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APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT
Quarterly Report No. 16, Phase II
July-September 1985

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INTRODUCTION

This is the sixteenth quarterly report, Phase II of the Applied Science and Technology Research Program in Egypt covering the period July-September 1985. The program is supported under Contract NEB-0016-C-00-1058-00 of the United States Agency for International Development (AID) with the National Academy of Sciences/National Research Council (NAS/NRC). Within NAS/NRC it is the Board on Science and Technology for International Development (BOSTID) which is responsible for program implementation.

An overview of each Project for Phase II which began in July 1981 was presented in the tenth quarterly report (January-March 1984); a summary of Phase I activities covering the years 1978-81 was written in June 1982.

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APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM IN EGYPT
Phase II: Sixteenth Quarterly Report
July-September 1985

A. Program Policy, Planning and Management

• Joint Consultative Committee (JCC)

There were no meetings of the JCC or the JCC executive committee during the three-month period from July 1 through September 30, 1985. The U.S. panel of the JCC has scheduled a meeting in Washington, D.C. at the NAS/NRC headquarters on Monday, November 4, 1985 (Joseph Henry Building, Conference Room 358, 2100 Pennsylvania Avenue N.W., 9:00 a.m. to 4:00 p.m.).

The final meeting of the full JCC (JCC-XVI) is scheduled in Cairo, Egypt, at the Academy of Scientific Research and Technology (ASRT) November 26-28, 1985.

• Science and Technology Policy Measures

A project report on the three S&T policy seminars held in 1981, 1982, and 1983 was completed by Dr. Leo S. Packer, NAS/NRC resident program director in Cairo, immediately before his departure in 1984 (See Annex A). This report, which has since been reviewed and is now generally available, is summarized below.

Inclusion of a special S&T policy element in part of Phase II of the Applied Science and Technology Research program was recommended by an advisory group to AID Mission Director Donald Brown led by Princeton Lyman from AID in Washington. The intent of the project was to deepen the understanding of the critical need for S&T analyses and policy programming inputs within the more traditional Egyptian economic and

political policy-making framework and to build an ongoing mechanism in ASRT for continuous policy study and analysis.

Three seminars were held in each of three years to bring about greater interaction among scientists, engineers, economists and others, both inside and outside the policy planning institutions of the Egyptian government. The ASRT, as the body authorized by law for the development and application of S&T for Egyptian well-being and growth, took responsibility for the three-year effort.

Although the project did not result in the institutionalization of an ongoing S&T policy analysis and evaluation group in ASRT with budget resources and a cadre of assigned manpower, the three-year effort achieved several positive results:

1. Involvement of a large number of influential decision makers from government, universities, industry and the ASRT in a review of S&T policy issues. This heightened their appreciation and awareness of the S&T dimension in all economic development activities. It also resulted in a draft technology policy statement in Arabic only, which was submitted by the ASRT President to a cabinet committee of the Prime Minister.

2. A high level of visibility of the S&T policy planning process in the government, coming to the attention of the Prime Minister and the President of Egypt, as well as several key ministers.

3. Demonstration of one process for engaging in policy planning and analyses. The activity provided a valuable learning experience for those who participated in the planning committees and broadens the base from which future manpower resources may be drawn for S&T policy activities.

Because the report by Dr. Packer is a summary of the ASRT methodology for the three seminars and because it discusses achievements in the context of broader planning in Egypt, the document is included as Annex A to this quarterly report.

- Research and Development (R&D) Management

The R&D management project has been concerned with the training of a cadre of ASRT, National Research Centre (NRC/Cairo) and other R&D personnel in the principals of management at project, program and institutional levels. It has also directed efforts toward strengthening of institutional systems for R&D within ASRT and NRC/Cairo.

Of the two elements, management training has shown the greater progress. The ability to conduct highly relevant training experiences within the Egyptian R&D context is now well established in NRC/Cairo. Several efforts to effect changes in institutional structure have also occurred. Among these one may cite the 1984 workshop conducted by a consultant from the Egyptian National Institute for Management Development and the ongoing work of the R&D Management Committee at the Centre.

A major event that occurred late in 1984 was the change in leadership of both the ASRT and the National Research Centre. Dr. Mohamed Kamel, former Director of the National Research Centre, became the ASRT President and Dr. M.B.E. Fayez, former ASRT Vice President, became Director of the Centre. The change did not affect basic S&T policies of ASRT or NRC/Cairo. The principal statutes

(By-laws) of the Centre were amended by the Egyptian Government in 1985 to direct that greater efforts be undertaken by NRC/Cairo to provide its R&D services on a reimbursement basis to Ministries, Governorates, and industry. The result is that contract research has new prominence and urgency. To mobilize NRC/Cairo resources to make the new system effective, Dr. Fayez has initiated a reorganization of the Centre, as illustrated in Figure 1.

Prior to the conclusion of the Applied Science and Technology Research program in September 1986, three R&D management systems activities are to be given priority:

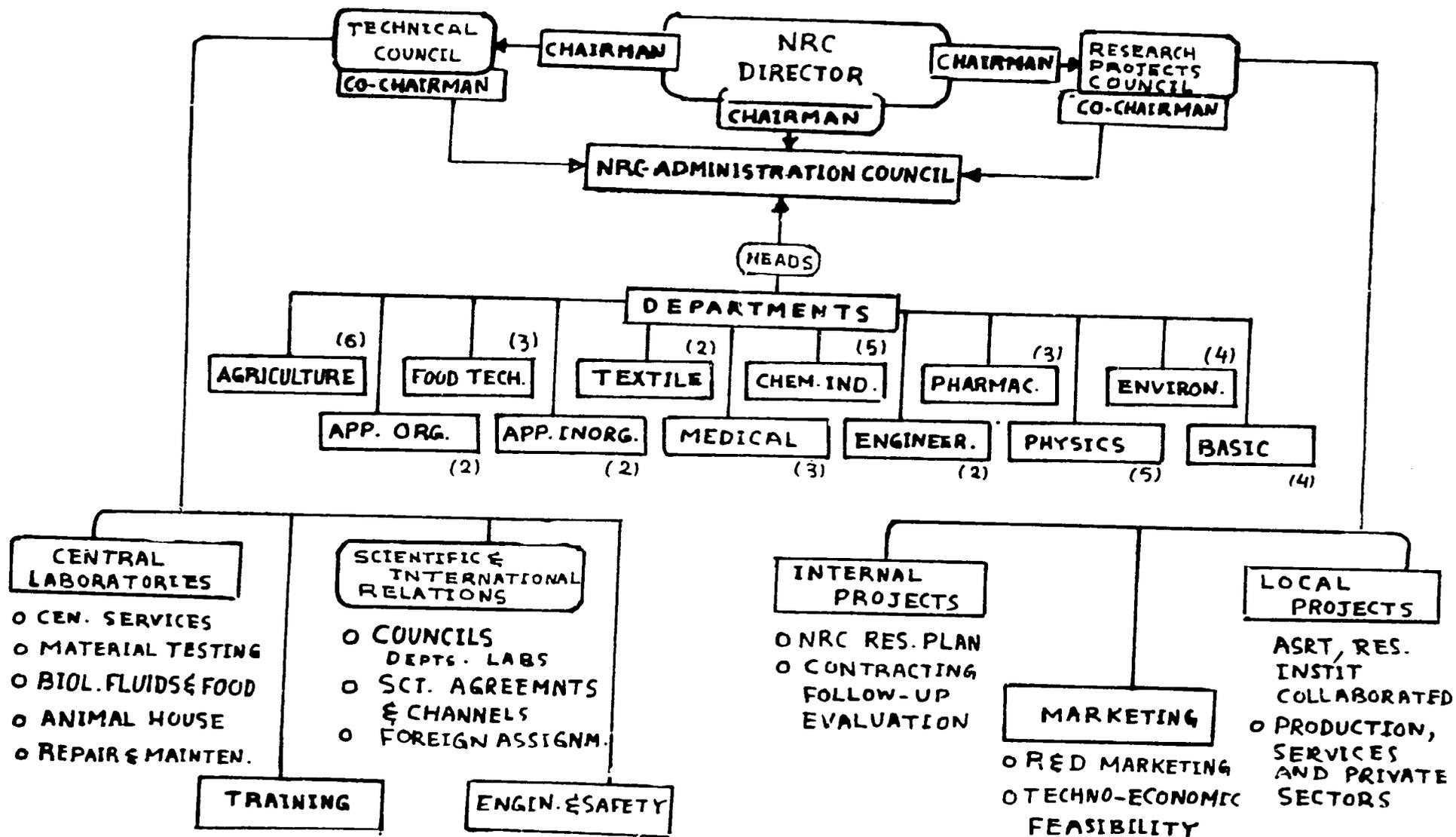
1. Assessment of the impact and benefit of the R&D management activities in ASRT and its affiliated research institutes. This will be undertaken by the consultant James Blackledge who has previously served the R&D management program as an advisor.

