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JPRS Report

Proliferation Issues

Russian Federation:
Foreign Intelligence Service Report
A New Challenge After the Cold War: Proliferation of Weapons of Mass Destruction

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CONTENTS

[This report contains foreign media information on issues related to worldwide proliferation and transfer activities in nuclear, chemical, and biological weapons, including delivery systems and the transfer of weapons-relevant technologies.]

Russian Intelligence Report on Proliferation

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Introduction

[Text] *The end of the Cold War era opened the floodgates for the world community to move to a new system of international relations. World confrontation ended in its "traditional" form, in which for decades after World War II two military blocs in political-ideological opposition to each other, and two superpowers—the USSR and the United States—faced off, going right to the brink.*

But it is now clear that the escape from a military-politically bipolar world has not only not eliminated, but has not even diminished, the possibility of destabilization of the of the international situation on the regional level. Proliferation of weapons of mass destruction [WMD]—nuclear, biological, and chemical—presents a special danger in this regard. The spread of WMD, like the metastatis of a cancerous tumor, can destroy the entire fabric of international relations and dash hopes for creating a just and lasting world order.

The problem of proliferation of weapons of mass destruction bears on Russian interests directly. A situation in which new states possessing weapons of mass destruction can appear along Russia's borders seems unacceptable. This unacceptability is deepened by the incompleteness of the process of state-building in the republics of the former USSR, some of which have been caught up in the fires of ethnic, national, and political conflicts. In addition, there is the obvious tendency of neighboring states to be drawn into these conflicts. Some of these neighboring states can be regarded as among those striving to acquire weapons of mass destruction, or they already have some kind of weapons of mass destruction.

The definite slowness of the process of concentrating nuclear weapons in Russia—which is in this regard the successor to the USSR—is also a serious problem. Furthermore, fairly influential forces are emerging which, despite the agreements reached earlier, would like to preserve their states' nuclear status permanently.

Russia, as a permanent member of the UN Security Council, is deeply interested in strengthening the effectiveness of international mechanisms intended to shield the world from the new (and, under current conditions, perhaps most serious) challenge after the Cold War: a proliferation of weapons of mass destruction.

Tracing the processes of proliferation of weapons of mass destruction, defining the catalysts of this process, setting criteria which will make it possible to define the point where a certain country is on the path to the creation of weapons of mass destruction—all these tasks have now been assigned to the Russian Foreign Intelligence Service.

In this report, prepared by Service experts, an attempt is made to elucidate the problem, which is so important to all mankind, in a comprehensive fashion. The Russian Foreign Intelligence Service hopes that this study, which is being made public in the spirit of glasnost, will make a reasonable contribution to overcoming one of the principal threats for the world community after the end of the Cold War.

[Signed] *Ye. Primakov*

Chief

Russian Federation Foreign Intelligence Service academician

CHAPTER I

Proliferation of WMD: A Threat to World Stability

A New Character of Regional Conflicts?

The main threat, obviously, is a chain: The proliferation of WMD, the possibility of their employment in regional conflicts, and the growing probability if that happens that a crisis will spread beyond the boundaries of the region.

Previously, the danger of the use of WMD was constrained mainly by the fact that a relatively small number of states possessing WMD were directly involved in the confrontation. Now the probability of their employment in conflict situations can be expanded significantly, owing to an increase in the number of countries that possess WMD, and also owing to their "transport" into conflict zones from the outside.

The end of the bipolar world, which was accompanied by the breakup of a number of states, changed the configuration of borders. Territorial disputes were exacerbated. The conflict space, part of which was a Europe that became more or less "calmed" by the Helsinki accords, was expanded. Moreover, European ethnic and national clashes were broadened to include states on other continents. An example of this is the activeness of the Islamic world in support of the Muslims in Bosnia and Herzegovina. Under these conditions, the danger of "internationalization" of the consequences of the "spread" of WMD is growing.

This pernicious trend is evident in the conflicts on the territory of the former USSR: in the North Caucasus, in the Transcaucasus, and in Central Asia—creating "fertile" soil for involving foreign states in them, some of which aspire to possess WMD.

In addition, the "traditional" zones of increased risk should be added to this—the Near East, the Persian Gulf area, South Asia, and Northeast Asia. Individual types of WMD have already been used in some of these areas; for example, chemical weapons were used in the Iran-Iraq war. At the present time, the probability and scales of the possible use of WMD in local clashes of the "traditional" type are increasing. No one should be misled by Iraq's nonemployment of WMD during the war in the Persian Gulf zone. This, it is possible, is not an affirmation but, to the contrary, an exception to the general trend that became possible only as a result of the existing combination of military, political, and moral-psychological factors.

The probability of WMD being used in regional conflicts of the "traditional type" is also increasing, because the very existence of the states involved is at stake. If the India-Pakistan conflict should shift to the crisis stage, the "prize" for the side that prevails can be the disintegration and practical cessation of the existence of the other state. It is no accident that in such a situation, as the experts believe, the conflict will not remain confined to the employment of conventional weapons. While not confirming that nuclear weapons are present in the inventories of the Indian and Pakistani armed forces, representatives of both states, nevertheless, say that they will immediately come up with such weapons, if they "appear" on the other side.

The danger of employment of WMD is also increasing in the "traditional" conflict on the Korean Peninsula. The possible instability and turmoil in the North when the power passes to another generation of leaders could immediately affect the methods of resolving or impeding the process of unification of the two Korean states.

It is patently obvious that the process of proliferation of WMD has not only a "horizontal," but also a clearly pronounced "vertical" dimension to its negative nature. This process makes it politically and psychologically difficult for states that possess nuclear weapons, or that aspire to them, to renounce their development or employment.

But even such a renunciation under conditions where proliferation of WMD is taking place is not an adequate guarantee of stability. The imperfection of the technology and equipment and of the safety systems in a number of countries, defects in the technologies for using and systems for monitoring the storage of WMD stockpiles and their components, missiles and other delivery systems make it necessary to seriously consider the possibility of not only sanctioned but also the accidental employment of WMD in regional conflicts.

The process of proliferation of WMD also has a negative impact on the situation on the global level. And this is due not to the probability that regional clashes involving the use of WMD may reach this level. The fact is that the spread of WMD is hindering the now-started movement toward the reduction or even the elimination of a number of existing types of WMD, and it is complicating the conclusion of appropriate bilateral agreements, and in the future—the achievement of multilateral agreements.

Naturally, this conclusion does not imply the idealization of the state of affairs in the so-called "nuclear (or global) club." It is generally known that, as a result of complicated negotiations, the United States and Russia have made substantial progress in the area of reducing of their strategic nuclear forces. In this regard, China occupies an isolated position, and England and France are in no hurry to join the negotiating process. Under these conditions, it is especially obvious that the proliferation of WMD beyond the bounds of the "global club" is hampering progress toward the achievement of multilateral agreements that are aimed at the reduction or elimination of such weapons. The proliferation of WMD, especially nuclear weapons, is undoubtedly, dimming the prospects for effective control over strategic armaments and may disrupt it altogether.

A New Type of Terrorism?

The problem of the terrorism of individual criminal groups and persons is causing serious concern in connection with the proliferation of WMD.

From the middle of the 1960's to the middle of the 1980's, that is, for a period of 20 years, experts in a special international group for the prevention of nuclear terrorism counted more than 150 incidents of different degrees of risk: explosions, attacks, the murder and kidnapping of officials, and the theft of fissile materials and components of equipment at various nuclear facilities. Judging by information of the FIS [Foreign Intelligence Service], the number of these types of incidents is on the rise.

Serious alarm is spreading due to the growing interest of the international organized-crime structures in conducting illegal trade in fissionable and other especially dangerous materials, documentation on WMD technology, and individual units for the manufacture of nuclear devices.

According to available data, this is being done mainly for the purpose of lucrative resale or profiting by other methods. At the same time, this activity increases the probability of WMD being acquired for purposes of blackmail.

The situation becomes especially dangerous in connection with the possibility of terrorism being conducted using WMD. This concerns not only nuclear terrorism. There is also a great possibility of chemical and biological weapons being used for terrorist purposes. At the same time, an additional temptation for employing chemical weapons for terrorist purposes is the fact that chemical agents are fairly widely used by the police and special forces of a number of countries.

An act of terrorism involving the use of WMD constitutes the greatest threat in a crisis situation as a step that lowers the "threshold" for the employment of WMD. Such a terrorist act can be followed by "adequate" retaliatory actions by the "victimized party" that are now aimed at the state whose citizens allegedly participated in the terrorist act. Such a "scenario" is quite realistic.

The threat of sabotage in relation to nuclear facilities of a peaceful nature is extremely dangerous. The consequences of sabotage can be catastrophic in terms of the radioactive contamination of large territories. This is especially clear when it is considered that, in the implementation of all current programs of various countries for the processing of nuclear fuel, by the end of this century the amount of plutonium earmarked for peaceful use will exceed the amount that the USSR and the United States used to create their nuclear arsenals, and, as is well-known, there are enough of them to destroy our planet many times over.

Meanwhile, not just a directed terrorist act, but practically any conflict in a region where a nuclear facility is located can lead to very grave consequences. Considering the sharply rising trend in international terrorism, wars involving small states that possess peaceful nuclear complexes may be associated with greater risks to global security than a direct confrontation between the "superpowers."

Terrorism involving WMD is turning from a plot of adventure films into an urgent problem for realistic policy that demands a thorough understanding and the development of reliable countermeasures.

An Ecological Threat?

Ecological problems that are associated not only with the use, or just the testing, but also with the production of these types of weapons serve as a very important incentive for increased international efforts in the area of preventing the proliferation of WMD. The appearance of a rapidly growing number of areas that, for various reasons, are exposed to radiation and chemical or bacteriological contamination is an additional confirmation of the increased danger posed by WMD in all stages of their creation.

The risk of catastrophic consequences is rising due to the fact that many of the countries that are trying to get hold of the "ultimate weapon" do not possess the necessary scientific-technical and financial capabilities to ensure the necessary level of ecological safety. Meanwhile, it is known that, even given compliance with all of the requirements, for example, for operating nuclear facilities, the amount of money needed just to restore the land on the territory they occupy runs into many hundreds of millions of dollars. It is hardly likely that specialists can be found who are capable of evaluating the expenditures for controlling the ecological consequences of serious accidents or sabotage at nuclear facilities of a military nature.

Increased attention (and, unquestionably, for a good reason) has recently been paid to the question of the burial of nuclear reactors and radioactive and highly toxic wastes. This problem has long since become a global one, affecting the interests of all countries of the world.

Of course, up to now, this problem has been the result of activities of the states of the "nuclear club." But even these countries that are advanced in the scientific and technical sense are raising more questions associated with the resolution of the problems of burying wastes than they are providing satisfactory answers. But what will happen in the event that WMD "spreads" and to what extent will this increase the danger of "unskilled" and unreliable burial?

Considering the technological complexity and the high cost of destroying these kinds of wastes (even for the "simplest" groups, the cost is estimated at $1,000 per tonne in Europe, and $1,500 in the United States), secret operations to dump them at great depths in the Arctic, Pacific, and Atlantic Oceans were common practice for sailors of the nuclear powers. It should be said that, till now, not one of the states that practiced the dumping of radioactive and toxic wastes on the ocean floor has declassified the sites of such graves and the amounts of toxic materials involved.

Numerous underground burial areas exist whose safety and longevity also raise grave fears. Dangerous production wastes have also been shipped to the territories of countries of the Third World and were destroyed with minimal safety precautions, and, consequently, at minimal cost: In Africa, the cost totaled $40 or less per tonne.

If we add to this the fact that no practical technology for burying wastes has been developed and that the entire procedure was simplified as much as possible, as a consequence of which sizable chunks of territory have already become contaminated with radiation and chemicals, then the ecologically catastrophic outlook for the proliferation of WMD becomes even more obvious. Even now, on the territory of the former USSR, areas whose radiation levels makes them unsuitable for life comprise 4 million square kilometers. Already, up to 15,000 hazardous radioactively and chemically contaminated zones have been revealed in the United States, and to clean up the effects of the activity of the American military-industrial complex alone will require, according to a statement by the U.S. Secretary of Defense, up to $200 billion. But, what will happen tomorrow?

CHAPTER II

WMD: The Proliferation Process

Measuring the Extent of Progress Toward WMD Possession

The rethinking of national and bloc strategies for ensuring security, that is taking place after the decades of the Cold War has revealed a paradoxical situation: In the

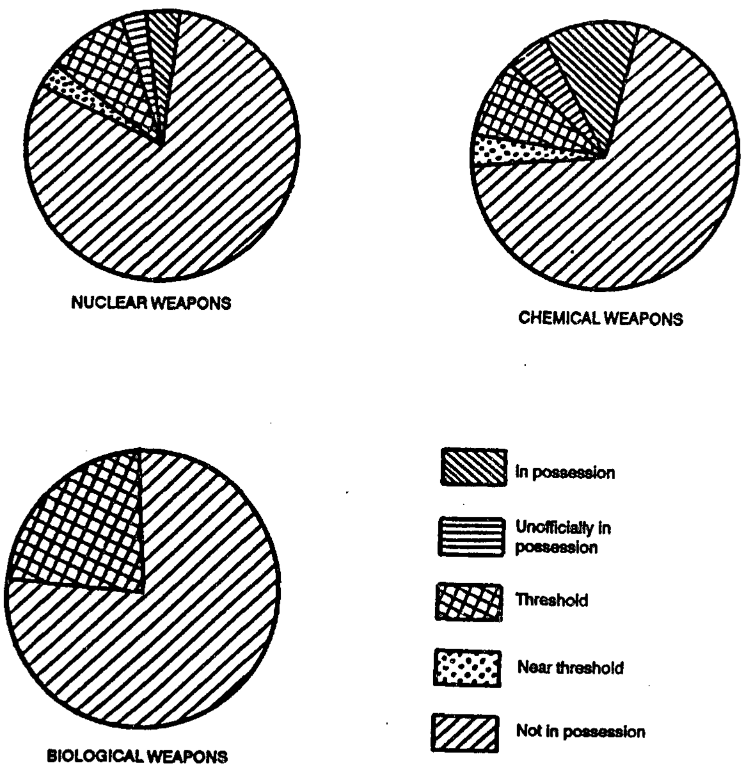

Diagram 1. Shares of Individual Categories of Countries in the World Community in Terms of Advancement Toward the Possession of WMD

heat of the establishment of strategic parity, the participants in the confrontation "overlooked" the problem of WMD proliferation.

According to various estimates, between 20 and 30 countries in the world have the potential for developing nuclear, biological, and chemical weapons and delivery systems. This does not mean that all of them are actively involved in developing WMD in one area or another. There are five "official" nuclear powers, the so-called "nuclear (or global) club." Other states have considerable stockpiles of chemical weapons. A number of countries possess technologies for the production of biological weapons.

From the standpoint of the problem of WMD proliferation, the following three groups of countries are of particular interest:

—countries that already have WMD but do not officially acknowledge this fact. The existence of such countries, along with the "global club," substantially influences the process of WMD proliferation;

—"threshold" countries, i.e. countries whose leadership has already made the appropriate policy decisions, and the available technical and scientific facilities and "incremental achievements" in the area of WMD development make it possible for them to become owners of such weapons in the near future;

—"near-threshold" countries, i.e. states which have initiated programs for developing (or possessing) WMD and have embarked on their implementation, but do not yet have potential commensurate with the programs. As of today, these countries cannot be classified as "threshold" because they are quite far from completing their programs. However, the intentions of these countries are such that, in the absence of active countermeasures, they will undoubtedly become owners of WMD. These countries are of interest in and of themselves from the standpoint of controlling the proliferation of WMD in the world. In the opinion of FIS experts, it is appropriate to view them as a separate category.

In view of the dynamic nature of these groups and the interest of countries in keeping the existance and production of WMD secret, the precise composition of each specific group may be determined only with great caution.

Therefore, while acknowledging the need to distinguish the above-described groups, the relatively arbitrary nature of placing a particular state in each group should also be acknowledged. However, estimates of the sizes of these groups based on FIS data are given in Diagram 1 for our readers' information.

Catalysts of the Process

Obviously, neither objective factors nor the subjective motives prompting the certain countries to aspire to possess WMD may be ignored in trying to understand the nature of the process of WMD proliferation. A number of questions arise in this connection. What are these factors? How objective are they? Can the world community, having grasped the perniciousness of the spread of WMD, block the action of these factors, or is their influence fatal?

1. There is no denying that the appearance of WMD is the result of an objective process of the development of scientific and military-technological thought, science, and technology. From this point of view, the development of these weapons is a natural stage in the development of weapons. At the same time, the scientific-technical revolution itself, including that in military affairs, was and is still viewed mainly as a basis for developing means of containment rather than winning a unilateral victory over a potential adversary.

Of course, there are flaws in this logic even when applied to the members of the "global club"—the five "official" nuclear powers—because no hard and fast line exists between the function of "containment" and the use of WMD. However, when geared to the global level, the containment function still entails a considerably lower risk of the use of WMD; this was demonstrated by the Cold War years. In turn, in the event of local conflicts, even those of low intensity, with potential or already existing "regional" nuclear states, this risk is immeasurably greater.

This is why it is possible to draw the following conclusion with confidence: The argument which holds that the nonproliferation of WMD supposedly amounts to discrimination against anyone who does not own such weapons appears even more unsound in the climate of an emergence from the Cold War, in a situation where possessing WMD is not prompted by the objectives of global containment.

Five states in the world became nuclear countries first during World War II and subsequently the cold war. The logic of confrontation and the drive to shelter themselves and the entire world from destruction brought this about. One may denounce the "nuclear" states, or not. One may agree with the arguments and the reasons cited for the decisions they made and acted on, or not. However, the incentives to possess nuclear weapons and other types of WMD which existed in the past have diminished sharply.

From this point of view, humanity inherited the "nuclear club" as a "burden from the past." It would appear that, at present, there are no apparent reasons to keep it. However, it is absolutely obvious that it is impossible to eliminate it right away. Both the inertia of antagonism and the fear of sliding back toward global confrontation once again are factors. Under these conditions, two paths to the elimination of a "nuclear club" that is restricted to five states exist. The first is to gradually reduce nuclear weapons, to ban some types of WMD and sharply restrict others. The second is for the number of states possessing nuclear and other means of mass destruction to grow without restraint. The first path amounts to humanity moving away from the abyss. The second path amounts to moving toward the abyss.

2. Without a doubt, all of this reflects actual reality. At the same time, it is evident that neither the unpopularity of the concept of a limited group of states having a monopoly on nuclear weapons, nor objective and subjective factors which prompt other countries to possess nuclear weapons and other WMD may be ignored.

