

MANAGEMENT REPORT

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**Submitted to the U.S. Agency for International Development; Bureau for
Global Programs, Field Support and Research; Center for Economic Growth**

**INTEGRATION OF GEOPHYSICAL METHODS FOR
GROUNDWATER EXPLORATION IN TURKMENISTAN**

Principal Investigator: Dr. M. Goldman

Grantee Institution: The Geophysical Institute of Israel

Collaborator: Dr. K. Kuliev

Institution: Turkmengeology

Project Number: CA20-011

Grant Number: TA-MOU-00-CA20-011

Grant Project Officer: William H. Crane

Project Duration: May 1, 2002 – June 30, 2005

The present semi-annual report describes briefly the main activities undertaken in the framework of the project during the period of June 2003 -November 2003.

The Financial Status Report is attached in Appendix A.

1. Scientific Summary:

During the above-mentioned period, a large amount of geological, geophysical and hydrogeological data was analyzed. Based on this analysis, new seismic lines and electromagnetic measurements were planned and located.

Combined application of the seismic and electromagnetic methods is expected to result in a reliable detection and mapping of water-saturated layers and in estimating the amount and quality of the groundwater in detected shallow aquifers of the Kazganchay area.

2. Scientific Issues:

At the present stage of the project, no needs for its restructuring or substantial budget changes were detected.

3. Managerial Issues:

Project managerial issues (including budgetary concerns, staff, timetable and research site changes) have not arisen in the last six months.

4. Special Concerns:

No special concerns arose.

5. Collaboration, Travel and Training:

On the basis of the geological and hydrological data prepared by the Turkmen specialists, as well as of the results of the seismic survey carried out at the previous stage of the project, the following collaborative activities took place:

- analyzing the data;
- planning new geophysical surveys;

- locating the geophysical surveys in the Kazganchay area;
- training the Turkmen specialists in performing TDEM measurements;
- conducting the second stage of seismic and electromagnetic field surveys in the Kazganchay area of Turkmenistan (Fig. 1).

In November 2003, a team of Israeli specialists visited Turkmenistan in order to transfer the technology of performing electromagnetic surveys, to provide training of the Turkmen partners and to plan and carry out the field geophysical surveys. The team included Dr. M. Goldman, M. Gendler and G. Shklyar. During the visit, the Israeli specialists held a series of meetings with local specialists regarding cooperation in groundwater exploration in Turkmenistan, performed a training of Turkmen geophysicists and carried out the geophysical surveys. The training activities took place both in the offices of the Ahal Geophysical Expedition of the S.C. "Turkmengeology" and during the field works in the Kazganchay area of the central Kopet-Dag region.

The participants from the Turkmen side included Dr. O. Atageldyev (State Minister, Chairman of the State Corporation "Turkmengeology"), Prof. K. Kuliev (Vice-Chairman of the S.C. "Turkmengeology") V. Fedin (Chief Geophysicist of the S.C. "Turkmengeology"), Prof. A. Avanesov (Chief Hydrogeologist of the Water Corporation "Senagat-Suv"), I. Bairamova (Head of the Ahal Hydrogeological Expedition) and Ch. Annageldyev (Head of the Ahal Geophysical Expedition).

The geophysical field surveys included seismic and electromagnetic measurements carried out in the Kazganchay area.

Seismic reflection survey were performed along two lines running in a general SW – NE direction (lines KA-003 and KA-004, Fig. 2). The lengths of lines KA-003 and KA-004 were about 3000 m and 10000 m, respectively. The lines pass through five water wells, 460-K, 318-P, 461-K, 316-P and 317-P. The seismic field works were conducted by the Ahal Geophysical Expedition using the same equipment and parameters as at the previous stage. The seismic data acquisition took about two weeks. After completing the acquisition, the data were copied to a cartridge and

transferred to the GII for processing. At the same time, the data were processed at the processing center of Turkmengeology.

The time domain electromagnetic (TDEM) survey included 8 TDEM soundings located along the seismic lines (soundings K1 through K8, Fig. 2). The western TDEM profile included points T1, T2, T7 and T3 and ran in the vicinity of water wells 461-K, 419-K, 316-P and 317-P. The eastern TDEM profile included points T8, T4, T5 and T6 and ran in the vicinity of water wells 459-K, 437-K, 460-K and 318-P.

