BIBLIOGRAPHIC DATA SHEET	1. CONTROL NUMBER	2. SUBJECT CLASSIFICATION (695)
	PN-AAH-948	TC00-0000-G232

3. TITLE AND SUBTITLE (240)

Applied science and technology research in Egypt; semiannual report, Jan.-June 1980

4. PERSONAL AUTHORS (100)

5. CORPORATE AUTHORS (101)

National Research Council. Board on Science and Technology for Int. Development

6. DOCUMENT DATE (110)	7. NUMBER OF PAGES (120)	8. ARC NUMBER (170)
1980	58p.	EG6ØØ.3Ø92.N277b-80

9. REFERENCE ORGANIZATION (130)

NAS

10. SUPPLEMENTARY NOTES (500)

11. ABSTRACT (950)

12. DESCRIPTORS (920)

Science and technology
Technology transfer
Research
Food technology
Biogas
Project planning
Egypt

13. PROJECT NUMBER (150)

263001600

14. CONTRACT NO.(140)

AID/ne-C-1474

15. CONTRA TYPE (14

16. TYPE OF DOCUMENT (160)

APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT

SEMIANNUAL REPORT

January -- June 1980

Contract No. AID/NE-C-1474

Project No. 263-0016

Board on Science and Technology for
International Development
Commission in International Relations
National Academy of Sciences-National Research Council

NATIONAL ACADEMY OF SCIENCES
WASHINGTON, D.C.

This is the fifth semiannual report of Contract AID/NE-C-1474, Applied Science and Technology Research in Egypt, covering the period January 1980 - June 1980. The report has been prepared by the staff of the National Academy of Sciences - National Research Council for the Agency for International Development.

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I

EXECUTIVE SUMMARY

The Fifth Meeting of the Joint Consultative Committee (JCC) for the Applied Science and Technology Program was held February 25-27, 1980 at the National Academy of Sciences, Washington, D.C. Dr. Hassan Ismail, President of the Egyptian Academy for Scientific Research and Technology (ASRT), chaired the meeting, which focussed on the JCC "self-evaluation" of the program and completion of recommendations to AID for a Phase II program plan. A summary report of the Fifth JCC meeting is found in Annex A of this report.

During the January-June 1980 reporting period, the following activities occurred:

- The Denver Research Institute (DRI) conducted a workshop in Cairo, "Management Aspects of Science and Technology," in February. In this follow up to the series of four workshops held in Denver in 1979, 71 deans, research directors or department heads from universities, ministries and ASRT bodies participated.

- R&D projects on the evaluation of Egyptian phosphates, wool scouring and wool wax recovery and corrosion causes and control continued well on schedule, except for research delays caused by the long lead times necessary for equipment delivery. Cooperation with appropriate industries has been noteworthy in these projects. A preliminary outline for the Red Sea Fisheries project was developed and approved.

The More and Better Food and the biogas technology demonstration projects proceeded as anticipated, except for problems caused by equipment procurement delays. Plans for the "new crops" demonstration project, to be

conducted jointly by Ain Shams and Al Azhar Universities and the National Research Centre, were outlined and initial assignments made.

The January-June 1980 period found preliminary results being assessed in a number of projects. All project teams charted the continuation and fruition of their activities in planning exercises for Phase II. Egyptian and U.S. program participants contributed to the JCC self evaluation and in providing information to the AID-sponsored program evaluation team which made its on-site assessment in Egypt in April.

II

INTRODUCTION

The Applied Science and Technology Program is a joint effort of Egypt and the United States to orient Egyptian scientific and technical research activities toward research needed for technical and economic development. The Program traces its origin to May 1975 when the Egyptian Academy of Scientific Research and Technology (ASRT), the United States National Science Foundation (NSF) and the United States National Academy of Sciences - National Research Council (NAS/NRC) jointly conducted a workshop on science and technology policy, research management and planning in Egypt. From the 1975 workshop and subsequent studies came a formal agreement in March 1977 between the ASRT and the United States Agency for International Development (AID) for a five-year cooperative venture to strengthen institutional and management capabilities of Egypt's sicence and technology (S&T) community. Both the ASRT and AID invited the NAS/NRC and the NSF to join in the activity which is known as the "Applied Science and Technology Research Program."

The organization and first meeting of the Program's binational panel - the Joint Consultative Committee (JCC) - took place in May 1978 in Cairo. For purposes of administration, the program is divided into two periods, Phase I from October 1978 to October 1980 and Phase II from October 1980 until October 1983.

This is the fifth semiannual activities report of the program prepared by staff of the NAS/NRC's Board on Science and Technology for International Development (BOSTID) under contract AID/NE-C-1474. It covers the period January 1 through June 30, 1980 and describes activities for

which the NAS/NRC is contractually responsible:

-- policy planning and management;

-- research project support;

-- demonstration project support; and

-- planning for Phase II.

Activities under program elements of (a) science and technical information systems, and (b) improving scientific equipment maintenance and repair capabilities in ASRT member institutions and universities are reported separately by the National Science Foundation.

Additional information for the January - June 1980 reporting period is found in the following annexes to this report:

Annex A: Fifth Meeting, Joint Consultative Committee, Applied Science and Technology Research Program, Washington, D.C., February 1980.

Annex B: List of Participants, Cairo R&D Management Workshop, February 1980.

Annex C: Travel for Program Planning, R&D Management and Technical Consultation.

III

PROGRAM HIGHLIGHTS

A. POLICY PLANNING AND MANAGEMENT

1. Fifth Meeting, Joint Consultative Committee (JCC)

The JCC held its fifth meeting February 25-27, 1980, at the National Academy of Sciences in Washington, D.C. under the chairmanship of Dr. Hassan Ismail. The principal items of business were a "self-evaluation" by the JCC of the elements of the program and the completion of recommendations to AID for a Phase II program plan. A summary report of the Fifth JCC meeting (including a list of participants) is attached (Annex A).

2. Research and Development Management Education

During February 6-12, 1980, the Denver Research Institute (DRI) conducted a workshop on "Management Aspects of Science and Technology" in Cairo as a follow-up to the series of four workshops held in Denver in 1979. This, the first of five R&D management education activities to be held in Cairo, was noteworthy for the number of institutions represented as well as the level of responsibility of the 71 participants: 37 were deans or vice-deans of Egyptian universities, 14 were directors or assistant directors of research institutions from five different ministries, and 20 were directors or department heads from five institutes affiliated with the ASRT. Principal topics covered at the workshop were the planning, organization, control and evaluation of R&D; examples were taken from Egyptian experience. Egyptian participants of the 1979 Denver workshops assisted the DRI staff in conducting the sessions. A list of participants is found in

Annex B. Additional workshop-seminars are to be offered late in 1980 in Cairo on R&D management, techno-economics, R&D marketing, and technology assessment.

3. Resident Advisor: National Research Centre

The NAS/NRC, ASRT and AID/Cairo agreed during this contract period that separate technical advisors on a full-time basis at the Egyptian Academy and the National Research Centre are not needed during Phase II (October 1980 onwards). Furthermore, the position of resident advisor to the ASRT which was never filled was eliminated as a contractual requirement and the position of resident advisor to the NRC/Cairo is being changed to "NAS/NRC Resident Director in Cairo for the Applied S&T Program." Most of the duties for the latter position will remain as before; namely, (a) coordination within Egypt of NAS/NRC inputs to the program, (b) participation at NRC/Cairo in projects strengthening the management of applied R&D through the planning, programming and marketing offices, (c) participation with the NAS/NRC staff in Washington in all aspects of planning and managing the Academy's activities under the program including meetings of the JCC, (d) assistance, as requested, to the President of the ASRT and the Director of the NRC/Cairo in Program subprojects, and (e) management of NAS/NRC technical and fiscal responsibilities under its contract with the U.S. AID Mission in Cairo.

In January and February Dr. Helmut Weldes, NAS/NRC resident advisor at the NRC/Cairo, participated in all aspects of the preparations for and the conduct of the Fifth Meeting of the JCC. The primary topics for that meeting were the evaluation of Phase I of the Program and

preparation of recommendations for Phase II. After the JCC meeting, Dr. Weldes remained in the USA for approximately eight weeks for hip surgery. Upon his return to Cairo he assisted the AID evaluation team and worked with the group preparing the Phase II program recommendations.