It should be acknowledged that incentives for quite a number of countries to advance toward "superweapons" still exist in the new historical period as well, and are being even reinforced at times. This advancement is due to the aggravation of regional conflicts. In the process, the following factors are played up in the domestic propaganda of countries which have set course for the possession of WMD:

—the "fear" factor, associated with the conclusion that the state (states) which is viewed, for one reason or another, as a potential adversary possesses WMD or may gain possession of them first;

—the "containment" factor, associated with making a potential adversary certain that a counterstrike is inevitable;

—the "victory" factor associated with the desire to achieve an overwhelming and quick advantage in a possible armed conflict through the use of WMD;

—the "extreme measure" factor, associated with the opportunity to use WMD when a direct threat of complete military defeat exists in the course of an armed conflict.

Meanwhile, the main point is that possessing the means of mass destruction does not automatically prevent or eliminate regional conflicts; nor does it prevent even the countries which already possess WMD "unofficially" from being dangerously drawn into such conflicts.

The case of Israel is instructive in this regard. It is known that the 1973 war was started by Arab countries at a time when Israel, according to various assessments, including by the Russian FIS and the American CIA, already had nuclear weapons. It is also known that 18 years later, during the war in the Persian Gulf, Tel Aviv, which had nuclear weapons, became a target for Iraqi missiles.

The fact that Israel possesses WMD has not stepped up the pace toward a settlement in the region. On the contrary, this fact has given some Arab countries the incentive to accelerate their efforts to produce WMD.

3. Subjective actions by political leaders and ruling groups of a number of states, who view the possession of "superweapons" as a pillar for their power inside the

country and regional influence, are a substantial reason for the proliferation of WMD. The motive of "national unity" is frequently exploited in this process: It is maintained that not only possession, but the mere demonstration of the possibility of possessing WMD facilitates the unification of the nation, relaxation of interethnic tensions, and defense of the territorial integrity of the state. In a number of cases, considerations of a "prestige" nature figure in as a catalyst for the process of WMD proliferation.

In the opinion of a number of experts, India was looking at such considerations in its time as it prepared for and conducted a peaceful explosion of a nuclear device. The "signal" to the effect that India had the scientific and military-technical ability to create nuclear weapons was picked up. However, this not only failed to prevent Pakistan from moving toward nuclear weapons, but may have even given a new incentive to do so. It goes without saying that such a "nuclear demonstration" in and of itself did not bring about detente in either Indian-Pakistani or Indian-Chinese relations; nor did it facilitate such detente. An analysis in retrospect shows this convincingly.

As far as the truly "prestigious" aspects are involved, the scientific, technical, and economic potential of a state may be very convincingly revealed in completely different ways, as evidenced by the experience of Japan and Germany.

Therefore, in light of the danger of the spread of WMD, the need to mobilize the entire potential of the world community to eliminate regional conflicts becomes even clearer. The FIS considers facilitating the settlement of existing conflicts and preventing the possible development of new conflicts one of its main tasks.

Additional "Irritants": Reality and Myths

The events of recent years indicate that the dissolution of the unified nuclear state of the USSR and the creation of sovereign republics, in four of which nuclear weapons are still deployed (Russia, Ukraine, Belarus, and Kazakhstan), as well as the process of "brain drain" partially associated with it, have become additional "irritants" which complicate the struggle against the proliferation of WMD.

Despite the aspiration to become nuclear-free proclaimed by Ukraine, Belarus, and Kazakhstan, the process of completely ridding these republics of WMD will take time. The problem of the physical safety of nuclear arsenals has also arisen in view of the political instability in some territories of the former Soviet Union.

Ensuring reliable control over radioactive and other hazardous materials in centers of WMD development, scientific research laboratories, and at enterprises which use individual types of nuclear raw materials in technological processes (radioactive isotopes, low-enriched uranium, etc.) is becoming even more crucial.

The problem of "brain drain" is arousing an extensive public response. The disintegration of a number of former socialist states and a sharp increase in the activity of developing states in the area of developing WMD, which coincided in time, have given rise to a certain phenomenon in the market of scientific expertise: both the demand for nuclear, biological, and chemical "brains" and the supply thereof have appeared simultaneously. The possibility of foreign specialists, mainly from the countries of the CIS and Eastern Europe, participating in the military programs of developing countries is giving rise to great concern. The cuts in military budgets, armed forces, and weapons production in these countries and the policy in the area of conversion of military production, which is at times poorly thought-out, are causing large numbers of highly skilled specialists to be thrown out of work.

However, neither East Europe nor the CIS is unique in this regard. Despite this issue not being equally acute in the United States and the countries of West Europe, the world community is entitled to ponder the consequences of, for example, the fact that the number of specialists in the nuclear weapons complex of the United States is expected to be reduced before the year 2000 from 30,000 to 14,500 people', that is, by more than half.

The alarming picture appears even more graphic in a climate where there is a general weakening of the system of control over the use of scientific-technical and military developments and specialists and there is the opportunity to move to the countries of the Third World or transfer one's expertise to them.

In view of the global nature of the problem, only extensive international cooperation and joint action by states can lay the groundwork for creating effective conditions for using scientists and specialists working in areas associated with the development of WMD, for peaceful purposes. Joint projects by Russia, Germany, the United States and other countries, which call for financing international scientific centers, including ones on the territory of Russia, and various systems for Russian scientists to train and work at prestigious authoritative scientific centers in the West, exemplify a constructive response to the challenge which has arisen.

However, these measures cannot be considered a panacea for the "brain drain." The underrating of the work of the employees of scientific and research-intensive facilities in countries experiencing serious economic difficulties, including of the area of remuneration for their labor, will always provide fertile soil for specialists to be "lured away" by those who are interested in their "brains" and are capable of paying for them.

At the same time, it is necessary to take firm restrictive measures, on the legislative and administrative levels, which are intended to counteract this brain and technology drain in the realm of the development and production of WMD for all states, and mainly for people who were trained in the former Soviet Union or have changed their sociopolitical profile in Eastern Europe, and are now experiencing difficult times.

In the opinion of FIS experts, at issue is the need to combine both national and inter-state multilateral measures. A ban on leaving the country for a certain period of time should obviously apply to individuals involved directly in the production of WMD. There should be a legislative basis for this ban. However, by all indications, even this is not enough. First, emigrant specialists who are involved in research, design, and production in areas adjacent to WMD may pose a danger. Second, there is a chance that specialists will first move to countries which, in conventional terms, are not a part of the "zone of risk" and subsequently re-emigrate to states developing WMD. Obviously, in view of these possibilities, a system of national sanctions and interstate multilateral agreements should be thought through in order to hold accountable specialist-citizens of one state who participate in creating WMD in another state.

It seems that this topic should attract the attention of political scientists and international law specialists—the sooner the better, and become a subject for comprehensive discussion and possibly for consideration by the appropriate agencies of the United Nations and other international organizations.

Under these conditions, the use of intelligence methods to monitor such "migration" to "high-risk" countries, support for measures which, in strict compliance with the laws and the constitution, are aimed at neutralizing efforts to "lure away" specialists to such countries, and the exchange of information on this issue with the intelligence services of other states which are not concerned with the proliferation of WMD become highly significant.

The drain of "brains," technology, and raw materials associated with WMD production is not a made-up problem; it is real. At the same time, speculation, conjecture, and even deliberate disinformation, which find their way into the pages of the press, frequently create a false impression of the real state of affairs in this area. For example, in Russia, which is frequently depicted as virtually the main source for the "nuclear brain" drain, a comparatively small percentage of the many hundreds of thousands of specialists and scientists employed in the area of nuclear physics, chemistry, biology, and even missile building are privy to the secrets of designing, calculating, modeling, and assembling experimental and combat copies of WMD systems. As of the beginning of 1993, the FIS had no data indicating that Russian specialists of this kind were working in Third World countries which are producing or starting up the production of WMD.

The repeatedly disseminated disinformation about the "leakage" of nuclear warheads and nuclear munitions from Kazakhstan to Iran, or the periodically appearing reports about the contraband sale of enriched uranium, plutonium, and other nuclear raw materials of Russian provenance in Europe are another example. In the opinion of FIS experts, the dissemination of "information" of this nature, spiced up by cock-and-bull stories and forgeries, looks like "active measures" on the behalf of foreign companies that would like to avoid competing with Russian and other suppliers in the world market for missile materials.

In this regard, the problem of so-called "red mercury" merits special attention.

The issue arose in 1990. A frantic campaign has continued since then which has been fueled by reports of offers by Russian and foreign companies to conclude deals, at times ranging up into the billions, with the price for this product quoted at up to $600,000 per kilogram; this is more expensive than super-pure platinum or enriched uranium.

Investigations have established that a compound with the chemical formula and characteristics indicated in the claims does not exist in nature and is not produced by any enterprise in Russia. This was confirmed by the Ministry of Industry, the Ministry of Atomic Energy of Russia, and the Russian Academy of Sciences.

It has become clear that a number of entrepreneurs, who were allegedly representing the interests of enterprises manufacturing "red mercury," actually were attempting to profiteer by way of deception from being middlemen between customers and what turned out to be nonexistent producers. In the process, they used fraudulent methods to achieve their goals, including references to "high-ranking patrons" and the production of forged certificates and other documentation.

Law enforcement agencies of the Russian Federation have pieced together the entire story. Based on the results of the efforts made, it can be stated with confidence that large-scale international financial machinations were being conducted under the cover of transactions involving "red mercury." These transactions used "deliveries" from the CIS for "laundering" criminally generated capital of both Western operators (the narcomafia) and domestic criminal structures. As has been documented, in a number of cases strategic materials—precious and rare-earth metals (platinum, gold, osmium, indium, uranium, etc.) transported abroad in the form of amalgams—were exported from our country under the guise of "red mercury."

CHAPTER III

Indications of Development (Possession) of WMD

There is no need to present detailed arguments about how important it is to develop a system of criteria for identifying the three groups of countries: those who possess WMD but do not officially acknowledge this fact; the "threshold" countries; and the "near-threshold" ones.

In defining these criteria, FIS experts used the following assumptions:

—the object of analysis is both the states which unofficially possess—or are potentially capable of coming into possession of—WMD, and the processes of international interaction (both at the inter-state and private-enterprise levels) that are associated with building or possessing WMD;

—the methodology for establishing the degree of a given country's involvement in the process of building WMD is based on a complex system for evaluating evidence of a political, economic, scientific-technical, and military-technical nature. Only the analysis of all four groups of indications can give it validity.

Described below are the general criteria, which are then elaborated in more detail with respect to individual types of WMD.

General Indications of a Political Nature

The first and crucial piece of evidence that a state intends to possess WMD is the corresponding political decision made by the country's leadership, without which the implementation of the program of building WMD in a given country is impossible. Setting up production of any type of "superweapons" requires the involvement of such a large portion of various parts of the industrial and scientific complex that, without state financing and leadership, such an action remains only a hypothetical possibility.

At the same time, as a rule, the political decision to build WMD is kept secret, and the fact that it had indeed been made may be ascertained either directly—through intelligence means—or through indirect indications.

The following may signal that such a decision has been made:

1. Not becoming party to the treaties aimed at restricting or renouncing the building and possessing of WMD, as well as, on a broader scale, failure to participate in international negotiations and forums on this subject.

2. Refusal to subject its facilities to international monitoring; attempts to prevent such inspections by international organizations or restricting their activities.

3. Creating an administrative structure directly subordinate to the supreme political leadership or the army command and vested with special powers to carry out functions that clearly do not correspond to those declared for this body.

4. Creating within the state foreign economic agencies or within the intelligence services special units vested with special rights and possessing substantial financial resources enabling them to buy raw materials, equipment, and technological samples abroad. The emergence for the same purpose of "private companies" connected with special organs.

5. Active lobbying in favor of building WMD on the part of influential political forces, parties, or groups close to the highest echelons of power.

6. Psychological preparation of the public to accept a military doctrine that includes the use of WMD (using the themes of "fear," "deterrence," "victory," "last resort measure," etc., described in the first part of the report).

7. No official reaction when a given state is accused of intending to build WMD and (or) "whipping up passions" in government media, as well as other media close to official circles, regarding the problem of WMD possession by countries involved in a conflict situation with this state.

8. Overt or covert support of countries that are virtually already on their way to building WMD.

General Indications of an Economic Nature

General evidence of this kind undoubtedly is the proportions of the military budget, or, more precisely, the share of the state budget devoted to the military. Hypertrophied military expenditures attract attention, especially when a country had limited financial resources and a poorly developed economy.

At the same time, the data on absolute levels of military spending in all three groups of countries under consideration—those unofficially possessing WMD, the "threshold," and "near-threshold" ones—as a rule are either not published or are concealed by including them in other budget line items. It is even more difficult to determine the structure of military spending. Information in this respect can be obtained mainly through serious analytical work using intelligence data. Here, of course, of particular importance are the data about nuclear, chemical, and biological programs. As a rule, they are either absent from official information or are of fragmentary and often contradictory nature.

In these circumstances of particular importance is information on the development of defense industry sectors and the structure of imports. For example, analysis of developments in the aircraft industry helps to evaluate more accurately the potential for building weapons delivery systems.

The structure of civilian industry sectors also serves as an indicator. Special attention should be paid, especially when other warning signs are present, to, for instance, a country building key segments of the nuclear fuel cycle, especially when it is not dictated by the need to maintain and develop peaceful applications of nuclear energy.

The system of main economic indicators is presented in Diagram 2.

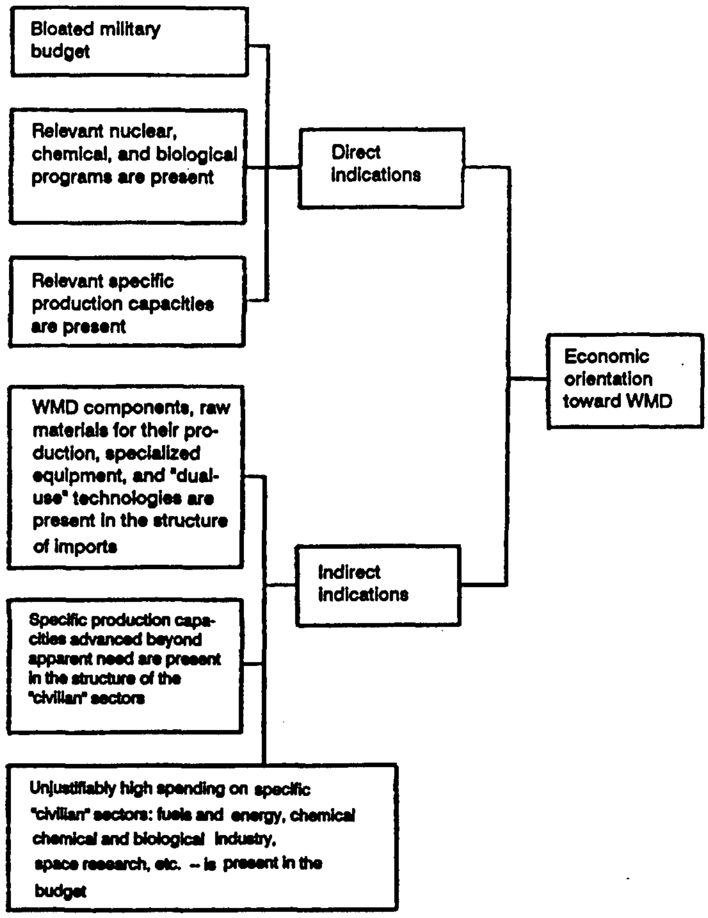

Diagram 2. Indicators of Economic Prerequisites for an Orientation Toward WMD

General Indications of a Scientific-Technical Nature

These can be divided into three groups. The **first** consists of technological factors associated primarily with the ability to obtain raw materials and intermediate supplies, as well as semifinished products needed for the production of WMD.

In the past, it was believed that in order to build a nuclear charge, for instance, it is necessary to have the indigenous capability to produce weapons-grade uranium and plutonium since the probability of importing them in significant quantities seemed quite low. Therefore, IAEA control was considered an "insurmountable obstacle" on the road to building nuclear weapons. Life forces us to temper such judgments. In FIS estimates, it is possible to conceal on average up to one percent of the nuclear materials to which IAEA control extends. The reason is that it is impossible to ensure complete control with existing technical means.

Another phenomenon that has developed of late is the expansion of the so-called "gray market." Its main distinguishing feature is that units, mechanisms, individual components of equipment and technological processes that fall into the category of "sensitive" technologies are offered here in circumvention of existing rules and restrictions. Using front companies, the special services of some developing countries (Pakistan, Israel, Iraq) have managed to import the needed technology, thus laying material groundwork for the production of a nuclear device.

The leading role in the "gray market" belongs to suppliers—mainly West European companies. A special place among them belongs to German firms. Steps taken recently by the German Government have cut the outflow of materials and technologies to "third countries" substantially. Now, however, there is an increased danger of materials and technologies from the countries of Central and East Europe, and the CIS transiting through Germany.

The **second** group of indicators is how well the national scientific and technical programs are staffed, and whether the country has a system for training skilled specialists in appropriate branches of science and technology. For instance, to build nuclear weapons, it is most important to have specialists in the area of uranium enrichment and plutonium reprocessing. When heavy water reactors are used for plutonium production, the importance of specialists on the production of heavy water increases sharply since its import is severely restricted.

The personnel component becomes decisive when a country is building weapons relying on indigenous resources. According to averaged Japanese estimates, building nuclear weapons takes approximately 1,300 engineers and 500 scientists, among whom nuclear specialists should represent at least 6.5 percent (as it was in the United States at the time). In other words, to accomplish the task the country needs to have about 120 highly skilled nuclear scientists in various specialties.

Many developing countries partially meet their need for such specialists by training national cadres abroad. The IAEA charter, among others, provides for assistance in training specialists for developing countries' nuclear energy complexes.

It is well known that the United States plays the leading role in this regard. It is interesting in this connection that specialists from the "threshold" countries comprise a disproportionally large percentage of the total number of foreign nuclear specialists trained in the United States. As a rule, such specialists have subsequently held high positions in the "threshold" countries' nuclear agencies and projects. In the process of training in the United States, specialists from "threshold" countries have participated in research on uranium enrichment, plutonium reprocessing, production of heavy water, etc. that provides the necessary knowhow and experience for building nuclear charges. Since the beginning of the 1980's, an increasing number of specialists from developing countries have been trained in the FRG, France, Great Britain, and Italy.

Nevertheless, most potential WMD possessors at the stage of making transition into the group of "threshold" countries do not generally have enough of their own highly skilled specialists. They begin looking for scientists and engineers abroad. The Democratic People's Republic of Korea [DPRK], Iran, and a number of other countries are at this stage now.