The main objective of the TDEM survey was to test the ability of the method to characterize groundwater salinity under specific hydrogeological conditions of the area. The Geophysical Institute of Israel (GII) acquired a great experience in performing similar surveys in Israel and abroad (Cyprus, Eritrea, Jordan). As a result, the present survey in Turkmenistan ran very smoothly, the collected data were of superior quality, and we believe the next stage of the project, including data processing and interpretation, will be as much successful as the acquisition was.

The equipment for the TDEM survey was brought from Israel. All TDEM measurements were carried out using the so-called central loop array, which is schematically shown in Fig. 3. The transmitter loop size in all eight soundings was 100 by 100 m that should provide the required exploration depth between 150 to 200 m. The Geonics PROTEM-67 TDEM instrument including high power TEM67 transmitter, PROTEM digital receiver and 100 m² receiver coil were used for the measurements. The power was supplied by car batteries provided by the Ahal Geophysical Expedition.

In the framework of the survey, the GII specialists conducted training of geophysicists from the Ahal Geophysical Expedition and from the State Corporation "Turkmengeologiya".

All the necessary logistical support, including surveyors, field workers, cars, cables, etc., was provided by the Ahal Geophysical Expedition.

The following activities are planned for the next 6 months:

- ❖ Processing and interpretation of the acquired seismic and geoelectric data at the GII and in Turkmengeology.
- ❖ Visit of the Turkmen specialists to Israel in order to perform a joint geological and hydrogeological interpretation and analysis of the seismic and electromagnetic data, to discuss the results of the second phase of the project and to plan the next phase.
- ❖ Joint interpretation of geological, hydrogeological and geophysical data for mapping the aquifer and estimating its properties.
- ❖ Preparing recommendation and report summarizing the conducted investigations.
- ❖ A purchase of three personal computers and software for interpretation of geoelectric data for Turkmen specialists.

APPENDIX A

FINANCIAL STATUS REPORT

APPENDIX B

LIST OF FIGURES

Fig. 1 Location of the study area

Fig. 2 Location map of water wells, seismic lines and electromagnetic measurements
in Kazganchay area

Fig. 3 Central loop TDEM field array



Fig. 1 Location of the study area

TDEM field set up

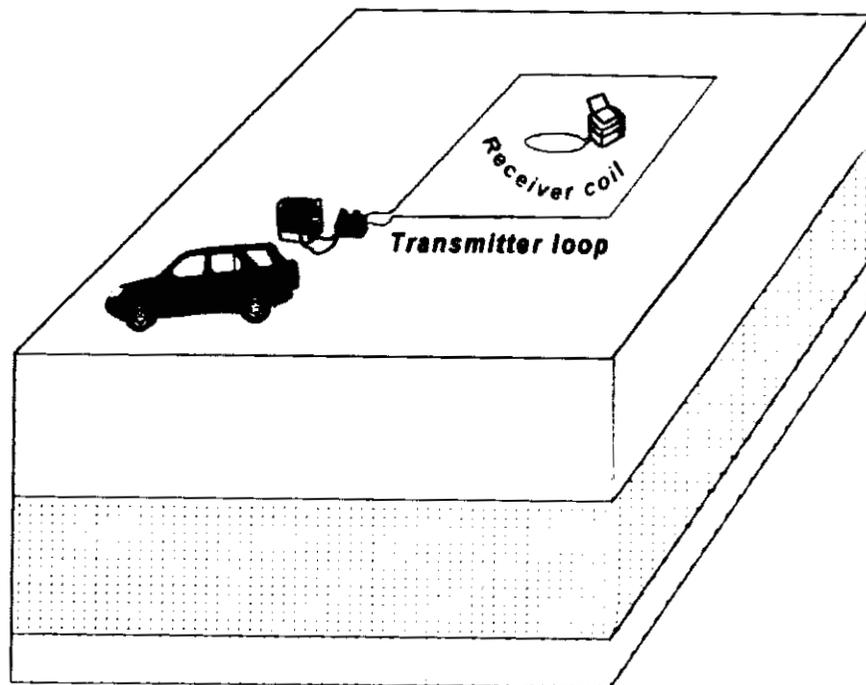


Fig. 3 Central loop TDEM field array