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For a background description of all elements of the Applied Science and Technology Research Program, see the summary status report for 1978-1981, prepared by the staff, Board on Science and Technology for International Development, NAS/NRC, dated June 1982. The summary status report also serves as the first quarterly report (October-December 1981) for Phase II.

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MAJOR ACTIVITIES

Policy Planning and Management

R&D Management Project

1. Objectives and Goals During Phase I, the R&D Management Project emphasized training activities for a broad cross section of senior management officials from the Academy of Scientific Research and Technology (ASRT) and for management and scientific personnel from the National Research Centre (NRC/Cairo), as well as other research institutes affiliated with the ASRT. Seminar-workshops were held at the Denver Research Institute, Denver, Colorado. A more general R&D management workshop was offered in Cairo for participants from the ASRT, NRC/Cairo, research institutes of Egyptian ministries, and several Egyptian universities.

The objective of the R&D Management Project in Phase II is to (a) strengthen existing management capabilities in Egyptian scientific organizations at the national, institutional, and project levels; and (b) institutionalize elements of R&D management development and training in Egypt.

Implementing the program involves the development of strategies to achieve the following goals:

- improved organizational structure and functions
- effective use and development of human resources

- systematic marketing of R&D services
- increased interaction between ASRT and R&D institutes to enhance cooperation with clients
- increased NRC linkages with public and private sector end-users.

In order to achieve the goals, three levels of Egyptian R&D management infrastructure need to be addressed. They are:

- National Level -- planners for science and technology policy in the ASRT and in the Egyptian national development planning office
- Research Institute Level -- directors and central staff managers plus laboratory heads
- Project and Program Level -- project and program leaders and their immediate professional staff.

2. Future Activities The JCC asked that a committee composed of Dr. A. S. El Nockrashy (ASRT), Dr. Osman Galal (NRC/Cairo), and Dr. Leo Packer (NAS/NRC resident program director) propose a plan for the Phase II of the R&D Management Project.

In May 1982 Mr. Gilbert Devey visited Cairo briefly while traveling in the Middle East for the government of Saudi Arabia. Mr. Devey was formerly a program director for the National Science Foundation in its R&D activities in Egyptian universities and, therefore, was familiar with R&D management structures, both in universities and in several research institutes affiliated with the ASRT. His review of current NRC/Cairo

management procedures led him to recommend that a U.S. partner be identified and contracted to assist the National Research Centre in strengthening its staff officers for R&D marketing, technoeconomic studies, and technology assessment. Mr. Devey's recommendation runs counter to a general desire by the JCC for more decentralized planning and implementation of R&D management activities during Phase II. His report is being reviewed by the the committee of El Nockrashy, Galal, and Packer; no action will be taken until the review has been completed.

In June, Mr. James Blackledge, a U.S. science and technology management consultant widely known for his work in many developing countries including Egypt, spent three weeks in Cairo working with the planning committee appointed by the JCC. His report emphasized an action program, centered and managed in Egypt by the ASRT and the NRC/Cairo, with the following major elements:

- A conscious decision to institutionalize R&D management nuclei and to create full-time R&D management staff officials responsible to the ASRT president and NRC/Cairo director.
- Offering additional workshops in Cairo on basic elements of R&D management directed to less senior researchers who have never had the opportunity to study management principles.
- Conducting specialized workshops in Cairo on the subjects of marketing of R&D, technoeconomic analyses of applied research, and administration of support services with strong participation from NRC/Cairo <u>and</u> from client organizations (public and private

sector, the governorates, other Egyptian institutions with an R&D orientation).

- In-house training in the NRC/Cairo. Management courses have been presented to NRC/Cairo researchers and project directors in the past. These efforts need to be extended and offered on a regular basis each year.
- Institutionalization and strengthening of the NRC/Cairo program office, which should become a full-time staff office responsible to the director, with expanded capabilities in technoeconomic feasibility studies and marketing as well as internal monitoring of research proposals.
- Industry-oriented seminars on "problem identification" to involve Egyptian industry leaders, Egyptian directors of research institutes (such as the NRC/Cairo), and selected U.S. industry/institute leaders in proposing realistic strategies for greater use of R&D and for improved management of Egyptian industrial development.
- ASRT management seminars that focus on implementation and management of large multidisciplinary and multi-institutional projects that have been jointly planned by ASRT and clients.
- Other activities, including highly selective training of Egyptian R&D managers abroad and the preparation of Egyptian case-study materials illustrating special R&D problems and the means by which they were solved (or not solved) in Egypt.

