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REF

SUMMARY: The Atomic Energy Organization of Iran was established by the Shah in April, 1974, during the world energy crisis, to develop nuclear power in Iran on a top priority basis. In the first two years of its existence the Organization has (1) grown into a bureaucracy of over 1,000 employees, (2) signed letters of intent for four large nuclear power plants, (3) initiated an intensive search for sources of uranium within Iran and abroad, (4) arranged for training of large numbers of Iranians in nuclear sciences and engineering abroad, (5) started development of nuclear research centers at home, and (6) entered into bi-lateral relationships with several foreign atomic authorities. The Government of Iran cultivates the impression that its ambitious program to produce 23,000 MWe of nuclear power by 1994 is purely intended as an eventual alternative to thermal and hydro-electric power and is in no way intended to serve as a base upon which to develop nuclear weapons capability. Iran has signed and ratified the Nuclear Proliferation Treaty (NPT) and has accepted controls of the International Atomic Energy Agency (IAEA) over the nuclear installations and material within its sovereignty. END SUMMARY.

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History

The antecedents of the present Atomic Energy Organization of Iran (AEOI) developed in the 1960's, partly in the Ministry of Science & Higher Education and partly in the then Ministry of Water and Power. The Ministry of Science and Higher Education carried on technical and administrative relations with the International Atomic Energy Agency (IAEA) and foreign atomic energy organizations. The Ministry of Water and Power began initial planning for the introduction of nuclear power and sent some Iranian students abroad for training in nuclear sciences and engineering.

The first atomic energy facility of any significance in Iran was a five megawatt research reactor constructed in the mid 1960's under the Atoms for Peace program. It became the showpiece of Tehran University Nuclear Center.

The AEOI was created by Imperial decree at the height of the world energy crisis in March 1974. A law was passed a few weeks later specifying its functions and giving it unusual authority to hire staff and to initiate a high priority program.

Functions

The AEOI has both developmental and regulatory authority and has been empowered to carry out the following functions:

1. To generate electricity from nuclear power plants for the national grid.
2. To carry on atomic research.
3. To train specialists needed in all phases of nuclear science and technology.
4. To promote applications of radioactivity in medicine and agriculture.
5. To study and make recommendations for the development of alternative sources of energy.
6. To represent Iran in international conferences dealing with atomic energy.
7. To determine participation of Iran in joint projects dealing with atomic energy.

Organization

The AEOI is an autonomous government agency headed by a President who has the rank of Deputy Prime Minister. Because of the Shah's strong personal

interest in the nuclear program, the President of the AEOI reports directly to him, and all major problems are referred to him for the ultimate decision.

The policy-making body of the AEOI is a High Council of Atomic Energy composed of the following:

- Prime Minister
- Minister of Energy
- Minister of Economic Affairs & Finance
- Minister of Agriculture & Natural Resources
- Minister of Science & Higher Education
- Director of the Plan & Budget Organization
- Director of the Department of the Environment
- President of the Atomic Energy Organization
(and four atomic experts)

The internal organization of the AEOI is still somewhat fluid, but the latest status (December 27, 1975) is as follows:

President (Dr. Akbar Etemad)
President's Office (Secretary: Ms. Doroud)
Public Relations

Committees of the AEOI reporting directly to the President:

- Planning Committee
- Research Coordination Committee
- Education Committee
- Safety, Safeguards, Radiation Protection Committee
- Organization & Administrative Committee

Nuclear Safeguards & Safety

- Nuclear Safeguards and Physical Protection (Eng. Mehdi Sarram)
- Nuclear Safety (Eng. Mohammad-Hassan Farzin)
- Radiation Protection (Dr. Parniapour)

Legal & International Office (Mr. Aziz Shirazi)

Office of Organization & Budget (Mr. Bahman Hekmat)

Planning Office

Information Service (for internal matters)

Deputy, Supporting Services (vacant, Dr. Etemad supervises directly)

Office for Construction (also Mr. Hekmat)
Nuclear Information Center (Mrs. Sang)
Computer Service
Education (Mr. Mustapha Sohrabpour)

Deputy, Research (vacant, Dr. Etemad supervises directly)

Nuclear Technology Center, Esfahan (Dr. Reza Khazaneh)
Radioactive Materials Research Center, Youssefabad, Tehran
(Dr. Ali Sekhavat)
Nuclear Research Center, Amirabad, Tehran (Dr. Mojtaba Taherzadeh)

