APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT

Quarterly Report No. 10: Phase II
January - March 1984

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INTRODUCTION

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

This report gives an overview of each of the program elements during Phase II (January 1982 to the present). A summary report for Phase I (1978-81) is dated June 1982.

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APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM IN EGYPT

PHASE II: TENTH QUARTERLY REPORT

January - March 1984

MAJOR ACTIVITIES

A. Policy Planning and Management

I. Joint Consultative Committee (JCC)

The thirteenth meeting of the JCC (JCC-XIII) is scheduled to be held in Washington at the headquarters of the National Academy of Sciences/National Research Council, April 16-18, 1984. A summary of the meeting and an account of the sessions will be included in the April - June 1984 quarterly report.

Terms of appointment for the five members of the U.S. panel of the JCC terminated on December 31, 1983. Dr. Mary Carter and Dr. James Hillier, who had served on the JCC since 1978, have graciously offered to be available informally for consultation and advice during the final years of the program. Drs. Gilbert White, George Bugliarello, and Karl Willenbrock have accepted reappointment to the panel to serve until December 31, 1985. Dr. Lowell Lewis, Assistant Vice President for Agriculture and Natural Resources and Director of the Agricultural Experiment Station, University of California at Berkeley, was appointed to the U.S.

panel in March.* The other vacancy on the panel will be filled in the near future.

II. Science and Technology Policy Measures

In the previous quarterly report (No. 9. October - December 1983) sectoral policy studies in agriculture and in industrial policy were described. The series of advisory studies is continuing in 1984 with the following sectors represented:

- Construction Technology (March 1984)
  National Construction Research Centre, Ministry of Housing, Construction and Land Reclamation
- Energy: Electrical Technology (March 1984)
  Ministry of Electricity and Energy
- Agricultural Technology: Second Annual National Policy Seminar (April 1984)
  Agricultural Research Centre, Ministry of Agriculture
- Petroleum Technology (April 1984)
  Ministry of Petroleum
- Capital Goods Seminar: Industrial Technology (April 1984)
  Ministry of Industry
- Irrigation & Water Resources Technology (May 1984)
  Ministry of Irrigation
- Industrial Technology: Second Annual National Policy Seminar (September 1984)
  Ministry of Industry

For each meeting background papers are prepared (in Arabic) which cover the following kinds of information:

1. Goals for sectoral development.
2. Principal sectoral development projects currently underway.

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* (See Annex II for biographical information on Dr. Lewis.)

3. Infrastructure and development:

- Existing R&D institutions
- Links between R&D institutions within Egypt and abroad
- Legal and organizational aspects
- Indigenous technology development vs technology from the outside
- Recommendations for additional institutional development or institutional arrangements

All of the above activities are being financed from Egyptian resources, primarily from the ministries involved with the full backing and participation of the Ministers themselves.

Based on the experience gained from these initiatives, which are a unique development of the S&T Policy Measures activity, several other ministries have indicated an interest to ASRT to participate in the same process.

III. Research and Development (R&D) Management

A. Links to the ASRT 5-year R&D Program

At its Washington meeting in May 1983 (JCC-XI) the JCC recommended that the R&D Management project be utilized to strengthen the ASRT 5-year R&D program. In August 1982, Dr. Abou El-Fotouh Abdel Latif, ASRT Vice President for the Specialized Councils, who is responsible for the management of the 5-year

program, was one of three Egyptian participants in the intensive three-week seminar in R&D management at the Battelle Columbus Laboratories. In 1983 Dr. Abdel-Latif's principal assistant for ASRT Council Affairs, Dr. Ahmed Naguib, attended the Battelle program. Early in 1984 the R&D Management Seminars conducted by the Denver Research Institute (DRI) were utilized for additional orientation and training of five persons associated with the ASRT 5-year program. To date, however, Dr. Abdel Latif has not sought a special linkage with the R&D management project even though the NAS/NRC Resident Program Director in Cairo (Dr. Leo Packer) and the NAS/NRC consultant for R&D management systems (Mr. James Blackledge) have both met with him and suggested that such arrangements were possible.

Management and administration of the 5-year R&D program will require a greater degree of ASRT project oversight than heretofore has been customary. To make program opportunities widely known throughout the Egyptian scientific community, announcements in the form of a "call for proposals" were made early in 1983 in Al-Ahram and Al-Akhbar, Cairo morning daily newspapers. The announcements followed the classification or work division of the 11 ASRT Specialized Councils (Food & Agriculture; Industry; Petroleum, Energy and Mineral Resources; Health & Medicine; Management & Economics, etc.) Upon receipt of the proposals, each Specialized Council appointed expert review committees which analyzed the proposed R&D plan and qualifications of the proposing individuals

and organizations. Recommendations were then made to the Specialized Councils where selections were made. These selections were reviewed, and either endorsed or returned to the Specialized Councils for further consideration by the ASRT Supreme Council and the ASRT President himself. The Specialized Councils also have management responsibility for reviewing progress of the work, evaluating, and reporting to the Supreme Council after grants are made.

To assist in the day-to-day tasks of reporting, financial administration, etc., Dr. Abdel Latif has recruited a staff of some 70 younger scientists (medical, agricultural, social, physical, and biological) and engineers. He has, with the full approval of the ASRT President, instituted a career development program for the young people. Those who are pursuing graduate study are granted the privilege to work a four day week at full pay. In addition, English language courses during working hours have been instituted using instructors under contract from the American University in Cairo. Dr. Abdel Latif expects that some of these young technically trained persons will pursue careers in R&D administration within ASRT and its affiliated research institutes. In time the best of these should rise within the ASRT system to become administrators for the Specialized Councils and assume similar high positions in the Technical Office of the ASRT President, the Planning and Program Office, etc.