The creation of a five-member Egyptian "management steering committee" has been suggested to coordinate the above activities, to monitor their implementation, and to suggest appropriate modifications. This steering committee would meet monthly and would interact regularly with a small (three-member) counterpart group from the United States that has extensive international R&D management experience.

A draft report prepared by Mr. James Blackledge, giving the rationale for the R&D Management Project and a proposed implementation schedule, was submitted upon completion of his assignment in Cairo on June 25, 1982. The report is being circulated for comment among management staff in the ASRT and NRC/Cairo and will incorporate comments from a wide group of reviewers prior to submission to the JCC on or about October 1, 1982. It is also expected that implementation of some elements of the plan will begin prior to JCC-X, scheduled for Cairo, November 27-29, 1982.

Science and Technology Policy Measures

1. Background The ASRT has always maintained a Principal Committee on Science and Technology Policy to advise the Academy Council on measures that are needed to improve linkages between Egypt's research and development "producers" and its "end users." There is general recognition, however, that performance in science and technology planning and its coordination with national social and economic planning and with the production sectors has fallen short of expected results.

When Phase II of the Applied Science and Technology Research Program was planned, AID and ASRT agreed that a program element on Science and Technology Policy Planning (Policy Measures) would be a valuable new activity. The JCC itself agreed to assume responsibility for that activity in Phase II. In November 1981 a seminar titled "Towards a Technology Policy for Egypt" convened in Cairo as a first step in that science and technology policy planning effort. A document on the first seminar is included in the status report summarizing program activities through December 1981.

JCC members agreed that the principal mechanism to advance science and technology policy planning would be the collection of analytical and evaluative information on Egyptian manpower resources and institutions, the study of interrelationships among those resources and institutions and officials who make decisions affecting national development, and the preparation of policy-oriented documents addressed to those responsible for Egyptian social and economic development planning.

One mechanism for discussion and debate of the analytical and evaluative studies are annual seminars to which Egyptian and invited foreign experts come. The participants represent the fields of science and technology, government fiscal and management planning, decision makers from the Egyptian Peoples Assembly, and cabinet ministers.

Because the first seminar raised issues that required greater data collection and analysis, several studies were recommended for Seminar II in November 1982. Among those recommended were:

- an in-depth analysis of Egyptian institutes that produce science and technology, including universities, institutes affiliated with the ASRT, and institutes or research centers of the ministries
- an in-depth analysis of technology service institutes such as those in design engineering, consultancy, and standards
- an in-depth summary of legislation affecting policy for science and technology, with particular emphasis on technology licenses, importation of technology, and joint ventures or turnkey projects.

2. Current Status Several studies were undertaken during this reporting period by persons designated by the ASRT. The National Academy of Sciences suggested that terms of reference for the papers first be prepared and that invitations for proposals be given to a number of individuals with additional announcements to be made in Egyptian institutions where policy research is conducted. This step was considered but rejected because ASRT had begun the process of preparing for Seminar II in December 1981 immediately after Seminar I was concluded.

The studies commissioned by ASRT include:

Studies	Authors/General Coordinators
(a) Science and Technology "production" groups	
. Universities	Dr. Izat Khairy, Sec. Gen. Supreme Council of Universities
. ASRT and affiliated institutes	Dr. M. Fayez, Vice Pres., ASRT
. National Research Centre (NRC/Cairo)	Dr. M. Kamel, Director, NRC
. Ministry of Industry	Eng. I. Sharkas, Eng. K. Maksoud, Dr. A.A. Azim, Gen. Organization for Industrialization
. Ministry of Agriculture	Dr. Gamal A. Samie, former Vice Pres., ASRT
. Other ministries	Dr. A. El-Fotouh Abdel Latif, Vice Pres., ASRT
(b) Technology "service" functions	
. Design, engineering, consulting	Dr. Moustafa El-Said and Eng. Y. Mazhar, Engineering and Design Dev. Centre, Ministry of Industry
. Standards and measures	Dr. F. Sobhy, Director, Egyptian Organization for Standardizaton and Quality Control, Ministry of Industry
(c) Legislative Studies	Dr. Wahli Ghobrial

The first draft of each study is due in July 1982. Thereafter, it is expected that Egyptian-American teams will use the materials in the preparation of issues papers for the November seminar.

