APPENDICES

with the advice for
Terms of Reference for the
environmental impact statement/
technical and financial feasibility
study for lining of the Ismailia
Canal, Egypt

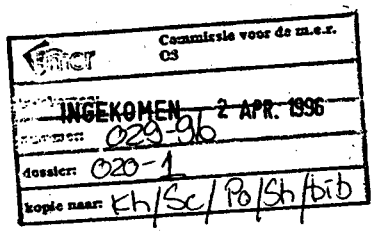
(appendices 1 to 4)

APPENDIX 1

Letter from DGIS dated 29 March 1996, in which the Commission has been asked to submit an advice for Terms of Reference

Ministry of Foreign Affairs

The Hague



Commissie voor de milieu-effectrapportage
t.a.v. de heer drs. J.J. Scholten
Postbus 2345
3500 GH Utrecht

Directorate-General
International Cooperation

Date : 29 March 1996

Re : Ismailia Canal Egypte
WW92850
JRC 381-93
MER/020/95

Ref : DST/ML-670/95

Bitumarin, a Netherlands firm will be supported with a grant under the ORET-programme for the delivery of materials and equipment for the lining of one kilometre of the Ismailia Canal in Egypt, to produce part of the construction materials in Egypt, to supervise the execution of the lining works and to train Egyptian engineers and operators in the application of this system. The transaction is to be considered as a pilot activity, which if successful, may find large scale application in lining of the Ismailia Canal in particular and of other irrigation canals in the Nile Delta in general.

The main objective of the project is to test the lining system on the possibilities for wide scale application with the objective of prevention of the present substantial leakage in those sections of the canal situated in sandy soils and, at the same time, to reduce maintenance cost of the canal. A second main objective is the expansion of the discharge capacity of the canal.

DGIS has decided that an EIA, a financial cost-benefit analysis and a technical feasibility should be executed during the pilot project. The three studies are interlinked, specially the Environmental Impact Statement and the technical feasibility. DGIS will provide Bitumarin with one set of Terms of Reference for the total study, integrating the three herefore mentioned ,parts.

I request, herewith, the Commission, with reference to the EIA agreement between DGIS and the Commission, to prepare an advice on the Terms of Reference for the Environmental Impact Statement and the technical feasibility study. In view of the technical feasibility I kindly request you to consider Mr P.J. Eversdijk, Ministry of Transport, Public Works and Water Management to participate as a team member of the working group of the Commission.

I would appreciate receiving a proposal concerning membership of the working group and the budget to formulate the advice.

THE MINISTER FOR DEVELOPMENT COOPERATION
For the Minister
Head Environment Programme,

K.A. Koekkoek

APPENDIX 2

Project information

Proposed Activity: A request for an ORET grant ('Ontwikkelingsrelevante Export Transacties', Export Transactions relevant for Development) has been made by Bitumarin for delivery of materials and equipment for the lining of one kilometre of the Ismailia Canal in Egypt. The transaction is to be considered as a pilot activity, which if successful, may find a large scale application in lining the Ismailia canal in particular and of other irrigation canals in the Nile Delta in general. The advice presents Terms of Reference for a technical and financial feasibility study with respect to the pilot project. Furthermore the advice presents Terms of Reference for an EIS for the Ismailia Canal as a whole, assuming that lining will be applicated on a large scale.

Categories: Flood prevention/control DAC CRS-code 92021; River development DAC CRS-code 97300

Project numbers: DGIS: WW92850; JRC 381-93; MER/020/95; Commission for EIA: 020

Procedural information:
Letter requesting advice for Terms of Reference: 29 March 1996
Advice for Terms of Reference submitted: 20 June 1996

Composition of the working group of the Commission for EIA:
Mr P.J. Eversdijk
Mr J.W. Kroon (chairman)
Mr R. Ooijen
Mr D. C. Verhage (resource person)
Mr G.J.M. Wintermans
Mr T. van der Zee

Technical secretary: Mr A.J. Kolhoff

APPENDIX 3

Terms of Reference for a monitoring programme of the pilot project

Table of contents

1. OBJECTIVES

The monitoring programme is aimed at the collection of the following data:

- general information of the pilot project;
- measurements of physical parameters for appraisal of structure performance (reduce leakage, increase of discharge capacity, reduction of flow resistance et cetera);
- monitoring of aspects of critical structural elements during installation for technical quality assessment (i.e. trimming of slopes and bottom, sealing of mattresses, attachment upperside of mattresses by ground anchors);
- systematic registration of installation process for extrapolation of investment costs to large scale application of the composite lining system (required man-hours, material quantities and operational hours of equipment).