The **third** group of indicators is the presence of modern scientific centers developing indigenous technology and design for nuclear charges and chemical-biological agents.

Information about nuclear, chemical, and biological firms that either exist or are being set up in a country; what they produce; the number of S&T specialists employed there, the circumstances of their training, and their specialization; production ties; and their financial status make it possible to assess the potential of a specific country to develop its indigenous industrial production of WMD, which may became the basis for series production.

Until very recently it was believed that a necessary indicator of a country's progress toward building WMD, especially nuclear weapons, was their testing. Of course, even now this problem of great importance—the reliability of WMD—is usually solved with the help of testing. However, under conditions where it is fraught with serious political and economic consequences and it is extremely difficult to decide to go ahead with WMD testing, there is an "alternative"—computer simulation of the corresponding processes and their individual stages. Therefore, not the least among the indirect indications of the existence of a program to build WMD is when a developing country purchases supercomputers or moves toward creating a sufficiently powerful computer network. Accordingly, information on this topic and its proper interpretation by analysts are of considerable importance.

An approximate structure of the indicators of a country's S&T potential that need to be taken into account in analyzing the possibility to produce a specific kind of WMD is shown in Diagram 3.

General Indications of a Military-Technical Nature

A natural indication of this kind is the orientation of the military toward the use of WMD. In this case, corresponding units and technical services are created within the military; laboratories with tighter security are set up; and the necessary testing and training of personnel are conducted. Calculating that in time of war a counterstrike will include WMD, military-technical facilities and those of the state government bodies are reinforced and protected accordingly. Army personnel undergo special training in conducting military operations under conditions of the use of specific types of WMD. Special weapons storage facilities are built.

These are what may be called direct indicators. There are also indirect ones. They include:

—intensification of intelligence operations to identify specific targets on the territory of the potential adversary, including their geographical, geophysical, economic, climatic, and demographic aspects;

—production (acquisition) of modern delivery systems, especially in conjunction with vigorous activities to build the key segments of the nuclear fuel cycle;

—conducting an intensive program of civil defense and the corresponding medical research.

An approximate structure of military-technical indicators pointing to a country's orientation toward the use of a specific type of WMD is shown in Diagram 4.

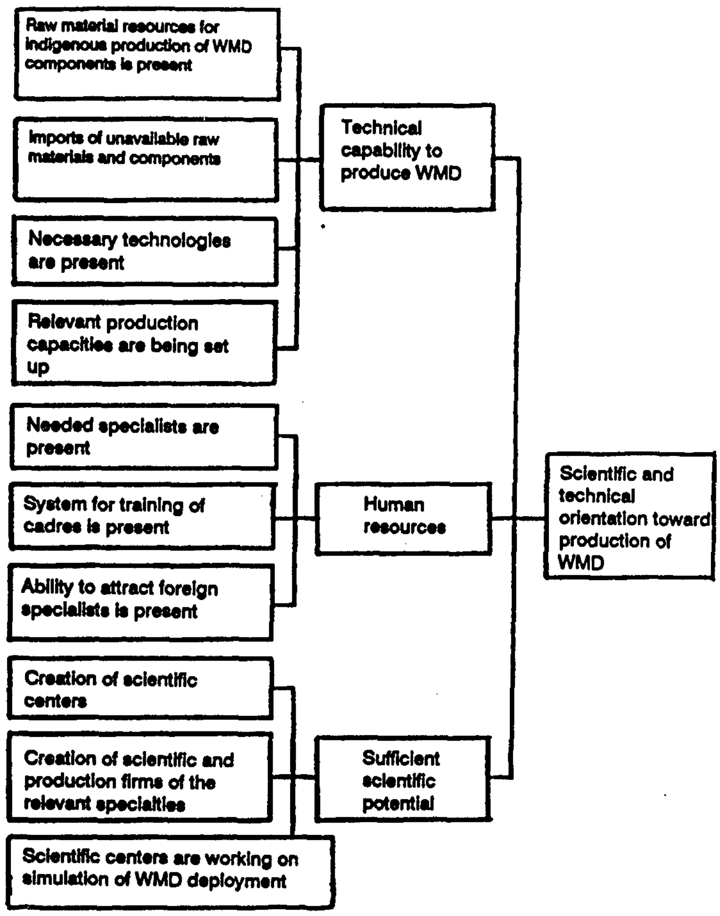

Diagram 3. Indicators of S&T Potential for the Production of WMD

CHAPTER IV

Nuclear Weapons

The continued implementation of nuclear programs in certain countries, the development of "sensitive" technology, and the creation of key elements of the fuel cycle have led to a situation where some of them have practically already created or may shortly create isolated copies of nuclear weapons.

Focusing on "Threshold" Countries

In recent times, special interest of the world community has been focused on "threshold" countries that are conducting intensive nuclear research, personnel training, and construction of nuclear power plants and facilities of the nuclear fuel cycle. Construction of key facilities of this cycle is underway in several of them, including experimental facilities and industrial plants for the enrichment of uranium, reprocessing of plutonium, and production of heavy water and uranium hexafluoride. In a number of countries, development is underway and production is even set up of powerful research and powerful reactors.

There is virtually not a single "threshold" country whose leadership acknowledges that efforts in the nuclear field have a military orientation. Moreover, many leaders of these countries claim that they are not building nuclear weapons, and at the same time refuse to permit representatives of the IAEA to inspect all of their nuclear facilities, especially those constructed independently and using "sensitive" nuclear technology.

An extremely dangerous phenomenon of recent times is the intensification of cooperation in the nuclear field among individual "threshold" countries, as well as between "threshold" and "near-threshold" countries. Exchanges of independently developed nuclear technologies are taking place, and joint R&D and personnel training is being conducted. This is enabling these countries to reduce their dependence in the nuclear realm on the traditional exporting countries, and in a number of instances (Argentina, India, Brazil, Republic of South Africa, South Korea) to become new exporters of nuclear

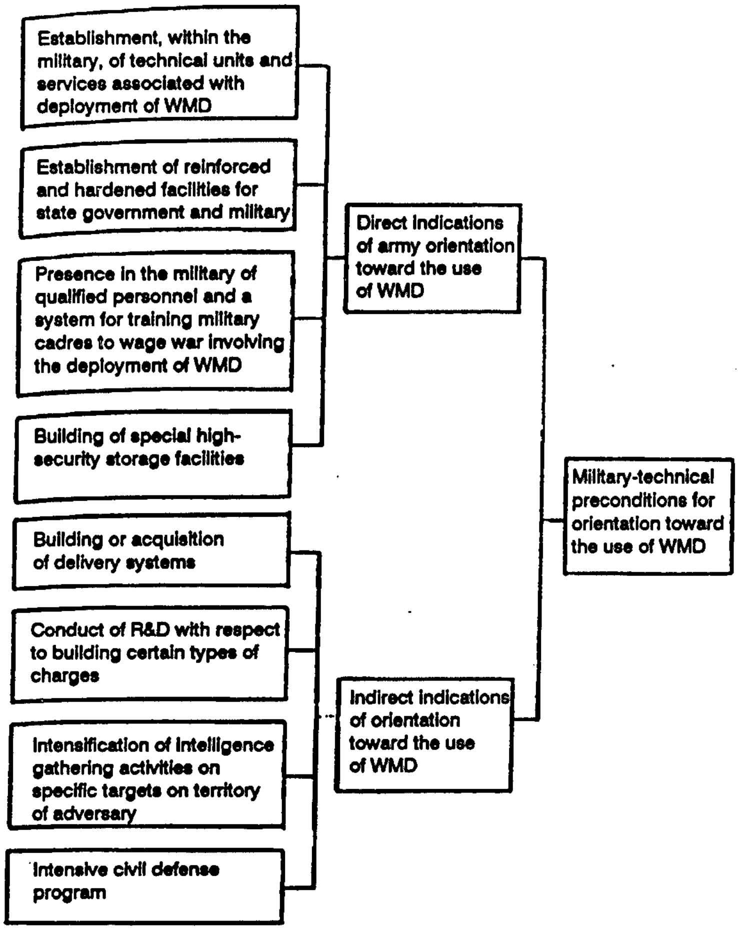

Diagram 4. Indicators of Military-Technical Potential for the Deployment of WMD

technology. Naturally this weakens opportunities for exerting controls which would block the production of nuclear weapons.

The danger is exacerbated by the fact that the growth in the nuclear capabilities of the "threshold" countries and a number of the "near-threshold" countries is being accompanied by the production and import of missiles capable of carrying critical payloads of up to 500 kg over distances of hundreds and even thousands of kilometers.

The "Poor Man's Bomb": Radiological Weapons

In discussing nuclear weapons, we should make a special point of treating the related subject of radiological weapons.

Until recently the likelihood of individual countries building radiological weapons and using them in armed conflicts was considered chiefly in theoretical terms. It would be absolutely incorrect and extremely dangerous, however, to rule out the possibility of theory turning into reality in this case.

During the Persian Gulf war, the "crisis group" established under USSR leadership discussed the matter of the real possibility of Iraq's use of radiological weapons against Israel. In the opinion of experts, this could not be ruled out, including for the reason that according to data obtained, Iraq's nuclear reactors had been shut down during their bombardment, which indicated that the nuclear fuel had been removed ahead of time.

No matter how blasphemous it may sound, the Chernobyl catastrophe played a significant role in directing the attention of military specialists to radiological weapons, revealing just a small fraction of the consequences that could result from the use of radiological weapons in densely populated areas of the planet.

In evaluating the situation with respect to radiological weapons, the following must be taken into account.

First of all, the danger of creating radiological weapons invariably arises and intensifies during the course of development of atomic energy in the developing countries. It is no exaggeration to assert that radiological weapons comprise the distinctive "shadow" of atomic energy, appearing wherever and whenever major stores of radioactive materials are established, regardless of their original purpose.

Second, the 90's are becoming a period of unprecedented flourishing of the international trade in fissionable material; this is providing many states with the opportunity to acquire and accumulate radioactive substances, including those suitable for use as radiological weapons.

Third, under conditions of intensified international control in the field of nuclear, biological, and chemical weapons, the radiological weapons sphere is becoming the least transparent and is virtually unregulated by the international community due to the absence of any international legal norms. Work in the United Nations Conference on Disarmament in Geneva on the draft Convention on the Banning of Radiological Weapons is in fact frozen. There are grounds to believe that radiological weapons may become the new "poor man's bomb," as two other varieties of WMD were considered at a certain stage—chemical and biological weapons.

Indications of the Process of Building Nuclear Weapons

The general indications that allow us to identify with a certain degree of confidence a tendency to build all types of WMD (these indications were discussed above) can be specified with respect to nuclear weapons. To this end, we focus on the presence of:

—appropriate services in the armed forces, a training program for conducting combat operations involving the use of nuclear weapons, means of protection, equipment and instrumentation for detecting radioactive contamination;

—secret nuclear research and development programs, training of the appropriate scientific personnel, conclusion of military contracts in areas closely related to the nuclear sphere, the existence of R&D programs;

—a country's indigenous natural resources and enterprises for processing the initial raw materials needed to produce nuclear weapons and fissionable materials;

—the importation of products which contain uranium and plutonium, making it possible to create raw materials for nuclear production;

—production capacities for the enrichment of uranium and reprocessing of plutonium which can serve as components of nuclear charges and (or) the technology for such production, as well as individual parts of the equipment and apparatus for security and control systems;

—qualified military and civilian personnel trained in working with hazardous radioactive substances;

—the possibility of conducting tests of nuclear devices, or work in modeling explosions, and the acquisition of computers of appropriate capacity for these purposes.

Certain Aspects of Monitoring

Diagram 5 shows a simplified hierarchy of the "tree of objectives" in analyzing the operation of elements of the nuclear fuel cycle in building a nuclear weapon based on plutonium. This is just one path, but it is highly characteristic. The "tree of objectives" diagram has obvious methodological significance and is applicable to other paths leading to the construction of nuclear weapons as well as other types of WMD.

According to the technological chain for building nuclear weapons based on plutonium, the lowest level of the "tree of objectives" is the initial raw material. Here the first branching of the "tree of objectives" takes place, insofar as the initial raw material may be the country's own—procured either outside IAEA control or under its control, or it can be imported. The variants of the import of raw material and raw material production under control are virtually equivalent in meaning insofar as in both instances, if a nuclear weapon is built secretly, not more than 1 percent of such raw material may be used.

On the level of production of nuclear fuel, a second branching of the "tree of objectives" takes place. The following variations are possible:

1. Indigenous (not under control) production of nuclear fuel.

2. Indigenous production of nuclear fuel under control.

3. Nuclear fuel is imported.

These variations may and in fact do exist in other than pure form. The presence of indigenous production of nuclear fuel in no way necessarily precludes its import. However, considering the functional framework for constructing such a "tree of objectives," experts believe it necessary to designate the three types of nuclear fuel sources as independent.

In comparing the different variants for obtaining nuclear fuel from the point of view of building a nuclear weapon, we may conclude that its production, even under control, enables the clandestine accumulation of radioactive materials to a greater degree than when the nuclear fuel is imported.

On the level of nuclear reactor, we see a further branching of the "tree of objectives." It must be noted that when we refer to an available reactor, we mean only a relatively powerful power or research reactor, since a research reactor with a power of less than 10 megawatts cannot in practical terms generate any significant quantity of plutonium, even over the course of several years.

A further branching takes place on the level of reactor type, insofar as heavy water is necessary for the normal operation of a heavy-water reactor. Since heavy water is a strategic material, its import is restricted and is subject to strict international control.

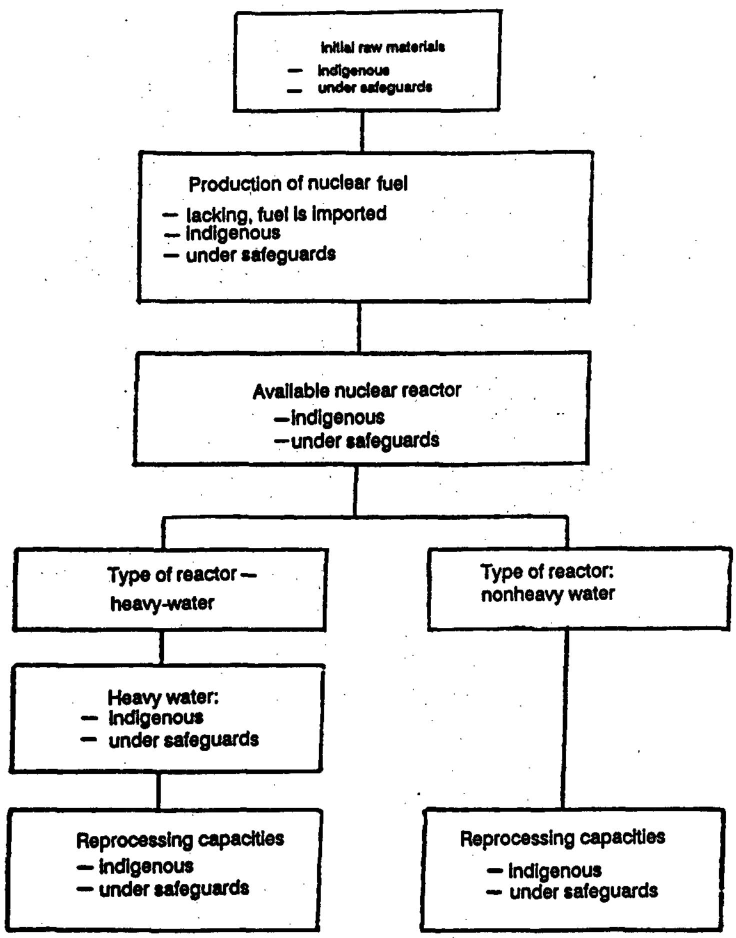

Diagram 5. Hierarchy of the "Tree of Objectives" in Selecting a Chain for Building Nuclear Weapons Based on Plutonium

On the final level, analysis takes place of the capacities for reprocessing of irradiated nuclear fuel which make it physically possible to obtain weapons-grade plutonium. This is equivalent to emergence of the scientific and technical foundation for building nuclear weapons. The presence of an indigenous reprocessing plant makes it possible, without control, to use the plant's entire capacity to produce weapons-grade material.

In accordance with the "tree of objectives," an original assessment of the possibility may be made, as well as of one scenario or another, of the building of a nuclear charge. Naturally, a detailed quantitative analysis must follow this original assessment.

CHAPTER V

Chemical, Biological Weapons

The most recent large-scale use of chemical weapons took place in the war between Iraq and Iran. Also, large sums of money were spent during Operation Desert Storm on preparing allied forces to deal with chemical weapons. Over the past several years, changes in the world political situation have reduced to virtually zero the danger of a first use of chemical and biological weapons on the global level. Nonetheless, the threat of their use, especially in low-intensity conflicts, has not been eliminated.

An agreement between the United States and the USSR on the destruction of accumulated stores of chemical weapons has entered into force. In January 1993, the multilateral Convention on Banning the Development, Production, Stockpiling, and Use of Chemical Weapons and on Their Destruction was signed. The effectiveness of this convention in the scheme of nonproliferation of chemical weapons will be directly proportional to the number of participating countries. The most important task of the world community today must be to gain the quickest possible commitment to this key convention of the greatest possible number of states, primarily from among the countries of the Arab world, where vacillation regarding participation in it has not yet been entirely overcome.

The Convention on Banning the Development, Production, Stockpiling, and Use of Bacteriological (Biological) and Toxic Weapons and on Their Destruction (1972) continues to be implemented and enhanced.

However, as the 1989 Paris Conference showed, a number of developing countries continue to view chemical and biological weapons as a means of achieving military accomplishment of national goals in regional conflicts with neighboring countries, and also as a counterweight to the nuclear power of the industrially developed countries.

Comparative Characteristics: General and Specific

The relatively low cost of developing the production of chemical and biological weapons, the opportunity of using them with available delivery systems, the appearance in developing countries of a significant number of highly qualified military-technical and scientific specialists, and also the push by certain circles of the industrially developed countries to profiteer from the trade in technologies and equipment for the production of chemical and biological weapons have assisted many countries in the Third World to acquire these weapons.

Taking these and other arguments into account, we can share the assessment that about 100 countries in the world now have the industrial base needed for creating chemical weapons.

The processes of producing chemical and biological agents have become significantly simplified, primarily due to the accessibility of the starting materials, lower requirements with respect to equipment, and shorter technological cycles.

