MPGAP برنامج تقدير موارد الثروة المعدنية والبترولية والمياه الجوفية
MINERALS, PETROLEUM & GROUNDWATER ASSESSMENT PROGRAM

AID Project 263-0105
Egyptian Academy of Scientific research and Technology
Desert Research Institute
Egyptian General Petroleum Corporation
Egyptian Geological Survey and Mining Authority
Remote Sensing Center

To: Project Officer, S. Arif

From: Project Coordinator, D. T. Snow

Subject: Annual Report, September, 1984

Your Ref. | Our Ref. | Date April 21, 1985

Enclosed are 3 copies of my belated Annual Report of September, 1984.

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ANNUAL REPORT

September, 1984

This report is an assessment of management aspects of the first year's program of MPGAP. If it were possible for an insider to remove himself to some distance, view the work accomplished as well as the fortunes and frustrations in the context of conditions imposed upon the participants, it would be possible to evaluate the proportion of the plans realized. This report attempts to do that.

Professional Relationships

The participants include able professionals of the Egyptian Geological Survey and Mining Authority, the Desert Research Institute, the Remote Sensing Center and the Egyptian General Petroleum Corporation, organized for this purpose under a Coordinating Committee headed by the Minister of the Academy of Science and Technology. On the American side, a Project Officer at the Agency for International Development supervises activities and especially budgetary aspects of the program, as well as a Project Coordinator, intended as a link between AID, all the four agencies, and a contractor, Bendix Field Engineering Corporation. Bendix is represented here by a Resident Director, an Editor and a staff of two administrative assistants, and at Grand Junction, Colorado, a Liason Officer, all of whom are charged with execution of the Agreement Tasks in all but the petroleum sector.

One unwritten objective, clearly of value to the national welfare, is for MPGAP to stimulate interagency cooperation, a propensity seldom displayed. Some successes can be marked. DRI has gotten valuable assistance from EGSMA which has provided logistical support at the field station of Marsa Alam: housing, fuel, accomodations, repairs and drilling service otherwise unavailable in that remote study area. EGSMA willingly helped DRI geologists become accustomed to the literature and geology of the area. But as DRI progressed, little collaboration developed. Though EGSMA has expressed interest in hydrogeology as a logical branch of their activities, none of their supervisory

staff have accompanied DRI in appreciating the findings of the first year's hydrologic data collection. The drilling contract was nearly a dead loss; instead of five test holes, only two were drilled, one of which failed to penetrate bouldery alluvium in Wadi Igla, and the second stopped short of the water table in Wadi Issel. DRI plans to resume drilling with its own new rotary rig in Spring, 1985, but it cannot be wholly independent of EGSMA. The existence of shop facilities, fuel, water, communications and camp conveniences at Marsa Alam will still help them reach their objectives. I believe EGSMA will advance such help willingly, since DRI has left much of the contract money unexpended with EGSMA.

An area of collaboration that seems inevitable and essential is the collection of meteorologic observations. DRI has yet to deploy weather stations, but when it does, it should enlist the permanent EGSMA stations for observers and helpers, as well as other public and private mining companies in the area.

In the other direction, EGSMA may ultimately receive great benefit from DRI's investigations, since groundwater supplies will probably be developed at the test wells completed, and the scientific basis for predicting water resources for camps, mines and wells is a predictable result of DRI's studies.

Between EGSMA and RSC, the Agreement included one collaborative active effort, namely aerial photography. It was to have been of an area in the Western Desert of interest to EGSMA that would then be flown by RSC. After passage of years, the area was covered by military photography, so duplicate filming could not be funded. From the viewpoint of RSC, timing was critical when they volunteered use of their newly-serviced aircraft and camera in 1984, for the period of warrantee would soon lapse. EGSMA could not find a substitute area that justified the expenditure since photo coverage of Egypt is complete except for a window of uninteresting geology west of Assiut. On the other hand, some areas of project study have only poor-quality photos and they may be worthy of repeat coverage. In time, the mission should be flown in accordance with the Agreement, perhaps with special saturated-color photography suggested by the MPGAP Resident Director.

The Remote Sensing Center can provide a valuable training service to EGSMA, DRI and other earth-resource institutions when its short courses in

remote sensing and photogeology are offered. These have been delayed by slow procurement of equipment by Wimvex Co., which is regretable because the adoption of modern satellite and airplane-derived imagery can revolutionize mapping, currently still done by conventional ground techniques.

The General Petroleum Co., EGPC's subsidiary, has provided cooperative aid to EGSMA, notably in providing geophysical logs for the identification of potash resources, and for advice and chemicals needed to formulate brine-based drilling mud used by EGSMA's Drilling Department to penetrate evaporite rocks. The Ras Gharib facilities of GPC are critical to the work of DRI and EGSMA in the Gulf of Suez coastal region. GPC's geologists have been always eager to discuss geologic features of interest to other agencies.

Both GPC and EGSMA are working in the East Oweinat area of southwest Egypt, and GPC provides air transport and base camp facilities for a variety of investigations besides EGSMA, which include the USGS and the Berlin Institute. The sharing of SIR-A and SIR-B imagery has been focal to all geologic work in the region. Both GPC and EGSMA are doing geophysical soundings of common interest.

The Aeroservice Co. contract is a model collaborative effort. Managed by GPC Chairman Hussein Kamel for aeromagnetic coverage of areas of interest to the petroleum section and for aeromagnetic and radiometric coverage of metallic and radioactive minerals sections, GPC has been the receiving station for the thousands of map products, which they distribute to EGPC and EGSMA, which is further distributed informally to the Nuclear Materials Corporation.

There are great opportunities for efficient use of field facilities and geologic interpretation of value to EGSMA and NMC. A pilot program is being implemented in 1984-1985, in an area of the Red Sea Hills studied previously by NMC.

Most damaging to the MPGAP objectives has been an unresolved dispute over budget responsibility for the Area II portion of the Aeroservice Co. contract, an amount of $4.8 million originally budgeted to the account of EGPC but never substantiated in writing. Since it is for EGSMA use, EGPC declines to take responsibility for it. If EGSMA must absorb it into their budget, they are overexpended for all other purposes and cannot get any of their equipment or further budget items. It would be to Egypt's best interest if the program can be resolved to facilitate EGSMA functioning. It is in the new minister's power to do so, since now, EGPC and EGSMA are under his authority.

