this issue is not well known, but seems to be reflected in a US State Department press release on 14 March 1968, with which the Soviet Union apparently did not disagree.<sup>60</sup> The US press release stated that:

For purposes of the treaty a nuclear powered submarine is not, in itself 'a weapon.' The treaty does not deal with such military applications of nuclear energy as nuclear propulsion of warships. Therefore, nothing in the treaty would prohibit the provision of nuclear fuel for this purpose....<sup>61</sup>

Coming a decade after the elaboration of the IAEA's Statute, the US press release quoted above may seem perplexing. As noted earlier, "...under the Statute nuclear-propelled military vessels are prohibited, and Agency safeguards would seek to prevent such use of nuclear material."<sup>62</sup> Even though a formal contradiction was avoided by having the NPT take "account of the statutory difficulty the Agency would have in safeguarding non-weapon military activities, by requiring merely that these controls extend to peaceful activities,"<sup>63</sup> the question remains as to why the states so heavily involved in seeking to ensure the peaceful uses

of atomic energy would have created such an obvious weakness in the new régime.

Although it is difficult to trace precisely the thinking that produced this grey area in the NPT, one explanation may be that the Treaty was, as described by the US representative to the ENDC, "the maximum area of agreement now obtainable."<sup>64</sup> On this question, it is worth noting the reluctance of many NNWS during the negotiations to accept safeguards proposed for the Treaty that would have excluded the nuclear activities of the NWS.<sup>65</sup> As one source observed:

...concern has been expressed by states such as West Germany and Japan that nuclear industries in non-nuclear weapon states would risk disclosure of industrial secrets in the international inspection process, while their commercial competitors in nuclear-weapon states would not.<sup>66</sup>

Moreover, it was suggested by Japan, for example, that "[t]he seriousness of this problem, in terms of the national interests of non-nuclear weapon States, can never be understood by the nuclear-weapon States unless they themselves accept such safeguards."<sup>67</sup> Furthermore, both Canada and Italy had earlier taken the similar position that if mandatory IAEA safeguards were to be imposed they should be equally applicable to both nuclear weapon and non-nuclear weapon states.<sup>68</sup> These assertions were so strong that two of the three NPT depository states, the US and the UK, eventually had to agree to provide an undertaking to place some of their peaceful nuclear activities under safeguards.<sup>69</sup>

In these circumstances, it seems that any proposal from the three depository states, the UK, the US, and the USSR, for the application of safeguards on non-proscribed military activities would never have been acceptable to the NNWS, unless of course the NWS themselves had been ready to accept equivalent safeguards on their own non-proscribed military nuclear activities.

This, in turn, was extremely unlikely. At that time, the US was already basing a growing fraction of its nuclear-armed ballistic missile force at sea on nuclear-powered submarines and had deployed nuclear-powered attack submarines, guided missile cruisers and aircraft carriers. Similarly, the USSR was deploying nuclear-powered attack submarines and nuclear missiles on nuclear-powered submarines. Finally, it seems that Britain, for its part, was interested in ensuring that the proposed treaty would not affect or limit continuing and future US transfers of nuclear technology to the UK for military uses, including naval nuclear reactors and the nuclear fuel for them.<sup>70</sup> The drafters of the treaty certainly had no intention of debating this question in a forum dedicated, in their eyes, primarily, if not uniquely, to controlling horizontal nuclear proliferation. Consequently, the final agreed text of the NPT called on the non-nuclear weapon states to accept safeguards only on their peaceful nuclear activities.

To reiterate, the NPT obligates the imposition of Agency safeguards only on nuclear material in peaceful uses in NNWS and is silent on whether safeguards would be required on fissionable material for use in nuclear military activities not specifically banned under the NPT – non-proscribed military activities. The "grey area" opens up two plausible ways of securing access to nuclear material for use in non-proscribed military activities outside of Agency safeguards. First, a NNWS could seek a non-application, or cut-off, of Agency safeguards on nuclear material for use in a non-proscribed military activity by negotiating a specific arrangement to this effect under paragraph 14 of its INFCIRC/153-type safeguards agreement with the Agency. Alternatively, a NNWS member of the NPT could import fissionable material for use in a non-proscribed military activity, completely free of IAEA safeguards, if the material was acquired for this use under NPT Article III.2. Each of these possibilities will now be examined.

### The Cut-Off of IAEA Safeguards under Paragraph 14 (INFCIRC/153)

When the IAEA Safeguards Committee met in 1970 to advise the Agency's Board of Governors on the content of a safeguards agreement necessary to meet the obligations of the Treaty, it was not in a position to challenge the NPT's calling for the application of safeguards only on nuclear materials in *peaceful* activities in non-nuclear weapon states and implicitly exempting from safeguards all nuclear materials used in non-proscribed military activities. The only room for improving NPT-related safeguards was in specifying conditions under which the transfer of nuclear material could take place, between and within NNWS, and from one type of activity to another, that is, when fissionable material in peaceful use (and subject to mandatory NPT safeguards) could be transferred to a (non-proscribed) military activity and exempted from safeguards. To this end, the Committee recommended a series of procedures under the framework of the "Non-Application of Safeguards to Nuclear Material to be used in Non-Peaceful Activities," listed under paragraph 14 in INFCIRC/153. (Reproduced in Appendix IV.)

Paragraph 14 has emerged as central to the whole question under discussion: section (a) (i) requires that states wishing to use nuclear material in a non-proscribed military activity inform the Agency of the nature of that activity, making it clear that the nuclear material to be so used is not already under a prior "peaceful use only" restriction; and section (a) (ii) requires that the nuclear material to be used in non-proscribed military activities will not be diverted to the production of nuclear weapons or other nuclear explosive devices – thus reiterating the NNWS' commitment not to develop nuclear weapons. In addition, paragraph 14 stipulates that the state and the Agency must reach an arrangement as follows:

(b) The Agency and the State shall make an arrangement so that, only while the **nuclear**

**material** is in such an [non-proscribed military] activity, the safeguards provided for in the Agreement will not be applied. The arrangement shall identify, to the extent possible, the period or circumstances during which safeguards will not be applied. In any event, the safeguards provided for in the Agreement shall again apply as soon as the **nuclear material** is re-introduced into a peaceful nuclear activity. The Agency shall be kept informed of the total quantity and composition of such unsafeguarded **nuclear material** in the State and of any exports of such material; and

(c) Each arrangement shall be made in agreement with the Agency. The Agency's agreement shall be given as promptly as possible; it shall only relate to the temporal and procedural provisions, reporting arrangements, etc., but shall not involve any approval or classified knowledge of the military activity or relate to the use of the **nuclear material** therein.<sup>71</sup>

As Italy never built its nuclear-powered naval tender, and no other country has ever requested the cut-off, or non-application, of safeguards under INFCIRC/153 paragraph 14, its scope and implications have never been tested. For similar reasons, the effectiveness of the provisions of paragraph 14, against any possible diversion of nuclear materials to the fabrication of nuclear weapons is difficult to evaluate. However, some general comments on the possible use and implications of paragraph 14 can be drawn from reviewing the past experience of IAEA safeguards.

### *The operation and scope of the "cut-off" of safeguards*

As noted above, INFCIRC/153 paragraph 14 stipulates that a NPT signatory state must satisfy the Agency that the use of any nuclear material in a non-proscribed military activity will be carried out in such a manner as not to conflict with any previous undertaking that the

state may have given with regard to using the material exclusively for peaceful or non-military purposes. In other words, if the state intends to use nuclear material that has been acquired under a bilateral nuclear cooperation agreement, it has to ensure that the agreement does not preclude the material's use in a non-proscribed military activity. Not only would this exclude nuclear material that could be supplied by the Agency, but also the material from many of the most important suppliers, insofar as both the Agency and the main suppliers have requested and continue to request that the material be used for peaceful purposes only. Hence, the implications of such a measure, for nuclear-ship propulsion, for example, have been described as requiring that

...the state wishing to use the option would have to obtain "new" (for instance, freshly-mined) uranium, then process it, enrich it (probably to the very high level of enrichment needed for submarine fuel) and perhaps fabricate it, all under special supervision, so as to demonstrate that it was exempt from any "no-military-use" clause.<sup>72</sup>

While this description correctly identifies some of the difficulties faced by a NNWS intending to use INFCIRC/153 paragraph 14, it should not be taken that this is the only way to operate under paragraph 14. The process described above refers only to nuclear-powered submarines as one non-proscribed military activity "allowed" under paragraph 14. Further, it is based on the premise that the NNWS would be acquiring nuclear material from one of the main suppliers. As well, the above scenario is most likely the one the Agency would like to see implemented in the event INFCIRC/153 paragraph 14 is ever invoked by a signatory NNWS. On all three counts the real situation could be quite different.

First, nuclear-powered submarines are not the only non-proscribed military activity that can be envisioned for the cut-off of safeguards.

Other such activities could include nuclear propulsion for space vehicles and military research reactors, to name but two.

Second, this line of argument assumes that there is no possible way of acquiring nuclear material without a "peaceful use only" condition. Yet, some countries import nuclear materials without such a condition from a variety of external sources. To cite one notable example: France acquires nuclear material from African sources without any restrictions for use in its nuclear weapon programme. Further, some second-tier nuclear suppliers, non-signatory to the NPT, do not necessarily require strict safeguards on their nuclear exports and they are increasingly in a position to supply not only raw nuclear material but also processed and enriched material. In their case, it is not clear if they all require a peaceful use only restriction.

Last, (and as suggested in the above scenario), it is not certain that all transformation of the material will be under "special supervision," i.e., under IAEA inspection. As will be examined later, the exact meaning of the provisions of INFCIRC/153 paragraph 14 remain to be defined.

Thus, while acquiring nuclear material free of any peaceful use only restriction is not an insurmountable problem, it appears that once a state has "proven" to the IAEA the eligibility of the nuclear material to be exempted from safeguards, no other legal barriers stand in its way. Indeed, while sections (b) and (c) of paragraph 14 specify that the Agency and the state must make a specific arrangement and that any lack of agreement might be perceived as the Agency's refusal to sanction the withdrawal of safeguards, nothing in the procedures outlined in INFCIRC/153 paragraph 14 really provides the Agency with such a power of refusal. In fact, paragraph 14 only stipulates that "[t]he Agency's agreement shall be given as promptly as possible."<sup>73</sup> Furthermore, it is difficult to imagine on what grounds the Agency would be able to justify such a refusal. On the one hand, the



Agency has no power or "legal basis" to judge the legitimacy of any non-proscribed military activity because neither INFCIRC/153 nor the NPT define such an activity or what it can encompass. On the other hand, the Agency cannot verify the authenticity of the declared activity because paragraph 14 stipulates that the arrangement shall only identify "...to the extent possible, the period or circumstances during which safeguards will not be applied [and]...shall not involve any approval or classified knowledge of the military activity or relate to the use of the **nuclear material** therein" (emphasis added).<sup>74</sup>

To summarize, a state wishing to withdraw material from safeguards under INFCIRC/153 paragraph 14 may do so, but only if the nuclear material to be exempted from safeguards is not under any previous "peaceful use only" restriction, because material involved in such activities cannot be used for any military purpose whatsoever. As noted earlier, the Safeguards Committee in drafting INFCIRC/153 attempted to narrow, but could not close, the loophole in the Treaty. Thus, once a state has "proven" that it possesses the material free of any restriction, it has only to comply with the following procedures listed under section (b) of paragraph 14:

- the state must agree that the safeguards will be removed from the nuclear material under use in a non-proscribed military activity "only while the material is in such an activity";
- the safeguards will "again apply as soon as the nuclear material is reintroduced into a peaceful nuclear activity"; and
- the Agency will be kept "informed of the total quantity and composition of any such unsafeguarded nuclear material" and on all exports of this material.

Obviously, the lack of specificity and vague terminology describing the procedures for the withdrawal of safeguards leaves scope for conflicting interpretations. This, in turn, can com-

promise the effectiveness of these measures to reduce the risks of diversion of unsafeguarded nuclear material to weapon production.

There are at least three problems with the procedures outlined in INFCIRC/153 paragraph 14 (b): 1) they fail to specify the length of time during which Agency safeguards can be withdrawn from the nuclear material to be used in a non-proscribed military activity; 2) they lack detailed reporting requirements concerning the exact composition of the nuclear material to be withdrawn from safeguards and the frequency of reports to be submitted to the Agency; and 3) they provide no definition of what constitutes "non-proscribed military" as opposed to "peaceful nuclear activity."

Some problems associated with the language and meaning of INFCIRC/153 paragraph 14 can be better understood by considering the case of fissionable material being used to fuel nuclear-powered submarines (SSNs). Not only may the operation of nuclear-powered submarines, today, be considered the most plausible justification regarding the cut-off of safeguards under paragraph 14, but also, bear in mind, paragraph 14 was conceived envisaging this use. Thus, if there are problems interpreting the procedures outlined in paragraph 14 governing the cut-off of safeguards for nuclear submarines, there could be even more significant problems were the Agency asked to consider other non-proscribed military activities.

As to the nuclear-powered submarines, a number of problems can be anticipated concerning the interpretation of INFCIRC/153 paragraph 14. First, considering paragraph 14 (b) does not specify the time frame for withdrawal of safeguards, and since nuclear submarines have a life cycle of some thirty years and are only refuelled every five years or more, a state could conceivably exempt the nuclear submarine fuel indefinitely from safeguards. Second, the absence of requirements concerning frequency of reports, as well as a lack of definition of the term "composition" of the nuclear material involved, could allow a state to withhold

from the IAEA all or most of the significant information concerning its nuclear submarine fuel or only sporadically to provide the Agency with incomplete reports. Finally, since paragraph 14 fails to adequately distinguish between "peaceful" and "non-proscribed military" activity, the use of the fissionable material would be undetermined giving rise to the possibility that a state could exempt from safeguards different stages of the nuclear submarine fuel cycle.<sup>75</sup>

All the above problems concerning the cut-off of safeguards under INFCIRC/153 paragraph 14 are significant. And, they would necessarily be magnified in scope because section (c) of paragraph 14, stipulating that "classified knowledge" does not have to be divulged to the Agency, has to be read in conjunction with sections (a) and (b). Because "classified" information would likely be determined by the state in question and not by the Agency, a state's claim to determine the scope of INFCIRC/153 paragraph 14 would be strengthened vis-à-vis the Agency. This, in turn, could allow a state to provide incomplete information to the Agency as to the exact nature of the fissionable material used as nuclear submarine fuel and on the spent fuel, since to give complete information could involve disclosure of what is considered as classified (military) information.<sup>76</sup> Such information could include data on the power rating of the nuclear submarine reactor, the quantity and enrichment level of the nuclear fuel, the fuel burn-up rate, and information relating to operational deployment.

The problem could assume even larger proportions were a state to argue that the Agency cannot apply safeguards at the stage when the fuel is fabricated (at an enrichment and/or a fuel fabrication facility), nor at the stage when the spent fuel is reprocessed (at a reprocessing plant), because such verification would amount to revealing the same militarily sensitive information as in the original case. Thus, a state

could argue to keep nuclear activities besides the nuclear fuel itself outside Agency safeguards, including, for instance, such front-end nuclear activities as enrichment and fuel fabrication, and back-end nuclear activities including reprocessing.

Questions of interpretation of the application of safeguards on "sensitive" stages of the fuel cycle could create significant problems for the Agency, in the event it was actually asked to agree to a cut-off of safeguards under paragraph 14. To underscore the problem, David Fischer, who was with the Agency's Secretariat at the time of the negotiations on INFCIRC/153, said "[w]e explained to the Committee that reprocessing the material would be regarded as a peaceful activity, requiring the re-imposition of safeguards." But as Fischer himself acknowledged, "[w]hether, in practice, the IAEA would be able to 'enforce' this interpretation -i.e., that reprocessing is a 'peaceful' activity- is open to question."<sup>77</sup>

Yet, writing in 1983, Hans Blix, current Director General of the IAEA, argued that the overall requirements of INFCIRC/153 paragraph 14 would be sufficient to prevent a state from operating a nuclear fuel cycle outside the scope of safeguards. He noted, for instance, that the irradiated fuel sent to a reprocessing facility after utilization in a nuclear submarine would require the re-imposition of safeguards.<sup>\*78</sup> While Blix's comments may be correct in relation to the most comprehensive nuclear fuel cycle, because it would be very difficult for a state to claim exemption from safeguards on the grounds that disclosure of classified knowledge is involved at each stage of the fuel cycle, he did not address the difficulties the IAEA would encounter in trying to impose its views.

While keeping sensitive nuclear facilities outside of international safeguards would be extremely problematic for the IAEA because the

\* For a similar understanding, see the letter to the authors from Christopher Herzig, the IAEA's Director, Division of External Relations, attached as Appendix V.

two principal paths to nuclear weapon production involve enriched uranium and plutonium produced in such facilities, it should also be evident that any use of INFCIRC/153 paragraph 14 to cut-off safeguards on non-proscribed military activities would create problems for the Agency.

### *Implications*

Because INFCIRC/153 paragraph 14 does not give the IAEA any right to verify by inspection, or by other means, any information from a state concerning the use of unsafeguarded nuclear material for non-proscribed military activities, the immediate consequence would be to deprive the Agency of the means to verify the authenticity of any of this information, causing it to lose track of the material.

This would result in a significant break in the Agency's continuity of knowledge concerning the ways in which any nuclear material is being used in a state. As a consequence, the IAEA would not be able to certify the nuclear status of the state involved in such activities, since the IAEA has always recognized that it is "...necessary for all nuclear material in a country's fuel cycle to be safeguarded if the IAEA is to be in a position to give assurances of non-diversion for the State as a whole."<sup>79</sup>

Otherwise, in cases where the IAEA is unable to apply complete safeguards on a state's nuclear fuel cycle, all it can do is certify that only those items placed under its supervision are not being used in any prohibited military activity. This is the case now for about eight non-signatories to the NPT that have retained or entered into INFCIRC/66/Rev.2-type agreements with the Agency for the supervision of specific equipment, facilities and/or nuclear material. In these cases, the Agency is unable to comment on the rest of the state's nuclear activities or give an assurance that no production of nuclear weapons is taking place.

Finally, it should also be emphasized that the problem could be further exacerbated since INFCIRC/153 paragraph 14 can facilitate the operation of undeclared nuclear facilities.

Indeed, while the Agency's ability to provide assurance of non-diversion is based on material accountancy, the Agency must be provided information on the design of the facility in which nuclear material is being used, for instance, in this case, of the nuclear submarine reactor. Since INFCIRC/153 paragraph 14 does not require such information, the operation of clandestine nuclear facilities could be facilitated, because in the absence of knowledge regarding the nuclear facility engaging in non-proscribed military activity, and with little or no knowledge on the material in use, it would be impossible for the IAEA to detect any anomaly, namely, whether any material reported to be used in non-proscribed military activity is missing or being used in an undeclared facility.