2. DESCRIPTION OF MONITORING PROGRAMME

In this chapter a detailed description of the key elements of the monitoring programme will be given.

2.1 General information

The gathering of general information of the pilot project consists of the following issues:

- key plan of area where the trial project is located;
- cross-sections Ismailia Canal before lining;
- local bottom depth;
- height of banks, levees and dikes;
- design cross-shore profiles after lining;
- construction details of Bitumarin lining system:
  - attachment of Hypofors membrane to Betomat mattings of concrete blocks;
  - manufacturing of concrete blocks;
  - earthworks;
  - equipment used for installation of mattresses.

2.2 Physical parameters

The measurements of the physical parameters for appraisal of structure performance (reduce leakage, increase of discharge capacity, reduction of flow resistance et cetera) will focus on the following:

bathymetrical/topographical data
Bathymetrical and topographical measurements should be performed at regular distances in series of (transversal) profiles along the trial section. The profile measurements simultaneously encompass the entire exposed and underwater parts of the canal.

The measurements are carried out along profile lines which should be a straight line at right angles to the canal banks and should be controlled from a bench mark with known reference level.

It is proposed to apply a distance of 50 m between successive profiles lines. This means that a total of 21 profile measurements should be performed along the trial section.

The exposed part of the profile should be measured with topographic instruments consisting of an engineers level with tripod in combination with a levelling staff. The underwater part should preferably be measured with a portable echo-sounder fixed on a small rubber type boat, with the transducer mounted under or on the side of the boat. When echo-sounding instruments are not available, bathymetric profiles should be surveyed point by point from a boat,

by measuring the depth of the canal bottom with a simple sounding line, consisting of a graduated rope and a ballast.

The measurements should be carried out for the existing situation, after trimming of the slopes and bottom of the canal and after the installation of the composite lining system.

Hydrodynamic data (current velocities and water levels)
Current velocity measurements should be carried out with a propeller type current meter (e.g. Ott propeller) operated from a small boat. The measurements should be carried out in several cross-sections. The cross-sections should be located near the upstream end of the trial section, midway and near the downstream end. For reference purpose an extra cross-section should be located at a sufficient distance upstream of the trial section (say 500 m).

In each cross-section the measurements should be carried out in 3 stations (in the centre of each profile and at either side of the centre at a distance of 15 m). In each station the current velocity should be measured at 5 points in the vertical (0.5 metre below the water surface, 0.5 metre above the bottom and 3 points evenly distributed over the remaining vertical).

For ease of interpretation the measurements should preferably be carried out in each cross-section simultaneously. However, from a practical point of view this is not considered as a realistic option (because of required manpower, number of instruments et cetera). In stead, it is proposed that during the whole measuring programme at one location (e.g. at mid-depth in the centre of the cross-section which is located 500 m upstream of the trial section) the current velocity is measured on a semi-continuous basis, say every hour. This measurement can also be carried out with a propeller type current meter or an automatic autonomous self-recording current meter.

The current measurements, on a monthly basis, should already start before the installation of the lining system (say a total number of three times). The objective of these measurements is twofold, viz. to gain experience in the measuring procedure and to obtain a representative measuring series for the existing situation (baseline situation). After completion of the lining system the current measurements should continue over a sufficient long period (say six month) in order to some obtain insight in the variability of the process.

In general, a properly maintained propeller meter is a reliable instrument for use in uniform and quasi stationary flows. Inaccuracies, generally, being in the range of a few percent. However, depending on the specific type, the functioning of the impellers may be sensitive to silt or sand. Therefore, calibration of the instruments should be done regularly in a known current.

Water levels can be determined easily by visual observations using a fixed tide board with centimetre-scale and known reference level. The measurements should be carried out simultaneously with the flow measurements in the same cross-sections. As it is expected that the daily variation of the water level is only small, a measuring interval of one hour will be sufficient.

Geophysical data (groundwater levels, bottom samples)
Groundwater levels should be measured on a semi-continuous, day-to-day basis, before, during and after completion of the lining works. The measurements should start already 3 months before the actual installation of the lining system (base line situation) and should continue over a period of 6 months after completion of the works.

To perform these measurements, extra groundwater gauge-tubes (?) should be placed along the channel in the area where the trial project is executed. It is proposed to place the gauge-tubes in the same cross-sections as where the current measurements are performed, viz.: at a distance 500 m upstream of the trial section, near the upstream end of the trial section, midway and near the downstream end.

