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MEMORANDUM TO HOLDERS

SPECIAL NATIONAL INTELLIGENCE ESTIMATE

Prospects for Further Proliferation of Nuclear Weapons

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MEMORANDUM TO HOLDERS OF

SNIE 4-1-74

PROSPECTS FOR FURTHER PROLIFERATION OF NUCLEAR WEAPONS

SECRET

THIS MEMORANDUM IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

THE UNITED STATES INTELLIGENCE BOARD CONCURS, EXCEPT AS NOTED IN THE TEXT, AS FOLLOWS:

The following intelligence organizations participated in the preparation of the estimate:

The Central Intelligence Agency, the intelligence organizations of the Departments of State, Defense, and Treasury, the National Security Agency, and the Energy Research and Development Administration.

Concurring:

The Deputy Director of Central Intelligence representing the Central Intelligence Agency

The Director of Intelligence and Research representing the Department of State

The Director, Defense Intelligence Agency

The Director, National Security Agency

The Special Assistant to the Secretary for National Security, Department of the Treasury

The Deputy Assistant Administrator for National Security, Energy Research and Development Administration

Abstaining:

The Assistant Director, Federal Bureau of Investigation

Also Participating:

The Assistant Chief of Staff for Intelligence, Department of the Army

The Director of Naval Intelligence, Department of the Navy

The Assistant Chief of Staff, Intelligence, Department of the Air Force

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PROSPECTS FOR FURTHER PROLIFERATION OF NUCLEAR WEAPONS

PRECIS

We reaffirm the major judgments of SNIE 4-1-74 which addresses the problem of prospects for further proliferation of *nuclear weapons*. It is concluded in the SNIE that in the 1980s the production of nuclear weapons will be within the technological and economic capabilities of many countries but that the principal determinant of the extent of nuclear weapons proliferation in the coming years will be political considerations.

This Memorandum to Holders addresses the concept that some countries might seek to further their political, and even military, objectives by the acquisition of a very modest *nuclear explosive* capability without time-consuming "weaponization" efforts. It concludes that there are a number of countries that could accumulate sufficient fissionable material, complete the necessary nuclear explosive research and development work, and thus be in a position to fabricate a nuclear explosive device without having violated the letter of the safeguard provisions of the IAEA or NPT. The fabrication could take no more than a few days. In virtually all cases, taking this step would involve the violation of safeguard agreements.

The earliest technically feasible dates when various countries could have a nuclear device in hand are shown in Table 1, page 6. The dates are based on *technical capability*. They are not dates considered prob-

able. Any attempt to actually fabricate and/or test a nuclear device will come only after the country has considered the political and strategic situation and is desperate enough to accept the consequences of abrogating safeguard agreements.

In most cases, the fabrication of nuclear *devices* is referred to in SNIE 4-1-74 as a step in a program aimed at the production of *nuclear weapons*. The level of effort and the amount of time required to produce *weapons* that are the focal concern of the SNIE would be greater than that needed to fabricate the *devices* referred to in this Memorandum. Thus one cannot necessarily compare the *device or weapon* dates given in the SNIE with the earliest technically feasible dates for *devices* in this Memorandum. Here we are concerned with single, unweaponized nuclear explosives. Since they in themselves may have a political impact, they may be the ultimate goal of the program.

DISCUSSION

I. INTRODUCTION AND REAFFIRMATION OF SNIE 4-1-74

1. SNIE 4-1-74 of August 1974 addresses the problem of the prospects for further proliferation of nuclear weapons. We reaffirm the major judgments that it contains. Still valid is its discussion about the "barriers" to proliferation, including the technological requirements for developing a nuclear explosive and the international restrictions such as the safeguards of the International Atomic Energy Agency (IAEA) and provisions of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

2. The major judgments of SNIE 4-1-74, in essence, are:

— In the 1980s, the production of nuclear weapons will be within the technological and economic capabilities of many countries. The principal determinant of the extent of nuclear weapons proliferation in coming years will, however, be political considerations—including the policies of the superpowers with regard to proliferation, the policies of suppliers of nuclear materials and technology, and regional ambitions and tensions.

— It is likely that India will proceed to fabricate weapons covertly. But the US or the USSR still might be able to dissuade its leaders. An Indian decision to proceed with an overt weapons program on any scale will be one factor inclining some other countries to follow suit.

