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BOARD OF GOVERNORS

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TECHNICAL CO-OPERATION

PROJECT SCHEDULES FOR 1993-94

32. ISLAMIC REPUBLIC OF IRAN

1. MANPOWER DEVELOPMENT (IRA/0/006) S3

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC E	Months	CC S	Months	NCC S	CC S	CC S	NCC E	CC E	NCC S	
1993	-	-	-	-	18	54,000	-	-	-	-	-	54,000	-	54,000
1994	-	-	-	-	24	75,800	-	-	-	-	-	75,800	-	75,800

Total expenditure to 30 September 1992: **$55,963** (TACF)

OBJECTIVES: To consolidate efforts and improve the knowledge and experience of national specialists through a systematic training programme.

BACKGROUND: The nuclear power programme in the Islamic Republic of Iran covers various fields of activity such as nuclear physics, nuclear chemistry, uranium exploration, nuclear engineering and technology, applications of isotopes and radiation in medicine, biology, hydrology and nuclear safety, with particular attention to radiation and environmental protection. The programme requires knowledgeable and experienced local specialists and the Iranian authorities continue in their efforts to provide systematic training for their staff. Fellowships and scientific visits are an important mechanism by which the Agency arranges for the transfer of scientific and technical know-how connected with the peaceful uses of atomic energy to developing Member States. This ensures maximum relevance of fellowship training and scientific visits to approved Agency-assisted activities. There are also numerous requests for fellowships and scientific visits that are valid and of high priority within a county's nuclear development programme but which may not fall directly within the scope of an Agency-assisted national project. These include situations where a fellowship is appropriate to train manpower for specific tasks where no other Agency input is required, or where such inputs have been provided in the past and the manpower training has a follow-up function, or where it is preparatory to activities for which Agency assistance is envisaged at a later date, or where the training is part of a regional programme. As in the past, the Agency will continue to ensure that all such fellowships and scientific visits are directly relevant to the country's needs and priorities in the field of atomic energy, and will give preference to training that is related to Agency-assisted activities.

NATIONAL INPUT: The Government of the Islamic Republic of Iran will make appropriate staff available for the fellowships and scientific visits, guaranteeing their continued assignment on their return to activities related to the Agency fellowships or scientific visits awarded.

AGENCY INPUT: The Agency will provide the necessary co-ordination and funding.

LONG-TERM IMPACT: This project will ensure that a suitable range of training and manpower development can occur within the broad scope of Agency programmes. The result will be a significant enhancement of the scientific and technical capacity of the country.

2. DEVELOPMENT OF RIA KITS (IRA/2/005) G5 New

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC S	CC S	NCC S	Months	CC S	Months	NCC S	CC S	CC S	NCC S	CC $	NCC S	
1993	1	10,350	-	-	-	-	-	-	-	-	-	10,350	-	10,350
1994	1	10,800	50,000	-	-	-		-		-		60,800	-	80,800
1995	1	11,400	10,000	-	-		-		-	-	-	21,400	-	21,400

OBJECTIVES: To establish a programme of indigenous production of high quality radioimmunoassay (R IA) reagents and kits.

BACKGROUND: There is a substantial demand in Iran for RIA. As imports of RIA kits and reagents are very difficult and expensive, the Atomic Energy Organization of Iran (AEOI) has decided to undertake a project for local production. With the assistance of the Agency, AEOI has been developing domestic production of radiopharmaceuticals with appropriate quality control since 1982. After commissioning facilities for the production of technetium-99m generators and iodine-131 by dry distillation, the present work will focus on the establishment of a radioimmunological laboratory and implementation of a programme for the development and production of the most widely used RIA kits in Iran.

NATIONAL INPUT: Local infrastructure, the existing production laboratory and animal house facilities are adequate for the programme. AEOI supports the programme and will provide the staff, local funding and laboratory space required for the project. The Iranian Government will contribute funds-in-trust to the equipment component.

AGENCY INPUT: The Agency has been requested to provide expertise, equipment and fellowship training in relation to the production and quality control of RIA kits. The most essential items of each component will be provided within the available budget for the project.

LONG-TERM IMPACT: It is expected that the project will result in the establishment of an adequate modern laboratory and routine RIA production for the medical applications in medical centres and hospitals in Iran.

3. URANIUM EXPLORATION (IRA/3/002) B1

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	4	41,400	50,000	-	-	-	-	-	-		-	91,400	-	91,400

Total expenditure to 30 September 1992: $762,798 (TACF)

OBJECTIVES: To complete the evaluation of airborne data, the preparation of maps and the integration of the data with the maps to facilitate the necessary follow-up exploration programmes.