The supervisory role of the Academy of Science and Technology has been very light, since the Committee has only met twice in eighteen months. They have preferred to exclude the AID ex-officio members, though this has not done any detectable harm. However, opportunities for enhancing inter-agency collaboration are lost by the infrequent meetings.

Between the Project Coordinator and the agencies, most relationships have been cordial and productive. He has interacted on a daily basis with all the EGSMA Directors and many on subordinate levels to keep abreast of activities and to function as advisor as frequently as possible. At DRI, good relations have been enhanced by similar professional background with many of the programs. At RSC, contacts have dwindled in frequency because the Resident Director, Dr. Lepley, has adopted the agency, which practices his specialty, remote sensing. During the last six months, a major proportion of the Project Coordinator's time and efforts have been spent with leaders in the petroleum sector, especially at GPC. The bidding process for a rig floor simulator and for a contractor for an enhanced oil recovery project have brought him very close to many men as well as the Chairman. But at EGPC, a vital communication link was broken as a result of a quotation that should never have been conveyed to the Exploration Director.

The Project Coordinator and the Resident Director, Dr. Larry Lepley, have been working smoothly together, because of mutual respect and a desire to get a difficult job done. We tend to agree with one another on methods and decisions, and each one maintains areas of pre-eminence in the MPGAP activities.

Editorial tasks assigned to Mr. Larry Stout would have been executed effectively had EGSMA found a solution to the need to motivate people to the job. Because it is considered unacceptable to criticize the writings of supervisors, and lacking financial incentives in the position of editor, it was not possible to sustain trainees, who found their earliest opportunities to flee to other jobs in EGSMA. Stout's departure in September has made it possible to hire a capable replacement, whose job has different emphasis. His primary job is marketing of mineral commodities. Documentation in mineral information packages, seminar proceedings, newsletters, press releases, public meetings and private presentations will be his media for influencing investors. If EGSMA assigns editors to his care, he is well prepared to instruct them. He will guide the writers of commodity summaries and oversee MPGAP publications.

Any AID-funded project has to operate under its directives. But the people trying to implement contracting, purchasing and training programs are people new to the process: they are either Egyptians in the four agencies, or new contractors to AID, such as Bendix Field Engineering employees, or the writer. Consequently, administration is slow, due to unfamiliarity.

Training Program

Bendix Field Engineering has responsibility for training the many areas described below. A pert drawing, graphically displaying the timing of events, is in continual flow and change. An up-to-date revision will be available soon from Bendix.

Trainees to U.S. Institutions

The training program, designed to transfer technology, to update the agencies, and to advance the capabilities of young scientists as well as leaders, has operated just about as planned. The Liason Officer in Grand Junction, Colorado, Dr. John Burger, has maintained an efficient procurement service, arranging during the past year for training courses for eleven Egyptians. These were all specialized assignments, requiring a close fit between the students' needs and the instructors' skills. Two mineralogists from the EGSMA Analytical Laboratories went to Beloit College for instruction from Prof. Woodward in the techniques of X-ray diffraction and fluorescence analysis, as well as scanning electron microscopy. A training course and an extensive tour for instruction in practical aspects of industrial minerals was arranged for four EGSMA geologists by Mr. Ted Eyde of Tucson, Arizona. The tour touched on about 30 products at 45 localities in the U.S. and Canada, most of which afforded conducted inspections of their mines and processing plants. The formal instruction was less successful. The four trainees went with instructions to preserve notes, photos and other records sufficient to draft a publication useful to the many geologists in Egypt not privileged to see what they did, and to transfer their information to the whole minerals community. Its outcome is eagerly awaited. In general, transfer of information by lecture is practiced most effectively by professional teachers, and subsequent instruction will largely be rendered by professors or ex-professors. A tailored lecture/report-writing/mine tour for

two EGSMA geologists in all aspects of the geology of tantalum-niobium and tungsten deposits was conducted by Prof. Dan Powell, based in Grand Junction but extending to the Western U.S., Canada, England, Spain and Portugal, because the geology pertinent to the Egyptian occurrences could only be seen in those countries. A study tour of three geological museums, at Duke University, New York University and the Smithsonian was arranged for the Head of EGSMA Museum to learn modern curating and display methods. Two geologists from the Remote Sensing Center attended a specialized course at Earth Resources in Michigan in order to learn the use of Landsat processing equipment identical to that which will be installed in Cairo under the MPGAP procurement program. They have returned to produce an Atlas with Egyptian Landsat scenes, scheduled for completion in 1986.

The next years program of U.S. training intends to increase the pace to 16 people, more nearly the rate intended by the program. In actuality, the problem has been the lack of trainees at EGSMA who can pass the English language test to qualify for foreign training. We have gotten the grade requirement relaxed a few points because most of the courses are taught on a close (two-on-one) relationship of student-to-teacher where individual communication problems can be handled. It remains to be seen whether the training rate can be increased to make fuller use of the administrative (Bendix) costs of the contract.

The projected training schedule includes two for rather formal training in igneous and metamorphic petrology, perhaps at the University of California, Berkeley. We want a program in massive sulfide minerals with emphasis on field relationships like Egypt. But training is available only in Canada, so the program should perhaps be taught by special arrangement with Newmont Mining, a U.S. firm doing mining in Canada. A suggested program in writing contracts and legislation in developing countries could be arranged at one of several U.S. institutions. A field and instructional program for four geologists in evaporite minerals will be scheduled, either at Colorado School of Mines Research Institute, or perhaps with Allied Co. at Green River, Wyoming, the Trona mine. There are three gold technology programs to be run this year. Much work has been done to facilitate use of the U.S. Bureau of Mines for instruction in mining engineering and extractive metallurgy. It is also an opportunity for EGSMA to learn what functions the Bureau of Mines provides a growing mining industry. Another foreign training slot is gold exploration, which should be targeted in Canada, for the same reasons as the polymetallic sulfides, so

conceivably by Newmont or Tech Mining Group, etc. Another training area needed is for trace element geochemistry. We do not really know how to specify this job, as yet. Two curators are to be trained abroad this year, perhaps at Duke University, according to the good experience of Mr. Raggi there. For the Desert Research Institute, the groundwater geologists are to be trained at three institutions checked out by DRI department heads Drs. Soliman and Himida on their U.S. tour. The young men are destined to the USGS, Denver, to the University of Arizona, and the Desert Research Institute, Reno, all places atuned to Egyptian conditions. We will have a photogeologist instructor trained at ERIM for later use in the RSC's short course in Cairo. This and the two remote sensing instructors have been delayed by the tardy Wimvex procurement. Some of the training planned for U.S. execution will be done in Cairo, at considerable savings we can translate to other productive ends. These include two librarians from EGSMA, one from DRI and one from RSC, all to be trained by Mr. El Arini, Librarian. Mr. Barry McCrae can train the remote sensing instruction here. Our efforts to replace U.S. assignments with local instruction is part of our response to the lack of English-language trainees.

