



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

To: Project Officer, S. Arif  
From: Project Coordinator, D. T. Snow  
Subject: Bimonthly Report for Period November 15, 1984 -  
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AID Project 2610105  
Egyptian Academy of Scientific  
Research and Technology  
Desert Research Institute  
Egyptian General Petroleum Corporation  
Egyptian Geological Survey  
and Mining Authority  
Remote Sensing Center

Your Ref

Our Ref

Date April 23, 1985

Subject report is submitted herewith.

David T. Snow

Task I      Regional Mapping

The generation of geologic maps proceeds at an imperceptible pace in EGSMA, as though only the USGS cartography teacher could finalize any document. The cartography staff, fully trained for production, was frustrated by editors who could not release or complete maps under review. Paper and film supplies didn't materialize fast enough. The system that should supply new trainees failed completely. So without work product or trainees to develop, all but one of the qualified cartographers have left for better paid, more rewarding jobs elsewhere. Belatedly, the one remaining is training a couple of replacements, so the staff capability to produce multicolor geologic maps remains alive, though barely. We look forward to a publication soon, the Wadi Qena metallogenic map.

I recommend no further equipment purchases unless an active map-production program is undertaken by EGSMA. MPGAP has more than done its work of preparing them since 1978. EGSMA could demonstrate more pride in its products by support of editing and cartography, the most visible and lasting evidence of Survey excellence.

Though it has been known that the field mapping methods employed reflect philosophies and methods quite different than ones currently used in geological surveys of England, France and U.S., no efforts have been made to change them as yet. Some simple field tools, such as proper compass/inclinometers have been supplied in small numbers by MPGAP. So far these have not been widely adopted, for lack of training in mapping methods. Dr. Laurence James is the first consultant to examine them, and suggests corrections. He has given informal field instruction. We are glad to learn of a British Survey program of field training underway, and believe that the consultant-teacher team of Johnson and Vranas should be given a trial. Their experience with shield rocks of the Arabian Peninsula will be beneficial to EGSMA, especially if the program is devised as instructor-training, i.e., for the development of an EGSMA curriculum to modernize mapping methods for all Egyptian field parties, petrological, mineral and stratigraphic.

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## Task II      Geophysical and Geochemical Studies

Until the gold exploration consultant, Dr. Larry James, came and studied the methods of geochemical exploration being used, methods of improving the geochemical work of EGSMA could only be discussed. From his observations and recommendations, a course of development can now be laid. EGSMA did not adopt the field-laboratory methods in vogue 20 years ago. It is apparent that central laboratory service to field parties is currently favored by exploration companies. The Russian style of grid-sampling that has proven so cumbersome should be replaced by limited field-geology-controlled sampling, with rapid laboratory turn-around facilitated by a smaller number of samples, more critically and diagnostically located. The procedural changes required are well within EGSMA capabilities.

Dr. James has identified elements that act as pathfinders to low-grade gold mineralization, the detection levels needed to be useful in exploration and some aspects of laboratory improvements needed to obtain such precision. He has suggested methods of obtaining rapid turn-around so that analyses can actively guide the field parties during the mapping season instead of a year later. He recommends we obtain a consultant to show us how to improve procedures and how to modify the spectrographic and atomic absorption analyzers.

In the past, tedious geochemical data manipulations by hand calculator limited the speed and effectiveness of assessment of field programs. Reports took over a year to be written. Even when computer programs have been known, no computer facilities have been readily accessible at EGSMA. While awaiting procurement of mini-computers, Dr. James suggested renting an IBM PC locally. It has been in near-continuous use at EGSMA ever since, and Dr. James has taught several classes in elementary use of the machine, and particularly, in the use of geochemical data-processing programs.