— A large collection of fragmentary and partly circumstantial evidence leads us to believe that Israel already has produced nuclear weapons. We do not expect the Israelis to provide confirmation of widespread suspicions of their capability, either by nuclear testing or by threats of use, short of a grave threat to the nation's existence.

— It would require very fundamental changes, such as the breakup of major defense alliances accompanied by a substantial increase in strife and tension throughout the world, to induce countries like West Germany, Sweden, Canada, and Italy to exercise their near-term capability.

— The Director of Central Intelligence, the Central Intelligence Agency, the Department of State, and the Assistant Chief of Staff for Intelligence, Department of the Army believe that Japan would not embark on a program of nuclear weapons development in the absence of a major adverse shift in great power relationships which presented Japan with a clear-cut threat to its security.[1] The Director of Naval Intelligence, Department of the Navy, and the Assistant Chief of Staff, Intelligence, De-

[1] The Energy Research and Development Administration now associates itself with this position. The Defense Intelligence Agency was associated with this position, but it is now associated with the position of the Director of Naval Intelligence, Department of the Navy, and the Assistant Chief of Staff, Intelligence, Department of the Air Force. See the SNIE for the development of this position and for the expansion of these and the other judgments.

partment of the Air Force, see a strong chance that Japan's leaders will conclude that they must have nuclear weapons if they are to achieve their national objectives in the developing Asian power balance. Such a decision could come in the early 1980s.

— Less sweeping changes could induce one or another of the less-advanced nations to mount the sort of nuclear effort India and Israel have made.

A. New Estimates

3. The possibility that some countries might seek to further their political and even military objectives by the acquisition of a very modest nuclear explosive capability, without time-consuming "weaponization" efforts, is referred to in SNIE 4-1-74 (see Conclusion J), but it is not explored in depth. In the past year, additional analysis has refined estimates about the facilities and the time that are required for development of an unweaponized device by certain countries. This Memorandum to Holders is intended to supplement the SNIE by presenting the estimates derived from the results of this analysis. The criteria used in making these estimates are:

(a) a *nuclear device* based on the possession of about 10 kilograms or more of chemically separated plutonium [2] or a somewhat larger amount of uranium highly enriched in U-235, and the completion of high explosive (HE) weapon research for the design of an implosion system and fabrication of a device. It would be capable of being delivered to a target only by a transport aircraft or some form of surface transport; or, in the extreme, it would be so large that it would be suitable only for a demonstration test.

(b) *an indigenous development program* to include contracted assistance from outside sources. Neither national, or subnational, theft nor purchase of nuclear weapons is considered. Also not considered are the use of nuclear material owned by other countries or the "crash" construction of nuclear reactors designed only for the production of plutonium.

(c) *a production capability* that would not necessarily violate the letter of the safeguard provisions of the IAEA or NPT. NPT safeguards prohibit the manufacture of nuclear explosives. IAEA safeguards that apply to non-NPT parties do not necessarily preclude the development of peaceful nuclear explosives. The Director General of the IAEA has stated, however, that the safeguards involve an obligation that the nuclear materials should not be used for the development, manufacture or testing of nuclear explosives of any kind. Neither set of safeguards addresses high explosive research or nuclear explosive design work. A treaty or safeguard violation would not occur until fissionable material was diverted to prohibited nuclear explosive use. A violation would be *confirmed* if an unauthorized device were to be exploded or if the possession of illegal nuclear explosives were officially acknowledged.

4. Based on the foregoing criteria, our evidence on the plans and activities of the various countries, and our assessment of their technical capabilities, we have estimated an *earliest technically feasible date* that a country could have an unweaponized nuclear device in hand. No allowances are made for possible delays in decisionmaking that might stem from poor technical planning and execution, or for delays generated by external obstacles and pressures. It is an earliest date based on technical feasibility, *not* a date considered probable.