In addition, he continued activities of planning, coordination, and management of U.S. technical advisory panels and participated with local Egyptian scientists in management aspects of individual subprojects. Dr. Welde also assisted individual project team leaders in the preparation of specifications of and justification for instrumentation and equipment orders.

B. RESEARCH AND DEVELOPMENT (R&D) PROJECTS

1. Evaluation of Egyptian Phosphate Ores

Major known deposits of phosphate rich ores in Egypt have been exploited. Larger deposits of lower grade phosphates are available, and if ways are found to exploit them economically, a great contribution can be made to meeting increasing national fertilizer demand. The project aims at evaluation of the technological problems for beneficiation of the available phosphate ores, pilot plant studies and operations, and agronomic studies with select crops using different fertilizer products in various soils.

Evaluation and beneficiation laboratory, pilot plant processing and agronomy studies are conducted by the project research team at the National Research Centre in close cooperation with industry. The technoeconomic feasibility and marketing aspect of the project is a collective NRC, university, and industry effort.

Tests for evaluation of the Abou-Tartour and Nile Valley deposits have beer conducted through a variety of techniques to enable selection of the best beneficiation route. While project efforts are proceeding on schedule, arrival of equipment and completion of the beneficiation pilot plant facility (El Tibbin) are necessary before results which can be translated to industrial conditions can be obtained. Training activities have proceeded on schedule. In April, Drs. Aziza Yousef and Tawfik Boulos, coprincipal investigators for the project, attended the 2nd International Congress on Phosphorus Compounds held in Boston, Massachusetts. While there they conferred with a representative of the International Fertilizer Development Center (IFDC), Muscle Shoals, Alabama, regarding equipment and training needs of the project. A second on-the-job training course at the IFDC for two members of the NRC/Cairo research team is scheduled to begin after the Ramadan holiday.

2. Improving the Processing of Wool Scouring and Wool Wax Recovery

This project aims to improve the existing processes used in Egypt for wool scouring and recovery of wool wax, at the same time improving the quality and quantity of wool wax. During this reporting period, the project's market study has been completed and the research and development stages advanced.

The market study compared the acid-cracked and the centrifugation wool wax processes, revealing that the acid-cracked wool wax has low economic value and limited demand. The R&D work concentrates on improving the scouring process to enhance both the quantity and quality of scoured wool. Improvement of wax recovery and wax quality provides the other focuses of the R&D stage.

The coprincipal investigators of the project, Drs. A. Kantouch and A. El-Bendak, traveled to the United Kingdom and the United States in January to observe the most advanced technologies in wool processing, to determine the adaptability of these techniques to Egyptian industry, and to learn the conditions for transferring the technologies to Egypt. In England they visited factories in Yorkshire at which the Lo-Flow and WRONZ processes are being utilized.

In the U.S., the project leader interviewed key management and research personnel at leading chemical and textile industries and in university textile research laboratories. As a result of investigating the merits of installing the Lo-Flow process at the Misr Beida Dyers plant, Drs. Kantouch and El-Bendak estimate an expected increase in value of more than $700,000 annually in the production of wool wax and wool tops. An additional environmental benefit resulting from the use of this advanced process will be a 40% reduction in the discharge of wax effluents.

3. Corrosion Causes and Control

The project objectives are to: (a) establish a well-equipped corrosion laboratory, (b) carry out research relevant to Egyptian needs, (c) develop corrosion inhibitors from Egyptian raw materials, and (d) develop a capability to provide technical assistance to Egyptian industry. Dr. Earl Snavely (Mobil Research and Development Corporation), U.S. ad hoc advisor for the project, visited Cairo from January 20 to February 1, 1980 to review progress and to make recommendations for Phase II. Dr. Snavely noted exceptional accomplishment in the tasks of inhibitor preparation and in developing a capability to provide

technical assistance, and praised the rapport that has been established between the Suez Petroleum Company and the NRC. Training needs were studied and recommendations made for ESCA equipment training at the manufacturer's facilities in the U.S. and at a laboratory (such as Battelle) that is using ESCA extensively. For training in oil refinery corrosion, Dr. Snavely suggested that since actual refinery training is difficult to obtain in the U.S., an experienced refinery corrosion technologist from the U.S. should spend two months in Egypt to assist in on-site training and problem-solving. Finding minimal progress in one area of corrosion research, Dr. Snavely recommended that research on galvanic corrosion should be abandoned or revised extensively.

In March 1980, Dr. Venice Gouda, coprincipal investigator for the project, made a fact-finding visit to the U.S. Dr. Gouda attended the Corrosion/80 Symposium of the National Association of Corrosion Engineers (NACE) held in Chicago and was present at various symposia relating to refinery industry corrosion and the use of electrochemical techniques to investigate or monitor corrosion. Dr. Gouda also studied special corrosion prevention techniques at several U.S. oil and chemical industry laboratories and refineries. As a direct result of Dr. Gouda's visit, Unichem International sent a two-man team (Mr. James Britton from Hobbs, New Mexico, and Mr. Gus Fernandes from Manchester, England) to Egypt in June to participate in two one-day symposia held at the Suez Petroleum Company and at NRC. The symposia, entitled "Corrosion, Fouling and Desalting in Petroleum Refining and Processing Plants," were held as part of the first annual meeting of the newly-organized Egyptian Association of Corrosion Engineers.

4. Red Sea Fisheries Development

An ad hoc NAS advisory committee visited Egypt January 31-February 6, 1980 to assist in further refinement of the Red Sea Fisheries Development project. Mr. Harvey R. Bullis, Jr., an independent consultant, and Mr. Benjamin Jones, U.S. National Marine Fisheries Service, met with ASRT President Ismail, Secretary General C.F.A. Latif, and Dr. A.R. Bayoumi, Director of the Institute of Oceanography and Fisheries. The visit included meetings in Al Ghardaqa (on the Red Sea) and Port Suez.

Advisory committee recommendations for specific project focuses were included in the revised proposal submitted to and endorsed by the JCC at its February meeting. Objectives have been outlined for four subproject investigations: (1) pelagic schooled fish, (2) deepwater shrimp, (3) reef fishes, and (4) lobster. If the fisheries to be explored prove adequate, economic benefit will be derived by enhancing Egyptian domestic fish food supply as well as providing export earnings. Data collection, training, vessel preparation, equipment procurement, and exploratory fishing are to be undertaken in the coming months.

C. DEMONSTRATION PROJECTS

1. More and Better Food

The project is a multidisciplinary activity consisting of three parallel lines of work:

a. Farm Systems Related Projects: Analysis of the agricultural base in the two demonstration villages of Kafr El Khadra (old lands) and Omar Makram (new lands) in order to increase farm productivity and to improve marketing practices.

b. Nutrition Related Projects: Analysis of the diet of the villagers to determine nutritional deficiencies; formulation of a locally-produced food supplement for primary school children; and testing of the food supplement for effectiveness and local acceptance.

c. Food Technology Related Projects: Assistance to the Egyptian food industry in solving production and quality control problems, primarily in the production of cottonseed oil and the manufacture of soft (Damietta) cheese.

During this reporting period, several fact-finding trips to the U.S. were undertaken by Egyptian researchers. Representing the farm systems projects, the head of the NRC Botany Department met with plant production specialists at the USDA Agricultural Research Center, Beltsville, Maryland, and visited five U.S. universities to discuss new crop varieties and new technologies for increasing crop production. The head of the NRC Soils and Water Use Laboratory visited laboratories of the USDA Soil Conservation Service in Washington and Arizona, and soil departments at two universities to observe field and laboratory practices in soil survey methodology. A vegetable crop specialist from the NRC surveyed new crop varieties and new technologies in vegetable crop production during visits to the USDA Research Center in Beltsville as well as relevant departments and extension facilities at five universities.

Aspects of the nutrition related projects and the food technology projects were investigated by three Egyptian scientists from the NRC Department of Food Sciences and Nutrition. The Department head viewed industrial applications of nutritional research at two major U.S.

industrial food research laboratories and discussed Egyptian food technology problems with American specialists at the Food and Drug Administration in Washington as well as at the University of California at Davis and at Berkeley. Two food technologists attended the Institute of Food Technologists' meeting in New Orleans and visited university and industry food technology research laboratories for discussions on the manufacture of nutritious food products from dried milk produced locally in Egypt and on ways to improve "Supramine," a high-protein food supplied by the Egyptian government to poor rural families. In addition, Dr. C.O. Chichester, Vice President of the U.S. Nutrition Foundation and ad hoc advisor to the food technology component of the project, met with the Egyptian research team in Cairo in February to assist in program planning.

