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To Whom it May Concern:

Enclosed is a copy of the quarterly report on the "Applied Science and Technology Research in Egypt" project (July-September 1982), Contract AID/NEB-0016-C-00-1058-00.

Copies of the report are also being sent to the persons indicated below.

Sincerely,

Dorothy M. Anderson
for Jay Davenport
Professional Associate

Enclosure

cc: Ms. Kathryn Cunningham, SER/CM
Ms. Carolyn Coleman, NE/TECH/HRST
Mr. Bert Porter, NE/EL
Mr. James Riley, USAID/Cairo
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APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT

Quarterly Report Number 4: Phase II

July - September 1982

Contract Number : NEB-0016-C-00-1058-00

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Report prepared by

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Introduction

This is the fourth quarterly report, Phase II, of the Applied Science and Technology Research Program in Egypt and covers the period June - September 1982. The program is 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).

For a background description of all elements of the Applied Science and Technology Research Program during Phase I (1978-1981), see the report prepared by the NAS/NRC staff dated June 1982.

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MAJOR ACTIVITIES

I. Policy Planning and Management

A. R&D Management Project

The report by Mr. James Blackledge, consultant on R&D Management programs, entitled "Strategies for Implementation of a Phase II R&D Management Program," was received in Egypt in mid-July. Its recommendations for strengthening the management base at the National Research Centre (NRC/Cairo) and the Academy of Scientific Research and Technology (ASRT) were reviewed in the April-June 1982 Quarterly Report. During this reporting period, Dr. Leo Packer, NAS/NRC resident program director in Egypt, has been working with both organizations to implement various elements of the plan. Emphasis should be given to the fact that the recommendations in the Blackledge report have not been adopted in their totality, but many elements are expected to be implemented

during the coming year. No steering committee or project coordinator on the Egyptian side has been appointed, and the decision to do so has not been formalized. Strengthening the Programming Office at the NRC/Cairo and upgrading certain ASRT executive planning and policy functions at ASRT are two specific elements for priority implementation.

A working seminar entitled "Productive R&D Management" was organized by the Battelle Institute in Columbus, Ohio, USA, for twenty participants from developing countries during the three-week period of August 2-20, 1982. One tuition-free scholarship was offered to the ASRT by the Battelle management, and two additional Egyptian participants were sponsored by the Applied Science and Technology Research Program. The three participants were: Dr. Aboul F. Abdel Latif, ASRT Vice President; Dr. A. S. El-Nockrashy, Director, Foreign S&T Programs, ASRT; and Dr. Yousef K. Mazhar, Director, Engineering and Design Development Center, Ministry of Industry.

The seminar was designed for senior and top management officials from organizations that conduct, sponsor, and manage large research and development efforts. The course included not only a policy orientation but also practical aspects of financial, personnel, and project planning; project reporting; and program evaluation. Upon his return to Cairo, Dr. El-Nockrashy prepared an extensive review of the course content, methodology and

presentation. He will hold a seminar on the Battelle experience at the NRC/Cairo in October.

B. Science and Technology Policy Measures

The first of a series of S&T Policy seminars on the theme "Toward a Technology Policy for Egypt" was held in November 1981 in Cairo and was widely attended by representatives of the Egyptian scientific community as well as planners and senior officials from science and technology-oriented agencies of the government. (See the Status Report, Phase I, 1978-81, dated June 1982). Because planning for the 1981 seminar had to be completed before the NAS/NRC Phase II contract was officially in operation, payment of certain costs which were to be shared between ASRT and NAS/NRC had to await that new contract. In July 1982, Dr. Packer was pleased to deliver, on behalf of the NAS/NRC and its financial sponsor, the USAID Mission in Cairo, a check for LE 15,000 to Dr. Ibrahim Badran, ASRT President. This represented approximately 50% of the total seminar costs.

Preparations for the 1982 S&T Policy Seminar on the same theme, "Toward a Technology Policy in Egypt," are reported to be under the direction of the ASRT Principal Committee on Science and Technology Policies. No preliminary agenda, however, is available. The Principal Committee has directed that a number of

commissioned analytical studies be prepared for discussion during an international seminar on November 24 and 25 preceding the Tenth Joint Consultative Committee Meeting.