B. R&D Management Workshops in Cairo

Under subcontract to the Denver Research Institute, two R&D Management workshops were conducted at the ASRT in February:

- Project Management, February 3 and 4-6, 1984
- Institute Management, February 3 and 7-9, 1984

Both workshops covered the four major management functions of planning, organization, control and evaluation. The Project Management workshop also stressed staffing and communication; the Institute Management workshop covered leadership and motivation, institute-client relations, and a systems approach to R&D management.

These two workshops were highly intensive, covering a curriculum by highlighting the topics which are taught in greater depth during 3-4 week time periods at the Denver Research Institute each year. The goal in Cairo was to orient a group of scientists and engineers from the ASRT and its affiliated research institutes in the principles of R&D management. ASRT is seeking to institutionalize management training in Egypt by adapting the principles to local institutional patterns and constraints. This process is neither an obvious one, nor does there yet exist a cadre of professionals who can devote full time to the task. Perhaps the principal deterrents to the institutionalization of new R&D management systems by the ASRT are:

- Differences among R&D leaders on needs, priorities, and organizational arrangements;

- Decision by ASRT top management on the priority for management systems reform in relation to other institutional needs; and

- Perceived lack of resources to go forward with R&D management changes, even on an experimental basis.

Annex I to this quarterly report gives an overview of the two Cairo workshop activities, the workshop agenda and a list of the participants.

Summary of Project Status and Plans for 1984-85

Note: This section was originally prepared for JCC-XIII and represents program and budget reallocations which were presented to the JCC members for discussion purposes. It is not necessarily the version that will go forward with JCC endorsement. Nevertheless, the narrative presentation gives a summary overview that is valid and useful for references purposes.

I. Science and Technology (S&T) Policy Measures Project

A. Basic Goal

The S&T Policy activity was designed to engage the Egyptian scientific community more actively in the process of technology policy development, including the analysis of its economic and social impacts upon Egyptian society.

B. Status: January 1984

- Three international seminars were held in 1981, 1982 and 1983 to involve scientists, government policy makers and leaders from industry and education in a structured reorientation of Egyptian S&T resources, more explicitly directed toward a continuing process of policy planning within the context of development goals. These activities involved the active participation of more than 100 persons organized by the ASRT Committee on Science Policy in preparing substantive inputs for the annual seminars. Over 600 persons attended the seminars and contributed to the discussions on policy issues. A draft technology policy statement represents one of the outputs of the three year effort. The draft technology policy statement is to be reviewed by the ASRT Supreme Council by mid 1984 and then sent by the Academy President to the Council of Ministers of the Government for its review.

- On a parallel path the Ministries of Industry, Agriculture, Energy, Irrigation and Land Reclamation are working on formal S&T policy planning within their sectors. These efforts are a direct result of the annual seminars on policy planning and offer the possibility for ASRT inputs and assistance with a view toward the formulation of decentralized policy planning but with ASRT coordination.

- The S&T Policy Measures project occurred during the time (1982-83) when the ASRT Councils were formulating their own recommendations for an expanded Academy role in R&D, linked to the current 1983-87 National Development Plan.

C. Termination Date

- End of 1984 as a project element under the Applied Science and Technology Research Program.
- Continuing program beyond 1984 with ASRT funding.

D. Activities

- Completion of Seminar III activities which includes publication of the Seminar final report, payment of meeting costs and of honoraria.
- Travel, observation and study visits for up to 5 Egyptians concerned with the technology policy statement and the sectoral policy planning activities.
- Participation of a limited number of foreign experts in policy planning (50 person days).
- Honoraria for a limited cadre of Egyptian experts working on related activities in 1984.

E. Expenditures and Budget

	Phase II Expenditures to Jan. 84		Budget thru 1984	
	U.S.$ x1000	L.E. x1000	U.S.$ x1000	L.E. x1000
Seminars in Egypt	8.8	58.5		
Seminar III		23.5		40.0
Training/Consultants			25.5	23.0
Honoraria				15.0
Totals	$8.8	LE82.0	$25.5	LE78.0

F. End of Project Accomplishments

- Draft national technology policy statement recommended by the ASRT President and Supreme Council to the Council of Ministers of the Egyptian Government.
- Ongoing S&T policy planning bodies active within several Ministries of the Government, especially in Industry, Agriculture, Energy, Irrigation and Land Reclamation.
- Strategy adopted by the S&T Policy Committee of the ASRT for the Academy's role in the ongoing policy planning function of the Egyptian scientific community.

- Core group within the ASRT capable of a continuing S&T policy Planning role as a staff arm of the ASRT President.

G. Future Directions

Continuing activities under direction of the ASRT Committee on S&T Policy Planning, dependent upon the form, structure and financing provided by the GOE from 1985 onward.

II. Research and Development (R&D) Management

A. Basic Goal

The R&D management activity was designed to strengthen management systems in Egyptian institutions having a primary emphasis on research, so that human and material resources may be utilized more productively for techno-economic development.

B. Status: January 1984

- Fifty-five (55) Egyptian senior scientists and R&D project managers given training opportunities in the United States at R&D management institutes in the Denver Research Institute, Battelle (Columbus) Laboratories, and MIT.

- Over one hundred and twenty five (125) Egyptian scientists and R&D project managers given training opportunities at the ASRT in Cairo in R&D management courses taught by representatives from the Denver Research Institute.

- Approximately 200 Egyptian scientists, R&D project managers and support personnel given training in R&D management principles at ASRT and NRC in Cairo. These short courses were offered in Arabic and English by persons who participated in training programs in the United States.

- ASRT project coordinator and monitoring staff operating the Applied Science and Technology Program based upon proven principles of R&D management.

C. Termination Date

- End of September 1985 as a project element under the Applied Science and Technology Research Program.

D. Activities

1. Training of trainers for R&D Management functions at ASRT and NRC.

- Preparation of a cadre of R&D management "trainers" to serve ASRT affiliated research institutes, universities and, upon invitation, ministry related R&D institutions.

- Preparation of materials to be used in Egyptian R&D management training courses

- Consultant advisors to assist in evaluations, techno-economic reviews and technical assessment activities.