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

The project is designed to prove the technical feasibility of converting agricultural, human, and animal wastes into methane for small-scale energy use in Egyptian villages, and to seek economic and socially acceptable ways for methane generation, distribution, and use in those villages.

Under the leadership of Dr. M.M. El-Halwagi, Pilot Plant Division, NRC, there are five multidisciplinary groups which are responsible for the R&D efforts:

a. Laboratory and bench scale research, concerned with optimization of anaerobic fermentation of waste materials from maize and cow dung,

b. Fertilizer evaluation of spent slurries from various digestion mixtures,

c. Engineering and development studies of biogas digesters, construction of a prototype device, measurement of operating characteristics, and design modifications to improve maintenance and operation,

d. Fundamental microbiology to determine the pathogenic substances in cow dung and means to render them inactive under the proposed fermentation operating parameters, and

e. Sociological aspects for village selection, communication, awareness, and implementation at the demonstration stage.

Dr. Philip Goodrich, Department of Agricultural Engineering, University of Minnesota, and chairman for the NAS/NRC advisory committee for the project, went to Cairo with the other committee members, Dr. Harold Capener (Department of Rural Sociology, Cornell University) and Dr. T.B.S. Prakasam (Metropolitan Sanitary District of Greater Chicago) to meet with the Egyptian team on January 15, 1980. The project was reviewed and recommendations for Phase II submitted to the JCC.

The NAS/NRC committee cited the progress being made toward meeting the projects' objectives, including good management, cooperation among personnel, timely reporting, and good relations at the village level. Bench scale studies and the operation of a pilot digester at the NRC have been significant achievements, especially in view of the delays in equipment procurement and lack of adequate funding for purchase of local materials.

During the period of the joint committee meetings a seminar on the project and the valuable experiences gained from the Asian study trip at the end of 1979 was held at the NRC. In addition to the Egyptian project leaders, the NAS/NRC committee members lectured to the seminar,

which included university and ministry researchers.

In April, Dr. M.M. El-Halwagi visited U.S. institutions and participated in the Fourth International Symposium on Livestock Wastes (Amarillo, Texas), and the Bio-Energy '80 World Congress in Atlanta, Georgia. In May, project member Dr. M.E. Abdel-Samie, a microbiologist, visited a number of U.S. institutions to expand his knowledge of anaerobic digestion for methane production.

3. New Crops for Arid and Semiarid Zones

A third demonstration project was endorsed by the JCC because of the potential importance for Egypt in developing innovative agriculture in nonirrigated, marginal land. Initial planning was undertaken in 1979, and in January 1980 an ad hoc NAS/NRC committee met with Egyptian counterparts for further refinement of a project proposal. Egyptian project leaders are drawn from the faculties of agriculture at Ain Shams and Al-Azhar Universities and the Division of Agriculture and Biological Research, NRC.

An initial demonstration site is planned at a Ministry of Agriculture facility in Fayoum Governorate. The introduction of species previously unknown to Egypt, such as jojoba, guayule, buffalo gourd, tepary bean, and milkweed, will assess their suitability for establishment of income-producing, forage, and environmentally rehabilitative plantings. Unconventional technologies for utilizing marginal land will be explored also. A special emphasis on salt-tolerant species will be included.

ANNEX A

STAFF SUMMARY REPORT

FIFTH MEETING OF THE
JOINT CONSULTATIVE COMMITTEE
APPLIED SCIENCE & TECHNOLOGY PROGRAM

Washington, D.C., USA
February 25-27, 1980

Participating Groups:

Academy of Scientific Research & Technology (ASRT)
Arab Republic of Egypt

U.S. National Science Foundation (NSF)

U.S. National Academy of Sciences - National Research Council
(NAS/NRC)

Report prepared by:

Academy of Scientific Research & Technology
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National Academy of Sciences - National Research Council
Washington, D.C., USA

July 1980

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I. SUMMARY

The Joint Consultative Committee (JCC) for the Applied Science and Technology Program, sponsored by the Egyptian Academy of Scientific Research and Technology (ASRT) and the United States Agency for International Development (AID), held its fifth meeting on February 25-27, 1980 at the National Academy of Sciences in Washington, D.C. The purpose of this meeting -- as specified at the previous JCC meeting in November 1979 -- was to conduct an evaluation of the Applied Science and Technology Program, and to provide AID with recommendations for Phase II of the Program.

Dr. Hassan Ismail, President of the ASRT, chaired the meeting. Participants included representatives from the ASRT, the Egyptian National Research Centre (NRC/Cairo), the U.S. National Science Foundation (NSF), the U.S. National Academy of Sciences/National Research Council (NAS/NRC), and the U.S. AID mission in Cairo. (See Appendix A for Agenda and Appendix B for a list of participants and observers.)

Program Evaluation

After reviewing all program activities through February 1980, the JCC concluded that Phase I of the program had been highly successful as an initial effort in catalyzing Egyptian institutions to strengthen the management of their national research capabilities, and to reorient their research and development resources to solve critical economic and social problems. Difficulties that arose periodically in various

projects or in program administration were well illuminated and solutions were achieved where possible, although many will be addressed in Phase II. Several background documents were submitted to the JCC for evaluation by the NAS/NRC, the NSF, the ASRT, and AID. Careful review and discussion of these documents by the JCC evoked the following conclusions and recommendations as to each program component.

Demonstration Projects. The More and Better Food project indicates overall progress, and its laboratory, field data collection, and work with industry is proceeding on schedule. The ASRT Council on Food and Agricultural Research will present suggestions for re-orientation and expansion of this project at the sixth JCC meeting in November 1980.

The Biogas Technology project also has shown good progress, particularly at the laboratory-pilot plant stages, and the major thrust of this project during Phase II will be village implementation with emphasis on the social aspects of introducing biogas technology in rural areas.

As the New Crops for Arid and Semi-Arid Zones project is still in the preliminary stages of development, no evaluation is possible at this time. The JCC recommended that the project emphasis for the remainder of Phase I and during Phase II be directed to (a) marginal lands as primary sites for implementation, (b) salt-tolerant, drought-resistant plants as choice crops, and (c) optimum use of available water resources.

R&D Projects. The Phosphate Ores, Wool Wax, and Corrosion projects have developed strong linkages between the R&D sector and industry, and were recommended for continuation.

The Red Sea fisheries project has not yet been initiated, but JCC panelists were assured that a re-designed focus and defined goals have given the project good prospects for success. On this basis, it was recommended for continuation.

S&T Information. Although the start-up time for the project was delayed, implementation of the survey and design study, as well as in-service training is proceeding intensively.

Instrumentation Technology. Efforts to establish maintenance and repair centers, provide training to Egyptian personnel, and procure equipment generally have been successful. However, the excessive delays in equipment procurement, which have been a major deterrent throughout the entire Applied Science and Technology Research Program were noted. The JCC recommended that an intensive study be undertaken to identify causes for procurement delays and to improve procurement and installation procedures.

Policy, Planning and Management. The JCC recommended continuance of seminars and workshops in Egypt, with increased participation of Egyptian personnel. The need to institutionalize R&D management training in Egypt was recognized. Several panelists recommended greater involvement of Egyptian trainees in developing S&T management training within

their institutions.

Phase II Planning

Two documents were submitted by the ASRT and the NAS/NRC for review by the JCC panel. The documents assisted the JCC to examine each program component and to focus upon assessment of the Program as a whole, especially as regards the Program's impact on Egypt's economic and social development. The JCC recommended that all projects initiated in Phase I should be continued in Phase II. Additional funds for new R&D projects were requested from AID, with November 1980 deadlines for specific new R&D project proposals. The new R&D projects will be designed so that results may be achieved within the three remaining years of the Program.

Following is a modified framework for Phase II of the Applied Science and Technology Program.

A. National Policy Measures for Science and Technology: This new component will be an operational frame of reference from which the ASRT may assume greater involvement in Egyptian S&T policymaking;

B. Management of the Applied Science and Technology Program: This offers a greater role for the ASRT in program direction in Phase II, both with respect to the program elements, and to the U.S. supporting institutions;

C. Demonstration Projects: The JCC recommends that the More and Better Food project be continued and extended to additional

villages, that the Biogas Technology project be completed according to its original plan; and that the New Crops for Arid & Semi-Arid Zones be implemented according to the guidelines discussed at the 5th JCC meeting.

