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RECOLLECTIONS FROM THE EARLY DAYS OF THE PAEC

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A committee constituted in January 1955 to prepare R&D program for the utilization of nuclear energy, recommended the establishment of the Atomic Energy Commission, which was created on February 24th 1956. Dr. Nazir Ahmad, the first chairman, assumed the office on April 11th, 1956. The commission chalked out the plan of actions and recruited a few scientists and engineers who were sent abroad for training. In the meantime a small laboratory with limited facilities was set-up in Karachi. The actual implementation of the plans began soon after the appointment of Dr.Usmani as Chairman in March 1960. Recruitment and training of manpower gained momentum and two laboratories with good experimental facilities was set-up at Lahore and Dacca in 1961 and 1962 respectively. An Agriculture Research Centre at Tandojam and Nuclear Medical Centres at Karachi and Lahore was also set-up in early 1960's. A multi disciplinary, Pakistan Institute of Nuclear Science and Technology was established in 1965 and a research reactor was installed which achieved first criticality in December 1965. In early 1960's studies were undertaken to examine the technical and economic feasibility of establishing a nuclear power plant for the generation of electricity. The construction of Karachi Nuclear Power Plant started in the middle of 1967 and completed in early 1971. The first criticality of the reactor was achieved in August 1971 and the plant was formally commissioned in 1972. In the middle of 1970's, embargo on the supply of materials and nuclear equipment by developed countries affected the programs of PAEC. This difficulty was overcome by developing a certain level of self-reliance and self-sufficiency in certain areas. PAEC, ever since 1960's remained a dynamic organization and continued to make greater progress in the next decades.

Keywords: Scientists'committee, PAEC, First chairman, Research reactor, Power reactor

The Government of Pakistan, in order to promote the United Nations "Atoms-for-Peace" program, decided in January 1955 to establish an Institute of Atomic Energy for the utilization of nuclear energy for various applications. Consequently the Ministry of Industries through a Resolution No: 20 (19) S&D-11/54 dated January 6th, 1955, constituted a committee of twelve scientists under the chairmanship of Dr. Nazir Ahmad, the-then chairman of the Tariff Commission. (Annexure-A) The task of the committee was to prepare a research and development program, delineate the planning details of an Institute of Atomic Energy and to initiate recruitment and training of manpower in various disciplines of nuclear science and technology. On 31st October 1955 this committee, after formulation of an initial program, recommended to the government to establish an Atomic Energy Commission as an autonomous body.

In view of this recommendation the Government of Pakistan through a Resolution No.P-22 (44) AE/55 dated February 29th, 1956, created the Council of Atomic Energy, consisting of a Governing Body and the Atomic Energy Commission. The governing body was composed of the Minister for Industries, Minister for Foreign Affairs, Secretary, Ministry of Industries, Secretary, Ministry of Finance and Chairman PAEC. The Commission had a chairman and four full time members, one each for research, power, finance and administration and three part-time members Dr. Nazir Ahmad was appointed as the first chairman of the Atomic Energy Commission and he assumed charge of the office on April 11th, 1956. Initially the PAEC was an attached department of the Ministry of Industries and Mineral Resources, and then became an autonomous body in 1964.

Dr. Nazir Ahmad, a physicist, was born on May 1st, 1898 at Lahore. He received his school education at Lahore and then joined the M.A.O College, Aligarh, from where he graduated in 1919. He then proceeded to England for higher studies and pursued research studies in physics, apparently at the University of Manchester, under

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Annexure-A

COMMITTEE OF SCIENTISTS

1	Dr. Nazir Ahmad	Chairman, Tariff Commission
2	Dr. Saleem Uzzaman Siddiqui	Director, Scientific & Industrial Research, Government of Pakistan, Karachi
3	Dr. Raziuddin Siddiqui	Vice Chancellor, University of Peshawar, Peshawar
4	Dr. Bashir Ahmad	Director, PCSIR Regional Laboratories, Lahore
5	Dr. M.Q.Khuda	Director, Scientific and Industrial Research Laboratories, Dacca
6	Lt.Col. M. Jafar	Director General of Health Services, Government of Pakistan, Karachi.
7	Dr. Mujtaba Karim	Head, Department of Physics, University of Karachi, Karachi
8	Dr. S. Chaudhuri	Ministry of Agriculture, East Pakistan Government, Dacca
9	Dr.Rafi Muhammad Choudhury	Professor of Physics, Government College, Lahore
10	Dr. M. Hafeez Tusi	Nishter Medical College, Multan
11	Mr. Zafar Alam	Principal, Agriculture College, Lyallpur (Faisalabad)
12	Dr. Maqsood Butt	Assistant Professor of Physiology, Veterinary College, Lahore