## Task III      Economic Viability and Estimation of Mineral Resources

Whereas the gold explorations have emphasized study of vein deposits known since Pharaonic times, our consultant, Dr. James, was brought here to evaluate other types of mineralization prominent elsewhere in the

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world but neglected in Egypt. He has looked at pyrite-bearing submarine volcani-clastic rocks, host of hot-spring effluents during deposition in Precambrian time. Such deposits have accounted for some of the major discoveries of low-grade, high-tonnage gold ore in Canada and Australia. They do exist in the Red Sea Hills, but gold content is only suggested, not proved. There are possibly areas like the Mad Ad Dahab district of Saudi Arabia where a stockworks in two volcanic conglomerates form a million-ton deposit of 26 g/T ore. The conglomerates, resembling the Shadli and Hammamat volcanics of Egypt, may have been initially of submarine deposition. Other gold deposits worth prospecting for may prove more valuable than the bull quartz deposits. These include quartz stockworks in any rock type, and iron-bearing metavolcanics. Exploration requires application of good geologic mapping techniques, sampling and analyses of gold and other elements (As, Sb and Hg) to appropriate detection limits. Fossil placers are to be sought also.

The gypsum exploration program continues, though no additional drilling has been done. It had been decided that geologic reconnaissance should be done of many prospective areas before a new drilling phase is undertaken. Accordingly, Mr. Abdel Moneim Kamel has been drafting a review of Red Sea and Mediterranean coastal regions which has indicated several new as well as old occurrences for further testing. Meanwhile, laboratory work on the Gemsa cores has revealed a remarkable deposit of 60-80%  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ , the hemi-hydrate sold as Plaster of Paris, usually obtained by costly calcining of  $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$ , gypsum.

The potash project, stalled by failure to find Zeit formation sylvite in the two Ras El Behar drill holes, has not been abandoned, since deeper drilling could still disclose sylvite beds corresponding to radioactive units in the top salt, South Gharib formation. It occurs in the 500-1000 m depth range at several localities. Since those depths exceed EGSM tools, the Project Coordinator has sought to locate future oil tests that could be cored in the appropriate interval. No tests being planned at onshore localities are within the predicted radioactive area, but if future drilling at Ras El Behar is done, an opportunity may arise. Alternatively, two companies have been contacted to develop their interests: Davy McKee and Stearnes Catalytic, who could do the exploration under a mineral concession. Or, if a British-American proposal results in a concession for

Frasch sulfur exploration, potash can be a second objective. Potash there remains a very likely occurrence and a major economic incentive for Egypt.

It has been learned that EGSMA geologists have discovered a high-grade kaolin bed at the foot of El Tih in the Sinai, and that Sinai Manganese Co. has promptly started mining it. Also, the National Research Center has discovered an important bentonite deposit on the desert road between Cairo and Alexandria.

#### Task IV      Upgrading the Analytical Laboratories

We finally have some significant work to do to improve laboratory output, as suggested by gold consultant, Dr. James. The prism flame spectrometers used for many years for routine elemental analysis have been recommended for retention, but for possible improvement. He suggests obtaining an opinion from an appropriate American consultant to see if the hardware or procedures should be modified to make best use of the apparatus. The existing AA spectrometer and the Beckman on order are believed to be state-of-the-art, but laboratory procedures, especially sample preparation and concentration, have limited the sensitivity below what should be expected of the system. He suggested means of improvement, and that without such changes no gold exploration program has much hope.

Fire assay furnaces have been installed at Marsa Alam to do check analyses close to the field parties. Sample preparation done at that laboratory has also been commented on by the consultant.

Until the budget for Aeroservice work in Area II is allocated to EGPC, there are no funds for EGSMA's laboratory equipment, especially the x-ray.

#### Task V      Geological Museum

New leadership at the Museum has stimulated some progress on the laboratory and office spaces, as well as in refurbishing the display area.

Task VI      Mineral Commodity Program

At the 2nd MPGAP Semi-Annual Seminar, Nov. 5-6, 1984, the new Minister of Petroleum and Mineral Resources stated intentions of stimulating mining investments. He announced that for a year there would be free availability of all existing geological and mineral resource information. The meeting featured 30 papers by invited speakers on a great variety of mineral resources of Egypt. The papers were remarkable in their practical approach to economic aspects of the various deposits. The proceedings will be delivered to the attendees of the symposium, and made available for distribution at cost.