D. R&D Projects: The Phosphate Ores, Corrosion, and Wool Wax projects are recommended for completion in Phase II. The Red Sea Fisheries project will be redesigned, and the project plan reviewed for approval by the Sixth JCC Meeting, so that the undertaking may proceed expeditiously during Phase II. A few new R&D projects will be selected for approval at the Sixth Meeting.

E. Infrastructure Development: The following elements were recommended for Phase II:

- STI project
- Equipment and Instrumentation
- Maintenance and Repair Facilities
- Standards and Measurements Project
- Manpower Development

Sixth JCC Meeting

The JCC agreed that the Sixth Meeting will take place in Cairo between November 10 and 13, 1980.

II. INTRODUCTION

The Applied Science and Technology Program, a cooperative endeavor of the Government of Egypt, the NAS/NRC, the NSF, and funded by the U.S. Agency for International Development (AID), emerged from Egypt's desire to strengthen its national research and development management capabilities, and to focus its research and development resources on solving critical economic and social problems. Initial planning for the program began in 1975 during the Workshop on Science and Technology Policy, Research and Management, and Planning, sponsored by the Egyptian Academy of Scientific Research and Technology (ASRT), in conjunction with the U.S. National Academy of Sciences/National Research Council (NAS/NRC) and U.S. National Science Foundation (NSF). In March 1977, following intensive joint discussions and planning by these parties, the Governments of Egypt and the United States signed a formal agreement establishing the Applied Science and Technology Program.

Within the limited five-year framework for this Program, planning and management activities in science and technology research are being emphasized with the participation of several Egyptian institutions. Individual projects are designed to demonstrate the application of science and technology resource planning and management to national priority problems. A separate program component provides scientific equipment and instruments to implement these various projects.

Phase I of the Program (years one and two), which will terminate in 1980, includes the following:

1. Policy planning and management of R&D;
2. Demonstration projects, multi-disciplinary in scope, directed

to priority areas of development;

3. R&D projects, also directed to priority areas;
4. Scientific and technical information systems;
5. Procurement of scientific instruments and equipment, as well as training in their maintenance and repair; and
6. Planning for Phase II (years three, four, and five).

In December 1977 a contract between AID and NAS/NRC was signed to implement components 1, 2, and 3. An interagency agreement between AID and NSF for components 4 and 5 was completed in 1978. All Egyptian and American parties are jointly responsible for component 6, Phase II planning. A total of U.S. $8.1 million, and Egyptian LE 895,000 has been allocated by AID for Phase I activities.

The Joint Consultative Committee (JCC) is the advisory body responsible for policy planning and management of the Program. Composed of five members each from Egypt and the United States, under the chairmanship of the ASRT President, the JCC meets semi-annually. This report covers the activities of the fifth meeting of the JCC (JCC-V) held in Washington, D.C., February 25-27, 1980.

III. REVIEW OF ACTIVITIES

A. BACKGROUND

The fifth semi-annual meeting of the Joint Consultative Committee (JCC-V) was convened at the National Academy of Sciences in Washington, D.C., February 25-27, 1980. In accordance with recommendations made at the fourth meeting in Cairo in November 1979, JCC-V panelists directed their attention to accomplishing a two-fold task: (1) evaluating program activities in light of program objectives, and (2) planning for Phase II of the Program. This was a departure from the agenda of previous JCC meetings, as there were no formal status report presentations by project leaders or from institutions involved in program implementation. However, project status reports were submitted to the JCC and aspects of the projects were discussed within the context of either evaluation or Phase II planning.

In his welcoming address to participants and observers, Dr. Hassan Ismail, chairman of the JCC, noted the ambitious goals of JCC-V and expressed confidence that the two tasks of program evaluation and Phase II planning could be achieved during the Washington meeting.

Dr. Ismail asked Mr. James Riley, AID/Cairo to speak to the JCC on AID's perception of program issues. Mr. Riley outlined the scope of an AID evaluation, scheduled to occur in April 1980. (This topic will be discussed at length under the heading, "Evaluation.") While reviewing Program progress during the first two years, Mr. Riley noted several factors have been observed by AID/Cairo:

- The role and involvement of U.S. personnel thus far have been large and costly. AID suggested relative reductions in Phase II.

JCC members pointed out that a goal of the program has always been the increased participation and assumption of leadership functions by Egyptians during PhaseII, thus reducing the need for U.S. consultants. The JCC did not feel that initial U.S. technical and managerial assistance had been excessive, given the diversity and scope of the program and the original goal of increasing ties between Egyptian and American scientists.

- Economic considerations have not been sufficiently emphasized in Phase I, nor has cost/benefit been sufficiently evident as a consideration in project selection.

The JCC commented that more emphasis on economic returns seems to constitute a major change in the approach of AID during Phase II as compared to Phase I.

- The original focus on strengthening the applied research capabilities of the ASRT should be expanded into a broader framework, so as to address the fundamental questions of science policy and institutional development on a national scale.

In response to this point, the JCC noted that such a change of focus would lead to a new perspective for Phase II, thus placing JCC responsibilities and functions in a different context. It would also require new resources of manpower and funds beyond those originally anticipated for Phase II.

B. EVALUATION

The Applied Science and Technology Research project grant agreement provides a general framework within which AID, in consultation with all participating parties, has scheduled a formal evaluation of all program

activities during the second year of Phase I, in order to:

- assess progress toward fulfilling program objectives;
- identify problem areas or constraints which might inhibit program progress;
- assess how information compiled might be used to resolve problems; and
- provide tentative conclusions of the program's overall impact on Egyptian development.

In order to assist AID in its evaluation process and provide the JCC with an additional management tool for preparing Phase II planning recommendations, the panelists decided to use a major portion of the fifth meeting for a "self-evaluation" of the Applied Science and Technology Program.

Prior to the fifth meeting the NAS/NRC had drafted an evaluation document which addressed the demonstration and R&D projects, policy planning, coordination, and management issues. The evaluation questions related to project progress, vis à vis stated goals and objectives, internalization of new management structures, linkages between institutions and end-users, operating problems and constraints, and the feasibility of achieving stated goals within prescribed time-frames. Where possible, project impact on Egyptian development was assessed.

Other background information for use in the JCC self-evaluation process was submitted by the ASRT, NRC/Cairo, the NAS/NRC senior advisor in Cairo, NSF and NAS/NRC subcontractors, NSF, various Egyptian project leaders, and the AID Mission in Cairo. (Note: Four background

reports were prepared for the JCC but, because of their volume, are not appended to this document.)

The self-evaluation session of the fifth meeting was preceded by an AID perspective on evaluation. Mr. James Riley, project officer for science and technology, USAID Mission/Cairo, stated that rather than being a normal and usual activity, AID's science and technology program in Egypt is a major undertaking -- the largest for any single USAID Mission in the Agency -- which can serve as a model for future AID science and technology programs in other developing countries.

The AID evaluation is to be made independently of that made by the JCC and will include two major facets:

(a) a broad assessment of science and technology policy in Egypt, including science policy decision-making, the institutional framework, and linkages between science and technology and socio-economic development, so as to provide guidance to AID for future program planning;

(b) a specific evaluation of the Applied Science and Technology Program (Project 263-0016) to determine the degree to which it is meeting its goals and objectives.

Mr. Princeton Lyman of AID/Washington and leader of the overall science policy assessment team for AID, addressed the JCC panel. He indicated that two AID evaluation groups will consult with Egyptians involved in various projects in Cairo and present a formal critique which, hopefully, will be useful to both Egyptian and American parties in the improvement of their programs and in preparation for Phase II of the Applied Science and Technology Program. Mr. Lyman asked to

meet with JCC members, NAS and NSF administrative staff prior to the AID team's departure for Egypt. He stressed that the evaluation report produced by the JCC panel at its fifth meeting would serve as an important background resource for the two AID evaluation groups.