Lord Rutherford. He obtained the degrees of M.Sc in 1923 and Ph.D. in 1925. On his return to India he was appointed as Assistant Director, Technological Laboratory, Central Cotton Committee of India in 1930 and after one year he was promoted as Director. In 1945 he was appointed Member of the Indian Tariff Board. After the partition of India he moved to Pakistan where he held various important positions including Joint Secretary of the Ministry of Economic Affairs, Secretary, Pakistan Development Board and Pakistan Planning Advisory Board. Dr. Nazir Ahmad was one of the top-most scientists of the sub-continent and a founder Member and the President of the Pakistan Academy of Sciences. In 1950 he was appointed chairman, Tariff Commission, and then chairman Pakistan Atomic Energy Commission in 1956.

In 1955, a Pakistan delegation led by Dr. Nazir Ahmad attended the first United Nations Atoms for Peace Conference in Geneva where United States of America (USA) offered a grant of US $ 350,000 to help the participating countries that would like to start nuclear research program for peaceful applications of nuclear energy. Pakistan got interested in this offer and invited a team of US Atomic Energy Consultants in March 1956 to study the feasibility of establishing a research reactor facility in Pakistan. Dr. Nazir Ahmad, in the first meeting of the Governing Body of PAEC held on May 21st, 1956, (Annexure-B) informed the Body regarding the USA offer of financial grant to offset part of the cost of a research reactor. He also summarized the salient features of the visit of US Atomic Energy Consultants. After detailed discussions the Governing Body suggested to obtain a medium-size research reactor such as CP-5, DIDO or swimming pool type and to get additional funds for the purchase of the research reactor from the US International Co-operation Agency (ICA) or from similar aid-giving agencies. Finally in 1959 the Government of Pakistan tentatively approved to install a “Swimming Pool” type reactor to initiate nuclear energy research program. The cost of this reactor at that time was quoted as US $ 600,000. The Government also decided to install this reactor at a suitable site near the-then Federal Capital in Karachi. However, the Cabinet later on suggested investigating other sites also for locating the reactor. Consequently a team consisting of two American Experts and three Senior Technical Officers of PAEC visited Lahore, Abbottabad and Peshawar for determining possible sites keeping in view factors such as the distance from populated areas, availability of water and power supplies, roads, climatic conditions etc.

In 1959 the Federal Capital was shifted to the new city named Islamabad. It was then decided to

Annexure-B

FIRST GOVERNING BODY OF THE ATOMIC ENERGY COUNCIL

1	Mr. Habib I. Rahmatulla	Minister for Industries
2	Mr. Hamidul Haq Choudhry	Minister for Foreign Affairs & Commonwealth Relations
3	Mr. Mumtaz Hasan	Secretary, Ministry of Finance
4	Mr. Abbas Khaleeli	Secretary, Ministry of Industries
5	Dr. Nazir Ahmad	Chairman, Atomic Energy Commission

locate the reactor near the new capital. A Committee of Dr. Nazir Ahmad (Chairman, PAEC), Dr. I. H. Usmani (Member, PAEC) and Dr. Abdus Salam (part-time Member of PAEC) was constituted to select a suitable site near Islamabad. Several sites were investigated and finally a site located at Nilore Village on Lehtrar road was selected. Later on some controversy arose regarding the seismic activity of this area, which was finally resolved by obtaining the opinion of seismic experts. After formal approval of the site the foundation stone of the Pakistan Institute of Nuclear Science and Technology (PINSTECH) was laid on April 20th 1963 by Mr. Z.A. Bhutto, the-then Minister of Industries and Mineral Resources, and the construction of the buildings started. Pakistan's first Nuclear Research Reactor supplied by AMF Atomic of USA was installed at PINSTECH and the first criticality of the reactor was achieved on December 21st, 1965, which was a landmark in the history of Pakistan. Later, on June 14th 1966 Field Marshal Ayub Khan, the-then President of Pakistan, visited PINSTECH and congratulated the scientists and engineers of PAEC for this achievement.

Soon after the establishment of Pakistan Atomic Energy Commission plans were made to set up some experimental facilities and to train manpower in various disciplines of nuclear science and technology. Therefore, in 1957 a small laboratory with limited facilities was set-up in a shed at West Wharf, Karachi, and recruitment of manpower started. PAEC recruited about 30 scientists and engineers, and sent them for 3 to 9 months' training in Europe and America through training programs arranged by U.S. ICA and International Atomic Energy Agency (IAEA). About 15 engineers were sent to the International School of Nuclear Science and Engineering at Argonne National Laboratory, Chicago.