### **The Absence of IAEA Safeguards Under NPT Article III.2**

As previously noted, in addition to paragraph 14 of INFCIRC/153, the NPT "grey area" provides another possibility for the use of nuclear material without Agency supervision. In relation to the NPT requirements concerning application of safeguards to the transfer of fissionable material between parties, Article III.2 stipulates that:

*Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production 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 this article (emphasis added).*

Thus, by its silence on the question of the application of safeguards to nuclear material transferred for "non-peaceful" or "non-proscribed" military activities, NPT Article III.2 indirectly authorizes the signatory NNWS to import nuclear material without imposition of Agency safeguards; however, only on the condi-

tion that the fissionable material is imported from non-signatory (NPT) or nuclear weapon states. Indeed, because all signatory NNWS have so far used fissionable material only in peaceful nuclear activities and, accordingly, have accepted IAEA safeguards on all the nuclear material in their possession, they would only be in a position to transfer fissionable material for non-proscribed military activities to another NNWS by asking for a cut-off of safeguards under INFCIRC/153 paragraph 14. This requirement, of course, is not necessary in the case of NPT non-signatory and nuclear weapon states because these states have only a part of their nuclear programmes under safeguards. Accordingly, they are the only states that can transfer fissionable material without safeguards under NPT Article III.2.

#### *Operation and Scope of NPT Article III.2*

In comparison to INFCIRC/153 paragraph 14, the scope of NPT Article III.2 is more difficult to ascertain because no written procedures are available. It may be recalled that in drafting the Agency's model safeguards agreement, INFCIRC/153, the Safeguards Committee could only devise procedures for the application and/or cut-off of safeguards on fissionable material placed under the IAEA's responsibility, i.e., on material in peaceful uses. Considering fissionable material under NPT Article III.2 would never be placed under Agency responsibility, at any point, before being transferred (from a NPT non-signatory or a nuclear weapon state) to a signatory NNWS for non-proscribed military purposes, the Safeguards Committee, or the Agency, could not devise any specific conditions or restricting procedures in this regard. It is, therefore, difficult to determine the precise scope of NPT Article III.2, although it may be argued that the extent of the absence of safeguards on non-proscribed military activities under NPT Article III.2 will eventually be determined only by the indirect involvement of the IAEA and only if the Agency could "prove" that the nuclear material being used without

safeguards under Article III.2 does at some point enter a peaceful nuclear activity. Indeed, in such a case, the Agency could claim that the Treaty Article III.1 obligation of a NNWS is to place this material under IAEA safeguards. In practice, though, it may be difficult for the Agency to act on that claim.

On the one hand, the NPT requires signatory NNWS to accept safeguards on fissionable material in peaceful uses only (Article III.1). However, since neither the IAEA nor the NPT provides any definition of terms such as "peaceful" and "non-peaceful," it would be difficult for the Agency to impose its views on what should be considered inherently "peaceful." On the other hand, the possibility exists that the Agency may not even be in a position to know about the existence of unsafeguarded nuclear material in a state since the material can be transferred free of safeguards to the NNWS pursuant to NPT Article III.2 which requires safeguards only on nuclear material transferred for peaceful purposes.

Given these limitations, two scenarios can be drawn. First, the IAEA might only find out about the presence of unsafeguarded material in a state had that state decided at some point to use the material in a facility already under Agency monitoring. In such a case, the state would inform the Agency that no further safeguards were required on the facility because no material requiring safeguards was being used. This could be argued on the grounds that according to INFCIRC/153 paragraph 8:

The Agreement should provide that to ensure the effective implementation of safeguards thereunder the Agency shall be provided...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.

the cut-off of safeguards for the same purpose under INFCIRC/153 paragraph 14.<sup>81</sup>

### *Implications*

The implications to the Agency of using Article III.2 of the NPT as an avenue to pursue non-proscribed military activities are greater than those of INFCIRC/153 paragraph 14.

In comparison with INFCIRC/153, NPT Article III.2 involves not only the absence of reporting on the quantity, composition, and actual use of fissionable material, but also heightens the possibility of keeping nuclear facilities outside safeguards, thus increasing the risk that the material will never become subject to safeguards.

Hence, in the absence of any previous Agency involvement with the nuclear material, and in the absence of any knowledge regarding its use, and the impossibility of determining whether the material will ever attract safeguards, the IAEA would be deprived of *all* means to certify that no material is being used to manufacture nuclear weapons. The obvious result would be to render insignificant – in terms of the Agency's capacity to assure compliance with the NPT – remaining safeguards on the state's other nuclear activities. It would also significantly increase the risk of diversion of unsafeguarded material to weapon use.

### **Non-Proscribed Military Activities**

Although both NPT Article III.2 and INFCIRC/153 paragraph 14 may be used to pursue legitimate non-proscribed military activities, the fact remains, however, that these could also open an "easy" way to acquire and use fissionable material for weapon production in violation of the NPT.

At present, at least five possible non-proscribed military activities involving the use or production of weapon grade material can be envisioned, each of which presents opportunities for the diversion of nuclear material to weapon manufacture.

Obviously, because the nuclear material subject to safeguards under INFCIRC/153 should only be – in accordance with NPT Article III.1 – the material "in all peaceful nuclear activities," and since no definition exists as to the precise meaning of the term "peaceful," it seems that, under this scenario, the Agency would not be in a position to enforce its view on the requirement for safeguards on the nuclear material. As a consequence, the Agency may also lose its right to require information on an installation when such material is being used.

A second scenario is of a signatory NNWS building a dedicated undeclared facility for non-proscribed military activities. Under this scenario, the IAEA would not be involved at all with such a facility because as noted above, under INFCIRC/153 paragraph 8, states can argue that facilities become subject to IAEA monitoring only when material *requiring* safeguards is used in them.<sup>80</sup> This would be even more problematic for the IAEA than the first scenario, because in this case the Agency would be deprived of knowledge of the existence of unsafeguarded nuclear material as well as on the facility in which it was to be used.

The conclusion that can be drawn from the above discussion is that in the absence of any procedures and definitions, were the IAEA ever to discover the presence of unsafeguarded fissionable material in a signatory NNWS, it would have difficulty asserting its view that the material is being used in peaceful activities and, hence, that it should attract safeguards. It follows that the Agency might not be able to retain its right to monitor facilities where such material is being used. This, on the other hand, increases the chances that material transferred under this option may never come under IAEA safeguards. In sum, the scope of NPT Article III.2 to pursue non-proscribed military activities is significantly more important than the scope of

Because the Agency would be denied all information and involvement with the material under NPT Article III.2, a state could be relatively free to use the material as it chose. For this reason, the following discussion focuses on non-proscribed military activities undertaken under INFCIRC/153 paragraph 14, since, in contrast to NPT Article III.2, it specifies certain procedures to be followed in regard to the cut-off of safeguards on nuclear material for use in non-proscribed military activities. These procedures, however, can be subject to differing interpretations and may not necessarily, therefore, be effective in preventing the diversion of nuclear material.

### ***Nuclear Ship Propulsion***

Even though, to date, only the five nuclear weapon states, (the UK, the USSR, the US, France, and China) have actually developed and continue to use nuclear ship propulsion technology,<sup>82</sup> the first and perhaps most plausible use of INFCIRC/153 paragraph 14 by NPT-signatory NNWS involves nuclear ship propulsion.

Modern naval nuclear reactors are fuelled either by highly-enriched uranium, as in the case of the US, the UK, and the USSR; or by low-enriched uranium, in the case of France.<sup>83</sup> Enriched uranium can be diverted to weapon use in a number of ways. Submarine reactor fuel consisting of highly enriched (over 97 percent U235 enrichment level) weapon-grade uranium<sup>84</sup> can be diverted to weapon use in two ways. First, because the material is already at an enrichment level suitable for weapon use, it can be diverted directly to weapon manufacture. Second, spent fuel from highly enriched uranium (typically at 70-80 percent U235 enrichment level)<sup>85</sup> can be relatively easily converted to weapon use.<sup>86</sup> Low-enriched uranium (LEU), while not suitable for direct use in weapons, yields spent fuel containing plutonium, which can be extracted at a reprocessing plant and could be subsequently used in the manufacture of nuclear weapons.

Although it is unlikely that excessively large

quantities of the highly enriched uranium (HEU) could be diverted directly to the production of nuclear weapons because of the risk of detection, this does not necessarily exclude the possibility of smaller amounts of HEU being diverted over a period long enough to accumulate sufficient material for weapon use. This would be the case, incidentally, even had the Agency been periodically provided with information concerning the quantity and composition of the unsafeguarded fuel, because INFCIRC/153 paragraph 14 does not provide for verification of such information.

To further clarify this point, it should be noted that in the case of nuclear submarines using HEU as fuel, the reactor core in medium-sized boats requires a charge of an estimated 100 kg of HEU at any given time.<sup>87</sup> Since only 25 kg or so are sufficient to make a nuclear weapon using HEU, the danger of diversion would increase proportionately with the size of a state's submarine fleet. Regarding spent fuel, submarines fuelled on HEU yield spent fuel at an enrichment level suitable for the manufacture of nuclear weapons without necessarily requiring further re-enrichment. Submarines using LEU yield spent fuel from which plutonium can be extracted in a reprocessing facility. In the absence of information on the design of the naval reactors and without knowledge about the functioning of the submarines (such as the reactor core sizes and the actual quantities of nuclear materials involved), it would be practically impossible for the Agency to certify that no diversion of fissionable material had taken place. Were nuclear ship propulsion reactors based on land/shore facilities for training and engineering purposes, the same scenario would be valid.

### ***Military Research Reactors***

Another possible means of diverting unsafeguarded nuclear material, using INFCIRC/153 paragraph 14, would be to declare one or more research reactors as being in use for non-proscribed military research only. The nature of such research could, for instance, include the

irradiation of military equipment in order to ascertain how well it would stand up to the effects of nuclear explosions<sup>88</sup> and whether it could be effectively protected against damage from radiation and electro-magnetic pulse. The risk associated with this scenario depends largely on the size and configuration of the reactor, the type of fuel and, if the fuel is not HEU that can be directly diverted to weapon production, the availability of an unsafeguarded reprocessing plant, in order to extract contained plutonium from the spent fuel.

#### ***Nuclear Propulsion of Space Vehicles***

A third category of non-proscribed military activity, and hence of relevance to the INFCIRC/153 paragraph 14 exemption, concerns the nuclear propulsion of space vehicles and satellites. Although the technology for nuclear-powered space vehicles is not yet within the reach of the NNWS, satellite technology is coming more and more within their range. As such, it provides another possible justification for using INFCIRC/153 paragraph 14 in order to exempt nuclear material from safeguards and, thus, the possibility of a misuse of the unsafeguarded material.

#### ***Armour-piercing ordnance***

A fourth possible non-proscribed military activity concerns the use of depleted uranium in armour piercing (anti-tank) projectiles, to add strength and weight to the ordnance. Depleted uranium, on the other hand, can also be used in some types of nuclear reactors to increase the production of plutonium.<sup>89</sup> Although natural uranium can be used in the same way, the possibility that depleted uranium can be used to assist in weapon production cannot entirely be ruled out.

#### ***Radiological Weapons***

Fifth, in terms of non-proscribed military activities, is the production of so-called radiological weapons, designed to kill or cause injury by disseminating radioactivity. The material involved in the production of such weapons would be impossible to track once released from safeguards and, by its very nature, would probably not be retrievable to safeguards.<sup>90</sup> Since these weapons would be made of irradiated fuel, significant quantities of spent fuel could be taken out of the scope of safeguards indefinitely. Hence, there would always be the possibility of an elaborate cover-up to extract fissile material from the spent fuel for the production of nuclear weapons. The problem here is that the IAEA theoretically could not obstruct such an undertaking, since radiological weapons would not involve the detonation of a nuclear explosive device.

Following from the above, it is clear that given the risks for diversion of unsafeguarded nuclear material under its terms, and whether it is under NPT Article III.2 or under INFCIRC/153 paragraph 14, the NPT "grey area" constitutes a dangerous weakness in the existing nuclear non-proliferation and safeguards régime. Until the recently announced Canadian decision to acquire 10 to 12 nuclear-powered submarines, however, the existence of the INFCIRC/153 paragraph 14 provision for non-application of safeguards, as well as the NPT's silence (under Article III.2) on the question of safeguards on nuclear material transferred for a non-proscribed military activity, was almost forgotten. Unfortunately, the Canadian decision could soon contribute to the reversal of this fortuitous situation.

#### IV. CANADIAN USE OF NUCLEAR MATERIAL WITHOUT SAFEGUARDS FOR SUBMARINE PROPULSION

Canada's decision to acquire a fleet of nuclear-powered attack submarines must be assessed in terms of the importance of NPT-IAEA safeguards and the ability of the Agency to verify the NPT obligations of non-nuclear weapon states. Ottawa's decision must also be viewed in the context of Canada's longstanding role as one of the so-called White Knights of the non-proliferation régime, that is, as one of its staunchest defenders. This chapter will consider the options available to Canada (INFCIRC/153 paragraph 14 and NPT Article III.2) for acquiring free of IAEA safeguards the enriched uranium needed to fuel the submarines; the chances of creating a good precedent; the possible consequences for Canada's own non-proliferation diplomacy and nuclear export policy as well as other problems related to the acquisition of the fuel.

Canada has three possible avenues for the acquisition of nuclear fuel for submarines outside of Agency safeguards: (1) it could import the nuclear material at an enrichment level suitable for the fuelling of submarines; (2) it could set up an enrichment facility and produce the enriched uranium indigenously; or (3) it could send its own natural or refined uranium to another country for enrichment.

Should Canada choose to import submarine nuclear fuel, it would become the first non-nuclear weapon state party to the NPT to acquire fissionable material outside of safeguards for a military purpose. This would be done by exploiting the weakness of Article III.2 of the NPT which does not require the imposition of safeguards on nuclear material transferred for a non-peaceful nuclear activity.

Alternatively, should Canada decide to enrich its own nuclear material it would be the first NNWS party to the NPT to invoke the INFCIRC/153 paragraph 14 exemption clause, for the cut-off of safeguards. This would

require the Canadian government to open negotiations with the IAEA on paragraph 14 of INFCIRC/164 (the Canada-IAEA safeguards agreement based on the model of INFCIRC/153), in order to arrange for the withdrawal of safeguards on the enriched uranium to be used to fuel the submarines.

Third, were Canada to have its own uranium enriched elsewhere, the precedent created would be determined by the composition of the material sent abroad for enrichment. If, as would be likely, natural uranium were transformed in Canada before being sent abroad,<sup>91</sup> it would automatically become subject to IAEA safeguards.<sup>92</sup> In this instance, Canada would have no option but to invoke paragraph 14 of INFCIRC/164 regarding non-proscribed military activities and withdraw the nuclear material from safeguards probably at the point where it leaves the conversion facility.

On the other hand, were Canada to send natural uranium or yellowcake for enrichment abroad, there would be no requirement to invoke INFCIRC/164 paragraph 14, because safeguards are not mandatory when nuclear material is in this composition<sup>93</sup> and because it would be sent to a NWS and returned to Canada for a military as opposed to a peaceful nuclear activity. In such a transfer, cut-off of safeguards would not be required as this would correspond to using NPT Article III.2.

In any case, Canada would be setting a precedent that has never been fully assessed. So far, the Canadian government has not indicated whether it intends to acquire the British *Trafalgar* or the French *Rubis/Amethyste* submarine (the two official contenders for the Canadian Submarine Acquisition Programme) and thus where and how Canada intends to obtain the necessary fuel. The only substantive comments by the Canadian government, to date, have been that no international monitoring of



the submarines or their fuel will be permitted,<sup>94</sup> but that (in creating a precedent) Canada will take care to set a good example.<sup>95</sup>

The contention that far from undermining the NPT-IAEA safeguards régime in acquiring safeguards-free nuclear material Canada may actually set a good example, raises some important questions. To begin with, were Canada to invoke INFCIRC/164 paragraph 14, would it be possible for Ottawa to negotiate an arrangement with the IAEA that would satisfy both the national security and commercial confidentiality requirements of the submarine supplier and yet still meet the Canadian government's own pledge to show "how it [paragraph 14] should properly be used"?<sup>96</sup> And if so, would such an arrangement be enough to reassure the international community that a diversion of nuclear material to weapon production was not taking place, and would this be an example worthy of emulation by other NNWS?

Alternatively, were Canada to choose the NPT Article III.2 route and decide, as a good gesture, for instance, to guarantee the IAEA that the spent fuel would be returned to the supplier and/or that the supplier would supervise the submarine fuelling programme and provide Canada with only the quantity of material required for one reactor core per submarine at a time, would this, again, be sufficient to reassure the international community and provide a good example for others?

### Setting a good precedent?

#### *Paragraph 14: INFCIRC/164 - (INFCIRC/153)*

As noted, in INFCIRC/153 the procedures of paragraph 14 would require that Canada inform the IAEA about the nature of the non-explosive military nuclear activity envisaged, in this case, the acquisition of nuclear submarines and fuel. Canada would then have to initiate discussions with the IAEA concerning the points at which the withdrawal and reimposition of safeguards would take place and then agree to inform the IAEA as to the quantity and composition of the nuclear material.

As mentioned earlier, the requirements of paragraph 14 can be interpreted in different ways. In order to create a good precedent, goes one argument, paragraph 14 procedures should be strictly adhered to, for instance, by accepting safeguards up to the point where the nuclear fuel enters the submarines, and the reimposition of safeguards just as soon as the fuel leaves the submarines. It could also include keeping the Agency informed of the total quantity and composition of the unsafeguarded material, say, on an annual basis.

While at face value this scenario seems quite workable and could be seen as not damaging the NPT or the IAEA, a deeper look at the facts would reveal a Pandora's box of inherent problems.

One problem could be the submarine supplier opposing such a strict reading of INFCIRC/153 paragraph 14. This is because any information provided to the IAEA by Canada, under a strict reading of paragraph 14, disclosing, for instance, the total quantity and composition of the fuel just before and just after its use in the submarines, would amount to the supplier's acceptance of revealing information on its own nuclear submarine programme. It cannot be overemphasized here that both contenders for the Canadian contract are offering military platforms that are in use and will remain in use for many years by their own navies. In fact, the French *Rubis/Amethyste* submarine is the most recent nuclear submarine design in the French arsenal. For that reason, it is not certain that the supplier of the submarine would be ready to agree to any international monitoring of submarine fuel before or after its use in the Canadian submarine programme, as this would mean revealing "sensitive" military information on its own naval nuclear programme. It should also be noted that the supplier may have similar objections, even if the submarine fuel were to be fabricated in Canada, since the same "classified" military information relating to quantity and composition would be involved.