B. Key Technical Considerations

5. Our estimates are based for the most part on the availability of plutonium that is produced by power or research reactors and the assumption that it is usable in a nuclear explosive.[3] In the case of

[2] *Separated plutonium* is plutonium (either weapon-grade or reactor-grade) that has been removed by chemical reprocessing from irradiated reactor fuel. *Reactor-grade plutonium* is "dirty" plutonium (i.e., high Pu-240 content) produced in a power reactor in normal operation. *Weapon-grade plutonium* is "clean" plutonium (i.e., low Pu-240 content) produced in a power reactor or research reactor where the irradiation time of the fuel is limited.

[3] This relatively crude assessment stands in contrast to the US nuclear weapons program where overriding importance attaches to many other considerations such as very elaborate requirements for nuclear safety and the special design objective of high efficiencies produced by compact devices deliverable by advanced weapon systems.

the South Africans, however, our estimate assumes as the fissionable material enriched uranium from their uranium enrichment pilot plant now reportedly in operation.

6. There is little reasonable doubt that many countries could design and manufacture a few nuclear devices using either weapon-grade plutonium or reactor-grade plutonium.[4] The designers probably would have high confidence, without testing, that their devices would yield at least a kiloton or two, though they might be less certain about actual yields which indeed would be highly variable, especially if reactor-grade plutonium were involved. We do not know, of course, whether that confidence in the potential performance of an untested device could be imparted successfully to a country's military and political leadership.

7. If size is not a constraint, development of a fuzing and firing system suitable for a nuclear device entails fairly standard technologies and therefore does not constitute a significant barrier. Many of the components needed for such a system could be purchased in international markets, and the necessary development and fabrication work could be performed secretly at a standard electronics installation.

C. Uncertainties and Principal Determinants

8. There are uncertainties of an essentially technical nature involved in estimating the earliest technically feasible date for the fabrication of a nuclear device. They are:

- the time needed to construct a fuel reprocessing facility (such a facility is needed to remove the plutonium from the irradiated fuel elements);
- the wide range of times that might be needed to design a suitable implosion system and conduct its testing;
- alternative possibilities for fissionable material production such as using the kind of plutonium produced by power reactors operating normally or reactors operated in a manner that would result in the production of weapon-grade plutonium; and
- the degree of confidence in the potential performance of a device that the designers feel must be achieved in order to meet whatever criteria have been imposed by the national leadership.

9. And there are much greater uncertainties about potential proliferation that are not technical. To a greater or lesser degree, economic costs must be weighed by decision-makers. But, as we note in SNIE 4-1-74, the principal determinant of the extent of nuclear weapons proliferation in coming years will be *political* considerations. These will include the policies of the superpowers with regard to proliferation, the policies of suppliers of nuclear materials and technology, and regional ambitions and tensions.

10. Recently major suppliers of nuclear materials and technology tentatively agreed on a series of guidelines[5] intended to reduce the possibility that their exports might be applied to nuclear weapon programs. In addition, all major suppliers which are parties to the NPT, undertake not to assist any nonnuclear-weapons state develop nuclear explosives for any purpose, and not to transfer any nuclear material unless it is subject to IAEA safeguards. France has indicated publicly that it would act as though it were a party to the NPT in regard to these obligations.

11. A nonnuclear-weapons state that is an NPT party accepts IAEA safeguards covering the full nuclear fuel cycle. A non-NPT state accepts IAEA safeguards on materials received from suppliers that are NPT parties. These safeguards provide for periodic inspection of facilities and accounting of nuclear materials by IAEA inspectors. There are only a few countries, including Egypt, Israel, India, South Africa, and Spain, which have certain nuclear facilities that are not subject to IAEA inspections. In some of these cases, however, facilities are subject to bilateral safeguards.

12. Although there is no system of formal sanctions against unauthorized use or diversion of nuclear materials, exposure of such an act through the IAEA inspection system would almost certainly risk

[4] See footnote 2, page 4.

[5] The US, USSR, UK, Canada, France, West Germany, and Japan are the countries involved in developing these guidelines.

loss or curtailment of foreign nuclear assistance. A country undertaking, for example, an ambitious nuclear power program predicated on outside assistance might well regard this risk as unacceptable. A country whose primary objective is fabrication of a nuclear explosive and whose acceptance of safeguards arose from a desire to facilitate acquisition of nuclear materials and technology would presumably be willing to take its chances. It is unlikely that diversion of significant amounts (kilogram quantities) of nuclear materials in violation of safeguards would remain long undetected; thus, in the perception of a potential proliferator, there might be little meaningful choice between clandestine diversion and outright abrogation of safeguards.