The commissioned studies, based upon a suggestion by Dr. Ibrahim H. Abdel Rahman and incorporated into the recommendations of Seminar I, are to amplify the content and scope of the preliminary diagnoses of S&T policies at the national level, the level of S&T producers, and the S&T users which formed part of the documentation for the 1981 effort. A communication to NAS/NRC from the ASRT indicates that the sectoral studies will include inputs from: (a) universities; (b) R&D establishments of the Ministries of Industry, Agriculture, and Irrigation; (c) consultancy establishments; and (d) standards and quality control organizations. In addition, a study on aspects of national legislation related to technological development is being prepared.

The Principal Committee has also invited several foreign experts to come to Egypt to share in the 1982 Seminar. These include:

- Dr. Fred Moavenzadeh, Director, Technology Adaptation Program, Massachusetts Institute of Technology, who has long been associated with the University of Cairo Technology Planning Program.

- Dr. G. S. Gouri, United Nations Industrial Development Organization, Vienna, Austria.
- Dr. Francisco Sagasti, Consultant from Lima, Peru, and former executive director, Science and Technology Policy Instruments Study in Developing Countries sponsored by the Canadian International Development Research Centre.
- Dr. M. S. Wionczek, Consultant from Mexico City and former planning director, National Council for Scientific and Technological Research of Mexico.

II. Demonstration Projects

A. More and Better Food

1. Training, Study, and Observation Programs

In July, Dr. Nabieh I. Ashour, Professor of Crop Physiology, NRC/Cairo, and a member of the group working on peanut and soybean crops in the villages of Kafr El Khadra and Omar Makram, visited the University of Georgia at Athens and its research stations for a field study of improvements in oil seed crops. He also visited North Dakota State University to learn firsthand about their sunflower research program, and the University of Illinois for

discussions about soybean production. In addition, he met with research scientists in the Plant Physiology and the Plant Protection Institutes, U.S. Department of Agriculture Research Center, Beltsville, Maryland.

Drs. Sohair El-Nockrashy, Associate Professor of Dairy Science, and Ali A. S. Ramadan, Associate Professor of Food Technology, both of whom are associated with studies of pesticides contamination of food in the demonstration villages, attended an intensive two-week course in July 1982 on the technology of pesticide analysis at the University of California, Davis.

2. Analysis of the More and Better Food Program

During the summer months, two graduate student interns, Rebecca and Peter Doan, from the Program on Policy Studies in Science and Technology, Cornell University, worked at the ASRT under partial support of the University and the Applied Science and Technology Research Program. Their general objective was to assist in S&T Policy-related studies. Under Drs. A. S. El-Nockrashy and Osman Galal, they undertook data gathering and analysis for a generalized case study of More and Better Food and a review/evaluation of the nutrition aspects of that demonstration program. They returned to Cornell University in late August and are expected to have their two studies completed in November 1982.

3. Food Technology Pilot Plant

Dr. Edmund Lusas (Director, Food Protein R&D Center, Texas A&M University System) and Dr. Soliman Shenouda (Research Specialist in Product Development, General Foods Technical Center, Tarrytown, New York) spent the period of September 11-October 1 as consultants at the National Research Centre. Their task was to prepare general feasibility design specifications for a multiple-purpose food technology pilot plant to serve Egyptian industry. The report of the expert group was prepared in Egypt in close collaboration with the food science and technology specialists of NRC/Cairo. Because the principal clients of the food technology pilot plant will be the Egyptian food industry, visits were made to a wide spectrum of end users in baking; dairy; poultry, fish, and meat processing; canning and freezing of fruits and vegetables; baking and vegetable oil extraction processors. The recommendations of the study were as follows:

o Because Egypt must strengthen its food processing industry and because that industry is presently seeking technical assistance of qualified scientists and engineers with well-equipped facilities for research and development, construction and equipping of a modern food technology pilot plant at NRC/Cairo should commence as soon as possible.