This assessment is intended to assist ASRT in furthering the reorganization of management systems in the affiliated research institutes.

2. Assessment of the present R&D marketing system of NRC/Cairo and strengthening of its services. This will be undertaken by the R&D management committee with the assistance of outside consultants as needed. Its goal is to strengthen marketing procedures and help the Centre achieve a higher degree of contract support.

3. Review of proposals for a management information system design for ASRT and NRC/Cairo and implementation of at least one step in that design.

Figure 1.
 Organization Chart: National Research Centre
 Cairo, Egypt
 September 1985



Numbers in parentheses represent number of laboratories in each Department.

- NAS/NRC Washington Program Management

After the termination of the position of NAS/NRC Resident Director for the Applied Science and Technology Research Program, Mr. Mohamed Gomaa, administrative specialist in the NAS/NRC office in Cairo, was given additional responsibilities. In early July Mr. Gomaa spent seven working days in Washington for on-the-job training in NAS/NRC financial management methods and accounting procedures. He worked with Associate Comptroller Michael Biela to set-up a record-keeping and disbursement system for Cairo operations now that all activities originate from dollar accounts. He also spent time with Mr. Davenport reviewing project activities and schedules for the remaining months of the program.

Mr. Augustus Nasmith made a regularly scheduled staff visit to NAS/NRC Cairo during the first two weeks of August. He assisted in planning and preparations for the visit of BOSTID advisor Dr. James Fitch, an agricultural economist working as consultant for the project "Technical and Socio-economic Evaluation of Irrigation Systems in New Lands" (Land Reclamation).

The Egyptian program coordinator, Dr. A.S. El Nockrashy, spent August 10-29 in Washington working with Jay Davenport on the structure and format of final reports for the program. Most of the time was given to preparing chapters in the comprehensive report for the More and Better Food program. Another report, covering NAS/NRC participation in 11 subprojects, is also in preparation. These reports are to be reviewed in draft form by the Joint Consultative Committee at its November meeting in Cairo.

While in the United States on other business for the National Research Centre, Dr. Nabil Saleh, coordinator of NRC/Cairo international programs and member of its R&D management steering committee, came to NAS/NRC Washington for one week of program coordination activities with BOSTID staff. His schedule also included visits to Battelle/Washington headquarters for discussions concerning possible inputs to R&D management training activities from that organization. He visited the American Chemical Society headquarters for a review of their current management and technical short courses. In his capacity as coordinator of equipment procurement, maintenance and repair for the Applied Science and Technology Research Program, Dr. Saleh met with Mr. Howard Metz at the National Institutes of Health.

B. Summaries of Project Status

- More and Better Food (MBF)

One of the basic assumptions of the MBF program is that improved agricultural productivity will increase the real income of farm families and will be translated into better nutritional status. The latter should occur either through an enhanced ability to purchase food or through an increase in consumption of home produced plant and animal products. Better nutrition was therefore incorporated into MBF both as a quality of life indicator and as a goal that manifests itself in improved health status of the program participants.

It is important to recognize that the goal of improved nutritional status may not be realized solely through greater agricultural

production. A number of factors other than access to food can and do affect nutritional well-being of farm families. These include poor sanitation, exposure to disease, access to medical care, work requirements, and time available for household and child care. Thus improving nutritional status must be recognized as a goal requiring a variety of inputs.

Available literature on nutritional impacts of agricultural development is sparse and variable in quality. There is ample evidence that a negative impact can occur. A nutrition education component is recognized, therefore, to be a necessary input in any project such as MBF. Not only was nutrition education included in MBF but other elements affecting nutritional and socioeconomic well being of participating families were also present. These were: (a) health surveillance for pre-school and primary school children as well as pregnant and nursing mothers, (b) a food supplement intervention program, and (c) provision of supplemental iron to reduce anemia in school-age children.

Using base line data collected from the villages of Kafr El-Khadra and Omar Makram and data gathered during the course of the agricultural, educational, health, and food supplement interventions, MBF scientists are documenting the resultant nutritional impacts. During this reporting period Dr. Abdel Rahman El Seidi, Professor of Agricultural Economics at Fayoum University and a participant in the MBF project at the National Research Centre, worked for two weeks at the University of Arizona on reduction and analysis of the data gathered from the villages. This visit followed one made in June 1985

by Dr. Amin Abdou, NRC/Cairo agricultural economist, who is the director of the socioeconomic analysis aspects of MBF. The effort to measure the nutrition and health consequences of the agricultural interventions is under the general direction of Dr. Osman Galal, Director, Nutrition Institute, and the principal scientist for the health/nutrition dimensions of MBF. Documentation, analysis, and verification of the health/nutrition correlations with project agricultural activities also involve assistance from specialists in the Department of Family and Community Medicine, University of Arizona College of Medicine, where similar activities with American Indians have occurred.

Dr. Sylvia K. El-Arini, Professor of Biochemistry at NRC/Cairo, spent four weeks as an invited visiting scientist at the U.S. Food and Drug Administration Laboratory in Washington, D.C. Dr. El-Arini is a participant in the MBF program responsible for quantitative and analytical aspects of MBF nutrition interventions. Her visit to Washington was partially supported by the MBF project.

- Technical and Socio-economic Evaluation of Irrigation Systems in the New Land

The Evaluation Project in the New Lands is being conducted by the Water Distribution and Irrigation Systems Institute (WDISRI), a multidisciplinary R&D unit of the Water Research Center, Ministry of Irrigation with funding under the ASRT 5-year R&D program of the Egyptian Government (LE 385,000) and U.S. AID from the Applied Science and Technology Research Program (U.S. \$136,000). The project seeks to evaluate both conventional and nonconventional technologies used in the reclamation, development, and cultivation of new lands at three sites:

- The Salhiya project, which is a large scale application of sprinkler and drip irrigation applied to newly reclaimed sandy soils by a state-owned company.
- The Nobariya site, which offers a variety of surface, sprinkler, and drip irrigation methods on both sandy and calcareous soils on various sizes of farms managed by the Egyptian Army, by a state-owned land development company, and by private landowners.
- The Inshass site, an irrigation research station of the Ministry of Irrigation, which offers the opportunity to test surface, sprinkler and drip systems under controlled conditions.

The project began in May 1984 with a design review and study phase of six months; data from the first of three successive crop years are being collected for analysis.

Dr. James Fitch, agricultural economist with the consulting firm Agrimanagement, Inc., Yakima, Washington, spent one week in Cairo (August 8-15, 1985) with the project principal investigator, Dr. Abdel Hady Rady, Director, Water Distribution and Irrigation Systems Research Institute (WDISRI).

Dr. Fitch prepared a report highlighting his discussions with project personnel (Annex B) in which the following points were noted:

1. In order for the Evaluation Project to have the highest possible impact, it is important that its work be based upon a clear and full understanding of previous land reclamation experience and the evaluation of that experience. The literature review conducted during Phase I was comprehensive with respect to past scientific and technical work but it did not include an equally wide review of evaluation

studies of previous Egyptian land reclamation experience. Note: Dr. Fitch's report, Annex B, includes a list of references on land reclamation experience and evaluation.

2. The Evaluation Project is a complex undertaking involving more than 50 scientists from several institutions working at three widely dispersed geographic locations. Communication among the individuals and groups is understandably difficult, but essential. Frequent opportunities to meet and discuss activities in informal as well as formal settings are essential to the dynamics of analysis and synthesis of results from the many disciplines represented. Dr. Fitch urged that project leaders be encouraged to publish interim findings and make separate reports analyzing topics of special interest rather than wait until the end of each season for a comprehensive report at each site.

3. The project would benefit from the opportunity for a scientific interchange between researchers from Egypt and the United States. Arrangements are currently being made through NAS/NRC with advice from Dr. Abdel Hady Rady and Dr. Fitch for six Egyptians to spend 2-3 weeks visiting arid lands R&D centers in the U.S.A. such as those at the University of Arizona, the University of California (Davis and Riverside) and elsewhere. It is expected that these visits will occur during the first three months of 1986. Similarly, a group of three or four U.S. specialists in various fields of soils research and irrigation technologies are expected to visit the three Egyptian research sites in January 1986.

- Development and Application of Biogas Technology in Rural Areas of Egypt

Work continued in Cairo and at NAS/NRC in Washington to prepare the papers from the November 1984 International Conference on Biogas Technology Transfer and Diffusion for publication. Elsevier Publishers, London, will issue the conference papers in book form. NAS/NRC is responsible for preparing a camera-ready manuscript (photo offset) of approximately 900 pages for delivery to the publisher before the end of November 1985. The book should then appear during the first quarter of 1986.

- Preparation of Selected Pharmaceutical Chemicals

In August Mr. Fay Cunningham, Director for Specialty Chemical Products and former head of pilot plant operations for The Upjohn Company, Kalamazoo, Michigan, spent one week with the NRC/Cairo project team for the pharmaceutical chemicals R&D project.