2. Design effort for a comprehensive Egyptian R&D management improvement plan.

- Creation of an Egyptian Council on R&D Management to direct the design effort.

- Joint NAS/NRC-Egyptian Council task force to oversee the design effort.

- Design of short-term and long-term programs for development of R&D management systems of ASRT and NRC. Operation of developed programs and establishment of control system and monitoring systems.

E. Expenditures and Budget (Phase II)	U.S.$ x1000	L.E. x10000
1. Expenditures to January 1, 1984		
Training/Consultants/Panels	76.4	21.5
2. Budget 1984-1985		
Training of Trainers	73.1	119.6
Design Comprehensive R&D Mgt Plan	27.5	46.7
Total for 1984-85	$160.6	LE166.3

F. End of Project Accomplishments

- Over 400 Egyptian scientists, R&D project managers, and support personnel given training in R&D management principles.

- Syllabus/workbook prepared by Egyptian trainers with case studies and other materials adapted to Egyptian R&D institutional needs.

- Core group of trainers established to carry on activities at ASRT and NRC.

- Participation in evaluation/technical economic assessments and other R&D management functions as part of training exercises.

- Creation of Council on R&D Management for policy planning purposes.

- Completion of a comprehensive R&D management plan for the period 1985-89.

G. Future Directions

The project by September 1985 will have set the stage for a comprehensive effort to institute new R&D management systems into the Egyptian applied research institutions. A plan for the new program (1985-89) will have been completed, endorsed by the JCC and the ASRT, and presented for the support of Egyptian, US and other donors.

III. More and Better Food

A. Basic Goal

The More and Better Food Program demonstration project was designed to involve NRC scientists and farmers from Egyptian villages in cooperative problem-solving effort to improve agricultural productivity. A parallel effort was also undertaken to teach mothers better nutritional practices and to help improve the diets of pre-school and school age children in the demonstration villages.

During 1984-85 the goal is to build upon past successes and to develop options for applying the lessons learned so that the ASRT regional centres program may be strengthened.

B. Termination Date:

September 1985 as a part of the Applied Science and Technology Research Program.

C. Activities:

- Preparation of end-of-project reports detailing the More & Better Food experience, including the experience gained in the demonstration villages and in management aspects of multidisciplinary, multi-institutional R&D projects.

- Preparation of a comprehensive action plan for linking resources of the National Research Centre's More & Better Food task force to the ASRT program for regional development centers.

- Consulting assistance for the NRC food technology pilot plant.

D. Expenditures and Budget (Phase II)

	U.S.$ x1000	LE x1000
1. Expenditures to January 1, 1984		
Training/Consultants/panels	34.0	13.9
Local Materials & Supplies		46.4
Equipment	100.0	
Incentives		229.7
2. Budget 1984-1985		
Consulting assistance, Food Tech pilot plant	6.6	5.2
Report and analysis of MBF Experience	15.3	9.3
Comprehensive plan for utilization of MBF experience in ASRT program of regional centers	22.6	27.5

IV. Biogas Technology

A. Basic Goal

The Biogas Technology project was designed to demonstrate that the application of village scale biogas systems is technically, economically and socially feasible in rural areas of Egypt.

B. Status: January 1, 1984

- Assessment of information available in the literature on state-of-the-art of biogas technology from sources in industrialized as well as developing countries. Both an extensive Asian study tour (China, India, Thailand and the Philippines) as well as a South American visit (Brazil) were made.

- Engineering design, construction and operation of at least six family sized units and one industrial sized biogas digester system were completed at the NRC and in Egyptian villages.

- R&D completed on anaerobic digestion of animal and agricultural wastes of various compositions.

- Testing of the toxicity and pathogenic composition of digester effluents and their evaluation as soil conditioners and fertilizers.

- Sociological and economic assessment of all biogas digester demonstration systems being carried out on a continuous basis.

C. Termination Date

- End of 1984 as a project element of the Applied Science and Technology Research Program.

D. Activities Remaining

- Completion at the NRC of a training and experimental facility for biogas technology, including two operating biogas units.
- Completion of the staff training program.
- Plan, organize and conduct the "International Conference on State-of-the-Art Biogas Technology, Transfer and Diffusion", Cairo, November 17-24, 1984.

E. Expenditures and Budget (Phase II)

	U.S.$ x1000	L.E. x1000
1. Expenditures to January 1, 1984		
NAS/NRC activities	38.4	22.3
Equipment	336.5	
LMS		16.0
Incentives (Paid until March '83)		62.2
2. Budget 1984		
Training, Observation, Study	8.5	2.9
U.S. Panel	3.3	6.9
1984 Conference	18.3	11.8
Equipment	0.0	
LMS		4.2
Incentives (April '83-Sept. '84)		34.0

F. End of Project Accomplishments

- Technical feasibility and social acceptance of biogas generation in family-scale biodigesters tested and proved in two Egyptian villages.
- Demonstration of technical and economic feasibility of large scale biogas technology systems for space heating and other energy requirements on a commercial poultry farm.
- Existence of a multi-disciplinary team at the NRC capable of design engineering, techno-economic analyses and associated activities for biogas generation systems.
- Demonstrated success of the scientific management approach to a complex set of research, design and development activities under Egyptian conditions and constraints.

- Establishment of a well equipped laboratory for analytical support of bio-energy development and steps taken toward the establishment of a broadly based design and development center for issues within a wider range of biomass utilization.

- Service to the Egyptian government in the area of biomass-based renewable energy potentials for the country.

G. Future Directions

- Serve as a design center for Egypt in biogas/biomass energy systems with a full spectrum of capabilities in technical, economic and social acceptability areas of analysis.

- Provide a training center for engineers concerned with biogas/biomass energy issues.

- Offer analytical services on a reimbursable basis for biogas energy systems studies and monitoring.

V. Arid Zones/Land Reclamation

A. Basic Goal

To support an effort for the review of land reclamation experience in Egypt with specific attention given to technologies and management systems.