Mr. Randall Chew III has reported for duty as editor and marketing specialist at EGSM. He will teach cash flow analysis for mineral investments, as well as train editors and edit publications. His highest-priority work is the assembly of the first cycle of mineral information packages. The data collection has been proceeding well, but to get the senior geologists to write a summary, including their extensive experience with ideas of prospective developments, more stimulus seems necessary. There are companies waiting for the gold package: notably Amax and Anaconda.

Task VII      Publication and Documentation Center

The EGSM library is to be moved to new quarters, as noted in previous reports. Spaces within the 1st floor, south wing at Abbassia are being cleared, walls erected, doors and air-conditioner ports cut, while offices are being vacated to make room for the long neglected document collections. The latter are being systematically boxed and labelled for the move. The architect and director of this move is Mr. Mohsen El Arini, bilingual library expert and consultant. Dr. Laurence Carver, a consultant hired for the purpose, designed a storage room there for all the Aerservice maps being generated from the aeromagnetic and radioactive surveys.

Training in data-handling by El Ahram (PI course) is being received by eight EGSM and DRI people. He is giving them additional training in librarianship. The task of building a new card catalogue has begun,

using the Dewey Decimal System. He has also contributed to the organization of the libraries and the Geological Museum, the Dokki Laboratory, the Marsa Alam facility, DRI and the Remote Sensing Center. His task is also to make the reference system compatible with the Egyptian National STI network. Many new library reference works have been and will be acquired, as he recommends. New shelving, filing, and furniture are being built or bought in the U.S.

Specifications for two mini-computers to serve data management and computational needs at EGSMA have been written by consultant, Raymond Sadowski of Amax Minerals Systems, Inc. He also ascertained that compatibility will be maintained with the National Technical and Scientific Network. Proposals for acquisition are to be sought.

#### Desert Research Institute

##### Task I      Groundwater Exploration

Field work in Area I near Marsa Alam has been completed as far as can be done without their drilling rig. An interim report, containing all data on 87 water-points, pumping tests, water chemistry, resistivity soundings on profiles across the wadis, and local geology, has been prepared. Work on areas 2 and 3 near Ras Gharib and Baharyia Oasis has been started this Fall. The data collection has not included any quantitative measures that can lead to engineered water-supply systems, but the deficiencies can be rectified after the drill rig has been received and made operational this coming Summer. Then, carefully selected wells can be drilled and pump-tested. The other quantitative measure that could prove valuable is meteorology, but no data-collection system has been deployed as yet.

Two DRI hydroscintists scheduled for training have designed their proposed tour around course offerings of the U.S. Geological Survey.

##### Task II      Data Organization and Analysis

The need for computer facilities has been evident for a long time. Recently DRI bought and put to use a Casio computer, but it proves insufficient in memory to process resistivity soundings with a U.S.G.S.

program. Thus, consultant Ray Sadowski set specifications that will satisfy greater needs in a personal computer with hard disk-pack storage system.

Library work has been done by the DRI staff under direction of Mr. El Arini. The collection of periodicals, reports and books has been reorganized and stored in new facilities. Map storage has also been overhauled. The collection of antique books on naturalia of Egypt was moved to, and organized in a special room at the Palace of Prince Youssef Kamel. Librarian training by Mr. El Arini supplemented attendance at the AJ Ahram P-1 course for several of the staff.

### Remote Sensing Center

#### Task I      Data Organization and Analysis

After occupation of enlarged spaces at the Academy of Science & Technology, it was time to reorganize the library holdings at RSC. Since their principle holdings are maps, photos, mosaics and folios, Dr. Burger obtained the services of a specialist in such data holdings, Professor Laurence Carver from U Calif. at Santa Barbara. He has organized their library and submitted a report and recommendations. While he was here, he also rendered assistance with large-format storage facilities of EGSM and DRI. His advice on tape storage for EGPC, and computer hardware and software for the other agencies was also solicited.