o The objectives of the pilot plant should be cost reduction of food products through improved yield, ingredient substitution, utilization of by-products and water reuse; development of new products (including low-cost, high-protein foods and expanded varieties of current foods); and product improvement. Programs should be instituted to improve the quality of ingredients and products as well as sanitation in food processing and distribution. Process cost-estimating services should be expanded, and consumer and market-testing procedures should be introduced.

o Priority should be given to products that promise low cost, nutritious mass feeding, and maximum use of ingredients including: (a) the baking industry; (b) high-protein, new compounded products achievable by extrusion processing; and (c) utilization of food by-products by recycling of nutrients. Other priority sectors include the processing of meats (including poultry and fish), vegetables, fruit, and dairy products.

o The preferable manner in which to proceed is for NRC/Cairo to appoint a full-time project leader with back-up staff and authority to make decisions so that an agreed-to schedule may be maintained. The NRC/Cairo project leader should be assisted by an appropriate U.S. equipment acquisition contractor who will complete equipment purchase specifications; arrange for the procurement,

evaluation, and shipment; advise on installation; and, with suppliers' representatives, where necessary, assist in both equipment start-up and NRC/Cairo staff training in the new pilot-plant facility.

o The pilot plant should be equipped with multiple-use machinery and equipment costing about U.S. $800,000 as specified in the report. After a review of the specific items of equipment by NRC/Cairo staff and technical assistance from the equipment acquisition contractor, as many items of the equipment specified, or items of better value, should be purchased. Particular attention must be given to compatibility with the Egyptian electrical supply and adaptability to metric units.

o A new building should be constructed at the NRC/Cairo site embodying the principles and specifications recommended by the expert group.

o To reach an optimum degree of industry cooperation, NRC/Cairo must establish and maintain closer liaison and communication with the Egyptian food industry than has been the practice in the past. Some indication to the industry that the change is occurring seems advisable, such as the establishment of a new Food Research Institute or a formal Industry Support Program.

The changes, moreover, must concentrate upon service-type operations desired by industry (in-plant quality control, technical information retrieval, cost reduction analyses, energy-saving assistance, etc). An Industry/NRC/Cairo Food Advisory Board may be another step to increase participation of the end-user in the pilot plant R&D program.

o An apprentice program should be established, with possible assistance from AID, under which NRC/Cairo food pilot-plant staff would visit American universities, experiment stations, food industry pilot plants, and nonprofit institutes to gain 4 to 6 months of practical pilot-plant experience.

B. New Crops for Arid and Semi-Arid Zones

1. Training, Study, and Observation Programs

During the period of June 28 - August 6, 1982, Mr. Zaki El-Sawi, a graduate student from the Horticulture Department, Ain Shams University, who works on the Arid Lands project, attended a course on plant propagation through tissue culture techniques at the University of California, Riverside. His specific area of interest within the New Crops demonstration project is the relationship of plant hormones to fruit development under conditions of stress.

Professor Mohamed El Kobbia, plant nutritionist from Ain Shams University and also a member of the New Crops group, visited the United States during July 6-25 to review current research on drought resistant plants. He was concerned with agricultural productivity under stress conditions, drip irrigation systems, hydroponics, and fertilizer delivery applications. His program included discussions with each advisory committee member as well as field research observation and study at the University of California, Riverside and Davis; Utah State University; the University of Arizona; Texas Tech University; and the USDA Salinity Laboratory at Beltsville, Maryland.

A course specifically tailored to the needs of the Arid Lands project was developed by the commercial firm Native Plants, Inc., of Salt Lake City, Utah. The two-week program was designed to give practical training in commercial field applications for tissue culture techniques. Site visits were conducted in Utah, Nevada, and California to compare "state-of-the-art" practices in commercial and experimental production areas for guayule and jojoba. The course was held August 9-20, 1982, and was attended by Dr. Maher A. Waly and Dr. Abdel Mageid Sleem of the Horticulture Department, Al Azhar University. Mr. Zaki El-Sawi, Ain Shams University, joined the group following his six-week course at the University of California, Riverside.