B. Status: January 1984

- A U.S. Panel met in November 1983 with an Egyptian counterpart group to assess the feasibility for a land reclamation experience study. A consensus was expressed that a well designed study was highly desirable and should be recommended to the ASRT.

- A second activity recommended to JCC is the testing of new technologies for land reclamation under various conditions which prevail in Egypt. Dr. M. El Gabaly, Egyptian member of the JCC and Chairman of the ASRT Council on Food and Agriculture is preparing a design proposal for the JCC to review at its meeting in April 1984.

- A small activity to investigate the characteristics of unconventional (to Egypt) arid plants of promising economic value continues at the secondary agricultural school in Omar Makram.

C. Termination Date

As an element of the Applied Science and Technology Research Program, the project would terminate in September 1985. Thereafter it would continue under ASRT and Ministry of Land Reclamation sponsorship.

D. Activities

Specific activities are to be recommended to JCC XIII.

E. Expenditures and Budget (Phase II)	U.S.$ x1000	L.E. x1000
1. Expenditures to January 1, 1984		
Training/Panel Activities (Arid Lands prior to cancellation in 1982)	28.6	22.4
2. Budget 1984-1985		
Training/Panels/Books, etc.	100.0	50.0
Equipment	100.0	
Local Materials & Supplies		88.0
Incentives		18.0

F. End of Project Accomplishments

The study of land reclamation experience is to be addressed to the ASRT and the Ministry of Land Reclamation. It will be a document upon which future policy decisions for investments in land reclamation can be based.

VI. Evaluation of Phosphate Ores

A. Basic Goal

Evaluation of the technical and economic problems which exist in converting low-grade Egyptian phosphate ores to phosphate fertilizers suitable for domestic use in Egyptian agriculture.

B. Status: January 1, 1984

- Technical studies on the beneficiation of low-grade Egyptian phosphate ores from three regions of the country successfully completed at the bench and pilot plant scales.

- Project personnel from the laboratories of the Central Metallurgical Research and Development Institute (CMRDI) and from industry were trained in the U.S.A. in the areas of ore characterization, ore beneficiation, chemical conversion to phosphoric acid and fertilizer end products, and in product granulation processes. Emphasis was given to pilot plant experience.

- Chemical conversion of beneficiated ores to phosphate end products awaits the completion of a specially designed, custom fabricated wet acid chemical reaction unit. The final components arrived in March 1984, assembly and testing are expected to require 60-90 days.

C. Termination Date

End of September 1983 as a formal project element of the Applied Science and Technology Research Program.

D. Activities Remaining

Final assembly and testing of the bench scale, wet acid phosphate reactor as a step in the conversion of beneficiated ores to phosphoric acid and fertilizer end products.

E. Expenditures and Budget (Phase II)	U.S.$ x1000	L.E. x1000
1. Expenditures to January 1, 1984		
Training/Consultant activities	12.0	5.6
Equipment	50.0	
Local Materials and Supplies (LMS)		4.0
Incentives		31.5
2. Budget 1984		
Consultant-engineer	7.9	5.5
Equipment	14.0	
LMS		6.2

F. End of Project Accomplishments

- Demonstration at the pilot plant level of the feasibility of beneficiating low-grade Egyptian phosphate ores from three separate deposits (Nile Valley, Western desert, and Red Sea.)

- Operation of a unique facility (bench scale) for the conversion of beneficiated phosphate ores to phosphoric acid in such a manner as to obtain reliable data for scale-up to pilot plant runs and estimates of economic feasibility for the beneficiation-acid conversion system.

- Contracting of CMRDI by two public sector Egyptian phosphate producers to help in training programs and to solve technical problems involving production processes and product quality.

- Personnel from CMRDI served the Egyptian Government on a phosphate fertilizer technical sales mission to China and on technical evaluation panels involving foreign techno-economic assessment of Egyptian ares. Thus a local cadre of expertise is being created by this R&D project.

G. Future Directions

- The Ore Beneficiation and Chemical Processing Unit of CMRDI will continue to serve as a focal point for phosphate fertilizer studies which are increasingly essential to Egyptian agriculture. As phosphate deposits of higher grade ores are depleted in Morocco, the U.S.A. and Jordan, the extensive Egyptian deposits of lower grade will become competitive for local and export use.

- Agronomic testing of phosphate fertilizer materials from Egyptian ores need to be undertaken to determine if any unforeseen problems may exist.

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

A. Basic Goal

Link the Textiles Research Laboratory, National Research Centre with the Misr Beida Dyers Company in a program of applied research and development for improving wool scouring and wool wax recovery operations.

B. Status: January 1, 1984

- The wool scouring process has been modified resulting in a better quality end product (wool tops) and a decrease in chemicals used and liquid wastes discharged.

- The wool wax recovery process has been converted to a continuous activity with higher wax yields of a more marketable end product.

- Optimization of scouring/wax recovery system continues to approach design specifications and product yields more nearly equaling those experienced in other countries.

C. Termination Date

End of September 1983 as a formal project element of the Applied Science and Technology Research Program.

D. Activities Remaining

Optimization of the wool scouring/wool wax recovery system must continue to minimize wax losses and produce a finer grade wax product.

E. Expenditures and Budget (Phase II)	U.S.$ x1000	L.E. x1000
1. Expenditures to January 1, 1984		
NAS/NRC activities	7.2	2.7
Equipment	0.0	
LMS		3.8
Incentives		15.2
2. Budget 1984		
Consultant-engineer	3.3	2.0
Equipment	0.0	
LMS		0.2
Incentives		0.0

F. End of Project Accomplishments

- NRC has built strong links with a public sector industry in textiles (Misr Beida Dyers Company) and demonstrated the Centre's capacity to solve applied R&D problems identified by the industry.
- Misr Beida Dyers has increased the market value of its principal wool product (tops) by improving its wash/wax recovery operations and has enhanced the marketability of a by-product (wool wax).
- The process has also decreased the cost of process chemicals in wool scouring, decreased process steam requirements and reduced the volume of wastes discharged from the wool scouring operations.