But even if the supplier were ready to accept

a compromise reading of paragraph 14 involving, for instance, inspection of the fuel before and after its use in the submarine and annual Canadian reporting on the fuel to the Agency, would this really be setting a good precedent in terms of the efficacy of the NPT? For if the Agency were not given the design and operational information on the nuclear facilities, namely, the submarine reactors, it could not determine how or in what quantity the material had actually been consumed and how much spent fuel should remain. Furthermore, if the IAEA could not verify (by on site-inspections or other intrusive means) the information received annually from the state, the information would be of no value in terms of proving that no diversion to weapon production had taken place.

So, with no information on the functioning of the reactor and with no means to verify any of the information it had received, the Agency would not be unable to ascertain the exact use of the material in the non-proscribed military activity. The result, of course, would be that the IAEA would not be in a position to certify that the state was complying with its NPT obligations. Hence, it is easy to understand that any use of INFCIRC/153 paragraph 14 would not be in the best interests of the NPT-IAEA régime.

### ***NPT Article III.2***

Is there a way in which Canada could set a *good* precedent by acquiring nuclear material free of safeguards under Article III.2 of the NPT? As explained earlier, under NPT Article III.2, a state could be free to acquire fissionable material outside the purview of the IAEA. Such a course of action could not conceivably be seen as furthering the interests of the non-proliferation régime. But would the recipient's unilateral declaration of the fuel to the IAEA with the guarantee, for instance, that the supplier would take back the spent fuel and provide only the quantity necessary for each submarine reactor core help to create a good precedent?

Again, it could be argued that such a scenario would indeed correspond to setting a good precedent, because of the voluntary declaration that the state would be making. But again, a deeper look at the facts reveals a different picture. As in the case of INFCIRC/153 paragraph 14, the first question to be resolved is whether the supplier would agree to such an undertaking? Would the unilateral offer be merely a declaration of the fuel to the Agency or would it involve actual inspection of the fuel by the IAEA before it enters and after it leaves the submarines? And, even then, as in the case of INFCIRC/153 paragraph 14, what would be the use of such an action if the Agency were not continuously kept informed of the actual use of the material and had no way to "match" this information with design information or, more important, if the IAEA could not verify for itself the authenticity of the data supplied. Obviously, unless these requirements were met, how positive would a "guarantee" be that the spent fuel being returned to the supplier corresponded to the actual quantity of spent fuel yielded by the nuclear submarines. How could a recipient state prove that the material it had received had indeed been used only for the designated non-proscribed military activities?

Since there are no meaningful answers to such questions, it would seem that any use of fissionable material for whatever purpose free of IAEA safeguards under NPT Article III.2 or INFCIRC/153 paragraph 14 could only serve to weaken confidence in Agency safeguards. Some might argue that setting a good precedent could nonetheless be achieved by substituting bilateral (or supplier-recipient) arrangements in lieu of Agency safeguards.

### ***Bilateral Safeguards***

Considering what has been said about the possibility of creating a good precedent either by using INFCIRC/153 paragraph 14 or by going outside the scope of the Treaty (Article III.2), there is a strong possibility that Canada might elect to devise its own "solution" to the problem,

that of bilateral safeguards, or monitoring arrangements, between Canada and the supplier state.

While this course of action would not change the fact that Canada would still be creating a precedent, (either by using INFCIRC/164 paragraph 14 or NPT Article III.2), the Canadian government might consider this desirable for at least two reasons. First, given the longstanding Canadian commitment to the creation and maintenance of the nuclear non-proliferation régime, Canada would certainly prefer to avoid having to use nuclear material for its nuclear-powered submarines without any safeguards whatsoever. In terms of precedent-setting and the example created for other countries, Canadian officials would probably prefer that Canada accept some sort of safeguards short of international safeguards on its naval nuclear propulsion programme. And while bilateral safeguards (i.e., monitoring arrangements administered by the supplier) might be Canada's preference, these would also likely be the only safeguards-type provisions acceptable to the supplier state.

In this context, there may be reason to believe that regardless of how Canada chose to obtain the nuclear fuel for its submarine programme (either under INFCIRC/164 paragraph 14 or under NPT Article III.2), some sort of bilateral monitoring arrangement would have to be instituted.

If INFCIRC/164 paragraph 14 were Canada's preferred option, one might expect bilateral safeguards-type arrangements to take over at the point where Agency safeguards are cut off. If NPT Article III.2 were the chosen route, bilateral arrangements could possibly apply to some part of, if not on the entire submarine programme. It should be noted that in both cases, Canada would probably claim to be creating a good precedent because such a course of action (i.e., bilateral safeguards-type arrangement) is neither required under the Treaty nor under the related IAEA (INFCIRC/153) safeguards system. But, even if the NPT-IAEA régime does not require safeguards on non-proscribed nuclear

military activities, would Canada's acceptance of bilateral safeguards-type arrangements really make a difference? In other words, could this really be considered setting a good precedent?

To understand the implications of choosing bilateral arrangements over Agency safeguards, it is important to keep in mind that, today, over 95% of the nuclear facilities in all non-nuclear weapon states are under the safeguards administered by the IAEA.<sup>97</sup> While the importance of this number reflects wide adherence to the NPT and the growing importance that the IAEA safeguards system has acquired over the years, the remaining small fraction of facilities not under international control are not necessarily safeguarded under bilateral arrangements. On the contrary, a significant portion of that fraction consists of unsafeguarded facilities built indigenously in countries that have not signed the NPT and have refused to accept comprehensive safeguards or, in a marginally less significant manner, of facilities transferred without any safeguards conditions whatever.<sup>98</sup>

The near absence of bilateral safeguards-type arrangements, today, can be explained by states' preference since the late 1950s to rely on an international system. When the need for an international control system began to be felt, states realized that not only would the continuation of the practice of bilateral arrangements have weakened the effectiveness of the new IAEA safeguards system but also could have jeopardized the chances of making the Agency's safeguards system truly international. The states most committed to the idea of an international régime, therefore, undertook to transfer the task of administering safeguards directly to the IAEA. The motivations underlying the preference for an international régime over bilateral arrangements were numerous and intermingled and remain valid to this day.

First, Agency safeguards were to be applied according to internationally agreed norms, thus assuring all nuclear suppliers subscribing to the régime that their nuclear transfers would require

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common safeguards. Such assurances had two advantages. On the one hand, the supplier could close off all possibilities of safeguards "bargaining" by potential recipients. On the other hand, if all suppliers were to subscribe to an international régime they would all be subject to the same rules requiring uniform safeguards on recipients, hence the question of safeguards would never stand in the way of closing a deal.

A second important advantage of Agency safeguards was that they provided a higher level of assurance against diversion. The issue here, of course, was not so much that of the supplier's ability to apply an adequate verification system as the course of action in case of misuse of the nuclear material. In many cases, it was feared that suppliers might feel compelled to conceal the wrongdoing, attempting instead to themselves correct the situation. Because the occurrence of such situations would be minimized under an internationally controlled verification process, assurance of no diversion given by the IAEA would carry greater weight than any bilateral assurances. Such Agency assurances, in turn, were essential for the creation and maintenance of a truly international non-proliferation régime. In fact, this was the only system that could contribute to attracting more states to subscribe to a nuclear non-proliferation commitment, by raising their confidence in the peaceful nature of nuclear activities in signatory states. Obviously, because bilateral safeguards-type arrangements are between two interested parties, recipients and suppliers, they cannot offer the same high level of confidence of no diversion as do Agency safeguards.

Even were a state to provide assurances it had no intention of diverting material to nuclear weapon manufacture, and even had the supplier agreed to supervise the use of the nuclear material supplied under so-called bilateral safeguards, this type of "self-inspection" would never inspire the same level of confidence provided by Agency safeguards and, therefore, could never replace or supplant them. In fact,

even if the verification arrangements applied by the supplier were excellent and no diversion ever took place under such a practice, that these arrangements could only reassure the supplier state means they would do nothing for the maintenance and strengthening of confidence in an international non-proliferation régime.

As Hans Blix, Director General of the IAEA, has acknowledged "[i]t goes without saying that safeguards verification must be independent and sufficiently thorough to be credible. Only then can they create the confidence which is their purpose."<sup>99</sup> Bilateral arrangements even if thorough cannot have the same level of credibility as IAEA safeguards, because they are not independently verifiable.

Finally, the phasing out of bilateral safeguards can also be explained in terms of their poor track record. The most recent demonstration of this came last year when Norway unsuccessfully attempted to obtain verification of the use made of some 20 tons of heavy water sold to Israel in the late 1950s. Under the terms of the bilateral Norwegian-Israeli agreement, the right of Norway to apply safeguards to the material is explicitly recognized. Still, Israel continues to refuse any such inspection and Norway has no means of verifying the peaceful use commitment on its nuclear transfer.<sup>100</sup>

Examples of past failures of bilateral safeguards-type arrangements are not unique to the Norwegian case. Without doubt, the most dramatic example of past failure of bilateral safeguards arrangements came in 1974 when India conducted what it called a "peaceful" nuclear explosion. At that time, India openly violated not just one but two bilateral arrangements — one with Canada covering the CIRUS reactor that was transferred in the mid-1950s and another with the US covering a large quantity of heavy water for use in the Canadian reactor. In both instances, the problem was complicated by the vague language of the agreement which simply required that the items transferred be used for "peaceful" purposes.<sup>101</sup> As India was not an NPT signatory, not bound by the Treaty's

provisions prohibiting all nuclear explosive devices, and in the absence of any restriction prohibiting explosive uses of the material supplied under the bilateral arrangement, India could claim to have violated neither agreement by declaring that its nuclear explosion was for "peaceful" purposes. The fact remains, though, that India had ignored warnings from both supplier states that they would not accept such loose interpretations of their bilateral arrangements.<sup>102</sup> The Canadian case, even included a warning that future cooperation could suffer as a result. Nonetheless, India openly defied both suppliers and went ahead with its "peaceful" nuclear explosion. The world was shocked. As to India, both suppliers had previous knowledge of wrongdoing but did nothing to warn the international community, preferring instead to correct the situation themselves. The end result was to threaten the entire non-proliferation régime.

These observations on the background and efficacy of bilateral safeguards-type arrangements raise questions about the real nature of the precedent Canada might create by re-instituting an outmoded safeguards system. While it is true that Canada could eventually claim, by invoking either NPT Article III.2 or INFCIRC/164 paragraph 14, not to be violating its international obligations under the NPT or related IAEA safeguards, and that it was even going so far as accepting bilateral monitoring arrangements in the absence of international safeguards, this purely legalistic stand could not pass for a good precedent. Canada's use of NPT Article III.2 or the best possible use of INFCIRC/164 paragraph 14 would still result in denying the IAEA its only means of ensuring the exact nature of a state's nuclear programme and, thus, the state's compliance with the Non-Proliferation Treaty. On the other hand, even if replaced by some bilateral safeguards-type arrangements, these could not provide the international community with an assurance of no wrongdoing. In this context, it is very difficult to share the Canadian government's view that the precedent created

would be a good example for others to follow, regardless of Canada's method of acquiring the nuclear material free of IAEA safeguards.

Furthermore, it is difficult to envision how such an action would not be in complete contradiction with Canada's past policy and how it would not have a detrimental impact on Canada's traditionally strong support for non-proliferation diplomacy and its longstanding strict nuclear-export policy.

### Consequences for Canada's NPT Diplomacy and Nuclear Export Policy

For over 40 years Canada has been at the forefront of international efforts to control the spread of nuclear weapons. In addition to having been the first country that could have possessed nuclear weapons and yet forswore their acquisition, Canada's overall record of involvement with nuclear non-proliferation has been impressive. Beginning with the "Agreed Declaration on Atomic Energy," Canada was involved, *inter alia*, in the first informal discussions leading to the creation of the IAEA; the Agency's first Board of Governors, the Eighteen Nation Disarmament Committee discussions in Geneva that led up to the negotiation of the NPT; the Safeguards Committee responsible for the drafting of the current international system of safeguards; the Zangger Committee<sup>103</sup> and, the London (nuclear suppliers) Club. More recently, in 1987, Canada was one of the seven western nations that agreed to impose controls on the transfer of ballistic missile technology as a means of impeding the spread of nuclear weapon delivery systems.<sup>104</sup> Furthermore, Canada has developed one of the world's most stringent policies governing the export of nuclear material and technology.

How does the decision to acquire nuclear-powered submarines and, by implication, the acquisition of unsafeguarded enriched uranium follow the logic of Canada's past and current nuclear export policy and non-proliferation diplomacy?

Current Canadian non-proliferation diplomacy

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and nuclear export policy have their roots in the aftermath of India's "peaceful" nuclear explosion in 1974. Internationally, of course, the event was very disturbing, but for Canada it was also most embarrassing. Not only had Canada failed to recognize any difference between a peaceful nuclear explosive device and a nuclear weapon, but the Indian nuclear test had also been made possible in the first place thanks to Canadian-funded nuclear cooperation that involved the transfer of both material and technology.

This unfortunate development illustrated that Canada's nuclear (bilateral) safeguards of the time were inadequate. In the case of India, which was and is still not an NPT-signatory, safeguards provisions in terms of a peaceful use only restriction applied to the Canadian-origin fuel and the plutonium extracted from it. As a result, India was able to assert that it had not breached its 1956 agreement with Canada, because the plutonium used in the 1974 test, although produced in the CIRUS reactor, was not extracted from fuel elements originating in Canada and, that in any case, it had only conducted a "peaceful" nuclear test.<sup>105</sup>

Following the Indian nuclear test, Canada undertook a review of its policy and, on 20 December 1974, announced a set of new nuclear non-proliferation and safeguards requirements that would henceforth be binding on all its nuclear partners. While demanding a mandatory assurance from the recipient that it would not develop any kind of nuclear explosive devices, the new policy called on all states cooperating with Canada on nuclear matters to accept IAEA safeguards over

...all nuclear facilities and equipment supplied by Canada for the life of those facilities and equipment...all nuclear facilities and equipment using Canadian-supplied technology...all nuclear material – uranium, thorium, plutonium, heavy water – supplied by Canada, and future generations of fissile material produced from or with these materials...all nuclear materials whatever their origin,

produced or processed in facilities supplied by Canada.<sup>106</sup>

Furthermore, the new policy gave Canada the right of prior consent "...over the retransfer of Canadian-supplied nuclear items;...over the reprocessing of Canadian-origin spent fuel, subsequent storage of the separated plutonium and enrichment beyond 20 per cent U-235 of Canadian-origin uranium."<sup>107</sup> Finally, Canada required fallback safeguards in case the IAEA was unable to implement its safeguards functions: in such circumstances, all nuclear activities in the recipient state would become subject to Canadian-administered safeguards.<sup>108</sup> These conditions were to apply to all contracts with NWS and NNWS alike, including contracts already in force. The only exception was that existing contracts could proceed for one year – this period was later extended for another year – during which time the new safeguards were to be negotiated with Canada.

Another strengthening of Canadian safeguards requirements occurred in December 1976 after Canada had failed to negotiate new nuclear cooperation agreements allowing for the necessary safeguards provisions with India and Pakistan. The Government announced that cooperation with NNWS under future contracts "...will [from then on] be restricted to [only] those [states] which ratify the Non-Proliferation Treaty or otherwise accept international safeguards on their *entire* nuclear programme" (emphasis added).<sup>109</sup>

Widespread international resentment resulted from Canada's new policies. Not only did Canada unilaterally require the renegotiation of its nuclear contracts and stop shipments of uranium to countries that did not engage in negotiations (on strengthened safeguards) within the Canadian-imposed deadline,<sup>110</sup> but also the provisions of the new policy exceeded the safeguards requirements of the NPT itself. For many NNWS party to the Treaty that had already formally committed themselves to its obligations and accepted IAEA safeguards, the Canadian requirements for fallback safeguards

and prior consent over retransfers, reprocessing and high enrichment were considered "excessive, unnecessary or both."<sup>111</sup> From the Canadian government's point of view, however, the reason for reorienting its policy was "simple and straightforward."

We wish to avoid contributing to the proliferation of nuclear weapons while at the same time satisfying the legitimate requirements for uranium and technology of countries which demonstrate the intention of restricting Canadian assistance only to *peaceful non-explosive uses* (emphasis added).<sup>112</sup>

In Canada's view, a commitment to peaceful use of nuclear materials could only be achieved by applying "...the maximum 'safeguards' or restraints attainable...."<sup>113</sup> However, while this change of policy was implemented in 1974, it did not "cover what a country receives from other suppliers or what it might do on its own."<sup>114</sup> As a result, therefore, Canada decided in 1976 to close this gap by further requiring its future NNWS trading partners to accept safeguards on their *entire* nuclear programme. This second requirement was of major importance to Canada. It underlined the idea that only safeguards on *all* nuclear activities could assure the effectiveness of any safeguards policy.

Taking all this into account, it is evident that were Canada to invoke INFCIRC/164 paragraph 14, or, in conformity with NPT Article III.2, import nuclear material outside the scope of IAEA safeguards, the foundation of its own nuclear non-proliferation policy would be severely shaken and damaged. On the one hand, because the Agency lacks both the power and the means to monitor nuclear material used in non-proscribed military activities undertaken via the use of paragraph 14, and has no power at all in cases where nuclear material is imported outside the scope of the NPT (Article III.2), the use of unsafeguarded nuclear material for non-proscribed military activities would create a situation similar to the one that Canada attempted to correct with its own new policy, namely, that

some activities of a state would be "secure" because they would be subject to safeguards, while others would be "insecure" for lack of safeguards. On the other hand, it is clear that Canada imposed the requirement of accession to the Treaty on its nuclear trading partners because it wanted them to renounce their right to decide what should or should not be placed under safeguards. Paradoxically, though, either of the routes now open to Canada for the acquisition of unsafeguarded nuclear fuel for the submarines would reinstate the right of states to determine which of their nuclear activities should or should not be placed under IAEA safeguards. For many of Canada's nuclear trading partners, who had to contend with its unilateral actions in the mid-1970s, the setting of either precedent by Canada – a "White Knight" – could scarcely be perceived as a continuation, much less an improvement, of its current non-proliferation policy. Further, by creating *within* the NPT-IAEA régime a new system of pre- or non-NPT types of arrangements under which a state can operate two parallel nuclear programmes, one under and one outside IAEA safeguards, Canada would not only be viewed as reversing its longtime hard line policy on comprehensive safeguards but as abandoning its traditionally strong support of the Treaty.