Deputy, Industry (Mr. Amir Hushang Saffari)

Desalination Project
Nuclear Power Plant Projects (Dr. Ahmad Sotoodehnia)
Environmental Studies (also Eng. Farzin)

Deputy, Fuel, Energy Sources (also Mr. Saffari)

Fuel Management (Dr. Ghassem Arabian)
Fuel, Exploration & Recovery (also Dr. Arabian)

Chief, Administration & Finance (Mr. Negahban)

Finance (Mr. Amertusi)
Personnel
Administrative Services (Mr. Hasanein)

At latest count there were over 1,000 employees of all categories in the AEOI. The Organization has unusual authority to hire personnel at wage rates above those normal in the GOI, a sign of the high priority given to the nuclear program.

There are two local consulting firms which have been established by influential Iranians to service the AEOI and through which most foreign consultants are obliged to operate. Iran Nuclear Energy Co. (INECO) a creation of the well known industrialist, Mr. Abolfath Mahvi, provides a wide variety of services. For example, NUS Corp. of Washington, D.C., has just completed a contract with INECO to provide initial advice on regulatory matters. The Bechtel Corp. will probably win a forthcoming project for training, which also will be handled through INECO.

URIRAN, a company owned by Eng. Reza Niazmand, who developed Iran's Sarchesmeh copper deposit, has undertaken for the AEOI the task of prospecting for uranium and is subcontracting with foreign aerial survey firms for a complete radiometric survey of Iran.

By operating through these companies, the AEIO can get urgent tasks off to an expeditious start without having to enlarge its own staff through normal bureaucratic processes. However, the AEIO pays a premium for these services, and this arrangement is also a natural for rake-offs and influence peddling, though none has been exposed thus far.

Key Personnel

President -- Dr. Akbar Etemad. Born Feb. 3, 1930, in Hamadan, Iran. Diploma in Electrical Engineering from Polytechnique of Lausanne in 1957. MSc. equivalent in Atomic Engineering from l'Institute Francais des Sciences et des Techniques Atomiques in 1958. PhD in Reactor Physics from Polytechnique of Lausanne in 1963. He worked for a year and one-half as a research engineer for Brown Boveri in Baden, Switzerland and then for five and one-half years for the Swiss Federal Institute for Atomic Reactor Research as head of their nuclear shielding group. Dr. Etemad returned to Iran in 1965 to head a small section for atomic energy matters in the Plan Organization with particular responsibility for construction of the research reactor at Tehran University. In 1968 he entered the Ministry of Science and Higher Education as Deputy Minister for Research and a year later became Director of its Institute for Research and Planning. He visited the U.S. in March-April, 1970, as a leader grantee. In 1973 he was named first Chancellor of Bu-Ali Sina University, a French language university to be built in Hamadan. He was appointed as Deputy Prime Minister and President of the Atomic Energy Organization of Iran on April 10, 1974. Dr. Etemad has numerous publications to his credit and has represented the GOI at several international conferences including meetings of the International Atomic Energy Agency. He is fluent in French and English but probably somewhat less so in German. He claims to have initiated a management system at the AEIO under which his subordinates are encouraged to make important decisions on their own when he is away on his frequent travels, but, in fact the Shah's known personal interest in atomic matters tends to inhibit any devolution of responsibility. Dr. Etemad is an extremely able, intelligent, and personable man, evidently wholly committed to bringing the Shah's vision of nuclear power for Iran into being. His wife was once the private secretary of former Science & Higher Education Minister Rahnema, a man who was in some measure responsible for Dr. Etemad's advancement. They have a child about one year old.

Vice President -- Eng. Amir Hushang Saffari. Born 1926 in Tehran. Electrical engineering diploma in 1951 from Polytechnic of Lausanne followed by a year of graduate study at the Imperial College in London and another with Westinghouse in the U.S. He returned to Iran in 1954 for work in electric power development and then joined the National Iranian Oil Co. (NIOC) in 1957. He advanced to become a member of the Board of Directors of the affiliated National Iranian Gas Co. (NIGC), switching to

the AEIO in 1975. He does not have the charm or the facility with English that Dr. Etemad does, but presumably brings organizational and administrative experience to the AEIO.

In Charge, Raw Materials & Fuel -- Dr. Ghassem Arabian. About 35 years old. Educated in Canada (University of Vancouver, British Columbia). Degree in Chemical Engineering. One of Dr. Etemad's first and most trusted assistants.