The project serves as an excellent example of end-user application of the R&D results. Misr Beida Dyers participated with the Applied Science and Technology Research Program in the cost of the activity by contributing over U.S. $100,000 for equipment, building modifications, and process control investment.

G. Future Directions

- Misr Beida Dyers is now planning to convert its second wool scouring line to the new, more cost-effective process demonstrated by this project.
- The NRC textile laboratory has demonstrated its problem solving ability and stands to gain new opportunities to serve Egyptian textile firms.

VIII. Corrosion Causes and Control

A. Basic Goal

- Establishment of a modern corrosion research laboratory at the National Research Centre
- Evaluation of corrosion problems associated with petroleum refinery operations and the testing of solutions designed to solve those problems technically and economically.

B. Status: January 1, 1984

- Evaluation of corrosion problems at the Suez Oil Refinery and recommendation of methods to help reduce their costs. Continuous monitoring of corrosion at certain plant sites awaits the installation of the monitoring equipment.
- Installation and testing at NRC of highly sensitive and accurate equipment for measurement of surface phenomena.
- Preparation and testing of a series of corrosion inhibitors from locally produced materials which show promise for steel, aluminum, zinc and copper in acid solutions.
- Elucidation of the conditions under which locally produced Egyptian steels exhibit accelerated corrosion rates with recommendations for improved quality control methods in manufacturing to reduce these effects.

C. Termination Date

- End of September 1983 as a formal project element of the Applied Science and Technology Research Program.

D. Activities Remaining

To enhance the utilization of the surface science instrumentation (The Perkin-Elmer ESCA/SAM Model 550 combines three methods of surface analysis in ultra-high vacuum with computerized data processing), a second visit from a specialist in the analytical techniques and their application to applied problems is planned. This will be coupled with additional training in instrument maintenance and repair to assist the NRC team in dealing wiih a wide spectrum of operational problems which can occur.

E. Expenditure and Budget (Phase II)

	U.S.$ x1000	LE x1000
1. Expenditures to January 1, 1984		
NAS/NRC activities	16.6	3.7
Equipment	84.2	
LMS		15.0
Incentives		37.4
2. Budget 1984		
NAS/NRC activities	18.1	4.4
Equipment	0.0	
LMS		0.5
Incentives		0.0

F. End of Project Accomplishments

- Establishment of a greatly enhanced corrosion R&D facility at the NRC with the most advanced surface science equipment and with specialized training for the corrosion evaluation team.

- Demonstration of the capability of the NRC laboratory to undertake applied problems in corrosion inhibitor R&D and in the analysis of the corrosion failure of locally produced structural steels.

G. Future Directions

Corrosion phenomena are ever present in industrial and other situations in Egypt and elsewhere. The measurement of corrosion rates and the understanding of their fundamental reaction mechanisms are extremely complex. Nevertheless, with a properly equipped laboratory and well trained personnel willing to undertake applied problems, it should be possible for the NRC corrosion group to serve end-users in industry to a greater extent than was possible in the past.

IX. Red Sea Fisheries

A. Basic Goal

To determine the technical and economic feasibility for commercial fisheries in the Foul Bay area of the Red Sea through a study of resources of open-sea and reef fish, deep-water shrimp and the spiny lobster.

B. Status: January 1, 1984

The project is proceeding slowly, in part due to the physical isolation of the area under study (Foul Bay, the extreme southern portion of the Red Sea with respect to the Egyptian-Sudanese border) and the lack of a permanently manned station of the Institute of Oceanography and Fisheries south of Suez.

During 1983 several field trips to the region were completed and the following studies undertaken:

- Physical features of the Foul Bay region, including topography and climate.
- Socio-economic survey of the population.
- Survey of past efforts to inventory fish species, composition and distribution.
- Fisheries infrastructure.

C. Termination Date

End of September 1985

D. Activities Remaining

- Field activities are expected to continue well into 1985.
- A limited amount of training and observation travel to the U.S.A. and of consultancy activities are provided.

E. Expenditure and Budget (Phase II)	U.S.$ x1000	LE x1000
1. Expenditure to January 1, 1984		
Training/Consultants	43.8	1.6
Equipment	0.0	
Local Materials & Supplies		33.3
Incentives		7.0
2. Budget 1984-1985		
Training/Consultants	7.9	5.5
Equipment	150.0	
Local Materials & Supplies		46.7
Incentives (April'83-Sept. '84)		30.5

F. End of Project Accomplishments

- Resources application study of the Foul Bay area of the Red Sea needed to determine the feasibility for more intensive fisheries activities.
- Socio-economic profile of the human resources of the region.
- Infrastructure needed to establish a commercial fisheries industry and benefit/cost aspects of fisheries investments.

X. Investigation and Evaluation of Egyptian Bentonites for Industrial Applications

A. Basic Goal

To study the technical and economic feasibility of mining, beneficiating and activating Egyptian bentonite clay minerals for agricultural and industrial uses.

B. Status: January 1, 1984

- Mineralogical evaluation of two bentonite deposits completed. (Fayoum area and Cairo/Alexandria road.)
- Laboratory scale acid activation of bentonites from the Fayoum deposit undertaken with good results when the product was tested as a bleaching material.
- Laboratory scale alkali activation of beneficiated bentonites containing less than 0.2% gypsum completed, and testing as foundry binders found to be comparable to those with imported bentonite materials.
- Three training, observation and study visits completed to U.S. bentonite producers; periodic visits from a U.S. consultant/advisor.

C. Termination Date

End of September 1985

D. Activities-Remaining

- Additional training, observation and study in the U.S.A. during 1984.
- Continuing visits by U.S. consultant/advisor on a frequency of six months. (Two visits 1984 and one visit 1985.)

- Determination of the economic feasibility of acid/alkali activation of bentonite from two Egyptian deposits.