By becoming the first NNWS party to the NPT to militarize the atom, Canada would also risk sacrificing its longtime reputation as a determined and forceful defender of the peaceful uses of nuclear energy. Furthermore, by asking other states to do what Canada itself is refusing to do, Ottawa would be repudiating the spirit of its own policy statement of 1965 on the export of uranium which stipulates that

...the Government will require an agreement with the government of the importing country to ensure with appropriate verification and control, that the uranium is to be used for *peaceful purposes only* (emphasis added).<sup>115</sup>

The creation of any precedent involving Canada's use of nuclear material free of IAEA

safeguards for any military purpose whatsoever could also create problems with some of Canada's nuclear trading partners, since certain bilateral nuclear cooperation agreements signed by Ottawa explicitly forbid the use of Canadian-supplied nuclear items (including material) for all nuclear explosive purposes as well as for any military uses whatever, while other agreements only prohibit all kinds of nuclear explosives.<sup>116</sup>

Thus, a Canadian decision to acquire nuclear material for the proposed submarine fleet, and to refuse IAEA monitoring over that material, could hardly avoid being perceived by the international community as a clear reversal of Canada's strong support for the NPT and its longstanding policy favouring peaceful uses of nuclear materials under strict Agency safeguards. Certainly, the discrepancy between Canada's longstanding strict safeguards policy under the NPT and a new loose implementation of that policy would diminish its credibility in nuclear non-proliferation diplomacy.

Finally, were Canada to acquire nuclear fuel free of safeguards, a number of other problems could be created for its non-proliferation policy. No matter what route Canada chooses to obtain enriched uranium free of IAEA safeguards, new bilateral nuclear cooperation agreements will have to be negotiated, raising the prospect of demands on Canada that could lead to the softening of other aspects of Canadian nuclear export policy, thereby, further weakening Canadian non-proliferation diplomacy.

#### **Canadian Nuclear Cooperation Agreements and the Acquisition of Nuclear Submarines and Fuel**

At present, France and the UK are the only two official contenders bidding for the contract to supply Canada with nuclear submarines and fuel. The UK still depends on the US for the supply of highly-enriched uranium (HEU) for its nuclear fleet.<sup>117</sup> France uses indigenously produced low-enriched uranium (LEU) in its nuclear submarines. With only two possible

suppliers for the nuclear-powered submarines, Canada's choices are inevitably limited because, for obvious reasons, it would make no sense for Canada to buy the submarine from one country and the fuel from another. Furthermore, given the high financial costs of the development of an uranium enrichment capability – estimated between several hundred million and a billion dollars<sup>118</sup> – Canada itself will likely not produce it. To date, in any case, there are no official indications that Canada is considering setting up a uranium enrichment facility of its own.

This leads to the conclusion that Canada will, in all likelihood, seek to acquire the enriched uranium fuel from a foreign supplier. In doing so, however, Canada will not be able to escape certain problems regarding the setting aside or renegotiation of some of its existing nuclear cooperation agreements with the possible suppliers of enriched uranium fuel for submarines.

Canada's existing nuclear cooperation with France and the UK through the Canada-Euratom agreement, and with the US via a number of bilateral agreements, will effectively determine the flexibility that Canada will have in selecting the source of supply for nuclear submarines and fuel. But, regardless of the source of supply, existing agreements will have to be renegotiated and/or new ones arrived at. Under the current bilateral agreements between Canada and the US, and the agreement between Canada and Euratom,<sup>119</sup> on nuclear cooperation in the peaceful uses of atomic energy, all potential suppliers are specifically barred from providing any nuclear material to Canada for any military purpose whatsoever. On the other hand, the only agreement between Canada and a potential supplier, i.e., the US, on nuclear cooperation for military purposes, does not authorize the transfer to Canada of submarine fuel unless amended.



### *Canada-Euratom nuclear cooperation agreement*

The current agreement in force between Canada and Euratom, negotiated in 1959, strictly forbids the use of nuclear material for the furtherance of any military purpose.<sup>120</sup> Consequently, any Euratom country supplying nuclear fuel to Canada for use in submarines would have to negotiate a new, separate arrangement with Canada enabling the transfer of such fissionable material. As regards the UK, direct negotiations with Canada would be required only if British-supplied uranium were involved, namely, British uranium sent to the US for high-enrichment and fabrication into nuclear submarine fuel for use in nuclear-powered submarines supplied to Canada.

One possible problem regarding Canada's securing nuclear fuel from either France or the UK is that other Euratom parties may object to such a transaction. While Article 86 of the Euratom Treaty clearly stipulates that special fissionable materials (defined as including, *inter alia*, "uranium enriched in the isotopes 235 or 233")<sup>121</sup> are the property of the Community, and that this right of ownership "extends to all special fissionable materials...subject to the safety control..." the extent of such control is described only in vague terms in the Treaty. According to Article 84 of the Euratom Treaty, "[c]ontrol may not extend to materials intended for the purposes of defence which are in course of being specially prepared for such purposes or which, after being so prepared, are, in accordance with an operational plan, installed or stocked in a military establishment."

The part of Article 84 dealing with nuclear material in use for "the purposes of defence" is evidently not clear on whether the right of withdrawal of safety control can be exercised on behalf of the military programme of a non-Euratom country. A negative answer to this would imply that the special nuclear material, whether French or British enriched uranium, is Community property and, as such, only the

European Community, and not the individual Euratom countries, is authorized to export it (Euratom Treaty Articles 59 and 62).

In any case, Article 103 of the Euratom Treaty stipulates: "[a] Member State shall communicate to the Commission any draft agreement or convention with a third country...to the extent that such agreement or convention concerns the field of application of this Treaty." Further,

[i]f a draft agreement...contains clauses impeding the application of this Treaty, the Commission shall, within a period of one month after the date of receipt of such communication, make its comments to the State concerned. Such state may not conclude the proposed agreement...until it has removed the objections of the Commission or complied with the ruling of the Court of Justice....<sup>122</sup>

It is not yet clear whether Britain or France would have to justify their case before the Euratom Commission for the export of nuclear material to Canada.<sup>123</sup> But, considering that the nuclear material would be exported to a NPT-signatory NNWS for use in non-proscribed military activities and would create a precedent in this regard, it is possible that some Euratom countries may oppose such a transfer. These countries may object on the grounds that any nuclear material under the security control of Euratom should be restricted to peaceful uses only, and that the removal of Euratom controls under Article 84 cannot be exercised on behalf of a third party.

### *Canada-US agreement on nuclear cooperation for mutual defence*

The 1955 "Agreement for Co-operation Concerning Civil Uses of Atomic Energy Between the Government of the United States and the Government of Canada," specifically bars the provision of any nuclear material to Canada for military purposes.<sup>124</sup> On the other hand, the 1959 "Agreement Between the Government of

the United States and the Government of Canada for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes" prohibits the transfer of reactors and special nuclear material (such as HEU) to Canada unless an amendment to the agreement is negotiated. As stipulated in Article IV concerning the "Transfer of Military Reactors and Material":

The Government of the United States, by amendment to this Agreement and subject to the terms and conditions mutually agreed upon by the Parties,

A. may agree to transfer, or authorize to transfer to the Government of Canada, military reactors [described, *inter alia*, as reactors for nuclear propulsion] and/or parts thereof for military applications; and

B. may agree to transfer to the Government of Canada special nuclear material for research on, development of, production of, and use in military reactors for military applications.<sup>125</sup>

Thus, only by amending the existing 1959 US-Canada agreement on cooperation for military uses of atomic energy can any transfer of enriched uranium for nuclear ship propulsion take place to Canada. To secure an amendment, the US Administration of the day would necessarily require Congressional approval. This raises two types of jurisdictional problems, one relating to the US Congress and the other to the US Administration.

The Canadian Department of National Defence claimed in a press release on 19 November 1987 that the US Administration, specifically the US Secretaries of Energy and Defense, have raised no objections to the transfer of "bid related information" from the UK to Canada.<sup>126</sup> In other words, the US Administration has approved the transmittal of *information* from the UK to Canada relating to the design of British-built *Trafalgar*-class nuclear-powered submarines. The US Administration, however, has also claimed the right to veto any

actual transfer of nuclear ship propulsion technology or reactors, since British nuclear submarine reactor design is derived from a US ship-propulsion reactor sold to the UK in the 1950s under a military cooperation agreement.<sup>127</sup> This means that the US government retains the final approval over any and all transfers of such items to Canada from the UK.

The US Congress, on the other hand, could raise objections to any amendment of the 1959 agreement in the light of a number of considerations, including proliferation concerns. One of the most important obstacles anticipated in the US Congress could be the reluctance to set a precedent. In fact, as Charles Van Doren recalls:

Italy approached the United States in the mid-1970s with a request for nuclear materials for use in the propulsion of Italian naval vessels; but the U.S. decided not to provide such material for that purpose, primarily because it did not wish to establish the precedent of a use of Art. 14 (or its avoidance through a direct transfer for military purposes).<sup>128</sup>

Other sources have gone so far as to suggest that similar requests over the years, from six Western nations, have been turned down by the US.<sup>129</sup>

Would a post-Reagan Administration in the US be ready to change its position for Canada? First, notwithstanding the idea of Canadian submarines operating in the Arctic Ocean causing concern in many quarters in the US, including the Navy, the fact that the US is not a contender for the submarine contract certainly diminishes any incentive for it to get involved in setting a precedent. Second, given that the US government, as a depository party to the NPT, is often one of the principal targets of criticism in many NPT fora, a post-Reagan Administration may be particularly sensitive to becoming directly involved in precedent-creating activity. Furthermore, since the Canadian nuclear submarines will not enter service until the early- to mid-1990s, a US-Canada agreement on fuel supply from the US could take effect

just before a decision on the continuation of the NPT is taken in 1995 by all the states parties. The US government of the day might prefer to avoid taking any action that could compromise its position at the 1995 NPT Conference.

Does this suggest that any agreement with the US is unattainable? Not necessarily. Other political factors would have to be considered. For example, since the UK does not produce its own submarine fuel, any US refusal to supply the fuel to Canada would be effectively vetoing the transfer of British nuclear submarines. In such circumstances, a US refusal could mean upsetting not just one but two important NATO allies. In addition, a US Administration might see the Canadian search for nuclear fuel as a good opportunity to seek compromises on Canadian policy governing the eventual destination of Canadian nuclear material that bars its

use in *all* US military activities. In this connection, were an arrangement negotiated between Ottawa and Washington on nuclear fuel supply, the US might request the return of the spent fuel without any condition whatever on its end use. Also, the United States might try to win back concessions concerning the ultimate destination of Canadian uranium exports. The United States would then have a political lever with which to pry the Canadian government away from its perceived excessive arrangements governing the potential end use of Canadian exports of nuclear material. In this way, another pillar of Canadian nuclear policy – vertical proliferation – would crack, because the quest for nuclear fuel could eventually expose Canadian policies to political pressure, with the upper hand held by the other side.

## V. THE CANADIAN PRECEDENT REGARDING THE NON-APPLICATION OF SAFEGUARDS AND THE IMPACT ON THE NON-PROLIFERATION RÉGIME

### Cut-off of safeguards under INFCIRC/153 Paragraph 14

In breaking the eighteen-year long record of non-invocation of the INFCIRC/153 paragraph 14 exemption, the first consequence of the Canadian decision would be to draw attention to the exemption's existence and to its utility as a means of obtaining nuclear material free of Agency safeguards for use in non-proscribed military activities.<sup>130</sup> As Canada moved toward using nuclear material without IAEA safeguards for a military purpose, the result would be to break the longstanding certitude that the nuclear activities of NNWS are essentially peaceful.<sup>131</sup> As well, and more important, the result would be to break the long established practice and confidence that the entire nuclear activities of NNWS party to the Treaty are covered by the IAEA's verification system. Given the fragile nature of the current non-proliferation régime such a *loss of confidence and a break in the Agency's safeguards system could be critical,*

especially in regard to the survival of the régime and the renewal of the Treaty in 1995.

Until now, the universal practice of application of safeguards on the nuclear activities of the NNWS party to the Treaty has been acceptance of IAEA safeguards on their *entire* nuclear programmes. This undertaking has always been considered extremely important by the international community, because it is the only way the Agency can certify the nuclear status of a state and its compliance with the NPT's obligation not to develop nuclear weapons.

If, in future, the IAEA were unable to provide the assurance that the NPT's commitments were being upheld (because, as noted earlier, INFCIRC/153 paragraph 14 does not involve proper verification by the Agency), the credibility of the IAEA and the efficacy of the Treaty itself might be undermined, calling into question the entire non-proliferation régime.

When considering that by the year 2000, at least 35 states could possess the technology to

produce nuclear weapons, the question arises which, if any, barriers will still be left standing to prevent these states from developing nuclear armaments. The answer will be greatly influenced by the level of confidence of each individual state in the peaceful nature of the nuclear programmes of other NNWS. Today, only the IAEA is in a position to provide a high level of confidence. But, in order to maintain the IAEA system of control, the NPT has first to be preserved, and this is far from certain. The Treaty has always been rather fragile and is now entering a new and particularly vulnerable stage in its development, with a last review conference scheduled for 1990 and the Treaty itself up for renewal five years after that.

Although it is difficult to determine whether the Treaty will continue in force indefinitely, or will be extended for an additional fixed period of time,<sup>132</sup> the fact remains that any invocation of INFCIRC/153 paragraph 14 before such a decision is taken in 1995 will greatly complicate the discussion on the continuation of the NPT. Indeed, it is difficult to imagine how negotiations on the continuation of the NPT will be unaffected by some of its signatories (at least Canada) denying the application of the IAEA's verification processes necessary to ascertain compliance with Treaty obligations.

While it is too early to predict the outcome of one signatory state denying verification of the Treaty's obligations, it would be prudent to anticipate that many states might fear other "defections" from complete IAEA verification. Such a prospect, in turn, may make them reticent to accept again, for a long-time, the commitments of the NPT, or they might want to protect themselves by making their Treaty commitments conditional, for instance, on no other "defection" from the régime.

In any case, and for whatever reason, if the NPT is not renewed in 1995, any denial of IAEA verification in the interim would only have served to ensure that any régime replacing the Treaty would be a weaker one. Indeed, it should be emphasized that if the NPT is not

renewed, all the IAEA safeguards arrangements negotiated to date in conjunction with the Treaty will become invalid. So, any subsequent attempt to build a new system of control over the use of atomic energy would have to start at the beginning. In effect, because comprehensive safeguards would have ceased to exist once Canada had broken the longstanding practice, whatever régime replaced the NPT would necessarily be unable to replicate the NPT's comprehensive safeguards system.

Yet, some Canadian officials might wish to argue that the precedent created by Canada of having fissionable material outside of IAEA safeguards could, in effect, fortify the international non-proliferation régime by inducing some NPT holdouts to join the Treaty. Such an argument could be based on the ground that many states that have refused to sign the Treaty have done so because it creates two classes of states and an imbalance of rights and obligations. To wit, nuclear-weapon states are allowed to retain their nuclear arsenals and undertake new military nuclear research – the non-nuclear weapon states not only relinquish their right to acquire such weapons but also have to accept IAEA safeguards as well as other restrictions on their nuclear programmes. In helping to establish the right of the NNWS to use nuclear material free of IAEA safeguards for certain non-proscribed military purposes, goes the argument, Canada could reduce the degree of discrimination between NNWS and NWS and thereby encourage some hold-out states to consider joining the NPT.

Such a line of argument, however, does not adequately take into account that the refusal of countries to sign the NPT has been for a number of other reasons which would not be addressed or resolved by the presence of the INFCIRC/153 paragraph 14 exemption. One reason many NNWS refuse to sign the NPT is that the Treaty proscribes all nuclear explosions and makes no differentiation between military and so-called "peaceful" nuclear explosions. While it is not immediately evident that some states refuse to

foreclose the "peaceful" nuclear explosion option only to keep their nuclear weapon option open, the fact remains that INFCIRC/153 paragraph 14 will not change the restriction on "peaceful" nuclear explosions. In any case, and providing some states have refused to sign the NPT in order to escape the application of full-scope IAEA safeguards on all of their nuclear activities for the sole purpose of pursuing non-proscribed nuclear military activities, there would still remain another obstacle that they could perceive as discriminatory.

This obstacle derives from the fact that most non-NPT signatory states are covered by the non-NPT INFCIRC/66-type safeguards, which stipulate (in accordance with the IAEA Statute) that nuclear materials must not be used to further "any military purpose." The problem is this (INFCIRC/66) undertaking does not end with its replacement by another safeguards agreement. Indeed, although paragraph 24 of INFCIRC/153 stipulates that "the application of Agency safeguards in the State under other safeguards agreements with the Agency [such as INFCIRC/66] shall be suspended while the [INFCIRC/153 NPT-type] Agreement is in force," this suspension does not apply to the safeguards agreement itself but only to the *application* of safeguards.<sup>133</sup> The basic undertaking of the previous agreement (INFCIRC/66) remains operative and is in no way diminished by the introduction of later INFCIRC/153 NPT-safeguards. In other words, once equipment, facilities or material have been subjected to INFCIRC/66-type safeguards, that agreement cannot be terminated. It can only be replaced by an INFCIRC/153-type safeguards agreement and the original peaceful use only restriction (under INFCIRC/66) continues unchanged and undiminished.<sup>134</sup>

The result is that a non-NPT signatory state that has previously accepted some INFCIRC/66-type safeguards and decides to join the Treaty now or at some later point, will have more constraints over the development of non-proscribed military activities than a country which had

signed the Treaty at the outset. Obviously, because countries in the latter category have replaced INFCIRC/66-type safeguards with INFCIRC/153-type safeguards agreements with the IAEA some time ago, most of the nuclear material and facilities or equipment originally under INFCIRC/66 safeguards in these countries are already at or near the end of their useful life, hence most of their nuclear programmes are now under INFCIRC/153 safeguards. This is particularly true since the part of their nuclear programme developed and acquired after INFCIRC/153 came into force in 1972 is covered by the (new) INFCIRC/153 safeguards.

The problems associated with the use of INFCIRC/153 paragraph 14 by potential (NNWS) signatories to the NPT might become quite complex, because their INFCIRC/66 safeguards agreements can apply not only to nuclear material but also to equipment and facilities. So even if a potential signatory state could prove, after signing the Treaty and entering into an INFCIRC/153-type agreement with the Agency, that the nuclear material to be exempted from safeguards for non-proscribed military use under INFCIRC/153 paragraph 14 were free of any prior "peaceful use only" restriction (as would any other NPT signatory using paragraph 14), it could still be prevented from using the material in those facilities or equipment previously covered by an INFCIRC/66-type agreement.