Program of Temporary Experts

Another phase of training/technology transfer is the program of TDY experts reporting to Egypt for short term assignments (1-4 months). Their purpose is to provide training in specialized topics needed for enhancing exploration, and to provide consultation to the agencies. Like the U.S. training program, the TDY program is also accelerating from a slow start, mainly because EGSMA has been unready to accept the consultants until the time is right to take full advantage of them. There is an understandable reluctance to involve larger and larger portions of the Survey's activities in MPGAP.

The first consultant, Mr. Harry Godbe, was popular for his low-key credibility as a senior mining engineer. He got into the gold mines, taught a group of geologists mine mapping techniques and mine evaluation. He examined EGSMA work of many years past to suggest ways of improving development. A major contribution was in detecting systematic errors in gold assays from spectrometric analysis, upon which too much reliance has been placed. It is insensitive to the trace quantities prevailing for gold exploration.

The second gold-industry consultant, Dr. Laurence James, is very well-versed in modern gold exploration principles. He will be used to find and develop occurrences in stratiform volcanic sequences which abound in the Precambrian rocks of the Eastern Desert. Many of the recent discoveries of significant gold have been in volcanics deposited on the sea floor, with metallic hot-spring effluents as the source of gold and sulfides of other metals.

In the execution of the Aeroservice Co. contract for aeromagnetic and radiometric coverage of the Eastern Desert, a close inspection of the company's operations and data-processing has been necessary. To assure the quality of products from the $7.5 million job, Prof. William Hinze of Purdue University, expert in aeromagnetic data-handling, has been engaged for quality-control. He has visited Houston about monthly since July, 1984, Cairo once and will continue until the products have all been delivered in late 1985. His advice on applications to petroleum exploration has been sought by EGPC and GPC, and he may be involved in sequal surveys being proposed.

A library expert, Mr. El Arini, a U.S. trained Egyptian very well-suited to get things done in the area of library re-organization and training, has been engaged for three months. He will design and is supervising the movement of holdings to new spaces at EGSMA. The RSC library will benefit from similar efforts. At both facilities and at DRI, Mr. El Arini is about to start training programs, instituting card cataloguing and eventually, computer referencing. His teaching will replace some of the U.S.-bound training programs.

During the coming year we have planned a larger number of expert visitors, and there are in addition, consultants from other sources fulfilling some of the functions planned under MPGAP. These free up funds for optional uses that keep occurring.

One of the areas of professed weakness in EGSMA has been structural geology. We have sought unsuccessfully all over the U.S. for an expert to fill the need for expertise in "melange" geology, such as exists in certain shield areas of the world. A Dr. Peter Johnson has approached us to help in teaching the intricacies of the Nubian Shield. Johnson and his teacher-colleague, Varnes, have worked together, teaching Saudi Arabians the elements of structural geology and metamorphic petrology . Their expertise is immediately applicable

to Egypt, whose basement rocks were continuous with Saudi Arabia before the Tertiary rifting of the Red Sea. The relatively junior status of the men may not be too important: I propose to have them engaged for a short, extendable duration.

A position is available for the enhancement of developments in the tantalum-niobium-tungsten-tin resources. At this moment, it is likely to be filled by Aquater, S.A., financed by Italy and headed by a Dr. Bartholomew. Their program is capable of providing training, field equipment, drilling and analysis for an in-depth development quite different from the hands-off American approach. It will be a good test of effectiveness in producing long-term improvements in Survey competence and in producing investments. MPGAP welcomes such collaboration parallel to our aims, as it frees money from a budget area that can support a new program.

Such a program has been proposed by the writer in the area of clay technology and exploration. We need a practical geologist with management skills to help EGSMA organize a wide-ranging reconnaissance of clays and silts for brickmaking all along the Nile Valley, and for similar search for higher-valued kaolin and bentonite. Testing facilities for brick are being built at Fayoum to demonstrate to old-time brick workers the feasibility of using sources alternative to Nile silts. For the more exotic clays, a testing program being conducted by Dr. Abdul Nader Attia at National Research Center should perhaps be refinanced and continued under MPGAP. The program has terminated just after making a major bentonite discovery on the desert road to Alexandria, and its contribution is of major importance.

A consultant in industrial minerals is scheduled this year. Mr. Verle Larsen of Colorado School of Mines Research Institute is a candidate. He has recently proposed a drilling program to seek bedded trona, a possible source of the Wadi Natrun Lake deposits carried by groundwater. This could be a resource far more valuable than glass sand. A host of other industrial mineral commodities are potentially developable in Egypt, many of which are wastefully being imported.

Another add-on for MPGAP would be a contract/legislation expert to help EGSMA shape its business relationships with investors. Ideal for the purpose would be one of the U.N. experts in the field, such as Thomas Wälde, who is working with developing nations all over the world, in efforts to bring about

more constructive contacts in mining. His services have been promised by U.N.D.P., but it is not certain yet to what degree. There is agreement that a "leasing expert" originally in the plan is not appropriate.

An exploration geophysicist will be needed in EGSMA. They could use him now, but two things suggest delay: the department needs many (10) new junior members to carry out its tasks, and the training for them should be timed for their arrival. Also, geophysical survey equipment on order but delayed by the budget problem mentioned should be on hand. Thus the expert cannot come sooner than Fall, 1985.

EGSMA has deleted plans for a Quaternary geologist, at least for the present. This is a reflection of more economic-oriented leadership in EGSMA.

Bauxite has been discovered in Saudi Arabia. Bauxite is the ore of aluminium and source of Egypt's major import, alumina. Since there are geologic settings in Egypt like that of Saudi Arabia's discovery area, the Project Coordinator has been attempting to stimulate exploration here. The firm responsible for the exploration in Saudi Arabia is Riofinex of England. They are interested in helping EGSMA explore, partly because of Mr. Abdel Tawab's visit to them, enroute home from his VIP tour of American gold mines in 1983, and partly because Riofinex wants to investigate the business climate in Egypt where they know mineral wealth exists. So, at our invitation, they have proposed a training program aimed at discovery in Egypt. One possibility is for British Council funding; another is to find no American competition for such specialized service, which requires intimate knowledge of the stratigraphy and paleoclimatology of the Arab-Nubian Shield.