BACKGROUND: The Atomic Energy Organization of Iran intends to embark on a nuclear power programme and uranium exploration in Iran represents an effort to search for adequate resources to meet future domestic needs. In this context, Iran is among the few countries in the world with a relatively strong exploration programme. The Agency is giving assistance under a long-term project on the processing of existing airborne data, the preparation of maps, and follow-up interpretation and in-depth study.

NATIONAL INPUT: Local staff, laboratories and some equipment, and funds for local expenditures are available under this on-going project. Maps are being produced on the basis of information stored on magnetic tape.

AGENCY INPUT: The Agency has been requested to continue technical assistance by providing expertise on a comprehensive programme which will include advice on geology, geophysics, geochemistry, analytical chemistry, mineralogy and borehole logging. Assistance in upgrading the laboratory has been also requested.

LONG-TERM IMPACT: It is expected that the project will result in the assessment of uranium resources in Iran and in the introduction of a comprehensive uranium exploration programme.

4. ORE DRESSING AND LEACHING OF URANIUM ORES (IRA/3/003) B1

YEAR	Experts		Equipment		Fellowships				Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	10,350	20,000	-	-		-	-				30,330		30,350
1994	1	10,900	30,000		-		-			-		40,800		40,800

Total expenditure to 30 September 1992: $10,760 (TACF)

OBJECTIVES: To set up a properly equipped dressing laboratory. To prepare a feed that permits the best balance of uranium recovery by optimized leaching conditions.

BACKGROUND: This project was approved as part of the 1991-92 programme.

5. VARIABLE ENERGY CYCLOTRON LABORATORY (IRA/4/019) G5

YEAR	Experts		Equipment		Fellowships				Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	10,350	80,000	100,000								90,350	100,000	190,350
1994			50,000	150,000	-		-					50,000	150,000	200,000

Total expenditure to 30 September 1992: $8,357 (TACF)

OBJECTIVES: To assist with the installation of a cyclotron for production of short-lived radioisotopes for clinical applications.

BACKGROUND: The Atomic Energy Organization of Iran is continuing their work on construction of a variable energy cyclotron laboratory for the production of gallium-67, tellurium-201, Iodine-123, carbon-11, nitrogen-13, oxygen-15 and fluorine-18 labelled components for positron emission tomography. The cyclotron has already been constructed by AEOI from Belgium using national resources. According to the schedule it will be delivered in 1992 and will be situated in the Nuclear Research Centre for Agriculture and Medicine in Karadj, where infrastructure preparations have already started.

NATIONAL INPUT: A site for the cyclotron is available at the Nuclear Research Centre in Karadj. The building, the laboratory space and the cyclotron will be under national jurisdiction. Two million dollars p.a. are being reserved for equipment and $ 1 million for operation. A local staff of 20 persons, including 6 scientists, will be involved in the project. The Iranian government will contribute funds-in-trust for the equipment component.

AGENCY INPUT: The Agency has been requested to provide expertise, training of local specialists, and some laboratory and interface equipment needed for the cyclotron.

LONG-TERM IMPACT: It is expected that the project will result in a fully functioning cyclotron laboratory for training and radioisotope production purposes.

6. ACCELERATOR-BASED ANALYTICAL TECHNIQUES (IRA/4/020) G4

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	MCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	10,350	30,000	-	-	-	-	-	-	-	-	40,350	-	40,350
1994	1	10,800	50.000	-	-							60,800	-	80,800

Total expenditure to 30 September 1992: $68,345 (TACF)

OBJECTIVES: To increase efficient utilization of the particle accelerator available in the country through the introduction of advanced techniques for the determination of tracer elements in different samples.

BACKGROUND: This project was approved as part of the 1991-92 programme.

7. RADIONUCLIDE PRODUCTION WITH CYCLOTRON (IRA/4/021) G5 New

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	2	20,700	-	-	-	-	-	-	-	-	-	20,700	-	20,700
1994	2	21,800	80,000				-	-	-	-	-	81,800	-	81,800

OBJECTIVES: To set up radiochemical facilities and techniques for the local cyclotron production of radionuclides for medical purposes.