In Charge, Nuclear Safeguards, Training -- Eng. Mehdi Sarram. Born 1942 in Kerman. MSc. in reactor engineering from the University of Michigan. Obtained reactor operator's license from the AEC. For several years he was the only qualified operator for the research reactor at Tehran University, and he still retains a consultancy role at the AEIO's Amirabad Nuclear Research Center.

In Charge, Project for Esfahan Nuclear Technology Center -- Dr. Reza Khazaneh. About 40 years old. Electrical engineering degree in Iran followed by graduate work in nuclear science in U.S. (University of California at Berkeley). Serves as principal negotiator with the French, since his French is more fluent than that of most of his colleagues.

In Charge, Power Plant Project -- Dr. Ahmad Sotoodehnia. About 38 years old. PhD. in nuclear engineering from UCLA. He worked several years for the NIOC before joining AEIO. Handles negotiations with Germans.

In Charge, Nuclear Safety, Environmental Studies -- Eng. Mohammad-Hassan Farzin. Born 1942 in Khoy, Iran. Civil engineer trained at Tehran University, Tufts College, and Northwestern University (1969-1972). He worked two years in Boston for Stone & Webster on non-nuclear projects before being persuaded to return to Iran to join the AEIO in 1974.

In Charge, Legal and International Affairs -- Mr. Aziz Shirazi. About 50 years old. Legal training in France and served about 10 years with OPEC in Vienna before joining the AEIO early in 1975. Speaks good French, fair English.

In Charge, Budget, Buildings & Maintenance -- Mr. Bahman Hekmat. Born 1936 in Tehran. Secondary and higher education mainly in U.S., but also a year or two in Poland. He held various positions in the GOI having to do with finance and planning before joining the AEIO in 1974 as one of Dr. Etemad's first assistants.

Director, Tehran Nuclear Research Center -- Dr. Mojtaba Taherzadeh. About 45 years old. Advanced degree from an American university. Spent many years with Cal Tech's Jet Propulsion Laboratory before returning to Iran in 1975 to join the AEIO.

Director, Youssefabad Radioactive Materials Research Center -- Dr. Ali Sekhavat. About 35 years old. He has an advanced degree from France and is more comfortable in French than in English. Dr. Sekhavat claims to have the Shah's personal patronage and certainly he has single-handedly developed a wide-ranging research institution, principally on sheer inventiveness and an unimpaired ego. (Two years ago he campaigned unsuccessfully in Sweden for a Nobel Prize.) Actually, he is undoubtedly more an inventor and showman than he is a scientist. For example, he makes extravagant claims for the beneficial physiological effects of negatively ionized air on both man and animals.

Training

The principal problem facing Iran in the nuclear power field is a dearth of trained and experienced manpower. From the outset priority has been placed upon attracting back from abroad Iranians already trained in nuclear sciences and engineering. In the two years since the AEOI was founded, Dr. Etemad reports considerable success in luring such people into his organization. Now the emphasis is upon finding and training the second wave of scientists and technicians needed to man the facilities planned and being built.

At the present time the AEOI has about 250 students at nuclear centers abroad, principally in the U.S. and the U.K. but more will soon also be sent to France, Germany, and Austria. The contract with MIT to train two groups of nuclear engineers in a 1.4 million dollar, two-year Masters program has received adverse publicity from environmentalist and anti-Shah groups but an equal number of Iranians are studying at other American universities. Iranians are also receiving training at the U.K.'s Harwell facility and British universities.

Of fundamental importance is initial training in Iran for young people selected for specialist studies abroad. A building has already been obtained in Tehran for a nuclear preparatory school for Iranian high school graduates, and it is likely that the Bechtel Corporation will win an 8 million dollar contract to organize and staff it. Later on, the large Nuclear Technology Center to be built near Esfahan will also have an important training function but at a more advanced level.

Budget

Some idea of the priority and pace of the Iranian nuclear energy program can be obtained from published budget figures:

	Iranian Year	
	2534	2535
	(3/21/75 - 3/20/76)	(3/21/76 - 3/20/77)
AEOI as a whole	\$30.8 million	\$1,027.7 million
Additional for purchase of uranium	-	\$ 171.7 million

Iran's Nuclear Power Policy

Iran has embarked upon one of the world's most ambitious nuclear power programs, because it sees no alternative to power from atomic fission for its needs in the middle-term future. As explained by Dr. Etemad to a recent American visitor, (1) Iran's petroleum exports will dwindle in about 15 years, (2) much of Iran's huge gas reserves will be needed in the oil fields for secondary recovery, (3) both oil and gas are ultimately more valuable as raw materials than as fuel, (4) it will take Iran 20 years to get into nuclear technology, and (5) in the cultural environment of Iran the Shah himself believes that a high visibility nuclear program with top priority must be mobilized if competing demands are not to siphon off the necessary money and manpower.