D. National Objectives in Developing a Nuclear Device

13. The countries considered in this Memorandum might have one or more objectives for trying to develop a nuclear device despite adverse world opinion. They might wish to have a status symbol which would permit them to achieve recognition as an advanced, and potentially powerful, state. They might wish to have a deterrent to discourage or at least raise the potential cost of the initiation of either conventional or nuclear hostilities by an adversary. A country might want to be able to employ a direct or implied threat to use a nuclear device in order to demand and obtain concessions from an adversary without a similar capacity. It might wish to use the device in a military conflict with a nation that had no ability to retaliate in kind. Finally, a peaceful nuclear explosive program might be the sole objective.

14. Many of the possible objectives of a would-be nuclear proliferator might be achieved without the actual testing of a nuclear explosive or officially acknowledging that it possesses such a capability. A case in point is Israel. It "enjoys" many of the advantages of such possession without having to risk the possible consequences of an official acknowledgement or an actual test of a device or weapon. Israel is, however, remarkable for its technical sophistication. Countries less endowed with skilled personnel may feel that testing is necessary, both to prove design performance and to attract world attention.

II. EARLIEST DATES OF THE TECHNICAL FEASIBILITY OF POSSESSION OF A NUCLEAR DEVICE

15. Estimates of the earliest technically feasible dates, based solely on technical requirements, when potential nuclear proliferators could have their first nuclear explosive follow. (See Table 1 for the listing of these dates by country.)

A. The Republic of China (ROC)

16. There is convincing evidence that the ROC has a specific program to develop nuclear devices. There is, however, no evidence on which to base a judgment about whether or when this work might be converted into a nuclear *weapons* program. We believe, nonetheless, that the ROC's fear of the power of the Peoples Republic of China and of isolation from the other nations of the free world and its concern over the extent of US support establish a strong incentive for development of a nuclear weapons capability.

17. Shortly after the detonation of the first nuclear device in China in October 1964, Chiang Kai-shek ordered the establishment of a nuclear weapon

TABLE 1

EARLIEST TECHNICALLY FEASIBLE DATE FOR A NUCLEAR DEVICE*

Japan	Within 1-2 years of a decision
West Germany, Italy, Canada, Sweden, Spain	Within 1-2 years of a decision
Republic of China	1978
Pakistan	1978
South Africa	1976-1978
Argentina	1978
Republic of Korea	1979
Brazil	1980
Yugoslavia	1980
Iran	1982
Egypt, Iraq, Saudi Arabia, Libya	Unlikely before 1983
North Korea, Cuba, North Vietnam	Not within next 10 years
Eastern European nations	Not in the foreseeable future

*A *nuclear device* based on the possession of about 10 kilograms or more of separated plutonium or a somewhat larger amount of highly enriched U-235, and the completion of HE weapon research for a successful implosion system and fabrication of a device.

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Nuclear Activities of Selected Countries

(Revised and Updated)

	Domestic uranium ore	Uranium enrichment *	Uranium enrichment **	Uranium enrichment ***	Natural uranium fueled reactors	Enriched uranium fueled reactors and fast breeders	Cumulative Pu production by 1975 (kg)*****	Cumulative Pu production by 1990 (kg)*****	Fuel reprocessing capabilities (current)	Heavy water production	Non-proliferation treaty	Limited test ban treaty
ARGENTINA	●				1	1	150	1,150	△	□		S
AUSTRALIA	●	□									R	R
AUSTRIA						1		950			R	R
BELGIUM						3		2,350			R	R
BRAZIL	•	□				1		200		□		R
BULGARIA	●					1 3	150	2,750			R	R
CANADA	●				5	5	4,690	17,700	□	○	R	R
CHINA, REP. of				□	1	3	16	1,500	□		R	R
CZECHOSLOVAKIA	●				1	4	330	1,500			R	R
DENMARK (GREENLAND)	•										R	R
EGYPT	•										S	R
FINLAND						4		1,350			R	R
GERMANY, EAST	●	□				2 2	250	3,200			R	R
GERMANY, WEST	•	△		□	2	9 17	4,360	20,400	△	△	R	R
GREECE	•										R	R
HUNGARY	●					1						R
INDIA	•	□			2	3 2	1,230	3,300	○	○		R
IRAN						1					R	R
ISRAEL	•	□		□	1		85	140	□			R
ITALY	•	□	□		1	2 3	2,410	5,500	△		R	R
JAPAN		□	□	□	1	1 8	4,400	24,500	△		S	R
LIBYA											R	R
MEXICO	•										R	R
NETHERLANDS		△		□		2	270	1,050			R	R
PAKISTAN	•				1		210	550				S
PORTUGAL	•											S
ROMANIA	•										R	R
SOUTH AFRICA	●			△								
SOUTH KOREA						2		700			R	R
SPAIN	●				1	2 7	880	5,950	△			R
SWEDEN	●		□	□	1	2 8	1,440	8,850			R	R
SWITZERLAND						3 3	1,600	4,600			S	R
YUGOSLAVIA	•					1		350	△		R	R