BACKGROUND: There is a need for indigenous production of cyclotron radionuclides and radiopharmaceuticals as the country is currently importing thallium-201 and gallium-67 for medical purposes. Other radionuclides, such as indium-111 and iodine-123, are not imported in spite of the potential demand because of their relatively short half-lives. To meet this requirement, the Atomic Energy Organization of Iran (AEOI) has bought a cyclotron to be installed at the Karadj Nuclear Research Centre. A building for the cyclotron is under construction and installation is planned for June/July 1993. To develop the infrastructure and proceed with the project, there is a need for expertise and supplementary items of equipment.

NATIONAL INPUT: The Nuclear Research Centre in Karadj receives high-priority support from A contract for the cyclotron has already been signed and the supplier is providing the cyclotron itself, one beam line and one solid target station for thallium-201, gallium-67 and iodine-123. AEOI will provide the funds required for all local expenses, including infrastructural development. The Iranian government will contribute funds-in-trust to the equipment component as well.

AGENCY INPUT: The Agency has been requested to provide expertise and training in radioisotope production by means of a cyclotron and in quality control. Provision of a hot cell with accessories has also been requested and this will be fulfilled within the limit of available funds.

LONG-TERM IMPACT: It is expected that the project will contribute to greater self-sufficiency in a number of radionuclides and radiopharmaceuticals.

8. PREPARATION OF AEOI STAFF FOR NPP CONSTRUCTION (IRA/4/022) AI New

YEAR	Experts		Equipment		Fellowships				Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	**8**	**82,100**	**10,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**72,100**	**-**	72,100
1994	**8**	**84,800**	**10,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**74,800**	**-**	74,800

OBJECTIVES: To increase the capacity of the Atomic Energy Organization of Iran (AEOI) for the evaluation of nuclear power plant bids and to develop a regulatory infrastructure and policy.

BACKGROUND: In view of the difficulties in restarting the Bushehr Nuclear Power Plant (NPP), AEOI must prepare for negotiation of contracts for possible new NPPs, e.g. WWER-type reactors. In these negotiations, the safety aspects of the proposed reactors are of significant importance. AEOI needs Agency assistance to prepare at least a minimum number Of its staff for negotiations, so as to assure the high quality and safety of the NPPs to be built, and in particular to overcome:
a) the shortage of well qualified personnel in the field of NPP construction and nuclear safety; and
b) the lack of experience in contract negotiations, preparations for the bidding process and project implementation, particularly from the standpoint of assuring safety from the very start of the process of design review and subsequent construction.

NATIONAL INPUT: The project has high priority in the country as well as the support of AEOI. The Nuclear Power Plant Division and Nuclear Safety Department have the requisite offices, equipped with computers and some software. AEOI will also provide the funds needed to cover local costs. The additional staff required will be trained through the Department of Education and Manpower Development.

AGENCY INPUT: The Agency has been requested to provide expertise and training in the subjects of nuclear safety, regulatory activities and project management.

LONG-TERM IMPACT: The project will significantly contribute to the development of an adequate infrastructure for the nuclear power programme in Iran.

9. SERO-MONITORING OF RINDERPEST USING NUCLEAR TECHNIQUES (IRA/5/009) D3 New

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	**10,350**	**10,000**	**-**	-	-	**-**	-	**-**		**-**	**20,350**	**-**	**20,350**
1994	**2**	**21,800**	**10,000**	**-**			**-**	**-**	**-**	-	**-**	**31,800**	**-**	**31,800**
1995	1	**11,400**	**10,000**	**-**	**-**	-	**-**	**-**	**-**	**-**	**-**	**21,400**	**-**	21,400
1996	1	**12,000**	**10,000**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**22,000**		22,000

OBJECTIVES: To introduce ELISA-based systems for sero-monitoring and to carry out rinderpest sero-monitoring as part of the overall programme of rinderpest control.

BACKGROUND: Rinderpest is responsible for substantial losses in livestock in the Middle East, and the Veterinary Organization of Iran is undertaking the necessary control measures to avoid an epidemic resulting in the subsequent death of many cattle. Although a vaccination programme has been initiated, experience in many other countries has shown the essential need to monitor this process if control is to be achieved.

NATIONAL INPUT: The Disease Control Section of the Veterinary Organization of Iran has three diagnostic laboratories and will soon obtain a new building for laboratory activities in Tehran. All local costs will be covered from the budget of the Organization. The Iranian government is committed to contribute to the project by funds-in-trust components of 1 m/m of expertise, $ 170,000 for equipment and 6 m/m of fellowships for the first year of implementation.

AGENCY INPUT: The Agency has been requested to provide expertise and guidance as well as certain items of equipment, including ELISA readers, computers, plate washers, pipettes, reagent troughs, microtitre plots, and FAO/IAEA rinderpest ELISA kits.