Dr. I. H. Usmani, who joined PAEC on May 21st, 1959, as Member Research, was appointed as Chairman PAEC on March 15th, 1960. Soon after his appointment as Chairman Dr. Usmani began implementing the plans prepared in the past and also formulated new programs, Realizing the necessity of good experimental facilities for research and development studies and training of manpower he planned to establish two laboratories, one each in West Pakistan and East Pakistan. The first Atomic Energy Centre was established at Lahore in 1961 whereas the second centre was established at Dacca in 1962. These centres had nuclear science facilities unmatched anywhere in Pakistan. Similarly an Agriculture Research Centre at Tandojam and a Nuclear Medical Centre at Karachi in 1960 and another at Lahore in 1963 was set up. A Centre for Space and Upper Atmosphere Research (SUPARCO) was set up at Karachi in 1964 under the chairmanship of Dr. Abdus Salam.

In order to implement the ambitious programs of the commission it was necessary to recruit and train more manpower in various disciplines of nuclear science and technology. Thus the recruitment of manpower was intensified. About 50 bright young scientists and engineers were recruited every year during 1960s by offering attractive salaries and better working conditions These persons were required to attend a six months nuclear orientation course at AEC Lahore and Dacca where they learned basics of nuclear physics, nuclear chemistry, health physics etc. After completing this course, scientists were sent abroad for Ph.D in various universities and engineers for MS or on the job training in nuclear engineering at Oak Bridge National Laboratory and other places to form a nucleus of nuclear power engineering group.

Many of the scientists and engineers who went abroad in 1958 to 1960 started to return to Pakistan after completing their studies. Most of them were posted at AEC Lahore where they started some R&D studies in various disciplines of nuclear science and also helped in the training program. A number of experimental facilities were gradually established at the Lahore Centre. These included a 14 Mev Neutron Generator and a sub-critical assembly of magnox-clad natural uranium rods. A Van-de-Graff linear accelerator and an IBM 1620 computer were set-up at the Dacca Centre. The research program started to take off and the first research paper dealing with Rodiochemical separation of cobalt was published by this author in an international journal in 1964. As more persons returned from aboard the R&D program gained momentum and more papers were published. In order to broaden their vision and scope of studies, many scientists were encouraged to proceed abroad for post-doctoral studies and specialized training in specific disciplines of nuclear science. The quality of R&D work gradually improved and soon the Lahore Centre acquired a good reputation for its research work and for organizing courses in industrial radiography, nuclear medicine and applications of radioisotopes in agriculture and industry. Studies on the utilization of solar energy for various applications were also started.

In early 1965 a team of scientists and engineers led by Dr. Innas Ali, the-then Member Research of PAEC, was sent to Japan Atomic Energy Research Institute (JAERI) in Japan to gain practical experience in nuclear reactor start-up and utilization of the reactor for various applications. These persons after their return to Pakistan were transferred to PINSTECH to participate in the commissioning of the Research Reactor. The R&D program gradually shifted to PINSTECH in the middle of the 1960s and a few of the scientists and engineers were transferred to PINSTECH in 1965 after the completion of Phase I of the Institute. The manpower training program was also transferred. The remaining persons except the geologists, were eventually moved to PINSTECH in 1971. The Lahore Centre was renamed as Atomic Energy Minerals Centre and the program of nuclear mineral exploration and processing of uranium ores for the production of yellow cake gained greater momentum.

The quarterly journal of PAEC by the name of *The Nucleus,* under the editorship of Dr. S.A. Durrani, the-then Director of AECL, started publication in 1964 from the Lahore Centre. The first issue contained messages from Mr. Z.A. Bhutto, the-then Minister of External Affairs & Atomic Energy and Prof. A. Salam, the-then Advisor to the President of Pakistan. Dr. I.H. Usmani wrote the foreword and Dr. G.T. Seaborg, the Nobel Laureate, contributed an article. The publication of the monthly newsletter of PAEC. "Pak Atom", started in 1969 but remained irregular for some years. PAEC also published a list of its scientists and engineers in 1967 and 1970 but later on its publication was suspended for security reasons.