Special studies done by the FIS show that the tendency that has been noted towards broad dissemination of biotechnologies (having a dual use, as a rule) and difficulties in controlling the production and use of biological agents and toxins increase the likelihood that biological weapons will be used by Third World countries in local military conflicts, as well as for subversive and terrorist purposes. In this regard, the advantage of biological weapons over nuclear and chemical weapons is emphasized from the point of view of the opportunity to inflict serious damage to an enemy's economy through covert use of biological weapons against plants and livestock in his agriculture. Nor can these actions be ruled out in peacetime for purposes of "economic warfare."

Unlike chemical weapons, whose use makes it necessary to build relatively large stockpiles of the appropriate chemical agents, certain varieties of biological agents are self-reproducing. With a small initial stockpile of biomaterial and using modern methods of industrial microbiology and biotechnology, large-scale production of biological weapons can be set up within several weeks.

Indications of Chemical Weapons Development

We can consider the presence of the following as constituting basic indicators (along with the general indicators of all varieties of WMD discussed previously) which would allow us to identify, with a certain confidence, the possibility of developing, producing, stockpiling, and making military use of chemical weapons:

—stockpiles of toxic substances, appropriate delivery systems, a military-chemical service in the armed forces, a training program for conducting combat operations involving the use of WMD, means of protection, and equipment and devices for detecting and identifying toxic substances, as well as for their decontamination and destruction;

—a military-chemical research and development system, scientific personnel engaged in research in the field of synthesizing highly toxic, physiologically active substances and toxicology, military contracts in chemical weapons-related areas, and R&D programs involving chemical weapons;

—the importing of chemical compounds which make it possible to synthesize the precursors of chemical agents or the agents themselves and highly toxic compounds;

—production capacities for the fabrication of chemicals capable of serving as semifinished chemical agents, or chemical technologies which, as regards the design characteristics of the equipment, apparatus, and security and control systems, are similar to those needed for making chemical agents.

—covert or secret sections and areas at enterprises specializing in the fabrication of peaceful chemical products;

—qualified military and civilian personnel trained in working with toxic and especially dangerous compounds;

—a system of secret storage depots for accumulating chemical weapons and specialized means of transporting them.

Indications of Biological Weapons Development

The development, production, stockpiling, and possible use of biological weapons may, in turn, be identified on the basis of the following basic specific indications:

—the existence of programs for training troops, special subunits or intelligence and sabotage groups, for operations involving the use of biological weapons;

—the presence or purposeful search for highly qualified specialists in immunology, biochemistry, bioengineering, and related fields, who have experience in the development of biological weapons and means of protection;

—the building of laboratories with enhanced security [according to international classification P-3 (BL-3) or P-4 (BL-4)];

—the development of secret research programs and secret special and military facilities of biomedical orientation;

—large-scale production of vaccines (against especially dangerous infections) and the existance of stocks of these vaccines which exceed real peacetime requirements;

—creation of a production base, specifically of bioreactors and fermenters with a capacity of more than 50 liters or a total capacity of more than 200 liters;

—outbreaks of especially dangerous infectious diseases not typical of specific regions;

—purchase of starting biomaterials and equipment for the production of biological weapons, as well as delivery systems for them;

—activity related to microorganisms and toxins which cannot be explained by civilian requirements, activity involving agents of especially dangerous infections not endemic to a given area;

—the existence of biotechnological equipment and conduct of work to create vectors of various diseases in people, animals, or plants, as well as composite media for culturing them;

—the existence of equipment for microencapsulation of live microorganisms;

—the existence of equipment for studying the behavior of biological aerosols in the environment.

Whereas, as is apparent from what has been discussed above, the building of a nuclear weapon requires a complex infrastructure that is difficult to conceal (space-based sensors aimed at detecting such activity have a fairly high degree of effectiveness), the infrastructure for production of chemical and, especially, biological weapons is barely noticeable to visual detection.

A task of even greater difficulty is the detection of already accumulated stockpiles of chemical and biological weapons. At the beginning of 1990, for example, Western military specialists estimated that to wage a large-scale chemical war in the territory of Europe, each side would require less than 600 tonnes of any variety of them. It is believed that even in a major and fairly prolonged regional conflict, an average of about 100 tons of chemical weapons would actually be required. Of course, the stockpiles of chemical weapons exceed these figures. But detecting 100 or 500 tonnes of concealed chemical weapons in any country is practically impossible. Chemical compounds and agents may be stored in containers smaller than regular barrels and may even be continuously on the move, in a number of instances.

Thus in detecting chemical and biological weapons there is no substitute for the human factor, and if we want to be more precise—to human intelligence.

CHAPTER VI

Missiles and Missile Technology

Missiles and missile technology have become so predominant in the assessment of the military and technological potential of any specific country that their availability or the adoption of programs to produce or acquire them in and of itself should prompt the world community to assess the aspirations of a given state.

Starting in the 1960's the United States, the USSR, FRG, and Great Britain made quite extensive deliveries of short-range ballistic missiles to their allies in all parts of the world, which also promoted the proliferation of technologies to produce them. In turn, these allied countries started to develop their own ballistic missiles, increasing their range and accuracy. As a result, in many Third World states there is now no lack of missile systems to deliver WMD, or experience in handling them. There are also far-reaching plans to improve them using indigenous resources.

A Destabilizing Factor

When combined with particular kinds of WMD into a single weapons system, missile systems are a destabilizing factor, particularly in regions where there is a strained political situation. There are a number of reasons for this:

—the relative "ease and simplicity" of use;

—the opportunity to deliver surprise attacks;

—"low cost" compared to the cost of acquiring and maintaining modern aircraft and training air crews and maintenance personnel;

—effectiveness, with a trend toward enhanced effectiveness as range and accuracy improve;

—a low level of vulnerability as compared with aircraft, particularly in mobile versions, which the recent events in the Near East have confirmed;

—the opportunity to exert military-political pressure, at least on immediate neighbors, particularly as delivery systems for WMD.

Despite attempts by particular political figures in "threshold" countries to distinguish between programs to develop peaceful space technology and to develop ballistic missiles for military purposes, it is quite obvious that they are closely interconnected: The result of implementing peaceful space programs is often acquisition of the technological grounding and experience required for subsequent development of ballistic missiles. Here, the aspirations of a number of countries to obtain constant access to information from artificial satellites, making it possible to insure that ballistic missiles are provided with appropriate and constantly updated target designations, may serve as one of the indirect signs suggesting that a particular state has corresponding programs to use missile weapons. For example, information that South Korea and Israel are interested in acquiring U.S. reconnaissance satellites puts us on our guard.

Proliferation of Missile Technologies

In recent years the technology for producing ballistic missiles has proliferated widely, particularly in the Near East and South Asia, as well as in Latin America. In a number of countries, the use of missile weapons is obviously already an integral part of present strategies and operational plans. The countries most advanced in this area might include (in addition to the industrially developed countries) Israel, Iraq, Syria, India, Pakistan, the DPRK, and Brazil. Despite the not always high specifications, Third World country missiles may be an extraordinarily effective instrument in possible regional conflicts, as Operation Desert Storm showed. And equipped with nuclear, biological, or chemical warheads, they may become the cause of major international conflicts.

As scientific and technical progress proceeds in Third World countries, we can expect further proliferation of missile technologies. And as this process continues and the number of countries possessing these technologies increases, we can undoubtedly expect their proliferation to accelerate.

Meanwhile, experience shows that measures of a purely restrictive nature, such as the "Missile Technology Control Regime," [MTCR] do not produce significant results. One confirmation of this is the fact that at a time when the United States was engaged in very serious efforts to prevent Iraq from obtaining missile weapons, up to 40 percent of all the equipment to build the Saad-16 military-industrial complex in the city of Mosul, which was designed to produce missiles, aircraft, and other kinds of weapons, was being supplied by a number of American companies, the largest of which included Hewlett Packard, Viltron, and Tektronix. In some cases complex transcontinental secret schemes for cooperation in the proliferation of missile technologies occur, as was the case with the Iraqi program based on the Condor project.

In addition to traditional supplier countries, China, the DPRK, and Israel have recently become sources for the proliferation of missile technologies in Third World countries.

It is well known that perfectly legal ways also exist for Third World countries to acquire the necessary technical experience and technologies: acting as subcontractors for Western aerospace companies, buying shares in them, setting up mixed or front companies, inviting foreign experts as guests, sending interns, etc. In addition, industrial espionage is becoming increasingly sophisticated and is spreading.

CHAPTER VII.

International Mechanisms: Effectiveness and Shortcomings

The world community has through joint efforts already created a certain political and international-legal basis for working to prevent the "spread" of WMD. This includes the Nuclear Nonproliferation Treaty [NPT], the Tlatelolco Treaty banning nuclear weapons in Latin America, the Convention on the Physical Protection of Nuclear Materials, the 1925 Geneva Protocol banning the use in military operations of asphyxiating and poison gases, the convention banning the development, production and stockpiling of bacteriological (biological) and chemical weapons, the convention banning and eliminating chemical weapons signed in January 1993, the World Basel Convention monitoring the transportation of hazardous waste products across different states, the Missile Technology Control Regime and a number of others.

International control systems have been set up. The IAEA, whose system of safeguards provides for regular checks of the activity of declared nuclear facilities, their civilian focus and nonuse of the nuclear fuel for military purposes and also for special inspections to check on undeclared activity, is playing a more active role.

Cocom, which, however, owing to its predominant orientation toward limitation of supplies of equipment and technology to the former USSR, failed, on the whole, to cope with the task of preventing leaks of "sensitive technology" to "high-risk" Third World countries, also had a similar mission.

National Export-Control Systems No Panacea

A big role in the prevention of the "leakage" of "dual-purpose" technology and the corresponding equipment is played by national export-control authorities. They work, as a rule, from specific lists of commodities whose exports are banned or restricted. In a sense the well-known Cocom lists are the central component in the export-control activity of all Western countries in the high-technology arena. A national export-control system geared to the prevention of the "spread" of WMD certainly produces practical results, particularly if it operates in close coordination with other countries' export-control services.

Export control of the corresponding technology and equipment, "dual-purpose" items primarily, is supported at the legislative level in many countries. An important step in this direction was taken by Russia with Edict No. 312 issued by President B.N. Yeltsin on 27 March 1992 banning exports of nuclear materials and technology to nonnuclear states which have not placed their entire nuclear activity under IAEA safeguards.

Edicts issued by the president of Russia and decrees by the Supreme Soviet and the government of the Russian Federation have established specific mechanisms for controling exports of nuclear materials and technology, precursor chemicals and dual technology. These include:

Edict No. 179 issued by the president of the Russian Federation on 22 February 1992 which determed the list of types of finished goods and waste products whose unrestricted sale is prohibited;

Edict No. 388 issued by the president of the Russian Federation on 11 April 1991 on measures to create an export-control system for Russia;

Decree No. 366 issued by the government of the Russian Federation on 29 May 1992, by which Russia subscribed to documents regulating exports of dual-use equipment and materials and the corresponding technology applicable for nuclear purposes, adopted by nuclear suppliers in March-April 1992 in Warsaw;

Decree No. 3244-1 issued by the Supreme Soviet of the Russian Federation on 8 July 1992 "Guaranteeing Compliance With the Russian Federation's International Obligations in the Field of Chemical, Bacteriological (Biological), and Toxic Weapons";

Decrees No. 706 dated 10 September 1992 and No. 734 dated 18 September 1992, issued by the government of the Russian Federation specifying the list of chemicals and technology which have a peaceful purpose, but which could be used in the development of chemical weapons and which are exported under license, and also the procedure for controling exports thereof from the Russian Federation;

Decree No. 800 issued by the government of the Russian Federation on 29 October 1992 specifying the list of pathogens, their genetically altered forms and fragments of genetic material which could be used in the development of bacteriological (biological) and toxic weapons and which are exported under license;

Decree No. 869 issued by the government of the Russian Federation on 12 November 1992 introducing state registration based on the common system of a federal register of potentially hazardous chemical and biological substances.

A national export-control system is, as experience shows, no panacea, however. It has long been recognized in the United States that export controls cannot stop the proliferation of WMD. This is borne out by instances of its successful circumvention by Iran, Pakistan, North Korea, and other potential possessors of WMD. For example, in the chemical realm the developed countries are basically endeavoring to display their opposition to the spread of "critical technology" symbolically.

A number of experts even believe that in some cases strict export controls lead to the accelerated creation of domestic production or to alternative sources of the acquisition of nuclear materials being found.

Principal Shortcomings of the International Mechanisms

For a whole series of reasons, the problem of the effectiveness of the current international mechanisms for prevention of the spread of WMD remains acute.

A. One of the most serious shortcoming of the present regime for the nonproliferation of WMD is the fact that the current international treaties have no provisions providing for the creation of an efficient mechanism for verification of instances of development of prototypes of specific types of WMD and their components. The existing prerogatives are limited merely to control of nuclear materials and facilities as regards their use and also the official sale or transfer of products and technology to other countries.

B. The system of IAEA safeguards, even bolstered by the regime of special inspections, is inadequate to the task of thwarting attempts to create nuclear weapons. Special IAEA inspections may be carried out, for example, only after reliable information on actual violations of the safeguards has been obtained. This requirement makes such IAEA inspections an unusual occurrence and thus creates a political "threshold of permissibility" for their application. In addition, a considerable time lag between a request to perform a special inspection and the actual arrival of an IAEA inspection group in the country may be expected.

In addition, the current IAEA safeguards do not fully provide for timely warning of the use of the plutonium and highly enriched uranium from civilian reactors for military purposes within a country; this sets the stage for the theft of nuclear raw materials.

The inadequacy of the provisions of the World Basel Convention on control of the transportation of hazardous waste has come in for particularly serious criticism of late, including from scientific circles. It is in this context that the well-known Japanese "plutonium project," whose purpose is the stockpiling in the country of colossal quantities of this fissionable material, has once again attracted attention.

The convention banning biological weapons fails to provide for any control mechanism whatsoever. The convention on chemical weapons, which is being prepared for signing, is distinguished in a positive sense in this regard.

Thus the current international mechanisms and the resources which are being employed are insufficiently effective for the guaranteed introduction of a nonproliferation regime. The urgent need to improve of such mechanisms and resources is obvious.

C. The treaties limiting the spread of WMD which exist or which are in preparation do not contain unequivocal provisions on what to do with the process stocks which already exist in the area of the development of the nuclear, chemical, or biological munitions of the states that subscribe to the treaties. This puts the present regime of nonproliferation in an ambiguous and uncertain position as regards the ultimate fate of the weapons components which may have already been created.

D. The plans for sanctions against violators of nonproliferation regime have been insufficiently effective. The main push of such sanctions has, in fact, been international economic organizations' denial of financial assistance for countries for which there is proof or strong suspicion that they are manufacturing WMD. The most probable candidates for the creation of WMD in the Third World, however, are experiencing no shortage of available financial resources, have no need of IMF and World Bank assistance and are, consequently, not very vulnerable to such sanctions, although they could have a certain deterrent effect all the same.

At the same time, however, we cannot close our eyes here to the fact that the application of "all-embracing" sanctions incorporating an economic blockade hits in practice at the interests of the people, ordinary people primarily, and does not, as a rule, lead to growing internal pressure on the leadership to force it to abandon the production of WMD.

E. The absence of information on the actual state of affairs in specific countries accessible to all members of the international community. Insufficient transparency precludes the possibility of making the nonproliferation regime all-embracing and appropriate to the actual threat.

New Approaches—A Demand of the Times

An understanding by the entire world community of the deadly danger posed by the proliferation of WMD should be the principal condition of all efforts undertaken in the international arena.

It is essential to firmly recognize that the effectiveness of mechanisms for limiting the spread of WMD can be ensured only when they are based on a coincidence of the goals of each individual state and the goals of the entire world community.

Much in this respect will depend on how decisively the leading states of the world conclusively depart from the stereotypes of the past—the division of "threshold" and "near-threshold" countries into "friendly" and "unfriendly", with all the resulting implications of this political double standard. It may be considered that Russia has embarked on this path and expects the same from its partners.

It is also clear that, without an improvement in the current internal mechanisms and the creation of new, effective ones, the growing wave of the proliferation of WMD can only be slowed at best, not stopped.

The solution to the problem is seen to be primarily the elaboration of a system of measures, which are coordinated and practicable for the entire community, of an all-embracing and imperative nature and geared to:

—an increase in the efficacy of the current accords pertaining to the regime of nonproliferation of WMD;

—a broadening of the range of subscribers to these accords, with particular emphasis on the conversion of "threshold" and "near-threshold" countries into subjects of the regime of the nonproliferation of WMD;

—the elaboration of effective measures and incentives rendering the aspiration to possession of WMD pointless.

This kind of approach fully corresponds to the interests of the security of Russia, which cannot fail to be disturbed by the reality of the proliferation of WMD, particularly near its borders.

Measures to reduce nuclear arms by countries which are members of the "nuclear club" should be an important impetus toward finding a solution to the problem of the proliferation of WMD. The treaties reducing strategic offensive arms (START I and START II) sharply lower the number of nuclear weapons of Russia and the United States. This in itself works in favor of the "unofficial nuclear states" and "threshold" and "near-threshold" countries that refuse to move down the path of possession of WMD. But the effect could be even more significant were the other members of the "nuclear club"—China, Britain, France—also to take steps toward reducing their own nuclear arms.

There was a time when official spokesmen of some of these countries declared that they would be given the "greenlight" to move toward a reduction in their own nuclear weapons when the USSR and the United States reduced their nuclear forces by 50 percent. The treaty signed in Moscow on 3 January 1993 reduces these nuclear forces by practically two-thirds; this undoubtedly affords an opportunity for further reductions in nuclear potentials not on a bilateral but on a multilateral basis.

The Mission: Extension and Improvement of the Nonproliferation Treaty

As we all know, the NPT expires in 1995. It is planned to hold a treaty extension conference that same year. It is essential to do everything not only to ensure its extension but also to take advantage of a favorable opportunity—to jointly find ways of enhancing its effectiveness. It would seem necessary in this connection, in the opinion of FIS experts:

1. To bring complete clarity to bear on the question that the treaty obligation "not to manufacture" nuclear weapons unequivocally incorporates a total ban on the production thereof, the corresponding R&D, and the creation of munitions components.

Such a ban would extend to all nonnuclear countries subscribing to the treaty and states which have signed other nonproliferation agreements.

Upon subscribing to the NPT, those "unofficially" possessing nuclear weapons and "threshold" and "near-threshold" countries would assume a special obligation to fully disclose activities aimed at the creation or possession of nuclear weapons in the past. In addition, such states would have to show that they are no longer performing work on the creation of their own nuclear weapons, have reshaped and redirected the efforts of the corresponding research and engineering groups, and have shut down or neutralized the facilities at which the work on the creation of nuclear weapons was performed and have also completely destroyed all munitions components manufactured earlier (or inherited). This, naturally, would also apply to the republics of the former USSR which have yet to achieve complete compliance with the START Treaty.