Of course, the restrictions described above, concerning the non-termination of the peaceful use undertaking under INFCIRC/66 would not hamper all potential signatories equally, depending on the extent to which the non-NPT INFCIRC/66 safeguards system covered their current nuclear programme. But, in any case, the contention that by setting a precedent through the use of INFCIRC/153 paragraph 14 Canada could help the current non-proliferation régime seems not to stand up to scrutiny. As noted, non-signatories that might consider joining the NPT in order to avail themselves of INFCIRC/153 paragraph 14 cut-off of safeguards would be in a position to benefit only to the

extent that their nuclear facilities, material, equipment and so on are not already covered by INFCIRC/66 safeguards. This obstacle makes it questionable whether the Canadian precedent would contribute to attracting many NPT non-signatories to join the Treaty, as those states may feel that, compared with earlier signatories, it represents yet another form of discrimination against them.

On the other hand, doubts exist about the nature of the contribution to the NPT régime were accession of states to the Treaty to come mainly from an interest in availing themselves of INFCIRC/153 paragraph 14 cut-off of safeguards. Further, those countries least hampered by previous INFCIRC/66 safeguards restrictions and able, under the NPT-IAEA régime, to avail themselves of the INFCIRC/153 paragraph 14 exemption, are the same states that, today, accept the least safeguards and raise the most serious doubts about the peaceful nature of their nuclear activities.

In short, it is very difficult to share the view that positive developments could result from the Canadian precedent of using INFCIRC/153 paragraph 14, or even that any positive development could be anticipated.

#### **Absence of Safeguards Under NPT Article III.2**

Since under NPT Article III.2 the Agency would be kept completely in the dark about the

existence and uses of unsafeguarded fissionable material and because the possibility exists under this option that a state could develop a nuclear programme outside of IAEA safeguards and possibly never return the material to safeguards, any use of NPT Article III.2 would be more damaging to the NPT-IAEA régime than INFCIRC/153 paragraph 14. The impact in terms of the efficacy of and confidence in the régime, as well as the consequences for its maintenance and renewal would all be greatly magnified in scope.

In sum, any use of INFCIRC/153 paragraph 14 or NPT Article III.2 to exempt fissionable material from IAEA safeguards would provoke a break in the Agency's knowledge about the actual use of the material. To reiterate, any break in the Agency's safeguards over any part of the nuclear activities in non-nuclear weapon states would inevitably lead to a diminution in "transparency" of states' nuclear activities – resulting in the IAEA's being unable to provide its reassurance that no diversion of nuclear material toward weapon manufacture is taking place.

Any damage to the IAEA's reassurance would degrade confidence in the NPT-IAEA's safeguards system. This, in turn, could weaken states' commitment to the NPT complicating and making difficult any chances of renewal of the Treaty in 1995.

## **CONCLUSION**

This study has highlighted the fact that the effort to control nuclear energy for peaceful purposes has been of great importance since the end of World War II, involving a long and difficult process. The creation and acceptance of the International Atomic Energy Agency was one important step in the quest but the international effort to curb nuclear proliferation was capped with the signing of the Non-Proliferation Treaty in 1968.

For the past two decades the NPT has been

the centrepiece of the global non-proliferation régime. The Treaty is not perfect and cannot in itself halt nuclear proliferation. Nonetheless, it constitutes the principal building block of the international non-proliferation régime.

This study examines, for the first time, one of the main new challenges facing the régime. This challenge has been identified as emanating from a "grey area" in the NPT. Contrary to popular wisdom and practice, the Treaty does not require comprehensive or full-scope safe-

guards since the "grey area" opens up at least two ways to acquire fissionable material free of IAEA safeguards. As described in this paper, NPT Article III.2 and INFCIRC/153 paragraph 14 provide ways to acquire nuclear material free of any Agency safeguards, for use in military activities not proscribed by the Treaty as currently in force.

Canada will be the first state to take advantage of the "grey area," as it seems about to acquire unsafeguarded fissionable material for use in nuclear-powered submarines. While it is legally possible under the NPT, in a narrow sense, to follow such a course of action, the study demonstrates that following either of the two paths to acquire fissionable material free of safeguards would seriously harm the IAEA-NPT régime. It bears repeating that even if the NPT-IAEA related safeguards function has been narrowly defined – as to verify that no nuclear material used in peaceful activities is diverted to the production of nuclear weapons – the Agency has been able, until now, to provide assurance that no production of nuclear weapons is taking place in any of the NNWS party to the Treaty. This, as explained, has been made possible because the IAEA has been given unfettered access to apply safeguards on *all* nuclear material in *all* nuclear facilities in *all* NNWS party to the Treaty. Any removal or avoidance of IAEA safeguards is tantamount to denying the Agency its ability to provide such assurance, which is the foundation on which rests the global strategy for curbing the spread of nuclear weapons.

Canada's apparent preference to substitute bilateral (i.e., supplier-recipient) arrangements for Agency safeguards will not limit, in any meaningful way, the damage to the NPT-IAEA régime. Once nuclear material is exempted from IAEA safeguards for use in non-proscribed military activities, and even if some sort of bilateral arrangements cover the material in such activity, inevitably, in terms of the application of international safeguards, a state's nuclear activities are bifurcated – one part (fission-

able material in peaceful activities) remains under international monitoring while another (nuclear material in non-proscribed military activities) is outside such purview. The resulting situation is one of partial safeguards. According to the IAEA's Director General:

It is perhaps worth asking what point there is in covering only part of a State's nuclear programme. One advantage is that an exporting State can be assured that the material or technology it has exported is being applied for peaceful purposes. And one can always hope that the importing State will consent to a gradual enlargement of the scope of safeguards later on.<sup>135</sup>

To paraphrase, less safeguards are better than none but not as good as more or comprehensive safeguards. For Canada to break almost two decades of unanimous acceptance of complete IAEA safeguards by NNWS party to the Treaty, would only serve to weaken confidence in the NPT-IAEA safeguards system and, accordingly, in the international non-proliferation régime.

At this stage, Canada's acceptance of anything less than comprehensive IAEA safeguards would also be in clear contradiction with its own longstanding policy and practice of requiring full-scope IAEA safeguards, and be at odds with its multilateral arms control efforts favouring effective verification of compliance.

For many years now, Canada has placed a strong emphasis on verification in its arms control diplomacy. The Department of External Affairs, in particular, has a vigorous Verification Research Unit within the Arms Control and Disarmament Division, focussed largely on developing new and strengthening existing multilateral verification measures. External Affairs officials have often asserted that the principal objective of verification measures is to provide *all* parties to an agreement with the assurance that non-compliance of a kind which would threaten national security could be reliably detected in a timely way.<sup>136</sup>

Considering that IAEA safeguards constitute

the NPT's verification mechanism, it is ironic that Canada would now prefer a bilateral arrangement that, by definition, suffers from the critical weakness of an inherent conflict of interest, and which -- even if it can provide some sort of assurance of no wrongdoing -- can only reassure one party, i.e., the supplier state. It is also ironic to note that the Canadian government has always stated that:

*In both its bilateral and multilateral efforts, Canada has relied heavily on the IAEA as a neutral and internationally acceptable body that can be called on to assure to the maximum extent possible that diversion of nuclear material for explosive purposes is not taking place. As the number and diversity of nuclear facilities in a growing list of countries increases, this key role of the IAEA will steadily grow in importance, as will the reliance of the international community on the effectiveness and objectivity of the agency (emphasis added).<sup>137</sup>*

As discussed in this study, any move by Canada to reject IAEA safeguards, or to dilute them by accepting bilateral arrangements for its nuclear submarine programme, would necessarily nullify the Agency's ability to provide assurance on the inherently peaceful nature of the nuclear programmes of all NNWS party to the Treaty.

Once again, however, the issue is by no means limited to Canada. As interest in nuclear ship propulsion grows, the requirement for a response by supporters of the NPT régime will become more and more pressing. With the Fourth NPT Review Conference scheduled for 1990, and with the régime's greatest test, its renewal, due just five years later, surely it is not too early to consider what is to be done to deal with the lack of provision for IAEA safeguards on non-proscribed military activities, specifically, nuclear-powered submarines.

As preparations begin for the 1990 NPT Review Conference, serious consideration should be given by Canada to laying the

groundwork to "close off" the INFCIRC/153 paragraph 14 exemption clause and to "adjust" the language in the NPT Article III to eliminate the safeguards-related "grey area." Alternatively, Canada should work in concert with the suppliers of nuclear naval propulsion technology and the IAEA to devise ways of extending safeguards to this type of non-proscribed military activity. Considering the detailed, intrusive on-site verification régime agreed to as part of the US-USSR Treaty banning Intermediate- and Shorter-Range Nuclear Forces (INF), and similarly strict verification provisions under negotiation in regard to a global treaty banning chemical weapons, and as part of the US-USSR negotiations on an agreement to reduce strategic nuclear weapons, it should not prove unduly difficult to reach agreement on a régime to extend IAEA safeguards to cover non-proscribed military activities in NNWS, including nuclear submarines, without necessarily compromising militarily sensitive information.

If Canada really would like to set a good precedent, the only truly responsible way would be to agree to place viable international safeguards on its nuclear-driven submarine programme with the direct involvement and participation of the IAEA. Canada should ask and assist the IAEA to devise and secure international support for a system under which the Agency would, as a matter of course, apply safeguards to naval nuclear propulsion programmes in NPT-signatory non-nuclear weapon states. In so doing, the IAEA would have to work in close cooperation with the suppliers of this technology to ensure that the new safeguards -- for instance, material accounting and inspections -- do not, in any significant manner, compromise the military and industrial/technological attributes of nuclear-powered submarines.

Devising IAEA safeguards to cover fissionable material in non-proscribed military activities in NNWS, such as nuclear-powered submarines, would go a long way toward ensuring that NPT commitments are being faithfully



adhered to and no material is being diverted to the production of nuclear weapons. Such measures would greatly help in reinforcing the NPT-IAEA régime, particularly as it enters the most critical phase in its history. Additionally, as interest in nuclear ship propulsion grows in both NPT and non-NPT states – especially, in countries considered proliferation risks – Canada could help establish internationally a norm for the transfer to and use by NNWS of such technology and materials. This would certainly help place Canada, once again, in a positive leadership role in the international effort to prevent the further spread of nuclear weapons. As well, it would be in keeping with past Canadian policy which recognizes that:

...in relation to nuclear proliferation; in the long term, the IAEA provides the only inter-

nationally-acceptable mechanism to protect against the diversion of nuclear materials for explosive purposes.<sup>138</sup>

In short, the acquisition of nuclear material free of IAEA safeguards, for use in non-proscribed military activities, by any NPT-signatory NNWS would inevitably result in the Agency's losing track of the material and would diminish the IAEA's ability to verify states' compliance with the NPT. Thus would Pandora's box be opened, immeasurably increasing the risk of diversion of fissionable material to weapon uses, weakening IAEA safeguards and diminishing the credibility of the IAEA, that could either singly or jointly serve to undermine the global nuclear non-proliferation régime.

## NOTES

1. The decision to acquire a fleet of nuclear-powered submarines was announced in June 1987 in a White Paper on Defence. See *Challenge and Commitment: A Defence Policy for Canada*, Department of National Defence, Ottawa, Ministry of Supply and Services (June 1987).

2. In late 1987, India "leased" a nuclear-powered submarine from the USSR, making it the first non-nuclear weapon state to acquire such vessels. India, however, is not a signatory to the NPT. For more details see note 82 below.

3. As quoted in Paul C. Szasz, *The Law and Practices of the International Atomic Energy Agency*, Vienna: International Atomic Energy Agency, Legal Series No. 7 (1970), p.12. Hereafter: Szasz (1970).

4. *Ibid.*

5. The United Nations Atomic Energy Commission was created in January 1946 by the 51 nations present at the first UN General Assembly. The UNAEC was to report to Security Council. Its membership was limited to the members of this body plus Canada.

6. Szasz (1970), *supra* note 3, p.14. See Szasz's summary of the Acheson-Lilienthal Report (pp.13-16) which formed the basis for the Baruch Plan. The Baruch Plan envisaged international ownership of sensitive nuclear facilities, such as, reprocessing and enrichment plants.

7. For a discussion on the Soviet position, see Bernhard G. Bechhoefer, "Historical Evolution of International Safeguards," in M. Willrich (ed.), *International Safeguards and Nuclear Industry*, Maryland: The John Hopkins University Press (1973), pp.22-23. Hereafter: Bechhoefer (1973).

8. For a review of Soviet proposals at the UNAEC see, Bertrand Goldschmidt, "A Forerunner of the NPT? The Soviet Proposals of 1947," *IAEA Bulletin* (Spring 1986), pp.58-64.

9. Address delivered by US President Eisenhower to the United Nations on 8 December 1953, as quoted in Bernhard G. Bechhoefer "Negotiating the Statute of the International Atomic Energy Agency," *International Organization*, Vol. XIII, (1959), p.40. Hereafter: Bechhoefer (1959).

10. *Ibid.*, pp. 40-41.

11. For a detailed discussion on the negotiation of the Statute, see Bechhoefer (1959), *supra* note 9.

12. *IAEA Statute*, Vienna: IAEA, 1973, Article II, p.5.

13. *Ibid.*, Article III.A.5, p.6.

14. See Article XII, of the *IAEA Statute*: "Agency safeguards," *supra* note 12, pp.26-29.

15. Paul C. Szasz, "International Atomic Energy Agency Safeguards" in M. Willrich (ed.), *International Safeguards and Nuclear Industry*, Maryland: The John Hopkins University Press (1973), p.75. Hereafter: Szasz (1973).

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16. See e.g., Bechhoefer (1973), *supra* note 7, p.28. See also, Szasz, *supra* note 3, p.536, and Allan McKnight, *Atomic Safeguards. A Study in International Verification*, New York: UNITAR, UN (1971), p.24.
17. For details on the evolution of safeguards, see Bechhoefer (1973), *ibid.*, especially pp.32-35. Bechhoefer notes that at a certain point in time US legislation "...assured that the price of nuclear material to cooperating nations would be less if they dealt directly with the United States than if they obtained U.S. material through the IAEA." p.32.
18. According to Myron B. Kratzer, "The Origin of International Safeguards," *Journal of the Institute of Nuclear Materials Management* (July 1987): "From the time of the Agency's formation and extending well past 1961, the official Soviet position was that safeguards were an unwarranted infringement on the sovereignty of nuclear have-not nations imposed by the imperialist, capitalistic countries, and one such country in particular." p.32.
19. IAEA document reference label: Information Circular (INFCIRC) followed by a number.
20. See e.g., Lawrence Scheinman, *The Nonproliferation Role of the International Atomic Energy Agency. A Critical Assessment*, Washington, D.C.: Resources for the Future (1985), pp.28-29. According to Scheinman, the change in Soviet attitude became evident in 1963 at the time of the signing of the Partial Test Ban Treaty.
21. IAEA, *The Agency's Safeguards System (1965, as Provisionally Extended in 1966 and 1968)*, INF-CIRC/66/Rev.2, Vienna: IAEA (1968), paragraph 3.
22. IAEA, *IAEA Safeguards Glossary*, Vienna: IAEA (1980), p.68 (paragraph 276). Hereafter: *Glossary*.
23. See Mason Willrich, "The Treaty on Non-Proliferation of Nuclear Weapons: Nuclear Technology Confronts World Politics," *Yale Law Journal* 77:8 (July 1968). Hereafter: Willrich (1968). According to Willrich: "As of June 30, 1967, the Agency had signed 34 safeguards agreements with 27 member states covering 61 reactors." p.1461.
24. As quoted in IAEA, *A Short History of Non-Proliferation*, Vienna: IAEA (1976), p.5.
25. *Ibid.*, p.5.
26. Composed of five NATO members, five Warsaw Pact members and eight non-aligned nations, the ENDC was established in 1961 by a unanimous vote at the UN General Assembly. The Committee gave high priority to the question of non-proliferation in 1966 after a request from the General Assembly.
27. In the late 1950s, some US State Department officials developed the idea of an MLF (Multi-Lateral Force) as a means of reassuring West Germany and heading off its incentives for developing nuclear weapons. In May 1961, US President J. F. Kennedy referred to a European sea-based nuclear force as a non-proliferation measure. Following the Cuban missile crisis of October 1962, he advanced the MLF idea as a means of buttressing European security. See John H. Barton and Lawrence D. Weiler (eds.), *International Arms Control: Issues and Agreements*, Stanford: Stanford University Press (1976), pp.296-299. See also, Albert Carnesale and Richard N. Haass, eds., *Superpower Arms Control: Setting the Record Straight*, Cambridge, Mass.: Ballinger (1987), pp.170-177.
28. By 1966, the US had given up on the idea of an MLF and, by 24 August 1967, when the US and the USSR presented identical drafts of the NPT, the two countries had agreed that the draft treaty language prohibited the MLF. According to Carnesale and Haass, the Soviets had linked the cancellation of the MLF to their willingness to sign the Treaty. See *ibid.*, p.177.
29. See Willrich (1968), *supra* note 23, p.1456.
30. See *ibid.*, p. 1456, fn 27, quoting Washington Center of Foreign Policy Research, *Report on International Organizational Arrangements for the United States Proposal for a Verified Agreement to Halt Production of Fissionable Materials for Weapons Purposes*, (1966).
31. NPT Article III.2 also requires that "(b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material" not be provided without the imposition of safeguards. See *The Treaty on the Non-Proliferation of Nuclear Weapons*. Reproduced in IAEA, *IAEA Bulletin* (Summer 1985), pp. 29-32. Hereafter: *NPT*. Reproduced in Appendix I.
32. Ryukichi Imai, "Nuclear Safeguards," *Adelphi Papers* No.86, London: International Institute for Strategic Studies (March 1972). p.10.
33. David Fischer in David Fischer and Paul C. Szasz, *Safeguarding the Atom. A Critical Appraisal*, Stockholm: Stockholm International Peace Research Institute (1985), p.24.
34. IAEA, *IAEA Safeguards. Aims, Limitations, Achievements*, Vienna: IAEA (1983), p.16. Hereafter: *Aims*.
35. Kratzer, *supra* note 18, p.33.
36. Though not clear at the time of formulation, the IAEA Board of Directors took the decision to use INF-CIRC/153 as the basis for negotiating safeguards agreements under the NPT, in February 1972. The reason underlying the decision could have been that "it was highly desirable that these agreements [NPT] be as uniform as possible - in fact, to avoid charges of discrimination and complications in implementation, they

would have to be as nearly identical as was practical." Szasz (1973), *supra* note 15, p.77.

37. Article III.1 of the NPT, *supra* note 31. See also IAEA, *The Structure and Contents of Agreements Between the Agency and States Required in Connection With the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/153 (Corrected), Vienna: IAEA (June 1972), paragraph 1. Hereafter: INFCIRC/153.