#### Task II      Atlas Production

Because delays in completion of the Wimvex procurement contract have seriously disturbed the production schedule, an interim system has been leased locally to upgrade the MDAS system adequately to get Landsat image processing underway. Although two men were trained at ERIM last Spring, they have been unable to complete more than the first seven scenes. After modifying the contract, ERIM provided Mr. Barry McRae to come to RSC for a brief period, sufficient to get the interim system functioning. I will report any production when it occurs.

Task III      Remote Sensing Workshops

Instructor training at Ann Arbor has been postponed for two reasons: The MDAS system has not yet been upgraded for training or course work, and because the RSC has had other project priorities that usurped manpower. However, some of the training materials are being acquired, such as TM, MSS and color aerial photography.

Egyptian General Petroleum Corporation

a. Aeromagnetic Study in the Eastern Desert

The preliminary basement interpretation of Area I-B has revealed that the magnetic basement is more complex and shallow than gravity and refraction data formerly suggested. The consensus of opinion by Drs. Meshref, Hinze and Hantar is that with 10-12,000 ft. maximum depths, and a low geothermal gradient, sources of petroleum are unlikely. Consequently, EGPC has abandoned plans for further exploration, such as seismic or deep drilling (see h below). Further north, generally downward, the basins are deeper, but these conditions have already been anticipated by ESSO, as the best basins are within their new concession.

Radiometric and magnetic profile data for Area II have been made available, as received by EGSM, and transmitted to NMC for their interpretive use. A pilot program, to evaluate causes of magnetic anomalies in terms of rock magnetic susceptibility, remnant magnetism and structure has been conducted in a test area near the Qena-Safaga Road. NMC has a camp nearby, but collaboration is unknown.

GPC continues to receive voluminous Aeroservice Co. products, but neither EGSM nor EGPC has adequate storage facilities to take their allotted documents. EGSM will be ready in about 6 months, EGPC uncertain

b. Seismic Study in the Eastern Desert

h. Stratigraphic Study (drilling) in the Eastern Desert

These two projects are currently dormant.

c. Seismic Data Storage System and Data Library

One aspect of this project is progressing, namely the work of filing well data, upon engagement of a data specialist from GUPCO. Their first task is to inventory Egypt's wells.

d. Source Rocks/Oil Migration in the Western Desert

It has been learned that GPC has engaged Robertson Research to do essentially this task.

e. Sedimentary/Petrographic Study in the Western Desert and Gulf of Suez

The Western Desert portion is part of the Robertson project. Gulf of Suez research is being done on a separate Robertson Project, financed by subscription in f. below.

f. Estimation of Existing and Potential Oil and Gas Resources of the Gulf of Suez

As reported last period, Robertson Research has won this project.

g. R & D Feasibility of Tertiary Enhanced Oil Recovery

Since September, the reservoir engineering section of GPC has been trying to finalize an RFTP, starting with a prequalifications questionnaire. From eight submissions, three companies have been determined to be qualified, not only for a feasibility study, but for possible sequel pilot testing.

The reservoir engineering department tends to postpone administrative work because too many other priorities occupy the time of the small staff. Thus it cannot be estimated when the proposal will satisfy all parties.

It is noted that the Minister of Planning has said that foreign aid funds should be spent on production, thus stimulating EOR over exploration projects. Another factor is in the understanding that GPC has acquired offshore fields FF, GG and HH, structural continuations of Bakr-Amer, containing some 400 million bbl of heavy crude, thus bringing the total to nearly a billion bbl that could ultimately be stimulated.

i. Training Equipment

In January bids for a Rig Floor Simulator were opened. The low, and only responsive bid was from Simtran Co. of Medway, Mass. We negotiated for several optional increments to the basic unit, and settled at \$250,000 for the delivered, installed equipment, with training provided. It arrives in time to feature in a program of driller training for all companies in Egypt, to be conducted at the Ras Gharib Training Center.