3. Summer Interns After JCC-IX, Drs. Galal and El Nockrashy visited Cornell University in Ithaca, New York. There they met with Dr. David Lewis, assistant director of the Program on Policies for Science and Technology in Developing Nations, who has been conducting a review of his 1978 study, "Meeting the Technology Needs of Development: Egypt's New Programs for Mobilizing Research Resources." To assist in data collection and preparations for the second Science and Technology Policy Measures Seminar scheduled in Cairo, November 1982, Dr. Lewis agreed to send two graduate students, Rebecca and Peter Doan, to Egypt for 10-12 weeks during the summer. Cornell University provided international transportation; the Applied Science and Technology Research Program gave the Doans a small grant for per diem expenses. Their work will involve identification of strategies and guidelines for more effective linkages among R&D producers and users as well as an assessment of development needs and the role of both ASRT and NRC/Cairo in meeting those needs.

Demonstration Projects

More and Better Food

In May 1982, Dr. Sohair I. Salem of the National Research Centre's Child Nutrition Laboratory in Cairo visited the United States for observation and study under the More and Better Food demonstration project. Specifically, her purpose was to identify and study new methods for determining nutritional status of village children. Her research with

the subproject on village nutrition revealed a need for simple, reliable measurements for trace elements, DNA, and RNA as indicators of nutritional status. Normally these measurements are made by taking blood samples, which is always difficult with small children. Dr. Salem developed an alternative method that employs analysis of human hair samples. She brought samples from Egypt to two nutritional research centers -- one at the University of Oklahoma and another at the University of North Dakota -- where she learned other methods to measure trace elements and participated in the work of those laboratories. An atomic absorption spectrometer, an essential instrument for this kind of work, is available in her laboratory at the NRC/Cairo (it was purchased during Phase I).

At the invitation of Dr. Nevin Scrimshaw, Dr. Salem visited the Department of Nutrition and Food Science at the Massachusetts Institute of Technology to learn about their iron deficiency experiments, which are related to her More and Better Food screening studies. She also used the opportunity to observe other activities at MIT concerned with prenatal nutrition and feeding of young children programs that are important to nutrition activities in Egypt.

Development and Application of Biogas Technology

The U.S. panel on biogas met with the NRC/Cairo biogas technology group April 3-8, 1982, in Cairo. Members of the U.S. panel are Dr. P. R. Goodrich, University of Minnesota (Chairman); Dr. H. R. Capener, Cornell University; and Dr. T.B.S. Prakasam, Metropolitan Sanitary District of

Greater Chicago. They commended the Egyptian team for their achievements in planning, construction, and field testing of digester designs and the biological engineering requirements of biogas generation systems. The panel also concurred with the Egyptian team's conclusion that emphasis now should be on the social and cultural factors affecting attitudes of the residents of the demonstration villages (Manawat and Omar Makram) toward use of biogas technology.

To achieve the desired level of acceptability in Egypt, a political commitment to biogas development and use is needed from officials at the village, governorate, and national levels. The biogas panel and their Egyptian colleagues believe this may be achieved through continued successful operation of the village biogas units; judicious choice of other demonstration sites, with clear evidence of operational success; education and extension work in the demonstration villages; publicity; careful management of the sites; and continued leadership by the NRC/Cairo group.

The general conclusion is that the biogas project has produced very good results and--given the operational problems encountered in such multidisciplinary R&D efforts--is on schedule.