At present Iran has an installed electricity generating capacity of about 5,000 megawatts (MWe), half of which is connected to the national grid. Of this total approximately 80 percent is generated in thermal power plants and 20 percent in hydro-electric plants. By 1994 the GOI hopes to have an installed capacity of 70,000 MWe to serve its industry and to cater to rising expectations among private consumers. At the moment, it is planned that 23,000 megawatts of the 1994 total will be supplied from nuclear power plants.

The GOI has stated repeatedly that it has no ambitions to become a nuclear weapons state. Iran has signed and ratified the Nuclear Proliferation Treaty (NPT) and has accepted controls of the International Atomic Energy Agency (IAEA) over the nuclear installations and material within its sovereignty. It has, in addition, proposed the creation of a nuclear-free zone in the Middle East. Furthermore, Iranians ask the more skeptical of their friends, "Against whom should we arm ourselves with nuclear weapons? Conventional arms serve our purposes adequately."

Iran's Nuclear Power Program

Iran's ambition to acquire an installed nuclear power capacity of 23,000 MWe by 1994 places its program among the largest in the world. It is for this reason that Iran is interested in assuring itself of supplies of uranium ore, in securing uranium enrichment services, and eventually having access to fuel reprocessing facilities. In fact, the AEOI wants

to develop its expertise in all phases of the nuclear fuel cycle so that it will be as independent as possible from outside constraints in the nuclear power field.

At an early stage in its planning the AEOI decided to concentrate upon light water reactor (LWR) technology. The reasons given for this were that (1) it was the most commercially advanced, (2) it had proven itself in the U.S. and elsewhere, and (3) there were more vendors from whom to buy reactors. It is also likely that this technology was attractive to the GOI for the reason that it tends to dampen the suspicions of NPT watchers. Since LWR's must be shut down to refuel, they lend themselves less easily to plutonium diversion than, for instance, the natural uranium heavy-water-cooled reactors marketed by Canada.

Uranium Exploration and Production -- The activity of Iranian agents to procure supplies of uranium and to obtain mining concessions might almost be described as feverish, and a valid picture of the present status is difficult to construct, owing to the highly commercial nature of such operations. It is public knowledge, however, that Iran has concluded arrangements for exploration and production of uranium deposits in Niger and Gabon, and an agreement with South Africa is being kept secret at the latter's insistence. It has also been reported that Australia has agreed to sell Iran uranium "under favourable conditions."

The earliest significant uranium exploration in Iran itself was carried out by the French in the 1960's. When the prospects did not look promising the project was terminated. Now a major new project is underway, funded by the AEOI, to find domestic sources, and Dr. Etemad is optimistic about finding commercially viable uranium deposits.

Uranium Enrichment -- Although the AEOI was originally contemplating building a uranium enrichment plant within the country, it soon realized this was not really feasible. Instead, the AEOI has looked abroad for investment opportunities which would secure for it the enrichment services its large program will require. France has been only too happy to oblige. Through a holding company (SOFIDIF) jointly owned by France and Iran, Iran has 10 percent participation in EURODIF, a gaseous diffusion plant now under construction in France. A loan of one billion dollars to the Commissariat a l'Energie Atomique of France, payable in three, yearly installments beginning November 1975, also helps the French Government to finance its portion of EURODIF. In addition, the GOI has taken a 25 percent participation (20 percent directly and 5 percent through EURODIF) in COREDIF, a company which is studying the feasibility of building another uranium enrichment plant in France. These investments assure Iran of sufficient enrichment services for the near term, but the AEOI indicates it is still interested in the possibility of investing

in the American gaseous diffusion plant proposed by Uranium Enrichment Associates, a joint venture of Bechtel, Goodyear, and Williams. The AEIO is also watching developments in gas centrifuge and jet nozzle enrichment technology. (To make the story complete, it should be noted that in June, 1974, Dr. Etemad signed firm contracts with the AEC covering enrichment services for 2,400 MWe of nuclear power, but delivery dates have been slipped several times owing to restudy of the U.S. export licensing process.)

