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Intelligence Memorandum

The Potential for an Indonesian Nuclear Weapons Program

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CENTRAL INTELLIGENCE AGENCY
DIRECTORATE OF SCIENCE AND TECHNOLOGY
OFFICE OF SCIENTIFIC INTELLIGENCE

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THE POTENTIAL FOR AN INDONESIAN NUCLEAR WEAPONS PROGRAM

SUMMARY AND CONCLUSIONS

Recent reporting has indicated that Indonesia hopes to have a nuclear weapon by 1985, but the primitive nature of its current nuclear program provides little, if any, chance of success. The Indonesians have not stated their reason for wanting nuclear weapons, but it is probably more closely related to prestige and politics than to military strategy. Efforts are under way to expand the nuclear research program and begin a nuclear power program. Because of the present attitude towards nuclear proliferation by the world's major nuclear suppliers, however, Indonesia probably will not be able to acquire the facilities (e.g., a chemical reprocessing facility) necessary to produce a nuclear weapon by its stated goal of 1985.

Even though Indonesia's nuclear program started in 1958, it has not progressed beyond basic research and radioisotope production. Most of its planned program has been dependent on Soviet and US assistance, but political problems in the 1960s halted Soviet aid and reduced the nuclear program to a bare minimum. The major components of Indonesia's nuclear program are a small US-supplied research reactor, a Soviet-supplied subcritical assembly, and radioisotope handling facilities. A research reactor was to be built by the Soviets, but the project, which had been inactive since 1967, was officially cancelled in 1971. The current program is centered around the use of radioisotopes produced in the US-supplied research reactor. There is a sizeable effort under way to start exploitation of uranium ore deposits that have been located recently in Indonesia. Although there were many indications in 1964 and 1965 that Indonesia was interested in acquiring nuclear weapons, the failure to obtain the Soviet research reactor ruled out any chance for acquiring the amount of plutonium that would be needed for a nuclear weapon.

DISCUSSION

Indonesia's interest in peaceful uses of nuclear energy began in 1956. At that time Dr. G. A. Siwabessy, Chairman of the State Commission of Radioactive Materials and Atomic Energy, visited the United States for a month to observe the programs and installations involved in the peaceful applications of nuclear energy. When he returned to Indonesia, concrete plans were made for the application of radioisotopes in medicine and agriculture, and training programs in nuclear science were planned for a number of universities. The early Indonesian nuclear program was developed in cooperation with the International Atomic Energy Agency (IAEA), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the International Cooperation Administration (ICA). The major facilities for the program are the Institute of Technology Bandung (ITB), the University of Gadjah Mada at Jogjakarta, the University of Indonesia at Djakarta, and the research reactor projects at Bandung and Serpong.

The Institute for Atomic Energy (IAE) was organized in 1958 as the controlling body for all peaceful uses of atomic energy in Indonesia. Dr. Siwabessy was appointed the head of the institute. A medical doctor and personal physician to President Sukarno, he also was a radiologist in charge of the

Institute of Radiology of the Faculty of Medicine at the University of Indonesia. Because of his personal interest in radioisotopes and his relationship with President Sukarno, Dr. Siwabessy was the early driving force of the nuclear energy program in Indonesia and is responsible for establishing the facilities and programs that exist today.

The IAE was directly responsible to the First Minister in the Office of the Presidential Cabinet. The First Minister was advised by the Atomic Energy Council, which was composed of the other ministers in the Cabinet. In 1965 the institute was replaced by the National Atomic Energy Agency (BATAN), which retained the same functions as the IAE, and is the controlling body for the Indonesian nuclear program today. The National Atomic Energy Council replaced the Atomic Energy Council in 1968 but did not hold a meeting until 7 October 1974. This is an indication of the low priority given to nuclear energy programs in Indonesia since 1965. Another indication of the national standing of the programs is the atomic energy budget. For fiscal year 1970/71 this budget was only US$580,000, or 0.018 percent of the state budget.

The most impressive component of Indonesia's nuclear program is a 1-MW TRIGA-Mark II research reactor located at the Bandung Reactor Center. This US-supplied reactor was under construction in 1961 and reached full power operation in January 1965. The initial power level was 250 kW but was raised to 1 MW in 1971. The 20-percent enriched uranium fuel needed for operation of the reactor is purchased from the United States. The reactor is used for neutron physics studies, educational purposes, and isotope production. The latter has been the prime function of the reactor, and as of 1973 some 361,638 curies of radioisotopes had been produced for use in research institutions, universities, and hospitals and for export. The major types of radioisotopes produced include iodine-131, phosphorous-32, gold-198, sodium-24, potassium-42, bromine-52, chromium-51, and sulfur-35. Other isotopes are produced according to demand, as well as many other marked compounds to be used as tracers in medical injections. A nuclear medical clinic has been established at the Bandung Reactor Center and operates under the Department of Health's Nuclear Medical Service. In 1973 the Bandung Reactor Center employed about 150 people, over half of whom were professionals.