While in the United States, Dr. Sleem also attended a technical meeting on guayule held in El Paso, Texas. Later, he visited the Universities of Arizona and California at Davis to learn about stress-related agricultural practices that are adaptable to the Al Azhar program's arid lands demonstration project.

C. Biogas Technology in Rural Areas of Egypt

A comprehensive technical report for the biogas project is being prepared for the November 1982 Joint Consultative Committee meeting. The information in this quarterly report is a summary of the technical-economic feasibility for biogas digester use in Egypt adapted primarily from a document entitled "The Expected Role of Biogas Technology in Rural Areas of Egypt: Energy Considerations" by Drs. M. A. Hamad and M. M. El-Halwagi.

Since 1981, demonstrations of family-sized biogas digesters based on traditional Chinese and Indian designs have been conducted at Al Manawat, an Egyptian village near Cairo. By March 1982 three additional test units incorporating design changes from the earlier experience were constructed and put into operation in Omar Makram, a new village 165 kilometers from Cairo.

The combined experience with the Indian and Chinese biogas digester designs exhibit the following limitations under Egyptian

operating conditions:

- Current capital costs for a 6-cubic meter, family-sized unit are about 700 Egyptian Pounds (US $1000) for the Indian type and 550 Egyptian Pounds (US $750-800) for the Chinese type. Both are expensive when one recognizes that the per capita GNP per year is about US $500 in Egypt.
- Based upon the distribution of cultivated land and the availability of materials, there is the theoretical potential in Egypt for 1.2 million biogas units. However, the cluster structure of Egyptian village housing and lack of space (which is necessary for building digesters) in those villages decreases the potential to about 250,000 units.
- Kerosene is the present fuel of choice for cooking in Egyptian villages. Its price is highly subsidized. If the world price of kerosene is considered to be LE 0.22/liter, the locally subsidized price is LE 0.03/liter. Thus, biogas units currently have a high price differential to overcome if they are to compete with kerosene.

Notwithstanding the constraints cited above, the introduction of biogas technology in rural areas of Egypt has appreciable

beneficial impacts when viewed from the standpoint of a renewable source of energy, organic fertilizer, pollution reduction, sanitation and general improvement in the quality of village life. The biogas technology group at the NRC/Cairo has received a number of interesting inquiries, which indicates the broad appreciation for the development of a renewable energy resource in Egypt. These include:

- The Volunteers in Technical Assistance (VITA), a U.S. private and nonprofit group, has concluded an agreement with the NRC/Cairo for the Center to build a demonstration digester in the village of Shubra, Kass Garbeya Governorate. NRC/Cairo has agreed to forego its usual overhead and general services charges and will construct the digester for VITA "at cost."
- The Ministries of Defense and of Energy have asked NRC/Cairo for construction cost estimates of biogas generators.
- The Organization for the Development of the Egyptian Village (ORDEV) has suggested that NRC/Cairo, under contract with them, build 1000 biogas units. The biogas group, however, has proposed that it build 50 digesters in close cooperation with ORDEV "trainees" (engineers and agricultural extension workers) who would, in turn,

supervise the larger effort. NRC/Cairo would, of course, be available for consultation to ORDEV as needed during the construction and start-up phases of the program.

Because of various key constraints, only about 2 million Egyptians would be expected to become energy self-sufficient on the basis of biogas for residential use. This would represent only about 10% of the 1980 population of rural families. By the year 2000, biogas could cover 5% of the total energy requirements in rural areas for residential and for agricultural uses. To achieve this goal, however, considerable R&D and field testing are still required. The digesters that have been used to date do not yet represent optimum designs for rural use in Egypt.

III. Research and Development Projects

A. Evaluation of Egyptian Phosphate Ores for Wet Process Phosphoric Acid and Phosphate Fertilizer Production

During the period from October 1981 through June 1982, when approvals and implementation of the local materials and supplies fund and the salary incentives fund were in process, the pace of the project naturally slowed but did not stop. New equipment arrived, was tested, and was put into operation. Bench-scale

beneficiation and characterization of Red Sea ores (Al Hamrawein) were completed; pilot-plant beneficiation of Nile Valley ores (Al Sabeia) began. Technical details will be reported to the JCC in November.