LONG-TERM IMPACT: Through the transfer of ELISA techniques for the sero-monitoring of rinderpest, the project will also contribute to the future use of this highly relevant technique for the diagnosis and control of other major diseases affecting livestock in Iran (e.g. brucellosis, foot-and-mouth disease, infectious bovine rhinotracheitis).

10. INDUSTRIAL APPLICATION OF RADIOTRACERS AND SEALED SOURCES (IRA/8/009) F1

YEAR	Expert		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	10,350	80,000	100,000	-	-		-	-	-	-	90,350	100,000	190,350
1994	1	10,800	20,000	50,000		-	-	-	-	-	-	30,800	50,000	80,800

Total expenditure to 30 September 1992: **$124,879** (TACF)

OBJECTIVES: To transfer radiotracer and nuclear gauging technology for eventual application in the chemical, mineral, petroleum, sugar, wood, paper, cement and steel industries

BACKGROUND: Radiotracer and nuclear gauging techniques have great potential in the Islamic Republic of Iran and industries which would utilize them have already been identified. To promote these techniques, the Atomic Energy Organization of Iran has organized a group in the Radioisotope Department of the Nuclear Research Centre in Tehran. The group is to work on the prototype development of level, thickness and density gauges and some of the prototypes developed show promise for industrial application. The group is also preparing itself for research and development work on radiotracers and industrial sources.

NATIONAL INPUT: A staff of 12 persons, including 4 scientists, laboratories and other facilities and equipment as well as adequate funds are available. The Iranian government will contribute funds-in-trust for the equipment component.

AGENCY INPUT: The Agency has been asked to provide expertise and training on radiotracer and nuclear gauging techniques, to help set up a laboratory for the production of sealed sources and to provide selected items of equipment needed for the programme.

LONG-TERM IMPACT: It is expected that the project will result in the establishment of a group of national specialists working in radiotracer and nuclear gauging technology applicable to a variety of local industries.

11. GAMMA SPECTROSCOPY IN THE MINERAL INDUSTRY (IRA/8/010) F1 New

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	10,350	10,000	-				-	-	-	-	20,350	-	20,350
1994	1	10,800	10,000	-	-	-	-		-	-	-	20,800	-	20,800

OBJECTIVES: To apply prompt gamma nuclear activation analysis (PGNAA) in the mineral industry as a fast and efficient technique for in-situ and on-line use.

BACKGROUND: The Atomic Energy Organization of Iran (AEOI) is supporting practical applications of nuclear techniques in industry. The Neutron Physics Division of the Nuclear Research Centre in Tehran Is helping the mineral industry to modernize exploration and exploitation processes in this respect. The potential uses of these techniques are in relation to coal mining, the

exploitation of copper, lead or zinc ores, and the cement industry. After laboratory study of material behaviour using irradiation techniques, a determination can be made as to which phases of the production process would prove to be most suitable for the introduction of nuclear analytical techniques from both the technical and economic points of view. In co-operation with the relevant industrial sector, appropriate measurement techniques can then be developed for introduction as appropriate.

NATIONAL INPUT: A research reactor, some laboratory space, staff and funds for local expenses will be committed. The Iranian Government will contribute funds-in-trust to the equipment component.

AGENCY INPUT: The Agency has been requested to provide expertise and training on PGNAA applications, in-situ in a coal mine and for on-line monitoring of coal processing. Some equipment for radiation detection will also be provided.

LONG-TERM IMPACT: It is expected that the project will result in practical applications of PGNAA in coal mining and will contribute to modernize exploitation processes in the mineral industry.

12. STRENGTHENING RADIATION PROTECTION IN IRAN (IRA/9/012) HO

YEAR	Experts		Equipment			Fellowships			Training	Sub-contracts		Total		Grand total
	Months	CC $	CC $	NCC $	Months	CC $	Months	NCC $	CC $	CC $	NCC $	CC $	NCC $	
1993	1	**10,350**	**50,000**	**50,000**	**-**	-	**-**	**-**	**-**	**-**	**-**	**60,350**	**50,000**	**110,350**
1994	1	**10,800**	**50,000**	**50,000**	**-**	-	**-**	**-**	**-**	**-**	**-**	**80,800**	**50,000**	110,800

Total expenditure to 30 September 1992: $132,368 (TACF)

OBJECTIVES: To upgrade the radiation protection laboratory in the Islamic Republic of Iran.

BACKGROUND: This project was approved as part of the 1991-92 programme.