Comprehensive special inspections would be carried out to verify the said declarations based on the international accord and also on the initiative of the inspected country itself as a demonstration of its good will. Other countries, absent indications of work on nuclear weapons being performed in them, would be deemed to be in compliance with the regime.

The enshrinement of such a "broad" interpretation of the NPT and other agreements could be a priority task of the IAEA. This problem could be raised in the group of nuclear material exporters and also in the course of negotiations within the framework of the Five. It could be discussed in the UN Security Council.

2. To devise and adopt a more sophisticated verification systems making it possible to reliably determine compliance with the ban on the development of nuclear weapons and also original stockpiles of nuclear materials. The main instrument providing for such control should be the IAEA, whose functions should, in this case, be extended and made more specific.

An inspection regime for nuclear facilities "under suspicion" could be proposed as a more sophisticated mechanism for verification of the NPT. Such a regime could be made standard for all subscribers to the NPT which have had or have on their territory nuclear facilities which were not previously under IAEA safeguards and also for countries suspected of developing nuclear weapons. The creation of such a mode could begin with the adoption of a corresponding resolution by the UN Security Council.

3. To expand the scale of legislatively specified economic and political sanctions to be imposed on states and private companies violating the regime of nonproliferation of WMD. This could assume particular urgency, for example, in connection with possible avoidance, including even collective and regional, of adherence to the Convention on the Destruction of Chemical Weapons, which was signed in January 1993.

The world has approached an understanding of the need for tough measures against violators of the nonproliferation regime.

At the same time, in the opinion of FIS experts, two points should be emphasized: sanctions should be imposed only based on a decision by the United Nations, and responsibility for violations of the regime of the nonproliferation of WMD should be borne not only by the purchaser but also by the vendor.

There is need for a refinement also of such international mechanisms as the Biological Weapons Convention and the Missile Technology Control Regime.

Dynamics of Countermeasures

Will not all this harm the S&T progress of a whole series of countries?

In connection with the fact that this question is far from rhetorical in nature, there is merit to the idea of the creation of a body which would comprise both states with developed S&T potential and countries interested in gaining access to participation in space research and the creation of a national base for this, for example. This would make it possible to modernize the international nonproliferation regime in such a way as to dispel or appreciably allay the suspicions that it is purposively consolidating the monopoly of use of the results of S&T progress for a small group of states.

A list of the norms and rules of behavior for the participants in the putative international body should be drawn up at the same time, of course.

An effective practical means of counteracting the proliferation of WMD could be the creation and use of a global "early-warning" system based on scientifically substantiated criteria. Such a system is intended to ensure an objective assessment of the extent of the existing threat of the proliferation of WMD and delivery systems for them by country. A global assessment system could appreciably strengthen and reduce the costs of such multibillion-dollar projects as the "Global System of Protection Against Ballistic Missiles".

Some states have already created their own national centers of this kind, an important part in whose activity is played by the intelligence services, which are now being reoriented to an increasingly large extent toward the accomplishment of the complex tasks of countering the spread of WMD.

Formulation of the political, international-legal, economic, and organizational-technical measures capable of guaranteeing a regime for the nonproliferation of WMD is being promoted to the level of top-priority goals for the entire world community following the end of the cold war. If the report of the Russian FIS is able to draw serious attention to these most important issues, its authors will consider their work a success.

Appendix

This appendix presents the concise results of an analysis of available information concerning the possibility of WMD being manufactured and stockpiled in individual countries. The appendix provides the most general assessments and conclusions. They are not, for understandable reasons, always borne out by references to official data.

The appendix does not, naturally, encompass all countries which are in possession of WMD or which aspire to possess them. The countries selected [provided in alphabetical order] are, in the opinion of Russian intelligence, the most characteristic from the viewpoint of the problem to which this report is devoted.

We do not rule out the possibility that certain objections or misgivings could arise upon examination of the assessments offered. We are prepared to accept and analyze all material that is at a variance with the conclusions adduced.

ALGERIA

The country has negligible S&T and material resources for the creation of potential for WMD.

In the Area of Nuclear Weapons

The country's first 15 megawatt heavy-water reactor, "As-Salaam," supplied by the PRC, is to be commissioned in 1993. This reactor's capabilities do not extend beyond the framework of the performance of conventional research in the field of isotope production, the physico-technical properties of fuel, neutron beam experiments, the improvement of nuclear reactor physics, and personnel training. Some experts, however, are of the opinion that this reactor will provide an opportunity for the production of plutonium-containing material and that, within approximately 6 years of commissioning of the reactor, Algeria could have stockpiled a sufficient quantity of such material for the creation of a nuclear weapon.

Algeria is studying the possibility of purchasing of nuclear reactors more powerful than the As-Salaam type for the generation of electric power and research to support industry, agriculture, and medicine.

The construction of a system of nuclear electric power plants mainly in the southern regions, where reserves of uranium ores have been prospected, is planned for the future (late 1990's-early 21st century).

Data which would reliably confirm the existence in the country of a military or parallel nuclear program allegedly approved in 1988 are lacking. The peaceful focus of the program was confirmed on 7 January 1992 by an official IAEA representative. Two IAEA inspections were carried out in Algeria in February 1992. At the same time, note was taken of Algeria's efforts to establish cooperation in the nuclear field with the PRC, Argentina, Pakistan, Libya, and Iraq for the purpose of gaining access to "technical secrets" and certain types of equipment. Algeria figures on the list of states suspected of concealing (prior to the IAEA inspections) stocks of nuclear fuel, groups of nuclear engineer specialists and valuable engineering forms and records evacuated from Iraq. In 1992 Algeria was denied scholarships for training nuclear engineer physicists at certain educational institutions of West Europe.

Algeria has not subscribed to the NPT.

In the Area of Chemical and Biological Weapons

International experts assume that Algeria had by mid-1992 terminated research in the sphere of these types of WMD. There are no reliable data on the existence in the country of chemical and biological weapons.

In the Area of Delivery Systems

Algeria has limited stocks of Frog 4 (40 km) and Frog 7 (70 km) short-range missiles formerly purchased from the USSR. A separate brigade armed with several dozen transporter-erector-launchers and a small store of missiles has been formed on this basis.

The complication of the domestic political situation in the country and the continuing crisis in society are not conducive to the development of serious programs pertaining to the creation of WMD.

ARGENTINA

The country possesses the S&T and industrial potential and also the skilled personnel and material resources needed for the creation of WMD.

In the Area of Nuclear Weapons

There is no information to the effect that Argentina possesses nuclear weapons. Nor is there reliable information to the effect that a serious program of a military-applied nature is under way in Argentina at this time.

Among Latin American countries, Argentina has the most developed nuclear industry. Its program is being pursued in two directions. On the one hand, a nuclear fuel cycle is being set up with the assistance of industrially developed states of the West and under IAEA control. On the other, low-capacity nuclear power plants not subject to international control are being built by indigenous efforts within the framework of a so-called parallel program.

Argentina is a member of the IAEA and a signatory to the NPT and the Tlatelolco Treaty banning nuclear weapons in Latin America, as well as to the Convention on the Physical Protection of Nuclear Materials. But it has not ratified the NPT or the convention and is not participating in the leading suppliers' elaboration of the criteria of nuclear export policy.

The program for the development of nuclear power engineering is oriented toward nuclear reactors using uranium as fuel and heavy water as coolant. Attention is called here to the fact that the mining of domestic uranium has been declining in recent years, although the country's need for it is objectively growing.

As of the end of 1992, Argentina had two heavy-water power reactors with capacities of 367 and 648 megawatts, respectively. A third with a capacity of 745 megawatts, whose commissioning is scheduled for 1994, is under construction. It is planned to have increased the total nuclear energy capacity to 14,000 megawatts by the year 2020. Together with reactors of foreign manufacture, at the time of installation of the new nuclear electric power plants, plans call for employing the domestic heavy-water reactor design with a capacity of 380 megawatts capable of producing up to 140 kg of plutonium a year. In the event of the successful implementation of this design, there will be an opportunity to produce of plutonium that is not subject to control on the part of the IAEA and also to supply such reactors to the world market.

The production of uranium dioxide (300 tonnes a year) and uranium hexafluoride has been organized. There are plants for enriching uranium up to 8.5 percent and also to produce fuel elements.

The task of creating a full fuel cycle incorporating the reprocessing of fuel to obtain plutonium for the purpose of using it in fast-breeder reactors was set also when the development of nuclear power engineering in Argentina began.

An experimental installation for the reprocessing of irradiated fuel, which will be converted to an industrial installation, has been created in the country. It has been conjectured that German and Italian firms took part in its construction and that classified production engineering information in the realm of fuel reprocessing was exchanged between Argentina and the FRG. Both parties categorically deny this. The Argentinians consider the installation to be of indigenous development and not subject to control, except in instances when it reprocesses fuel which falls under IAEA safeguards.

Indigenous capacities for the production of heavy water have been built in the country.

As a whole, Argentina has sufficient technological potential for the comparatively rapid creation of a nuclear device if the national leadership makes the political decision to do so.

In the Area of Chemical and Biological Weapons

There is no reliable information to indicate the presence of these types of WMD in Argentina.

In the Area of Delivery Systems

It is significant that Argentina's nuclear potential is developing in parallel with the implementation of long-term rocket-construction programs, in which Western technology is mainly being used. Argentina has been participating in international cooperation in the field of space research since the 1960's. The Castor sounding rockets were created at the end of the 1970's to carry out a program in partnership with the FRG, to study the atmosphere and circumterrestrial space, as were for similar research in cooperation with the United States, using Orion 2 rockets.

At the Paris Air Show in 1985, Argentina demonstrated the Condor 1 solid-fuel missile, which could deliver a 400 kg payload to a distance of approximately 100 km. A most important role in the Condor 1 program was performed by the West German firm MBB. It obtained a contract for preparation of the design of the next-generation missile—the Condor 2—which could carry a payload of up to 700 kg. This large a payload makes it possible to install a nuclear warhead thereon and deliver it to a distance of up to 800 km, which would bring targets from Argentine territory in the area of the Malvinas (Falkland Islands) into range. Work on this program was performed with the technical assistance of Egypt and with the financial support of Iraq.

In 1985 the firm MBB dropped out of the program. But its subsidiary Transtechnika has continued to supply individual components for this program. Up to 40 percent of the complex's equipment has also been supplied by the American companies Textronics and Scientific Atlanta.

In 1990 Argentine President C. Menem announced the termination of the Condor project. In February 1992 the Argentine Air Force turned control of it over to the civilian space agency that had been formed by the government.

BRAZIL

The country possesses the S&T, industrial, raw material, and financial resources for the creation of WMD. The situation in this area can be characterized as follows.

In the Area of Nuclear Weapons

There is no information to indicate the presence of nuclear weapons in Brazil. At the same time, there is information to indicate that the country has a major advanced program of research of a military-applied nature.

Brazil is a member of the IAEA, but has not subscribed to the NPT. It has ratified the Tlatelolco Treaty banning nuclear weapons in Latin America and the Convention on the Physical Protection of Nuclear Materials. Although Brazil does not participate in the elaboration of the criteria of the supplier countries, the obligations that it has assumed are more stringent than the demands of the NPT or the Tlatelolco Treaty. Thus, for example, the Brazilian Government has announced its renunciation of nuclear testing even for peaceful purposes.

The country has a dependable raw material base for the development of nuclear power engineering: proven reserves of uranium constitute approximately 150,000 tonnes, explored reserves of thorium, approximately 600,000 tonnes. There are plants for the manufacture of reactor fuel.

Nuclear activity is being conducted within the framework of two programs: the official nuclear power engineering program undertaken under the control of the IAEA, and a "parallel" program being conducted in an atmosphere of secrecy under the actual direction of the country's armed forces.

Work on the "parallel nuclear program," which is not under IAEA oversight, is being mainly performed in the Power Engineering and Nuclear Research Institute, the Air Force Aerospace Technology Center, and the Brazilian Army Engineering Developments Center, as well as in the Nuclear Research Institute.

A conversion facility with a capacity of 90 tonnes of uranium hexafluoride a year was commissioned in 1984, as was subsequently a second laboratory facility with a capacity of 15 tonnes of uranium hexafluoride a year.

Independent work on the centrifuge enrichment of natural uranium was commenced in 1979 by Brazilian Navy and National Nuclear Energy Commission specialists. By the end of 1992, approximately $80 million had been spent on this project. The first demonstration installation for uranium enrichment by the above-mentioned method came on stream in April 1989. At the initial stage it was producing uranium with an enrichment of up to five percent, and it was planned subsequently to raise it to 20 percent. The installation has become a key component in Brazil's "parallel nuclear program" aimed at the independent production of fuel for the propulsion systems of nuclear-powered submarines. Brazilian specialists believe that a 20 percent enrichment level is sufficient to fuel a compact 50 megawatt nuclear reactor, which it is planned for development by the mid-1990's. Some $50 million has already been spent on this project.

According to available information, a laboratory-scale installation for the reprocessing of irradiated fuel, which was built back in the 1970's, but did not function due to difficulties in handling the radioactive waste, has been commissioned in Brazil. What is most likely is that it began operation in 1987 with an average output of less than 1 gram of plutonium a day. According to other sources, the system's output is up to 5 kg of plutonium a year.

In specialists' estimates, Brazil is at a stage of the nuclear program development where all the main technological processes necessary for the creation of an indigenous closed fuel cycle have been developed and tested on laboratory systems of varying scale.

Brazil is very close to the threshold where, in the event a political decision to do so is made, the comparatively swift manufacture of its own nuclear device becomes a real possibility. At the same time the appearance in Brazil of new, more balanced approaches and views in the nuclear arena, including the "parallel program", should be viewed as a positive development.

In the Area of Chemical and Biological Weapons

There is no information to indicate that Brazil is engaged in work which could be related to the creation of chemical and biological weapons. Nonetheless, it possesses important S&T and production potential in chemical and pharmaceutical industries, which could, if necessary, be appropriately redirected.

In the Area of Delivery Systems

Brazil is engaged in a program of exploration of circumterrestrial space, employing sounding rockets of the Sonda family, which, if used as ballistic missiles, could have a range of up to 1,000 km. The Sonda 4 is the prototype of a more powerful four-stage rocket delivery system designed for putting satellites weighing over 100 kg into orbit.

The Orbita firm, which on the basis of the Sonda 4 is developing EE series ballistic missiles with a range of 150 to 800 km, was organized in early 1987 to expand the possibilities of ballistic missile design. According to information received, Brazil is also engaged in the development of SS series ballistic missiles with a range of up to 1,200 km.

Great significance in this work is attached to expanding cooperation with China, which is rendering assistance to Brazil in assimilating techniques for the production of liquid-fuel components, and also with France, which is supplying guidance and control systems.

Brazil is one of the countries that has displayed interest in recruiting specialists with various areas of expertise from the military-industrial complexes of European countries, including the CIS countries.

EGYPT

The level of development of science and technology and the degree of qualifications of the national personnel as well as the available material and financial resources make it possible to characterize the country's latent capabilities in the realm of WMD as follows.

In the Area of Nuclear Weapons

There is no information to indicate the presence of nuclear weapons in Egypt. Egypt is not expected to possess nuclear weapons in the foreseeable future. The country has no special program of military-applied research in the nuclear realm.

Four uranium deposits have been prospected in Egypt. Their industrial development, including the extraction and enrichment of uranium for subsequent use as fuel for nuclear power plants, is planned.

There is a 2 megawatt research reactor which was commissioned in 1961 with the technical assistance of the

USSR. An agreement with India to increase this reactor's capacity to 5 megawatts was signed in 1991.

Operating this reactor for 30 years has enabled Egypt to create its own research base supported by fairly well qualified personnel in various fields of research in the area of atomic energy. There are, in addition, agreements with Britain and India for rendering assistance in the training of national personnel for scientific research and work at the country's nuclear enterprises.

A deal was concluded in 1992 for Argentina to supply Egypt with a 22 megawatt reactor. A contract for the supply to Egypt of a Russian MGD-20 cyclotron accelerator signed in 1991 remains valid.

Egypt has subscribed to the NPT.

Since 1990 Egypt has been a member of the 11-country Arab Nuclear Power Organization. A number of Egyptian research projects are being implemented under the aegis of the IAEA. There are bilateral agreements in the field of the peaceful use of atomic energy with Germany, the United States, Russia, India, China, and Argentina.

According to a statement from the Egyptian Agency for the Use of Atomic Energy, the principal task of Egypt's nuclear program is to conduct research and to use its results in agriculture, medicine, biotechnology and genetics. However, international experts who visited the Inshas Nuclear Center in 1991-1992 observe that a block which in its design features and engineering protection could in the future be used, if necessary, to produce weapons-grade plutonium from uranium irradiated in the research reactor is being built in the center's radiochemical department.

In the Area of Chemical Weapons

The country has the scientific and industrial base that is sufficient for the production of certain types of chemical weapons involving the use of local and imported raw materials. Specifically, techniques for the production of nerve and blister agents have been assimilated. There is information to the effect that Egypt is displaying interest in overseas purchases of warheads for liquid chemical agents. The stockpiles of chemical agents available at this time are insufficient for broad-based operations, but the industrial potential would make it possible to produce additional quantities in a relatively short time. The substantial industrial capacity for the manufacture of pesticides using techniques similar to chemical agent production processes are a significant reserve for chemical weapons production.

In the Area of Biological Weapons

The country has a program of military-applied research in the area of biological weapons, but no data have been obtained to indicate the creation of biological agents in support of military offensive programs.

The research programs in the area of biological weapons date back to the 1960's. As we all know, in the early 1970's President As-Sadat confirmed this, announcing the presence in Egypt of a stockpile of biological agents stored in refrigerated facilities. Toxins of a varying nature are being studied, and techniques for their production and refinement are being developed at the present time by a national research center.

There is information on cooperation between Egypt's research centers in areas of biological research related to biological weapons and certain civilian and military laboratories of the United States, particularly in the field of highly pathogenic microorganisms and dangerous vectors. The functioning in Egypt of a U.S. naval military-medical laboratory for the study and development of means of combating particularly dangerous infectious diseases is also known. The laboratory is one of the leading Near East medical-biological centers, equipped with the latest apparatus and staffed with highly qualified American specialists. Concern is raised by the fact that the subject matter of the research of this laboratory is strictly classified.

In the Area of Delivery Systems

By 1990, Egypt's missile forces were armed with a regiment of Soviet Scud B (300 km) and a regiment of Frog 7 (70 km) transporter-erector-launchers as well as a certain quantity of Sakr 80 and Sakr 365 Egyptian-Iraqi-North Korean short-range missiles. It is technically possible to fit the Scud and Frog warheads with chemical weapons.