Nuclear Power Plant Projects -- In the early months of its existence, officials of the AEIO frequently spoke of their expectation that American companies would win the contracts for construction of the first Iranian nuclear power plants. Later the same officials stated that the American companies proved slow to respond to the AEIO's insistence upon receiving proposals incorporating not only construction of plants per se but also training of the personnel to man them, provision of the enriched uranium to fuel them, and construction and operation of all the local infrastructure necessary to build and run them. The Iranians felt they had to press for so-called super-turnkey contracts, because they had no experience in nuclear power and because the most likely sites for the plants were on the south coast, an area which is practically a wilderness. The American companies were reluctant to commit themselves to such ventures in a foreign environment, especially since they had lost heavily on turnkey projects in the U.S. when American utilities, too, were entering the nuclear age.

In the period when the American companies were gearing up to meet the Iranian concept of super-turnkey projects, other foreign vendors, eager to gain a foothold in the market, signed the first letters of intent for Iranian nuclear power plants. (It is alleged that their governments guaranteed them against unusual losses.) The German firm, Kraftwerk Union, agreed to build Iran Nuclear Power Plants Nos. 1 and 2, actually two 1,200 MWe stations at the same site, to be completed in 1981 and 1982. The very next day it was announced that Framatome of France would build another two plants of 900 MWe each to come on stream in 1983 and 1984. After these initial commitments in November of 1974, there was less urgency to contract for additional power plants for the time being. Although AEIO officials still remark that they expect American vendors to supply approximately half of their projected nuclear power plants, no further commitments have been made to this date. With the recent downturn in Iran's oil income it is quite conceivable that the original 23,000 MWe program may be stretched out over a longer period and that further orders will be deferred for a while.

The AEIO has employed six firms of consulting engineers to conduct surveys for suitable power plant sites. These have included the American firms

Bechtel, Dames & Moore, Stone & Webster, and d'Apollonia. Each was given a separate sector to study along the Persian Gulf coast, the Caspian Sea coast, or the Karun River, which are the only locations in the country with sufficient water for reactor cooling. Of the two sites offered to it near Bushehr, Kraftwerk Union chose Halileh, 12 kilometers south of the small port city, for construction of Iran Plants 1 and 2. The site had previously been surveyed for a petrochemical plant, but the AEOI prevailed -- another indication of the priority the nuclear program enjoys.

As of this date, Kraftwerk Union is still operating on the basis of a letter of intent, and no final price for the twin plants has been agreed upon. It is reported that the estimated cost has escalated to about 3 billion dollars and that the AEOI is balking at this. A three-month extension of the letter of intent has been agreed upon in order to allow time for further negotiations for a fixed contract. In the meantime, Hochtief, the subcontractor for civil engineering works, has assembled a construction crew of several thousand men and has already poured massive foundations for the first unit. It is reported that pressure is on to complete this unit in time for the Crown Prince, now 15, to throw the main switch on his 21st birthday (in October, 1981).

The site for Plants 3 and 4 has been fixed on the Karun River between Ahwaz and Khorramshahr, and Framatome expects to start construction sometime toward the end of 1976.

Sites on the coast of the Caspian Sea may well be chosen later in the program, because a concentration of population and industry there creates a heavy and increasing demand for electricity, but owing to Russian development works the level of water in the Caspian is an uncertain factor. Also, to build on the Caspian Coast it would be necessary to ship large reactor components through the Soviet Union, which the GOI is reluctant to be constrained to do.

Reprocessing -- The AEOI has no immediate plans with regard to reprocessing but expects that it will be desirable to recycle its fuel domestically in 15-20 years. By that time it hopes to have quite a few nuclear power plants operating, and the storage of spent fuel will become a problem which it feels it will have to solve at home. Although reprocessing of fuel in commercial quantities has not yet been demonstrated, the AEOI is confident domestic reprocessing would improve the economic viability of nuclear power in Iran. Officials of the AEOI tend to reject the concept of multinational regional reprocessing plants, not so much from the standpoint of restricting their control of the process but because they are highly skeptical of the practicability of Middle Eastern nations jointly owning and managing such a complex enterprise. Although Prime Minister Bhutto is obviously looking to Iran to help him use the reprocessing plant France recently agreed to sell to Pakistan, this idea has not had a favorable reception at the AEOI.