Demonstration Projects

The three demonstration projects were selected specifically to show how effective management methods may facilitate the multi-disciplinary approach to problem-solving and foster new linkages with research institutions and end-users. An important issue raised during the fifth meeting was how successful demonstration projects can be integrated more systematically into national development activities. In general, demonstration projects benefit from an abundance of specialized talent for problem solving throughout the life of the projects which is difficult to replicate when larger-scale application is instituted.

The multi-faceted More and Better Food demonstration project has shown considerable success in implementing the laboratory, field, and industry subcomponents, all of which are proceeding on schedule. The project involves plant and animal production, nutrition studies, medical observation of food and nutrition patterns of village children, nutrition intervention experiments, and food technology activities with industry. It addresses the key Egyptian priority issues of providing greater quantities and more nutritious foods, establishing important linkages between institutions and local industries, and thereby offering incentives to help reduce massive migration of peasant farmers to the overcrowded cities.

Some subcomponents of the More and Better Food project warrant particular attention. For example, more solid links have been developed between the NRC in Cairo and industry in an effort to improve food technology and manufacturing. This suggests that NRC/Cairo should expand its services to Egyptian food industries.

Activities of consulting and demonstration in the two initiated villages are so successful that other Egyptian villages have been pressing for inclusion into the project. For the first time at this level there is real interaction among physical and social scientists, technicians, and the villagers themselves, whose voluntary participation in and support and empathy for the project are keys to its success. Expansion to other villages was recommended for Phase II. New village sites should reflect different socio-economic, climatic, and geographic areas throughout Egypt.

The project is presently so varied that some JCC members suggested separating the components into "food technology" and "integrated rural development" activities in Phase II.

The Biogas Technology for Rural Areas demonstration project has been very successful in utilizing Egyptian animal and vegetable wastes for the production of methane gas at the bench and pilot-plant scale. As a result of training opportunities and field trips to the People's Republic of China, Thailand, India, and the United States, the participants have determined how biogas technologies are being utilized elsewhere for rural areas. They have learned to construct simple generators for villages entirely with local materials. The NRC/Cairo pilot plant division has begun testing a locally-constructed

digester; technologists and sociologists are analyzing field base-line data from the demonstration villages to help determine how to proceed most expeditiously in those villages. The project director reports good village-level participation in the planning and data gathering aspects of the work.

The New Crops for Arid and Semi-Arid Zones project is still in an early stage of development and the JCC therefore did not make a formal evaluation of its activities. JCC panelists discussed alternative aspects of the program design, suggesting an emphasis on "cash" crops in arid zones. The ASRT project management committee is exploring the feasibility of using marginal lands for food crops because of the high priority of food security in the Egyptian five-year plan. Specifically salt-tolerant and drought-resistant plants are being considered. The committee will determine if this new direction duplicates other ongoing AID food programs in Egypt. The JCC panel also recommended that marketing for cash or food crops be clearly fully considered in making the firal choice.

R&D Projects

As examples of the application of R&D to specific needs, teams have been working on problems in Egypt's fertilizer, petroleum, and textile industries. The projects develop linkages with industry, government agencies, and scientific institutions, and employ end-user input at every state of development. As for the two projects, Corrosion and Wool Wax and Wool Scouring, NRC/Cairo reported that local industries are actively seeking tc change their operating methods and become more cost-effective. Although some panelists questioned the priority of the

Wool Wax and Wool Scouring project, both the NRC/Cairo Director and the NAS/NRC advisor in Cairo stated there is the potential for the wool processing industry to become a more efficient export earner for Egypt by improving the primary product (wool tops) and recovery of waste (wool wax). The Phosphate Ore Beneficiation and Fertilizer Production project addresses the need for high-quality phosphate fertilizer production from Egyptian ores of low phosphorus content. Two ore samples, western desert and Nile Valley, have been utilized in the studies. In both cases laboratory (bench scale) materials have been beneficiated and the resultant ores converted to phosphoric acid. In addition, pilot plant beneficiation has begun on the western desert ores with promising results. Continuous operation (lab scale) of conversion to phosphoric acid for fertilizer manufacturing has not been possible because the equipment has not been delivered to NRC/Cairo.

The fourth R&D project, Development of Red Sea Fisheries, was not evaluated because it is still in the preliminary development stages. Dr. Ismail stated that positive results are expected from this endeavor, and that it relates to two high priority needs (expanding high protein food resources and providing export earnings). A revised plan has been developed in which four activities are to be explored: determining the potentials of open sea and reef sea fish populations for commerical exploitation in the Foul Bay area, of deep-water shrimp, and of the spiny lobsers in the coastal reefs.

The JCC recommended continuation of this project through Phase II, urged completion of surveys of the feasibility of the proposed subprojects, and appointment of project principal investigators prior to the November 1980 JCC meeting.

Evaluation of the Policy Planning and Management component led to several conclusions and recommendations. The JCC noted that management training from such institutions as DRI (subcontractor of NAS/NRC) has been well received by Egyptian participants. It urged that the bulk of future training take place in Egypt, with increasing direction of the training by Egyptians who had completed the courses, and with greater use of Egyptian case studies in the coursework. In discussing the management training activities of the program conducted by the DRI, two points of reference for implementing training were expressed: (a) acquiring management skills primarily through "in-service" experiences supplemented by short-term management-oriented training, and (b) acquiring management skills through formal, specifically structured management education programs. A series of four DRI workshops to be held in Cairo before the end of Phase I are regarded by the JCC as introductory training for scientists and engineers who have not had formal management education.

A major issue affecting this and nearly all Egyptian S&T projects is a continuing exodus of skilled Egyptian personnel to the private sector and to countries outside Egypt. Dr. Ismail stated that this "brain drain" is a concern of the Egyptian government and is not within the scope and purpose of the Applied Science and Technology Program. He indicated that governmental action on this problem will be forthcoming (by 1981).

Although the start-up time for the Science and Technology Information (STI) project has been delayed, the survey of Egyptian information needs (a design study which includes a computer-accessed

information experiment, as well as a current information resources planning inventory), and the in-service training of science information specialists are proceeding well at this time.

Evaluation of the Instrumentation Technology (IT) project revealed notable progress in establishing maintenance and repair (M&R) centers and in training the associated personnel. The equipment procurement process indicates excessive impediments in the cycle of identification of need, specification for purchase, receipt of firm offers based upon bidding, delivery to Egypt, and pre-use installation and testing. Equipment delays have been a major constraint for all projects in the Applied Science and Technology Program. The JCC requested that efforts be intensified to locate the bottlenecks and find means to reduce the two-year hiatus between a project director's request for equipment and the receipt of that equipment in operational status at the Egyptian laboratory.

C. PHASE II PLANNING

Phase II planning is a natural outgrowth of the JCC's continuing evaluation of proposals and ongoing projects. The panel views Phase I (1978 to October 1980) as the program start-up period, when projects are brought from the concept to design stage; when special training and orientation take place; when equipment needs are identified and equipment ordered and received. Phase I is a time for formation of multi-disciplinary and multi-institutional teams. Phase II then will become that period for demonstration of new R&D management techniques by the ASRT, when projects can show the

application of science and technology to village or local industrial situations. Phase II is the "pay-off" of intensive NRC/Cairo and industrial R&D collaboration; it is a time for maintenance and repair facilities to serve laboratories and universities, and for the STI system to become operational. Thus, Phase II is the maturation of the Phase I foundation period.

The JCC reviewed two Phase II planning documents submitted by the ASRT and NAS/NRC, to examine each program component and determine future trends, but primarily to assess the overall program, its direction and subsequent needs. While focussing full attention on specific actions in a small number of select projects during Phase II, the program may prove useful by example in assessing general science and technology policy measures at the national level.

The JCC moved to include a separate category in the Program, entitled "National Policy Measures for Science and Technology." Egyptian JCC members will define specific objectives and suggest methodologies for this new program category, along with a detailed budget, to be presented for approval to the JCC-VI meeting in November 1980. It was agreed that the program will be stronger and more effective by this addition in Phase II without detracting from other categories.

The Applied Science and Technology Program will be composed then of five major components:

- National Policy Measures for Science and Technology
- Program Management and Control
- Demonstration Projects
- R&D Projects
- Infrastructure Development

The JCC felt that greater institutionalization of project management should take place in Egypt so as to insure the benefits of the total program and continuity after Phase II draws to a close. Concern with continuity prompted Mr. Riley to inform the JCC that AID would not provide salary incentive payments during Phase II. Recognizing the importance of incentives for the success of the total program, the JCC urged that they be provided by the Government of Egypt. Dr. Ismail indicated that he will pursue this issue, including allocation of Egyptian pounds available to the Egyptian government through the AID commodity import program.