An agreement was concluded in 1990 on military cooperation with China, in accordance with which Beijing is to assist in the modernization of the Egyptian Sakr plant and help establish the production of new modifications of the Scud B-class missiles and three indigenous types of Egyptian surface-to-surface missiles.

ISRAEL

The country has the requisite industrial and S&T potential for developing WMD.

In the Area of Nuclear Weapons

Israel is a country which unofficially possesses nuclear weapons mated with missile delivery systems. Israel's leadership itself does not confirm but does not deny reports on the presence of nuclear weapons on the country's territory. At th·· same time, the question of Israel's nuclear weapons is on the agenda of the next UN General Assembly session.

While a member of the IAEA, Israel is avoiding accession to the NPT. Tel Aviv has signed, but not ratified, the Convention on the Physical Protection of Nuclear Material. Nor is Israel a party to international agreements on nuclear export controls.

A heavy-water reactor and an irradiated-fuel reprocessing plant are mainly used for the production of weapons-grade nuclear material. They are not under

IAEA safeguards. Their capacity is sufficient to manufacture five to 10 nuclear weapons a year. A 26 megawatt reactor was commissioned in 1963 with the help of France and was modernized in the 1970's. After being upgraded to 75-150 megawatts, the production of plutonium could grow from 7-8 kg of fissionable plutonium a year to 20-40 kg. The irradiated-fuel reprocessing plant was created in about 1960, also with the assistance of a French company. From 15 to 40 kg of fissionable plutonium a year can be produced there.

In addition, the stocks of fissionable plutonium could be increased with the aid of a 250 megawatt heavy-water reactor at a new nuclear electric power plant, whose construction the government officially announced in 1984. Given a certain operating mode, the reactor could, it is estimated, produce more than 50 kg of plutonium a year.

Israel has been accused of secret purchases and the theft of nuclear materials in other countries—the United States, Britain, France, and the FRG. Thus the disappearance of more than 100 kg of enriched uranium from a plant in the state of Pennsylvania, supposedly bound for Israel, was discovered in the United States in 1986. Tel Aviv acknowledged the fact of its illicit removal of cryotrons (an important component in the creation of modern models of nuclear weapons) from the United States in the early 1980's.

Stocks of uranium in Israel are estimated to be sufficient for its own needs and even for exports for roughly 200 years. Uranium compounds can be separated at three plants for the production of phosphoric acid as a by-product in the amount of approximately 100 tonnes a year. For uranium enrichment the Israelis patented a laser enrichment method back in 1974, and in 1978 they devised an even more economical method for separating uranium isotopes based on the difference in their magnetic properties. According to certain information, Israel also participated in "enrichment studies" using the aerodynamic nozzle method conducted in South Africa.

With this base Israel could altogether potentially have produced up to 20 nuclear weapons in 1970-1980, and by this time from 100 to 200 weapons.

In addition, the country's high S&T potential is making it possible to continue R&D to refine the design of nuclear weapons, specifically to create modifications with enhanced radiation and accelerated nuclear reaction. Tel Aviv's interest in the development of thermonuclear weapons cannot be ruled out.

In the Area of Chemical Weapons

Israel has a store of chemical weapons of indigenous manufacture.

The development of chemical weapons in Israel began in the mid-1960's. In 1990 the country's defense minister announced that Israel had chemical weapons and would use them if attacked, by Iraq, for example.

At the present time Israel is capable of producing chemical agents of all types, including nerve, blister, and incapacitating agents, etc. To do this, the country has a highly developed chemical and petrochemical industry and skilled specialists as well as stocks of source material.

Large-scale research (including ones in support of the authorities) is still ongoing in Israel in the area of synthesizing new physiologically active substances.

In the Area of Biological Weapons

There is no direct evidence of the presence of biological weapons in Israel.

At the same time, according to various indications, a ramified program of biological research of a general nature, in which elements of a military-applied purpose are present, is being implemented in Israel. Specifically, Israeli research centers are cooperating closely with top American military laboratories within the framework of a U.S. Defense Department program for protection against biological weapons.

As a whole, Israel possesses a strong civilian biotechnology base, which, if necessary, could be redirected fairly easily to the production of biological weapons.

In the Area of Delivery Systems

Israel has amassed the most modern missile potential in the Near and Middle East region. An absolute majority of the missiles is of indigenous production.

Systems of foreign manufacture are present in the inventory of the Israeli Army only in the short-range missile class. These are 12 transporter-erector- launchers and more than 100 Lance ballistic missiles (120 km) obtained from the United States in the latter half of the 1970's. In addition, American Patriot missiles are employed in the country's antimissile defenses.

The remaining missile systems were created in Israel. In the short-range missile class, there are two MAR systems: the MAR-290 (40 km) and the MAR-350 (40-150 km). The latter is a launcher on a tank chassis and carries four missiles (in two packages). The development of the Jericho series missiles began in 1963. The army has been equipped with the Jericho 1 solid-fuel short-range missile (480 km), which was based on the French MD-660 missile, for more than two decades. The mobile version of it was deployed in 1973.

More than 100 of the Jericho 2 system (750 km) were designed and deployed in the intermediate-range missile class in 1977-1981.

A "full" class of intermediate-range missiles was in place in Israel by 1989. The latest modification of the Jericho 2B, which has been successfully tested, is capable of hitting targets at a range of up to 1,300 km. As a result Israel's missile potential fully covers the boundaries of the Near and Middle East.

A qualitative leap forward has been accomplished simultaneously in the area of the development of ICBM's and the conquest of space for military-applied purposes. The Ofek 1 satellite was placed in near-Earth orbit in September 1989 with the help of the "Shavit" booster, as was the more sophisticated Ofek 2 space satellite in April 1990. Finally, the launch of the combined-purpose Ofek 3 space satellite (with an approximate service life of 2-3 years), that is, with communications and reconnaissance support missions, was planned in 1992.

The data available on the Shavit missile indicate that it could deliver a small nuclear warhead more than 4,500 km. The parameters determined in the original design permit the development of the Shavit, increasing its range to 7,000 km.

Since 1990 Israel has been stepping up a new area of the missile program connected with sea-launched cruise missiles. The American Tomahawk sea-launched cruise missiles, which could enable the Israeli Navy in the East Mediterranean to approach the level of armament of certain NATO members (Turkey, Greece), have been taken as the model.

INDIA

The country possesses high industrial and S&T potential, skilled national personnel and the material and financial resources for the creation of WMD.

In the Area of Nuclear Weapons

India may be classified among the countries which unofficially possess nuclear weapons. There is an advanced program of military-applied research in the country.

While it is a member of the IAEA, India has not, however, signed an agreement to place its nuclear activity under the safeguards of this organization. Nor has it subscribed to the NPT.

India is one of the few developing countries capable of independently designing and building nuclear power units and performing various operations within the framework of the fuel cycle, from uranium mining to the reprocessing of spent fuel and waste.

The country has its own uranium reserves, which, by IAEA estimates, constitute approximately 35,000 tonnes at a recovery cost of up to $80 per kilo. The reserves of natural uranium and the quantity of uranium concentrate produced are sufficient to operate the current and future reactors up to approximately 1995. In addition, there are substantial reserves of thorium—369,000 tonnes. India has succeeded in making considerable progress in its nuclear program and in developing original technology, thereby reducing its dependence on imports. The Indians' scientific output in the area of using the thorium fuel cycle is highly regarded, for example.

The design of the first nuclear power plant with the Tarapur reactors was developed by the American General Electric company. Both its units came on stream in 1969. At the present time India has six operating power reactors with a total capacity of 1,159 megawatts (electrical). Of these, only two nuclear power plants (in Tarapur and Rajasthan) are under IAEA safeguards. Specialists believe that India will in the not-too-distant future become a supplier of heavy-water reactors to other countries.

In addition, eight research reactors, the most powerful of which is the Dhruva reactor with a thermal capacity of 100 megawatts, built entirely by Indian specialists, are in operation in the country. According to a statement by Indian spokesmen, the reactor is intended for the production of isotopes for industrial purposes, medicine, and agriculture. But it could be seen also as a possible source of plutonium.

As a whole, a national nuclear fuel cycle for experimental and research reactors (pilot installations) and for power reactors (industrial installations) has been created in India. The research reactors and their fuel cycle are not under IAEA safeguards here.

In the estimation of experts, India, having exploded its own nuclear device in 1974, has laid a strong foundation for the development of a military nuclear program. It possesses both great potential production capabilities and an experimental base. With stocks of irradiated reactor fuel not under safeguards, the country could reprocess it in order to extract plutonium for the creation of a powerful arsenal of nuclear weapons.

In the Area of Chemical Weapons

India's armed forces are equipped with chemical weapons and with modern means of protection against them, and they undergo training in combat operations under chemical conditions. Military chemical warfare engineer specialists have been trained at military training institutions of NATO and the USSR.

The highly developed chemical industry enables India not only to meet its own requirements in practically any branch of chemistry but also to supply chemicals overseas, including "dual-use"items; this is actually being done by private Indian companies in the Near East region.

In the Area of Biological Weapons

India does not possess offensive biological weapons. However, it does have considerable potential in the field of biotechnology. The nature of the work of certain civilian research centers cooperating with the Defense Ministry suggests that its results could be used for military-applied purposes, primarily in a defensive respect.

No fewer than five military centers are involved in developments in the military-biological area. The programs being conducted by these research centers are of a classified nature.

In the Area of Delivery Systems

India has a large number of military aircraft of varying purpose which could be fitted for carrying WMD.

The surface-to-surface Prithvi mobile operational-tactical missile was successfully tested in May 1992. Its range is 300 km with a warhead weighing 250 kg. If the weight of the warhead is increased to 1,000 kg, its range is 150 km. The Prithvi operates on liquid rocket propellant and is a modified version of a stage of a boosted-thrust satellite launch vehicle.

In 1991-1992 Indian specialists appreciably accelerated the pace of modification of the Agni intermediate-range ballistic missile with a range of up to 2,500 km with a payload weight of up to 1,000 kg. But during the testing the range of fire did not exceed 800 km. The weight parameters and the S&T groundwork make it possible in principle to fit it with a nuclear warhead.

Experimental-design work is being done on the creation of cruise missiles, mainly air-launched ones.

An analysis of the available information indicates that the country has the necessary industrial potential and scientific and engineering base for the creation of small hybrid engines, a flight-control computer complex, global navigational-satellite communications receivers, a television guidance system, etc. At the same time the weaknesses of Indian industry in supporting the existing programs with a dependable component base and special instruments are becoming more and more glaring.

Delhi has scored achievements in the field of space research. The Indian leadership regards the launch of a booster rocket on 20 May 1992 as a breakthrough in its missile-space program. The Cross series Rohini satellite (weighing 106 kg) was put into near-Earth orbit at an altitude of 450 km with the aid of this solid-fuel four-stage rocket (23.8 meters long, weighing 41.7 tonnes) with additional boosters. The launch appreciably advances developments with respect to the military application of missiles.

IRAQ

Until recently, Iraq aspired to possess all types of WMD to some extent. It is the only Arab country with experience in the combat use of chemical weapons, in 1983-1984 (against Iran and the Iraqi Kurds) and missile weapons in 1981-1988 and 1991 (against Iran, Israel, and Saudi Arabia). A quite extensive program of nuclear research has been undertaken and biological developments for military-applied purposes have also been performed in Iraq.

By the start of 1993, the UN Special Commission and the IAEA had completed the destruction of Iraq's WMD on the basis of a series of UN Security Council resolutions, the most important of which is Resolution 687 on the disarmament of Iraq in connection with its aggression against Kuwait in early 1991. Simultaneously, in accordance with Resolution 715, the Special Commission and the IAEA have made preparations for long-term monitoring in Iraq for the purpose of preventing a revival of Iraq's WMD programs.

The implementation of both resolutions is being impeded somewhat by the fact that certain clauses and provisions, those pertaining to dual-use material particularly, allow an ambiguous interpretation. Political complications have been introduced by the Iraqis' attempts to conceal from the UN inspectors some stocks of WMD and also certain efforts in this area; this has been used to tighten the international sanctions on Iraq, up to and including the threat of the use of military force against Iraq.

The situation in the area of WMD in Iraq can be characterized as follows.

In the Area of Nuclear Weapons

Iraq is a signatory to the NPT and a member of the IAEA. But this has not prevented it from undertaking the development of nuclear weapons.

In an interview in October 1991 in Baghdad with R. Ekeus, chairman of the Special Commission, T. Aziz, deputy prime minister of Iraq, acknowledged that Iraq had spent "billions of dollars" on this.

It may be considered proven, however, that by the time of the start of Operation Desert Storm Iraq did not have a nuclear device. The IAEA inspection group reached this conclusion on the grounds that Iraq does not possess a sufficient quantity of special fissionable material. Iraq's program for the creation of nuclear weapons was at an early stage, as indicated by the amounts of funding and of equipment, materials and human resources devoted to it. It is also obvious that, as a result of the military operations of the Multinational Force and IAEA inspection activity, its production capacity for special fissionable material has been eliminated.

Considerable quantities of highly enriched uranium were in Iraq under IAEA safeguards and have been removed from Iraq. It is not yet completely clear whether there are stocks of unregistered special fissionable material which could, possibly, have come from overseas. But even if there are such, the production capacity for the creation of nuclear weapons therefrom has been eliminated.

Based on Iraq's obvious violation of the NPT and the IAEA safeguards agreement, the sponsors of UN Security Council Resolution 687—the United States and Britain—are insisting henceforth on maximum constriction of the framework of nuclear activity permitted Iraq.

In the Area of Chemical Weapons

In the summer of 1991 Iraq told the Special Commission of the presence of 46,000 filled chemical warfare munitions and approximately 700 tonnes of chemical agents in munitions and storage tanks. Subsequently, UN experts estimate, these figures were increased to 55,000 munitions and more than 1,500 tonnes of chemical agents. As of 1 June 1991 over 341,000 chemical warfare munitions and 750 tonnes of chemical agents of the VX and mustard gas types had been accumulated at the main chemical agent destruction sites in the Samarra area. The program to destroy all chemical agent stocks is slated to take approximately a year. The Iraqi authorities are displaying an interest in it being carried out quickly due to the numerous instances of chemical agent leaks caused by damage to the storage tanks and some of the munitions during Operation Desert Storm and also by aging and depressurization processes, etc.

In the Area of Biological Weapons

Biological weapons have not been discovered in Iraq. At the present time, the UN inspections have been set the goal of checking the statements by official representatives of the United States, Britain, Germany, Israel, Iraq, and other countries regarding the military focus of a number of Iraq's biological programs. These statements are based on indirect data, specifically on warning signals concerning work in Iraq with biological agents that could potentially be suitable for the creation of biological weapons (typhus, cholera, malignant anthrax, tularemia, bubonic plague,etc.). Some experts have called attention to the broad spectrum of vaccines being produced in Iraq (up to 15 types) and the considerable production capacity, appreciably in excess of peacetime needs (12 million doses a year of foot-and-mouth disease antidote vaccines, with a domestic demand for 2 million doses or less, for example).

Iraq's overseas orders for dual-use equipment and biological material (the order from Iraq's Ministry of Defense in Germany in May 1989, for example, for a large consignment of heating and drying appliances) and also Iraq's purchase of 17 strains of various toxins and bacteria from an American biological cultures collection, including tularemia, are being subjected to in-depth analysis.

Current conjecture has not as yet been borne out by other data. Specifically, there is no information regarding a system of storage of large masses of biological agents and, what is most important, on perfected systems for the delivery of finished biological weapons.

In the Area of Delivery Systems

In accordance with UN Security Council Resolution 687, all the ballistic missiles with a range of over 150 km which Iraq had declared have been destroyed.

The UN Special Commission assumes, however, that the Iraqis have hidden approximately 200 Scud-class missiles from the inspection teams. The experts surmise that they could either be hidden on the territory of Iraq or could even have been taken to certain other Arab countries.

In addition, a multitude of instances of Iraqi importation of advanced missile technology for the purpose of developing indigenous missile construction has been ascertained. Specifically, UN inspection teams have discovered approximately two dozen facilities associated with the manufacture, testing, and maintenance of ballistic missiles. The main research subdivision incorporating up to 50 laboratories was the Saad 16 secret military center near Mosul. In addition, Iraq had the Al Anbar space center not far from Baghdad.

These defense enterprises undertook the modernization of the Soviet Scud B missile (300 km), on the basis of which two modifications—the al-Husayn (600 km) and al-Abbas (900 km)—were developed. The precise number of these and other possible Scud B modifications is also to be ascertained.

Despite the destruction of the missile production capacity during the course of Operation Desert Storm and the UN inspections, the Iraqis have commenced repair and restoration work at certain missile enterprises and are preparing to retool them.

IRAN

With allowance for various factors, the country's potential capabilities in the area of WMD can be characterized as follows.

In the Area of Nuclear Weapons

Iran does not possess nuclear weapons. However, the country has a program of military-applied research in the nuclear realm. But without outside scientific and technical assistance, the appearance of nuclear weapons in Iran in this millennium is unlikely. Even if outside assistance arrives unimpeded and the corresponding financial resources ($1-1.5 billion annually) are invested in the program itself, the creation of nuclear weapons is not even in this case feasible for 10 years.

The majority of the experts points to three fundamental "inhibitors" on Iran's programs for the creation of WMD: the weakened condition of the country due to the 8-year war with Iraq, the low level of development of the national industrial base, and Iran's considerable dependence on foreign assistance in the advanced branches of science and technology. To overcome the latter "inhibitor" the Iranian leadership has created a system of purchasing "dual-use" technology overseas, in circumvention of the Cocom; this system is similar to those of Iraq and Pakistan.

Of the three centers for the study of the problems of atomic energy in Isfahan, Koraj, and Tehran, specialists' heightened attention is drawn to the latter, where since 1968 highly enriched fuel (93 percent) has been used at a research reactor with a nominal capacity of 5 megawatts. This fuel will be under intensified IAEA control until the reactor is switched to low-enriched fuel.

Despite the fact that Iran ratified the NPT back in 1970 and has since 1992 allowed the IAEA to inspect all of Iran's nuclear facilities at random, many specialists are made wary by statements by the Iranian leadership about the country's imminently becoming a nuclear power and information on Iran's increasing imports of dual-use materials. At the same time, as long as the imported equipment is within the limits of IAEA control, there are no grounds for saying that an advanced Iranian military program exists in the area of nuclear weapons. Attempts by international experts and various countries' special services to find evidence in Iran of a "parallel" nuclear program have yielded no results as yet.

In the Area of Chemical Weapons

Iran possesses at least two types of chemical weapons.