The primary purpose of the visit was to review in detail process flow sheets developed for the pilot plant runs in the synthesis of eight pharmaceutical chemicals that are the subject of the R&D project. Mr. Cunningham and the NRC/Cairo group covered each synthesis in a step-by-step manner; the notes of Mr. Cunningham were kept by the group for reference and incorporation into the operating procedures briefing book. Attention was paid to the protocols utilized in U.S. pilot plant and manufacturing-scale operations. Special attention was given to safety procedures, hazardous waste generation and disposal. A cautionary note was given concerning steps where there are proposed addition sequences of solvent and reagent liquids followed by solid-reagent transfers. In several instances recommendations were

given to quantify the reaction exotherms (heat outputs) to be aware of potential hazards. Suggestions were made to substitute some troublesome solvents and reagents by other safer analogous chemicals. Closer liaison was recommended between the NRC/Cairo team and the chemical engineering group at El Nasr Pharmaceutical Company where pilot plant runs are to be conducted.

Mr. Cunningham also gave a four-hour seminar reviewing the sequence of chemical process development from synthesis to full chemical production based upon Upjohn experience. This highlighted the tasks of chemists, development engineers, design engineers, and production managers. Each has special tasks and each must contribute to the total system. The audience was 18-20 people including the NRC/Cairo team, chemical engineers from the NRC/Cairo pilot plant laboratory, and several engineers from El Nasr Pharmaceuticals Company.

It is anticipated that Mr. Cunningham will return to Cairo in early December for 10 working days to assist in several of the pilot plant runs.

DISCUSSION

Table 2
Projects Review and Summary of Status
July-September 1985

<u>Project</u>	<u>Activities</u> <u>July-September 1985</u>	<u>Status/Remarks</u>
<u>1. Program Policy, Planning and Management</u>		
1.1 JCC-XVI	<ul style="list-style-type: none"> ● Preparation of draft agenda ● Communications between Drs. Kamel and Dr. White regarding agenda, field visits, etc. ● Discussions/planning of background papers during visit of Dr. A.S. ElNockrashy to Washington 	<ul style="list-style-type: none"> ● JCC-XVI scheduled for Cairo, Nov. 26-27, 1985 ● Pre JCC field visits November 24, 1985
1.2 S&T Policy	<ul style="list-style-type: none"> ● Completion of reviews, project summary report 	<ul style="list-style-type: none"> ● Project summary report by Dr. Leo S. Packer, See Annex A
1.3 R&D Mgt	<ul style="list-style-type: none"> ● Request for proposal, Mgt. Info. System Design issued by ASRT 	<ul style="list-style-type: none"> ● 6 proposals received by ASRT, late Sept. 1985
1.4 Program Mgt Activities NAS/NRC Washington	<ul style="list-style-type: none"> ● Working visit Mr. M. Goma, NAS/NRC Office in Cairo to NAS/NRC in Washington ● Working visit Mr. A. Nasmith to Cairo 	<ul style="list-style-type: none"> ● Purpose: fiscal and program mgt. under contract extension ● Purpose: program coordination/mgt., special attention to land reclamation
<u>2. Demonstration/R&D Projects</u>		
2.1 More & Better Food	<ul style="list-style-type: none"> ● Working visit, Dr. A.S. ElNockrashy to prepare draft MBF final report ● Working visit, Dr. Osman Galal to University of Arizona 	<ul style="list-style-type: none"> ● First draft completed by 1 September 1985 ● Work with cooperating group on analysis of MBF agricultural impacts on nutrition

- Working visit, Dr. Abdel Rahman El Seidi to University Arizona
- Data reduction and analysis for health/nutrition aspects of MBF
- Working visit, Dr. Sylvia El Arini, NRC/Cairo to U.S. Food and Drug Admin. laboratories, Washington, D.C.
- Analytical methods & procedures for MBF nutrition projects
- 2.2 Techno-Evaluation of Irrigation
- Consulting mission, Dr. James Fitch, to project field sites in Egypt
- Report of Dr. Fitch, see Annex B
- 2.3 Biogas technology
- Continuation publication preparations, Biogas Tech Conference manuscript
- Elsevier (London) to publish
- Manuscript due date, late November 1985
- 2.4 Pharmaceutical Chemicals
- Advisory mission to NRC/Cairo
- Preparations for pilot plant runs, 8 pharmaceutical chemical products

ANNEX A
(Quarterly Report No. 16, July-September 1985)

APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM

SCIENCE AND TECHNOLOGY POLICY MEASURES
Project Report

TOWARDS A TECHNOLOGY POLICY FOR EGYPT

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NATIONAL ACADEMY OF SCIENCES/NATIONAL RESEARCH COUNCIL
APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROJECT

OCTOBER 1984

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APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM
Project Report
SCIENCE AND TECHNOLOGY POLICY MEASURES
"Towards a Technology Policy for Egypt"

I. INTRODUCTION: BACKGROUND, OBJECTIVES AND APPROACH

The Science and Technology Policy Measures activity is one of eleven subprojects comprising Phase II of the Applied Science and Technology Research Project. The responsible Egyptian agency is the Academy for Scientific Research and Technology (ASRT) and the funding is provided by the government of Egypt and the U.S. Agency for International Development (AID).

The broad objective of the overall project is the reorientation of Egypt's S&T skills toward serving national development needs. It seeks to encourage institutional and attitudinal changes in Egypt's S&T community through demonstrating processes and methods leading to productive involvement in the key sectors of the economy. In this context, specific target areas were:

- strengthening S&T program management and control capabilities of the ASRT and NRC,
- demonstrate among village populations improved practices in food, nutrition and energy,
- improve use of S&T capacity for support to industry,
- develop support systems such as nationwide information system, equipment maintenance and repair and standardization of measurement.

The project sought to advance these aims by encouraging problem-solving research, better linkages between R&D and the productive sectors, upgrading of skills and equipment for applied

research and improvement of Egyptian ability to program and manage such research.

In early 1980, an assessment of Phase I recommended that Phase II provide support for studies at sectoral and subsectoral level to provide understanding and guidance on technology choice and management conducive to major national objectives. This work during the period 1981-1984 is the subject of this report.

During the previous years, a number of policy activities and studies had been carried out within the Egyptian government and with the help of foreign experts. The intent of the Technology Policy subproject was to increase national policy and management capability and to deepen understanding of critical technology policy issues. It was anticipated that the ASRT would use U.S. and other foreign experts to help in delineating technology choices for Egypt and in stimulating institutional change and better management and decision systems in ASRT and NRC.

It was recognized early on that "the goal was not to create a universal or global national technology policy." Such an idea is irrelevant, unrealistic or at least premature for Egypt. Even if it were possible, the policy would be so general as to have no practical impact. What was needed was a sectoral or subsectoral approach that might lead to guidelines for decision making at the ministry, industry, firm, or farm level. Also, specific across-the-board problems that cross sectoral boundaries could profitably be studied. It was well understood that this was a massive, difficult, long-term undertaking.

It was hoped that the project would be a step in the right direction that would encourage the creation of the required supporting analytical capability in ASRT for the long-term effort.

And ASRT provided the best institutional setting for this work since it has the legal and statutory authority for developing S&T guidelines for government. Moreover, it had already reached out to universities, industry, and other government agencies to create its special advisory councils and committees. This extensive network centered on ASRT provided an existing base for enlisting the various societal elements and qualified Egyptian and foreign experts. Moreover, the ASRT's Policy Council, with a very distinguished membership, and under the chairmanship of Dr. I. H. Abdel Rahman, former Minister of Planning, a scientist, economist and former senior international agency director, was an ideal group to play a central role.

Thus the project contemplated providing support for a selected set of policy analyses tied to sectoral areas or issues of technological choices supported by case studies, Egyptian or foreign, with facts, figures and well-defined options. This work would require ASRT to organize and assign qualified staff and bring in foreign expertise as needed to carry out the necessary research. It was expected that special studies would be commissioned in Egypt and overseas to broaden the perspective with comparative experience of other countries. The selection and effective use of foreign assistance and experience was intended to be valuable in moving from dependence to true international cooperation for Egypt's needs. It would help to enlarge the perspective of the studies and increase the confidence of the Egyptian

policy staff to be established in ASRT. Thus, Egypt would be able to pursue the necessary on-going work beyond the duration of this project.

II. THE POLICY SEMINARS

It is interesting as well as significant that the sequence of three seminars at yearly intervals showed a gratifying increase in depth, breadth and participation of qualified people. The first seminar was primarily devoted to a description of the structure, operation and problems of the R&D community in Egypt. The aggregate of commissioned written contributions provided a panoramic view of perceptions of researchers regarding their own programs, institutions, plans, accomplishments, problems, scientific and technical developments and so on. An attempt was also made to sample the attitudes of selected users of technology and to explore their needs and feelings concerning the more effective use of R&D results. Useful insights were obtained into the wide gap between science and technology, technology and application, and the dominant role of imported technology for specific applications. All of these insights suggested policy implications which had to be developed more explicitly later on.

