

APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT  
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April-June 1984

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## INTRODUCTION

This is the eleventh quarterly report, Phase II, of the Applied Science and Technology Research Program in Egypt, covering the period April-June 1984. The program is supported under Contract NEB-0016-C-00-1058-00 of the United States Agency for International Development (AID) with National Academy of Sciences/National Research Council (NAS/NRC).

This report gives a summary of each of the program elements for the period April-June 1984. An overview of each project for Phase II (July 1981-March 1984) was given in the tenth quarterly report (January-March 1984); a summary report for Phase I (1978-81) was issued in June 1982.

## TABLE OF CONTENTS

<u>MAJOR ACTIVITIES</u>	<u>Page</u>
A. Program Policy, Planning and Management	1
● Joint Consultative Committee	1
● Science and Technology (S&T) Policy Measures	2
● Research and Development (R&D) Management	4
B. Summary of Project Status	6
● More and Better Food	6
● Development and Application of Biogas Technology in Rural Areas of Egypt	8
● Arid Zones/Land Reclamation	9
● Evaluation of Phosphate Ores	10
● Improving the Process of Wool Scouring and of Wool Wax Recovery	10
● Corrosion Causes and Control	10
● Red Sea Fisheries	11
● Investigation and Evaluation of Egyptian Bentonites for Industrial Applications	11
● Preparation of Selected Pharmaceutical Chemicals	12
<u>DISCUSSION</u>	14
● New Contractual Reporting Requirements	14
● A "Macro-Performance" Evaluation	16
● A "Micro-Performance" Example	18
Addendum I:	20
Recommendations and Conclusions, Thirteenth Meeting, Joint Consultative Committee (JCC), Washington, D.C., U.S.A., April 16-17, 1984.	21
● Annex A: Evaluation of Technologies Used in the Reclamation and Development of New Lands in Egypt (Prepared by Dr. M. El Gabaly, JCC member)	28
● Annex B: Agenda	32
● Annex C: List of Participants, Invited Guests and Observers	35

	<u>Page</u>
Addendum II:	40
<p>Proposed 1984-86 R&amp;D Management Plan, Applied Science and Technology Research Program, Dr. A. A. Abdul Azim, Director, Central Metallurgical Research and Development Institute, Cairo, Egypt.</p>	
Addendum III:	43
<p>More and Better Food: An Integrated Approach for Development by Dr. Osman Galal, Director, Nutrition Institute, Cairo and Project Coordinator (Nutrition), More and Better Food Demonstration Project, National Research Centre, Cairo (Dokki), Egypt.</p>	
Addendum IV:	47
<p>Summary of the ASRT Irrigation Systems and Land Reclamation Project, 5-Year R&amp;D Program (June 1984).</p>	
Annex A:	54
<p>Context of Proposed Collaboration, Applied Science and Technology Research Program</p>	
Addendum V:	56
<p>Remarks on Overall Performance Evaluation, Applied Science and Technology Research Program by Dr. Leo S. Packer NAS/NRC Resident Program Director in Cairo, JCC XIII, April 16, 1984.</p>	
Addendum VI:	60
<ul style="list-style-type: none"> <li>● Travel to Egypt</li> <li>● Travel from Egypt</li> </ul>	

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APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM IN EGYPT  
PHASE II: ELEVENTH QUARTERLY REPORT  
April - June 1984

MAJOR ACTIVITIES

A. Policy Planning and Management

1. Joint Consultative Committee (JCC)

The thirteenth meeting of the JCC (JCC XIII) was held at the headquarters of the National Academy of Sciences/National Research Council in Washington, D.C., on April 16-17, 1984.

Dr. Ibrahim Hassan, JCC Chairman, introduced the new U.S. member, Dr. Lowell Lewis, Assistant Vice President for Agriculture and National Resources and Director of the Agricultural Experiment Station, University of California at Berkeley.

The principal documents prepared for JCC XIII were:

- Status Reports of Projects, Applied Science and Technology Research Program in Egypt, October 1983-March 1984.
- Administrative and Management Report. Prepared by Dr. A. S. El Nockrashy, March 1984.
- Project Evaluation Report, Applied Science and Technology Research Program (263-0016). Prepared by Joint AID-ASRT Team, Mrs. N. Vreeland, AID, Chairperson, December 1983.
- Evaluation of Technologies Used in Land Reclamation and Development of New Lands in Egypt. Project paper. Prepared by Dr. M. El Gabaly, JCC member, April 1984 (See Annex A of Addendum I of this report).

- Proposed Program Plan and Budget Reallocation. Prepared by Dr. A. S. El Nockrashy, March 1984.

Unless otherwise noted each of the above documents is available from the ASRT in Cairo or the NAS/NRC in Washington.

Recommendations and conclusions arising from JCC XIII are given in Addendum I to this quarterly report.

Drs. Hassan Ismail and Gilbert White were appointed as an Executive Committee of the JCC to work with the ASRT and NAS/NRC principal staff to facilitate program implementation particularly with respect to: (a) Land Reclamation, (b) More and Better Food, (c) Research and Development (R&D) Management, and (d) Program and Budget Reallocations. They met in Chicago on June 1 and again in Paris on June 23, 1984 to review the program documents prepared by staff members and to make decisions for JCC. Further details on actions of the Executive Committee are given under the relevant sections of this quarterly report.

#### B. S&T Policy Measures

Since Seminar III (November 1983), ASRT has continued to organize sectoral meetings to explore practical policy measures which promote better technological choices within the current national development plan. Specific meetings held or scheduled were:

<u>Sector</u>	<u>Sponsors</u>	<u>Date</u>
1. Building and Construction	Ministry of Development, Housing and Land Reclamation, ASRT	7-8 March '84
2. Agriculture	Ministry of Agriculture, ASRT	10-11 April '84
3. Petroleum	Ministry of Petroleum and and Petrochemicals, ASRT	8 April '84
4. Capital Goods	Ministry of Industries, ASRT	10 April '84
5. Water Resources	Ministry of Irrigaton and and Water Resources, ASRT	12 May '84

These meetings have been accepted enthusiastically by the participants from the sectors, by the Minister responsible for the sector, by other key government officials and by the ASRT Councils. They permit much needed dialogue and discussion which highlight the issues involved in technological decisions and policy coordination so necessary for more consistent economic planning.

One specific outcome of the Building and Construction Sector policy planning meeting was an audience with President Mubarak in early April. The President endorsed a recommendation for a national conference on low-cost housing to be convened in Cairo in September 1984. This development demonstrates the indirect effects of the sectoral approach to S&T Policy Planning which has been sponsored by ASRT and catalyzed by the Applied Science and Technology Research Program.

C. Research and Development (R&D) Management

In his administrative and management report to JCC XIII, Dr. A. S. El Nockrashy, program coordinator for ASRT, reported that 58 persons from the Academy, from affiliated research institutes and the universities have had an opportunity for U.S. training in R&D management, R&D marketing, techno-economics, technology assessment, or contract management under the Applied Science and Technology Research Program. About 8-10 of these have become a core group of trainers who have already offered 9 management training programs to over 550 participants in all-Egyptian workshops. Participants in the local programs have been senior researchers and key personnel with management responsibilities from all R&D related organizations such as ASRT and its institutes, universities, ministries and public sector industries. This is one measure of the progressive institutionalization of R&D management training in Egypt, particularly since the beginning of Phase II in August 1981.

Looking toward the future, and taking into consideration the 1983 Evaluation Report (Vreeland), JCC XIII requested ASRT and NAS/NRC to direct attention to the following two-step process:

Step 1: Immediate undertaking of an assessment of the present status of management practice, identification of management needs, and design of short-term programs for 1984-86 to strengthen management systems within ASRT and the National Research Centre (NRC). This activity should be undertaken largely by Egyptians, individuals and firms, with outside consultants or other participants whenever appropriate. The end product

will consist of a work plan which will be put into operation immediately. This will be achieved through implementation of selected elements of good R&D management practice.

Step 2: A group will be assembled by the ASRT and the NAS/NRC, with participation and concurrence by representatives of U.S. AID, to find appropriate means for designing and implementing a longer range R&D management system. This should take into consideration all sectors currently engaged in R&D or which are clients for R&D. A preliminary report of this design effort will be reviewed by the ad hoc JCC Executive Committee, and the final detailed plan should be made available for consideration during JCC XIV. The plan should include an operational system, and control and evaluation mechanisms.

Dr. A. A. Abdul Azim, Director, Central Metallurgical Research and Development Institute (CMRDI), a participant in one of the original R&D management workshops at the Denver Research Institute in 1979, and a member of the core group that has participated in the training programs in Egypt during Phase II of the Program, was asked to take responsibility for "Step 1" planning (short-term programs, 1984-1986). Dr. Abdul Azim spent much of the month of June in the United States consulting with persons from Battelle, Arthur D. Little, and Georgia Tech and writing a draft project plan for submission to an ASRT-NRC task force committee. He was also advised and assisted by James Blackledge, the R&D management consultant who had on two occasions worked with the Egyptian group in Cairo. NAS/NRC staff in Washington assisted in U.S. consultations, technical arrangements and in the discussions of proposed project elements which were eventually included by Dr. Abdul Azim in his draft

program plan. For a synopsis of that plan as of July 5, 1984 see Addendum II of this quarterly report.

The "Step 2" planning process as of July 1, 1984 had not been definitively decided upon by the ASRT-NRC Task Force Committee on R&D Management. Both the "Step 1" and "Step 2" plans are expected to be completed in a form that may be discussed by the JCC Executive Committee during the latter part of the July-September quarterly reporting period.

B. Summary of Project Status

1. More and Better Food

During JCC XIII, Dr. Osman Galal, Director of the Nutrition Institute and Project coordinator for the major nutrition element of the More and Better Food project presented a short issue-oriented paper entitled "More and Better Food: An Integrated Approach for Development" (See Addendum III). This paper suggests that nutrition interventions in the target population of the demonstration villages of Omar Makram and Kafr Al Khadra translate quickly and directly into improved socio-economic benefits such as health status and performance in school. Thus food quality improvement rather than quantity improvement in these villages was a more satisfactory and beneficial result of the program. This could have profound consequences on the strategy of extending More and Better Food into a wider, integrated rural development program in Egypt.

Other activities undertaken under the More and Better Food Project during the reporting period included:

- Review evaluation and analysis of the program with the view toward incorporating technical results and methodological techniques into a larger effort affecting many Egyptian villages. This process began with a seminar of the MBF Steering Committee and principal investigators in Cairo in late March and continued with a seminar in Tucson to compare health-nutrition aspects of MBF with an integrated rural health program of the University of Arizona.
- A visit to the Department of Community and Family Medicine, University of Arizona by Dr. Aly Zein El Abedein, Head of Community Medicine and Rural Health, NRC, to study techniques for measuring nutritional intervention in rural populations especially those which also include simultaneous agricultural changes (new varieties, improved old varieties). Again, the goal is to achieve a more effective integrated rural development program for Egyptian villages.
- A consulting visit by Dr. Soliman Shenouda, General Foods Corporation, to the NRC for technical guidance to the Egyptian architect-engineering team and the food technology group at the Centre. Dr. Shenouda focussed upon the building design for the food technology pilot plant and R&D function interrelationships as they can affect specific requirements for utilities, pilot plant sanitation, equipment selection, etc.