A major new facility, a wet chemical processing unit designed to convert beneficiated phosphate materials to phosphoric acid for later transformation to phosphate fertilizers, was designed in 1981 and ordered under the equipment procurement procedures. Because it is a unique design with components from a variety of manufacturers, the delivery lead times are long. Some components have arrived but others are still in the procurement/delivery pipe line. Completion of the wet chemical processing unit, projected for late 1982, will add a new dimension to the ability of the NRC/Cairo to serve the phosphate industry. A contract to do specific studies for the Al Hamrawein Company (public sector mining-beneficiation of Red Sea ores) is under negotiation.

It is interesting to note that the phosphate ores project has brought the NRC/Cairo Ore Beneficiation and Chemical Processing Laboratory into closer collaboration with Egyptian phosphate producers. Contracts totaling LE 45,000 have been fulfilled with the Al Hamrawein Company during the period of 1980-82. In addition, beneficiation activities at the NRC/Cairo ore-processing pilot plant, which has received some equipment under the Applied Science and Technology Research Project, have increased with other Egyptian industries. The Iron and Steel Complex, for example, has

contracted with the same group that is conducting the phosphate ore project for a total of approximately LE 120,000.

B. Corrosion Causes and Control

The addition of highly advanced surface analysis equipment in the NRC/Cairo Corrosion Laboratory has greatly enhanced the problem-solving capability of that organization. A Perkin-Elmer instrument, Model 550 ESCA/SAM, for multiple analyses based upon X-ray photoelectron spectroscopy (ESCA), auger election spectroscopy, and scanning auger microscopy (SAM) has been purchased and is now in operation. The ESCA/SAM equipment has been tested during the past 15 months, its operating characteristics have been determined, and appropriate applications are now being solicited from groups outside NRC/Cairo.

As part of Phase II, corrosion failure analyses of Egyptian steel reinforcing rods used in construction are being investigated. This work, together with results of new studies on corrosion inhibitors from natural products, will be presented in November to the tenth JCC meeting.

C. Improving Wool Scouring and Wool Wax Recovery

In 1981, the Misr Beida Dyers Company reached the decision to permit the NRC/Cairo Textiles Laboratory to use one wool scouring

line at the company's production plant near Alexandria for pilot-plant testing of a modified Australian-developed system of scouring. Equipment totaling $350,000 (plus installation) was needed. An agreement was reached that the USAID-financed program would purchase approximately US $220,000 of major items, such as special centrifuges, pumps, and auxiliaries, and that Beida Dyers would finance the balance plus all installation costs. Delivery of major items began in early March 1982, but the final items requiring long lead time did not arrive until September. Installation will require approximately 90 days, but start-up testing is expected in late November or early December 1982. A complete progress report is to be given at the November 1982 meeting of the JCC.

D. Development of Red Sea Fisheries

In order to accelerate the R&D study of Red Sea fisheries resources, consideration has been given to forming a partnership between the ASRT Institute of Oceanography and Fisheries and an American counterpart organization that also is recognized for its research and development activities in tropical marine environments.

In June 1982, two representatives from the Smithsonian Institution National Museum of Natural History attended a

conference at Al Ghardaga on the Red Sea. Because the Smithsonian Institution has long been interested in the flora and fauna of that region, exploratory discussions were begun considering the possibility of bringing a small research vessel of the Institution's marine systems laboratory to the Red Sea for a two-year period. The vessel is used as a training and research facility, is self-contained for a 16-person complement of scientists, and has the great advantage of mobility. The initial idea involved reserving one-half of the positions on the vessel for Egyptian scientists, particularly those involved in the proposed areas of emphasis in the Red Sea fisheries project (pelagic or open-sea schooled fish, deep-water shrimp, reef fish, and spiny lobsters). The discussions were continued in the United States in August when Dr. Abdel Latif, ASRT Vice President, visited Washington after the Battelle Institute Program in Productive R&D Management. Dr. Ahmed E. Bayoumi also came to Washington in his capacity as the Director, ASRT Institute of Oceanography and Fisheries.