The Second Seminar, in 1982 was more oriented toward policy questions, particularly relating to technology transfer in primary development sectors. As in Seminar I, the preparatory work consisted of papers commissioned to various leaders in technology-producing and technology-using activities. Several government ministers and senior industrial executives participated in the discussions and provided useful perspectives. The idea arose that technology policies, explicit and compatible with other policies in other sectors, could be developed

and serve a useful purpose. These policies could be sector-specific or more generally related to technology's interactions and impact. It was generally felt that the time was ripe to try to do this, building on the diagnostics and descriptive work of Seminars I & II.

Thus, in 1983 when preparations were organized for Seminar III, a different approach was taken. Instead of commissioning papers from individuals or teams of individuals, it was decided to establish six thematic working groups as follows:

1. Choice of Technology,
2. Indigenous Capabilities,
3. Technology Transfer,
4. Organizations and Mechanisms for Technology Development,
5. International Cooperation and New Technologies,
6. Instruments for Technology Policy Implementation.

Each working group consisted of about 10-15 selected individuals, chaired by a recognized authority in the field. The entire operation was directed by Prof. Essam Galal, a highly respected and experienced leader in policy matters. Under his vigorous supervision there followed a period of intensive work by the groups, leading ultimately to a broad synthesis statement which was to be called the draft technology policy. The process, important in itself, worked quite well. A high level of interest and participation was maintained. Illuminating interactions within each working group and between working groups were observed. The initial groups were augmented by new participants while a few people dropped out. The wide range of concerns as well as their complexity became better understood. The intense pace of the work continued until just before Seminars III.

The formal program and discussions at Seminar III demonstrated the increased sophistication and realism of technology policy thinking as compared to previous seminars. The draft policy paper was discussed as well as alternative follow-up actions. Seminar III marked the end of a 3-year effort that, in spite of problems and shortcomings, was a positive achievement. It is hoped that ASRT will maintain its leadership in technology policy development in the years to come.

III. THE SECTORAL OR INTERACTIVE APPROACH

Early in 1983, Dr. I. H. Abdel Rahman, Economic Adviser to the Prime Minister, Chairman of ASRT's Policy Council and a leader in Egyptian policy development over many years, proposed a specific, focussed and activist approach to implement technology developments in Egypt. He outlined an idea for bringing together within one sector the researchers and producers of technology, and the executives responsible for operations and carrying out policy within that same sector. He pointed out that within each sector, communication and cooperation between the two groups was deficient or absent and can be catalyzed by an outside intervention. He therefore suggested trial efforts by ASRT, within the framework of ASRT's policy project, to test the idea.

The sectors of agriculture, industry and irrigation were selected for initial examination. Each of the concerned ministries has a sizeable research establishment and each has a large operational and policy implementation responsibility. The Agricultural Research Center is the largest research organization in Egypt, comprising 3000 qualified R&D workers in specialized institutes, experimental field stations and 26000 acres of development farms. It also includes about

2000 workers in the Agriculture Extension Service, an ideal mechanism for the diffusion and transfer of technology.

The Ministry of Industry is also endowed with six specialized R&D institutes and centres and directly supervises about 120 public sector industrial companies some of which have substantial technology development units. The Ministry of Irrigation has six established research institutes and a very large operational role throughout Egypt.

Within each of the three sectors, it was known that the research programs and results were poorly linked to the operating functions and that communication and coordination were weak. Thus the research agenda did not respond to or influence policy and the implementation elements did not significantly affect research planning.

In each sector, the first contact with the Minister was enthusiastically received, and the subsequent work was fully supported by each Ministry. Each sectoral approach was tailored to the specific structure and needs of each Ministry.

Under the guidance of Dr. Abdel Rahman and senior ministry officials, working groups were organized and studies and data gathering were assigned. There came a series of intensive meetings to delineate technology needs and policy requirements for that sector. This ascending and accelerating dialogue, bringing together producers and users of technology, culminated in a carefully prepared sector-wide meeting of several hundred key personnel, chaired by the Minister, at which recommendations were made and actions decided upon. Perhaps the most useful result was the creation of personal and professional links within each sector and improvement of communication within each

Ministry. It is known that organizational and policy changes as well as new research programs resulted from these meetings.

The first three major sectoral meetings took place in late 1983 and the work is still going on, since other ministries have requested similar assistance. Once the initial cycle is shown to be successful, each ministry can follow up on its own, releasing the ASRT team to turn to another sector. Indeed, this effort has produced influence and results far beyond its modest cost and should find broader application. It represents a good example of the unique capability of ASRT to influence and enhance technology transfer and diffusion at the national level.

IV. DISCUSSION

During Phase II, the Technology Policy project has been characterized by annual periods of intense activity for several months preceding the Seminars held in November of 1981, 1982 and 1983. The pattern each year has been to hold a National Policy Seminar, where the proceedings and publications were in Arabic, preparatory to the International Policy Seminar, in English, several weeks later. This has worked out quite well, because in every year, the National Seminar has built upon previous work and has sharpened the focus and created the agenda for the subsequent International Seminar. Indeed, in terms of influence and visibility within the Egyptian community, the National Seminar may have been much more useful in raising consciousness and awareness of issue, and in providing a forum for expression that is more free and uninhibited than that of the International Seminars.

The enormous volume of papers and publications produced for and by the three pairs of seminars varied widely in quality and relevance. For Seminars I and II, large numbers of persons were commissioned to write papers, many of whom were inexperienced in policy work. Some individuals had narrow professional or institutional outlooks, which were reflected in their contribution. Some contributors provided similar material in successive years. On occasion, the guidelines for papers were either vague or unclear. Often the papers were distributed too late for seminar participants to digest their contents and reflect before the seminars. These problems were caused to some extent by the inability of ASRT to organize a permanent supporting staff and to plan the work in advance for continuity throughout the year, not just the weeks preceding the seminars. This also meant that contributors of papers worked under severe time pressures, making it more difficult to provide a thoughtful, reasoned contribution.

One general observation is that the three years of work were largely descriptive and had a small quantitative content. Because there was no permanent research staff and little advance planning, it was not possible to do much analytical and statistical work, to assemble a firm data base, or to commission papers and studies requiring several months or several years of persevering work. The writer believes that as a result, the depth and persuasiveness of the papers as a whole was reduced.

Although a few foreign visitors were invited to attend the International Seminars and many of them provided interesting and stimulating discourses, the total impact of their participation was limited. In a large public forum with a crowded agenda, even the best

qualified foreign visitor could only have limited exposure. A longer visit of several weeks by selected foreign working-level policy experts, interacting with Egyptian counterparts, would have been more useful than the short ceremonial visits of the "Statesmen of science and technology policy.

Although the ASRT President gave the policy effort his total support and encouragement and a great deal of personal time and effort, there was no continuity of senior supervision and responsibility over the three-year period. Thus there was no unified theme or concept during this time and little ongoing work unrelated to preparation for the seminars.

In spite of the above, there are a number of very positive aspects of the policy activity that should be mentioned:

1. It achieved a very high level of political visibility, coming to the attention of the Prime Minister and the President of Egypt, and several important ministers.
2. It succeeded in involving as contributors or participants a very large number of influential decision makers from government, the universities and industry and it heightened their awareness of the issues and problems of technology policy.
3. It built a useful base for future work by identifying, clarifying and crystallizing the complex dimensions of technology policy, and provided a valuable learning experience continuing in the future.
4. It encouraged a unique dialogue among several hundred persons inside and outside the S&T community, by means of the intense interactions in committees and working groups.

5. It showed the need for institutionalization of a permanent, full-time staff of policy analysts in ASRT.

6. It demonstrated the usefulness of analyzing the comparative experience of other countries, through glimpses of what happened in Korea, India, and Mexico, for example.

7. It proved the effectiveness of Egyptian leadership in developing technology policies using their own talents and resources, with selective help from outside sources.

8. The Sectoral or Interactive Approach appeared to be an innovative service to other ministries, with significant near-term and long-term benefits in various sectors, and enhanced influence for ASRT.

The technology policy project departed from the intent and approach sketched in the AID project paper for Phase II. Its emphasis and effort were skewed away from analytical policy studies and substantial foreign interaction toward the annual set of seminars, thereby losing depth and continuity. It produced some very good work but it failed to establish itself as an integral element of ASRT. These shortcomings can and should be corrected in the future. Overall, the project was a worth-while effort in the right direction.