For the Remote Sensing Center, a Dr. Larry Carver will be engaged soon as a library expert. His specialty, uniquely desirable for this client, is filing of maps and photographs. He can also help EGSMA and DRI with similar storage and retrieval problems.

Mr. Barry McCrae is an expert on the MDAS system, from ERIM. He will come for a short period to help get an interim system installed and functioning so that RSC can hope to fulfill its Landsat Atlas commitment. Later, when the permanent equipment arrives, McCrae will return for similar work and instruction of operators.

A photogeology expert will be hired who is qualified to teach the use of modern imagery, such as radar, TM, MSS, etc., as well as low-altitude black and white and color photography for geological explorations.

Experience suggests that the agencies cannot handle so many visitors efficiently, and our year's expectations should include no more than half the above.

VIP Tours

One senior geologist, Dr. Abdel Tawab, Director General of Exploration, was conducted on a VIP tour of major gold mines in the Western U.S. that represent the newly-discovered type of low-grade large-tonnage disseminated (Carlin-type) ore bodies. So far, nothing like these have been suggested to exist in Egypt, but even now, no attempt has been made to find them. Perhaps the environment for disseminated gold as hydrothermal replacements is unlikely here. Dr. James has been asked to investigate the possibilities as well as the volcanogenic types. Dr. Tawab's visits to mining companies may bear results from Amax, Inc. (previously promoted by the Project Coordinator) and from Riofinex.

Two DRI scientists, hydrogeochemist, Dr. Rimeda, and geophysicist, Dr. Samy Soliman, were taken on a fast tour of research facilities from Washington to Denver, Arizona, Reno and many field locations. They were exposed to alternatives for subsequent DRI training. They witnessed drilling activities and research laboratories. It was a rich opportunity for updating perspectives in hydrologic investigations.

An EGSMA geologist, Mr. Ibrahim Shalaby, is scheduled to travel to ERIM to do interactive computer-processing of TM imagery. It requires a person knowledgeable of the specific geologic occurrences in test site images, such as the sulfide minerals, alteration products and geochemistry. After that assignment, Mr. Shalaby will have an opportunity to visit several institutions active in Economic Geology, such as USGS, University of Michigan, Colorado School of Mines, etc.

Another VIP visit planned is for a senior cartographic geologist, Mr. Mohammed Mussa. The object is to learn all the modern methods of computer-assisted map-making, such as have developed for satellite tape processing. His assignment will be either in Reston or Denver, the USGS centers.

Funds for VIP travel can perhaps be used more profitably in some instances outside of the U.S.A. An objective worthy of such diversion would be to send some senior EGSMA executives to visit developing nations. Geologists dealing with contracts and marketing in Egypt could gain from other countries important insights into methods of successful contracting. Some candidates are Indonesia, the Philippines, Morocco, Turkey, or others that have struggled with conflicting business and nationalistic goals, yet have been able to promote multi-national mining companies.

Problem Areas

In the above discussions, certain problems of administration have been mentioned. In addition, there has been administrative work load for all MPGAP staff that sometimes conflicts with creative and problem-solving effort. Report writing is essential for organization and evaluation, but it tends to be postponed until it is of such high priority that nothing else can interfere.

In like manner, obligations in Cairo have minimized the amount of field time available for the Project Coordinator and Resident Manager, whereas our ability to help the agencies is impaired by lack of field exposure to their work and problem areas. Managers of earth-science programs must be required to devote a healthy proportion of time to field work or become stale and unable to conceive new programs.

Consultants, though intended for field work, are likewise forced to spend excessive time in the office. The problem is seemingly logistical, for EGSMA has to interfere with on-going project work to find field facilities, men and transport means to assist the consultant in his inspections. High priority must be placed on field support for consultants' time or their services will be wasted.

The Geological Survey has had two changes in Chairmanship, whose effect has been to slow the decision process while new leaders become fully informed. Thus, programs that could be implemented early tend to be postponed until later. TDY assignment and training programs have slowed during reorganization. Furthermore, the evaluation of recommendations made by consultants takes time so that implementation is delayed. EGSMA is willing to change, but the changes will have to be deliberate.

In the petroleum sector, delays in instituting research programs agreed upon have been delayed more by lack of supervisory personnel deemed essential to any contract supervision than by indecision. Only minor training and procurement work has gone forward. A breakdown in communications between the EGPC Manager and the Project Coordinator has brought progress there largely to a halt. In GPC the work of preparing pre-qualifications and RFTP data on EOR has been slowed down because GPC lacks reservoir engineering staff it can devote to such work.

Because the GOE has been unable to budget the funds corresponding to the Agreement, the efforts on the Egyptian side have not followed expectations. Field operations on such programs as were intended to be main efforts of MPGAP include the potash and gypsum programs. Drilling done by EGSMA has been done at very modest expense and results have been correspondingly modest. Two holes to 470 and 250 m were drilled for potash in the Gemsa-Ras El Behar area, whereas the total project proposed by Abdullah Wasif envisioned more and deeper ones. The negative exploration results could be turned to positive ones if funds would be dedicated to adequate drilling. The gypsum exploration, including 10 shallow holes in the Gemsa and Gebel Zeit areas, was moderately successful, but it, too, suffered from short funding. Though economic discoveries have been made, their exploration, reserve delineation and evaluation would require an expanded field program costing many times the tiny budget expended to date. If MPGAP is to pay economic dividends, adequate budgets are necessary to do the exploration work of EGSMA.

Administrative efficiency was long impaired at the Abbassia office facility. For 3 months all expatriate help operated out of a single, unequipped space with neither secretarial or communications equipment. It took over 6 months to outfit our offices adequately. A driver could not get an appointment from AID for 9 months.