New Crops for Arid and Semi-Arid Zones

The U.S. panel (Dr. Cyrus McKell (chairman) from the agricultural firm of Native Plants, Inc., in Salt Lake City, Utah; Dr. Darrel Metcalfe from the University of Arizona; and Dr. J. R. Goodin of Texas Tech University) visited Cairo, April 1-10, 1982, for field visits to the experimental sites

and discussions with Egyptian colleagues on the project's progress. They visited Al Azhar University and the NRC/Cairo laboratories; Maryout (West Noubaria), an experimental location of the Ain Shams University in the Western Delta; the Baharia Oasis farm site of Al Azhar University located approximately 350 km southwest of Cairo; and the Kom Osheim site in El Fayoum.

Based on their observations and on preliminary results from field testing in Phase I, the U.S. panel recommended that future efforts be concentrated at Kom Osheim and the Baharia Oasis. Several logistical problems were noted which continue to impede progress, but resolution of the major problems (funds for local materials and supplies, incentive payments, transport, and long lead time for equipment delivery) are actively being worked on by the ASRT, NAS, and other contracting parties.

The Egyptian-American group also discussed training programs for project scientists and greater interdisciplinary coordination during Phase II. Project success may hinge upon proper interpretation of basic information on growth of plant root, soil salinity, and water movement in soils.

For the 1982 meeting, the U.S. panel offered to present a technical seminar on topics of current R&D interest such as plant selection, propagation methodologies, growth responses, and field management in arid agriculture. In addition, economic potentials (perception of world demand) may be an important topic for future discussions and consultation.

Research and Development Projects

Improving the Processing of Wool Scouring and Wool Wax Recovery

Three Egyptians from the wool scouring and wax recovery activity undertook a study-observation trip through Europe in conjunction with the manufacture of specialized equipment for installation in Misr Beida Dyers Company, the end user for this project. A summary of their travel follows:

Person	Place/Date	Purpose
Dr. Adel A. Kantouch Head, NRC Textile Research Lab and Principal Investigator for the Wool Scouring/Wax Recovery Project	International Wool Secretariat, U.K. April 12-24, 1982	Fact-finding on Lo-Flow Scouring Process
	Alfa Laval Company France and Sweden 4/25 - 5/9/82	Operation and maintenance of centrifuge equipment for Egypt
Dr. Abou Zeid Production Director, Misr Beida Dyers Company	Alfa Laval Company France and Sweden 4/25 - 5/9/82	Operation and maintenance of centrifuge equipment
and Eng. W. Khalil Maintenance Manager Misr Beida Dyers Company	Alfa Laval Company France and Sweden 4/25 - 5/9/82	Operation and maintenance of centrifuge equipment

Since the centrifuge and other auxiliary equipment are being manufactured on special order for the Misr Beida Dyers Company, the three-person team visited the factory facilities in Sweden and France to complete arrangements for shipment, installation, and start-up. The team made a final check of the design specifications and proposed plant layout with engineers of the Alfa Laval Company. They also reviewed maintenance and operating procedures for the centrifuges, pumps, and mechanical equipment, with special attention to corrosion prevention and to operational procedures that minimize wastewater pollution.

The wool scouring/wax removal line is scheduled for installation at the Beida Dyers plant near Alexandria, Egypt during June, July, and August 1982.

Investigation and Evaluation of Egyptian Bentonites for Industrial Applications

Professor Haydn Murray, chairman of the Department of Biology at Indiana University, met with the Egyptian bentonites team at the National Research Centre in Cairo June 11-18, 1982, to discuss program plans. Prof. Murray is a clay mineralogist with 16 years industrial experience in mining, beneficiation, and utilization of clay materials.

The bentonites project is designed to use Egyptian bentonite clays for industrial purposes in foundries, in oil-drilling muds, as a soil conditioner, in bleaching of vegetable oils, and in ceramics. Bentonite deposits exist in commercially exploitable quantities at three or four distinct sites in Egypt. These deposits have not been characterized completely (mineralogical description with analyses of active materials and of impurities). The NRC/Cairo research team proposes to do mineral analysis, laboratory testing, pilot-plant activation, development for end-use with industrial consumers, economic evaluations of the process steps, and—ultimately—market development.