Research

The Atomic Energy Organization of Iran is going to have three research centers, each of which will have a distinctive function.

Nuclear Research Center, Amirabad, Tehran -- This is already functioning, because it was previously the Tehran University Nuclear Center and was taken over intact when the AEOI was formed. It is equipped with a 5 MWe swimming pool reactor and a Van de Graaf particle accelerator and will continue to concentrate on long range nuclear research to advance the state of scientific knowledge. A new interest at the Center is controlled thermo-nuclear fusion using laser technology, and the AEOI is strongly interested in working cooperatively with the Los Alamos Laboratory of ERDA on this endeavor.

The AEOI hopes to obtain TRIGA fuel elements and controls from General Atomic in order to modernize the existing research reactor. This is also expected to expedite the production of radioisotopes for industrial and research purposes. The Center's environmental research section engages in studies of air pollution and has also been involved in chemical analysis of foodstuffs and drinking water. An important aspect of the Center's work is the provision of a radiation protection service for Iran.

Radioactive Materials Research Center, Youssefabad, Tehran -- This is the rather large establishment built up by Dr. Ali Sekhavat with showmanship and royal patronage. Although the projects usually shown to visitors reflect his sometimes bizarre ideas, it is understood that he has some quite able people working in his shadow. The Center's general role is seen as support for the AEOI in a wide variety of radiation uses and measurements. It is also expected to take on the task of analyzing uranium-bearing rock samples submitted by prospecting teams.

Nuclear Technology Center, Esfahan -- This installation does not yet exist, but it has been budgeted for \$300 million and is expected to employ 1,200 people when completed. It is to be the principal center of support for the nuclear power program and is to develop a capability to cope with problems of operating, repairing, and refueling nuclear power plants, particularly those which the operating staffs themselves cannot handle. The initial design concept has been completed by Technicatome, a subsidiary of the French AEC, and the second phase of modifying and elaborating it through detailed consultations with the AEOI has begun. Construction will probably begin in December, 1976, and it is hoped that it will be complete and in use two years later. A site, twelve kilometers southeast of Esfahan has already been acquired and surveyed in detail.

The Esfahan Center will have about five major divisions, two of the most important of which will be the Reactor Division and the Metallurgy Division. The Reactor Division will be equipped with a French Minerve research reactor developing only 100 watts and devoted mainly to studies in nuclear physics and the training of reactor physicists. It will also have a nuclear power plant simulator on which to train reactor operators. Studies in fluid mechanics, heat transfer, and corrosion will be carried on.

The Metallurgy Division will serve a key function -- to study materials to be used in reactors and other facilities in which radioactive substances are manipulated. It is not expected to include a hot cell for handling highly radioactive substances, the first step toward a reprocessing facility, but only "table-top equipment."

Also included in the Esfahan Center will be sections for fuel fabrication, uranium chemistry, and desalination, as well as a division of water, energy, and environmental studies. All of these divisions and sections are intended to speed the transfer to Iran of foreign nuclear technology and to develop indigenous capability to deal with any operational and maintenance problems. Incidentally, the center will also train Iranians in nuclear technology. In the beginning, at least, the Center will not be expected to engage in large scale production of nuclear substances or equipment, only to know how these materials are produced and handled.

Relations with the United States

There is an existing Agreement for Cooperation for Civil Uses of Atomic Energy between the U.S. and Iran, which was signed in 1957 and amended in 1964 and covers principally research matters. IAEA safeguards were applied to the U.S.-Iran agreement by a later tri-lateral agreement.

When the Government of Iran decided to launch a nuclear power program, in the course of which signing enrichment services contracts with the AEC and contemplating purchase of nuclear power plants from U.S. industry, it became necessary to negotiate a new, more inclusive bilateral agreement. A first draft of a new agreement was presented to the GOI in February, 1975, and after a round of negotiations a second was presented in May, 1975. Since that time there have been no detailed discussions between the two governments on this subject, but the new bilateral is to be considered again in April, 1976, on the occasion of Dr. Etemad's proposed visit to the U.S. Although there has been some disagreement on the quantity of enriched uranium Iran would be allowed to import from the U.S. and some uncertainty about the GOI's thoughts on physical security measures, the principal point at issue has been whether the U.S. could have a veto on the right of Iran to reprocess U.S.-supplied fuel within

Iran. Unfortunately, failure to sign a new U.S.-Iran bilateral has, in effect, stymied sales efforts of U.S. vendors of nuclear power plants and has reduced GOI interest in the plant of Uranium Enrichment Associates. As previously mentioned, American industry is participating in various aspects of the Iranian nuclear program, such as site survey, uranium prospecting, and preparation of regulations, but the major commercial prizes of the Iranian program have thus far gone to competitors, owing to a conflict between quite justifiable American concerns about nuclear safeguards on the one hand and Iranian pride on the other.