During the Washington discussions, Dr. Richard S. Fiske, Director of the National Museum of Natural History, informed Drs. Bayoumi and Abdel Latif that the Smithsonian vessel would <u>not</u> be available to visit the Red Sea but that scientists from the Smithsonian wished to explore alternative means of marine resource assessment in the area with Egyptian colleagues. Emphasis would be

placed upon a basic and systematic survey of the selected sites and the seasonal distribution of the species under investigation.

A second proposal for collaboration came from a group of biological scientists at the University of Puerto Rico who have been active in similar marine environments in the Caribbean. The group, led by Dr. Douglas Shapiro, has been searching for means to extend its work to the Red Sea. Dr. Shapiro came to the U.S. mainland for discussions during the visit of Dr. Bayoumi. The University of Puerto Rico group has also given a rather marked emphasis to basic aspects of marine resources assessment in its proposal for collaboration with the Institute of Oceanography and Fisheries.

At the November 1982 meeting of the Joint Consultative Committee, consideration will be given to the activities report of the NRC/Cairo Red Sea fisheries development group, the proposed cooperation with the Smithsonian Institution, the University of Puerto Rico, and other groups that may suggest collaboration in this R&D project.

E. Preparation of Selected Pharmaceutical Chemicals

During discussions with Dr. M. B. Fayez, principal investigator for the pharmaceutical chemicals R&D project, and his four senior staff persons, two severe constraints requiring

resolution were identified:

1. Equipment items. Although the key to technical and economic success for the project lies in results obtained from the pilot-plant stage and its ultimate scale-up to full production facilities, building blocks even at the laboratory level are essential to this R&D project. Thus, for a variety of reasons the NRC/Cairo natural products laboratory requires a reasonable supply of glassware and other simple items to enable the group to do parallel testing of the 13 products identified by the Egyptian pharmaceuticals industry as being the most urgent products for investigation. The list of items is available and priority procurement attention is being sought through the contractor.

2. Intermediate chemicals. Because the pharmaceutical chemical end-products desired are not now manufactured in Egypt, many of the chemical intermediates are unavailable except in gram quantities from the Egyptian market. The group, therefore, needs expedited delivery of approximately 24 intermediate chemicals in quantities up to one kilogram for each item. These chemicals must be purchased in convertible currencies from suppliers outside Egypt and shipped to NRC/Cairo by air freight. A system of highly accelerated procurement/delivery is under study with the assistance of the NAS/NRC resident program director in Cairo.

Similarly, approximately 12-15 intermediate chemicals are required for semi-pilot plant studies in quantities of tens of kilograms. These, too, must be purchased with dollars outside Egypt. Delivery time of 3-6 months is required. Again, an expedited procurement/delivery method is under study.

In spite of the constraints cited above, the pharmaceutical chemicals R&D group has made progress at the bench scale which will be reported to JCC in November.

F. Egyptian Bentonites for Industrial Applications

Since the April-June quarterly report, the bentonite group has continued to concentrate its efforts on bench-scale testing of materials from the Fayoum deposits. This involves beneficiation of the bentonite clays, cleaning of the product, and acid or alkali treatment depending upon the desired end-use. Results of these tests will be reported in November.

A considerable planning effort both at NRC/Cairo and at NAS/NRC in Washington has been made for the proposed technical visits to the United States. Dr. Aziza Yousef, who also heads the phosphate R&D project and is a specialist in ore beneficiation, is expected to go to the United States in early November for a series of visits to bentonite mines specifically on beneficiation problems

at the pilot-plant level and for up-scaling to the production level. Dr. A. A. Abdel Azim is expecting to attend a technical meeting for ASRT in Venezuela and plans to visit the NAS/NRC panelist Dr. Haydn Murray at Indiana University as well as United States bentonite producers to discuss marketing of Egyptian materials. His visit will require only the marginal costs of United States internal transportation and per diem.