APPENDIX A
Seminar I

Towards a Technology Policy for Egypt
An International Seminar
10-12 November 1981
Cairo, Egypt

Organized jointly by the Academy of Scientific Research and Technology
and the US Agency for International Development

PROGRAMME

Tuesday, 10 November 1981

Belle Epoque Room, Meridien Hotel

- 9:00 Opening of the Seminar, addresses by:
Prof. M. K. Hilmy, Minister of State for Education and
Scientific Research
Prof. I. G. Badran, President of the Academy of Scientific
Research and Technology
Prof. G. White, President of the U.S. Panel in the Joint
Consultative Committee, Applied Science and Technology Project
- 9:30 Coffee break
- 10:00 Presentation of the three main topics (with a briefing on the
position reached in regard thereto in the Special Seminar held
during 1 and 2 November 1982):
1. Prof. M. Kamel: Science and Technology Policies in
Egyptian Research Institutions (ref. Document NTP/Seminar
I/4 and 21 annexes).
 2. Prof. M. B. E. Fayez: The Need for a National Technology
Policy (ref. Documents NTP/Seminar I/2, 3, 5 and 6).
 3. Prof. I. H. Abdel-Rahman: Science and Technology Policy -
Users Point of View (ref. Document NTP/Seminar I/7).
- 13:00 Adjournment
- Lunch, hosted by the President of the Academy of Scientific
Research and Technology.
- 14:30 Start of afternoon session.
- Presentation of views by some guests:
- Prof. G. White
 - UN System
 - Developing Countries
 - Prof. I. H. Abdel-Rahman: Some proposals regarding the
orientation of the Seminar's business.

16:00 Open discussion.

17:00 Adjournment.

Wednesday, 11 November 1981
Belle Epoque Room, Meridien Hotel

9:00 Start of morning session.
Continuation of discussion on the Seminar's main topics.

13:00 Adjournment

Lunch, hosted by the President of the Academy of Scientific Research and Technology

14:30 Start of afternoon session
Five participants (ca. 10 minutes each) will be invited to present a resume of the discussions, highlighting the specific lines of action recommended by the Seminar for implementation during the Project's first year.

15:30 Coffee break

16:00 Final discussion of the Seminar's conclusions, in which members of the Final Report drafting group participate.

17:00 Adjournment

Thursday, 12 November 1981
Academy of Scientific Research and Technology
(Meeting room to be announced)

9:00 Meeting of the Final Report drafting group (about 10 members) with the Rapporteur to prepare a concentrated draft final report (5-6 pages) in which the major orientations emerging from the Seminar are highlighted, and the recommended activities for implementation during the Project's first year are described.

General Secretariat Conference Room (National Democratic Party Building)

18:00 Final session
Introduction of the draft final report.
Discussions. Adoption of the Final Report.

19:00 Closing of the Seminar

APPENDIX A
Seminar II

Towards a Technology Policy for Egypt
An International Seminar
24-25 November 1982
Cairo, Egypt

Organized Jointly by the Academy of Scientific Research and Technology
and the US Agency for International Development.

Venue: Luxor Room, Hotel Meridien, Cairo

PROGRAMME

Wednesday, 24 November 1982

9:00 Opening of the Seminar

First Session:

- Address by H. E. Professor Mustafa K. Hilmy, Deputy Prime Minister and Minister of State for Education and Scientific Research.
- Address by Professor Ibrahim G. Badran, President of the Academy of Scientific Research and Technology.
- Address by Professor Gilbert F. White, Chairman of the U.S. Panel in the Joint Consultative Committee of the Applied Science and Technology Project.

10:00 Coffee break

10:30 Professor M. B. E. Fayez, Presentation of the Report of the National Seminar held on 30 and 31 October 1982 (document NTP/Seminar II/9), Presentation of Document NTP/Seminar II/4 entitled "Approach to the Formulation of the National Technology Policy Required for Egypt and the Identification of its Arrangements."

Professor Ibrahim H. Abdel-Rahman: Introduction to the Seminar activities, and presentation of document NTP/Seminar II/2, 2a, 12 and 13 entitled:

2 Towards a Technology Policy for Egypt Frame Work for Discussion

- 2a Towards a Technology Policy for Egypt
Summary Position Paper and Possible Points for Discussion
- 12 An Interactive Approach
To Promote Technology for Development in Egypt
- 13 Human Resources Development for Planning Management and
Implementation of Science and Technology Programmes
- Professor M. Kamel: Presentation of document NTP/Seminar II/11
entitled "Egypt's Technological System: Present and Future
Responsibilities."
- Prof. A. S. El-Nockrashy: Presentation of the Summary Report
of the All Egyptian Seminar, Cairo, October 30-31 (1982),
Document NTP/Seminar II/15.
- 11:30 Comments by leaders of the national economy sectors on the
general objectives of the Seminar and on the substantive issues
related to the role of R&D in the process of technological
development.
- 13:00 Adjournment for lunch to be served in the same room.
- 14:30 Second Session:

Invited comments and special technology policy related
contributions by:
- Professor Fred Moavenzadeh, MIT, Cambridge, Massachusetts,
USA.
- Professor Miguel S. Wionczek, El Colegio de Mexico, Mexico
City, Mexico.
- Mr. G. S. Gouri, UNIDO, Vienna, Austria.
- Members of the Joint Consultative Committee of the Applied
Science and Technology Project.
- Discussion
- 17:30 Adjournment

Thursday, 25 November 1982

9:00 Third session

- Professor E. E. Galal: Presentation of document
NTP/Seminar 11/10 entitled "Role of Legislation in
Technology Development: Need and Feasibility."

- Professor M. Moustafa El Said & Eng. K. Maksoud:
Presentation of the Role of Engineer Consulting offices.
- Professor Ibrahim H. Abdel-Rahman: Presentation of
Correlation Between Technology and National Development.

10:00 Coffee break

10:30 On the basis of the previous presentations, additional contributions are invited so as to help in building a definitive position by the Seminar regarding the procedural and substantive aspects of the required activities during the forthcoming inter-seminar period (until November 1983). Such aspects may include the following:

- The conceptual framework of the National Technology Policy.
- Activation of the national R&D establishment and the orientation of its contributions.
- Creation of working relationship between the national R&D establishment and the national economy sectors.
- Creation of the general atmosphere which favours the nation's technological development.
- The issue of financing R&D.
- Rationalization and maximization of the benefits of foreign S&T contributions.

13:00 Adjournment for lunch to be served in same room.

14:30 Fourth Session:

Continuation of discussions.

16:00 Summary of conclusions reached by the Seminar presented by Secretariat.

17:30 Closing of International Seminar.

APPENDIX A
Seminar III

Towards a Technology Policy for Egypt
An International Seminar
16-17 November 1983
Cairo, Egypt

President of Seminar: Dr. I. Badran

Rapporteur: Dr. M. B. Fayez

Programme of the International Seminar
16 and 17 November 1983
Belle Epoque Room, Hotel Meridien, Cairo

Wednesday: 16 November 1983

- 9:00 Opening Address of the Seminar
10:00 Coffee break
- 10:30 First Session: Chairmen, Prof. G. F. White and Prof. M. Hahfouz
Theme: Interaction of economic and technological activities in Egypt. Introduced by Prof. Ibrahim H. Abdel-Rahman
Documentation:
1. The Interactive Approach to Promote Technology for Egypt.
 2. Follow-up of the Interactive Approach in Building and Implementing the Technology Policy for Egypt.
- 11:30 Adjournment for lunch
- 14:30 Second Session: Chairmen, Eng. A. W. El-Bishry and Prof. M. M. Hafez
Theme: The Policy Formulation Approach. Introduced by Prof. Essam E. Galal
Documentation:
1. Unified Final Report of Working Groups
 2. The Technology Policy Statement (first draft)
- 17:30 Adjournment

Thursday: 17 November 1983

- 9:30 Third Session: Chairmen, Prof. H. M. Ismail and
Prof. S. Gaballa
- Continuation of discussions on the themes of the first day.
- 13:30 Adjournment for lunch
- 14:30 Fourth Session: Chairmen, Prof. I. G. Badran, Prof. I. H.
Abdel-Rahman and Prof. E. E. Galal
- Conclusions and consideration of the post-seminar activities.
- Documentation:
- The Formulation and the Post-Formulation Phases. Introduced by
Prof. Essam E. Galal
- 17:00 Closure of the Seminar

APPENDIX B
LIST OF DOCUMENTS

Towards a Technology Policy for Egypt
A National Seminar: 2-3 November 1981
An International Seminar: 10-12 November 1981
Cairo, Egypt

NTP/Seminar I/1	A Background Note (English)
NTP/Seminar I/2	The Important Issues to be Addressed in the National Technology Policy (English)
NTP/Seminar I/3	A View of the National Technology Policy Required for Egypt (English)
NTP/Seminar I/4 and 21 Annexes	Summary Paper on Science and Technology Policies in Some Selected Egyptian Research Institutions (English)
NTP/Seminar I/5	A Summary of Ten Science and Technology Policy Studies in Egypt (1972-1980) (English)
NTP/Seminar I/6	A Study of the ASRT Conferences Related to Science and Technology Policies (English and Arabic)
NTP/Seminar I/7	Science and Technology Policy, Users Point of View (English)
NTP/Seminar I/8	Towards the Formulation of a Technology Policy for the Food Industries Sub-Sector in Egypt (English)
NTP/Seminar I/9	The Drug Industry in Egypt and its Development: A Science and Technology Perspective (Arabic)
NTP/Seminar I/10	Is it Possible to Establish the Main Features for a National Technological Policy for Egypt? (Arabic)

