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NPT Article IV: U.S. Support for Peaceful Nuclear Cooperation

The NPT and the Promise of Article IV

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is the cornerstone of the global nuclear nonproliferation regime. With 187 parties, the Treaty has the widest acceptance of any arms control agreement in history. This broad support illustrates the importance of nonproliferation to the world community as a crucial element of international security. The 1995 NPT Review Conference extended the treaty indefinitely, and the United States continues to encourage universal adherence to it.

Article IV of the NPT affirms that all states party to the Treaty have a right to benefit from the peaceful uses of the atom. It further commits the parties to cooperate with one another in the "fullest possible exchange" of nuclear equipment, materials, and information for peaceful purposes. The United States takes this commitment very seriously and has strongly supported technical cooperation both through international organizations and bilaterally. This pamphlet provides an overview of this support with particular emphasis on the period from 1995 through 1999.

U.S. Support for Technical Cooperation Through the International Atomic Energy Agency

The United States channels considerable support for peaceful nuclear cooperation through the International Atomic Energy Agency (IAEA). IAEA programs have enabled nearly 100 developing member states to take advantage of nuclear technology in fields such as agriculture, water resources, human health, physical and chemical sciences, and environmental and industrial technology.

The principal IAEA programs for transferring technology to member states are the Research Contract Program and the Technical Cooperation Program. From 1995 through 1999, IAEA awarded nearly 7,000 research contracts to developing member states at a cost of over $41 million. During this same period, approximately 1,000 technical cooperation projects provided expert services, training, and equipment in support of national, regional, and interregional development priorities. The total approved budget for these projects was approximately $263 million.

The United States is the largest donor to the IAEA Technical Cooperation Program. The United States provides approximately one-third of all funding for technical cooperation projects and one-quarter of all funding for research contracts and other IAEA technical cooperation activities. In addition, the United States funds projects, contracts, training, and other activities that are not included in the Agency's regular program. These "extrabudgetary" contributions from the United States amounted to more than $30 million from 1995 through 1999.

The United States also strongly supports the IAEA's efforts to enhance the effectiveness of the Technical Cooperation Program through the New Strategy for Technical Cooperation. Developed around the concept of model projects, the New Strategy aims to increase the lasting social and economic benefits of technical cooperation to member states. The United States has expended more than $1 million in direct support of this initiative, primarily by providing a series of experts at no cost to the IAEA.

The new emphasis on supporting tangible and lasting benefits to member states is readily demonstrated in fields that are vital to human development, including human health, agriculture, water resource development and management, and human resource development. In all areas of cooperation, the IAEA maintains a strong emphasis on nuclear safety.

Human Health

Human health is clearly one of the most basic development needs, and peaceful applications of nuclear technology make a major contribution to establishing and maintaining good health. One out of every three patients admitted to hospitals in developed countries receive either diagnosis or treatment using nuclear technology. Developing nations benefit from technical cooperation through the IAEA in four major areas: nuclear medicine, radiotherapy and radiobiology, dosimetry and medical physics, and nutrition and health-related environmental studies.

Nuclear medicine includes radioimmunoassay (RIA), a highly sensitive and relatively inexpensive technique used to measure minute amounts of substances, such as antigens, hormones, enzymes, and drugs in the body. Through the IAEA, 18 countries in Asia, Africa, and Latin America have established national screening programs using RIA to detect possible health problems in infants. Another application of nuclear medicine tests for the accumulation of radiopharmaceuticals at selected focal points in the body, which assists in the diagnosis and early treatment of disease. In the Philippines, for example, the United States is supporting an IAEA project that has enabled hospitals to screen millions of public school children for urinary tract abnormalities that can lead to permanent kidney damage.

The IAEA has introduced nuclear medicine into more than 40 developing countries and made major contributions to the technical infrastructure required. Since 1991, for example, the IAEA has provided about 50 gamma cameras for use in nuclear medicine applications. In addition, member states have upgraded existing gamma cameras at very low cost by using technology developed by IAEA. In 1998 alone more than 150 cameras were upgraded.