Under the new framework for Phase II outlined above, the JCC recommended continuation of all three demonstration projects. The More and Better Food project will emphasize both integrated rural development and food technology; three additional villages from various areas of Egypt will be incorporated into the village demonstration project. The New Crops for Arid and Semi-Arid Zones project will shift its focus to include carefully selected food crops while emphasizing production in marginal agricultural lands or areas with poor water quality (saline). Four distinct locations were suggested for the project: Fayoum, New Valley, Sinai, and the Western Desert.

All R&D projects were recommended for continuation. The Red Sea Fisheries project will be redesigned and initiated by Phase II. A total of $1.5 million will be requested for new R&D projects to be selected according to criteria established by the ASRT Specialized Research Councils, and by the JCC. These criteria will stress the impact of each proposed project on the Egyptian socio-economic area. Selected new projects will

be submitted for approval at the forthcoming JCC meeting in November 1980.

Under the Infrastructure Development component, projects recommended for continuation in Phase II are: (a) Scientific and Technical Information Services; (b) Instrumentation Technology (both maintenance and repair, and core equipment); (c) Standards and Measurements; and (d) Manpower Development.

Under the Policy Planning and Management component, the JCC moved to implement a Management Control System, which will establish specialized R&D management support offices in both the ASRT and NRC/Cairo. The NAS/NRC Program Management sub-component will undergo a change by deletion of ASRT and NRC resident advisors, and their replacement with an NAS/NRC program manager.

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APPENDIX A

ACADEMY OF SCIENTIFIC RESEARCH

AND TECHNOLOGY

NATIONAL RESEARCH CENTRE

NATIONAL ACADEMY OF SCIENCES/NATIONAL RESEARCH COUNCIL

NATIONAL SCIENCE FOUNDATION

Fifth Meeting, Joint Consultative Committee
Washington, D.C. USA
February 25-27, 1980

AGENDA

Monday, February 25
NAS Conference Room 150
2101 Constitution Ave., N.W.

9:30 a.m. — OPENING SESSION

- Welcome	H. Guyford Stever Chairman, US Panel, JCC
- Response and Remarks on Meeting Goals	Hassan Ismail President, ASRT Chairman, JCC
- Prospective from AID on Program Evaluation and Phase II Planning	James B. Riley US Agency for International Development, Cairo
- Discussion	

10:30 a.m. — PROGRAM EVALUATION

- Background for the Evaluation Task of the JCC	Hassan Ismail Chairman, JCC

- Discussion
  * Demonstration Projects
    - More & Better Food
    - Biogas Technology
    - New Crops for Arid Zones
  * Research & Development Projects
    - Phosphate Ores & Fertilizers
    - Wool Scouring/Wool Wax Recovery
    - Corrosion
    - Red Sea Fisheries

12:30 Noon — LUNCHEON honoring the Egyptian JCC, Members Lounge, NAS Building

2:00 p.m. — PROGRAM EVALUATION
(Discussion continued)

* Instrumentation Technology
  - Equipment
  - R&M Training
* Science & Technology Information
  - Design Study
  - Training
* Policy Planning, Management & Control
  - R&D Management Education
  - JCC/NAS-NRC Mgt.
  - NSF Mgt.
  - ASRT Mgt.

4:30 p.m. — - JCC Executive Session on Evaluation

Tuesday, February 26
NAS Conference, Room 250
2101 Constitution Ave., N.W.

9:00 a.m. — PHASE II Program Planning

- Background for the Phase II Planning Task for the JCC — Hassan Ismail, Chairman, JCC
- Discussion

I. Policy Planning, Management & Control

II. Demonstration Projects

III. R&D Projects

12:30 Noon — LUNCH
Refectory, NAS Building

2:00 p.m.	PHASE II Program Planning (Discussion continued) IV. Infrastructure Development
4:30 p.m.	- JCC Executive Session on PHASE II Program Planning

Wednesday, February 27
NAS Conference Room 250
2101 Constitution Ave., NW

9:30 a.m.	JCC RECONVENES FOR APPROVAL OF MEETING CONCLUSIONS AND RECOMMENDATIONS
11:00 a.m.	JCC/AID EVALUATION DISCUSSION
12:00 Noon	ADJOURN

APPENDIX B

NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue Washington, D.C. 20418 USA

COMMISSION ON INTERNATIONAL RELATIONS
Cable Address: NARECO
TWX #: 7108 22 9589

February 29, 1980

Fifth Meeting
Joint Consultative Committee
APPLIED SCIENCE AND TECHNOLOGY PROGRAM

List of Participants
and Observers

EGYPTIAN JCC MEMBERS

Dr. Hassan Ismail
President, Academy of Scientific Research and Technology (ASRT)

Dr. Mostafa Al-Gabaly
Counsellor, Ministry of Agriculture

Dr. Osama Al-Kholy
Director, Industrial Development Center for the Arab States

Dr. Ibrahim Helmy Abd El-Rahman
Counsellor, Office of the Prime Minister

U.S. JCC MEMBERS

Dr. H. Guyford Stever
Consultant
Member, National Academy of Sciences and National Academy of Engineering

Dr. George Bugliarello
President, New York Polytechnic Institute

Dr. Mary E. Carter
Director, Southern Regional Research Laboratory
U.S. Department of Agriculture

Dr. James Hillier
Consultant
Vice President (retired), RCA Corporation
Member, National Academy of Engineering

Dr. Gilbert F. White
Chairman, Commission on National Resources
National Academy of Sciences

Dr. Helmut Weldes (Ex Officio)
Senior Staff Officer, Board on Sciences & Technology for International Development (BOSTID)
Senior Advisor, National Research Centre, Cairo

EGYPTIAN ADVISORS

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

Dr. M. Darwish
Cultural and Scientific Counsellor
Embassy of the Arab Republic of Egypt, Washington

Dr. A. S. El-Nockrashy
Director, Applied Science & Technology Project
Academy of Scientific Research and Technology

Dr. Osman Galal
Head, Technical Office
National Research Centre

NATIONAL ACADEMY OF SCIENCES

Mr. David Williams, Comptroller

Dr. Victor Rabinowitch
Director
Board on Science & Technology for International Development (BOSTID)

Mr. Jay Davenport
Staff Officer, BOSTID

Mr. Augustus Nasmith
Staff Officer, BOSTID

Mrs. Maryalice Risdon
Staff Assistant, BOSTID

Deborah Hanson
Secretary, BOSTID

Shirley Donnell
Secretary, BOSTID

NATIONAL SCIENCE FOUNDATION

Dr. Harvey Averch
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Mr. Roger Doyon
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Dr. Lawrence Edwards
Program Manager, Africa and Asia Section, DIA

Mr. Eugene Pronko
Program Manager, Africa and Asia Section, DIA

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Mr. Princeton Lyman
Special Assistant to the Director

AGENCY FOR INTERNATIONAL DEVELOPMENT

Mr. Alfred A. White
Acting Assistant Administrator, Bureau for Near East

Mr. William Feldman
Director, Office of Science & Technology
Bureau for Development Support

Mr. James Riley
Director, Industry, Science, & Technology Division,
U.S. AID Mission, Cairo

Mr. Gerald Kamens
Director, Office of Egypt/Israel Affairs,
Bureau for Near East

Mr. Bert Porter
Office of Egypt/Israel Affairs,
Bureau for Near East

Mr. Edgar Pike
Office of Technical Support
Bureau for Near East

George Self
Office of Technical Support
Bureau for Near East

NATIONAL ACADEMY OF ENGINEERING

Dr. N. Bruce Hannay
Foreign Secretary

NATIONAL BUREAU OF STANDARDS

Dr. Kurt Heinrich
Chief, Office of International Relations

Dr. Sam Chappell
Senior Standards Specialist, Office of Domestic & International Measurement Standards

NATIONAL INSTITUTES OF HEALTH

Mr. Howard Metz
Biomedical Engineering & Instrumentation Branch

CATHOLIC UNIVERSITY OF AMERICA

Dr. Bahaa El-Hadidy
Graduate Department of Library & Information Science

GEORGIA INSTITUTE OF TECHNOLOGY

Dr. Vladimir Slamecka
School of Information and Computer Science

UNIVERSITY OF WISCONSIN

Dr. Norman Huston
Director, Instrumentation Systems Center
College of Engineering