A variety of factors have caused excessive delays in acquiring commodities scheduled for the agencies, but lack of administrative skills is at the root of most delays. The writing of specifications has been impaired by lack of familiarity with the types being requested, on the part of both recipient Egyptians and facilitator Americans. Full knowledge of performance requirements and materials available is needed to write specs that are "free" enough

to permit several companies to compete. In the case of a drill rig for DRI, it took time to reach agreement on the optimum configuration as well as the necessity for local shop maintenance ability. In GPC, slow but thorough committee procedures have required much time in preparing for a bid on a rig floor simulator to be installed at the training facility at Ras Gharib. Specs and bids for laboratory and field equipment needed by DRI could have been implemented rapidly but delays have occurred. For EGSMA, similar lab and field equipment items have been delayed long after specs were written because a major budget problem has developed between EGPC and EGSMA over which agency is to pay for the cost of Area II surveys by Aeroservice Co. When resolved, the procurement will go forward.

Even consumable items take time to come overseas. The EGSMA cartography needs for publishing finished geologic maps has suffered from communications between EGSMA, unable to specify such items as exact paper requirements, and Bendix, Grand Junction, who was unwilling to risk buying uncertain materials.

The proper storage of great volumes of data being generated by the Aeroservice Co. from aeromagnetic and radiometrid surveys of the Eastern Desert has awaited development of facilities by EGSMA and EGPC. Meanwhile, the data pile up at GPC, threatening their safety and organization. At this writing, EGSMA plans to reorganize spaces for their library, including a room for storing the 30,000-odd survey maps. A consultant, Larry Carver, will assist in planning the use of the space. At EGPC no plans have yet been developed for storing the materials. EGSMA plans to store the magnetic tapes at CAPMAS where air conditioned facilities are available. But EGPC cannot even safeguard their existing tapes in custody for lack of proper space at the Petroleum Research Institute.

One of the publication problems recognized is inability of the contractor, Bendix, to meet the bi-monthly schedule of newsletters. Each one seems to be a formidable job of getting text from the agencies, editing it, getting approval from all sources, then publication. It must be made less formal to succeed as a newsletter less than 6 months out of date. Alternatively, it requires devoting higher talent at greater cost and priority.

Another publication problem remains. EGSMA has not been speedy at the assembly of information packages to describe the national resources of minerals.

Though the EGSMA Board and the Minister have approved dissemination of mineral data, the junior people assigned have other work to do, i. e., the packages require higher priority for timely completion.

The writer has described a seemingly fundamental problem in EGSMA, namely the disparity between terms of mineral contracts being offered as a model and the terms of business generally required by transnational mining companies in order to successfully operate a joint venture or concession partnership. Whereas EGSMA has studied the model in committee, the changes brought about are minimal. The predictable result is that negotiation efforts underway will be fruitless for either side. Until major conceptual changes are made, the underlying reason for MPGAP will be thwarted by failure to successfully promote mining in Egypt.

Accomplishments

MPGAP has initiated so many tasks that it cannot fail to have some positive results. The first year's accomplishments are therefore considerable, even though objectives were met in only a few areas.

In EGSMA, a long period of training in cartography succeeded in building a capable staff, thoroughly indoctrinated in color-separation procedures for turning out geologic maps. The newest issue was the Aswan metallogenic map. The sequel, Ras Benas Sheet is the first wholly-Egyptian colored map produced since 1928, but it was stalled for lack of paper. Work on several others has been hampered by the brain drain while training has kept the staff capability barely alive. Still, the investment in cartography can be perpetuated if EGSMA will continue to appreciate its worth by continuing the training.

In the editorial area, while EGSMA had three capable persons assigned under Larry Stout's tutelage, a good suite of papers were processed for Annals No. 13. Since that staff has moved elsewhere, the publication is still pending printing. The current staff cannot duplicate the accomplishment since the present assigned editors are junior and lack English skills.

The field programs identified with MPGAP have made some positive progress: in the potash explorations, EGSMA succeeded in drilling two holes 470 and

250 m deep in evaporites, using brine-based mud, a new technique for them. Many years have passed since they have done deep drilling so we consider the technical success encouraging, especially since they did it with nothing in the way of expense from other sources. All radioactive target beds drilled proved to be polyhalite, not sylvite, the ore of potash.

The gypsum program completed 10 shallow core holes and proved the existence of some useful deposits. Of interest is a deposit of 60-80% $CaSO_4 \cdot \frac{1}{2}H_2O$, unusual in that it has the hemi-hydrate form (Plaster of Paris) attained usually by calcining. Thus it could be used directly as building plaster after grinding. The skill and leadership demonstrated by the gypsum program is evidence that a properly-funded Egyptian exploration program could pursue objectives efficiently, and if the GOE would fund MPGAP, there are many similar programs to be executed. They are not to be funded by AID, for that would negate the purpose of the project. The program has much work to do on other deposits in many parts of coastal Egypt now being surveyed. EGSMA's gold program has re-established two mine-development camps and two exploration camps in a manner akin to the many expeditions of the 1960-1978 era. An accomplishment is the preservation of underground mining techniques which can be valuable in the future. They are also doing some underground diamond drilling. At Atud, a second quartz vein parallel to the "Main" vein was discovered, thereby increasing the reserves and attractiveness of that unexploited deposit. In any of these projects, a major discovery or a significant foreign-financed exploitation is needed to stimulate the Survey, which operates on a starvation budget. It is an accomplishment of will to keep it alive.

A major contract let to Aeroservice Co. has been accomplished in the E.D. and parts of the W.D. A large area was targeted for aeromagnetic surveying of a suspected sedimentary basin with potential for petroleum, and very extensive areas of the Red Sea Hills Precambrian terrane have been the object of both aeromagnetic and radiometric methods. Similar coverage of an area including Bahariya Oasis and another of East Oweinat have been flown. Voluminous data products and interpretation maps are being received periodically from Houston. Evidence of the exploration value is the recent ESSO concession covering much of the E.D. sedimentary province. Years of interpretive work and field-checking will be done in the future by both EGSMA and the Nuclear Materials Corporation if they will utilize the data to its fullest potential. Several uranium

and potassium anomalies have been identified. Planning is in progress to extend the AM surveys to other exploration areas in the Nile Delta and South Sinai, areas deficient in modern coverage but high prospects for gas and oil.