38. INFCIRC/153, *ibid.*, paragraph 28.

39. See INFCIRC/153, *ibid.*, paragraph 34. Under INFCIRC/153, material in mining and ore processing is not subject to safeguards. IAEA safeguards apply on uranium hexafluoride (UF<sub>6</sub>) as it leaves the conversion plant – yellowcake or natural uranium (U<sub>3</sub>O<sub>8</sub>) is the source material converted to UF<sub>6</sub>. See *Glossary*, *supra* note 22, p.16. See also Appendix II.

40. For a general discussion on the application of safeguards under INFCIRC/153 see, IAEA, *IAEA Safeguards. An Introduction*, Vienna: IAEA (1981). Hereafter: *An Introduction*.

41. See INFCIRC/153, *supra* note 37, paragraphs 42-48; also see *Glossary*, *supra* note 22, paragraphs 111, 112 and 113, pp.29-30.

42. These examples are drawn from: Imai, *supra* note 32, p.10.

43. See *Glossary*, *supra* note 22, Tables II and III, pp. 21-22.

44. *Aims*, *supra* note 34, p.4, fn.5.

45. Kratzer, *supra* note 18, p.33.

46. Fischer, *supra* note 33, p.78.

47. *Ibid.*, p.79.

48. Szasz (1973), *supra* note 15, pp. 77-78.

49. In addition to the NPT and its accompanying safeguards system, the international non-proliferation régime is generally considered to be reinforced by a number of multilateral agreements including the 1959 Antarctic Treaty, the 1967 Treaty for the Prohibition of Nuclear Weapons in Latin America (the Tlatelolco Treaty), and the 1985 South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga). The Antarctic Treaty bans military, including nuclear uses of Antarctica. The Tlatelolco Treaty prohibits nuclear weapons in Latin America and requires the application of IAEA safeguards on nuclear activities in all signatory states. Likewise, the Treaty of Rarotonga bans nuclear weapons or other explosive devices in the South Pacific Nuclear Free Zone and requires NPT safeguards administered by the IAEA.

Two other important multilateral treaties complement the NPT system. The 1967 Outer Space Treaty bans the emplacement of nuclear weapons in Earth orbit and in outer space, and prohibits the installation of such

weapons on celestial bodies. The 1971 Sea-Bed Treaty outlaws the stationing of nuclear weapons on the seabed, on the ocean floor and in the subsoil thereof beyond the outer limit of a 19 km (12 mile) territorial-sea zone.

50. See e.g., A. Mikhailov, "Effective Control Over Nuclear Export," *International Affairs*, Moscow, (June 1982), p.23.

51. The first members of the Nuclear Suppliers Group included Canada, France, Japan, West Germany, the US, the UK and the USSR. By 1978, it had been enlarged to fifteen nations: Belgium, East Germany, Italy, the Netherlands, Sweden, Czechoslovakia, Poland and Switzerland, in addition to the core group of seven. The Nuclear Suppliers Group is also referred to as the London Club. For a discussion of their work, see Simone Courteix, *Exportations nucléaires et non-prolifération*, Paris: Economica (1978), pp.47-53.

52. While natural uranium contains only 0.7% of uranium 235, which is fissile, the fabrication of a bomb with this material requires that its concentration in U235 exceed 90% or more (although some estimates claim that this number can be as low as 50%).\* An enrichment plant is required for the enrichment or concentration of natural uranium to the desired level. While previously considered too costly and difficult to operate, enrichment technology is now proliferating. Only 25 kilogrammes\*\* of HEU are required to build a nuclear bomb.

Plutonium is not found in nature but is produced as a result of the irradiation of nuclear material in a reactor and its use in bombs requires that it be chemically separated from the residual uranium and other radioactive materials found in the spent fuel. Facilities used to "reprocess" plutonium are costly and technically difficult to manage but again such technology is also spreading and small production facilities can be used to acquire modest quantities of plutonium. Only 8 kilogrammes\*\* of plutonium are necessary to fabricate a nuclear weapon.

\* See, Ted Greenwood, George W. Rathjens and Jack Ruina, "Nuclear Power and Weapons Proliferation," *Adelphi Papers* No. 130, London: International Institute for Strategic Studies (Winter 1976), p.5.

\*\* See *Glossary*, *supra* note 22, pp. 20-21. The IAEA defines a "threshold amount" as "the approximate quantity of special fissionable material required for a single nuclear explosive device." The threshold amount of plutonium 239 is 8 kg; of uranium-235 (90%-95% enrichment level) is 25 kg; and of uranium-233 is 8 kg, for a single nuclear explosive device, respectively.

53. It is estimated that between 35 and 40 states could develop nuclear weapons by the year 2000. See, for example, David Fischer quoted in *Le Devoir*, 29 April 1988, p.4, "Trente-cinq pays sont capables de construire la bombe atomique."

54. Article X.2 of the *NPT* (*supra* note 31) stipulates: "Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue into force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty."

55. The term "second-tier" nuclear suppliers is used to refer to the new suppliers as compared to the traditional first-tier suppliers which include Canada, France, West Germany, Japan, US, UK and USSR and are part of the Nuclear Suppliers' Group. See note 51.

56. Szasz (1970), *supra* note 3, p.352.

57. Fischer, *supra* note 33, p.81.

58. See for example: *Nuclear Power and Merchant Shipping*, U.S. Atomic Energy Commission, Division of Technical Information, Washington, D.C. (1964), p.36.

59. It is interesting to note that as early as the Conference on the IAEA Statute in 1956, questions were raised concerning the Agency's role in relation to such an application of nuclear energy. Although it is not clear if the intention was to use nuclear ship propulsion for military purposes, it is worth noting that the issue was brought up in connection with definitional problems concerning the Statute. Indeed, concerned that the proposed Statute included no definition of the terms "peaceful" and "military", two countries, France and India, proposed amendments in this regard. As Paul C. Szasz noted:

"After a brief debate, in which the principal sponsors recorded their understanding that the Agency would not be precluded from concerning itself with the nuclear propulsion of civilian ships and vehicles even though similar propulsion units might be used for military transport, both proposals were withdrawn." (*Supra* note 3, p. 352).

It is difficult to speculate on the reasons why France and India, both known as strong opponents of safeguards, would have been interested in clarifying the Agency's responsibilities in this matter. It is worth noting, however, that at the time of the negotiations on the Statute, studies on the efficiency of naval nuclear reactors were well underway. At the time of the Conference on the Statute, a US nuclear-powered submarine, the *Nautilus*, had already been operationally deployed for two years, and another such boat was being built in

the US; the Soviet Union was in the process of launching a nuclear-powered icebreaker, the *Lenin*, and conferences were being convened worldwide to discuss the potential and the practicality of applying nuclear propulsion technology to power sea-going vessels. (See, R.F. Pocock, "Nuclear Marine Propulsion: A Brief Historical Survey," *Journal of the Institution of Nuclear Engineers*, 21:6 (Nov.-Dec. 1980), pp.174-175). In this context, it is plausible that during the negotiations on the Statute, developing countries such as India, perceiving that they were already being discriminated against under the proposed Statute in terms of the application of safeguards, wanted to secure as many compensating benefits as possible. After all, even the final draft of the Statute was not clear about the scope of the assistance the Agency could render to states. Article III.2, for example, does not define the scope of the Agency's assistance but only stipulates that the Agency is authorized "[t]o make provisions, in accordance with this Statute, for materials, services, equipment, and facilities to meet the needs of research on, and development and practical application of, atomic energy for peaceful purposes, including the production of electric power, with due consideration for the needs of the underdeveloped areas of the world." Furthermore, Article II of the Statute requires the Agency to ensure that its assistance "...is not used in such a way as to further any military purpose." Considering that nuclear ship propulsion could have both military and civilian applications, it was not at all certain that the Agency could be in a position to render assistance to states with respect to this (new) application of nuclear energy.

In any case, this episode illustrated that the nuclear ship propulsion option was a matter of concern, even before the implementation of the *NPT*, and that some states were opposed to having it reserved exclusively for the superpowers.

60. See Mason Willrich, *Non-Proliferation Treaty: Framework for Nuclear Arms Control*, Virginia: The Michie Company (1969), p.69. Hereafter: Willrich (1969).

61. Statement by US State Department spokesman Robert McCloskey, 14 March 1968, (unpublished). Cited in Willrich (1968), *supra* note 23, p.1464, fn. 46.

62. Szasz (1973), *supra* note 15, p.86.

63. *Ibid.*

64. Statement of United States Representative to the ENDC, Eighteen Nation Disarmament Conference *Procès Verbaux* 378 (prov.), at 23, as quoted in: Willrich (1968), *supra* note 23, p.1447.

65. In this connection it should be noted that the safeguards envisioned in the US and Soviet treaty drafts of

1965 were to be quite permissive and loose. As Michael Sullivan noted:

"Article III in the United States' draft was vaguely worded and included only a weak obligation that all states 'cooperate in facilitating the application of IAEA or equivalent international safeguards to all peaceful nuclear activities'. The Soviet Union's draft was even more permissive on the matter of controls, calling upon all parties merely to 'refrain from offering support, encouragement or inducement to states seeking to own, manufacture, or exercise control over nuclear weapons'." (Michael J. Sullivan III, "Indian Attitudes on International Atomic Energy Controls", *Pacific Affairs*, 43:3 (Fall 1970) pp.363-364.)

Thus, in comparison with earlier drafts, the safeguards called upon by the final text of the NPT were to be much more restrictive. Not only had the requirement for safeguards become mandatory but this obligation applied only to NNWS.

66. Willrich (1969), *supra* note 60, pp. 102-103.

67. U.N. General Assembly *Proceedings*, Twenty-Second Session, First Committee, 1565th meeting - 10 May 1968, p.8.

68. See Glenn T. Seaborg and Benjamin S. Loeb, *Stemming the Tide. Arms Control in the Johnson Years*, Mass.: Lexington Books (1987), p.279.

69. See Bechhoeffer (1973), *supra* note 7, pp.40-41.

70. On this subject, John Simpson wrote: "...care was taken to ensure that it [NPT] contained no legal limitation upon continued Anglo-American transfers of strategic nuclear technology and materials, and, as it was solely concerned with dissemination and acquisition of nuclear weapons, it included no provisions related to nuclear submarine reactors." John Simpson, *The Independent Nuclear State: The United States, Britain and the Military Atom*, London: Macmillan Press (1986), p.184.

71. INFCIRC/153, *supra* note 37, paragraph 14.

72. Fischer, *supra* note 33, p. 81.

73. INFCIRC/153, *supra* note 37, paragraph 14(c).

74. *Ibid.*, paragraph 14 (b) and (c).

75. A nuclear fuel cycle includes activities such as mining, milling, processing, conversion, enrichment, full fabrication, reactor use, spent-fuel handling, reprocessing and storage of fissile materials. See Appendix II.

76. Writing before the formulation of INFCIRC/153, McKnight noted that if safeguards were to be applied up to the point where the fuel enters the submarine and were reapplied when the spent fuel leaves the subma-

rine, some countries could raise such arguments. This view can be found in: McKnight, *supra* note 16, p.130.

77. David Fischer, response to authors' questionnaire, 14 July 1987. Fischer is a former Assistant Director-General for External Relations at the IAEA and is the author of numerous articles and books on safeguards and non-proliferation issues.

78. See Hans Blix, "Aspects juridiques des garanties de l'Agence internationale de l'énergie atomique", *Annuaire français du droit international*, Vol. 29, (1983), p.47.

79. *An Introduction*, *supra* note 40, p.16.

80. The contention that only facilities using material subject to safeguards attract Agency's monitoring was made before by former IAEA inspector, Roger Richter, in his testimony to the US Congress relating to the bombing of Iraq's nuclear reactor by Israel. Commenting on the fact that certain facilities acquired from Italy had not been declared to the IAEA and consequently were not yet under safeguards, Richter stated:

"These facilities are not under safeguards and as long as Iraq maintains that it is not processing plutonium or fabricating uranium fuel in these facilities, they will remain outside of safeguards. This may be disturbing to you as IAEA inspector. Nevertheless, you are aware that as a signatory of NPT only facilities which Iraq has declared to the IAEA as containing either thorium, natural or depleted uranium in metal or oxide form, or plutonium are subject to your examination. (Quoted in, *Hearings Before the Subcommittees on International Security and Scientific Affairs on Europe and the Middle East and on International Economic Policy and Trade of the Committee on Foreign Affairs*, House of Representatives, 97th Congress, First Session, 17 and 25 June 1981, U.S. G.P.O. Washington, 1981, p.54.)

Although Richter referred only to facilities fed with nuclear material that do not require the application of safeguards (such as natural uranium), or facilities said to contain no nuclear material, his testimony leaves no doubt about the fact that a state is not required to declare facilities that are *not* fed with material *subject* to safeguards and that the IAEA cannot request that they be monitored. This tends to confirm that if the Agency is unable to assert its view on the requirement of safeguards on nuclear material acquired under Article III.2 (because of a lack of definition in the NPT-IAEA arrangement and in the Treaty itself, on the meaning of the term "peaceful"), the IAEA may not only be unable to continue the monitoring of facilities - once such

material is introduced in it – but may also be powerless in requiring the monitoring of facilities built for a dedicated non-proscribed military activity.

81. In this connection, it should be noted that the examination of the scope of the absence of safeguards under Article III.2 reveals a more serious loophole in the NPT-IAEA safeguards régime. Indeed, since the Agency may not be able to assert its views on what should be considered inherently peaceful and because NPT Article III.1 requires the application of safeguards only on nuclear material used in peaceful activities, the possibility cannot be ignored that a state can keep a *complete* nuclear fuel cycle outside of safeguards. In other words, that a state possessing or importing nuclear material in a composition not requiring the application of safeguards (natural uranium for instance), decides not to subject the material to Agency's supervision at the point where safeguards are usually applied (i.e., at the conversion stage), and keep it unsafeguarded afterwards on the grounds that NPT Article III.1, in the absence of any definition of its provision, does not require it.

The NPT Article III.1 option as an avenue to acquire or posses unsafeguarded nuclear material is not discussed further in this paper because it can be argued that any recourse to its use for keeping nuclear material outside of safeguards would be in clear contradiction with the spirit of the IAEA safeguards agreement. This, in turn, could be argued on the basis that if INFCIRC/153 paragraph 14 can reasonably be considered to represent the Safeguards Committee's or the Agency's general understanding on how non-proscribed military activities should be conducted under the NPT, one important parameter permitting the non-application of safeguards under this clause is that no classified military information be revealed to the Agency. As previously noted, the non-application or cut-off of safeguards under INFCIRC/153 paragraph 14 could assume larger proportions than what the Agency would prefer because of this provision, since states could make a strong case for keeping enrichment, fuel fabrication and reprocessing facilities outside safeguards for reasons of not divulging classified information to the IAEA. It was also noted, however, that it would be difficult for a state to argue exemption of other activities on the same ground. Obviously, because Article III.1 implies having nuclear material outside of safeguards at the first significant stage of the nuclear fuel cycle (i.e., conversion), it is therefore difficult to determine a legitimate security reason for doing so. In this regard it may be noted that the difference between NPT Articles III.1 and 2 resides in the fact that the material that can eventually

be kept outside of safeguards under Article III.2 would necessarily be at a composition beyond the conversion stage which in some types of non-proscribed military activities can possibly begin to be considered militarily sensitive. In any case it is clear that since no guidance is available from the NPT or the IAEA, or even if it is assumed that INFCIRC/153 paragraph 14 represents the Agency's general understanding on how non-proscribed military activities should be conducted under the NPT, Article III.1 is another significant loophole in the NPT which can create important problems. These, however, are beyond the scope of the present study.

82. India has recently "leased" a Soviet "Charlie I" class nuclear-powered submarine that has been renamed the *INS Chakra*. According to press reports, the USSR will require the boat to return to a Soviet port for refuelling the nuclear reactor and will retain control over the nuclear fuel. See, for example, *Jane's Defence Weekly*, 6 Feb. 1988, p.199; *Far Eastern Economic Review*, 24 Dec. 1987, p.18; *The Christian Science Monitor*, 25-31 Jan. 1988, pp.1 and 13; and *International Defense Review*, 2/1988, p.108.

83. US submarines are known to operate on highly enriched uranium. See *Nuclear Weapons Databook: Volume II. U.S. Nuclear Warhead Production*, Cambridge, Mass.: Natural Resources Defense Council (1987), p.71.

Since British nuclear-powered submarines such as the *Trafalgar*, have nuclear reactors based on US nuclear-ship propulsion technology, it can be assumed that both countries use HEU as submarine fuel. The contention that British SSNs run on HEU can also be found in John Simpson, *supra* note 70, especially pp.181-205.

According to advertisements in Canadian newspapers by the Canadian subsidiary (SNA Canada Inc.) of the manufacturers of the French *Rubis*-class SSN, SNA France, the *Rubis/Améthyste* is the "only available submarine design that does not use weapon grade fuel." (See, e.g. *Ottawa Citizen*, 28 April 1988, p.E1). According to certain reports, the French submarine runs on uranium enriched to 9 percent.

While little is known about Soviet nuclear ship propulsion systems, references in some specialized literature suggest that HEU is the fuel used.

Design information on Chinese submarines is not available in the open literature, though it is believed that the Chinese boats are based on older Soviet-design submarines. See Christopher Chant, *Naval Forces of the World*, London: Chartwell (1984), pp.13-14 and 62.

84. US nuclear submarine reactor cores use uranium 235 enriched to over 97 percent. See *Nuclear Weapons Databook*, *ibid.* As discussed in the note

above, British nuclear submarines probably use the same type of fuel.

85. *Ibid.*

86. According to Ted Greenwood *et al.*: "[t]heoretically, uranium weapons can be made from mixtures of U-235 and U-238 containing about 10 per cent U-235, but in practice enrichment to about 50 per cent or better would be needed, and even then the critical mass would be more than three times that of U-235." (*Supra* note 52, p.5)."

87. This figure is extrapolated from the fact that cores in US naval nuclear reactors average about 200 kg of HEU each. Since British-designed nuclear attack submarines are nearly half the size US nuclear attack submarines, the figure of 100 kg for a reactor core is within the realm of possibility. See *Nuclear Weapons Data-book*, *supra* note 83, p.71.

88. This is based on Charles Van Doren's, response to authors' questionnaire, 3 August 1987. Van Doren is a former Assistant Director of the United States Arms Control and Disarmament Agency and former head of its (nuclear) Non-proliferation Bureau.

89. Depleted uranium can be used as a target element in some types of research reactors such as the Material Testing Reactors (MTRs) provided by France to Iraq. See Israel, Ministry of Foreign Affairs and Atomic Energy Commission, *The Iraqi Nuclear Threat-Why Israel had to Act*, Jerusalem (1981), pp.47-53. Depleted uranium can also be used in the fuel rods in liquid metal fast breeder reactors (LMFBR) to convert fertile uranium-238 into fissile plutonium at a rate faster than the reactor's consumption of fissile fuel. LMFBR fuel rods are filled with plutonium dioxide and depleted uranium dioxide, and a blanket of other fuel rods containing depleted uranium dioxide is used to surround the reactor core. Experimental LMFBRs are reportedly in use in several countries. See *Nuclear Power Issues and Choices*, Report of the Nuclear Energy Policy Study Group, Cambridge, Mass.: Ballinger (1977), pp.397-398.