APPENDIX B
Seminar II
LIST OF DOCUMENTS

Towards a Technology Policy for Egypt
National Seminar: 30-31 October 1982
An International Seminar: 24-25 November 1982
Cairo, Egypt

- NTP/Seminar II/1 Project on integrated studies for the development of the role of S&T in Egypt: Outline of the required studies by M. Kamel and M. B. E. Fayez (in Arabic)
- NTP/Seminar II/2 Framework for discussions by I. H. Abdel-Rahman
- NTP/Seminar II/2/a Summary position paper and possible points for discussion by I. H. Abdel-Rahman
- NTP/Seminar II/3 Summary of the most important elements of the technology policy for Egypt by M. Kamel (in Arabic)
- NTP/Seminar II/4 Approach to the formulation of the National Technology Policy required for Egypt and the identification of its arrangements by M. B. E. Fayez
- NTP/Seminar II/4/a A set of seven annexes on proposed terms of reference for studies on general (horizontal) issues by M. B. E. Fayez (in Arabic)
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- NTP/Seminar II/5 Feasibility of legislation in technology development by E. E. Galal, W. G. Wahba, M. S. El-Halafawy and M. Hifal (in Arabic)
- NTP/Seminar II/6 Terms of reference for sectoral (vertical) studies by M. Kamel (in Arabic)
- NTP Seminar II/6/a Terms of reference for the analysis of sectoral (vertical) studies by I. H. Abdel-Rahman (in Arabic)
- NTP/Seminar II/7 Summary compilation of sectoral studies by some senior research staff members of the National Research Centre, Cairo (in Arabic)
- NTP/Seminar II/7/ Summary and analysis of sectoral study on agriculture and irrigation (in Arabic)
add. 1
- NTP Seminar II/7/a Sectoral study on agriculture and irrigation (in Arabic)

- NTP Seminar II/7/b Sectoral study on light industries (in Arabic)
- NTP/Seminar II/7/c Sectoral study on heavy industries (in Arabic)
- NTP/Seminar II/7/d Sectoral study on petroleum, energy and mineral resources (in Arabic)
- NTP/Seminar II/7/e Study on engineering design and consultancy firms; S&T information centres; standardization, standard specifications and quality control establishments; and scientific instrumentation facilities (in Arabic)
- NTP/Seminar II/8 Summary compilation of reports of UNIDO experts in the fields of petrochemical industry, micro-electronics industry, genetic engineering and biotechnology and machine tools industry
- NTP/Seminar II/9 Report of the National Seminar on "Towards a Technology Policy for Egypt," Cairo 30 and 31 October 1982
- NTP/Seminar II/10 Role of legislation in technology development: Need and feasibility by E. E. Galal, W. G. Wahba, M. S. El-Halafawy and M. Hilal
- NTP/Seminar II/11 Egypt's technological system: Present and future responsibilities by M. Kamel
- NTP/Seminar II/12 An Interactive Approach to Promote Technology for Development in Egypt by I. H. Abdel-Rahman
- NTP/Seminar II/13 Human Resources Development for the Planning Management and Implementation of Science and Technology Programme
- NTP/Seminar II/14 Report of the International Seminar on "Towards a Technology Policy for Egypt," Cairo 24 and 25 November 1982

APPENDIX B
Seminar III:
LIST OF DOCUMENTS

Towards a Technology Policy for Egypt
An International Seminar
16-17 November 1983
Cairo, Egypt

- I. The Final and Unified Report of the Work Groups of the Project "Towards a Technology Policy for Egypt" (NTP/Seminar III/1)
 - Index
 - Preface (summary of report)
 - Introductory Chapter: Justifications and Feasibility of Elaborating a Technological Policy for Egypt
- II. Personnel (Supervisory Committee, Technical Secretariat, 6 Working Groups)
- III. Technology Policy Statement (first draft) (NTP/Seminar III/2)
- IV. The Formulation and the Post Formulation Phase (NTP/Seminar III/3)
- V. The Third Seminar: Towards a Technology Policy for Egypt 1981-1982-1983 by I. H. Abdel-Rahman, November 16, 1983
- VI. Follow-up of the Interactive Approach in Building and Implementing Technology Policy in Egypt by I. H. Abdel-Rahman
- VII. Remarks on "Towards a Technology Policy for Egypt" by Dr. Delwin A. Roy

APPENDIX C

DRAFT TECHNOLOGY POLICY STATEMENT

Seminar III

16-17 November 1983

Cairo, Egypt

SUMMARY

The draft Policy Statement on Technology is broadly constructed and seeks to establish guidelines for development of a comprehensive policy with the recognition that such a policy must be dynamic. The primary objective of the policy is the development of indigenous technologies (in contrast to imported technologies) with major emphasis on an extensive system for planning, establishment of priorities and integration of efforts at the national level and among sectors in technology development.

The statement recognizes the ultimate level of technology needed, the relationship of Egyptian technological development to other developing countries, the multidimensional nature of technology development, and the need for much more extensive coordination of relatively scattered efforts in such areas as education, economic planning, etc., applied to technology development as well as the need to deal with long-term and short-term needs.

The statement includes extensive discussions of the means for indigenous technology development with emphasis on requirements to adapt technology to the cultural identity and traditions of Egyptian society. Special emphasis is placed on increased self reliance, the elimination of "turn-key" projects and the use of depackaging for adaptation. Explicitly stated is the need for creation of demand on technology by users with accompanying scientific planning, economic feasibility studies and modifications of organizational structures and practices and related legislation.

The Policy Statement specifies the need for clearly identified criteria in the planning process, identification of high priority sectors and consideration of the questions of incentives, customs, marketing and crucially, market demand.

From the sectoral viewpoint, the statement recognizes the need for modification of curriculum and teaching methods which will be more directed to technology development and the need for programs to be prepared and integrated in terms of skilled labor, technicians, scientific and technological administrators, and designers, along with researchers.

The need for personnel for planning, evaluation, scientific and technological feasibility studies are recognized as a vital and urgent

need. Also emphasized is the need to establish technological development units at firms, including both public and private sectors, with good communications between these units and those of planning and administration.

Related elements discussed in the statement include reconsideration of the laws and regulations governing R&D personnel with respect to appointments, promotion and incentives, the increase of R&D funding through contributions of production sectors, and the establishment of centers for acquisition and dissemination of technical information.

For choice of technological sectors, criteria are listed for selection which reflect demand, productive capability, R&D capability and economic aspects of the sector. Among those sectors proposed for early emphasis are: the textile industry, food industry, drug industry, capital goods industries and petrochemicals.

The second chapter of the Statement discusses the methods of implementation of the Technology Policy, including the role of planning, broad national legislation needs and an institutional mechanism for overall coordination of technology development. The approach taken is that the development of indigenous capability is as vital to Egypt as the direct economic return from technology. The five-year plan with annual budgeting will be the framework for strategy development.

Extensive attention is given to considerations which must be given to possible revisions of legislation both directly and indirectly affecting technology development. Included are such topics as patents, investments, organization of industry, custom laws, import-export laws, education, labor and taxation.

For coordination, the Statement proposes the use of Academy of Scientific Research and Technology to coordinate implementation of the Policy, but not to replace the existing sectoral structures and their mechanisms for technology development.

ANNEX B
(Quarterly Report No. 16, July-September 1985)

APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM

Demonstration Project

TECHNICAL AND SOCIOECONOMIC EVALUATION OF IRRIGATION SYSTEMS
IN THE NEW LANDS

Consultant's Report

James B. Fitch
Agricultural Economist
Agrimanagement, Inc.
August 1985

Annex B

Applied Science and Technology Research Program
Demonstration Project
Technical and Socioeconomic Evaluation of Irrigation Systems
in the New Lands

Sponsored by
Egyptian Academy of Scientific Research and Technology

Water Distribution and Irrigation Systems Research Institute
of the Ministry of Irrigation

U.S. Agency for International Development

Consultant's Report
James B. Fitch
Agricultural Economist
Agrimanagement, Inc.
August 1985

1. Summary.

During the course of five days the consultant visited project research sites at Salhiya, Nohariya, and Inshass; he reviewed the project proposal, related project history and a number of recent research and evaluation reports on new land reclamation and development in Egypt (see Reference List); and he had the opportunity to meet and discuss the project with the director and key scientists (see List of Persons Contacted).

The reclamation of new lands continues to receive high priority as a means of attacking Egypt's food security problem. There is still a need for information and analysis which would indicate how best to proceed. Careful analysis of economic and social considerations is particularly important. Both Egyptian government and international organizations will be able to use the findings of this study as they become available.