2. Development and Application of Biogas Technology in Rural Areas of Egypt

Dr. Shirin El Shawarby, Associate Professor of Chemical Engineering, National Research Center, participated in three weeks of specialized technical training on infrared spectroscopy, liquid chromatography and on microcomputer programming at the Perkin-Elmer Company, Norwalk, Connecticut. Dr. El Shawarby also visited the Department of Chemical Engineering, University of Virginia at Charlottesville, the Merck Chemical Manufacturing Company, Elkton, Virginia and BioChem Technology in Malvern, Pennsylvania for observation and study of biochemical engineering scale-up processes and instrumentation techniques.

The project principal investigator, Dr. M. M. El Halwagi, travelled to the United States to present a technical paper at the 9th International Conference on Energy, Power and Environmental Systems, San Francisco, June 4-6, 1984. He also met with BOSTID and AID staff in Washington and with the 3-member U.S. advisory panel in Chicago to review preparations for the international biogas users conference scheduled in Cairo, November 1984. Prior to returning to Egypt Dr. El Halwagi presented one of the six invited papers at the Bioenergy 84 World Conference, Gothenburg, Sweden (June 15-21) and attended the Chemrawn III World Conference on Resource Material Conversion in The Hague, Netherlands (June 25-29, 1984).

3. Arid Zones/Land Reclamation

A proposal for assessment of Egyptian land reclamation experience was considered by JCC XII (November 1983) with the recommendation that an independent study be undertaken by the ASRT through a small group with diverse skills and experience. The ASRT subsequently learned that a World Bank-contracted review of Egyptian land reclamation activities would be completed in June 1984 and recommended that further ASRT assessment be postponed until the World Bank review became available.

Early in 1984 the ASRT through its 5-year R&D program in support of the Egyptian National Development Plan approved and funded a four-year land reclamation project entitled "Evaluation of Irrigation Systems in New Lands and their Effects on Crop Production." Based upon its previous discussions on the issue of land reclamation, JCC XIII agreed that resources from the "New Crops for Arid Lands" demonstration project (largely uncommitted during Phase II) be reprogrammed to support the new ASRT land reclamation activities. The funds from the Applied Science and Technology Research Project would broaden the ASRT project to emphasize evaluation of irrigation technologies, land tenure, rural institutions, cropping patterns and irrigation management. This JCC support should be viewed as a supplement to strengthen ongoing ASRT R&D efforts. JCC members asked that more detailed information be prepared by staff members of ASRT and NAS/NRC in Cairo for review by the JCC Executive Committee prior to its transmittal to AID for concurrence in the reprogramming of funds from the New Crops project.

By mid June the first step in the process outlined above was completed and was then reviewed by the JCC Executive Committee in Paris.

After comments by the JCC Executive Committee were incorporated, ASRT submitted the project to U.S. AID/Cairo for formal approval to reprogram funds. A reply is expected by early August 1984.

Addendum IV is a descriptive summary of the ASRT irrigation systems and land reclamation project, 5-year R&D Program (dated June 1984).

4. Evaluation of Phosphate Ores

By late March 1984 all component parts for a custom-designed wet-acid phosphate conversion reactor had been received at NRC in Cairo. Assembly and testing of the sub-systems were proceeding prior to start-up runs with beneficiated samples of Egyptian ores. The test runs are scheduled to continue through September. In early October a chemical engineer from the International Fertilizer Development Center plans to go to Cairo for approximately one month of conversion studies, data analyses and interpretation. Technical and economic results are expected to be available before the end of calendar year 1984.

5. Improving the Process of Wool Scouring and of Wool Wax Recovery

No new information. Final report expected by October 1984 for JCC XIV.

6. Corrosion Causes and Control

A second visit of Dr. Thomas, Battelle Pacific Northwest Laboratories (Richland, Washington) is planned in October 1984 to:

- Present a training course on maintenance and repair of the Perkin-Elmer surface science instrumentation and equipment in the

corrosion laboratories of NRC. The training course will occur in the presence of a Perkin-Elmer technical representative so that all systems may be included (high vacuum, electronics, and micro-computer).

- Assist the principal staff in R&D marketing discussions with Egyptian public sector firms and thereby help to establish an industry-based clientele for surface science service activities, particularly where metal corrosion is a significant problem. Exact timing of the visit and training sessions is dependent upon: (a) schedule of the Corrosion Laboratory, NRC, (b) availability of spare parts and auxiliary apparatus on order for Phase II, and (c) availability of Dr. Thomas plus a technical representative from the Perkin-Elmer Company, manufacturer of the NRC surface science equipment (ESCA/SAM Model 550).

#### 7. Red Sea Fisheries

No report for this period.

#### 8 Investigation and Evaluation of Egyptian Bentonites for Industrial Applications

The manager of the Egyptian General Petroleum Company, Dr. Fouad Abdel Azim, visited the United States for two weeks in April to study current R&D and field management practices in oil drilling fluid technology. The General Petroleum Company is the user organization in Egypt concerned with the application of bentonites to petroleum operations. His itinerary included visits to the Amoco Research

Laboratory and Dow Chemicals in Tulsa, Oklahoma; to Magcobar Research and NL Baroid Corporations in Houston, Texas; and to the Mobil Field Research Laboratory in Dallas, Texas. He was given access to R&D on the use of computers in the simulation of oil well drilling operations and to cost/performance measurement methods for bentonites in drilling fluids.

In May, the U.S. advisor for the Bentonite Clay project, Dr. Haydn Murray of the Department of Geology, Indiana University, made one of his periodic visits to NRC for discussions on the progress of the R&D work. He made a second visit to the areas along the Cairo-Alexandria desert road where high quality bentonites have been discovered. The analyses of the samples from this area look so favorable for high quality applications in drilling muds that the expensive step of alkali conversion would not be necessary. A meeting was held between NRC project representatives and the Egyptian Geological Survey to arrange that the Survey carry out extensive exploration and characterization of the Cairo-Alexandria Road deposit. Analytical determinations in this testing program will continue to be the responsibility of the NRC bentonite group.

#### 9. Preparation of Selected Pharmaceutical Chemicals

An intensive in-plant study and observation program for a 5-person Egyptian team from El Nasr Pharmaceutical Chemical Company and from the NRC Pilot Plant Laboratory was held in the United States during the three-week period from May 10 through June 2, 1984. One week each was scheduled at: (a) the Upjohn Company, Kalamazoo, Michigan; (b) Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey; and (c) the

Ciba-Geigy Corporation, Summit, New Jersey. The group studied scale-up operations from laboratory to pilot plant to industrial production, plant safety, quality control operations, and environmental concerns in pharmaceutical chemicals manufacturing.

Those participating were:

- From El Nasr Pharmaceutical Chemicals
  - Dr. Zakaria Sakr Khafagi, Chairman
  - Dr. Osama Abdel Wareth Kebir, Director, Research and Quality Control
  - Dr. Mohamed Maher Abo Roumia, Head, Development and Project Section
- From the National Research Centre, Pilot Plant Laboratory
  - Dr. Faten Ahmed Hamouda, Chemical Engineer
  - Eng. Mohamed Zakria Mahmoud Yehya, Chief Engineer

The cooperation of pharmaceutical chemical companies in the training, study, and orientation programs of the Egyptian pharmaceuticals group from NRC in 1983 and in the 1984 program for those from the NRC Pilot Plant Laboratory plus El Nasr Company was outstanding. The Upjohn Company invested 26 days in the program; Merck, Sharp and Dohme 10 days; and Ciba-Geigy 15 days. In addition one day visits were made to Smith, Kline and French Laboratories (Swedeland, Pennsylvania), Hoechst-Roussel Pharmaceutical Company (Somerville, New Jersey); and Sterling-Winthrop Research Institute (Rensselaer, New York).

DISCUSSION

I. New contractual reporting requirement

The NAS/NRC contract for the Applied Science and Technology Research Program has been extended from May 31, 1984 through January 31, 1985. A new requirement was included in the amendment stating that each progress report refer to the status of individual activities with emphasis on:

- The identification of major milestones which are expected to be achieved during the next reporting period, and
- Key decisions made (during the current reporting period).

To fulfill this requirement the following information is provided:

<u>Project</u>	<u>Major Milestones Expected July - September 1984</u>	<u>Key Decisions April - June 1984</u>
1. Joint Consultative Committee (JCC)	Functioning JCC Executive Committee	a. Creation of Executive Committee  b. Note: Other "key" decisions are included under R&D Mgt, MBF, etc.
2. S&T Policy Measures	First draft of final report prepared	Not applicable
3. R&D Management	a. Appointment of ASRT-NRC joint steering committee  b. Preparation of short term ('84-'86) program plan and approval by JCC Executive Committee	a. ASRT concurrence with AID Evaluation Report for short term ('84-'86) program  b. ASRT concurrence in need to formulate a long-term (5 year) plan

- c. Preparation of long term (5 year) program plan and discussion by JCC Executive Committee
- 4. More and Better Food (MBF)
  - a. Outline of MBF plan and schedule to September 1985
    - a. JCC requested MBF Steering Committee to prepare outline for integrated rural development program based on MBF experience
  - b. First draft of integrated rural development plan for JCC Executive Committee
- 5. Biogas Technology
  - Completion of training, orientation and study component of project
  - Not applicable
- 6. Arid Zones/Land Reclamation
  - a. Preparation of land reclamation R&D project incorporating ASRT project and resources under JCC program
    - a. Phase out arid lands project and use resources for land reclamation activities in conjunction with ASRT-approved project under 5 Year R&D Program
  - b. Review and approval of project (6a) by JCC Executive Committee
  - c. Submit new project to USAID/Cairo for concurrence and use of existing funds under 263-0016
- 7. Evaluation of Phosphate Ores
  - Proof testing of major new equipment
  - Not applicable
- 8. Wool Scouring
  - Preparation of final report for JCC
  - Not applicable

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|------------------------------|--|--|
| 9. Corrosion                 | a. Decision on scope of 84-86 maintenance contract and award of contract | Not applicable   |
|                              | b. Preparations for visit of consultant M&R training                     |  |
| 10. Red Sea Fisheries        | Continuation of data gathering, Red Sea area                             | Not applicable   |
| 11. Bentonite Clays          | a. Characterization of Cairo-Alexandria Road deposit                     | a. NRC-Egyptian Geological Survey collaboration on Cairo-Alexandria Road deposit |
| 12. Pharmaceutical Chemicals | Arrival of major portion of bulk chemicals for pilot plant runs          | Not applicable   |

## II. A "Macro-Performance" Evaluation

At the JCC XIII meeting in Washington in mid-April 1984, Dr. Leo S. Packer, NAS/NRC Resident Program Director in Cairo gave a presentation entitled, "An Overall Performance Evaluation". Dr. Packer's remarks were prepared to stimulate discussion about "results" in the Applied Science and Technology Research Program. His brief paper constitutes an informal evaluation of the S&T system in Egypt as it affects, and was affected by, the Applied Science and Technology Research Program. Dr. Packer's paper is included as Addendum V to this report.