Prof. Murray found a strong Egyptian team from the Central Metallurgical Research and Development Institute (CMRDI) of the National Research Centre. Members of the team are:

Dr. A. A. Abdul Azim	Principal Investigator and CMRDI Director (physical chemist)
Dr. Abdel Kadir Attia	Clay Mineralogist (ore evaluation)
Dr. Aziza Yousef	Chemical Engineer (beneficiation)
Dr. Nabil Felix	Chemist (mineral activation)
Dr. Adel Ismail	Chemical Engineer (pilot plant operations)
Dr. Wajas Ismail	Chemist (ceramics and refractories)
Dr. Fayez Salib	Agronomist (soils)

The group is well acquainted with both the supply-side aspects of the project (mining and mineral characterization) and the market aspects (end uses in foundries, oil prospecting, the building industry, and vegetable oil processing).

Dr. Murray and Dr. Adel Abdul Azim outlined a program plan for the coming six months which will consist of:

- Immediate surveying/characterization of those bentonite clay deposits for which there is little data
- Improvements of the pilot plant through the addition of a few key items of equipment
- Acid-activation testing using sulfuric acid rather than the more corrosive hydrochloric acid, followed by testing of product acceptance
- Orientation and study visits to the United States by three members of the bentonites team
- Review of progress and reassessment of results late in 1982 or early in 1983.

PROBLEMS AND THEIR RESOLUTION

R&D Management Project

Both ASRT and NRC/Cairo have taken positive steps to strengthen R&D management systems and improve the understanding of senior administrators in management methods. Leaders of those institutions recognize that more needs to be done and it is this realization that has resulted in a strong commitment to a management development project in Phase II. Although the

proposed program outlined in this quarterly report suggests an important and necessary series of actions, there are other issues that the Egyptians must address. The changes needed require policy decisions that will require time and discussion before being fully implemented. These management changes include the following:

- Authority for senior administrators to hire, assign, discipline and, if necessary, dismiss members of an R&D staff.
- Creation of career paths with means to recognize, reward and promote scientists who contribute to applied research projects. Thus, publication in foreign scientific journals would cease to be the primary "measure" of good research.
- Authority to set R&D goals and criteria, measure work progress, evaluate results in light of alternative uses of available resources and--when desirable--terminate projects.
- Creation of career paths in R&D administration and/or technical support services with adequate incentives, recognition, salary, and job security.
- Institution of well-defined evaluation and job performance standards as the basis for individual remuneration and promotion.

It is recognized that some of the above goals run counter to traditions and long-established practices in Egyptian R&D institutions. The changes imply a more competitive, open, and "individual-centered" approach to institutional and personnel management. Naturally, the blind adoption of

practices from abroad (especially from the USA or Western European countries) would be neither successful nor desirable. The goal is to achieve higher individual productivity and to apply the results from R&D to solving Egyptian social problems with the resources at hand. Policy changes need to occur to accomplish this goal, and this will require time. But commitments should be made during Phase II with a resolve to continue in the process of management improvement long after the Applied Science and Technology Research Project has been completed.

The following are among the more immediate actions that are needed to launch the R&D management project:

- Formation of an Egyptian steering committee that will meet at least once a month to give guidance, set criteria for participation, and monitor performance.
- Appointment of full-time R&D management program coordinators at the ASRT and the NRC.
- Creation of a three-person U.S. panel to serve with the Egyptian steering committee in the organization, policy planning, and program evaluation aspects of the project. The U.S. panel should meet with the steering committee at six month intervals.
- Identification of immediate targets for projects in terms of seminar-workshops, training courses, internship opportunities and Egyptian industry-Egyptian R&D institute interactions.

Although the Joint Consultative Committee requested that the R&D management project plan be reviewed at its 10th meeting scheduled in November 1982, elements of the project plan should move ahead as soon as possible.

Overall Management Implementation Plan

There is a contractual requirement that NAS/NRC provide AID a Phase II management implementation plan. The plan requires project-by-project analyses and projections for training needs, consultant and/or panel advisory services, implementation of research and development within the targets for each activity, equipment needs and post-project plans for extension and/or industry use. Until June 1982 the NAS/NRC working with ASRT, NRC, and especially with individual project leaders has not been able to prepare an overall management implementation plan because:

- The local materials and supplies allocations were not decided upon until March and funds were not available until about April 1982.
- Incentive payments lapsed in October 1980 and were not resumed as of June 1982. This caused a gradual decrease in level of effort. Individual investigators early in 1982 felt that they could not provide a project implementation schedule until there was a solution to the overall problem (Note: an 18 month increment for incentives became available in late July 1982).
- Equipment procurement plans could not be made final because the technical contract for that service was not finally signed until June 1982.