Two additional technical visits are planned for members of the bentonite R&D team. Their purpose is to study acid/alkali activation at pilot-plant and production scale and to visit U.S. bentonite end-users in foundries, vegetable oil bleaching, and oil well drilling industries.

PROBLEMS AND THEIR RESOLUTION

I. Introduction

In previous quarterly reports, the issues of local materials and supplies (LMS), salary incentives, and equipment procurement methods were cited as constraints to the implementation of the demonstration and the research and development (R&D) projects. The LMS fund was approved and put in effect by June 1982. Salary incentives were approved in August 1982, and payments were authorized on a quarterly basis. An equipment contract combining the functions of specification preparations-for-bid and actual procurement responsibility was awarded by AID to the Scientific Instruments Center, University of Wisconsin, in July 1982. Procurement approvals, however, still require the USAID, the NAS/NRC, Wisconsin, the ASRT, and the project principal investigators to be in the decision chain. As USAID/Cairo attempts to accelerate the implementation of its assistance program in Egypt, efforts should be made to shorten the decision. Ideally, the principal investigators, ASRT, and Wisconsin could form the necessary core group with authority to bypass both NAS/NRC panels and USAID for procurement of items of less than U.S. $25,000 or some other threshold amount deemed reasonable by USAID/Cairo, the

ASRT, and Wisconsin. Such a system would, for example, eliminate the problems cited in this report for the pharmaceutical chemicals R&D project and would accelerate procurement for most items in all other projects.

The August visit to Cairo by Mr. Edward Falk, University of Wisconsin Scientific Instruments Center, greatly catalyzed the examination of Phase II equipment requirements. His efforts for close association with principal investigators, key project scientists, and the NAS/NRC resident program director in Cairo to accelerate equipment procurement are highly commended.

II. Science and Technology Policy Measures

The NAS/NRC has not received explicit instructions concerning the S&T Policy Measures project. As a consequence, it has not been possible to provide assistance as previously contemplated by the project design for such activities as:

- Agenda planning for the international portion of the 1982 S&T Policy seminar.
- Suggestions for criteria in the preparation of sectoral studies.

- o Suggestions for an analytical methodology in preparation of issues papers for the seminar which could be based upon the sectoral study results.
- o Suggestions for special speakers, if any are needed, for the 1982 seminar.
- o Joint planning of follow-on activities so that the third and final seminar in 1983 will culminate in action-oriented programs by ASRT and other appropriate Egyptian organizations.

The JCC is expected to discuss the planning process for the S&T policy seminar series during its November 1982 meeting.

III. R&D Management Project

The previous quarterly report (April-June 1982) discussed a set of recommendations made by Mr. James Blackledge, management consultant from the United States, for a series of activities to strengthen R&D management functions of the ASRT and the NRC/Cairo. The recommendations have been favorably received in Cairo, but decisions on their implementation have not been made. The decisions were deferred in part due to the absence of the ASRT

program coordinator from Egypt for 4 weeks. He was attending the Battelle Institute seminar on productive R&D management in Columbus, Ohio. The decisions to be implemented require a new sub-category for expenditures within the present NAS/NRC local currency budget. This is viewed to be an administrative step within the authority of the USAID Mission in Cairo.

Clearly, steps to initiate a properly coordinated series of activities at the ASRT and the NRC under the R&D management program element deserve a priority in the October-December 1982 quarter and should be second only to the Joint Consultative Committee meeting itself.

IV. Program Follow-up

A fundamental goal of the Applied Science and Technology Research Program is to link the various laboratories of the National Research Centre more closely with end-users so that sponsored R&D becomes a major, and growing, function of the Centre. There is evidence that sponsored R&D is taking on increasing significance. Examples that were cited in this report include:

- Projects of the Ore Beneficiation and Chemical Processing Laboratory with phosphate ore producers from the Red Sea

area and from the Egyptian iron and steel manufacturing complex.

- o Projects of the pilot plant group (biogas technology) with a variety of Egyptian ministries and with the Organization for the Development of the Egyptian Village.
- o Links between the Egyptian pharmaceuticals industry and the NRC/Cairo natural products and pharmaceuticals laboratory that have directed the pharmaceutical chemicals R&D efforts.
- o Links between the bentonites R&D project and end-users in a variety of Egyptian industries (foundries, vegetable oil processing, and construction).