## III. A "Micro-Performance Example"

The pharmaceutical chemicals R&D project was initiated in Phase II because of the recognition by NRC that the Egyptian drug industry has

largely been one that formulates and packages imported materials. There is a good tradition for the production of natural drugs but only marginal progress has been made in the area of synthetic pharmaceuticals and fine chemicals.

The project enjoys a close association with public sector industry through its steering committee of pharmaceutical company managers and key NRC scientists. Very early in the planning stage NAS/NRC was asked to obtain access to leading pharmaceutical companies in the USA to provide opportunities for experiences in: (a) pilot plant operations, (b) scale-up design principles from the laboratory bench level to pilot plant, and (c) scale-up from pilot plant to production levels. Dr. M. B. E. Fayez, project principal investigator came to the United States where he met with Dr. Lewis H. Sarett, Vice President (retired) for Research, Merck, Sharpe & Dohme Pharmaceutical Company.

Through the interaction of Drs. Fayez and Dr. Sarett at the planning stage, invitations to spend up to two weeks in supervised orientation and study were made available at:

- Merck, Sharpe and Dohme Research Laboratories  
Rahway, New Jersey 07065
- Ciba-Geigy Corporation'  
Summit, New Jersey 07901
- The Upjohn Company  
Kalamazoo, Michigan 49001

The visits became a "hands-on" experience with supervised opportunities to participate in both design and decision sessions and conferences. In addition to the work on scale-up techniques and principles and on

pilot-plant operation a number of additional subjects were covered in depth. These included: (a) pilot plant and production quality control, sanitation, and maintenance of yield; (b) plant hazards and safety; (c) pharmaceutical regulations and consumer safety laws; (d) environmental aspects of pharmaceuticals production; and (e) waste disposal and management.

During 1983 four of the principal chemists from the NRC pharmaceuticals laboratory were involved in the orientation and study; in 1984 two chemical engineers from the NRC Pilot Plant Laboratory and two chemical engineers from Egyptian pharmaceuticals companies as well as the chairman of El Nasr Pharmaceuticals (Egypt's principal producing pharmaceutical company) participated. A total of 54 working days was allotted to the program; 10 by Merck, 15 by Ciba Geigy, 26 by Upjohn and one-day specialized visits by Smith, Kline and French; Hoechst-Roussel; and Sterling-Winthrop Pharmaceuticals.

No precise dollar value can be given to this cooperation which was freely offered by the companies. Indeed, the study/orientation involved subject matter and scale of operation (pilot plant and production levels) which are only available from industry. Were an order of magnitude dollar value placed upon the activities by company based upon time input of professional and support personnel involved a conservative estimate would be \$50,000. Dr. Frank Press, President of the National Academy of Sciences, wrote letters to the Presidents of the pharmaceutical companies describing the services given as

"outstanding assistance" to the cooperative program in applied science and technology between the U.S. National Academy of Sciences/National Research Council and the Egyptian Academy of Scientific Research and Technology.

Addendum I

THIRTEENTH MEETING  
JOINT CONSULTATIVE COMMITTEE  
APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM

Washington, D.C., U.S.A.  
April 16-17, 1984

Report prepared by:  
Academy of Scientific Research and Technology  
Cairo, Arab Republic of Egypt

Board on Science and Technology for International Development  
Office of International Affairs  
National Academy of Sciences/National Research Council  
Washington, D.C. 20418, U.S.A.

Thirteenth Meeting Joint Consultative Committee  
Applied Science and Technology Research Program

Egyptian Academy of Scientific Research and Technology  
U.S. National Academy of Sciences/National Research Council

Washington, D.C., U.S.A.

April 16-17, 1984

Recommendations and Conclusions

I. Executive Summary

The thirteenth regular meeting of the Joint Consultative Committee (JCC) for the Applied Science and Technology Research Program was held on April 16 and 17, 1984 at the headquarters of the National Academy of Sciences/National Research Council (NAS/NRC) in Washington, D.C., U.S.A.

The thirteenth JCC meeting occurred at a time when most activities had reached full maturity and were looking toward completion by September of 1985. AID had completed its process evaluation of the program and written a report which was submitted to the ASRT in December 1983. U.S. AID/Cairo was in the midst of an S&T sector assessment that was expected to be completed by mid-summer 1984. This activity was to include a high level critique by a joint panel whose Egyptian members were to be appointed by the Academy of Scientific Research and Technology (ASRT) and American members by the AID. The S&T sector assessment and critique were to form the basis for future program plans to begin in 1986 and continue for five years.

As reported by ASRT the status of elements of the Applied Science and Technology Research Program was as follows:

- Standards and Measurement (ASRT and U.S. National Bureau of Standards). The project training and equipment procurement activities were on schedule and expected to be completed by September 1985.

- Instrumentation Technology (ASRT and the U.S. National Institute of Health). The project was designed to strengthen the capacity of the ASRT affiliated institute, the Scientific Instrument Center (SIC), to serve as a central, national facility for scientific equipment maintenance. In addition the project was responsible for establishing repair and maintenance centers and training of personnel for those centers in seven Egyptian universities (Cairo, Assuit, Minija, Tanta, Alexandria, Zagazig and Menoufia). This activity also was on schedule and the expected completion date was September 1985.

- Instrumentation Technology and Equipment Management (ASRT and the University of Wisconsin at Madison). The focus of this effort is the procurement, shipment, delivery and initial start-up supervision of all scientific equipment and instrumentation for the overall Applied Science and Technology Research Program. This is a continuing activity scheduled to the end of project, September 1985.

- Research and Development Projects (ASRT and NAS/NRC). Three projects: (a) Corrosion in Petroleum Refineries, (b) Improvement of Wool Scouring, and (c) Beneficiation of Phosphate Ores have achieved their goals and activities are essentially terminated except for final delivery of some equipment and end of project consultancies. Three projects: (d) Red Sea Fisheries, (e) Pharmaceutical Chemicals, and (f) Utilization of Bentonite Clays are scheduled for completion in September 1985.

- Demonstration Projects (ASRT and NAS/NRC). The demonstration project Biogas Technology for Egyptian Villages will be concluded by January 1985.

The project More and Better Food will be institutionalized within the National Research Centre and plans are being made to continue it beyond September 1985 within a larger framework of an Egyptian integrated rural development program financed by the ASRT, the Governorates and international donor organizations.

The project on Arid Zones is to be combined with an ongoing Land Reclamation Research Program of the ASRT 5 Year R&D effort.

- S&T Policy Measures (ASRT and NAS/NRC). The three-year effort was essentially completed late in 1983 with a concluding seminar in Cairo. The activity merits further consideration by the JCC but its future is primarily dependent upon institutionalization within the ASRT.

- R&D Management Systems (ASRT, National Research Centre and NAS/NRC). This area received special attention by the AID evaluation report (December 1983) and consideration by JCC XIII. Essentially the program was recommended to continue until September 1986 under strong sponsorship of the ASRT and NRC with attention to management training, and the institutionalization of activities directed toward end-users (such as marketing of R&D services by NRC and creation of a comprehensive R&D management system within ASRT). In addition a longer-term R&D management systems plan was recommended to be prepared which would spread the philosophy and practice of management systems widely throughout the R&D structure of ASRT and its institutes, government ministries in which R&D is a prominent function, the universities, and industries where R&D needs to be undertaken so that Egyptian products may be more competitive in local and export markets.

## II. More and Better Food Recommendation

A progress report was submitted to the thirteenth meeting of the JCC describing activities undertaken in the More and Better Food Demonstration Project since the JCC XII. Activities now are continuing in four villages of different socio-economic patterns. The JCC members believed that the results of the nutritional component in the project have resulted in a marked improvement of the nutritional situation at village level. The JCC recommended continuation of this activity and the inclusion of more villages of different socio-economic patterns.

A summary of discussions that took place in the Egyptian workshop on MBF held in the NRC on the 31th of March were presented. Its main recommendations, with which the JCC concurred were:

1. The MBF project should continue as an experimental vehicle for dissemination of practical scientific information to the end-users (farmers).

2. The MBF project should pursue vigorously the institutionalization of its activities within the NRC, and

3. The MBF project should re-orient its activities to be a major input in the rural development process in a national rural development plan.

The JCC further recommended that the project should identify representative models for different village patterns and assess the cost of technical, social, and economic changes.

### III. Land Reclamation and Development Studies

A proposal for assessment of Egyptian land reclamation experience was considered by JCC XII (November 1983) with the recommendation that an independent study be undertaken by the ASRT through a small group with diverse skills and experience. The ASRT subsequently learned that World Bank-funded assessments of land reclamation experience would be completed in June 1984, and felt that the ASRT assessment activity would have been duplicative.

JCC XIII considered a proposal to support a project entitled "Evaluation of Different Technologies Used in the Reclamation and Development of New Lands" which would complement the major effort of the ASRT Agricultural and Food Council to assess conventional and non-conventional irrigation practices. The Applied Science and Technology Research Program contribution would broaden the irrigation study scope to include more emphasis on evaluation of technologies, land tenure and rural institutions, cropping patterns, and irrigation management.

After discussion by JCC Member Dr. El-Gabaly and including observations by guests from the World Bank Division of Agriculture, the JCC endorsed in principle the proposed project which would assist Egypt in identifying specific technology constraints to which reclamation programs might be subjected. The JCC support of the project was viewed as a research and development effort and as an educational program which could contribute to the knowledge base for future decisions with regard to land reclamation. Recalling the emphasis of the American panel report of November 1983, the JCC stressed the importance for the project to deal with institutional and socio-economic considerations which are so often critical to the possibilities for technological success. It was specifically suggested that the study address (a) the

agronomic questions in land reclamation, (b) the related social, economic and institutional aspects, and (c) the institutional focus of this research to assure the continuation of its momentum after the termination of the project. Time is a critical factor in the implementation of the project given the continuing official Egyptian government commitment to reclamation.

JCC members understood that more detailed information with due consideration of the emphasis recommended by JCC would be prepared by the staff for review by an ad-hoc JCC executive committee and submitted to AID within a sixty day time frame. In the meantime other activities in Cairo would be undertaken to begin specification of equipment, books and specific training activities.

#### IV. R&D Management Systems

A significant element of the Applied Science and Technology Research Program in Egypt has been that of R&D management training with the goal of strengthening management systems for research and, ultimately, the enhancement of efficiency of resource utilization in research and development. Since 1979, fifty-eight persons from Egypt have travelled to the United States for short-term specialized R&D management courses at the Denver Research Institute, Battelle/Columbus Laboratory and the Massachusetts Institute of Technology. Nine training programs with over 550 participants from the ASRT, research institutes, universities, ministries and public sector firms have been given a basic orientation to the principles of R&D management in all-Egyptian workshops. This reflects a reasonably high-level continuing effort at institutionalization of R&D management training by the ASRT and by NRC.

The program to date represents early steps toward the goal of full institutionalization of strengthened R&D management systems in Egyptian research organizations. To reach the desired goal, the JCC agreed that a two-step process be undertaken within the Applied Science and Technology Research Program.

Step 1. Immediate undertaking of an assessment of the present status of management practice, identification of management needs, and design of short-term programs for 1984-86 to strengthen management systems within the ASRT and NRC. This activity should be undertaken largely by Egyptians, individuals and firms, with outside consultants or other participants as appropriate. The end product will consist of a work plan which will be put into operation immediately. This will be achieved through implementation of selected elements of good R&D management practices.