*Gas Centrifuge

**Gaseous Diffusion

***Other

● Major

● Significant

• Minor

[8] In operation as of August 1975

[8] Under construction or planned for operation by 1980

○ Operating plant

△ Pilot plant

□ Research

R Ratified

S Signed but not ratified

****All reactors, including research reactors, capable of producing significant quantities of plutonium.

*****Most of this plutonium will be high burn-up material and most will still be contained in the spent fuel. Figures are estimates based on proposed operating procedures. Actual amounts will vary depending on how reactors are operated.

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research institute, which he initially placed under military control. Although it was announced in 1968 that the institute was being transferred to civilian authorities, there is evidence that the military still plays a major role in its operation. There have been several recent reports that the institute is now carrying out research and development on high explosives and design work on nuclear explosives and that it is acquiring certain materials suitable for the fabrication of nuclear devices.

18. A 40 megawatt, natural uranium reactor has already operated long enough to have produced irradiated fuel elements containing enough plutonium for one or two nuclear devices. A pilot chemical separation plant is planned; it will have the capacity to separate enough plutonium each year for at least one device. The ROC attempted earlier this year to obtain from France the design of a separation plant, but the French Government aborted the transaction. There is recent evidence that the ROC now intends to design and build the facility on its own with some foreign technical assistance and using components purchased abroad. We judge that Taiwan has the technical competence to succeed in this project within two or three years. It will then be in a position to divert separated plutonium to fabrication of a nuclear device. In so doing, however, it would violate its obligations under the NPT as well as the resultant IAEA safeguards that apply to all of its nuclear materials. The potential availability of this plutonium, coupled with the ongoing high explosive and weapon research and development, lead us to the judgment that the ROC could have a nuclear device in hand *as early as 1978*. It is unlikely to attempt to actually fabricate a device, however, before it judges the political and strategic situation to be desperate enough to justify open acknowledgement of a nuclear explosive capability.

B. Pakistan

19. The uneasiness in Pakistan which developed after the Indian nuclear test of 1974 was subsequently increased by India's continuing naval development program, its absorption of Sikkim, and its agreement with Kashmiri nationalist leader Sheikh Abdullah in February 1975 that further consolidated its hold over most of disputed Kashmir. Although India and Pakistan made progress in the past year in resolving some of their differences on trade and communications, key differences remain, and the Pakistanis continue to hold that India seeks a weak, unstable, and even a dismembered Pakistan.

20. Shortly after the Indian nuclear test, Prime Minister Bhutto reportedly stated [redacted] (b)(1)
[redacted]hat he had completed a plan which would (b)(1)
insure that Pakistan would produce a nuclear device in four years. Bhutto stated publicly in late 1974 that Pakistan would explode a nuclear device if denied the help it sought in strengthening its conventional military capabilities. The US decision in February 1975 to end its embargo on sales of conventional arms to Pakistan and India may have reduced Pakistan's motivation to develop nuclear weapons, but we believe that it did not remove it. On balance, we conclude that the Pakistanis still intend to try to acquire a nuclear capability.