90. This is based on a response to the authors' questionnaire: privileged information.

91. A policy statement by Canada's Energy Minister, Donald Macdonald, in September 1974 stipulated that unless specifically exempted, all Canadian yellowcake or natural uranium (U<sub>3</sub>O<sub>8</sub>) must be upgraded or further processed to its most advanced form possible in Canada, i.e., to uranium hexafluoride (UF<sub>6</sub>) before being exported. In September 1983 this policy was reaffirmed and continues in place today. See David G. Haglund, "Protectionism and National Security: The Case of Canadian Uranium Exports to the United

States," *Canadian Public Policy*, XII:3, (September 1986), pp.463-464.

92. See note 39. Also, *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/164, Vienna: IAEA (2 June 1972), paragraph 34 (a) and (c). Hereafter: INFCIRC/164.

93. See note 39. Also INFCIRC/164, *ibid.*, paragraph 33.

94. Robert Fowler, ADM (Policy), Department of National Defence, Briefing on the Defence White Paper, DND Headquarters, Ottawa, 5 June 1987.

95. The contention that Canada will take care to set a good example was made by Defence Minister Perrin Beatty at the House of Commons Standing Committee on National Defence on 25 June 1987. At this meeting, Mr. Beatty referred only to invoking "clause 14", but stated that "it would be an example of the right way to use clause 14....We will be showing, in Canada's using it, how it should properly be used....We will be using it for propulsion only, and the example that we will set is how the clause should properly be used." Canadian Defence Minister, Hon. Perrin Beatty, *Minutes of Proceedings and Evidence of the Standing Committee on National Defence*, House of Commons, 25 June 1987, p.14:27. See also p.14:41.

96. *Ibid.*, p.14:27.

97. See *IAEA Bulletin*, 29:3, (1987) p. 32. This not only includes all facilities in signatory states but also some facilities in non-signatory states. In this latter case, the supervision of the IAEA may have been implemented following a voluntary offer from the state, or the state may have been compelled to do so by the supplier as a condition for its cooperation.

98. This type of transfer was more frequent before the establishment of the NPT régime, for example, the supply of the Dimona (heavy-water/natural uranium) reactor sold by France to Israel in the late 1950s.

99. Hans Blix, "Safeguards and Non-Proliferation: The IAEA and Efforts to Counteract the Spread of Nuclear Weapons," *IAEA Bulletin* (Summer 1985), p.5.

100. See for instance, *The New York Times*, 26 May 1987, p. A-13; and 17 February 1987, p. A-10. See also, Gary Milhollin, "Heavy Water Cheaters," *Foreign Policy*, 69 (Winter 1987-1988), pp.100-119.

101. The 1956 Canada-India agreement covering the forty-megawatt natural uranium/heavy-water CIRUS reactor, stipulates that "The Government of India will ensure that the reactor and any products resulting from its use will be employed for peaceful purposes only."

See Article III of the intergovernmental agreement between the two countries as signed on 28 April 1956 and reproduced in Gordon H.E. Sims, *A History of the Atomic Energy Control Board*, Ottawa, G.P. Centre (1981), p.192.

Under the 1956 US-India agreement for the sale of heavy-water for use in the CIRUS reactor, the material was to be used for "research into the use of atomic energy for peaceful purposes". As quoted in Leonard Spector, *Nuclear Proliferation Today*, New York: Vintage Books (1984), p. 32.

Both the Canadian reactor and the US heavy-water had been used for the production of the plutonium used in the nuclear test.

102. In November 1970, the US sent India an *aide-mémoire* stating that:

"the United States would consider it incompatible with existing United States-Indian agreements for American nuclear assistance to be employed in the development of peaceful nuclear explosive devices. Specifically, for example, the use for the development of peaceful nuclear explosive devices of plutonium produced therefrom would be considered by the United States a contravention of the terms under which American materials were made available". Reproduced in Spector, *ibid.*, p.32.

Similarly, on 7 October 1971 the Canadian Government advised India that:

"the use of Canadian supplied material, equipment and facilities in India, that is at CIRUS, RAPP-I and RAPP-II, or fissile material from these reactors, for development of a nuclear explosive device would inevitably call on our part for a reassessment of our nuclear cooperation arrangements with India...." Reproduced in Sims, *ibid.*, p.195.

103. The Zangger Committee including both present and potential nuclear suppliers was formed in the early 1970s to study the problems of the interpretation of the NPT safeguards, and principally the terms "...equipment or material especially designed or prepared for the processing, use or production of special fissionable material..."[Article III.2]. Though the Zangger Committee report was a considerable achievement as the major suppliers had reached consensus on a list of nuclear material and equipment that would trigger the application of IAEA safeguards, it did not cover the most sensitive nuclear fuel cycle technologies. As well, the Committee did not reach agreement on requiring full-scope safeguards (i.e., safeguards on all of a recipient state's nuclear activities) as a condition for

nuclear cooperation, thus leaving the non-NPT states in a better position than NNWS signatory. Some of these weaknesses were later addressed by the Nuclear Suppliers Group.

104. See, *Control of Transfer of Missile Technology*, Communiqué no. 069, Department of External Affairs, Canada, 16 April 1987.

105. On Canadian nuclear cooperation with India, see, for instance, Sims, *supra* note 101, pp.186-196.

106. *Statement by the Honourable Donald S. Macdonald*, Minister of Energy, Mines and Resources, Canada, 20 December 1974.

107. *Canada's Nuclear Non-Proliferation Policy*, Ottawa, Department of External Affairs (1985), p. 13.

108. Fall-back safeguards are meant to operate "[i]f a state should decide to withdraw from the NPT, if that treaty should fall into disrepute, or if the IAEA is for some reason no longer able to apply safeguards to a state's nuclear activities." *Ibid.*, p.15.

109. *Notes for a Statement on Motions by Secretary of State for External Affairs, The Honourable Don Jamieson*, House of Commons, Canada, 22 December 1976, pp. -2.

110. By 1 January 1977, in accordance with the provisions of the 1974 policy, shipments of uranium to Japan and the Euratom Community were halted, as no agreement had been reached within the deadline. See Sims, *supra* note 101, p.197.

111. Mark Moher, "Nuclear Suppliers and Non-Proliferation: A Canadian Perspective," in Rodney W. Jones *et al.*, (eds.), *The Nuclear Suppliers and Nonproliferation*, Mass.: Lexington Books (1985), p. 46. For a detailed elaboration of Canada's nuclear non-proliferation policy, see pp. 43 to 54.

112. Honourable Don Jamieson, *supra* note 109, p.2.

113. Honourable D.S. Macdonald, *supra* note 106, p.2.

114. Honourable Don Jamieson, *supra* note 109, p.2.

115. Right Hon. L.B. Pearson, Prime Minister, *House of Commons Debates - Official Report*, 3 June 1965, p.1948.

116. It might be argued that since Canada has only entered into nuclear cooperation agreements for peaceful purposes with other non-nuclear weapons states, all military uses of Canadian-supplied nuclear items and material are excluded by definition. While this interpretation may well be correct, it does not explain why some agreements, such as the one between Canada and Indonesia, specifically prohibit all kinds of nuclear explosive devices as well as all military uses whatsoever, while other agreements, such as between Canada and Egypt, only exclude the development of all kinds of nuclear explosive devices.



Article VI of the *Agreement Between the Government of Canada and the Government of Indonesia Concerning the Peaceful Uses of Nuclear Energy*, (13 July 1982), states that Canadian supplied nuclear material shall "...not be used or diverted to the manufacture of nuclear weapons, other military uses or the manufacture of any other nuclear explosive device."

Article IV.I of the *Agreement Between the Government of Canada and the Government of the Arab Republic of Egypt for Co-operation in the Peaceful Uses of Nuclear Energy*, (17 May 1982), stipulates: "The Parties agree that the items subject to the provision of this Agreement shall not be used to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices."

Recently, Defence Minister Perrin Beatty claimed that: "In more recent agreements, signed during the 1970s and 1980s, the [Canadian] Liberal government of the day differentiated between explosive uses of the uranium and other uses. Our concern has always been not with nuclear power...but with nuclear explosives. The decision by the government of the day, then, with subsequent agreements - a number of which have been signed during the 1970s and 1980s- to refer explicitly to nuclear explosives really indicated with greater precision where Canada's concerns lay." *Minutes of Proceedings and Evidence of the Standing Committee on National Defence*, House of Commons, 16 and 18 June 1987, pp. 13:28-29.

The contention that Canadian nuclear export policy is not concerned with non-proscribed military activity was also recently asserted in a letter from Secretary of State for External Affairs Joe Clark to Greenpeace. In his letter, Clark wrote that "...all uranium export contracts are carefully scrutinized by the Government to ensure, inter alia, that Canadian exports are for non-explosive purposes only..." *Letter from the Secretary of State for External Affairs, the Right Hon. Joe Clark, to Greenpeace Nuclear Issues Co-ordinator, Mr. John Willis, Ottawa, Canada, 4 November 1987*, p.1.

While these statements do not explain the differences of language in recent Canadian bilateral agreements they also seem inconsistent with repeated official statements on the peaceful use of Canadian-source material which stipulates, for example, that: "...the network of bilateral nuclear agreements that Canada has put into place with its nuclear partners...provide[s] assurance that Canada's nuclear exports are used solely for legitimate, peaceful, nuclear energy production purposes," *Canada's Nuclear...*, *supra* note 107, p.27. Further, these statements do not provide any indication on whether the current Canadian government would allow

any dealing with countries engaging in non-proscribed military activities (i.e., with countries refusing safeguards on their entire nuclear programme). A positive answer would suggest a drastic change in Canadian policy since the policy statement of 1976 stipulates clearly that: "Shipments (of reactors and uranium) to non-nuclear weapon states under future contracts will be restricted to those which ratify the Non-Proliferation Treaty or otherwise accept international safeguards on their entire nuclear programme" (emphasis added). *Honourable Don Jamieson, supra* note 109, pp. 2-3.

See also the 1985 statement of Canada's Ambassador for Disarmament Douglas C. Roche:

"Canada's nuclear programme is strictly for peaceful purposes and entirely subject to safeguards. In nuclear exports Canada imposes a rigorous set of requirements on its potential customers - both nuclear-weapon and non-nuclear weapon states alike - requirements which go far beyond the full-scope safeguards of the IAEA. Canada will export nuclear materials, equipment and technology only to those countries that have accepted IAEA or equivalent safeguards over their entire nuclear programme and activities." Douglas Roche, "Canada and the NPT: The Enduring Relationship," in David B. Dewitt (ed.), *Nuclear Non-Proliferation and Global Security*, Beckenham, Kent: Croom Helm (1987), p.166.

117. The UK reportedly enriches uranium to some 60 percent at its Capenhurst facility and then sends it to the US for further enrichment to a level suitable for use as nuclear submarine fuel. Discussion between John Simpson and Tariq Rauf at Charlottesville, Virginia, on 21 November 1987. See also, Norman Dombey, David Fischer and William Walker, "Becoming a Non-Nuclear Weapon State: Britain, the NPT and Safeguards," *International Affairs*, 63:2, (Spring 1987), p.198.

118. This estimate was given by Mr. Eldon J. Healey (Assistant Deputy Minister (Materiel), Department of National Defence) in *Minutes of Proceedings and Evidence of the Standing Committee on National Defence*, House of Commons, 25 June 1987, p.14:28.

119. "The Treaty Establishing the European Atomic Energy Community (Euratom)," entered into force on 1 January 1958 and has been acceded to by Belgium, the Federal Republic of Germany, France, Italy, Luxembourg, Netherlands, Denmark, Greece, Portugal, Spain, Ireland and the United Kingdom. See United Nations, *Treaty Series: Treaties and International Agreements Registered or Filed and Recorded With the Secretariat*

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of the United Nations, Vol.298, (1958). Hereafter: *Euratom Treaty*.

120. For the agreement covering Canada's nuclear cooperation with France and the United Kingdom, see *Exchange of Letters between Canada and the European Atomic Energy Community (Euratom)*, Brussels, 16 January 1978. Canada, Treaty Series 1978, no.26. In this exchange of letters amending the *Agreement Between the Government of Canada and the European Atomic Energy Community for Co-operation in the Peaceful Uses of Atomic Energy of 6 October 1959*, paragraph (c) reads as follows:

"Material which is subject to the terms of the Canada/Euratom Agreement of 1959 shall not be used for the manufacture of any nuclear weapon or for other military uses of nuclear energy or for the manufacture of any other nuclear explosive device." (p.6).

121. Article 197, *Euratom Treaty*, *supra* note 119, p.229.

122. Article 103, *ibid.*, p.204.

123. Part of the above section was drawn from Charles Van Doren's response to authors' questionnaire. See *supra* note 88.

124. For the peaceful nuclear cooperation with the US see *Working Consolidation of the 1955 Agreement for Co-operation Concerning Civil Uses of Atomic Energy Between the Government of Canada and the Government of the United States of America, as amended*.

Article XII (c) dealing with Guarantees stipulates:

"Designated nuclear technology, material, equipment and devices, major critical components and components subject to this Agreement and source or special nuclear material used in or produced through the use of any components subject to this Agreement, and over which a Party has jurisdiction, shall not be used for any military purpose." (p.20).

125. *Agreement between the Government of the United States of America and the Government of Canada for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes*. Agreement signed in Washington, 22 May 1959. Entered into force 27 July 1959.

126. See Department of National Defence, *Press Release*, 19 November 1987.

127. See for example *Ottawa Citizen*, 19 November 1987, pp. A1 and A2; and 1 December 1987, p.A3. For the text of the US-UK accord, see *Agreement Between the Government of the United Kingdom of Great Britain and Northern Ireland for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes*, 3 July 1958.

128. Charles Van Doren, *supra* note 88.

129. Official source in Ottawa (name withheld). Also *Letter to US Defense Secretary Caspar Weinberger and to US Energy Secretary John Herrington*, from Congressman Melvin Price (now deceased), dated 5 November 1987.

130. Based on response to authors' questionnaire: privileged information.

131. This is based on Fischer's comments *supra* note 77: "As the amount of unsafeguarded weapons-grade uranium in NPT NNWS increased, as the number of states possessing access to or means of producing such weapons-grade material increased and as the number of states having nuclear submarines or other unsafeguarded nuclear plants or stocks increased, the assurances given by the NPT and the non-proliferation régime ...against diversion of nuclear materials to nuclear weapons...must surely diminish. The confidence that the nuclear activities of NNWS were essentially peaceful, would obviously be the first casualty."

132. See note 54.

133. See IAEA, *Compatibility of Safeguards Agreements and the Agency's Statute*, GOV/INF/433, Vienna: IAEA (21 January 1983).

134. See *ibid.*

135. Blix, *supra* note 99, p.6.

136. See *Verification Research Program*, External Affairs, Canada, (Verification Brochure No.3), Ottawa (1987).

137. Bureau of United Nations Affairs, Department of External Affairs, *Canada and the International Atomic Energy Agency*, Government of Canada, Ottawa (1979), p.6.

138. *Ibid.*

## Appendix I

Source: IAEA Bulletin, 27:2  
(Summer 1985), Vienna:  
International Atomic Energy  
Agency, pp.29-32.

### Preamble

## The Treaty on the Non-Proliferation of Nuclear Weapons

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty",  
Considering the devastation that would be visited upon all mankind by a nuclear war  
and the consequent need to make every effort to avert the danger of such a war and to  
take measures to safeguard the security of peoples.

Believing that the proliferation of nuclear weapons would seriously enhance the danger  
of nuclear war.

In conformity with resolutions of the United Nations General Assembly calling for the  
conclusion of an agreement on the prevention of wider dissemination of nuclear  
weapons.

Undertaking to co-operate in facilitating the application of International Atomic Energy  
Agency safeguards on peaceful nuclear activities.

Expressing their support for research, development and other efforts to further the  
application, within the framework of the International Atomic Energy Agency safe-  
guards system, of the principle of safeguarding effectively the flow of source and special  
fissionable materials by use of instruments and other techniques at certain strategic  
points.

Affirming the principle that the benefits of peaceful applications of nuclear technology,  
including any technological by-products which may be derived by nuclear-weapon  
States from the development of nuclear explosive devices, should be available for  
peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear  
weapon States.

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to  
participate in the fullest possible exchange of scientific information for, and to contribute  
alone or in co-operation with other States to, the further development of the  
applications of atomic energy for peaceful purposes.

Declaring their intention to achieve at the earliest possible date the cessation of the  
nuclear arms race and to undertake effective measures in the direction of nuclear disarmament.

Urging the co-operation of all States in the attainment of this objective.

Recalling the determination expressed by the Parties to the 1963 Treaty banning  
nuclear weapon tests in the atmosphere, in outer space and under water in its Preamble  
to seek to achieve the discontinuance of all test explosions of nuclear weapons for  
all time and to continue negotiations to this end.

Desiring to further the easing of international tension and the strengthening of trust  
between States in order to facilitate the cessation of the manufacture of nuclear  
weapons, the liquidation of all their existing stockpiles, and the elimination from  
national arsenals of nuclear weapons and the means of their delivery pursuant to a  
treaty on general and complete disarmament under strict and effective international  
control.

Recalling that, in accordance with the Charter of the United Nations, States must  
refrain in their international relations from the threat or use of force against the territorial  
integrity or political independence of any State, or in any other manner inconsistent  
with the Purposes of the United Nations, and that the establishment and maintenance  
of international peace and security are to be promoted with the least diversion for  
armaments of the world's human and economic resources.

Have agreed as follows:

### ARTICLE I

Each nuclear-weapon State Party to the 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.

### ARTICLE II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the  
transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive  
devices or of control over such weapons or explosive devices directly or indirectly; not  
to manufacture or otherwise acquire nuclear weapons or other nuclear explosive  
devices; and not to seek or receive any assistance in the manufacture of nuclear  
weapons or other nuclear explosive devices.

### ARTICLE III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards,  
as set forth in an agreement to be negotiated and concluded with the International  
Atomic Energy Agency in accordance with the Statute of the International

**Non-proliferation  
Undertaking by NWS**

**Non-proliferation  
Undertaking by NNWS**

**Safeguards Agreements**

Atomic Energy Agency and the Agency's safeguards system for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production 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 this article.