Step 2. A group will be assembled by the ASRT and the NAS/NRC, with participation and concurrence by representatives of U.S. AID, to find appropriate means for designing and implementing a longer range R&D management system. This should take into consideration all sectors currently engaged in R&D or which are clients for R&D. A preliminary

report of this design effort will be reviewed by the ad hoc JCC executive committee, and the final detailed plan should be made available for consideration during JCC-XIV. The plan should include an operational system, and control and evaluation mechanisms.

Implementation of the two-step plan will be pushed forward on a rapid schedule as soon as the ad hoc JCC executive committee gives its endorsement.

#### V. Proposed Program Plan and Budget Reallocation

At its meeting in November 1983 (JCC-XII) the members of the Joint Consultative Committee requested the staff to prepare a review of expenditures and, in light of the goals for each project, to propose overall budget reallocations and projections for the future.

Concurrently with JCC XII preparations an AID evaluation team conducted a process evaluation of the Applied Science and Technology Research Program which also stressed the need for reviewing the budget and making decisions on reallocations.

The results of these reviews and evaluations led the JCC to recognize the following:

- The three R&D projects: (a) Corrosion in Petroleum Refineries, (b) Improvement of Wool Scouring, and (c) Beneficiation of Phosphate Ores have essentially completed their original objectives as of October 1983. The achievements encountered in these projects were of great benefit to production sectors.
- Three additional R&D projects and two demonstration projects should be concluded by September 1985 or sooner. They are: (a) Red Sea Fisheries, (b) Pharmaceutical Chemicals, (c) Utilization of Bentonite Clays, (d) More and Better Food, and (e) Biogas Technology.
- Four priorities exist for the balance of the time and resources remaining in the overall program. These are:

Priority 1: Institutionalization of an R&D management activity to serve the Academy of Scientific Research and Technology (ASRT) and the National Research Centre (NRC).

Priority 2: Identification of a mechanism to institutionalize an integrated rural development program based upon More and Better Food and the related projects dealing with food, agriculture, nutrition and village development.

Priority 3: Redirection of the New Crops for Arid Lands project through cooperation with the ASRT-approved project on evaluation of different technologies used in the reclamation and development of new lands and already funded under the 5-year R&D program.

Priority 4: JCC oversight and continuing support of the process of S&T policy measures particularly relating to the program of interactive sectoral studies and the policy implementation stage.

Because reallocation of the budget requires more specific definition of program elements, identification of the tasks, and scheduling before detailed cost estimates can be made, the JCC agreed:

- That the staff and specialized groups, including contracted specialists where necessary, be utilized to prepare specific action plans in the areas of R&D management systems, rural development and land reclamation. These tasks will determine the detailed budget reallocations and should be completed within 60 days.
- That an ad hoc executive committee consisting of an Egyptian and a U.S. member of the JCC be appointed by the ASRT President in consultation with the chairman of the U.S. panel to review the proposed action plans so that the formal reallocations, including contract extensions where required, are completed before the next JCC meeting (JCC XIV). (Note: Drs. Hassan Ismail and Gilbert White were appointed as the ad hoc executive committee.).
- That interim contract extensions be concluded immediately to insure continuity of all activities while detailed plans and budget reallocations for the priority areas are being made.

#### VI. Technology Policy

Recognizing the increasing importance of reflecting in the ASRT program the strategic macro-aspects of technology's contribution to development in Egypt, the JCC recognized the great demand which is building through the Five-Year-Plan and which needs to be met by a better, more organized supply from the S&T community. The interactive S&T Policy approach stressed this awareness. Recommendations on this subject in the AID evaluation report are generally acceptable. The subject will be further reviewed during the 14th JCC meeting, noting in particular the report of the AID S&T assessment mission which is currently under preparation.

#### VII. Standards and Measurements

1. In view of the proposed budget reallocation for the Applied Science and Technology Research Program, it is recommended that support be given for additional equipment costing \$50,000 and that the budget for the Standard Reference Materials be increased by \$25,000.

2. The JCC further recommended that technical workshops be organized in areas such as fire safety research, building technology, and industrial quality control during 1985 within a reallocation of funds with the original budget.

3. The JCC stressed the importance of developing access to national and international standards data bases in order to promote the increased utilization of standards in the Egyptian economy and the encouragement of education in the area of standards, measurements, and quality control.

VIII. Science & Technology Information (STI)

The JCC recommended that:

1. The STI network be institutionalized, including its form of management.
2. Efforts be continued to establish the health information node.
3. ASRT consider subsidizing a sixth node for the education/manpower planning sector.
4. The JCC XII recommendation dealing with the STI Project be modified as follows: Additional short-term consultants in areas specific to the needs of individual nodes will be engaged rather than assigning a full-time U.S. project coordinator to the project in Cairo.

## Annex A

### EVALUATION OF TECHNOLOGIES USED IN THE RECLAMATION AND DEVELOPMENT OF NEW LANDS IN EGYPT.

(Proposed Project of the Academy of Scientific Research and Technology  
with Cooperation from the U.S. Agency for International Development)

#### I. INTRODUCTION

The rapid expansion in the reclamation of desert soils during the early 1960's without the availability of information on soil management, irrigation economics, suitable cropping patterns, energy and labor costs, and land tenure systems has led to disappointing results and poor performance of some projects. This state of affairs has continued up to the present time. The newly developed private and public projects are still faced with the same questions, mainly:

- What to grow
- Which method of irrigation is most suitable from the point of view of yields, energy, labor, irrigation efficiency, and land tenure
- What are the economic returns of desert development under different soil, climatic and topographical conditions.

In order to be able to answer some of these queries, the Agricultural and Food Council of ASRT has approved a project to evaluate different methods of irrigation, both conventional and non-conventional, under different soil, topographical conditions, cropping patterns and management conditions.

#### II. OBJECTIVES

1. To evaluate different technologies both conventional and non-conventional used in the reclamation, cultivation and development of new lands.
2. To study problems of land tenure and rural institutions under different technologies.
3. To train people in the field of land reclamation, irrigation management, land settlement and project analysis for agricultural and rural development.
4. To prepare guidelines for the reclamation and development of different soil types to overcome major constraints facing the development of old -new lands.

### III. PLAN OF WORK

#### 1. Stage I (April 84 - September 84):

- Select three representative locations for future reclamation projects (sandy, calcareous sandy and calcareous loamy soils) in the West and East Delta for pilot studies.
- Collect basic information and data on each of the sites regarding climate, soil, water resources, cropping pattern, rural institutions, etc.
- Use the available data in designing the studies for the three pilot areas.

#### 2. Stage II (October 84 - September 88):

- Design the experiments at each site to include:
  - a. Different methods of irrigation (surface, basin, border, furrow, drip, sprinkler, ...etc.)
  - b. Different cropping patterns
  - c. Different quantity and frequency of irrigation
  - d. Different crop management
  - e. Different land tenure.
- Measure and record different parameters such as:
  - a. Soil moisture profile
  - b. Water distribution
  - c. Water losses and water balance
  - d. Salt distribution and salt balance
  - e. Root distribution
  - f. Energy consumption
  - g. Labor requirements
  - h. Plant diseases and physiological disorders
  - i. Performance of mechanization
  - j. Yield.
- Analyse collected data with the objective of reaching:
  - a. Comparative evaluation of different irrigation methods under different soil conditions and cropping patterns. This evaluation should be based on irrigation efficiency, cost of lifting water, energy requirements, labor requirements, plant diseases, crop yields (quantity and quality.)
  - b. Evaluate different methods used in the reclamation, cultivation and settlement of the new lands including different techniques used in soil improvement, suitable cropping pattern, cropping sequence and intensity.

- c. Evaluate different land tenure systems including small holders (3-6 acres), University graduates (10-30 acres) private agribusiness, private companies, government companies, under different irrigation methods as to production per unit area, cost of production, efficient use of resources, social implications.
- d. Examine existing rural institutions required to serve settlers in the new lands such as credit, marketing, extension, research, procurement of inputs, etc.
- f. Prepare guidelines and recommendations for future reclamation projects to overcome present constraints facing old -new lands.
- e. Submit a final report.

#### IV. IMPLEMENTATION OF THE PROJECT

First, a joint agreement between Academy of Scientific Research and Technology (ASRT) in Egypt and United States Agency for International Development needs to be made. ASRT appoints as the supervisory committee:

- Dr. M.M. El Gabaly, Chairman, Food and Agriculture Council of ASRT.
- Dr. Hassan Ismail, Chairman, Natural Resources Committee, Food and Agriculture Council, ASRT.
- Dr. M. Abu Zeid, Chairman, Water Resources Center, Ministry of Irrigation
- Dr. Omar Wahby, Prof. of Agricultural Economics University of Cairo.
- Chief Investigator would be Dr. Hassan Wahby, Director Water Distribution and Water Management Institute, Ministry of Irrigation.

Other cooperating groups are:

- Soil and Water Research Institute, Ministry of Agriculture
- Soil and Water Science Department, University of Cairo
- Department of Agricultural Economics, University of Suez Canal
- Desert Institute, Ministry of Development
- New Communities and Land Reclamation
- International Center for Rural Development, Marint

V. BUDGET (Two Years)

A. Foreign Contribution	(\$ U.S.)
<u>Equipment</u>	100,000
Soil testing, soil survey, laboratory equipment for water and soil analysis, dyfrometer analysis set, complete agricultural sampling kit, jet fill tensiometers, vehicles	
<u>Training</u> (Courses for Professional Training in Egypt and Visits)	80,000
Project analysis for agriculture and rural development Basic agricultural survey statistics and methods Agricultural research methodology Irrigation principles and practices Soil testing and fertilizer management Assessment and improvement of on-farm irrigation systems.	
<u>United States Experts</u>	50,000
<u>Library Support</u>	20,000
Books, Technical Reports, Thesis Scientific periodical magazines	
TOTAL	<u>250.000</u>
B. <u>ASRT Contribution</u>	<u>L.E.</u>
Equipment	20.000
Operational Costs	103.460
Incentives, Travel Expenses, Computer	376.540
TOTAL	<u>500.000</u>

Annex B

AGENDA

Thirteenth Meeting, Joint Consultative Committee  
Applied Science and Technology Research Program  
Egyptian Academy of Scientific Research and Technology (ASRT)  
National Research Centre (NRC/Cairo)  
U.S. National Academy of Sciences/National Research Council (NAS/NRC)

Washington, D.C., USA

April 16-17, 1984

Monday, April 16, 1984  
Board Room, NAS Building  
2101 Constitution Ave., N.W.