Immense areas of virgin terrain for mineral exploration have been opened recently in the W.D., stimulated by the shuttle-based side-imaging radar and the field efforts of a joint EGSMA-USGS program. They have identified an intricate system of Tertiary river-channels important for groundwater development. Huge areas of Precambrian rocks, partially mantled by blown sand, can also be mapped, and geochemical sampling programs can utilize the paleo-drainage system. A full-fledged resource program may be mounted some time when SIR data can be obtained from NASA on a future mission. Because this exploration tool has a unique capability of penetrating the sand cover (up to 5 m), it can open up a huge virgin Precambrian terrane to a search for minerals. I therefore recommend that MPGAP arrange to finance the USGS SIR-B team efforts and sequel programs. The Fall 1985 mission will require about $35,000 but a country-wide resource program would have to shoulder a large share of the mission costs. Completion of the SIR-B study will provide evidence of the effectiveness of the method for general applications.

One accomplishment has been to focus EGSMA and MPGAP attention on resources other than those originally included in the Agreement. The host of industrial minerals imported by Egypt as well as potential exports are fit subjects for new Survey programs, and MPGAP training, information, consultations and initiatives have identified means of pursuing resource evaluation and dissemination measures. Four geologists received a specially-tailored course in industrial minerals, visiting over 40 North American mines and plants. Regrettably, EGSMA has not yet assigned those men to appropriate sequel duties. More needs to be done to put specialized training to work. Significant progress may be made toward implementation of programs proposed by MPGAP. These include: an organized reconnaissance program to locate and test clay sources to replace Nile silt; a drilling program to locate a possible buried source of Wadi Natrun's trona; a program to train and transfer techniques of identifying bauxite in Egypt; a remote-sensing program, including a variety of tools to be applied to two test areas in the Red Sea Hills and one in South Sinai; an enhanced-color aerophotographic mission to replace the black-and-white mission originally in the project.

The MPGAP scope has logically expanded to provide data-collection and dissemination for minerals other than the original three: gold, potash and gypsum. Our efforts to liberate the internal reports have resulted in ministerial approval of unencumbered dissemination. Accordingly, work has begun by a large group in EGSMA to collect information packages on gold, polymetallics, gypsum, limestone and dolomite, clays, silica sand and by Summer, 1985, the first of these will be ready for advertisement and use by potential investors. Other commodity data will be disseminated later. The Second MPGAP Symposium focussed on Egypt's resources and the proceedings, including 30 papers of wide interest and practical application, are to be published in April, 1985.

MPGAP personnel have collaborated with EGSMA and EGPC people concerned with the need to modify the traditional production-sharing contracts to make them appropriate and attractive for mining applications. The Project Coordinator has contributed in reports, memos and committee meetings toward those ends, and the Resident Manager is programming the Third Symposium to introduce the contract practices of other developing nations by inviting attendance of foreign experts in that field.

We have responded to inquiries from mining companies, and in cases, solicited interest from companies we believed would want to be informed of mineral prospects. All of the latter category have terminated correspondence. But Amax and Anaconda are both intending to come to investigate gold occurrences once the gold package is ready. We have had occasion to develop with several private-sector Egyptian companies an interest in mining such materials as bentonite, barite, glass sand and feldspar. Because the mining law favors such companies, it is likely that their activities may be the best prospects for new mining activity. The Desert Research Institute has accomplished most of their objectives in Area 1, south and west of Marsa Alam. Based on all known water-points and extensive resistivity sounding work, water chemistry and well testing, they have begun to describe the groundwater hydrology. When their drill rig is finally delivered in Spring, 1985, the critical data-collection from pumping tests in drill holes can be obtained to make quantative hydrologic predictions possible. Another quantitative topic that remains out of reach is rainfall/recharge/runoff estimation. They are committed to the development of a meteorological data-collection system, but no progress has been made.

DRI has commenced data collection in two other areas: west of Ras Gharib and in the Bahariya Oasis region. They are diligent in keeping to their project plan.

Progress toward an evaluation of water supplies useful to mines in the Red Sea Hills is the knowledge that the middle reaches of most wadis are saturated below a level that is variable from wadi to wadi. In the upstream source areas, water may be absent, whereas in downstream reaches flowing on coastal sediments, water quality is very poor. For mine and process planning, especially the design of heap leaching operations, more quantitative measures of safe valley yield, well-field supplies, water quality and environmental damage will have to be obtained, even if for only a very few typical wadis. Such results will give investors an expectation, to be proved and developed by their own consultants.

In the area of library upgrading, both EGSMA and DRI are undertaking a move to new quarters. The EGSMA operation is very ambitious, involving 700 m^2 of new space being rebuilt in 8 rooms on the south wing at Abbassia to replace the numerous overcrowded rooms formerly housing non-circulating collections. One room is to be devoted to the 60,000 maps being delivered by Aeroservice Co., the products of the aeromagnetic and radiometric surveys of the E.D. The prime mover has been a library expert, Mr. Mohsen El Arini. He has also instituted English-language training and computer training for large segments of both staffs. New card cataloguing of the collections has been started. Acquisitions have been made by Bendix for all libraries.

Accomplishments in remote sensing include the award of contracts with Earth Resources in Michigan (ERIM) and WIMVEX, Inc., for training and technological assistance in the use of the upgraded MDAS system, and for procurement of equipment and software, respectively. Two engineer/geologists were trained in all phases of preparation of Landsat scenes, including photo-processing. They completed seven scenes while in Ann Arbor, preparatory to production in Cairo. Because of undue delays in equipment procurement by WIMVEX, the process has been set back many months. An interim system based on leased tape drive is being set up, and an ERIM consultant brought in to initiate its use. Finally, the 82 scenes are in development, but the completion date will be no sooner than 1986.

The preparations for training courses scheduled to be offered by RSC in remote sensing for exploration and photogeologists have been delayed by higher-priority project work from paying sources.

Agreement has been reached between EGSMA and RSC to execute an aerial survey funded by AID. The black-and-white cartographic photography originally programmed for the Bahariya Oasis area is to be replaced by an enhanced-color survey of a mineral-rich test site in the Southern Red Sea Hills, utilizing new technology provided by consultant Dana Slaymaker. Because new optical systems permit enlargement from small-format film, a great economy is possible. Not only will RSC acquire a new aerial camera (75 mm) that can be flown in their Beechcraft or a more economical single-engine plane, but also the laboratory processing equipment will be purchased. The consultant will train personnel in the whole operation. There is presently no facility for color aerial photography in the Middle East. Furthermore, RSC is leap-frogging the technology in applying a cost-effective small-format camera system, and in applying enhanced color techniques for geological applications, to provide greatest contrast between rock types and mineralization. RSC may provide such service to explorations in the whole region.