In 1962 Indonesia purchased an IRT-2000 research reactor from the USSR, and a construction site was prepared at Serpong, about 25 kilometers from Djakarta. This reactor, designed to supplement the TRIGA reactor at Bandung, would have had a much larger isotope production capacity because it had a power level of 2 MW versus 250 kW at that time for the TRIGA. Construction of the reactor was complicated by many problems including financing, loss of equipment and components enroute from the USSR, damage to parts that did arrive, and eventually political upheaval in 1965. As a result, construction never progressed much beyond site preparation, and the entire project which had been inactive since 1967 was formally cancelled in 1971. Since the power level of the TRIGA had been raised to 1 MW, it was felt that the IRT-2000 reactor was no longer necessary. The Serpong site was closed down, but it is now under consideration as the location for a large nuclear research center.

The universities in Indonesia have played an important role in the nuclear program. The TRIGA reactor is located adjacent to the Institute of Technology Bandung (ITB) which uses the reactor and provides research and laboratory facilities in support of the radioisotope production program. The Djakarta Institute of Technology is associated with the University of Indonesia and is also involved in research on the utilization of isotopes. The University of Gadjah Mada in Jogjakarta has radioisotope laboratories, a subcritical assembly purchased from the USSR in 1961, a reactor simulator, and a Cobalt-60 gamma irradiation facility. A nonuniversity related research center at Pasar Djumat is also very active in the utilization of radioisotopes and has been involved in geological surveys for thorium and uranium.

Indonesia has recently become interested in obtaining nuclear power plants, and the director-general of BATAN, Prof. A. Baiguni, says that too much time has already been wasted on the nuclear energy program without making any significant progress. The industrial sector believes that any nuclear power program should be based on natural-uranium-fueled, heavy-water-moderated reactors such as the type built by Canada. This type of reactor could use domestically produced fuel manufactured from uranium, which has recently been discovered in Indonesia. Recent surveys conducted with French and West German assistance have located uranium deposits in West and Central Kalimantan and Sumatra; Indonesia hopes to begin mining with Romanian, French, and West German help by 1985. It

is planned that a 600-MWe nuclear power plant using natural fuel will be in operation by 1983. This is an unlikely date and will probably slip by a few years.

Indonesia's nuclear program has been and will remain almost entirely dependent on outside assistance for new equipment and training. In order to support a growing nuclear power program, Indonesia would like the United States to provide training and assistance in the production of fuel elements, information and guidance on acquiring a materials testing reactor, assistance in developing and equipping a laboratory for nuclear safety standards, training and assistance in research and development for the application of radioisotopes, training opportunities in other areas of the nuclear field, assistance in the development of nuclear electronics and computer technology, and assistance in the organization of a planning division. Indonesia already has received assistance from Australia for its radiation measurements project at Bandung and has received neutron spectrometry equipment from India. One reason for Indonesia's renewed interest in ratifying the Non-Proliferation Treaty (NPT) has been the hope that, by being a full party to the treaty, it will be easier to obtain foreign assistance. Some supplier nations would like to make ratification of the NPT a prerequisite for nuclear purchases.

Although Indonesia has no capability to manufacture nuclear weapons now or in the near future, the Indonesian Minister of State for Research, Sumitro Djojohadikusumo, recently said that Indonesia hoped to have nuclear weapons by 1985. Such talk is not new, however, as evidenced by reporting in 1964 which predicted Indonesia would have a nuclear bomb in 1965. At that time it was felt that the only way Indonesia could get a nuclear device was for Communist China to provide one, since it had no capability to produce its own. Indonesia has no known military requirement for nuclear weapons but probably desires to acquire them only for prestige and political reasons.

In order to have nuclear weapons by 1985, Indonesia must not only develop the necessary weapon component designs and high explosive systems but must also obtain enough fissile material for at least one device. Although the amount of material required is relatively small, i.e., 5-6 kilograms of plutonium, the plutonium will be very difficult for Indonesia to acquire without violating safeguard agreements on the facilities used to produce it. The easiest way, perhaps, would be to produce plutonium in the natural-uranium-fueled power reactor that Indonesia hopes to build, and then separate enough plutonium from this fuel for at least one or two devices in a clandestine fuel reprocessing facility. This method of obtaining plutonium would probably be a violation of the safeguards on the reactor, but it is conceivable that the separation might be done without detection. Such a method would require that the power reactor be operational and, therefore, it would be at least 1987 before a nuclear device could be produced.

If Indonesia wished to avoid the safeguards problem, it would have to obtain a small research reactor, fuel fabrication facilities, and reprocessing facilities from a supplier who would not insist on safeguards. Such facilities could provide enough material for one or two nuclear devices by 1985, but there are no known suppliers who would not require safeguards. The use of enriched uranium for a device is not considered realistic because of the extremely high cost and the advanced technology associated with building an enrichment plant.

The present worldwide concern over nuclear proliferation has reached a point that makes the purchase of the nuclear facilities necessary for a weapons program extremely difficult if not impossible. If such facilities are obtained, the safeguards and assurances that are applied to them will, in theory at least, prevent their undetected use for a nuclear weapons program. The Indian nuclear test provides a good example of how a peaceful nuclear program can be used to produce nuclear devices, but it should be noted that the Indian facilities were not under safeguards but limited only by agreement to peaceful uses, and they were purchased before the concern over proliferation became so intense and widespread. In short, Indonesia, which has only a very meager nuclear program, will find it extremely difficult to acquire the facilities necessary for a weapons program.