MORNING SESSION

9:30 am	Welcome	George Bugliarello U.S. Panel, JCC  John Hurley, Director BOSTID
	Response	Ibrahim Badran Chairman, JCC and President, ASRT
	Remarks	Kenneth Sherper Director, Office of Technical Support Bureau for Near East AID/Washington
10:15 am	NRC Status Report	Mohamed Kamel Director, NRC/Cairo
10:30 am	Administrative and Management Report	A. S. El-Nockrashy General Coordinator Applied S&T Research Program
10:45 am	NAS/NRC Report	Leo Packer NAS/NRC Resident Program Director in Cairo
11:00 am	Break for Coffee	
11:15 am	AID-Evaluation Report Discussion	Nena Vreeland, Office of Evaluation, USAID Washington

12:30 pm            Luncheon honoring            Lecture Room  
                         Dr. Ibrahim Badran and        Main NAS Building  
                         guests from Egypt            2101 Constitution Ave., NW

Luncheon Speaker  
Frank Press, President,  
National Academy of Sciences  
Topic: The National Research Council Program in 1984

AFTERNOON SESSION

2:00 pm            Technology Policy in            I. H. Abdel Rahman  
                         Egypt                            JCC Member  
                         Discussion

2:45 pm            Proposed Program Plan and    A. S. El-Nockrashy  
                         Budget Reallocations         
                         Discussion

3:45 pm            More and Better Food         Osman Galal  
                         Future Directions            NRC Cairo  
                         Discussion

4:30 pm            Adjourn

Tuesday, April 17, 1984  
Joseph Henry Building, Room 356  
2100 Pennsylvania Avenue, N.W.

MORNING SESSION

9:00 am            Scientific and Technical        Vladimir Slamecka  
                         Information System            School of Information and  
                         Discussion                        Computer Science  
                                                                Georgia Institute  
                                                                of Technology

11:00 am            Land Reclamation Studies       M. El Gabaly  
                         and Projects                    JCC Member  
                         Discussion                        Edward Quicke  
                                                                World Bank

12:15 pm            Break for working lunch        Howard Lusk, AID/Cairo  
                         Informal presentation on  
                         status of USAID S&T sector  
                         assessment

2:00 pm	Instrumentation Technology Discussion	Murray Eden, NIH, Bethesda Norman Huston, Univ. of Wisconsin, Madison
2:30 pm	Standards and Measurements Discussion	A. F. Dawoud, NIS, Cairo
3:00 pm	Executive Session Recommendations and Conclusions	George Bugliarello Ibrahim Badran
5:30 pm	Adjourn	

Annex C

List of Participants, Invited Guests and Observers

Thirteenth Meeting  
Joint Consultative Committee  
Applied Science and Technology Research Program

Washington, D.C.

April 16-17, 1984

Egyptian JCC Members

Dr. Ibrahim Badran  
President, Academy of Scientific Research and Technology (ASRT)

Dr. Ibrahim Abdel Rahman  
Counselor, Office of the Prime Minister

Dr. Abdel Aziz Hegazy  
Ex-Prime Minister and President, Commerce Syndicate

Dr. Hassan Ismail  
Counselor, ASRT

Dr. Mostafa El-Gabaly  
Counselor, Ministry of Agriculture

U.S. JCC Members

Dr. George Bugliarello  
President, New York Polytechnic Institute

Dr. Lowell Lewis  
Assistant Vice President for Agriculture and Natural Resources and  
Director of the Agricultural Experiment Station  
University of California

Dr. F. Karl Willenbrock  
School of Engineering and Applied Science  
Southern Methodist University

Dr. Leo S. Packer (ex officio)  
NAS/NRC Resident Program Director in Egypt

Dr. James Hillier  
International Consultant (former member and special consultant to JCC)

Egyptian Advisors

Dr. Mohamed Kamel  
Director, National Research Centre (NRC/Cairo)

Dr. Yehia Kabil  
Cultural Counselor and Director, Education Bureau  
Embassy of Egypt  
Washington, D.C.

Dr. A. S. El Nockrashy  
Director, International Secretariat, ASRT and  
General Coordinator, Applied S&T Research Program

Dr. Osman Galal  
Head, Child Health Lab, NRC/Cairo  
Director, National Institute of Nutrition and General Coordinator at  
NRC/Cairo for technical aspects of the Program

Dr. Abdel Fatah Dawoud  
Director, National Institute for Standards

Eng. M. Shaloot  
Instrumentation Project Director, ASRT

Dr. Ahmed El Khordagy  
Instrumentation Project Director, ASRT

National Academy of Sciences

Dr. Frank Press  
President

Dr. Victor Rabinowitch  
Executive Director  
Office of International Affairs

Mr. John Hurley  
Director  
Board on Science and Technology for International Development (BOSTID)

Mr. Jay Davenport  
Senior Staff Officer, Egypt Program, BOSTID

Mr. Augustus Nasmith, Jr.  
Staff Officer, Egypt Program, BOSTID

Mrs. Maryalice Risdon  
Staff Associate, Egypt Program, BOSTID

Mrs. Eileen V. Payne  
Administrative Secretary, BOSTID

Mrs. Krystyna Dollison  
Administrative Secretary, BOSTID

Agency for International Development/Cairo

Dr. Howard Lusk  
Associate Director, Human Resources Development Cooperation  
USAID Mission in Cairo

Dr. Sherif Arif  
Science and Technology Division  
USAID Mission in Cairo

Mr. Eric A. Peterson  
Science and Technology Division  
USAID Mission in Cairo

Agency for International Development/Washington

Mr. Richard Tropp  
Special Assistant to the Administrator

Dr. Howard Minners  
Science Advisor

Dr. John Eriksson  
Deputy Assistant Administrator  
Bureau for Science and Technology

Dr. Harold Dregne  
Senior Land Resource Adviser  
Office of Agriculture  
Bureau for Science and Technology

Ms. Frances C. Li  
Special Assistant  
Bureau for Science and Technology

Mr. Richard Blue, Director  
Office of Egypt Affairs  
Bureau for Near East

Mr. Bert Porter  
Assistant Egypt Desk Officer  
Office of Egypt Affairs  
Bureau for Near East

Mr. Kenneth Sherper, Director  
Office of Technical Support  
Bureau for Near East

Dr. Harold Freeman, Chief  
Human Resources and Science and Technology Division  
Office of Technical Support  
Bureau for Near East

Ms. Carolyn Coleman  
Office of Technical Support  
Bureau for Near East

Mr. Art Braunstein  
Office of Technical Support  
Bureau for Near East

Mr. Robert F. Zimmerman  
Office of Development Planning  
Bureau for Near East

Mrs. Nena Vreeland  
Office of Evaluation  
Bureau for Program and Policy Coordination

Department of State

Dr. Thomas Vrebalovich  
Bureau of Oceans and International Scientific and Environmental Affairs

Georgia Institute of Technology

Dr. Vladimir Slamecka  
School of Information and Computer Science

National Bureau of Standards

Dr. Edward L. Brady  
Associate Director for International Affairs

Dr. Kurt Heinrich  
Chief, Office of International Relations

Mrs. Doris Bluebond  
Program Analyst, Office of International Relations

National Institutes of Health

Dr. Murray Eden  
Chief, Biomedical Engineering and Instrumentation Branch

Mr. Howard Metz  
Biomedical Engineering and Instrumentation Branch

University of Wisconsin

Dr. Norman Huston  
Director  
Instrumentation Systems Center

Mr. Edward Falk  
Instrumentation Systems Center

International Bank for Reconstruction and Development

Mr. Edward F. Quicke  
Economist  
Europe, Middle East, and North Africa (EMENA)

Mr. William A. van Tuijl  
Engineer  
EMENA

Addendum II

Proposed 1984-1986  
Research and Development (R&D) Management Plan  
Applied Science and Technology Research Program

Outline of the Major Elements and Administrative Structure

by

Dr. A. A. Abdul Azim

Director, Central Metallurgical Research and Development Institute  
Cairo, Egypt

I. Introduction

The basic ideas of Dr. Abdul Azim's plan are contained in a set of documents which consist of:

- Part I, Draft Discussion Paper.
- Part II, Draft Description of R&D Management Activities.
- Part III, Preliminary Work Schedule and Outline of Responsibilities, First Year 1984-85.
- Part IV, Plan for the Second Year, 1986.
- Part V; Preliminary Budget.

II. Elements of the Program

A. Summary

The goal of the 1984-1986 program is to strengthen R&D management systems at the ASRT and the National Research Centre (NRC) primarily by improving the level of project management of principal investigators of ASRT-and NRC-sponsored R&D, strengthen marketing of R&D at the NRC, and strengthen the monitoring-control of grant-sponsored R&D of the ASRT.

B. NRC Program Elements

- R&D project management training. Conduct three training programs in 1984-85 (Year 1) and three training programs in 1985-86 (Year 2) for 20-25 NRC principal investigators per session. Emphasis upon program planning, fiscal management, reporting, scheduling, self-evaluation, and liaison with end-users. Workshops to be planned, managed and conducted by an Egyptian core group of trainers led by Dr. El Nockrashy, Abdul Azim, and El Halwagi. One U.S. consultant to be contracted to assist the Egyptian core group.

- R&D marketing. Contract the services of an R&D marketing specialist from the U.S.A. (one person month/year) to work with Dr. Abdul Azim and NRC-industry R&D committees in strengthening liaison for problem solving.
- R&D technical services to industry. Contract approximately 3 person months per year of time for technical problem-solving in industry in areas where NRC-industry R&D committees are collaborating.
- Techno-economic assessment. Conduct, entirely with Egyptian staff resources, a techno-economic workshop (2 weeks duration) for 15-20 NRC principal investigators. Leader and organizer: Dr. M. M. El Halwagi.
- Training of trainers. In order to extend the number of "core trainers" in NRC who can offer R&D project management workshops and seminars, select up to 20 participants from the Year 1 cycle of 3 workshops and prepare them to assume major training responsibilities during Year 2 of the program. Training would consist of (a) a one-week, full-time, highly intensive "training" seminar conducted by the present NRC core group plus the new candidates (a U.S. consultant could assist), and (b) opportunities for 8 Egyptians from the new candidates to participate in U.S. management training seminars during the summer of 1985 (MIT, Battelle, other).

#### C. ASRT Program Elements

- R&D project management training. Conduct three "separate-but-equal" R&D project management seminars in 1984-85 (Year 1) and three in 1985-86 (Year 2). Participants would be principal investigators from grantee organizations under the 5-year R&D program of the ASRT. These courses would be essentially the same as those organized by NRC and would be taught by the same core group (El Nockrashy, Abdul Azim, El Halwagi, etc.).
- Grant Management. Visit by a high level specialist from a U.S. organization which, like ASRT, has an extensive grant-management responsibility. The specialist might come from NSF, NIH, or the USDA Agricultural Research Service (or similar organization). Approximate length of visit would be 2 weeks; goal would be to recommend ways in which the ASRT grant management system might be strengthened.
- Training Course for ASRT Grant Monitors. Conduct a course of about 3 weeks for ASRT grant monitors. Course to be given at ASRT by a contracted Egyptian management consultant group.

III. Management Structure

A. Basic Policy Making and Program Monitoring Group: ASRT-NRC Task Force Committee on R&D Management.

1. Chairman: Dr. M. Kamel, NRC Director
2. Members: Dr. A. F. Abdel Latif, Vice President ASRT

Dr. A. S. El Nockrashy, Coordinator, ASRT, Foreign Technical Assistance Programs

Dr. A. A. Abdul Azim, Director, CMRDI

Dr. Osman Galal, Director, Nutrition Institute

Dr. M. M. El Halwagi, Head, NRC Pilot Plant Division

Others to be named as appropriate.

B. Basic Planning Group in ASRT: ASRT R&D Management Advisory Committee.

To be appointed.