In leading this study, the Water Distribution and Irrigation Systems Research Institute (WDIRSI) is taking advantage of its past experience in conducting interdisciplinary research. The project has been organized in a competent fashion, drawing on scientists from a variety of related disciplines and institutions.

The initial design and formulation stage was completed in 1984, and the first of three successive crop years of data collection is almost complete.

Interdisciplinary communication within the project could be improved, and the flow of information and analysis from the project could be accelerated if researchers were encouraged to contribute to a series of special staff papers, to be presented at periodic seminars and workshops. The staff papers and seminars could focus on topics of special importance or interest, such as small settlers rejection of sprinkler technology in favor of surface irrigation methods.

The project would benefit from initiating the planned exchange of Egyptian and U.S. scientists at this time.

2. Current status of the project.

The Evaluation Project is being conducted by the Water Distribution and Irrigation Systems Research Institute (WDISRI) of the Water Research Center, Ministry of Irrigation, with funding from the Egyptian Government (LE 385,000) and USAID (\$136,000) which is provided through the Egyptian Academy of Scientific Research and Technology (ASRT).

The project aims to evaluate both conventional and nonconventional technologies used in the reclamation, development and cultivation of new lands. As outlined in the project proposal prepared by WDISRI in 1984, this is to entail analysis involving scientists from a number of disciplinary areas: irrigation engineering, water requirements and irrigation efficiency, sociology, economics, soil science, and agronomy.

The project design shows the clear influence of WDISRI's past experience with interdisciplinary research. This was gained under the USAID sponsored Egyptian Water Use and Management Project. WDISRI has wisely chosen to include a variety of disciplines within the project and to seek help and cooperation from other related institutions.

In addition to WDISRI personnel, scientists and technicians from the Ministry of Agriculture (Soils and Water Research Institute, and the International Center for Agricultural Development at Maryut) and Cairo University (Soils Department) are also participating. In addition, there is institutional cooperation with the Ministry of Rehabilitation and New Communities (General Authority for Rehabilitation Projects and Agricultural Development), the Ministry of Land Reclamation (Beheira Land Reclamation Company), and the Arab Contractors Farm at Salhiya.

The sites chosen for research offer a useful variety of technical and socioeconomic circumstances. The Salhiya Project represents a large scale application of sprinkler and drip irrigation to newly reclaimed sandy soils by a state-owned company. The Nobariya site offers many different kinds of surface, sprinkler, and drip irrigation applications on both sandy and calcareous soils; it includes a farm run by the Army, a state owned land development company, several sizes of independently developed private farms, and both small settlers and graduates land distribution areas. The third project site at Inshass is an irrigation research station which offers the opportunity to test

surface, drip and sprinkler irrigation systems under controlled conditions.

The project began in May 1984 and is scheduled to last for four years. Phase I (May-September 1984) consisted in research design, selection of staff and field research sites, determining measurement criteria and procedures, literature review, and preliminary data collection. Phase II, which is scheduled to last for three years and which entails field measurement of experience in a variety of reclamation settings during three successive crop years, is now almost one year underway. Phase III, final analysis and report writing, will begin in late 1987.

3. Significance of the Project.

The project is very timely and has the potential to produce information and recommendations which could be instrumental in guiding Egypt's development programs in the new lands.

Egypt's food security concerns are widely known. During the past ten years, the gap between food consumption and food production has been widening rapidly. There has been a sharp increase in agricultural imports, particularly food grains, coupled with a sharp decline in agricultural exports such as cotton and rice. Reclamation and development of new lands is seen as one way of helping to redress this situation. However, only about 65 percent of the 1.1 million feddans which have been reclaimed since 1962 are currently in production, and it is estimated that up to 70 percent of that which is being farmed is still of low productivity (World Bank, 1984).

A number of recent studies, notably the Pacific Consultants report (1980) and a series of reports by Hunting Technical Services (1979) have questioned the technical and economic feasibility of large scale land reclamation. However, these reports were often prepared during relatively short time periods, they were based on limited field observations, and participation of Egyptian research institutions was limited. Nevertheless, partly because of such studies, some international donor agencies, including USAID, have been slow to participate in funding new lands reclamation projects.

Despite limited international support, the Egyptian Government continues to place high priority on expansion of the agricultural land base. The current five-year plan calls for the development of 430,000 feddans of new projects. Although the Pacific Consultants questioned the economic viability of projects requiring water lifts of more than 20 meters, the Arab Contractors farm at Salhiya has been developed with water lifts of up to 110 meters for some areas. The whole issue of water lifts is apparently critical to economic outcome. A sensitivity to this issue, and care in determining actual lift in each of the project sites, is something which deserves careful attention.

Farm decision makers may not be sensitive to the lift factor in making their decisions on what kind of equipment to obtain and how to

irrigate. It was noted that the Ministry of Irrigation is picking up the uphill lifting costs at Salhiya, whereas the (state owned) company itself only pays the pumping costs for sprinkler operation and field distribution. In one of the Nobariya areas it was stated that the farmers were not paying any electricity costs for pumping. Even in cases where farmers do pay for pumping, it is expected that this is at subsidized electrical rates. It appears that the government does not have a uniform policy on these issues, and the result may be that farmers are making inappropriate choices of equipment and irrigation method. This merits special attention within the Evaluation Project.

The Salhiya farm entails sophisticated, large scale technology, even though the cited studies call the economic feasibility of this into question. One recent study by Winrock International (1985) suggests that conventional surface irrigation methods and surface irrigation with gated pipe may be far more economical than center pivots and drip. Thus, it is perhaps significant that settlers in the Nobariya area have been observed by project researchers to be scrapping their sprinkler irrigation systems in favor of surface irrigation methods. Is this the underlying economics at work, or is it, as project members had speculated, an indication that these small farmers prefer to use the old technology with which they are most familiar? What electric rates are these farmers paying? What is the real reason behind this phenomenon? Is it economic, social or technical in nature? To obtain a proper answer, more extensive investigation is required. This is an ideal set of issues on which the interdisciplinary skills within the project could be focused, and I would recommend giving it some special attention.

Previously developed new lands areas in such projects as Nobariya and South Tahrir continue to be distributed to settler and graduates, without the past experience of such groups having been fully examined. Two recent studies, one by the Desert Development Center of American University (1985) and another by Kishk, Soliman and El-Zqnaty (1985) help to describe the graduates and small settlers experience and to identify certain problems which have arisen, and Pacific Consultants also paid some attention to these programs, but only a small part of the need to evaluate these programs has been filled to date. In the coming months, care will be required in organizing the work of the sociologists from the International Agricultural Development Center who will be involved in conducting this research.

At the present time, the Egyptian Government could benefit greatly from detailed analysis and field studies of existing reclamation projects. For example, the Ministry of Land Reclamation is currently working on a Land Reconnaissance Survey to classify and identify lands and areas which are most suitable for reclamation. Consultants working on this survey have expressed a need for the types of detailed information which will be produced by the Evaluation Project in developing their selection criteria. Furthermore, USAID now appears to be rethinking its stance on support of reclamation projects and could also be expected to utilize this analysis. Thus, there is a time value on the information which the project will produce, and every effort

should be made to analyze and publish results as soon as they are available.

In order for the Evaluation Project to have the highest possible impact, it is important that its work be based on a clear and full understanding of previous research and evaluations. The literature review which was conducted during Phase I did a good job of covering past scientific work by Egyptians, but it did not include a thorough examination of recent studies such as those conducted by Pacific Consultants and Hunting Technical. A Reference List of such studies enclosed, including one or two recent items which appeared only after the project's original literature review was conducted.

It is recommended that copies of the studies in the reference list be procured for the project library and that a seminar be organized to discuss these studies among project scientists. Above all, it is important that the role which economic and social considerations have played in these evaluations and that the social and economic analysis in the Evaluation Project be oriented so as to fully address these concerns.

4. Promoting Communication and Early Analysis of Findings.

The Evaluation Project is a big undertaking which involves a large number (more than 50) of scientists from several different institutions working in three widely scattered sites. Communication in such circumstances is understandably difficult. Nevertheless, frequent and clear communication and interaction among researchers in interdisciplinary projects is essential. It helps to promote understanding among people from diverse backgrounds. It lays the groundwork for the synergy which becomes possible when people from different disciplines cooperate, and it helps to eliminate unnecessary duplication of effort.

Project leaders are promoting communication and exchange of ideas within the project in several ways. The project's Scientific Committee meets monthly in conjunction with the Coordinating Committee. The Principal Investigator (Dr. Abdel Hady Rady) and the Project Coordinator (Economist Farouk Abdel Al) meet regularly with the various research site directors. The Coordinating Committee has tried to observe the practice of traveling to each site to hold a discussion session with the Site Team members at least once a month. While this practice has obviously been beneficial, I noted that there was still a lack of familiarity with the specific objectives of the project among some team members and that there was also some lack of mutual understanding of the work going on in the various disciplines.