A comprehensive program to test a variety of remote-sensing tools, including Landsat, Thematic Mapper, SIR, enhanced color and the aeromagnetic and radiometric coverage has been designed by the Resident Director for three test areas in the Red Sea Hills and Sinai. This will require future program funding.

The petroleum sector accomplishments have not been many, because the Agreement projects were shelved by EGPC until they had personnel available for management of contracts. There has been one on-going contract with Aeroservice Co. to provide 165,000 Km^2 of aeromagnetic and 102,000 Km^2 of radiometric survey coverage in the E.D., Bahariya and E. Oweinat areas. The flights were completed in 1984, and all products will be delivered by June, 1985. By engaging Dr. William Hinze as quality-control consultant, AID and GPC have been able to assure continued excellence in contractor performance. Whereas the products have already been used by GUPCO and ESSO, the data, available at EGPC and EGSMA, will have continued application to petroleum and mineral explorations for years to come. The products are deemed "state-of-the-art" and of incalculable worth to the country. ESSO utilized it in their decision to take an E.D. concession, and has paid $600,000 into a revolving fund. Success of

the project has stimulated plans for a new aeromagnetic survey of the Nile Delta, the Northern Sinai and SW Sinai on the Gulf of Suez, mainly because no adequate AM surveys exist for those areas, currently attracting new concessions.

Preliminary data disclosed several small basins in the E. D. where previously there had been suspected to be one large one. The interpreted depth was less. Accordingly, the plan for sequel surveys by seismic methods and drilling has been shelved.

Radiometric anomalies have already been noted, and the Nuclear Materials Co. has obtained data for field-checking. In 1985, EGSMA is doing a field test in a small well-studied area near the Qena-Safaga Road. There is no established plan as yet to systematically evaluate the economic geology, geochemistry and geophysics for all anomalies, which is the intended optimum use of the Area II surveys. No enthusiasm for iron-ore exploration near Bahariya Oasis has been expressed either. On the weakness of implementation demonstrated, there is no apparent reason to extend the proposed Sinai coverage to include AM or radiometry of the crystalline area of S. Sinai. That could be a mistake.

MPGAP was committed to provide equipment for the Training Department of GPC. To keep close to budget, they opted to limit the request to one device, a Rig Floor Simulator, to be used at Ras Gharib Training Center to instruct drill crews of all companies in all drilling procedures and emergency measures. Because the Minister has designated the Center as training facility for all companies, the acquisition of this key apparatus in March is timely. An extensive program of courses is being designed to make fullest use of it.

Research and development in enhanced oil recovery has been debated as an appropriate MPGAP activity, but a small budget was initially included. Accordingly, we have watched closely the EGPC-funded study of the Nullipore reservoirs at Ras Gharib Field being done by Improved Petroleum Recovery Co. Gas-cap restoration was quickly hailed as effective at increasing production by pressure recovery and diminished water-cut. Steam drive in the Nullipore will be initiated after a huff-and-puff test of steam stimulation is done on shallow tar sands there. Meanwhile, MPGAP and GPC have completed a prequalification screening of possible contractors, and prepared an RFTP for three companies to propose a feasibility study of EOR applications at the

Bakr-Amer Field, Gulf of Suez. It is expected to lead to pilot tests and if successful, to thermal stimulation of up to a billion bbl of heavy crude in the Bakr-Amer, HH, GG and FF fields.

Because the Minister of Planning has decreed that foreign aid funds should be directed first at production, the EOR projects are expected to attract increasing levels of AID funding. These can be counted on for engineered projects of more certain return than exploration projects in pioneering areas not favored by oil companies.

Proposals for a) Seismic surveying of an area of Upper Egypt indicated to conceal some 10,000-12,000 ft. basins by AM interpretation, b) Data storage and digitization and for c) synthetic seismic log generation, are being reviewed by a consultant to AID, with the probability that some of those programs are now appropriate for execution.

The contractor, Bendix Field Engineering Co., has responded to the training schedule as limited by unanticipated restriction of English-language deficiencies, agency programs needing critical manpower, and perceived project priorities. The contractor has put on two very successful Semi-Annual Symposiums, one on management of MPGAP, the other on Egypt's natural resources. A third, on mineral law and contracts, is in planning for Spring, 1985. There have been two issues of the Newsletter, mailed to over 700 recipients. Proceedings of the last Symposium are in press.

Purchase of Equipment

Vehicles procured for EGSMA and DRI have been received during the year. These include 16 jeeps, 8 trucks, 4 water-trucks and 2 carry-all vans for the former, and 4 jeeps, 1 truck, 1 water-truck and a caravan for the latter. All but the caravan have been received and put to field use.

The next major vehicle to be purchased is a drill rig for DRI. Specs have finally been completed for a rotary-percussion-coring rig capable of 1500 ft. exploration holes in all terrane. A garage and repair shop has been committed by DRI so that proper maintenance can be effected as tools and skills are acquired. A drilling expert from the US will spend 3 months assembling and testing the rig, then training crews.

Electronic equipment and software to update RSC's MDAS system has been placed in a procurement contractor's hands. They are inexpensive, but not especially swift in execution. Meanwhile, RSC has made plans to install rented equipment to do the atlas production for which they are committed.

A $250,000 contract for a drilling-rig simulator has been let to SIMTRAN Co. of Medway, Massachussetts, for delivery in March. A staff will come to train GPC personnel in its use and maintenance. A maintenance contract has been negotiated also.

Exploration equipment is scheduled for delivery. EGSMA and DRI will each obtain resistivity and IP resistivity gear as well as well logging equipment of various types. EGSMA will receive an x-ray diffractometer and fluorescence analyzer for the Dokki Laboratory. A long list of other tools to be obtained include others to be let in a bid package, and consumables to be ordered directly by Bendix under its budget. DRI's procurement includes water analysis tools. EGSMA bid processing has been held up for budget reasons, but should soon be freed up by Ministerial action on the budget. DRI's list is unnecessarily delayed by the EGSMA problem.

Mini-computers have been specified for EGSMA, which requires one for library and general use in all departments, plus another largely dedicated to geophysics. DRI is to get a similar system. A consultant was hired to draft those specs, and an RFB will be issued soon.

It should be noted that library acquisitions by Bendix have enhanced the holdings of EGSMA, DRI and RSC, and other consumables and minor hardware have been provided.

