ACHIEVEMENT OF A WEAPON CAPABILITY BY ADDITIONAL NATIONS

(b)(1)
(b)(3)

The capability of other nations to attain nuclear weapons depends upon the following factors: (1) availability of uranium, (2) the ability to produce U-235 or plutonium, (3) a substantial nuclear scientific and technological capability, (4) a major scientific and engineering capability in electronics, explosives, etc. for non-nuclear components, and (5) the ability to make the needed investments within available national resources for a weapons program. These factors, of course, bear upon but are independent of the most important factor in embarking upon a nuclear weapons program, which is a national decision to do so. N.I.E. 4-2-64 of October 21, 1964, assesses these factors and concludes that within the next decade those countries capable of developing independent nuclear weapons programs are India, Israel, Sweden, West Germany, Italy, Japan, and Canada. Of the countries having a capability, the estimate concludes that only in the case of India are the chances better than even that a decision will be made to develop nuclear weapons within the next few years.

[redacted]

With respect to all the other countries analyzed, the judgment is that the chances are less than even to unlikely that a national decision to acquire nuclear weapons will be taken.

What, then, are the elements in support of civilian atomic energy programs that could assist these nations and perhaps others having lesser capabilities should they decide at some point in the future to embark upon

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a weapons program. Basic information has already been published and widely disseminated on nuclear physics, neutron cross sections, uranium and plutonium metallurgy, power reactor technology, and chemical processing technology. In addition, the field of controlled thermonuclear reactions is unclassified and much literature is available internationally in this field. On the basis of the existing fund of information, those nations having the scientific and technical personnel to apply it to a weapons program also probably have at hand much of the capability required to achieve the special nuclear materials production base involving plutonium essential to a weapons capability. A sufficient amount of information is generally known with respect to the design of nuclear fission weapons so that once special nuclear material not subject to safeguards is available, the problem of testing a device and developing deliverable weapons is not regarded as an insurmountable limitation. The National Intelligence Estimate generally describes this in terms of a time factor of one to three years.

What are the factors determining whether a nation can produce its own special nuclear material? Appendix __ desicribes free world availability of natural uranium and concentrate production capability, exclusive of the United States. It can be seen that over the next decade it will be increasingly difficut to maintain complete safeguards on the supply of natural uranium, which is basic to the production of either enriched uranium or plutonium. Moreover, over the next five to ten years, the world supply of natural uranium will probably exceed demand, thereby making for a highly competitive situation which will not be conducive to establishment of uniform and rigorous safeguards over its end use. Appendix __ contains a table setting forth major free world reactor supporting facilities exclusive of the United States which constitutes an indication of the level in various countries

of available nuclear technology which could be used as the base for a weapons effort.

Appendix P describes the nuclear reactors of the free world excluding those of the United States and the United Kingdom and notes the amount of estimated annual plutonium production for each. It can be seen from this appendix that large quantities of plutonium will be produced in a number of countries. It should be noted, however, that the plutonium produced in the majority of these facilities is subject to guaranties and safeguards against use of generated material for any military purpose. In connection with the world-wide availability of power reactors, the United Kingdom, Canada, and France all are active in seeking foreign markets for their reactor concepts. As all of these concepts involve the use of natural uranium fuel, other factors being equal they have a competitive advantage over U.S. enriched uranium reactors, since other nations prefer natural uranium fuel over enriched uranium because of the former's much wider availability under more normal market conditions. (Thus far the U.K. has sold two large power reactors abroad; Canada one, with at least two others under active negotiation; while France recently sold a 500 MWe reactor to Spain with few if any safeguards comparable to those required by the U.S., insofar as we have been able to determine.) However, in most instances, the economic superiority (particularly in capital cost) of U.S. power reactors, together with our long-term fuel supply policy for enriched uranium fuel, has led to the selection of a U.S. reactor. For example, until the last moment, the Indians were unwilling to consider other than a natural uranium reactor for installation at Tarapur. Nevertheless, the decisive economic superiority of the General Electric offer on an enriched uranium reactor led to its ultimate acceptance and, as a further consequence, the acceptance of international safeguards on the reactor as well. (Although the Tarapur reactor received AID financing assistance, the assistance was from AID funds already allocated to India and, hence, displaced other high priority Indian development projects.