Mr. Edward Falk
Instrumentation Systems Center
College of Engineering

ANNEX B
TRAVEL TO UNITED STATES

NAME	DATES	PURPOSE	PLACE
1. A. Kantouch)) 2. A. El-Bendak)	January 19-26	Study/observation, wool wax project	National Academy of Sciences/National Research Council, Washington, D. C. Burlington Industries, Clarksville, Virginia North Carolina State University, School of Textiles, Raleigh, North Carolina Cotton, Incorporated, Raleigh, North Carolina Wool Bureau, Woodbury, Long Island, New York Amerchol, Inc., Edison, New Jersey
3. Abdel-Fattah Dawoud)) 4. Mohamed Khodair)	January 27 - February 7	Program planning, standards & measurement project	National Bureau of Standards, Washington, D.C National Bureau of Standards, Boulder, Colorado
5. Helmut H. Weldes	February 11 - March 8	Program planning, JCC-V	NAS/NRC, Washington, D. C.
6. A. S. El-Nockrashy)) 7. Osman Galal)	February 17 - March 16	Program planning, JCC-V	NAS/NRC, Washington, D. C. Tulane University, Dept. of Nutrition, New Orleans U.S. Dept. of Agriculture, Southern Regional Research Laboratory, New Orleans Food Protein Research & Development Center, Texas A&M University, College Station, Texas University of California at Davis Denver Research Institute, Denver, Colorado

NAME	DATES	PURPOSE	PLACE
8. Hassan Ismail	February 25-27	JCC-V	NAS/NRC, Washington, D. C.
9. Mostafa Al-Gabaly	February 25-27	JCC-V	NAS/NRC, Washington, D. C.
10. Osama Al-Kholy	February 25-27	JCC-V	NAS/NRC, Washington, D. C.
11. Ibrahim Abd El-Rahman	February 25-27	JCC-V	NAS/NRC, Washington, D. C.
12. Venice Gouda	March 1-23	Attend symposium; study/observation, corrosion project	National Association of Corrosion Engineers Corrosion 80 Symposium, Chicago, Illinois Amoco Research Center, Naperville, Illinois Mobil Research and Development Corporation, Paulsboro, New Jersey Mobil Field Research Laboratory, Dallas, Texas Unichem International, Hobbs, New Mexico
13. Mohamed El-Halwagy	April 10-27	Attend 2 symposia; discussion visits for biogas project	NAS/NRC, Washington, D. C. Office of Technical Support, Bureau for Near East, Agency for International Development, Washington, D. C. 4th International Symposium on Livestock Wastes, Amarillo, Texas Bio-Energy '80 World Congress, Atlanta, Georgia Clean Energy Research Institute, University of Miami, Coral Gables, Florida
14. Aziza Yousef))	April 19-26	Attend international congress, phosphate fertilizer project	2nd International Congress on Phosphorus Compounds, Boston, Massachusetts
15. Tawfic Boulos)			
16. F. A. Sobhy))	April 14-26	Program planning, standards and measurements project	National Bureau of Standards, Washington, D.C. American National Standards Institute, New York, N. Y. Air Conditioning and Refrigeration Institute, Arlington, Virginia Food and Drug Administration, Food Technology Division, Washington, D. C.
17. A. Kasim Selim)			

NAME	DATES	PURPOSE	PLACE
18. Mohiy Abdel-Samie	May 10 - June 4	Attend meeting, study/ observation, biogas project	American Society of Microbiologists Annual Meeting, Miami Beach, Florida University of Illinois, Department of Microbiology, Urbana, Illinois University of Wisconsin, Department of Bacteriology, Madison, Wisconsin U.S. Department of Agriculture Forest Products Laboratory, Madison, Wisconsin Institute of Gas Technology, Chicago, Illinois Dr. T. B. S. Prakasam, U.S. member, biogas panel, Chicago, Illinois
19. A. Talaat Higazi	May 15 - June 8	Study/observation, More & Better Food	NAS/NRC, Washington, D. C. University of California at Davis, Agronomy and Range Science Department University of Arizona, Tucson, Arizona University of Florida, Gainesville, Florida U.S. Department of Agriculture Agricultural Research Center, Beltsville, Maryland Cornell University, Agronomy Department and Vegetable Crops Department, Ithaca, N.Y.
20. Ibrahim Rifaat)) 21. El-Sayed Hegazi)	June 4 - 26	Attend meeting; study/ observation, More & Better Food	NAS/NRC, Washington, D. C. Institute of Food Technologists Annual Meeting, New Orleans, Louisiana University of Wisconsin, Department of Food Science, Madison, Wisconsin Del Monte Research Center, Walnut Creek, California University of California at Davis, Department of Nutrition Carnation Research Corporation, Van Nuys, California Utah State University, Logan, Utah (Rifaat) Food Protein R&D Center, Texas A&M University College Station, Texas

NAME	DATES	PURPOSE	PLACE
22. **Sabry Riad Morcos**	June 8 - 26	Study/observation, More & Better Food	NAS/NRC, Washington, D. C. Food & Drug Administration, Division of Nutrition, Washington, D. C. Gerber Products Company, Fremont, Michigan University of California, Department of Nutritional Sciences, Berkeley, California University of California at Davis, Department of Nutrition Carnation Research Corporation, Van Nuys, California
23. **Fayez S. Hanna**	June 15 - 29	Study/observation, More & Better Food	NAS/NRC, Washington, D. C. U.S. Department of Agriculture, Soil Conservation Service, Washington, D. C. U.S. Salinity Laboratory, Riverside, Calif. University of California, Department of Soil and Plant Nutrition, Berkeley, Calif. University of Arizona, Department of Soils, Water and Engineering, Tucson, Arizona U.S. Department of Agriculture, Soil Conservation Service, Phoenix, Arizona U.S. Water Conservation Laboratory, Phoenix, Arizona
24. **Mohamed El-Beltagy**	June 23 - July 12	Study/observation, More & Better Food	NAS/NRC, Washington, D. C. U.S. Department of Agriculture Agricultural Research Center, Beltsville, Maryland Texas A&M University, Department of Plant Science, College Station, Texas University of Arizona, Tucson, Arizona University of California, Riverside, Calif. University of California at Davis, Vegetable Crops Department Cornell University, Vegetable Crops Department, Ithaca, New York

ANNEX B

TRAVEL TO THIRD COUNTRIES

NAME	DATES	PURPOSE	PLACE
1. A. Kantouch)) 2. A. El-Bendak)	January 6-18	Study/observation, wool wax project	International Wool Secretariat, Ilkley, Yorkshire, England Sir James Hill & Son, Ltd., Bradford, Yorkshire, England Croda, Inc., Rawcliff Bridge, Yorkshire, England Jarmain & Co., Huddersfield, Yorkshire, England University of Leeds, Textile Department, Yorkshire, England
3. Mohamed El-Halwagy	April 28-30	Fact finding, biogas project, Total Energy Module System(TOTEM)	Rome, Italy

ANNEX C

TRAVEL TO EGYPT 1980

NAME	DATES	PURPOSE
1. Augustus Nasmith	January 8 - February 11	Development and Application of Biogas Technology in Rural Areas of Egypt; New Crops for Arid and Semi-arid Zones; Program Management
	March 22 - April 15	Program Management
2. Philip Goodrich	January 6 - 17	Development and Application of Biogas Technology
3. Harold Capener	January 6 - 17	Development and Application of Biogas Technology
4. T.B.S. Prakasam	January 11 - 19	Development and Application of Biogas Technology
5. Cyrus McKell	January 17 - 23	New Crops for Arid and Semi-arid Zones
6. Joe Goodin	January 17 - 23	New Crops for Arid and Semi-arid Zones
7. Darrel Metcalfe	January 17 - 24	New Crops for Arid and Semi-arid Zones
8. Harvey Bullis	January 29 - February 7	Development of Red Sea Fisheries
9. Benjamin Jones	January 29 - February 7	Development of Red Sea Fisheries
10. C. O. Chichester	February 1 - 7	More and Better Food
11. Earl Snavely	February 2 - 9	Corrosion Causes and Control
12. Don Evans	February 4 - 12	DRI Survey Seminar on R&D Management
13. James Freeman	February 3 - 12	DRI Survey Seminar on R&D Management
14. James Frasche	February 4 - 12	DRI Survey Seminar on R&D Management
15. Gordon Milliken	February 3 - 12	DRI Survey Seminar on R&D Management
16. Richard Roberts	February 2 - 12	DRI Survey Seminar on R&D Management
17. Kurt Heinrich	May 10 - 20	Standards and Measurements Program Planning
18. Samuel Chappell	May 15 - 26	Standards and Measurements Program Planning
19. Stefan Peiser	June 4 - 6	Standards and Measurements Program Planning
20. Jay Davenport	June 10 - July 1	Phase II Planning, Program Management

ANNEX C

TRAVEL WITHIN THE U.S.A.