Radiotherapy has been highly successful in the treatment of cancer, but the equipment and professional training required to administer it are very expensive. Since 1989, the IAEA has allotted approximately $33 million for 105 national and 22 regional projects in 61 countries. Major new projects to upgrade or establish national radiotherapy centers have been initiated in Mongolia, Ethiopia, Namibia, Nicaragua, and Ghana since 1995. In addition to its regular support for funding IAEA technical cooperation, the United States has made extrabudgetary contributions totaling $660,000 for these national centers.

It is essential that all applications of nuclear technology be carried out safely, and this is especially true in medicine. Through the program in dosimetry and medical physics, the IAEA supports quality control efforts in several ways: by establishing local standards against which equipment can be calibrated, by conducting on-site assessments of the accuracy of radiation beams, by providing detection equipment, and by operating a worldwide system of quality control for thermoluminescence detectors.

In cooperation with the World Health Organization, and with the assistance of a cost-free expert provided by the United States, the IAEA has rapidly expanded its programs and projects in nutrition. In Peru, for example, a government program provides supplementary breakfasts to more than 300,000 undernourished primary school children. Peru is using nuclear techniques provided through the IAEA to evaluate the initiative's impact and to improve the effectiveness of the feeding program using local foodstuffs.

Since 1995, the IAEA has approved an average of 125 health-related technical cooperation projects each year, with total financial allocations of more than $60 million. In addition to its regular contributions to IAEA, the United States has provided extrabudgetary funding of approximately $2.5 million for human health projects in at least 20 countries in Asia, Africa, Latin America, and Europe.

Agriculture

Providing sufficient food for the world's population is a global priority. Yet malnutrition affects one of every five persons. Through its support for IAEA's food and agriculture program, the United States seeks to increase both the quantity and quality of agricultural production. Nuclear techniques offer an important means to boost this production in several ways.

- **Balancing soil, water, and nutrients to increase crop yield.**
  Nuclear techniques allow farmers in Egypt and Syria to develop irrigation strategies that maintain crop production while saving up to one-third of water previously required.

- **Boosting crop yield through effective fertilization.**
  Nuclear techniques have more than doubled production of soybeans in Zimbabwe by allowing use of rhizobia bacteria to act as a biological nitrogen fertilizer factory.

- **Creating disease-resistant and insect-resistant plants.**
  Nuclear techniques allow development of new varieties of several crops, including rice and sorghum, which mature earlier than standard strains and have better grain quality.

- **Improving animal production and health.**
  Nuclear techniques are used in more than 70 developing countries to improve breeding techniques to yield larger herd size as well as to improve animal health. These techniques are also used to improve diagnosis of major diseases affecting livestock, such as rinderpest and trypanosomiasis.

- **Insect control and eradication.**
  The nuclear technology with the most far-reaching potential for helping farmers in developing countries is the sterile insect technique (SIT). Radiation-sterilized male insects are released into an infested area; when they mate with females in nature, no offspring are produced. Infestation is thereby reduced and, with repeated applications, can be entirely eliminated. SIT is a unique, non-polluting technique that has been used successfully against the Mediterranean fruit fly and the New World screw worm. The IAEA, with strong support from the United States, is now engaged in an effort to eradicate the tsetse fly from Africa. This insect infests 36 African countries and causes millions of dollars of losses in meat and milk production, as well as thousands of cases of sleeping sickness in humans each year. The IAEA has completed a successful program to eradicate the fly from Zanzibar. A much larger and more complex effort is under way in Ethiopia.

From 1995 to 1999, the United States and other major donors channeled more than $47 million to technical cooperation in agriculture through the IAEA, supporting an average of 120 projects each year. The United States also provided an additional $4 million in related support to agricultural projects in approximately 20 developing countries.

Isotope Hydrology for Water Management

Although over 70% of the earth's surface is covered by water, less than 3% of that is fresh water -- most of it locked up in glaciers, ice caps, the atmosphere, and deep underground reservoirs -- and just 13% of the world's fresh water is readily available to meet human needs. Projections indicate that worldwide demand for fresh water will double every 21 years. Nuclear technology can make a unique and valuable contribution to water resources management through the use of isotope hydrology, which provides information on sources, movement, and quantity of water in different environments including rivers, lakes, and groundwater. Through technical cooperation with the IAEA, strongly supported by the United States, developing countries are learning to incorporate isotope techniques into their national water management programs.