During the Geneva conference to formulate a global convention to ban chemical weapons, in 1992 Iran's representatives confirmed the presence of chemical weapons in the Islamic Republic of Iran.

At present the industrial production of mustard gas and sarin has been established in Iran. A plant for the production of pesticides, which could be used as precursors in the manufacture of nerve and blister agents, operates not far from the capital.

In terms of the assortment of starting chemicals, Iran is partially dependent on imports.

The main chemical munitions with which the Iranian Army is equipped are 155 mm artillery shells for American-made howitzers, 120 mm mines, and chemical aerial bombs.

Research is being conducted in the area of synthesizing chemical agents and the search for new physiologically active substances.

In the Area of Biological Weapons

Iran does not have offensive biological weapons as of this time. But it is possible to say with confidence that there is a military-applied biological program.

According to certain reports, scientific research has been underway in Iran for approximately three years. An initial program of research, development, and procurement in the area of biological weapons has been approved. There is a possibility that small stocks of biological agents have already been produced. Western countries have recorded attempts by Iranian representatives to purchase unofficially equipment and biological materials suitable for the production of biological weapons, mycotoxins in particular.

In the Area of Delivery Systems

At present Iran's actual missile potential is confined to Scud B short-range missiles (300 km) received from Syria and the DPRK as well as Chinese Silkworm antiship missiles (80 km), that can be launched from mobile launchers. Iran also has indigenous developments in missile construction: the Ogab (40 km), Tandar-68 (40 km), Nazaret (90 km), Shahin 2 (100-130 km), Iran 130 (130 km) and Mushak (160 km). Regarding military-industrial organization, in 1989 Tehran announced that it had assimulated the production of a ballistic missile with a range of up to 200 km. As yet, however, it is unclear to what extent the results of this work have been translated into weapons for the missile subunits of the Iranian Army. Available data confirm that there are "bottlenecks" throughout the whole of Iran's missile program, primarily a shortage of skilled personnel, science-intensive technology, scarce starting materials, and, possibly, the requisite amounts of financing.

NORTH KOREA

The DPRK leadership has for a number of years been engaged in efforts aimed at simultaneously developing the potential for all three types of WMD—nuclear, biological and chemical. The development of systems for the delivery thereof has been undertaken in parallel. But the intensity and productiveness of the work in each of these areas have been and remain dissimilar, and as of this time the state of affairs is characterized by varying degrees of progress and sophistication.

In the Area of Nuclear Weapons

The DPRK does not possess nuclear weapons at this time. For a comparatively long period of time, however, the DPRK has been developing a military-applied program in the nuclear realm, which is at an advanced stage, although is not distinguished by a high S&T or engineering level. Specialists of the DPRK National People's Army are participating in the nuclear research program.

North Korea possesses a quantity of raw material that is perfectly adequate for the development of nuclear power engineering. Reserves of uranium deposits are put at 26 million tonnes of ore (more than 15,000 tonnes of uranium). With the help of the USSR and the PRC on the basis of the available raw material resources, work was initiated in the 1960's on the creation of a scientific-experimental infrastructure, the training of the necessary contingent of specialists and the construction of production capacity in a peacefully oriented nuclear industry.

A number of specialized research institutes, including the Atomic Research Center in Yongbyon, the nuclear power and radiology institutes, the Nuclear Physics Department at Pyongyang University and the Nuclear Research Technology Department at the Kim Chak Polytechnical Institute, are operating in the country at this time.

The DPRK has signed the NPT and an agreement placing all of its nuclear activity under IAEA control.

A network of nuclear industry facilities has been created over the nearly three decades that the nuclear program has been in operation in the DPRK, among which the following should be highlighted from the standpoint of their possible use for the purposes of military-applied research:

1. The special laboratory at the Kim Il-song Pyongyang University, where work in the area of experimental nuclear physics is being performed.

2. The plant for the production and storage of fuel rods at the Atomic Research Center in Yongbyon.

3. The 5 megawatt research nuclear reactor in Yongbyon.

4. The 50 megawatt nuclear reactor in Yongbyon. The North Korean side maintains that it is in the construction stage. It is noteworthy that both the 5 and 50 megawatt reactors belong to the dual-use reactor category and could be used both to generate electric power and to produce weapons-grade plutonium.

5. The radiochemical laboratory of the Radio Chemistry Institute at Yongbyon.

6. The 200 megawatt gas-graphite natural-uranium reactor which is under construction at Taejong.

7. The uranium mines at Pakchon and P'yongsan.

8. The two uranium-enrichment plants.

9. The established sites for the planned construction of three power reactors with a capacity of 635 megawatts each.

The available data nonetheless indicate that there is skepticism regarding assessments that there has been a "breakthrough" in the DPRK's creation of indigenous nuclear weapons. A gap has now emerged in the engineering chain developed by the DPRK back in the early 1970's: development of the raw material base—scientific-experimental research—production of fissionable material—creation of an explosive device—range testing thereof—"refinement" of delivery systems—creation of nuclear weapons. The gap has occurred at the plutonium-production stage.

The inspections of the DPRK's above-listed nuclear facilities performed by IAEA experts in 1992 did not show conclusively that the North Korean leadership had abandoned plans to use them to conduct military-applied research. However, the commencement of the implementation of the agreement between Pyongyang and the IAEA on inspections of North Korea's nuclear facilities has increased appreciably the transparency of the DPRK's nuclear program and created a good basis for a more objective evaluation of the status and purposes thereof. At the same time, an appreciable positive contribution could be made by the consultations now being conducted between North and South Korea on mutual inspections of nuclear facilities.

In the Area of Chemical Weapons

The information available to international experts indicates that the DPRK has a program of military-applied work in the chemical area and an adequate industrial base. Although the high degree of secrecy of the research which is being conducted seriously hampers an analysis of the true picture in this respect, there are claims by the United States and South Korea that North Korea has stockpiles of chemical agents. Responding to these claims, a North Korean Foreign Ministry spokesman delivered the following statement in early 1993: "The DPRK has never had any chemical weapons, and there has been no change in its government's position against their development, production, storage and use." At the same time the DPRK did not take part in the international Chemical Weapons Convention signing ceremony in January 1993 in Paris.

In the Area of Biological Weapons

According to these same estimates, North Korea is performing applied military-biological research at a whole series of universities, medical institutes and specialized research institutes. Work is being performed at these research centers with pathogens for malignant anthrax, cholera, bubonic plague and smallpox. Biological weapons are being tested on the island territories belonging to the DPRK. No information indicating that these programs are offensive in nature has been received.

In the Area of Delivery Systems

Frog 5 and Frog 7-class short-range ballistic missiles purchased by the DPRK from the USSR in the late 1950's and upgraded Scud B missiles, also of Soviet manufacture, and the North Korean Scud C variant constitute the basis of the North Korean delivery systems potential.

Using technology obtained from Egypt, the DPRK is upgrading the Scud-class missiles purchased earlier from the USSR and exporting them to countries in the Near and Middle East. The North Korean Nodong 1 intermediate-range missile with a range of approximately 1,000 km, which the DPRK intends to offer on the world market, is at the testing stage. Taken together, the available data indicates that the DPRK has a national missile industry that is creating models which could be used as systems for the delivery of chemical and, after modification, nuclear weapons.

The development of the DPRK's missile industry is, however, encountering a number of objective difficulties associated primarily with the shortage of skilled scientists and engineers for enhancing the scientific-engineering level of the work that is being done and with the comparatively low engineering state of industry. In this connection the North Korean side is engaged in an active quest for the necessary specialists overseas in order to turn missile manufacturing into a competitive export sector.

LIBYA

Although Western experts put Libya in the "most dangerous" category as regards the possession of WMD, there have been acknowledgments on their part of late that this assessment is overstated.

In the Area of Nuclear Weapons

The FIS has no information to indicate that Libya has nuclear weapons.

Libya has certain amount of research experience in the area of nuclear power engineering. A nuclear research center was built in Libya in 1982 with the assistance of the former USSR. Approximately 500 Libyan operators have been trained there altogether. They gained experience in working on power engineering, electronics, analytical chemistry, vacuum technology, low-temperature physics, and metal-working. The Libyans have independently achieved certain research results in the area of reactor physics, plasma and solid-state physics, radiochemistry, analytical chemistry, and materials science. Approximately 50 foreign nuclear engineer specialists are currently working in Libya on private contracts. There are among them no specialists in the field of the developing nuclear weapons.

In 1984 Libya and the Imchiko company (Germany) signed an $83 million contract for organizing the production of heavy water at Rabta. Subsequently, however, the Libyans encountered organized opposition from Western countries in a coordinated denial of access to technology associated with the creation of nuclear weapons. The actual S&T boycott forced the Libyan leadership to broaden its contacts with developing countries and to seek other ways of obtaining the necessary materials and technology. In 1989 Libya and Pakistan concluded an agreement to exchange information and to cooperate in the realm of nuclear research. Provision was made to dispatch Pakistani nuclear engineer specialists to the Tajura research center, and Libyan trainees for training in Pakistan. According to certain reports, in February 1992 Libya signed the first agreement on cooperation with the PRC in the fields of nuclear power engineering and chemistry.

Libya has opened all its national nuclear facilities to IAEA international inspection, confirmed its commitment to the NPT, and advocated the creation of a nuclear-free zone in the Mediterranean and the Near East.

On the whole, it can be maintained that the available engineering base and S&T level will not permit Libya to approach the creation of nuclear weapons in the foreseeable future.

In the Area of Chemical Weapons

Libya has certain stocks of chemical weapons—70-80 tonnes. Until recently, certain types of chemical agents (sarin, mustard gas, phosgene) were produced in Libya, but in limited quantities. The stock of chemical agents that has been produced is considered inadequate for conducting large-scale combat operations. The Libyans' attempts to purchase industrial technology from Iraq and Iran for synthesizing chemical agents has produced no results. By 1992 the campaign against Libya conducted by the United States had forced the former's leadership to wind down production capacity for the manufacture of chemical agents, to dismantle the equipment and redirect some of the facilities for the manufacture of medicinal drugs. This applied mainly to the chemical plant at Rabta, where the production of mustard gas had been organized. There is no information to indicate that the equipment or the stocks of mustard gas (approximately 50 tonnes) have been destroyed.

Some experts are concerned about the construction of a chemical plant in the Ubari area that is currently under way. Nor can the possibility that research work is continuing in the area of chemical weapons at the facilities of the military research center in the Gharyan region, where laboratory equipment and the necessary chemical components purchased overseas are concentrated, be ruled out.

In the Area of Biological Weapons

There is information indicating that Libya is engaged in initial testing in the area of biological weapons. At this stage the Libyans are displaying particular interest in information on work involving biological agents overseas. In contacts with representatives of other Arab countries, Libyan specialists are expressing a willingness to fund joint biological programs, including ones of a military-applied nature, provided that they are not undertaken on Libyan territory.

In the Area of Delivery Systems

At present Libya is equipped with Soviet-made Frog and Scud missiles. Their technical capabilities are such that they cannot carry nuclear weapons. The Libyans are displaying an interest in purchasing ballistic missiles capable of hitting targets at a distance of over 150 km. Specifically, they have been negotiating with the PRC for the purchase of CSS-2 missiles and with Brazil for the purchase of missiles with a range of up to 1,000 km.

Earlier the Libyans took certain steps to establish indigenous production of ballistic missiles, utilizing, in particular, the technical assistance of the well-known German Otrag Company.

PAKISTAN *In the Area of Nuclear Weapons*

Pakistan is a member of the IAEA but has not signed the NPT or the Convention on Physical Protection of Nuclear Materials, and it is not a party to international agreements regarding the control of nuclear exports.

Pakistan has a military nuclear potential. Pakistan's applied military research and production program is distinguished by its well-developed infrastructure and fairly high technical level.

The military nuclear program began in the middle of the seventies and was initially oriented toward uranium as a means of creating nuclear weapons.

A key figure in the nuclear program was Doctor Abdul Kadirkhan, who effectively utilized the experience he gained while working in Holland.

Pakistan began work on the creation of enrichment capacities in 1947. German firms played a significant role in the creation of capacities for producing the initial raw materials for enriching uranium (uranium hexafluoride), although there is no cooperation with the FRG through official channels. In 1980 a plant for producing uranium hexafluoride with an annual capacity of 218 tonnes was put into operation at Multan. It was designed and constructed by a German firm in violation of FRG export laws. By 1984 an experimental installation for separating uranium isotopes by the centrifugal method was installed in Sikhal, and the first line of an industrial enriching plant was set up at Kakhuta. According to existing estimates, when it reaches its planned capacities, the plant in Kakhuta could annually produce high-quality uranium in sufficient quantities to manufacture 12 nuclear devices. In 1988 there was a report that a second enriching plant was being built not far from Islamabad (Golra Sharif), in the Vakh region where there is also a complex for precision mechanics, which, it is assumed, manufactures components for nuclear devices.

At the demand of the United States, Pakistan halted the production of weapons-grade uranium. The production capacities have been mothballed, but production could be resumed in an extremely short period of time.

Pakistan has created capacities for producing heavy water. In 1976, with assistance from Canada, an installation capable of satisfying the needs of the Kanupp nuclear power plant was started up in Karachi. In 1980 the Belgonucleare firm participated in the construction of an installation in Multan with a capacity of 13 tonnes of heavy water, which is not covered by IAEA safeguards.

Recently there have been signs that a nuclear military program oriented toward the use of plutonium is being conducted. A reactor with a capacity of 70 megawatts, which can be used for production, is at the construction stage. By now, about half of the construction and assembly work has been completed on this facility. The radiochemical plant in Chashna can be used for extracting the plutonium produced in this reactor.

In order to supply uranium enrichment and processing enterprises, Pakistan has created a large and ramified state structure which successfully conducts secret purchases of materials abroad. Special attention is devoted to acquiring technologies and materials from the United States. From the Netherlands Pakistan illegally obtained scientific and technical documentation for an installation for centrifugal enrichment. From Switzerland they purchased vacuum valves, evaporators, and condensers for centrifuges; from Great Britain, Canada, and the United States—electric inverters; and from France—evaporators, dissolvers, and other components. More than 70 German firms broke German laws to deliver modern electronic and measurement equipment, compressors, vacuum ovens, beryllium, and zirconium, as well as equipment for producing uranium hexafluoride.

The A.Q. Khan Research Laboratory, a subdivision of the Defense Science Technology Organization, is working directly in the area of nuclear weapons. Nuclear devices of the implosion type are being developed. "Cold testing" was conducted in 1986 on a device of this type that was developed.

At present, Pakistan, according to various estimates, has four to seven nuclear devices manufactured from highly enriched uranium. In a recent statement the country's defense minister confirmed that Islamabad has "nuclear capability." The situation that has developed has caused a certain tension in American-Pakistani military relations and led to the adoption by the Senate of the well-known Pressler Amendment, which is now at the center of the dialogue between Islamabad and Washington.

In the Area of Chemical and Biological Weapons

There is no reliable information to indicate the existence of chemical weapons in Pakistan. But research of an applied military nature is being conducted in this area.

The available information does not make it possible to determine the actual scope of this program. However, analysis of information on the scientific research base, industrial products, the importation of dual-use raw materials, accidents, mass poisonings, and other incidents in the chemical and biological industry show that there exists a certain potential for conducting work of a chemical and biological nature.

A certain indication of the attitude of the country's government toward the problem of chemical weapons is the hesitant attitude of the Pakistani delegation to the UN Conference on Disarmament in Geneva with respect to the Convention on Banning Chemical Weapons.

Available information on Pakistani chemical and biological enterprises shows that they—mainly in pesticide production—are employing technologies that can be used for producing precursors of chemical agents for military purposes.

One of the new signs that prompt us to pay more attention to the possible creation of several kinds of chemical weapons is the purchase of large batches of dual-use chemical raw materials. Thus there are reports that phosphorus compounds used for creating chemical weapons have been shipped into the country. There has been a sharp increase (from 2.5 tonnes in 1987 to 31.4 tonnes in 1991) of Pakistani purchases of arsenic from abroad (China, South Korea, Hong Kong). According to reliable information, branches of private companies located in Pakistan (both national and branches of Western ones) do not use arsenic. Available information on the nature of technologies at state industrial enterprises does not make it possible to adequately explain its use on such a large scale. In spite of the large volume of imported arsenic, all the information about it has been removed from the customs service manual.

From assessments by Pakistani environmental protection specialists, we have learned about significant supplies of pesticides (tens of thousands of tonnes in the provinces of Sindh and Punjab) which are in long-term storage. Considering the constant shortage of pesticides in the country's agriculture, there is no explanation for the accumulation of these chemicals.

It has been established that in Pakistan research is being conducted in the area of the chemistry of toxic and especially dangerous substances and microbiology. The main scientific centers conducting this work are microbiology laboratories of the scientific and technical subdivision of the Defense Ministry (Defense Science Technology Organization), the scientific research institute of chemistry at the university in Karachi (HEJ Research Institute of Chemistry), and the microbiology faculty of the university in Karachi.

All of the subject matter related to chemical and biological weapons is classified. There are no scientific publications on the work of chemists and biologists of the aforementioned subdivision of the Defense Ministry, although its workers are always attending conferences on microbiology and toxins.

In the Area of Delivery Vehicles

In 1981 Pakistan initiated an indigenous program for space research using rockets purchased from the United States, France, and England. Under license from the French Scientific Research Center for Space Research, two types of sounding rockets have been developed—the Rakhnum, which carries a payload of 38 kg to an altitude of 100 km, and the Shakhiar which delivers 55 kg to an altitude of 450 km. According to a statement by Pakistani officials, in 1989 tests were conducted on a liquid-propellant rocket motor for a domestic booster capable of putting light space satellites into low near-Earth orbit. In the same year they launched a multistage space research booster rocket, which carried a package of scientific instruments weighing 150 kg to an altitude of 480 km.

In April 1988 Pakistan announced the testing of a ballistic missile of indigenous manufacture capable of reaching Bombay and Delhi. According to certain reports, it was developed with technical assistance from Chinese and German specialists. According to reports from the Pakistani side, in February 1989 successful tests were conducted on two ballistic missiles, the Khatf-1 and Khatf-2 (a modification of the Chinese M-11) with flight distances of 80 and 300 km, respectively. China rendered essential aid in the development of certain of their components, particularly the inertial guidance systems. The Pakistanis say the missiles are very accurate and can carry a payload of more than 500 kg, which makes them attractive as a means of delivering nuclear weapons.

Pakistan's military and political leadership has announced plans to become self-sufficient in the production of all kinds of weapons and that, in addition to those that already exist, another ballistic missile with a range of 600 km is being developed. At the same time attempts are being made to increase the distance of the Khaft-2 missiles to 650 km with a payload of up to 1,000 kg.