It is recommended that interdisciplinary communication within the project be promoted. One way to do this would be to hold periodic (perhaps every two to three months) workshops or seminars to discuss the research plans, reports and findings of different teams or individual scientists.

The original work plan calls for reports on research activities to be filed every six months, after the end of each growing season. The first report (for the growing season which ended in April-May) is due within the next two weeks, and the first annual report (to include the growing season ending in September-October) is due by the end of the year. This is to be followed by a workshop to be held in January. While this is all necessary and to the good, it seems that the project could benefit from some interim analysis of important issues on a less formal basis.

It is recommended that project scientists be encouraged to publish interim findings and make separate reports which analyze topics of special interest, rather than waiting until the end of each season or year to publish their findings. Perhaps a special series of staff papers would be in order for this purpose. Such papers would be logical items to include on the agendas of the periodic workshops discussed above. An investigation of why small settlers are reverting back to old, surface irrigation methods would make an excellent topic for one of the staff papers and seminars.

5. Scientific Interchange and Short Term Training.

The project budget has ASRT/USAID funding for a limited amount of scientific interchange to support the activities of the Project. It is planned that four or five U.S. scientists will visit Egypt in the near future and that five or six Egyptian project members will visit U.S. institutions.

Specific areas of interchange would involve socioeconomic evaluation, irrigation technology (surface, sprinkler, and drip), and soils problems related to reclamation. There is a particular interest to have contact with U.S. scientists who are familiar with the specifics of equipment which is offered by different U.S. manufacturers, since Egyptians often feel that they are exposed to a limited set of information about what is available.

The project leaders would like to limit the interchange to a few carefully chosen institutions and sites in the U.S., in order to make the most out of a limited budget. It would be best to have U.S. scientists come from the same institutions which the Egyptian scientists will be visiting. Several U.S. institutions have been identified, with a view toward those with experience in Egypt and/or with work on similar irrigation and soils problems. These include the University of Arizona, University of California at Davis, Utah State University, the Columbia Basin Project (Bureau of Reclamation at Ephrata, Washington), and the Bureau of Reclamation's Salinity Laboratory at Riverside, California. While Colorado State University is highly regarded in the project, there is some feeling that project staff are probably already quite familiar with what that school has to offer and that they would benefit more by exchange with other institutions.

Since the National Academy of Sciences, the participating organization in the United States, has a limited time left in its program in Egypt, it is recommended that project leaders now proceed to prepare a complete list of the personnel they would like to nominate for U.S. visits. In the meantime, I will contact the Academy and help them to work out more details of the institutional contacts, and to help identify the U.S. scientists who are likely to be most productive for the exchange.

List of Persons Visited

- Dr. Abdel Hady Rady, Director of Water Distribution and Irrigation Systems Research Institute, and Principal Investigator on the Evaluation Project
- Economist Farouk Abdel Al, Director of Economics Section, WDISRI, and Project Coordinator
- Dr. Hassan Ismail, Member of Joint Consultative Committee, Egyptian Academy of scientific Research and Technology
- Dr. Abdel Hamid Abu Sabe, Director, International Agricultural Development Center, Mariut, and member of Scientific Committee for Project
- Engineer Abdel Wahed Mohamed, Manager of Arab Contractors' Salhiya Farm, and Site Team Leader
- Engineer Abdel Aty Allam, Site Team Leader for Inshass Site
- Dr. Abdel Moneim El Tukhy, Soil Survey Unit, Soils and Water Research Institute, Agricultural Research Center
- Dr. Abu Serie Badawy, Irrigation Engineer, Soils and Water Research Institute, and Site Team Leader for Nobariya
- Dr. Mona El Kady, Director of Irrigation Systems, WDISRI, and member of Coordinating Committee for Project
- Mr. Peter Gajewski, Acting Associate Director for Agricultural Resources, USAID Cairo
- Dr. Sherif Arif, Project Officer, Science and Technology, USAID Cairo
- Mr. Edward Stains, Director of Irrigation and Land Development, Agricultural Resource Office, USAID Cairo

List of References

- Bremer, Jenifer, "New Lands Concepts Paper II: Rethinking AID Assistance Strategy for the New Lands of Egypt," Report prepared for USAID/Cairo by Development Alternatives, Inc., April 1981
- Desert Development Center, American University in Cairo, "Desert Community Aspects in AUC Desert Development Systems," First Progress Report, March 1985
- Gotsch Associates, "Private Land Reclamation in Egypt: Implications for Agricultural Development," Report prepared for USAID/Cairo, April 1983
- Hunting Technical Services, Darwish and Partners of Cairo, and Binnie and Partners of London, "Suez Canal Region Integrated Development Study," Prepared for Ministry of Development and New Communities, Advisory Committee for Reconstruction, 1979.
- Includes following reports of special interest:
- Special Report No. 1 - Summary and Main Report
 - Special Report No. 2 - Comparative Analysis of Reclamation Experience
 - Special Report No. 4 - Alternative Strategies and Site Selection Criteria
- Kishk, Mohamed Ateef, Ibrahim Soliman, and Metwali El-Zanaty, "The Analysis of the Farm Management Survey of the Graduate Farms and the Small Holding Farms in Samalout Region of El-Menia Governorate," Report to the Ford Foundation, Cairo, 1985
- Pacific Consultants, "Egypt: New Lands Productivity Study," Report prepared for USAID/Cairo, January 1980
- Winrock International Institute for Agricultural Development, "Egypt: Irrigation Techniques for the New Lands," Draft report prepared for the Ministry of Agriculture, May 1985
- World Bank, "Arab Republic of Egypt: Five Year Investment Plan Review, Land Reclamation " Draft Report, October 1984
- World Bank, "Arab Republic of Egypt: Selected Issues in Agriculture, Irrigation, and Land Reclamation," Regional Projects Department, Europe, Middle East and North Africa, May 1983

ANNEX C
(Quarterly Report No. 16, July-September 1985)

APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM

Summary of Project Travel

ANNEX C
TRAVEL FROM EGYPT

June 30 - September 30, 1985

NAME	DATE	PURPOSE	PLACES VISITED
<u>PROGRAM PLANNING AND MANAGEMENT</u>			
1. Mohamed Gomaa Administrative Specialist NAS/NRC Cairo office	July 1-10	Orientation on NAS/NRC accounting & financial mgt; program planning	NAS/NRC, Washington, D.C.
2. A. S. El Nockrashy ASRT Program Coordinator	August 10-29	Program planning; preparation of final reports	NAS/NRC, NBS, AID, Washington, D.C.
<u>R&D MANAGEMENT SYSTEMS</u>			
3. Nabil Saleh* Coordinator, International Programs, NRC/Cairo	July 23-Aug. 1	Project planning and review; discussions on equipment M&R	NAS/NRC, Battelle Institute, American Chemical Society, NIH, Washington, D.C.
<u>MORE AND BETTER FOOD</u>			
4. Osman Galal Project Coordinator	July 6-27	Review of statistical/analytical procedures developed for MBF; review of women in development activities; preparation of final report on nutrition aspects	Dept. of Family & Community Medicine University of Arizona, Tucson
5. Abdel Rahman El Seidi Professor of Agricultural Economics, Fayoum University	July 30-Aug. 17	Computer-aided analysis of data on nutrition interventions	Dept. of Family & Community Medicine University of Arizona; International Food & Agricultural Dev., Tennessee State Univ., Nashville; NAS/NRC, Washington, D.C.
6. Sylvia K. El Arini* Professor of Biochemistry, NRC/Cairo	August 5-20	Study of techniques for in vivo methodologies for quantitative determination of drugs & other trace substances from biological fluids	U.S. Food & Agriculture Dept. Biopharmaceutics Lab, Washington

* Airfare provided by another source

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ANNEX C

TRAVEL TO EGYPT

June 30-September 30, 1985

<u>NAME</u>	<u>DATE</u>	<u>PURPOSE</u>
<u>PROGRAM PLANNING AND MANAGEMENT</u>		
1. Augustus Nasmith Jr. Staff Officer, BOSTID	August 2-14	Project planning and review; discussions with AID/Cairo re contract and program timetable; coordination of advisory visit of James Fitch on plans for land reclamation technology evaluation activity
<u>TECHNICAL AND SOCIO-ECONOMIC EVALUATION OF IRRIGATION SYSTEMS IN NEW LANDS</u>		
2. James Fitch Agrimanagement, Inc. Yakima, Washington	August 8-15	Consultation with principal investigator and project staff; visit to three project sites; planning for visits to Egypt by U.S. consultants and observation/study visits to U.S. by Egyptians
<u>PREPARATION OF SELECTED PHARMACEUTICAL CHEMICALS</u>		
3. Fay Cunningham Director, Specialty Chemicals The Upjohn Company Kalamazoo, Michigan	August 15-25	Visit to NRC pharmaceutical pilot plant to review flow sheets and equipment layouts in preparation for product syntheses scheduled to begin in November