21. Since 1972, the Pakistanis have been operating a natural uranium power reactor. We estimate that there could be as much as 200 kilograms of plutonium in irradiated fuel elements being stored in the site's cooling ponds. Pakistan plans to construct a small chemical reprocessing facility with French assistance, but negotiations have been deadlocked over the issue of safeguards and no contract has yet been signed. The French are insisting on stringent conditions which include IAEA safeguards and a prohibition against retransfer of materials and against replication of the technology. Strict adherence to these conditions would severely circumscribe the facility's value for a nuclear weapons program. We believe that the facility could be completed two or three years after construction begins. Assuming an early start, as well as completion of HE and weapons research and development (R&D) concurrent with construction of the reprocessing plant during this time period, the Pakistanis could develop a device *as early as 1978*.

C. South Africa

22. There is no indication that South Africa currently is pursuing a nuclear weapons program. The only likely military threat to South Africa would come from its African neighbors. Its military capability is so much greater than theirs that it has

no military need for nuclear weapons in the foreseeable future. Its political and psychological isolation could, however, affect its perception of such a threat and it might then feel the need to enhance its already significant deterrent capability with nuclear weapons.

23. South Africa is not a party to the NPT and, although it requires IAEA safeguards to apply to all nuclear materials it exports, some of its own nuclear facilities are not subject to safeguards. South Africa enjoys, therefore, a measure of flexibility not available to NPT states or to states dependent on the major suppliers for nuclear materials and technology. On the other hand, a South African official has indicated that his government will consider ratification of the NPT, if it is demonstrated that safeguards can be applied in a manner that both satisfies IAEA requirements and preserves the secrecy of South Africa's enrichment process.

24. Although South Africa will have no power reactors until the 1980s, a plant for the separation of uranium isotopes is now in operation. The South Africans have announced that the plant produces only low-enriched material. But it may be able to produce highly enriched material now; if not, it probably could be adapted either by use of a different operational mode (called "batch" operation) or through plant modification which probably would take a year or two. If the design of the plant enables it to produce highly-enriched material now, enough of this material could be available for a nuclear device as early as 1976. Although we have no evidence of high explosive and weapon research and development underway in South Africa, such activities could be taking place and, indeed, could have been completed already without our knowledge. We conclude that South Africa could develop a nuclear device, using U-235, *sometime in the 1976-1978 period.*

D. The Republic of Korea (ROK)

25. President Pak Chong-hui's decision to give high priority to a nuclear explosives program reportedly remains firm despite increasingly evident problems associated with its cost and complexity and the risk that pursuit of such a program will have adverse political effects in the region and seriously complicate ROK-US relations. Present efforts largely are confined to the planning stages and much of what has been done so far is in direct support of the government's ambitious power program. A US-supplied power reactor which uses slightly enriched uranium probably will be operational in 1977, and by 1978 will have produced irradiated fuel suitable for reprocessing. The ROK government is currently negotiating with the French for the construction of a small reprocessing plant. In the face of strong US pressures to prevent such an arrangement, the ROK has taken an equally strong position that it has the right to have such a plant, on the basis that it is intended only for training purposes and therefore does not represent a potential for the development of nuclear explosives.

26. If the ROK and France conclude an agreement and the ROK chooses to defy US prohibitions against indigenous reprocessing of fuel from reactors it has supplied, the ROK might be able to begin producing plutonium in 1978. On that basis, and assuming that the high explosive and weapons research and development are completed by that time, the ROK conceivably could have a nuclear device *as early as 1979.* Even then, the ROK would have to violate or abrogate safeguards and NPT obligations in pursuing an explosives program.

E. Other Countries

27. We have detected no recent changes in the basic attitude of either *Argentina* or *Brazil* toward a nuclear weapons program. Recent publicity given to the potential for such a program in each country—sparked by the Brazil-West German accord—has stirred up a good deal of nationalistic rhetoric. Government spokesmen in Brasilia and Buenos Aires still officially deny any intentions to go forward with a nuclear weapons program. Should either become convinced that the other was embarked on such a program, it undoubtedly would follow suit.

28. *Argentina.* Irradiated fuel in a natural uranium power reactor, in operation in Argentina since 1974, contains enough plutonium for several nuclear devices. A small chemical separation plant is now under construction and we estimate that it probably will be able to separate enough plutonium each year for a few nuclear devices. It

could be operational in 1977. Assuming that high explosive and weapon research and development are completed by then, a nuclear device could be available *as early as 1978*. Argentina's current economic crisis, however, has slowed down work on some of its nuclear projects. Financial and other problems besetting its nuclear program will probably delay completion of the chemical separation plant.