- Assessing the extent and the mineralogical composition of the Cairo/Alexandria road deposit.

E. Expenditures and Budget (Phase II)

	U.S.$ x1000	LE x1000
1. Expenditures to January 1, 1984		
Training/Consultant activities	9.5	11.9
Equipment	300.0	
Local Materials and Supplies (LMS)		16.0
Incentives		33.5
2. Budget 1984-1985		
Training/Consultant activities	33.2	17.2
Equipment		
LMS		13.9
Incentives (April '83-Sept. '84)		24.0

F. End of Project Accomplishments

- Laboratory and pilot plant beneficiation and activation of bentonite clays and their testing as soil conditioners, vegetable oil bleaching compounds, foundry binding materials, oil well drilling muds and in ceramic production.

- Determination of the economic feasibility of utilizing Egyptian bentonite clays in any or all of the above applications.

- Strengthened ties between the CMRDI and the clay minerals industries of Egypt and among various industries that use clay minerals products.

G. Future Directions

- Dependent upon the benefit/cost analysis for Egyptian bentonite materials in various applications.

XI. The Preparation of Selected Pharmaceutical Chemicals

A. Basic Goal

To select, adapt and test processes up to the pre-production stage for a small number of vital pharmaceutical chemicals which will be economically feasible to manufacture in Egypt.

B. Status: January 1, 1984

- A broadly based industry steering committee has been formed with the NRC Division of Drug Industries Research to participate in the project.
- A selection of twelve possible chemical pharmaceutical products for investigation has been made. These products are widely used in the Egyptian market.
- Completion of laboratory synthesis for six of the selected products has been completed.
- Training, observation and study for four NRC scientists has been completed in the U.S.A. on scale up to pilot plant, product quality control, plant safety, and waste disposal.

C. Termination Date

End of September 1985

D. Activities Remaining

- Laboratory synthesis to outline the chemical pathways for the remaining six products.
- Pilot plant experiments for all chemical pharmaceutical products which are considered technically feasible to produce.
- Additional training opportunities for NRC pilot plant engineers and for representatives from industry.
- Economic scale-up studies from pilot plant to production level.
- Limited testing of chemical products at production levels to prove feasibility and economics of the process.

E. Expenditures and Budget (Phase II)	U.S.$ x1000	LE x1000
1. Expenditures January 1, 1984		
Training/consultants, etc.	15.4	6.4
Equipment and Chemicals	147.0	
Local materials and supplies		21.6
Incentives		39.3
2. Budget 1984-1985		
Training/consultants, etc.	26.3	16.2
Equipment and Chemicals	93.0	
Local materials and supplies		38.4
Incentives (April '83-Sept. '85)		33.0

F. End of Project Accomplishments

- Demonstration of the technical and economic feasibility to produce in Egypt a set of chemical pharmaceutical products which are in demand in the local market.
- Strengthening of a drug industries consulting team at the NRC and its ties with the Egyptian Pharmaceuticals industry.

G. Future Directions

- Dependent upon the benefit/cost analysis for each of the chemical pharmaceuticals which may be proposed for Egyptian production.

DISCUSSION

Evaluation

- Background

During November and December 1983, the U.S. AID Mission in Cairo conducted a process evaluation (program review) of the Applied Science and Technology Research Program (Project 263-0016). The evaluation team was composed of the following persons:

- Mrs. Nena Vreeland (team leader), U.S. AID Office of Evaluation, Washington
- Mr. Ross Thomas, U.S. AID staff member (retired) with long experience in industry development activities
- Dr. Michael Radnor, Director, Center for Interdisciplinary Studies in Science and Technology, Northwestern University
- Dr. Ahmed M. Azzam, President (retired) Zagazig University, former Counselor for Science and Director of the Education Bureau, Egyptian Embassy in Washington
- Dr. Nayel Barakat, Dean of Science (retired), Ain Shams University

A "process" evaluation deals with management aspects of a program and its functional harmony prior to the completion of the overall program rather than with technical results of individual subprojects and achievements within the context of the national development plan. This particular process evaluation also attempted to examine project goals as originally conceived in the light of general achievement and thereby assess the overall planning process.

- Recommendations and Conclusions

The evaluation team stated that "one of the major achievements of the Applied Science and Technology Research project is that it has served as a vehicle for cooperation on the part of Egyptians and Americans to accomplish a significant improvement in Egypt's scientific and technological resources." During the short history of the ASRT, that institution has established itself as a primary resource within the Egyptian S&T community. At the same time it has articulated a need to improve its R&D management practices and foster improvements in management systems of its affiliated research institutes in order that those institutions might respond better to the development needs of Egypt.

With this central emphasis upon R&D Management, the specific recommendations of the evaluation report were:

1. The National Academy of Sciences (NAS/NRC) as a U.S. contractor, should consult with ASRT and, under ASRT guidance, adjust its work in terms of a shift to:

(a) strengthening the management functions of ASRT,

(b) a stronger in-country training program including a training-of-trainer approach.

AID, too, will need to consider its support of this change. This could result in an extension of the NAS contract to September 1986, including parallel continuance of the Joint Consultative Committee (JCC) through September 1986. Within the JCC program the evaluation team recommends that "national policy measures" activities continue as primarily an Egyptian effort.

2. All R&D and Demonstration Project activity under the project should be concluded by September 1985 or sooner.

3. ASRT should review the budget and decide on the reallocations which it proposes.

4. The budget reallocation proposal should apply criteria for specific R&D and Demonstration projects as follows:

(a) Emphasize those projects which are at, or close to, completion in terms of their originally planned purpose and outputs;

(b) Give priority to ongoing activities with active institutionalized end-user support;

(c) Give consideration to ongoing or completed activities which show high potential for institutionalization with end-users, or with R&D institutions interested in undertaking a similar program of applied research and in which there is tangible evidence of user commitment to adopt research results;

(d) Give consideration to completing by 1985 projects for which a follow-on is already a part of the ASRT Five-Year R&D Plan.