Note: The Committee is to have an Executive Coordinator who will be responsible for administrative, executive and liaison functions. That person will head a small staff (focal point) of essentially full-time persons to help with all program and administrative matters.

C. Basic Planning Group in NRC: NRC R&D Management Advisory Committee.

Dr. A. A. Abdul Azim

Dr. Osman Galal

Dr. M. Kassem

Dr. H. Samir Abdel Rahman

Dr. Nabil Salah, Executive Coordinator

Note: Dr. Nabil Salah will head a small staff (NRC focal point) of essentially full time persons to help with all program and administrative matters.

Addendum III

MORE AND BETTER FOOD  
AN INTEGRATED APPROACH FOR DEVELOPMENT

By  
Dr. Osman Galal, M.D., Ph.D.  
Director of the Nutrition Institute  
  
Project Coordinator (Nutrition) NRC  
March 1984

I. Introduction

The More and Better Food project (MBF) was conceived and implemented by the National Research Centre (NRC) to study the impact of increasing food productivity and improving food quality on rural development, nutrition and health. Activities were carried out during the last five years in two villages; very recently two other villages were added to the project. Implementation has raised issues related to nutrition, agricultural management, and rural development. The experience gained and lessons learned encouraged the participants to look more critically at the original objectives of the project and convert it into the larger context of rural development. This report describes the evolution of the project's objectives, and puts forward a strategy for continuing its redirection toward more comprehensive rural development. It identifies integration as a key mechanism toward achieving rural development, and characterizes the integration process in the Egyptian context, i.e., the integration processes appropriate to Egyptian culture.

II. Nutritional Concept of the Project

It was hypothesized that various nutrition programs should be directed to overcome the consequences of food intake inadequate with respect to quantity and quality. Some age groups are more sensitive to nutrient deprivation than others. This is due to the fact that in periods of accelerated growth more (and better) food is needed per unit of body weight. It is worth remembering that reaching a good nutritional status is a goal by itself. Moreover, it raises the capabilities and performance of the individual. Work performance will be improved, an impact on behavior will be observed, and defense against infections will be enhanced. Therefore, achievement of this goal affects not only the individual's quality of life but also that person's ability to contribute to national development.

### III. Nutritional Interventions

A survey of the nutritional status of school age children (6-12 years) in Kafr Al-Khadra village discovered high rates of anemia as measured by blood hemoglobin (Hb) levels. Using standard measurements (WHO), 75.2% of the target student population was found to be suffering from various degrees of malnutrition--27.5% severe and 47.5% of moderate severity. As measured by Hb levels, an average of 30% of the children suffered from anemia. However the anemia was found to rise to about 50% in the 11-12 year age group and to 44% in the 7-8 year age group. Although iron content in the food is marginally sufficient for the physiological requirements of the target population, the form in which the iron is present is of low bio-availability. These findings led the NRC scientists to undertake a pilot study of iron fortification through a nutrition intervention program.

A protein-rich formula was devised from locally available ingredients which conformed with the food habits of the target population. The ingredients were fortified with iron and zinc and made into a cake by the only bakery in the village. This work was supervised and monitored continuously by NRC scientists during the 90-day test period of the nutrition intervention program. The supplementary cakes were distributed six days weekly in the classroom and eaten by the children under supervision of their teachers.

After ninety days the nutrition intervention program succeeded in reducing the measured protein-energy deficiencies from 75.2% to 57.7% and those in the "severe" category from 27.5% to 11.4%.

In addition a second program to affect nutritional improvement among the pre-school age children was designed and concurrently implemented. Two methods were used. The first was a biscuit appropriate for children 18-36 months of age, the second a powder for children 6-18 months old.

Several semi-pilot processes were carried out in collaboration with the Research and Quality Control Department of Misr Bisco Company where the formulae were processed. These processes were designed to formulate biscuits containing protein content exceeding the 2-4% level contained in the types of biscuits then being produced by the company. These efforts succeeded by preparing biscuits containing 12% protein.

After designing and testing the technological aspects, such as the type of packaging that suited the conditions of transportation and distribution, a batch of one ton was prepared. Half of this quantity was packed in cellophane packages of 100 gm each; the other half was ground and packed in polyethylene bags each containing 700 gm powder.

The products were transported to the village, stored under the supervision of the health and nutrition staff, and used by 200 children of both sexes (age 6-36 months).

At the end of the feeding program, the measurements of the nutritional status were repeated, and compared with those of the baseline data. Improvements in both the nutritional status and level of blood Hb were elicited.

A third intervention was conducted in Omar Makram, the other demonstration village. Iron and other trace elements were added to fertilizer spray and applied to plants. The effect of enriched food in the area on the individuals and the assessment of the iron bio-availability is still in process. A decrease in the severity of anemia in Omar Makram would suggest the success of this approach.

#### IV. Discussion

The sequence for nutrition intervention programs starts with production of food, whether of plant or animal origin or both, which is essential to supply the target population with the raw materials as specific nutrients. Next comes the food processing stage, which must be considered as preparatory before food becomes available to the individuals. Finally, the food consumption pattern should be looked upon as the way the food is utilized. The ultimate effect of the intervention on the target population is studied by various methods, the most important of which is the assessment of the nutritional impact on the individual.

The nutritional status of the target population in two villages, Kafr Al Khadra and Omar Makram, was surveyed and the baseline data recorded. The results showed that in both villages, iron deficiency anemia and short stature were the two major nutritional problems. These results were not surprising as they accorded with those of the national nutrition survey of Egypt performed by the Nutrition Institute in 1978 and 1980.

The project, as planned, started to increase productivity of food of plant and animal origin in both villages. Several new technologies were introduced, many successes of increasing production were reported, and solid achievements observed. In addition, the farmer-scientist relationship developed fruitfully. The farmer learned about and grasped new technology from scientists; at the same time, scientists gained experience in solving the problems of the rural areas. This mutually beneficial interchange, if capitalized upon, should be the cornerstone for further planning of rural development programs.

One original hypothesis, that when productivity of food increased many of the nutritional aberrations would disappear, was not confirmed. Children who were suffering from malnutrition did not necessarily belong to households where the leading male (farmer) participates in increased productivity projects, i.e., they did not benefit from the increased crop yield. It was difficult to explain why, in the same ecological environment, you find children who are anemic and malnourished, and others who are not. Inadequate food distribution, in terms of the nutritional requirements of individual family members, and feeding practices might be causal factors.

Two approaches for combating anemia were tested within the framework of the project: production and supplementation. Increasing food production alone did not alleviate the nutritional problem. It was only when processing was done, and distribution assured, that positive results were achieved. In Kafr Al Khadra the school lunch program which distributed a processed cake, fortified with iron, to all school children, and the biscuits for pre-school children, gave encouraging results during the first year of implementation. The prevalence of anemia was reduced. The performance of children at school, as observed by their teachers, improved. And the absences during the academic year were less frequent than before introducing the lunch program. The lesson learned in Kafr Al-Khadra seems to be that integrated nutrition interventions, i.e., ones that encompass processing, distribution and consumption, are most likely to succeed.

As originally conceived, the MBF project intended to concentrate on "more food" and direct little effort to "better food." However, when baseline data showed that the major nutritional problems were in quality rather than quantity, the emphasis of the project shifted. An integrated approach to nutrient supplementation took precedence over, and had greater impact than, food production.

The success in nutritional terms of MBF's integrated interventions relative to the nutritional impact of its food production efforts suggests the intriguing possibility that the well-known sequence of better socio-economic status leading to improved nutritional status may in fact be reversed. That is, better nutrition may lead, fairly quickly and directly, to improved socio-economic standing. To the extent that this latter dynamic holds, and it certainly bears investigating further, integrated nutrition interventions should assume important, indeed central note in rural development strategy. One implication of placing nutrition center stage, of seeing it is the engine that drives development, is the need for yet another kind of integration, that of all the institutions which constitute the infra-structure of the village to first identify, then coordinate, their contributions to better community nutrition. MBF looks forward to exploring the exciting possibilities its experience to date has generated.

Addendum IV

Summary

ASRT Irrigation and Land Reclamation Project  
Five-Year R&D Program

I. Project Title

Evaluation of Irrigation Systems in New Lands and their Effects on Crop Production: Soil Properties, Water Requirements and Economic Evaluation of the Systems.

II. Duration of Project

Four years from May 1984 to April 1988.

III. General Objectives

The major objective is to conduct technical and socioeconomic studies to evaluate the use of irrigation systems in the new land. Cropping patterns will be selected to fit physical and chemical properties of different soil types as well as irrigation systems. Variation of soil properties, water requirements, irrigation efficiencies, energy needs and economics factors will also be studied and evaluated for each irrigation system. The ultimate aim is to develop recommendations for optimizing crop production under various methods of irrigation.

IV. Technical Approach

The basic technical approach is to test sprinkler and drip irrigation systems in several reclaimed areas and in many different soil types. Testing will show effect upon crop production and will involve:

- Types of cropping patterns, crop rotation and other agricultural practices.
- Operation, maintenance, durability, efficiency and technical performance of different irrigation systems.
- Effect on physical and chemical properties of soils.
- Water and energy requirements.
- Socioeconomic evaluation of various systems under different conditions.

## V. Project Phases

### A. Phase I (5 months)

- Collect data on previous work related to project activities in the 3 areas.
- Select experimental fields and complete equipment requirements.
- Establish detailed work plan for field and laboratory work.
- Write Phase I report.

### B. Phase II (3 years)

- Plant cultivation and agronomic practices (fertilization, weed control, pest control, etc.).
- Soil and water sampling and analysis (salinity, salt distribution, alkalinity, etc.).
- Irrigation studies (irrigation water consumption, drainage efficiencies, system evaluations, energy comparisons, etc.).
- Socioeconomic evaluation (costs, production, operation and maintenance, etc.).
- Write periodic progress reports.

### C. Phase III (7 months)

Final report, including recommendations.

## VI. Interdisciplinary Integration

The four primary disciplines to be represented are:

- Irrigation engineering (systems evaluation and operation).
- Socio-economic evaluation.
- Soils and agronomy.
- Water requirements and irrigation efficiencies.

Support functions will include computer services, analytical laboratory, field technicians, project secretariat and administration.