29. *Brazil*. There will not be a nuclear power reactor in operation in Brazil before 1978. The package deal that has been negotiated with West Germany includes the acquisition by Brazil of a chemical separation plant, in addition to several reactors and a facility for uranium isotope separation. It is highly unlikely that the uranium isotope separation facility will be operational before 1980, but the chemical separation facility could be operating by the time that irradiated fuel is being discharged by the power reactor supplied by the US. Assuming the successful completion of HE and weapon R&D, as well as unrestricted use of the German-supplied reprocessing facility, Brazil could have a device *as early as 1980*.

30. *Iran*. The very ambitious nuclear power program of Iran includes the planned purchase of reactors from the US, France, and West Germany, and possible collaboration in nuclear development with South Africa. Preparation of the site for the first reactors is now underway. It is not likely, however, that any of these reactors will be in operation before 1980-1981. Iran is also seeking a chemical reprocessing facility; one could be constructed by the time the first power reactor is complete. (The US has not yet succeeded in its efforts to convince Iran that such a chemical reprocessing facility should be owned and operated on a multinational basis.) Iran could also conduct the necessary HE and weapons R&D during this period and thus conceivably could have a nuclear device *as early as 1982*.

31. *Japan, West Germany, Italy, Canada, Sweden, and Spain*. These industrially advanced countries all have operating power reactors. In most cases they possess significant quantities of plutonium already separated from irradiated reactor fuel. In the case of Spain, there is a report that the Nuclear Energy Board has studied the feasibility of producing nuclear weapons using such plutonium from its power reactors. However, there is no indication that HE and weapon R&D have actually been undertaken either in Spain or in the other countries. All of these countries have the capability to conduct such HE and weapon R&D, however, and any of them could have a nuclear device *within one or two years of a decision* to develop one.

32. *The Arab States. Egypt, Iraq*, and *Saudi Arabia* have expressed an interest in developing nuclear power programs. The development of nuclear devices depends on the time that is required to negotiate contracts for the acquisition of nuclear power reactors and chemical separation facilities and to construct and operate them. Given the time needed to satisfy all of these requirements it is *unlikely* that any of these states could have a nuclear device *in less than eight years*—that is, before about 1983. Although *Libya* has ratified the NPT, acquisition of nuclear weapons became a stated objective of Qadhafi in 1974 (indeed, Qadhafi reportedly has tried to purchase nuclear devices outright). But the acquisition of nuclear reactors is still in the negotiating stage and reportedly the negotiations are aimed at obtaining one from the USSR for operation about 1982. Considering the time needed for training personnel and for reactor construction and operation, it is *unlikely* that Libya could have a nuclear device *before 1983*.

33. *North Korea, Cuba, and North Vietnam*. These countries have varying degrees of incentive to acquire a nuclear weapon. North Korea and Cuba have indicated an interest in obtaining nuclear reactors, and they have attempted to obtain assistance to this end from the West as well as the Soviet Union. We do *not* believe, however, that sufficient aid will be supplied to permit the development of a nuclear device by any of these countries *within the next ten years*.

34. *Yugoslavia*. Yugoslavia has a program for developing a capability to construct nuclear power reactors and to fuel them with domestic uranium. A very small chemical reprocessing facility also has been constructed. It has reprocessed some of the irradiated fuel from a research reactor supplied by the Soviets in 1966. Its first nuclear power re-

actor was purchased from the US and is scheduled to be operating about the beginning of 1979. There is no evidence that Yugoslavia intends to construct reprocessing facilities large enough to handle the irradiated fuel from this reactor. If it should decide to do so concurrently with the construction of the reactor, however, and if it completes necessary HE and weapon R&D, it could have a nuclear device in being *as early as 1980*.

35. *Other Eastern European Nations.* Although several of the Eastern European nations have nuclear power programs, it is *not* considered likely that any of them will be able to develop a nuclear device *in the foreseeable future*. The Soviet Union probably will not permit these nations to build and operate fuel reprocessing facilities of significant size or to have uncontrolled access to sufficient plutonium for use in fabricating nuclear explosives.

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