Appendix ___ sets forth chemical processing facilities outside the United States that are built or will be constructed through 1970 and is an important indication of the extent to which chemical separations technology can be, and is being, developed independently by those desiring to do so.

N.I.E. 4-2-64 estimates that the cost of a modest program for producing plutonium weapons would not be prohibitive to most of the middle powers. "A program to produce one or two low yield (about 20 kt) plutonium fission weapons per year would cost $140,000,000 to $180,000,000 through the first detonation, and $20,000,000 to $30,000,000 per year thereafter." The estimate points out that cost increases markedly for a more than minimum program and notes, for example, that production of fifteen to thirty plutonium fission weapons per year would probably be $600,000,000 to $700,000,000 plus subsequent annual operating expenses of about $100,000,000. It is important to point out that these cost figures are independent of any costs that might be incurred to produce delivery vehicles.

The bulk of these costs represents building plutonium producing reactors and chemical separations facilities on the assumption that natural uranium can be procured from either internal sources or on the open market without safeguards. In point of fact, this has been the route followed by France in achieving the capability she presently possesses.

The controls envisaged by the Atomic Energy Act to prevent nuclear proliferation are predicated on the supposition that the essential step in a nuclear weapons capability is the production of special nuclear

material not subject to appropriate safeguards and controls. In keeping with this premise, the United States has even refused to exchange technology on production processes for the enrichment of U-235, developed subsequent to our World War II cooperation, with the United Kingdom. Further, when it became apparent that gas centrifuge technology might be a useful means for producing highly enriched uranium, the United States imposed stringent classification on the process and assumed leadership in persuading those Western countries (Germany and the Netherlands) which were working in the centrifuge area to impose rigid classification on the results of their work as well as on the foreign commercial exploitation of the process. The ability to control plutonium has presented a more complex problem due to the fact that as early as 1953, countries other than the United States had independently developed power reactor technology using natural uranium graphite reactors capable of producing substantial quantities of plutonium.

A major purpose of the Atoms for Peace Program was to deter other countries from developing independent supplies of U-235 or unsafeguarded plutonium which might be available for weapons use. This in turn required the demonstrated willingness on the part of the United States to meet the legitimate peaceful needs of foreign countries under suitable controls both for slightly enriched uranium, the most desirable fuel for large-scale civilian power reactor programs, as well as the more highly enriched uranium necessary for basic supporting nuclear technology.

The actions taken under the Atoms for Peace Program to encourage United States industry to develop economic nuclear power reactors, to

encourage simultaneously interest in using power reactors as a basic energy source abroad, and to assist in the building abroad of supporting facilities for a civilian nuclear power industry were undertaken at a time when the production of electricity by nuclear energy was not economic. Within the last two years, nuclear power has economically come of age and the efforts abroad organized to exploit the nucleus as a source of electric energy have not been, in any sense, oriented toward the production of weapons. In the majority of instances, there has also developed a recognized dependence upon the United States as the exclusive long-term supplier of slightly enriched uranium for economic power reactor systems as developed by the AEC and U. S. industry. This latter fact is extremely important since all supply of enriched uranium by the United States has been predicated on arrangements calling for safeguards and inspection to assure that the special nuclear material used and plutonium produced will always be used exclusively for civil purposes. The growing commitment, then, of many foreign nations to civilian nuclear power programs based on slightly enriched uranium-under safeguards and controls requires that any national decision to embark on a weapons program involve new facilities for the production of special nuclear materials for use in weapons. This in turn tends to require the development of independent weapons production facilities as against multi-purpose (plutonium production and power) facilities and has the continuing effect of keeping the cost of entry into a special nuclear material production program for a weapons effort at a fairly high level. In those countries where national programs must be

mounted on the basis of relatively limited resources, the extent to which money and scientific and technical manpower are engaged already in important nuclear programs related to civil uses may well have a further limiting effect on any decision to establish an independent nuclear weapons capability.

Finally, in the long-term, dependence upon the United States as the economic supplier of uranium 235 will provide increasingly an important leverage in diplomacy for assuring that materials dependent countries pursue policies in support of non-proliferation, since the possibility of withholding special nuclear material or reactor technology will increasingly entail profound consequences on foreign economies.