For example, a shallow groundwater assessment using isotope techniques in the Nile Valley of Egypt pointed to a reserve of deep groundwater (the Nubian sandstone aquifer) that increased the water supply in that region up to 20%. Lima, Peru, receives very little rainfall and depends for its water supply almost exclusively on rivers flowing from the Andes Mountains. But due to growing population, traditional supplies have diminished and become more polluted. Isotope techniques helped to locate a new source of water emerging from an abandoned copper mine on the other side of the Andes that could be relied on for the future; 15% of Lima's water now comes from this source. In Ethiopia, the highlands have a relative abundance of water, but the low region of Moyale is very dry. Through the IAEA, it has been determined that some of the water resources the people now rely on in this area are non-renewable. This

critical information will lead to much improved water management plans to make the most of what resources remain.

Over the past ten years, the IAEA has supported more than 150 isotope hydrology projects at a cost of approximately $20 million in more than 60 developing countries. In addition to supporting one-third of these costs, the United States has provided $350,000 in extrabudgetary contributions for isotope hydrology projects in the past five years.

Human Resource Development

Between 1994 and 1998, IAEA awarded 4,826 fellowships, averaging just over three months each. During the same period, an additional 1,629 individuals were awarded scientific visits.

Fellowships and scientific visitor awards are paid for with extrabudgetary funds from various donor countries. The United States contributed over $600,000 - approximately three times the amount donated by all other major donors for this purpose - between 1994 and 1998. In this same period, the Agency also organized and funded a total of 636 training courses that served nearly 8,000 individuals. The United States hosts approximately six major interregional training courses each year at one of its national research laboratories or universities.

Bilateral Cooperation

Many countries, especially those party to the NPT, have benefited from U.S. efforts to provide peaceful nuclear assistance on a direct, bilateral basis. While all aspects of U.S. bilateral assistance are too numerous to recount here, it is useful to discuss one of the many areas of cooperation, "sister laboratory" arrangements.

In the early 1980s, the United States launched a new initiative to establish cooperative institutional relationships between its own nuclear research laboratories and those in developing nations that have supported the NPT. Mexico was the first beneficiary of the sister laboratory program when its National Institute of Nuclear Research was paired with Los Alamos National Laboratory in March 1982. In addition, sister lab arrangements are currently in place with Argentina, Costa Rica, Ghana, Romania, Thailand, Egypt, Morocco, and Peru.

These arrangements generally provide for the following:

- exchange of scientific and technical information;
- short visits by expert teams or individuals to U.S. labs or their foreign counterparts;
- longer-term personnel assignments, ranging from one week to six months;
- exchange of samples, materials, instruments, and components;
- training of scientific and technical personnel through fellowships, seminars, or courses; and
- various collaborative projects.

The sister labs program establishes a direct line of communication between U.S. nuclear specialists and the nuclear research and scientific communities in participating countries and helps to facilitate cooperation in the peaceful uses of nuclear energy.

Summary

During the period since the 1995 NPT Review and Extension Conference, the United States has steadily increased its support for the IAEA's Technical Cooperation Program. During this period, this program allotted more than $250 million to fund approximately 2,000 national, regional, and interregional projects in approximately 100 developing countries. During this same period, the Agency's Research Contracts Program provided approximately $40 million for research contracts in member states. The United States and other donors also provided nearly $30 million for the management and administration of these projects and contracts.

As the largest contributor to the IAEA's Technical Cooperation Program, the United States strongly supports this program. Total support provided by the United States to these activities in this five-year period is approximately $100 million. At the same time, the United States sustains peaceful nuclear cooperation pursuant to its 27 bilateral agreements for cooperation covering over 40 countries as well as cooperation through sister laboratory arrangements with nine NPT parties. Clearly, the United States is fulfilling all of its obligations under Article IV of the NPT in many ways around the world.

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