In addition to creating its own systems, Islamabad's striving to augment its missile arsenal with purchases from China. During 1989- 1990 it conducted negotiations for acquiring the complexes of the Silkworm and the M-9 short-range missile (600 km). 1991 marked the beginning of the deployment on the territory of Pakistan of launchers for Chinese M-11 short-range missile (300 km), several sets of which were turned over to Islamabad.

The offer to buy missiles of a new class from Pyongyang was withdrawn because of the sharply negative reaction from the United States and the possibility of additional economic sanctions from Washington.

SYRIA

Syria has limited scientific-technical, industrial, and financial resources for the full-scale creation or acquisition of a full range of WMD.

In the Area of Nuclear Weapons

Syria is a party to the Nuclear NPT. In 1992 it signed an agreement with the IAEA which calls for inspections of facilities on its territory.

Syria does not have nuclear weapons and does not have a directed program of an applied military nature in the nuclear realm.

The lack of the necessary industrial base, the shortage of hard currency, the tighter international control over the proliferation of nuclear technologies, the Syrian army's possession of "other means of deterrence," and the common strike zone with Israel in the event of the use of nuclear weapons—all these factors have conditioned Syria's renunciation of nuclear ambitions.

Its nuclear potential for peaceful purposes is insignificant.

In the Area of Chemical Weapons

Syria has a chemical weapons potential. The program to organize the production of chemical weapons began during the seventies. At that time the country created a system for purchasing the appropriate equipment and technologies from developed countries. Its main efforts were concentrated on the creation of an industrial base for the production of semifinished products necessary for chemical agents for military purposes.

At the present time Syria has a developed production capacity for mustard gas and organophosphorus nerve agents based on indigenous raw material and basic semifinished products.

It is typical that Syria does not regard the military chemical agents available to the Syrian army as WMD. According to Syrian military doctrine, military chemical agents are components of military parity only with Israel and will be used only in the event of large-scale aggression by Israel against Syria.

In the Area of Biological Weapons

In spite of the concern expressed by Israel about the biological agents for contaminating drinking water that Syria is supposed to have, there is no reliable information about the existence of biological weapons in Syria or a directed program for the creation of an offensive potential in the biological realm.

In the Area of Delivery Systems

The country does not have an indigenous missile construction base. But there are signs of a change in the policy of the country's leaders in this regard. According to certain information, Iran is giving Syria financial support in the creation of a missile construction base. As of now, nonetheless, Syria has one of the largest missile arsenals in the Third World. Until recently it was filled exclusively with deliveries from the former USSR: Frog-7 (70 km), Scud-B (300 km) and Scarab (120 km).

Recently there has been a tendency toward diversification of missile imports by Damascus. An agreement has been concluded with the PRC for the delivery of M-9 missiles (600 km) to Syria. In 1991-1992 Syria received two batches of Scud-C missiles (600 km) of North Korean manufacture. There are plans to increase the range of the Scud missiles by reducing the weight of the warhead and creating intermediate-range missiles that use solid propellant, components of which are being purchased from abroad.

TAIWAN

[Note: The consideration of Taiwan as a separate case in no way signifies a change in the official position of the Russian Federation regarding this issue.]

Having a developed industrial and scientific and technical potential, Taiwan is in a position, according to experts, to create WMD components and means of delivering them.

In the Area of Nuclear Weapons

Taiwan does not have nuclear weapons. Nevertheless, Taiwan has made attempts to set up the production of plutonium on an experimental basis.

With technical assistance from American and West European states, a developed atomic energy industry has been created in the country. As early as the middle of the eighties, there were six nuclear power reactors with an overall capacity of 4,900 megawatts in operation in Taiwan.

The Taiwan Scientific Research Institute of Nuclear Energy was founded in 1965, and by 1985 its staff exceeded 1,100. The institute has modern scientific equipment, a research reactor, and laboratories where development work is done in the area of nuclear fuel and research is conducted on the technology of radiochemical processing of irradiated uranium.

In the system of Taiwan's Defense Ministry, there are also research subdivisions with good scientific equipment which specialize in the area of nuclear physics. Taiwan has a considerable number of highly qualified nuclear specialists who have been trained abroad. During the period from 1968 through 1983 alone, more than 700 Taiwanese specialists took this training in various countries, primarily the United States. As the nuclear energy industry develops, the extent of training of specialists abroad has increased. In certain years more than 100 Taiwanese nuclear scientists have gone out for training, mainly to the United States.

Taiwan does not have indigenous natural supplies of nuclear raw materials and is actively cooperating with other countries in searching for and developing uranium deposits. In 1985 a five-year agreement was signed between a Taiwanese firm and an American firm for joint processing of uranium ore in the United States. That same year a contract was signed with the Republic of South Africa for the delivery of uranium from this country for 10 years.

Taiwan is a member of the NPT, but it does not have an agreement with the IAEA for this organization to safeguard all of its nuclear activity. IAEA safeguards apply only to those facilities and nuclear materials for which this is stipulated under the terms of the contract when they are delivered to the country.

One can assert with a fair amount of confidence that officially imported nuclear technologies, know-how, and equipment will not enable Taiwan to create nuclear weapons, but they do provide the necessary experience in working in the nuclear area, and this could accelerate indigenous nuclear developments of a military nature if the Taiwanese were to decide to do so.

In the Area of Chemical Weapons

There is no information to indicate that Taiwan has the capability of setting up the production of chemical weapons. Yet attention is drawn to the fact that Taiwan was not among the 100 countries that announced that they have no chemical weapons.

In the Area of Biological Weapons

Taiwan does not have biological weapons. Still, it has shown signs of conducting biological research of an applied military nature.

Taiwan has a significant scientific and technical base in the area of traditional microbiology and a large number of skilled biotechnology specialists trained in the United States and Western European countries. In the area of industrial biotechnology, Taiwan is cooperating actively with the United States, Japan, France, and other countries of the West.

The country's biotechnology sector has a developed infrastructure and widely uses technologies which are basic to the production of biological weapons.

Taiwan participates in international scientific and technical cooperation in the area of biology. Joint biomedical programs encompass such areas as immunology, genetic engineering, and tropical medicine. The military biological centers in the country, in addition to doing scientific work, train military personnel in medical and biological specialities.

The developed microbiological industry and the high level of scientific research in biological areas enable Taiwan to set up production and acquire biological weapons in relatively short periods of time.

In the Area of Delivery Systems

Taiwan has a developed scientific research and industrial base for the production of missiles for various purposes. They created the first models of their own ballistic missiles in the seventies. The work was conducted in secret, especially when it came to surface-to- surface missiles. In all likelihood this was conditioned by the fact that Taiwan received American technology for conducting this work, primarily the Lance system, which served as a basis for the creation of the indigenous Ching Feng missile. There is good reason to think that the Lance technology made its way to Taipei through channels of cooperation with Israel. In 1981 the Ching Feng missile was displayed in a military parade in Taiwan. It was equipped with a conventional warhead and a simplified inertial guidance system, and it has a range of up to 120 km.

The leading center for the development of missile technology is the CIST (Chung Shan Institute of Science and Technology) scientific research institute, which enjoys special protection from the Taiwan Ministry of Defense. It was here in 1988 that development was completed on the Hsiung Feng II antiship missile and also the Tien Kung surface-to-air missile. These missile systems were essentially based on technologies used in the Israeli Gabriel missile system.

There is no doubt that, in the realm of missile technology, the purchasing companies created by Taiwan abroad bypass a number of restrictions imposed by the MCTR and the export control requirements of the United States and other countries of the West.

According to some reports, Taiwan is currently developing an operational-tactical missile with a range of up to 950 km.

CHILE

According to expert estimates, Chile's scientific and technical potential and material resources make it possible for it to conduct a program covering the entire WMD spectrum.

In the Area of Nuclear Weapons

There are no nuclear weapons in Chile. The country has neither the technical nor the financial capabilities to conduct a targeted program for the creation of nuclear weapons.

So far, nuclear energy is in the embryonic stage. The country has no nuclear electric power plants or installations for producing nuclear fuel. Two experimental reactors intended for physics and medical-biological research are in operation. They were built with assistance from the United States and France. These reactors are under IAEA control.

Chile is not a party to the NPT.

In the Area Chemical Weapons

During the period of Pinochet's military dictatorship in Chile, technology for producing chemical weapons and small stockpiles of them were created. All the work was conducted within the framework of an especially secret program which was regarded as a kind of counterbalance to Argentina's nuclear program.

Most of the work was done at the Institute of Chemical Research of the Armed Forces of Chile (Instituto de Investigaciones Quimicas del Ejerctito de Chile), which is located on the outskirts of Santiago. The grounds of the center are carefully protected, including by a special military unit.

The country has special storage facilities for chemical weapons. The arsenal of the Chilean Army includes aerial bombs and rocket- and cannon-launched projectiles filled with chemicals. The Chilean armed forces are fairly well equipped with means of chemical protection; during their training they learn methods of conducting operations under chemical conditions.

So far there has been no information to the effect that, since the democratically elected President Aylwin came to power, the existing stockpiles of chemical weapons have been destroyed. But there have been announcements by Chilean officials saying that the country has no chemical weapons.

In the Area of Biological Weapons

There is no reliable information about work in this area.

REPUBLIC OF SOUTH AFRICA (RSA)

The scientific and technical and industrial potentials and also the material and financial resources of the RSA are sufficient for it to acquire WMD.

In the Area of Nuclear Weapons

The Republic of South Africa does not have nuclear weapons. It can be stated with certainty, however, that the RSA has both the scientific and technical bases and the industrial base for their manufacture. The RSA nuclear program completed the full cycle necessary for the creation of nuclear devices. In August 1988 the RSA officially acknowledged its military nuclear program.

The RSA has been working actively in the area of nuclear weapons since the beginning of the seventies. The country has created an industrial base for enriching uranium. Highly enriched uranium has been produced at an experimental station in Valindab. During its operation the country was able to produce enough weapons-grade uranium to manufacture several dozen nuclear devices.

The first uranium-based nuclear device of the cannon type was created in the RSA in the eighties. Later, work was done on weapons of a more modern design, including even thermonuclear ones. Experts think the country has the practical capabilities of creating explosives of this type. An experimental test site was created in the seventies in the Kalahari desert with a shaft 300 meters deep. The test site was mothballed for more than 10 years, but in 1988 activity in the area of the test range was resumed. It was possibly related to preparations for testing more modern nuclear explosives, which could have been manufactured either in the RSA or in some other country. The program for developing gas centrifuges for enriching uranium was completed in the RSA in 1988.

At present no significant activity is being observed at the test site.

In 1991 the RSA signed the NPT as a nonnuclear state. By now the RSA has an agreement with the IAEA for full safeguards.

After signing the NPT, the RSA admitted that it had a considerable quantity of nuclear materials, including stockpiles of weapons-grade uranium. RSA state bodies have rendered active assistance to IAEA inspectors in conducting their inspections, including at the enriching plant in Valindab, which was previously declared off limits. The inspectors were shown the gas centrifuges for enriching uranium. But they were not allowed to inspect the mothballed shafts in the Kalahari desert. Therefore the purpose and use of the shaft are still in question to this day.

Moreover, certain experts doubt that the RSA has showed the IAEA all of its stockpiles of nuclear materials. In particular, there are doubts about the nuclear materials in the form of nuclear explosive devices or weapons.

Because of the cutback in its military program, there is concern in the RSA about the possible "drain" of specialists and scientists employed in this program to "threshold" or "near-threshold" countries.

In the Area of Chemical Weapons

There is no information to indicate that chemical weapons have been developed in the RSA.

The RSA signed the Geneva Protocol in 1930 but has not yet withdrawn the proviso concerning retaliatory use of chemical weapons.

The country has a chemical industry with a developed infrastructure which is capable of the industrial production of the majority of modern types of chemical weapons virtually without foreign participation.

In the Area of Biological Weapons

The RSA signed the Convention on Banning Biological Weapons in 1975.

In the Area of Missile Technology

The Republic of South Africa has a considerable potential in the area of missile technology and missile production. It is significant that, in spite of the privatization of many enterprises of the military-industrial complex, the country's missile industry continues to be state-owned.

The basis for missile construction in the RSA was created in close cooperation with Israel, particularly with the Israel Aircraft Industries firm. In a fairly short period of time in cooperation with the Israelis they gained the ability to produce intermediate-range missile systems. Test launches of these missiles have been recorded. The main facilities in the missile sector are based in the region of Cape Town. There is a large experimental test site in Overberg. The decline in the use of the testing ground that has been seen recently is forcing the South Africans, first, to reduce their numbers of service personnel and, second, to search for new partners: this, naturally, poses the threat of a personnel and technology drain.

Within the framework of both the nuclear and missile programs, the South Africans have created a network of secret trade organizations for purchasing "dual-use" technologies, materials, and equipment abroad. The most typical of them is Gamma System Associates. The goals, tasks, and work methods of these procurement organizations are quite similar to those of similar organizations in Iraq, Pakistan, Iran, and a number of other countries. It has not been established whether Israel was cooperating with the RSA in supporting the work of these organizations. An assessment of available data shows that these organizations have regularly obtained advanced "dual-use" technologies from the United States, the FRG, and other Western countries.

One should note as a positive factor that RSA state policy calls for restrictions on the proliferation of missiles and missile technologies outside the country.

SOUTH KOREA

The unsettled nature of the situation on the Korean peninsula and South Korea's powerful industrial-technical potential make it necessary to keep a careful eye on the situation in this country in the context of possible proliferation of WMD. There is no doubt that if the DPRK were to create nuclear weapons, then South Korea would sharply step up its efforts to acquire an indigenous nuclear bomb.

In the Area of Nuclear Weapons

Taking into account the statements by the United States and South Korea, one might think that tactical nuclear weapons had been removed from the country. South Korea does not have indigenous nuclear weapons. It is known that, until the middle of the seventies in South Korea, there was a large applied military program which was halted under pressure from the United States. At that time South Korea was forced to make a choice in favor of the American "nuclear umbrella."

South Korea became a party to the NPT and placed its nuclear activity under IAEA safeguards.

South Korea is distinguished by the advanced nature of its program for the development of peacetime nuclear energy, which is being implemented through cooperation with the industrially developed states. In 1956 an agreement was concluded with the United States for cooperation in the area of the peaceful use of nuclear energy, in 1962 the Korean Scientific Research Institute of Nuclear Energy started up an American-made nuclear reactor with a capacity of 250 kilowatts, and in 1971 a second reactor of American origin with "zero" capacity (2 kilowatts) was started up.

Industrially developed Western countries have played a large role in training South Korean nuclear specialists. According to expert estimates, in 1986 there were 4,800 scientists and practical workers in this area, more than 500 of whom were trained abroad. In the United States alone during the period from 1955 through 1965, 66 specialists were trained at firms that supply nuclear technology and in the International Institute of Nuclear Science and Technology.

Cooperation between South Korea and the West, however, is not limited to personnel training alone. Nuclear R&D is being conducted in conjunction with the United States, France, Canada, Australia, Japan, and Taiwan. In 1984 a French-South Korean agreement was signed for cooperation in R&D related to the development of new types of fuel elements for nuclear power plants and the study of their behavior in the core of the reactor. At that time (1984) Canada was conducting negotiations on transferring to South Korea the complete technology for the production of heavy-water reactors of the Candu type and possibilities of reexporting them to other countries.

In constructing nuclear power plants South Korea also relies on assistance from countries of the West, importing high-power reactors and turbogenerators. At present contracts have been signed with firms of the United States, Great Britain, Canada, and France for the construction of 10 nuclear reactors.

Cooperation with industrially developed countries objectively increases South Korea's own capabilities in the nuclear area, and this improves the scientific and technical preconditions for the appearance of nuclear weapons in the country. In 1986 the South Korean minister of science and technology announced South Korea's intention to independently construct a heavy-water research reactor with a power of 40 megawatts by the beginning of the nineties. This will make it possible to use it as a production reactor. At the same time cooperation with countries of the West does not extend to such key areas of the nuclear fuel cycle as reprocessing and uranium enrichment; this would objectively hamper the South Koreans in the creation of nuclear weapons if they were to decide to do so.

In the Area of Chemical Weapons

South Korea has the necessary industrial potential for the production of certain kinds of chemical weapons.

There is no information to indicate that South Korea has created indigenous chemical weapons. South Korea's statement that it does not have chemical weapons is, however, regarded with a certain amount of skepticism by a number of experts.

In the Area of Biological Weapons

The FIS has no reliable information to indicate that offensive biological weapons have been developed by South Korea. There are signals indicating that South Korea is conducting research in the area of biological weapons and has the necessary technologies for the creation of biological agents.

The country is conducting a program to accelerate development of the biotechnical industry. The South Korean government has been promoting it since 1981, using large bank loans and tax revenues to finance scientific laboratories and industrial firms. A government program has also been adopted for eliminating the shortage of skilled cadres.

Biotechnological research is being conducted by South Korean scientific and university centers, many of which are doing their work in conjunction with U.S. military medical centers located in the country. South Korea is increasing its potential in the area of biotechnology at a rapid rate. The South Korean association for research in the area of genetic engineering in 1985 included 19 companies, which invested $15 million in microbiological R&D. Seven large firms which dominate the microbiological industry in South Korea are investing money in joint R&D with the United States. The technologies and production capacities that now exist in the country for producing vaccines by genetic engineering methods could, if necessary, be covertly used for creating a stockpile of potential biological agents.

In the Area of Delivery Systems

South Korea has to a considerable degree gleaned its technical knowledge in the area of ballistic missiles from the technology of the well-known American Lance missile system.

In 1987 South Korea manufactured and tested its own Korean SSM two- stage ballistic missile with a range of 180-250 km. The missile is a modified version of the American Nike-Hercules surface-to-air missile. All of the electronic equipment of the guidance and control systems has been replaced with more modern kinds, and the missile's component design and warhead have been changed. Additionally, while modernizing the American-made Honest John missiles it has acquired, South Korea has increased their accuracy considerably.

LIST OF ABBREVIATIONS

WMD	Weapons of mass destruction
KhBO	Chemical and biological weapons
YaO	Nuclear weapons
KhO	Chemical weapons
BO	Biological weapons
OV	Chemical agents
BA	Biological agents
BOV	Chemical agents for military use
BR	Ballistic missiles
RSD	Intermediate-range missiles
RMD	Short-range missiles
SLCM	Sea-launched cruise missiles
ISZ	Space satellites
AES	Nuclear power plant
TVEL	NPP fuel element
NIR	Scientific research
R&D	Research and development

TABLE OF CONTENTS FROM ORIGINAL RUSSIAN

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