V. Overall Management Implementation Plan

The management implementation plan was discussed in the previous quarterly report. During the present period, steps were taken to obtain the necessary information from the principal investigator in each project.

The fundamental building blocks for the plan are: (a) careful reassessment of end-of-project (December 1983) status in light of current information, (b) project training needs, (c) consultant

needs, (d) equipment constraints (if any), and (e) inputs from end-users which affect project implementation. A project-by-project training (including orientation and study) report is currently in process at ASRT. Project status reports and end-of-project goal statements are in preparation for the tenth meeting of the JCC, to be held on November 27-29, 1982. Thus, for the first time since the NAS/NRC contract was signed in late September 1981, the required background information to provide USAID/Cairo with a realistic management implementation plan is becoming available. The document will be completed in November 1982, submitted to the JCC, and revised for final submission in December 1982.

TRAVEL TO THE UNITED STATES

July 1 - September 30, 1982

Name	Date	Purpose	Place
MORE AND BETTER FOOD			
1. Nabih T. Ashour Professor of Crop Physiology, NRC/Cairo	July 14-August 7	Plant physiology, field production of maize, soybeans, sunflower, peanuts	University of Georgia facilities in Athens, Griffin and Tifton
2. Ali A. S. Ramadan Associate Professor of Food Technology NRC/Cairo	July 8-24	Technology of Pesticide Analysis course	University of California/ Davis
3. Sohair A. El-Nockrashy Associate Professor of Dairy Science NRC/Cairo	July 8-24	Technology of Pesticide Analysis course	University of California/ Davis
NEW CROPS FOR ARID AND SEMI ARID ZONES OF EGYPT			
4. Zaki El Sawi	June 28-August 21	Plant Propagation through Tissue Culture course Commercialization of tissue culture techniques course (field and laboratory experience)	University of California/ Riverside Native Plants, Inc., Salt Lake City, Utah
5. Talaat El-Kobbia	July 6-27	Plant nutrition, soil salinity, drip irrigation, hydroponics, fertilizer applications	USDA Agriculture Research Center, Beltsville, MD Native Plants, Inc., Salt Lake City University of California/Davis University of California/ Riverside U.S. Salinity Laboratory, Riverside, California Texas Tech University, Lubbock University of Arizona, Tucson

Name	Date	Purpose	Place
6. Maher Amin Wa_y	July 25-August 21	Commercialization of tissue culture techniques course (field and laboratory experience) Soil analysis, micro-element deficiency	Native Plants Inc., Salt Lake City, Utah Albion Laboratories, Clearfield, Utah
7. Abd El-Mageid Sleem	August 12-Sept. 4	Commercialization of tissue culture techniques course (field and laboratory experience) Third annual meeting, Guayule Rubber Society Field operations, propagation, and breeding of guayule	Native Plants Inc., Salt Lake City, Utah El Paso, Texas University of Arizona University of California/ Davis
R& D MANAGEMENT EDUCATION			
8. Aboul F. Abdel Latif Vice President ASRT	July 31-Sept. 5	Battelle International Program in Productive R&D Management Red Sea Fisheries project discussions	Battelle, Columbus, Ohio Smithsonian Institution, Washington
9. A. S. Nockrashy Director, Foreign S&T Programs, ASRT	July 27-August 25	Battelle International Program in Productive R&D Management Program planning	Battelle, Columbus, Ohio NAS, Washington, D. C.
10. Yousef Khalil Mazhar Director, Engineering and Design Development Center, Ministry of Industry, Cairo	July 31-August 21	Battelle International Program in Productive R&D Management	Battelle, Columbus, Ohio

TRAVEL TO EGYPT

July 1 - September 30, 1982

Name	Date	Purpose
1. Jay Davenport	September 10-October 1	Program management and planning
2. Edmund W. Lusas	September 11-30	Consultant for food technology pilot plant
3. Soliman Shenouda	September 11-October 3	Consultant for food technology pilot plant