5. Special ASRT attention should be given to the design and installation of the procurement/maintenance/repair management system of the Scientific and Technical Instrumentation Center (SIC).

6. The Georgia Institute of Technology contract (scientific and technical information system) should be extended to October 1986, but should be reevaluated in late 1984 and 1985.

7. Subject to progress in this new strategy, AID should consider favorably further future support, preferably through a matching of funds with end-user sponsors.

- Analysis

The evaluation report recommendations, if they are to be implemented within the time period of 1984-1986, imply consideration on the part of the ASRT of:

1. Significant changes in management functions and of relationships and procedures within the ASRT which would be mandated and monitored by the ASRT President himself;

2. Allocation of funds from the ASRT budget or from other Government of Egypt sources particularly for staff compensation and for support functions;

3. Creation, at least for a transition period through 1986, of a full-time program coordinator position with appropriate staff for the ASRT R&D management improvement project;

4. A time-phased plan which assures that key steps are taken as needed; and

5. An understanding that many traditional practices of operation and administration can be streamlined to encourage primary attention to the program itself rather than to procedures and protocol.

At the same time AID and the contractor (NAS/NRC or whatever other organization is involved) must commit resources to supplement those of the ASRT with sufficient flexibility to meet the needs. Recognition must be given at the outset of the activity that a two-year program (1984-86) can only be an initial step in a longer process of R&D management system improvement. The task is

primarily one which the ASRT must institute and undertake itself. Technical assistance and resources from the U.S.A. and elsewhere can be catalytic and useful but the institution building process is not one that can be imposed or structured from the outside. At least three formidable obstacles (institutional constraints) must be faced by ASRT management in order to begin a major effort at R&D management improvement. At the same time AID and all contractor parties which join in the partnership to assist ASRT must recognize and be prepared to work with ASRT under those constraints:

- R&D management systems and practices as known in the USA exist in an environment of open communication, delegation of responsibility and authority, and flexibility which are not generally characteristic of present practice in Egypt. There needs to be formed with ASRT a group of activist individuals with a clear mandate to institute new management arrangements. The new arrangements should be considered "experimental" rather than immutable. Steps have already been taken within the management of the ASRT Five-Year R&D program to open communications on requests for proposals, on review of proposals, and on the administration of newly approved projects. Thus the climate or environment for significant change appears positive.

- Managers must be motivated to do their work in imaginative, often in "risk-taking" experimental ways. This implies status and rewards within the ASRT and the affiliated research institutes

commensurate with responsibilities which they must assume. Because of stringent limitations on pay and benefits within the present Egyptian government personnel system, ASRT must look for new mechanisms to attract and retain the talent and skills needed for its permanent professional staff. This is a high priority consideration which has been given too little emphasis and certainly cannot be accomplished without the full assent and participation of the ASRT President.

- The process of recruitment, training, and selection of personnel for R&D management roles must have clearly established and well publicized criteria. Research and/or teaching experience are not necessarily the prerequisites which assure that an individual will become a "manager." The process must be open to talented individuals from other disciplines. The seniority rule can not be allowed to be the basis for candidate eligibility. There are talented and committed people who understand the needs and have the aptitudes.

ANNEX I

Summary Overview
R&D Project Management/R&D Institute Management
Workshop at the Academy of Scientific Research & Technology
Cairo, Egypt February 2-9, 1984

Denver Research Institute
Subcontractor to
National Academy of Sciences/National Research Council

The following is a summary report covering the Denver Research Institute's subcontract AID-2442-4-051 with the National Academy of Sciences. Briefly, the subcontract provided for the preparation and execution of workshops in R&D project and institute management in Cairo during the period 2-9 February 1984 in support of the R&D management program of the Egyptian Academy of Scientific Research and Technology (ASRT).

- One day--Introduction to R&D Management (common to both workshops)
- Three days--Project Management
- Three days--Institute Management

Each activity covered the four major management functions of planning, organization, control, and evaluation. In addition, the Project Management workshop covered staffing and communication while the Institute Management workshop covered leadership and motivation, institute-client relations, and a systems approach to R&D management.

The participants of both workshops were well selected. For the most part, their positions seemed appropriate for the workshop they attended. They participated enthusiastically in the program; the English language was the medium of expression throughout.

DRI objectives through the two management overview courses were to stimulate the participants' interest in R&D management, to foster a commonality of management concepts and terminology which provides a basis for further participant discussions within their own work situations of local management problems and opportunities, and to build an esprit de corps of Egyptian scientists and engineers for management improvement. We believe that all of these program objectives were achieved.

The major criticism given by the participants was related to their brevity. DRI agrees that a period of more than one week is needed to introduce in a reasonably coherent way the subjects of R&D project and institute management. In Denver DRI conducts overview courses on these two subjects each year and the period allotted is eight weeks.

In spite of the brevity of the Cairo workshops, there was generated a strong interest and desire on the part of the participants to have and provide better R&D management in their own work and that of their laboratories. This interest and momentum needs further reinforcement. This means that the ASRT R&D management program should offer further follow-on courses and consultancy in specific areas of R&D management. The Egyptian Academy has in the past drawn on its own and its associated institutes to conduct management courses and provide consultancy assistance. Such activities are to be highly encouraged and should be institutionalized on a continuing basis.

To accomplish the goal of local institutionalization of R&D management programs in Egypt, a cadre of strong management trainers and consultants will be required. The process of building this cadre could be accelerated by providing selected R&D managers training in how to be R&D management consultants and trainers. Such a course should aim at:

- Developing and enhancing individual and group capability in compiling information and preparing instructional material in subject areas of R&D management,

- Expanding the participants' knowledge and understanding of R&D management concepts and techniques,

- Providing a participative experience which would result in a greater capability to transfer management skills and knowledge to R&D managers in Egypt,

- Preparing workbooks relevant to the Egyptian environment that will serve as core material for workshops to be given by Egyptian trainers,

- Motivating and preparing participants for a commitment to positive change in their home environment by continuing R&D management training and consultancy in Egypt.