Relations with Other Countries

The Iranians appear to have closest and most satisfactory relations in the nuclear field with the French. These rest upon a June, 1974, agreement of quite general nature but including practically all the peaceful uses of nuclear energy. Subsidiary agreements have been signed later covering sale of two nuclear power plants (November, 1974), uranium enrichment (January, 1975), the Esfahan Nuclear Technology Center (May, 1975), and joint participation in foreign uranium prospecting and exploitation (November, 1975). It is understood that although the June, 1974, agreement with France obliges the latter to consider cooperation with Iran in all stages of the nuclear fuel cycle, by tacit agreement the subject of reprocessing has not yet seriously arisen. The French technique of signing a general, overall agreement first, followed only later by sub-agreements on particular areas of cooperation has the advantage of taking difficult hurdles one by one rather than attacking the whole mass of issues frontally.

Although Germany was the first country to sell Iran a nuclear power plant, the fact remains that the construction now in progress at Halileh is still covered only by a fairly detailed letter of intent rather than a contract. Negotiations on a firm contract between the AEOL and Kraftwerk Union were broken off in March, 1976, due mainly to escalating costs. With the concurrence of the Shah, the letter of intent has been extended for an additional three months, but KWU insists it must have a contract by the end of that period.

Until the present, German participation in the Iranian nuclear program has been limited to construction of power plants, so the Government of the Federal Republic is anxious to conclude a general bilateral agreement which will open the way for cooperation in related activities as well. Negotiations were held up for a while by the London suppliers' meetings in 1975. They were taken up again in February, 1976, but were inconclusive. They are to be resumed sometime in the spring of this year. It is reported from a reliable source that the German draft conforms to the London guidelines and may even go beyond them in certain areas. It is also

reported that the Iranians have sought to include in the agreement a commitment by the Germans to sell a reprocessing plant to Iran should the latter decide to acquire one in the future.

Atomic energy officials of India and Iran have exchanged visits, and there appears to be considerable enthusiasm on the Iranian side for cooperation, particularly in the fields of research and training. Officials of the AEOI especially admire India's Bhabha Atomic Research Center at Trombay and would like to emulate India in developing a considerable degree of independence in the nuclear sphere. Talks leading to an agreement for cooperation are expected to commence soon between the two nations.

Although there is contact between the atomic energy authorities of Iran and Pakistan, and at least one Pakistani is working in the AEOI, there is apparently little substantive cooperation between the two as yet.

The Western press has reported that Iran has signed an agreement to purchase \$700 million worth of uranium from the Republic of South Africa and that it will invest in a South African uranium enrichment plant. This story has been denied publicly, but in confidence an AEOI official has confirmed that there is a secret agreement to purchase uranium from South Africa. It is evidently being kept under wraps at the insistence of South Africa. The exact source of the ore may be in Namibia rather than the territory of the Republic itself, since reworking of the Rand mine tailings for their uranium content would only be feasible if the price of gold itself were driven higher.

The AEOI has two agreements with atomic authorities in the U.K. One of these involves cooperation in a program of research to be carried out at the Nuclear Research Center at Amirabad, Tehran, and the other covers research-type training of Iranians at the U.K.'s Harwell Institute.

A dozen or so Argentinians are working in the AEOI, mainly in the regulatory field, but Iran does not have a nuclear agreement with the Government of Argentina. Dr. Etemad has just completed a visit of about a week in Brazil with two of his principal officers and some sort of agreement may result from it, but the two countries are at about the same level of development in the nuclear power field and have little to offer one another.

Iran has sent missions of atomic energy officials to many other countries and has received several such officials itself, but nothing significant has evidently developed from these other contacts.

Relations with International Organizations

Iran has been an active member of the International Atomic Energy Agency (IAEA) for some years.

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Together with the American Nuclear Society, the European Nuclear Society, and the IAEA, the AEOL is sponsoring an international Conference on Transfer of Nuclear Technology to be held at Persepolis April 10-13, 1977.

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