## VII. Project Management

- A. Project Director: Dr. Hassan Wahby, Director,  
Water Distribution Research Institute,  
Ministry of Irrigation

B. Scientific Committee:

- Dr. Wahby, Project Director
- Dr. A. Abou Saber, Director, International Center for Agricultural Development, Ministry of Agriculture (Ph.D. Mechanical Engineering, University California)
- Dr. I. Antor, Director, Soils and Water Research Institute, Agricultural Research Center (Ph.D. Soils Science, Alexandria University)
- Dr. I. Habib, Professor, Soils Department, Cairo University, (Ph.D. Soils, Cairo University)
- Agr. Eng. A. Selim, Chairman, General Authority of Reconstruction and Agricultural Development

In addition, there will be a Coordination Committee (see Fig. 2) representing the four major disciplines listed above, as follows:

- Irrigation Engineering: Ms. Mona El Kady
- Socioeconomic Analysis: Dr. Farouk Abdel Al
- Soils and Agronomy: Dr. Ahmed Taher
- Water Requirements: Engr. Nadya Wahby

VIII. Collaborating Organizations

- Water Research Center, Water Distribution Research Institute, Ministry of Irrigation
- Cairo University, Faculty of Agriculture, Soils Department
- Suez Canal University, Faculty of Agriculture, Economics Department
- Soils and Water Research Institute, Agricultural Research Center, Ministry of Agriculture
- International Center for Agricultural Development, Maryout branch, Ministry of Agriculture
- General Authority for Reconstruction and Agricultural Development, Ministry of Reconstruction

### IX. Work Site Locations

- A. Field Work: Selected areas in the newly reclaimed land of El Salhia and west of Nubariya, where there are different kinds of soils, climate, crops and irrigation systems. Also, Inshass Experimental Station will be developed as a third site for project activities and state-of-the-art studies.
- B. Laboratories: Soils, water and plant samples will be analyzed mainly in the Water Distribution Research Institute laboratories. Depending on facilities available, some analytical work will be carried out in the field.
- C. Offices: Project headquarters will be at the Water Distribution Research Institute, Cairo.

### X. Manpower Estimates

For each of the three sites mentioned above (see Fig. 1) a technical team will be assembled, with the following estimates in person-months per year:

Team leaders	12
Irrigation Engineer	36
Mechanical Engineer	12
Socio-economic Analysis	12
Agronomist	36
Water Requirements	12
Pesticides, Insecticides	6
Technicians	60
Technician Supervisor	12
Driver	<u>24</u>
Total	222 person-months/year

The general support for all 3 sites:

Computer Analysis	24
Laboratory Analysis	24
Drafting	6
Secretarial, Admin., Finance	<u>12</u>
Subtotal	66 person-months/year
Specialized Consultants	<u>36</u>
Total Support	102 person-months/year

The grand total for the project is:

$3 \times 222 + 102 = 768$  person-months/year or full-time equivalent of about 64 person months.

XI. Budget

The original budget proposed to ASRT was approximately LE 500,000. The authorized grant however, was reduced to LE 385,000, as follows:

	<u>LE</u>
10% held by ASRT	38,500
Incentive payments for professionals	205,000
Supporting services	82,000
Equipment purchases	26,000
Operating costs and maintenance	26,000
Final Report and publication	<u>7,500</u>
Total	LE 385,000

Evaluation of irrigation systems in new land and their effects on crop production, soil properties, water requirements, and the economical evaluation of their systems.

*Dr. Ismaila Comal  
1st reclaimed by King F.*

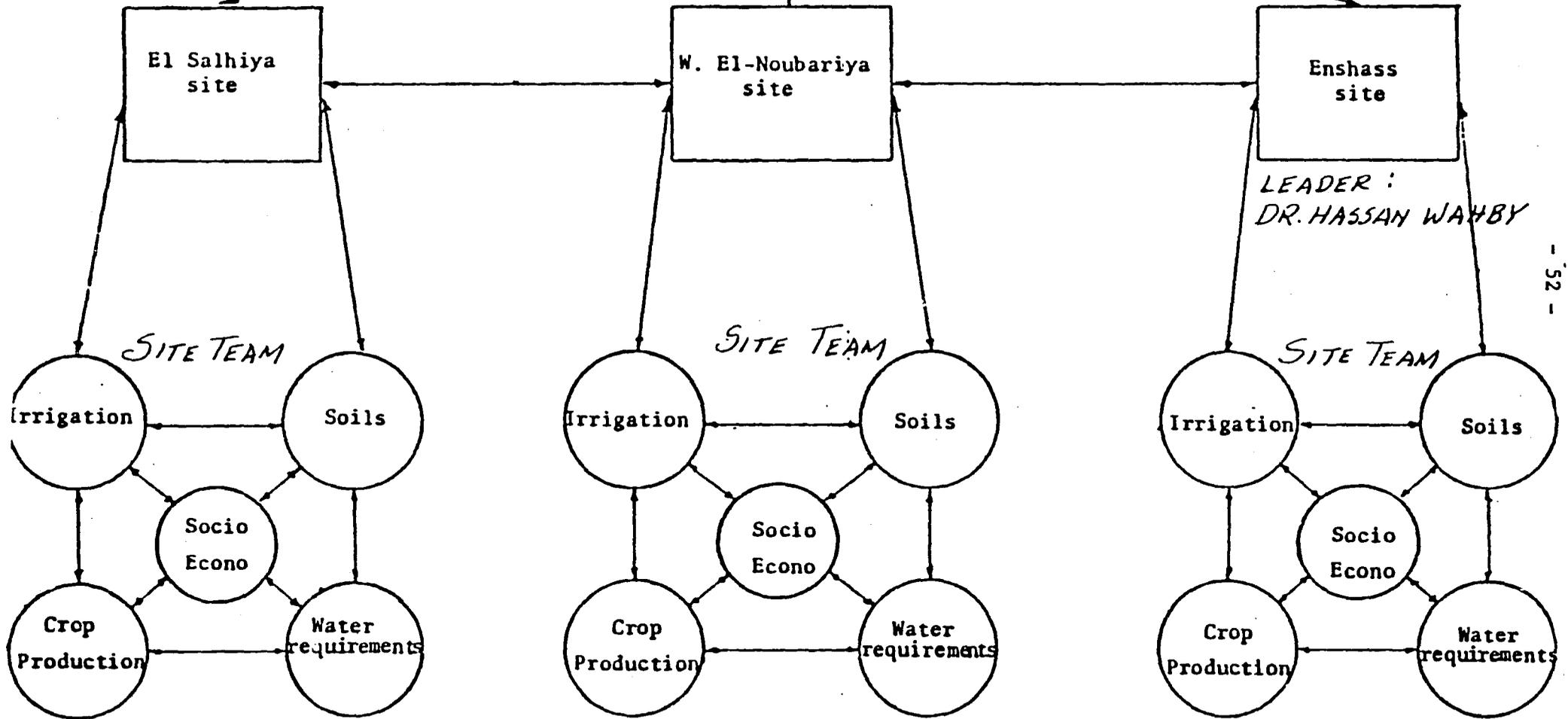


Figure 1. FIELD SITE ORGANIZATION

Dr. ABU ZEID  
DR. EL GABALY  
DR. HASSAN ISMAEL  
DR. OMAR WAHBY  
(ECONOMIST)

Acadamy Supervising  
Committee

~~Dr. HASSAN WAHBY~~ Project Director

Scientific Committee *SEE MEMBER LIST  
IN TEXT*

Coordination  
Committee

Irrigation Systems  
*Mona El Kady*  
Socio-Economic  
*Farouk Abd  
El Al*  
Water requirement  
*Engr. Nadya Wahby*  
Soils  
*Dr. Ahmed Taher*

Enchass

Scientific  
Supervisors

Team Leader  
- irri. engineer  
- Mechanical eng.  
- Socio-Econ.  
- Soils  
- Water require-  
ment  
- Agronomist  
- Insecticide  
- Technician  
- Labors  
- Drivers

W-Noubariya

Scientific  
Supervisors

Team Leader  
-irri. engineer  
-Mechanical eng.  
-Socio - Econ.  
-Soils  
-water require-  
ment  
-Agronomist  
-Insecticide  
-Technician  
-Labors  
-Drivers

El-Salhiya

Scientific  
Supervisors

Team Leader  
-irri. engineer  
-Mechanical eng.  
-Socio Econ.  
-Soils  
-water require-  
ment.  
-Agronomist  
-Insecticide  
-Technician  
-Labors  
-Drivers

Cooperative Groups

Consultants

Adminis-  
tration

Secretariat

Draft

Laboratory

Computer

ANNEX A

Context of Proposed Collaboration  
Applied Science and Technology Research Program

Based upon meetings held in 1983 among JCC members and a comprehensive discussion at JCC XIII, the JCC indicated a willingness to recommend supporting the ASRT project (described in Annex A), provided that the assistance by the Applied Science and Technology Project was used to expand the scope of the ASRT project and to emphasize certain aspects believed by the JCC to be of major importance.

The JCC recommended a major effort in the area of social, organizational, and economic aspects of land reclamation projects and irrigation systems. This was consistent with the advice of the World Bank experts consulted during JCC XIII, and the report of the special panel of experts that visited Egypt in November 1983 to meet with Egyptian counterparts.

In essence, the advice stressed the overriding importance to the success of national and reclamation programs of many of the following factors:

- Planning effectiveness and project design.
- Management infrastructure.
- Logistics of seeds, fertilizers, pesticides, etc.
- Land use policies.
- Land tenure.
- Financing and credit facilities.
- Effect of government intervention policies.
- Engineering works, specifications and standards.
- Maintenance and follow-up services.
- Behavioral and attitudinal responses of farmers.
- Long-term effects such as salinization, drainage problems, etc.
- Economics of construction, installation, operation, energy, labor, and maintenance.
- Urban invasion of agricultural lands.

Several JCC members felt that a carefully designed additional effort along these lines, supplementing the scientific and

technological content of the ASRT project would represent the best use of the additional resources provided by the Applied Science and Technology Project. In addition, it would be possible to increase the equipment procurement budget and release additional funds for enlarging the scope of the project.

The additional support of the Applied Science and Technology Project should consist of:

- Equipment purchases for field sites and laboratories.
- Training activities, primarily in Egypt.
- Local materials and supplies.
- Expert consultants, Egyptian and foreign, as needed.
- Observation, study and professional travel.
- Information and reference materials.

As of June 1984, and, in accordance with the recent reallocations, unexpended funds from Arid Zones available for the purpose are approximately:

U.S. dollars	27,500
Egyptian pounds	53,500
	\$ 115,000 for equipment
Local materials and supplies are to be estimated by ASRT.	

As of mid-June 1984 the project staff had begun to compile an equipment list, but had not yet addressed the detailed redesign of the project plan to accommodate the concerns and recommendations of the JCC. There is, however, an evident desire to do so, and a belief that the necessary skills exist within the institutes of the Ministry of Irrigation and in other ministries and academic institutions (e.g., the Department of Community Development of the School of Social Work at Helwan University). The ASRT project is well designed to develop and maintain interdisciplinary links with other institutions, and its management is favorably disposed to conform to the JCC advice. Should the JCC recommend the affiliation of the two projects, and should AID approve, the ASRT project director should be requested to work up a detailed plan to be submitted to JCC XIV in October 1984. In the meantime, the JCC Executive Committee and AID could, if they wish, provide interim approval for support of the ASRT project before JCC XIV.

Addendum V

Remarks on Overall Performance Evaluation  
Applied Science and Technology Research Program

by  
Dr. Leo S. Packer  
NAS/NRC Resident Program Director in Cairo

JCC XIII

April 16, 1984

This JCC meeting is very special in the history of JCC proceedings, since it considers at the same time a recently completed Project Evaluation Report, a current S&T Assessment activity of much wider scope, and a normal and expected restructuring of our project elements with the resulting reallocation of resources.

You may recall that at the last JCC meeting in Cairo (JCC XII, November 1983), I offered a few ideas on an approach to project evaluation. We all know that the four standard textbook elements of R&D Management are: (a) planning, (b) organization and staffing, (c) execution and control, and (4) evaluation. In my experience the last element, evaluation, is the weakest and most neglected component of management. I see evaluation as the systematic and periodic comparison of the original plan with an objective view of what is actually happening. It is an important process but also difficult to do well. Let me try to explain why it is so hard to judge what is really happening.