The industrialization process in Pakistan gained momentum in the 1950s, which required higher generation of electricity. Since Pakistan is an energy resource-deficient country the generation of electricity from nuclear energy was also considered by PAEC in the late 1950s. A contract was awarded to two U.S. Companies by PAEC to jointly study the technical and economic feasibility of establishing a nuclear power plant in Pakistan for the generation of electricity. The feasibility report was submitted to the PAEC in May 1961. The experts from the IAEA also conducted a similar study, on the request of PAEC, in 1962. In the meantime Power Commission of Pakistan conducted an independent survey of the projected power requirements of the country in the next 40 years. All these reports concluded that the conventional energy sources alone could not meet the projected power requirement. Therefore, generation of electricity from nuclear energy could be a viable option.

On the basis of these studies Dr. I. H. Usmani pleaded the case for the establishment of a nuclear power plant and finally got the approval from the Government of Pakistan. Of the three possible sites Karachi site was selected for the nuclear power plant due to increasing power requirements of the city and other considerations. After considering various types of power reactors, Canadian Deuterium Reactor (CANDU) was selected and got approved from the Government of Pakistan. Then a contract was signed on May 24th, 1965, with the Canadian General Electric Company Ltd. (CGE) for the supply of a 137 MW(e) Nuclear Power Reactor to PAEC. The construction of Karachi Nuclear Power Plant (KANUPP) after obtaining the "Construction Permit," was started in the middle of 1967 and

Annexure-C

CHAIRMEN OF PAEC

1	Dr. Nazir Ahmad (Late)	April 11, 1956 – March 14, 1960
2	Dr.I.H.Usmani (Late)	March 14, 1960 – March 15, 1972
3	Mr. Munir Ahmed Khan (Late)	March 15, 1972 – April 7, 1991
4	Dr. Ishfaq Ahmad	April 8, 1991 – April 5, 2001
5	Mr. Parvez Butt	April 6, 2001 – to date

completed in early 1971. The first criticality of the reactor was achieved on August 1st, 1971.

The commissioning of the plant was started but interrupted due to Indian hostilities, which resulted in the loss of East Pakistan. This event caused general demoralization and discontent among PAEC employees mainly due to political uncertainty. In March 1972 Dr. I.H. Usmani was transferred to the Ministry of Science and Technology and Mr. Munir Ahmed Khan, who had the relevant technical background was appointed as chairman PAEC on March 15th 1972. Mr. Munir Khan, soon after his appointment, took measures to improve the confidence level and morale of the employees. The commissioning of the reactor was restarted and completed in 1972. The Karachi Nuclear Power Plant was formally inaugurated on November 28th 1972 by Mr. Z.A. Bhutto, the-then President of Pakistan. Dr. I.H. Usmani, who started this project, could not attend this ceremony due to unknown reasons.

The decade of 1960s was an eventful decade for the PAEC. During this period the programs gained tremendous momentum and the PAEC made remarkable achievements by establishing a number of research facilities in various disciplines of nuclear science and technology and in capacity building. The commissioning of the first Research Reactor in December 1965 was a landmark in the history of the country. The manpower trained during this period is a valuable asset of the PAEC. These highly trained and dedicated persons played a significant role in achieving various objectives of the PAEC.

The embargo on the supply of materials and nuclear-related equipment and denial of manpower training facilities by the developed countries in the 1970s affected the programs of the PAEC. However, the embargo turned out to be a blessing in disguise as it initiated the process of indigenization. Local fabrication of parts and design of systems was started, observing strict adherence to the international standards. Numerical-control milling machines were introduced for the manufacture of better quality products. Non-destructive testing techniques were extensively used for quality assurance of these products .The indigenization process improved the skills and confidence levels of the scientists and engineers to progress on their own without any help from other countries. Soon the PAEC developed a certain level of self reliance and self sufficiency in some areas of nuclear technology by the concerted efforts and dedication of the people trained during the 1960s. The establishment of first- rate training facilities, comparable with those existing in the developed countries, proved very useful for self-reliance in the training of manpower in various disciplines of nuclear science and technology. The indigenization also caused the growth of supporting sister institutions in both the public and private sectors. The Pakistan Atomic Energy Commission, ever since the 1960s, has remained a dynamic organization and continued to make greater progress in the next decades under the leadership of its Chairmen (Annexure-C) by establishing chemical plants, nuclear power plants and nuclear fuel cycle facilities. It has provided national leadership in all areas of science and technology and helped to raise the stature and respect of scientists and engineers in the society. The benefits of the applications of radiation and radioisotopes have been extended to the public in health care, food production and for quality assurance of industrial products.

Dr. I.H. Qureshi is former Member (Tech.) / Sr. Member of PAEC and at present Scientist Emeritus, PINSTECH.

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