Because the above interdependent actions have not been accomplished, an implementation plan cannot be prepared until ASRT, NRC, NAS/NRC, and the University of Wisconsin coordinate schedules for on-site preparation in Cairo. This did not occur in July because of the Ramadan observance and is not expected to occur in August because of the absence from Cairo of the ASRT project coordinator.

ANNEX A

REPORT ON TRAVEL OF EGYPTIANS TO THE UNITED STATES, APRIL-JUNE 1982

TRAVEL TO THE U.S.

April 1 - June 30, 1982

Name	Date	Purpose	Place
1. Sohair I. Salem Research Professor, Child Health Laboratory, National Research Centre (NRC)	May 13-June 2	Study/observation, fetal malnutrition, atomic absorption techniques for human hair analysis (More & Better Food demonstration project)	Pediatrics Department, Univ. of Oklahoma USDA Human Nutrition Laboratory, Grand Forks, North Dakota Department of Nutrition & Food Science, Massachusetts Institute of Technology
2. Zaki El Sawi Lecturer assistant, Department of Horticulture, Ain Shams University, Cairo	June 28-August 8	Summer session course "Plant Propagation through Tissue Culture" under Dr. Toshio Murashige (New Crops for Arid and Semiarid Zones of Egypt demonstration project)	University of California, Riverside

ANNEX B

REPORT ON TRAVEL OF AMERICANS TO EGYPT, APRIL - JUNE 1982

TRAVEL TO EGYPT
April 1 - June 30, 1982

Name	Date	Purpose
1. Cyrus McKell (chairman)	April 1-10	New Crops for Arid and Semiarid Zones of Egypt advisory committee meeting
2. Darrel Metcalfe	April 1-10	"
3. Joe Goodin	April 1-10	"
4. Philip Goodrich (chairman)	April 2-7	Development and Application of Biogas Technology in Rural Areas of Egypt advisory committee meeting
5. T.B.S. Prakasam	April 2-7	"
6. Harold Capener	April 2-7	"
7. Peter and Rebecca Doan, Cornell University	May 28-August 14	Graduate interns in the office of Dr. A.S. El-Nockrashy for science and technology policy studies
8. Gilbert Devey	May 28-31	Consultant for national science and technology policy planning activities
9. David Lewis	May 30-June 4	Consultant for national science and technology policy planning activities
10. James Blackledge	June 4-24	Consultant for design of R&D management training component
11. Haydn Murray	June 11-18	Advisor for assessment of basic plan and current status of bentonite project
12. Augustus Nasmith Jr.	March 29-April 14	Program management in conjunction with Biogas and New Crops committee meetings in Cairo

ANNEX C

REPORT ON TRAVEL OF EGYPTIANS

TO THIRD COUNTRIES, APRIL - JUNE 1982

TRAVEL TO THIRD COUNTRIES

April 1 - June 30, 1982

Name	Date	Purpose	Place
1. Adel A. Kantouch Head, Textile Research Laboratory, NRC	April 17-24	Fact-finding re operational procedures and preventive maintenance practices for Lo-Flow wool scouring process	International Wool Secretariat, London headquarters and pilot plant at Ilkey, Yorkshire
	April 25-May 9	Orientation on installation, operation, and maintenance of centrifuge equipment to be installed at Misr Beida Dyers plant (wool wax R&D project)	Alfa Laval Company, France and Sweden
2. Abou Zeid Production Director, Misr Beida Dyers Company, Alexandria	April 25-May 9	Orientation as above	Alfa Laval Company, France and Sweden
3. W. Khalil Maintenance Manager, Misr Beida Dyers Company, Alexandria	April 25-May 9	Orientation as above	Alfa Laval Company, France and Sweden