A problem in any systematic evaluation process is that one can draw incorrect conclusions from correct observations when the scope of those observations are inappropriate. I make a comparison with examining a specimen under a microscope. At high magnification, one can see a cell or a cell nucleus and observe certain characteristics. Reducing magnification may show a tissue of thousands of cells and corresponding phenomena. Continuing onward, one can observe an entire organ or organism and conclude something about health or disease. All the observations are valid for their particular levels of magnification and all must be considered in an integrated way before developing a valid general conclusion. Misuse of the space dimension or using the wrong scope for observation can lead to many false conclusions. It is similar to drawing conclusions on the state of the economy based only on one or two indicators, or concluding that a war is being won or lost, based on local anecdotal information. Therefore valid "micro-observations" can lead to totally false "macro-conclusions."

R&D is a complex activity. One task cannot describe a subproject, one subproject may not be representative of a large project, a project may not properly represent a major program, and a program may or may not correctly characterize an institution or a national R&D system.

Another dimension rarely considered explicitly in R&D evaluations

is time. Just as a snapshot does not fully describe a dynamic process, a look at an R&D activity may be misleading if the time interval of observation is too short. Certain R&D efforts develop in 3 months, other mature in one year, others in ten years. Evaluation within the wrong time frame can lead to incorrect conclusions, even if based on correct observations. Trend analysis, that is, looking at change as well as speed of change is important to avoid this pitfall.

When applied to the Applied Science & Technology Research program, the scope of JCC activity is quite properly the overall program as well as its component elements. This is a more than adequate pre-occupation for our mutual concerns and cooperative efforts. Just as there are numerous micro considerations outside the focus of JCC attention, in the other direction our project is part of the large matrix of a National Research System, that is the vital concern of the Egyptian political and scientific leadership. Our project is one part, we hope a significant and productive part of the whole. We are now looking through our microscope with the lowest magnification and the widest possible field of view. Let me share with you a few personal observations at the national, or "macro" level. I know that some of these are subject to discussion and difference of opinion but I hope that you agree with me that the overall conclusion is a highly promising one. Thus, the broader perspective beyond our project provides in my opinion, considerable encouragement for our continuing cooperation. I would like to ask you to consider with me the following general observations and to reflect on whether you agree with my general prognosis:

1. Institutional and organizational structure exists in Egypt for conducting a larger volume of research and more productive R&D. Over 200 identified organizational elements for R&D are at various stages of development and over 25000 persons are engaged in aspects of R&D.

2. Relatively large numbers of well educated, well trained and talented researchers are present in existing institutions. A large reservoir of potentially productive people can be motivated and energized to do good work. We have seen this in our project and elsewhere.

3. Experience shows that under favorable circumstances (support, leadership, encouragement) extremely valuable work can be done in all fields of national interest.

4. A large fraction of the best people are bilingual or trilingual and are familiar with international standards of research and the current status of their own scientific and engineering disciplines.

5. The top leadership of the science and technology community has increased its access to Egypt's political decision makers who acknowledge the importance of science and applied research to economic development. President Mubarak's visit last year to ASRT to endorse the 5-year plan, and the Prime Minister's visit to the recent S&T Policy Conference have more than symbolic meaning.

6. A strong trend exists in the universities, ASRT and NRC, and other institutes toward applied research and direct contacts with user community. Considerable experience is being accumulated in effective technology transfer. I refer you to Dr. Kamel's report for examples.

7. The new 5-year S&T Plan is a decisive step in articulating and implementing a national plan based on a very rational and effective advisory system in ASRT, through its Councils and Committees.

8. A new awareness of the importance of R&D planning and management is evident among the key leadership personnel, middle management and the younger generation of researchers.

9. Improved utilization of laboratory facilities, equipment and instrumentation is evident in many institutions.

10. Positive steps to improve staff services and institutional management are being considered in NRC with widespread support.

11. ASRT is increasingly capable of integrating and utilizing the best knowledge and advice available in Egypt and other countries through its system of specialized councils and committees.

12. ASRT is conducting a systematic dialogue with the universities and with industry, both public and private. It is also extending its cooperative relationships with the governorates, both financial and technical.

13. The new STI program offers the possibility of better utilization and exchange of information at the national level.

14. The USAID assistance program gives increasing prominence to science and technology and receptivity to new program ideas. Other countries and international organizations are following this trend.

15. There is a prospect of increased political stability and cooperation in the region, including encouragement of Egyptian leadership in science and technology and sharing with other developing countries.

16. Egypt now has a national R&D plan and budget, approved by the President and the Council of Ministers. There is also an increased awareness of the importance of integrated policy development.

17. The quantity and quality of university-based research and user involvement, are improving.

18. There is more interdisciplinary research and more cooperation with other ministries than has been true in the past. People are steadily learning ways to overcome traditional problems and to venture in new directions.

The above observations certainly do not mean that all problems have been or will be solved and that the road ahead is smooth and easy. I am merely suggesting that one should reserve judgment based on limited or personal viewpoints.

I believe that overall, the Applied Science and Technology Research project has shown important achievement. Although not reaching a few of its more ambitious aims, it points toward even more challenging and important undertakings in the future. We can (and do) lose a few small battles while winning the war. Change is inevitable; if we can favorably catalyze both its speed and direction, we are doing what is most important. The best way to do this is to strive to improve our individual project performance and to recognize and develop opportunities that grow out of our joint efforts.

TRAVEL TO EGYPT

April 1 - June 30, 1984

<u>NAME</u>	<u>DATE</u>	<u>PURPOSE</u>
<u>MORE AND BETTER FOOD/FOOD TECHNOLOGY</u>		
1. Soliman Shenouda Research Specialist General Foods Corporation Tarrytown, New York	April 1-12	Consulting services re modifications to preliminary design of food technology pilot plant at NRC/Cairo
<u>INVESTIGATION AND EVALUATION OF EGYPTIAN BENTONITES</u>		
2. Haydn H. Murray Chairman Department of Geology Indiana University Bloomington, Indiana	May 22-31	Review project progress, field visit to Sinai deposits and Cairo-Alexandria road deposit to monitor analytical and field data

TRAVEL FROM EGYPT  
April 1 - June 30, 1984

NAME	DATE	PURPOSE	PLACES VISITED
<u>PROGRAM PLANNING AND MANAGEMENT</u>			
Ibrahim Badran Chairman, JCC	April 15-19	JCC-XIII	NAS, Washington, D. C.
Hassan Ismail Member, JCC	April 16-20	"	"
Abdel Aziz Hegazy Member, JCC	April 14-19	"	"
Ibrahim Abdel Rahman Member, JCC	April 15-19	"	"
Mostafa El Gabaly Member, JCC	April 15-19	"	"
Mohamed Kamel Director, National Research Centre, Cairo	April 15-20	"	"
Leo Packer NAS Resident Advisor	April 8-25	JCC-XIII and program planning	"
A. S. El Nockrashy Program Advisor	April 8-May 5	JCC-XIII and program planning for More & Better Food and R&D Management	NAS, Washington University of Arizona, Tucson Denver Research Institute, Denver
Osman Galal Program Advisor	April 14-May 28	JCC-XIII and program planning for More & Better Food	NAS, Washington Centers for Disease Control, Atlanta, Georgia Tennessee State University, Nashville University of Arizona, Tucson Soliman Shenouda, Consultant, General Foods, Tarrytown, N.Y.

TRAVEL FROM EGYPT (cont.)

April 1 - June 30, 1984

NAME	DATE	PURPOSE	PLACES VISITED
<u>R&amp;D MANAGEMENT SYSTEMS</u>			
Tawfik Galal Director, Office of Public Relations, ASRT	April 17-May 4	Seminar on New Communication Methods in S&T	University of Kansas, Lawrence, Kansas
A. A. Abdul Azim Director, CMRDI	May 26-June 16	R&D management fact-finding re models for management information systems, R&D marketing, management decentralization, management evaluation of R&D	
<u>DEVELOPMENT AND APPLICATION OF BIOGAS TECHNOLOGY IN RURAL AREAS OF EGYPT</u>			
Shirin I. El Shawarby Assoc. Professor of Chemical Engineering, NRC	April 23-May 18	Training on Perkin-Elmer instru- mentation, fact-finding on bio- chemical engineering instrumenta- tion and scale-up to pilot plant	Perkin-Elmer Corporation, Norwalk, Connecticut Dept. of Chemical Engineering, Univ. of Virginia, Charlottesville, Va. BioChem Technology Inc., Malvern, Pa. Merck Chemical Mfg. Div., Merck and Co., Elkton, Va.
M. M. El Halwagi Head, Pilot Plant Laboratory, NRC	May 30-June 30	Planning meetings re biogas November conference  9th International Conference on Energy, Power & Environment BioEnergy '84 World Conference CHEMRAWN III World Conference	NAS, Washington, D.C. AID/BSP, Washington, D.C. Washington Suburban Sanitary Comm., Beltsville, Md. Metropolitan Sanitary District of Greater Chicago San Francisco, Calif.  Gothenburg, Sweden The Hague, The Netherlands

TRAVEL FROM EGYPT (cont.)  
April 1 - June 30, 1984

<u>NAME</u>	<u>DATE</u>	<u>PURPOSE</u>	<u>PLACES VISITED</u>
<u>MORE AND BETTER FOOD</u>			
Aly Zein El Abedein Head, Dept. of Community Medicine & Rural Health, NRC	May 9-31	Measuring nutritional impacts of agricultural innovation	Dept. of Family and Community Medicine, University of Arizona, Tucson NAS, Washington, D. C.
<u>PREPARATION OF SELECTED PHARMACEUTICAL CHEMICALS</u>			
Zakaria S. Kahfagi Chairman, El Nasr Pharmaceutical Chemicals Co.	May 10-June 2	Study/observation re U.S. industry practices in scale-up operations, quality control, safety measures, environmental concerns	The Upjohn Company, Kalamazoo, MI Merck Sharp and Dohme Research Laboratories, Rahway, N.J. Ciba-Geigy Corporation, Summit, N.J.
Osama A.W. Kebir Director of Research & Quality Control, El Nasr Pharmaceutical Chemicals Co.	"	"	"
Mohamed M. Abo Roumia Head, Development & Project Sector, El Nasr Pharmaceutical Chemicals Co.	"	"	"
Faten Ahmed Hamouda Professor of Chemical Engineering, NRC	"	"	"
Mohamed Z. Mahmoud Yehya Chief Engineer, Pilot Plant Laboratory, NRC	"	"	"
<u>INVESTIGATION AND EVALUATION OF EGYPTIAN BENTONITES FOR INDUSTRIAL APPLICATION</u>			
M. Fouad Abdel Azim General Manager, General Petroleum Co., Nasr City	April 9-22	Study/orientation re applications of bentonites in oil well drilling fluids	Amoco Research Lab., Tulsa, Okla. Dowell Division, Dow Chemical, Tulsa Magco Research, Houston, Texas NL Baroid Corp., Houston, Texas Mobil Field Research Lab, Dallas, TX