BY NAS/NRC PANELISTS AND STAFF

NAME	DATES	PURPOSE	PLACE
1. George Bugliarello	February 25-27	Fifth Meeting, Joint Consultative Committee (JCC-V)*	Washington, D. C.
2. Mary E. Carter	February 25-27	JCC-V	Washington, D. C.
3. James Hillier	February 25-27	JCC-V	Washington, D. C.
4. Gilbert F. White	February 25-27	JCC-V	Washington, D. C.
5. Augustus Nasmith	June 17-18	Program management**	University of Arizona, Tucson

*Guyford Stever, Chairman of the U.S. Panel, JCC, resides in Washington thus no travel costs were incurred.

**Traveled to Arizona on other NAS business; per diem only furnished by Egypt program.

ANNEX D

LIST OF PARTICIPANTS

I. UNIVERSITIES:

1. AL-AZHAR

- Dr. I. Hanout, Vice Dean, Faculty of Science
- Dr. M. A. Omar, Vice Dean, Faculty of Agriculture
- Dr. S. Ashmawy, Vice Dean, Faculty of Commerce
- Dr. F. Al-Hefnway Professor, Faculty of Medicine

2. HELWAN

- Dr. M. Samy, Vice Dean, Faculty of Tech. and Eng., Mattria
- Dr. Atiat Khattab, Vice Dean, Faculty of Physical Education
- Dr. R. Sewallum, Vice Dean, Faculty of Tech. and Eng., Helwan
- Dr. A. Metwally, Assist. Prof., Faculty of Commerce

3. ASSUIT

- Dr. A. I. Saleh, Vice Dean, Faculty of Engineering
- Dr. A. F. Abdel-Al Vice Dean, Faculty of Agriculture
- Dr. I. H. Solar, Vice Dean, Faculty of Veterinary Medicine
- Dr. A. I. Belal, Vice Dean, Faculty of Science, Aswan
- Dr. M. Z. Badr, Vice Dean, Faculty of Science

4. AL-MANSOURA

- Dr. M.A.M. Housain, Vice Dean, Faculty of Agriculture
- Dr. M. F. Saad, Vice Dean, Faculty of Engineering
- Dr. M.M. Al-Kerdawy, Vice Dean, Faculty of Pharmacy

5. TANTA

- Dr. G. A. Hassan, Vice Dean, Faculty of Science
- Dr. O. M. Lamey, Vice Dean, Faculty of Agriculture
- Dr. A.T. Al-Damanhouri, Vice Dean, Faculty of Commerce
- Dr. M.K. Yousef, Vice Dean, Faculty of Pharmacy

6. ALEXANDRIA

- Dr. F.M. Kalag, Vice Dean, Faculty of Agriculture.
- Dr. M.H.S. Vice Dean, Faculty of Eng.
- Dr. Y.H. Yousef, Vice Dean, Faculty of Science.
- Dr. S.A. Khafagy, Vice Dean, Faculty of Pharm.

7. AL-ZAGAZIG

- Dr. A.M. Bahgat, Dean, Faculty of Veterinary.
- Dr. M.M. Abdel-Baky, Vice Dean, Faculty of Agriculture.
- Dr. M.A. Younes, Dean, Faculty of Science.
- Dr. I. Gamal-Al-Din, Vice Dean, Faculty of Agriculture, Moushtohor.

8. AL-MENIA

- [illegible] M A. Al Shahat, Prof., Faculty of Agriculture.
- [illegible] Y.S. Mohamad, Prof., Faculty of Science.
- [illegible] F.A Al-geldaway, Prof., Faculty of Eng.
- Dr M.A. Nasr Prof., Faculty of Education

9. AL-MENOFIA

- [illegible] F.N. Shatlah, Vice Dean, Faculty of Agri.
- [illegible] I.M. Al-Sokany, Vice Dean, Faculty of Electronic Eng.
- Dr. A.A. Naser, Vice Dean, Faculty of Tech. Edu.

Am.N.

II. MINISTRIES

1. AGRICULTURE

- Dr. H. Bekhati,	Ass. Director, Soil & Water Res. Inst.
- Dr. M.A. Mosa,	Ass. Director, Cotton Res. Inst.
- Dr. K. Yaoub,	Ass. Director, Plant Diseases Res. Inst.
- Dr. E. Attalla,	Ass. Director, Plant Protection Inst.

2. LAND RECLAMATION

- Eng. H. Abdel-Aziz,	Vice Minister for Animal Production.
- Eng. A.F. Abou Hedb,	General Manager for Planning
- Eng. R.F. Iskandar	General Manager for Agricultural Ind.

3. INDUSTRY

- Dr. Y.K. Mazhar,	Director, Eng. Design Develop. Centre.
- Eng. A.I. Ahmad,	Director, Electronic Ind. Develop. Centre.
- Chem. O. Abou-Zeid,	Director, Plastic Ind. Develop. Centre.
- Dr. A.M. Taher,	General Mang., Tech. Research Dept.
- Eng. M.M. Amin	Mang. Technology Transfer Dept.

4. ELECTRICITY & ENERGY

- Eng. Y.R. Riad,	Vice Minister, Rural Electricity.
- Eng. M. Swidan,	General Mang., Egypt Elect. Org.
- Eng. A.F. Al-Seidy,	Research Mang., Org. of Atomic Stations.
- Dr. I.F. Hamouda,	Vice President of Atomic Energy Org.
- Dr. H.M. Roushdy,	Director of Radiation Techn. Centre.
- Dr. A.A. Abdel-Rasoul,	Director of Atomic Research Centre.

5. TRANSPORTATION

- Dr. A.A. Al-Menzawy,	Manag. Transportation Project, Planning Org., Economic Affairs.
- Dr. A.F. Lasheen,	Manager of Transportation Org., Tech. Affairs

III. RESEARCH INSTITUTES

1. NATIONAL RESEARCH CENTRE

- Dr. N.L. Deef,	Prof. Ind. Res.
- Dr. M.A. Alaam,	Prof. Ind. Res.
- Mr. M.M. Attia,	Ind. Res.
- Dr. T.R. Booles,	Prof. Ind. Res.
- Dr. M.R. Shalash,	Prof. Food & Agric.
- Dr. M.A. Abaas,	Prof. Food & Agric.
- Dr. S.R. Morcos,	Prof. Food & Agric.
- Dr. I.E. Refaat,	Prof. Food & Agric.
- Dr. T. Hegazi,	Prof. Food & Agric.
- Dr. Magdolen El-Gamal,	Prof. Medical Res.
- Dr. Orcheda H. Heshmat,	Prof. Pharma. Res.
- Dr. M. Kasem,	Prof. Pharmaceutical Res.
- Dr. Neham Negm,	Prof. Pharmacuetical Res.
- Dr. M.F. El-Hawari,	Prof. Biochem.
- Dr. I.A. Bakr,	Prof. Energy Res.
- Dr. I.A. El-Malah,	Prof. Energy Res.
- Dr. M.S. Abdel-Salam,	Prof. Environ. Res.
- Dr. T.G. Hussein,	Prof. Physics Res.
- Dr. Samia El-Temtami,	Prof. Genetics.
- Dr. A. El-Nefali,	Prof.

2. INSTITUTE OCEANOGRAPHY & FISHERIES

- Dr. R. Bayoumi, — Director of Institute.

3. INSTITUTE OF ASTRONOMY & GEOPHYSICS

- Dr. M. Faheim, — Director of Institute.

4. INSTITUTE OF STANDARDIZATION AND METROLOGY

- Dr. A. Dawoud, — Director of Institute.