Recommendations

From the organizational point of view, I would encourage more active management of MPGAP by having the MPGAP Coordinating Committee meet bimonthly and by including the Project Officer, Project Coordinator and Bendix Resident Director as non-voting invitees. It is the only opportunity for the member agencies to collaborate on common problems, potentials and projects, and for lack of administrative effort, the opportunities are lost without meetings.

The contracts of the Project Coordinator and Resident Director should be modified to require, at most, quarterly reports instead of bimonthly reports. A disproportionate amount of time is spent in such reports, leaving too little for contacts with the agencies. Another neglected area is field work for the MPGAP principals. Unless it is understood that our job cannot be done wholly in Cairo, full utilization of Drs. Lepley and Snow is impossible. It is in field settings that the real-world problems become apparent, that experience can be brought to the solution of exploration problems, and where new opportunities can be envisioned. A geologist cannot function as a consultant if kept unaware of the geology and field situations.

The Newsletter has not been very regular nor very newsy, mainly because of its formality. I suggest it be prepared in note form by the Resident Director for writing by the Editor and regular bimonthly distribution instead of bi-annually. It should not necessarily be approved by EGSMA, Project Coordinator/ Officer, etc., but rather, be the R.D's responsibility. I don't believe there are project secrets or EGSMA secrets to be kept, so print "all the news that is newsworthy" to potential investors, our target audience. Xerox typed text (or word processor text) to avoid printing delays.

Because it is involved in many activities there are several suggestions here for EGSMA:

The lack of incentive money has been discussed for months, and a possible solution offered if the MPGAP project work would be put on the 5-year plan. Then such problems as the retention of qualified people in the editing jobs could be solved by making the position more attractive.

The position of Editor could be made prestigious, as suggested long since by Mr. Stout, by organizational action of EGSMA, so that senior geologists with the requisite geological experience as well as English skills could be appointed. MPGAP cannot help EGSMA fulfill the publication needs unless it takes action.

The production of mineral information packages has begun, but unless higher priority is given the work, the slow assembly of data and delays in drafting of a summary document will make the packages late for effectiveness

during the remaining project life. An organization (Bendix) is on hand at great cost, waiting to get to work on active publication and marketing tasks. EGSMA's help in making the information accessible would speed the process of attracting investors.

Routine reporting should be required of field parties, not for internal use, but for publication. The Annals have become University publications, and even the Geological meetings are dominantly for professors appointments. EGSMA can regain leadership through publications and meeting presentations. MPGAP can help.

I recommend that the assignment of personnel to receive MPGAP training, especially overseas, be accompanied by a plan of incorporating that training into EGSMA upon return to the organization. Instead of returning to his old work, a newly-trained specialist (say in industrial minerals) should have a commitment to assignment in Mr. Bakr Naseim's department, and at least in part, to work on a project related to his new learning. Furthermore, the trainee should understand and be willing and expected to contribute to the training of his fellow workers who did not get the study opportunity abroad. In other words, a trainee must build a file of notes and data to use for future training in Egypt.

The Project Coordinator is supposed to form a Training Committee, yet such a committee exists in EGSMA. The P.C. and R.D. could and would contribute to the action and effectiveness of that committee if invited. EGSMA's needs could be met more fully if better understanding were encouraged through that committee.

Some specific EGSMA projects have been recommended and they are submitted again for consideration:

1) An industrial minerals expert is scheduled for 1985 engagement. Assign to him all remaining trainees from Ted Eyde's course in US, giving them the job of assessing Egypt's industrial mineral opportunities, and producing reports for quick publication in Egypt and for foreign consumption.

2) Organize a reconnaissance of potential clay/silt resources for brick-making, especially along the Nile Valley. Assign men and mobile equipment under leadership of an expert on economic deposits of clay for brick, drilling mud and ceramics.

3) Seek funds for deep drilling (500 m may not be enough), while planning an exploration for Wadi Natrun's source of trona, as per Verle Larsen's proposal. Hire Larsen to direct it, but not until drilling can be done.

4) Waste no more time in getting a bauxite-training program started, using Reynolds, Kaiser or Riofinex, as needed. Evaluate Egypt's potential resources, and start a field program to find and evaluate deposits.

5) Prepare for a broad-based mineral reconnaissance of sand-concealed regions of Egypt when side-imaging radar coverage becomes available for the whole region. Using the available SIR-A and SIR-B data, operate a pilot program of geologic mapping of primitive Precambrian terrane now scanned in the Arabian Desert and the western sand fringe of the Red Sea Hills, apply geochemical prospecting techniques using paleo-drainage information (radar rivers), and collaborate with the USGS field team (October, 1985) to develop systematic procedures for ore-finding. AID and EGSMA should insist on such provisions in the funding of USGS logistical help for 1985.

It is recommended that the Geophysics Dept. be stimulated by assigning an expert in use of electrical sounding and various logging devices, timed to arrive after the new equipment has been received at EGSMA.

The development of investment opportunities can be stimulated by continued awareness of changing terms of international mining business, as indicated by contracts and experiences of other developing countries. Every opportunity should be taken by EGSMA to collaborate and communicate with their counterparts negotiating with mining companies. Meetings held by UN or other agencies should be attended and participation in Egypt sought.

Direct participation of EGSMA and MPGAP people in the marketing of minerals would help identify potential investor companies and to find entrepreneurs willing to put venture capital into mining, processing and transportation facilities. There is a need for seed money, perhaps under MPGAP, to overcome investor resistance, Egyptian and foreign, who see no history of successful mining business here.

I have few recommendations to make for Desert Research Institute work. The main area of potential improvement is in quantitative hydrology, without which the MPGAP objectives of stimulating mining cannot be met. To that end I suggest:

1) Plan to obtain training from US, either by travels or by visiting experts, for developing numerical skills among the hydrologists. Basin modelling of such entities as wadi alluvial fills and piedmont gravels can be done, to predict yields to well fields for mineral process needs. A few typical wadis should be thoroughly analyzed, utilizing test data made available by the new drill rig capability so that investor companies can have expectations and can program consulting firms in specific discovery areas.

A general hydrological approach (budget) cannot be done without precipitation data. I suggest that an imaginative weather-data collection system could be deployed in the E.D. involving rain-gages in all mines and agency camps.

The Remote Sensing Center has opportunities in future service to mining companies that we hope to attract to Egypt. The training courses in remote sensing, including photogeology, should be implemented as soon as possible.