There are a number of steps which could be taken by ASRT to encourage and foster the creation of a cadre of Egyptian professionals in R&D management. DRI offers specific training opportunities to "train-the-trainers" but other approaches such as internships at R&D institutions are also possible.

For an ASRT R&D management development program to establish and maintain credibility, it must induce positive management changes. This is important at both the project and the institute levels. The ASRT management development cadre should, on the conclusion of the trainers and consultancy workshop, initiate a program aimed at achieving such change. This could consist of:

- Conducting specialized R&D management courses for targeted audiences in Egypt.

- Selecting several R&D projects which are in the formulation stage for the cadre to support in a consultative mode throughout their duration. Cases could be prepared on these projects, and they could serve as prototypes.

- Selecting an institute at which the cadre would conduct a management needs assessment. After identifying opportunities for strengthening the selected institute's management practices, cadre members could serve as management consultants to assist the institute to implement proposed management systems or to bring about recommended changes in practice.

DRI believes that the quality of the ASRT management program would be augmented and the time required for the cadre to master training and consultancy techniques would be accelerated if technical assistance were provided the ASRT program. Such assistance would be more effective if it were provided by the same organization that conducts the workshop for the R&D management trainers and consultants.

Finally, DRI proposed that members of the ASRT management training and consultancy cadre be afforded opportunities to participate in R&D management development courses and other in-service training activities in the United States on a regular basis.

Egyptian R&D Management Workshop

Academy of Scientific Research and Technology

Cairo, Egypt February 2 and 4-9, 1984

Conducted by:

Dr. Ronald Black
Mr. James Frasche
Denver Research Institute

Day 1: Common to All Participants

- Concepts of R&D Management
- Origins of R&D
- Principles of Planning

Day 2: R&D Project Management

- Project Planning: Principles of Benefit/Cost Analysis
- Project Planning: Benefit/Cost Exercise
- Project Planning: Selection
- Project Planning: Selection Exercise

Day 3: R&D Project Management

- Proposal Preparation
- Proposal Preparation Exercise
- Monitoring and Control
- Monitoring and Control Exercise

Day 4 R&D Project Management

- Project Organization, Staffing and Communications
- Project Organization, Staffing and Communications Study
- Project Evaluation
- Project Evaluation
- Project Evaluation Exercise

Day 5: R&D Institute Management

- R&D Institute Planning
- R&D Institute Planning Exercise
- R&D Institute Organization
- R&D Institute Organization Case Study

Day 6: R&D Institute Management

- Leadership and Motivation
- Management Information Systems
- Institute-Client Relations
- Institute-Client Relations Exercise

Day 7: R&D Institute Management

- R&D Institute Evaluation
- R&D Institute Evaluation Exercise
- Systems Approach to R&D Management

Research & Development Management Training
Cairo Workshop
February 1984

R&D Project Management
Academy of Scientific Research and Technology
Denver Research Institute

PARTICIPANTS

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3. Dr. Nabih Ibrahim Ashour	Professor and Head Agricultural Research Laboratory NRC
4. Dr. Adel Mikhail Azer	Head, Unit for Social Policy Research, The National Centre for Social and Criminological Research Imbaba
5. Dr. Nadia Halim Soliman	Technical Secretary Population Research Council ASRT
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Research & Development Management Training
Cairo Workshop February 1984

R&D Management
Academy of Scientific Research and Technology
Denver Research Institute

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15. Mrs. Mah Mohamed El-Shora	Director, Post Graduate Students Ain Shams University Heliopolis
16. Dr. Nabil A. Saleh	Professor Coordinator for International Programs Office of the President National Research Centre

TRAVEL TO EGYPT

January 1 - March 31, 1984

NAME	DATE	PURPOSE
PROGRAM MANAGEMENT		
1. Jay Davenport Staff Officer, BOSTID	January 7 - February 9	Program planning, contract extension discussions, preparation of issues papers and reports for JCC, program continuity during absence of NAS/NRC Resident Director for home leave
R&D MANAGEMENT SYSTEMS		
2. Ronald Black Technical Director Denver Research Institute (DRI)	January 30 - February 11	Conduct workshops on R&D Institute Management and R&D Project Management
3. James W.D. Frasche Management Scientist DRI	"	"

Annex III

Lowell Nelson Lewis (1931)
491 Boynton
Berkeley, California 94707
415/644-4231

Academic Training: PhD. Michigan State University, 1960 (horticulture); M.S. Michigan State University, 1958 (horticulutre); B.S. Pennsylvania State University, 1953 (horticulture)

Employment:

1981-present	Assistant Vice President, Agriculture and Natural Resources, and Director of the California Agricultural Experiment Station. Responsible for the agricultural research program at the Berkeley, Davis, and Riverside campuses.
1971-1981	Associate Dean, College of Natural and Agricultural Sciences, University of California, Riverside
1960-1971	Research and teaching faculty member, Department of Botany and Plant Sciences, University of California, Riverside

Major research activities: genetic regulation of cellulase; cellulase in plant development, protein and hormone changes associated with abscission

Recent public service activities:

1982-1983	Member and chairman, Experiment Station Committee on Organization and Policy (ESCOP), working with the U.S.D.A. and Congress on development of budgets, policies, and organizational structures supporting the experiment station system
1983	Testified before House Agricultural Subcommittee on Research on the organization of agricultural research in the U.S.
1983	Member, special committee to review binational agricultural research and development program between the U.S. and Israel
1982-1983	Member, Competitive Grants Advisory Committee for the Secretary of Agriculture
1982	Member, Winrock Conference set up by Rockefeller Foundation and the Office of Science and Technology Policy of the White House to review status and future needs of agricultural research in the U.S.
1979	Advisor, New Crops for Arid Lands project, NAS/NRC program with Egypt