3. The safeguards required by this article shall be implemented in a manner designed to comply with article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of the Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

#### ARTICLE IV

#### International Co-operation Towards Peaceful Nuclear Developments

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

#### ARTICLE V

#### Peaceful Nuclear Explosions

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

#### ARTICLE VI

#### Nuclear Disarmament

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

#### ARTICLE VII

#### Nuclear-Weapon-Free Zones

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

#### ARTICLE VIII

#### Amendments, Treaty Reviews

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any

proposed amendments shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all Parties to the Treaty, to consider such an amendment.

2. Any amendments to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

#### ARTICLE IX

#### Signature, Ratification, Accession, Depositaries, Entry into Force

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and the United States of America, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear device prior to January 1967.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to article 102 of the Charter of the United Nations.

#### ARTICLE X

#### Withdrawal, Treaty Extension

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

#### ARTICLE XI

#### Authenticity

This Treaty, the Chinese, English, French, Russian and Spanish texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of the Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

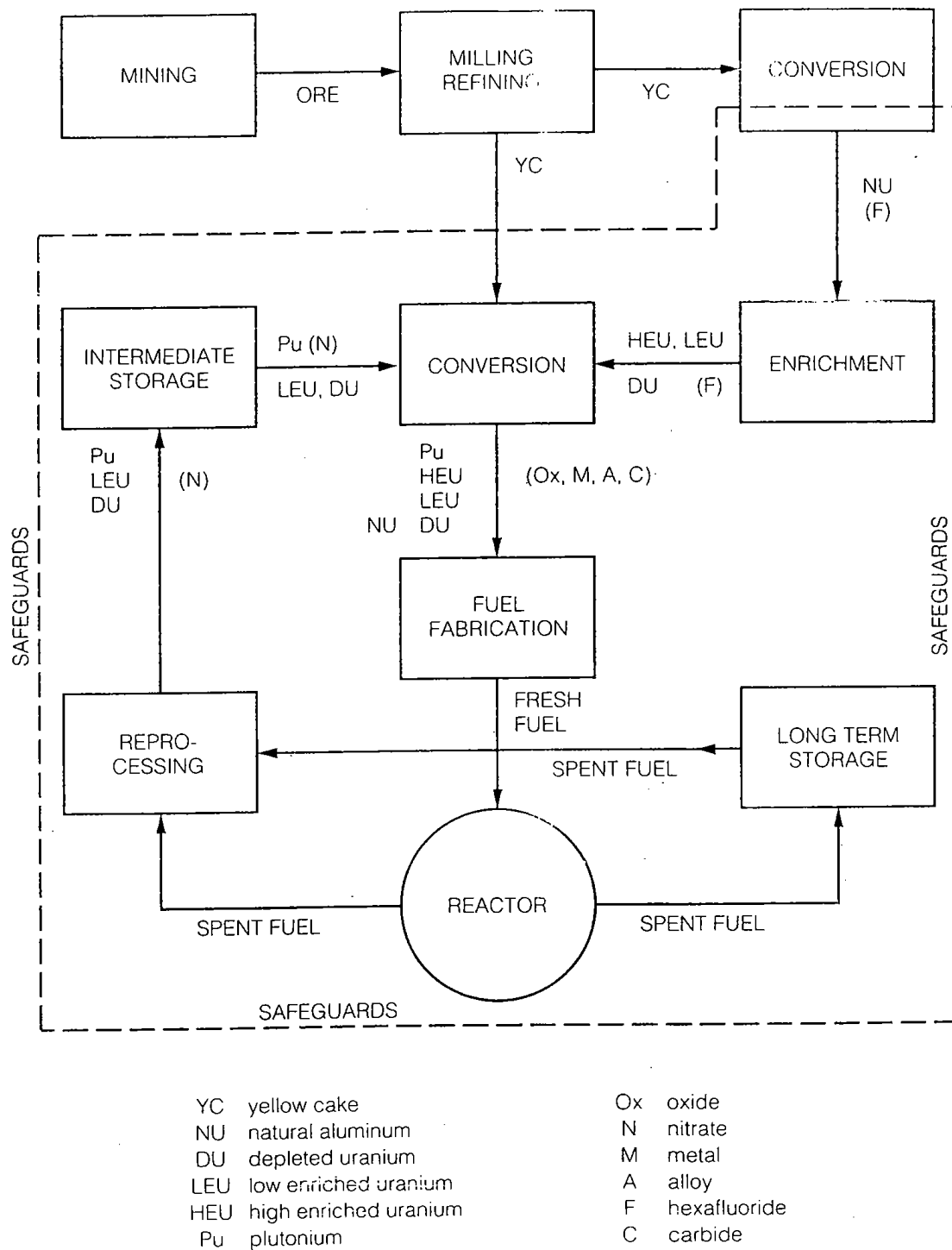
In witness whereof the undersigned, duly authorized, have signed this Treaty.

Signed in London, Moscow and Washington on 1 July 1968.

Entered into force on 5 March 1970.

## Appendix II Simplified Flow Diagram of the Nuclear Fuel Cycle

Fig.6 in IAEA *Safeguards. An Introduction*. Vienna: International Energy Agency (1981). p.17  
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# Appendix III Parties to the NPT and List of Safeguards Agreements with Non-Nuclear-Weapon States

## CHRONOLOGY OF DEPOSITS OF RATIFICATIONS, ACCESSIONS AND SUCCESSIONS

1. Ireland .....	1 July 1968	65. Burundi* .....	19 Mar. 1971 (acc.)
2. Nigeria .....	27 Sep. 1968	66. Tonga* .....	7 July 1971
3. Denmark .....	3 Jan. 1969	67. Dominican Republic .....	24 July 1971
4. Canada .....	8 Jan. 1969	68. Democratic Kampuchea .....	2 June 1972 (acc.)
5. Cameroon .....	8 Jan. 1969	69. El Salvador .....	11 July 1972
6. Mexico .....	21 Jan. 1969	70. Fiji* .....	14 July 1972 (acc.)
7. Finland .....	5 Feb. 1969	71. Philippines .....	5 Oct. 1972
8. Norway .....	5 Feb. 1969	72. Benin* .....	31 Oct. 1972
9. Ecuador .....	7 Mar. 1969	73. Thailand .....	7 Dec. 1972 (acc.)
10. Mauritius .....	25 Apr. 1969	74. Australia .....	23 Jan. 1973
11. Botswana* .....	28 Apr. 1969	75. Nicaragua .....	6 Mar. 1973
12. Mongolia .....	14 May 1969	76. Côte d'Ivoire .....	6 Mar. 1973
13. Hungary .....	27 May 1969	77. Honduras* .....	16 May 1973
14. Poland .....	12 June 1969	78. Bahamas* .....	10 July 1973 (acc.)
15. Austria .....	27 June 1969	79. Sudan .....	31 Oct. 1973
16. Iceland .....	18 July 1969	80. Gabon .....	19 Feb. 1974 (acc.)
17. Czechoslovakia .....	22 July 1969	81. Grenada* .....	19 Aug. 1974 (acc.)
18. Bulgaria .....	5 Sep. 1969	82. Sierra Leone .....	26 Feb. 1975 (acc.)
19. New Zealand .....	10 Sep. 1969	83. Western Samoa* .....	17 Mar. 1975 (acc.)
20. Syrian Arab Republic .....	24 Sep. 1969	84. Republic of Korea .....	23 Apr. 1975
21. Iraq .....	29 Oct. 1969	85. Belgium .....	2 May 1975
22. German Democratic Republic .....	31 Oct. 1969	86. Germany, Federal Republic of .....	2 May 1975
23. Swaziland* .....	11 Dec. 1969	87. Italy .....	2 May 1975
24. Nepal* .....	5 Jan. 1970	88. Luxembourg .....	2 May 1975
25. Sweden .....	9 Jan. 1970	89. Netherlands .....	2 May 1975
26. Taiwan Province of China* .....	27 Jan. 1970	90. Gambia* .....	12 May 1975
27. Iran .....	2 Feb. 1970	91. Rwanda* .....	20 May 1975 (acc.)
28. Afghanistan .....	4 Feb. 1970	92. Libyan Arab Jamahiriya .....	26 May 1975
29. Romania .....	4 Feb. 1970	93. Venezuela .....	26 Sep. 1975
30. Paraguay .....	4 Feb. 1970	94. Singapore .....	10 Mar. 1976
31. Ethiopia .....	5 Feb. 1970	95. Japan .....	8 June 1976
32. Malta* .....	6 Feb. 1970	96. Suriname* .....	30 June 1976 (succ.)
33. Cyprus .....	10 Feb. 1970	97. Guinea-Bissau* .....	20 Aug. 1976 (acc.)
34. Mali .....	10 Feb. 1970	98. Panama .....	13 Jan. 1977
35. Jordan .....	11 Feb. 1970	99. Switzerland .....	9 Mar. 1977
36. Lao People's Democratic Republic* .....	20 Feb. 1970	100. Portugal .....	15 Dec. 1977 (acc.)
37. Togo* .....	26 Feb. 1970	101. Liechtenstein .....	20 Apr. 1978 (acc.)
38. Tunisia .....	26 Feb. 1970	102. Congo* .....	23 Oct. 1978 (acc.)
39. Yugoslavia .....	3 Mar. 1970	103. Tuvalu* .....	19 Jan. 1979 (succ.)
40. Burkina Faso* .....	3 Mar. 1970	104. Sri Lanka .....	5 Mar. 1979
41. Costa Rica .....	3 Mar. 1970	105. Democratic Yemen* .....	1 June 1979
42. Peru .....	3 Mar. 1970	106. Indonesia .....	12 July 1979
43. Malaysia .....	5 Mar. 1970	107. Bangladesh .....	27 Sept. 1979 (acc.)
44. Jamaica .....	5 Mar. 1970	108. Cape Verde* .....	24 Oct. 1979 (acc.)
45. Liberia .....	5 Mar. 1970	109. St. Lucia* .....	28 Dec. 1979 (acc.)
46. Somalia* .....	5 Mar. 1970	110. Barbados* .....	21 Feb. 1980
47. Greece .....	11 Mar. 1970	111. Turkey .....	17 Apr. 1980
48. Maldives* .....	7 Apr. 1970	112. Egypt .....	26 Feb. 1981
49. Ghana .....	5 May 1970	113. Solomon Islands* .....	17 June 1981 (succ.)
50. Lesotho* .....	20 May 1970	114. Antigua and Barbuda* .....	1 Nov. 1981 (succ.)
51. Bolivia .....	26 May 1970	115. Papua New Guinea* .....	25 Jan. 1982 (acc.)
52. Haiti .....	2 June 1970	116. Nauru* .....	7 June 1982 (acc.)
53. Kenya .....	11 June 1970	117. Viet Nam .....	14 June 1982 (acc.)
54. Lebanon .....	15 July 1970	118. Uganda .....	20 Oct. 1982 (acc.)
55. Zaire .....	4 Aug. 1970	119. Dominica* .....	10 Aug. 1984 (succ.)
56. San Marino* .....	10 Aug. 1970	120. Equatorial Guinea* .....	1 Nov. 1984 (acc.)
57. Uruguay .....	31 Aug. 1970	121. St. Vincent and the Grenadines* .....	6 Nov. 1984 (succ.)
58. Guatemala .....	22 Sep. 1970	122. Seychelles* .....	12 Mar. 1985 (acc.)
59. Madagascar .....	8 Oct. 1970	123. Brunei Darussalam* .....	26 Mar. 1985 (acc.)
60. Central African Republic .....	25 Oct. 1970 (acc.)	124. Bhutan* .....	23 May 1985 (acc.)
61. Morocco .....	27 Nov. 1970	125. Kiribati* .....	18 Apr. 1985 (succ.)
62. Senegal .....	17 Dec. 1970	126. Belize* .....	9 Aug. 1985 (succ.)
63. Holy See .....	25 Feb. 1971 (acc.)	127. Democratic People's Republic of Korea .....	12 Dec. 1985 (acc.)
64. Chad* .....	10 Mar. 1971		

..... 27 Nov. 1968  
 ..... 5 Mar. 1970  
 ..... 5 Mar. 1970

— 47 —

- Asia and the Pacific

afghanistan

- 

- Africa and the Middle East

## Bapin\*

- The Americas.*

gua and Barbud

1. Antigua and Barbuda\* (succ.)
2. Bahamas\*
3. Barbados\*
4. Belize\* (succ.)
5. Bolivia
6. Canada
7. Colombia
8. Costa Rica
9. Dominica\* (succ.)
10. Dominican Republic
11. Ecuador
12. El Salvador
13. Grenada\* (acc.)
14. Guatemala
15. Haiti
16. Honduras\*
17. Jamaica
18. Mexico
19. Nicaragua
20. Panamá
21. Paraguay
22. Peru
23. St. Lucia\* (acc.)
24. St Vincent and the Grenadines\* (succ.)
25. Suriname\* (succ.)
26. Trinidad and Tobago\*
27. USA
28. Uruguay
29. Venezuela

States in italics have signed but not yet ratified the NPT. All other States have ratified/acceded/succeeded.

\*\* Entry added by the authors.

Source: Appendix D, David

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#### Appendix IV

### The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/153)\*

#### Non-application of safeguards to nuclear material to be used in non-peaceful activities

14. The Agreement should provide that if the State intends to exercise its discretion to use **nuclear material** which is required to be safeguarded thereunder in a nuclear activity which does not require the application of safeguards under the Agreement, the following procedures will apply:

- (a) The State shall inform the Agency of the activity, making it clear:
  - (i) That the use of the **nuclear material** in a non-proscribed military activity will not be in conflict with an undertaking the State may have given and in respect of which Agency safeguards apply, that the **nuclear material** will be used only in peaceful nuclear activity; and
  - (ii) That during the period of non-application of safeguards the **nuclear material** will not be used for the production of nuclear weapons or other nuclear explosive devices;
- (b) The Agency and the State shall make an arrangement so that, only while the **nuclear material** is in such an activity, the safeguards provided for in the Agreement will not be applied. The arrangement shall identify, to the extent possible, the period or circumstances during which safeguards will not be applied. In any event, the safeguards provided for in the Agreement shall again apply as soon as the **nuclear material** is reintroduced into a peaceful nuclear activity. The Agency shall be kept informed of the total quantity and composition of such unsafeguarded **nuclear material** in the State and of any exports of such material; and
- (c) Each arrangement shall be made in agreement with the Agency. The Agency's agreement shall be given as promptly as possible; it shall only relate to the temporal and procedural provisions, reporting arrangements, etc., but shall not involve any approval or classified knowledge of the military activity or relate to the use of the **nuclear material** therein.

\* See note 37

Appendix V



INTERNATIONAL ATOMIC ENERGY AGENCY  
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE  
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ  
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

WAGRAMERSTRASSE 5, P.O. BOX 100, A-1400 VIENNA, AUSTRIA  
TELEX: 1-12645, CABLE: INATOM VIENNA, FACSIMILE: 43 222 230184, TELEPHONE: (222) 2360

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230-410.M1.11

20 August 1987

Dear Mr. Rauf,

I refer to the letters which you and Ms. Desjardins have addressed to several staff members of the International Atomic Energy Agency concerning your Centre's research project on nuclear non-proliferation. A number of the questions you have asked involve matters of judgement about the Non-Proliferation Treaty and the policy of the Canadian Government in relation to the Treaty. It would not be proper for individual staff members of the Agency to make comments or judgements in such political or policy areas, which could be interpreted as reflecting the view of the Agency and its Secretariat as a whole. Nor is it proper for the Agency itself to take a position on legitimate national policy debates.

I would suggest that the most comprehensive source of information on several of the questions you have asked is the records of the discussions of the Committee set up by the Agency's Board of Governors in 1970 with the task of formulating the document which eventually was published as INFCIRC/153 (corrected). This Committee was open to all Member States. The Secretariat of the Committee was provided by staff members of the Agency. If you have not done so already, you will no doubt be approaching the Canadian Government and requesting access to these records.

My colleagues will not be replying individually to the letters you have addressed to them. However, the following comments may be helpful to you in carrying forward your project. They reflect the Secretariat's understanding of the background to paragraph 14 of INFCIRC/153, which has, as you know, been incorporated in all safeguards agreements with the individual States concerned concluded pursuant to accession to the NPT.

INFCIRC/153 is intended to provide for the application of safeguards to enable non-nuclear-weapon States (NNWS) parties to the NPT to implement their undertaking made in Article III.1 of the NPT to conclude with the Agency safeguards agreements for the "exclusive purpose of verification of the fulfilment of its (the State's) obligations assumed under this Treaty (NPT) with a view to preventing diversion of nuclear energy from peaceful uses to

Mr. Tariq Rauf  
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Canadian Centre for Arms Control and Disarmament  
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Canada



...2/

nuclear weapons or other nuclear explosive devices". The undertakings made by NNWS parties to the Treaty prohibit the use by NNWS of nuclear material for nuclear weapons or other nuclear explosive devices. They do not explicitly exclude or include the possibility of NNWS parties to the Treaty making use of nuclear material for other non-proscribed military purposes.

However, also pursuant to Article III.1 of the Treaty all peaceful nuclear activities in NNWS parties to the Treaty are subject to safeguards. Hence, nuclear material in such States, which might eventually be used for a non-proscribed military purpose would be subject to safeguards until or unless such an event occurred. It was therefore considered necessary to include in INFCIRC/153 a provision (paragraph 14) to deal with a situation where safeguards would not be applied to nuclear material, hitherto subject to safeguards in the NNWS concerned, which was to be used in non-proscribed military activities. A provision of this nature would be necessary if the Agency were to continue to be able to fulfil its safeguards responsibilities under the individual safeguards agreements concluded with NNWS parties to the NPT.

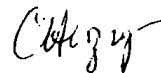
Paragraph 14 of INFCIRC/153 (corrected) has the same status today as it had at the time of its incorporation in the document. This document has not been amended since the request by the Agency's Board of Governors in 1971 that it should be used in the negotiation of safeguards agreements concluded in connection with NPT.

To the Secretariat's knowledge there is no formal definition of "non-proscribed military activity". We understand that at the time of preparing INFCIRC/153 naval propulsion was commonly considered the most likely use. We also understand that most, if not all, participants in the Committee which prepared INFCIRC/153 favoured a narrow construction of the term "non-proscribed military activity", and that processes such as enrichment or reprocessing to produce materials for use in such an activity would not themselves be considered as non-proscribed military uses and would therefore be subject to safeguards in the NNWS concerned.

There has been no request up to now to invoke the provisions of paragraph 14 of INFCIRC/153.

Regarding your question 12, while one could envisage highly-enriched uranium being procured for a non-proscribed military activity, but in fact being destined for nuclear weapons or explosive devices, such an action would be a clear violation of the undertakings made under the NPT.

Yours sincerely,



Christopher Herzig  
Director  
Division of External Relations

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