In each cross-section the gauge-tubes should be placed at either side of the canal at a distance of 5, 10, 50, 100, 250 and 500 m from the canal banks.

The filters in the gauge-tubes should be situated at a sufficient depth below the saturation zone in order to prevent drying up.

Bottom samples should be collected by means of an ordinary Van Veen type grab, and should be analysed on grain-size distribution. For the determination of the wet bulk density, samples should be collected by means of a medium size core-sampler, fitted with one-way valves to retain soft material. The collected samples may be regarded as practically undisturbed. Bed material should be transferred into 100 ml containers (marked and labelled, with known weight and volume) and sealed in plastic. In the field laboratory the total weight should be determined to an accuracy of 10 mg and should be stored in an electric oven to dry. Both wet and dry bulk density should be calculated, yielding the porosity of the material.

It is proposed to collect the bottom samples in the same profiles as where the bathymetrical measurements are performed. The samples should be taken after trimming of the bottom and the slopes of the canal (but before placing of the lining system).

Daily weather conditions
The weather parameters (air temperature, surface water temperature, humidity, degree of cloudiness) and the water temperature at the project site should be measured on a semi-continuous, day-to-day basis, before, during and after completion of the lining works. The objective of these measurements is to estimate the total loss of water mass of the trial section induced by evaporation.

The measurements should start already 3 months before the actual installation of the lining system (base line situation) and should continue over a period of 6 months after completion of the works.

2.3 Aspects of critical structural elements

From a technical point of view it is concluded that the proposed construction is sound, simple and well workable (see NEI report, September 1995).

It is also understood that the delivered supplies will comply with the quality for Netherlands water related structures.

It is assumed that the Contractor will adopt a proper quality control system for the proper realization of the construction process, i.e. that specifications will be fulfilled and that construction will proceed according to the programme.

Processes that can be subjected to quality control system are listed in the Table enclosed (derived from Manual on the Use of Rock in Hydraulic Engineering, CUR 169).

During construction stage monitoring of aspects of critical structural elements should be carried out for technical quality assessment. For the composite lining system the contractors quality plan should at least address the following critical aspects (and the corresponding placing tolerances):

- cleaning, excavation and smoothing of bank and canal bottom (unevenness);
- positioning of mattresses (interstices);
- adhesion of mattresses with bituminous sealing strips (leakage);
- attachment of mattresses to the slope with stakes or ground anchors (instability);
- results of find inspection by divers (with video equipment).

It should be stated that the final monitoring programme of this stage can only be made with the construction contract and contractors quality plan on the desk.

2.4 Systematic registration of project

Systematic registration of all stages of the project should be carried out to enable an extrapolation of the investment and maintenance costs to large scale application of the lining system.

The registration should comprise the following issues:

- required man-hours (local and foreign staff) for work preparation, training, manufacturing and assembling of mattresses, transportation, earthworks, installation and maintenance of the composite lining system;
- material quantities;
- type of equipment and operational hours;
- re-calculation;
  by post (part of the work) keep up to date: man-hours, equipment-hours, supply's, stock-taking of all equipment with description of normative parameters.

3. PROCESSING OF MONITORING DATA

The bathymetrical and topographical data as measured during the period of the survey should be reduced to Chart Data or to Ordnance Data depending on the request of the Ministry of Public Works and Water Resources. The applied Data must be clearly defined and reference marks be mentioned in detail. The results should be presented graphically in plots and on diskette in ASCII-format.

The water levels should also be reduced to Chart Data or to Ordnance Data. The results should be presented in tables and on diskette in ASCII-format.

For the current measurements in the cross-sections the full period of the records must be elaborated and presented in 4 ways, including relevant information on location (cross-section, station), depth of instrument, local depth below CD, type of instrument and serial number, type of impeller and serial number, and calibration data:

- graphically in plots per station, showing the current velocity distribution over the vertical, positive in the downstream direction;
- on diskette in ASCII-format;
- per station showing the depth-averaged velocity and unit-width discharge;
- per cross-section the total discharge.

Separately, a table should be provided showing the comparison between the reference current recorder (e.g. at mid-depth in the centre of the cross-section which is located 500 m upstream of the trial section) and the current velocities in the remaining cross-section.

For the groundwater level recordings the results should be presented in 2 ways, including relevant information on cross-section, date et cetera:

- graphically in plots of one week each, showing the daily distribution of the groundwater level along the cross-sections;
- on diskette in ASCII-format, one column for the time (interval of 1 day), and one for the groundwater levels at the various locations per cross-section.

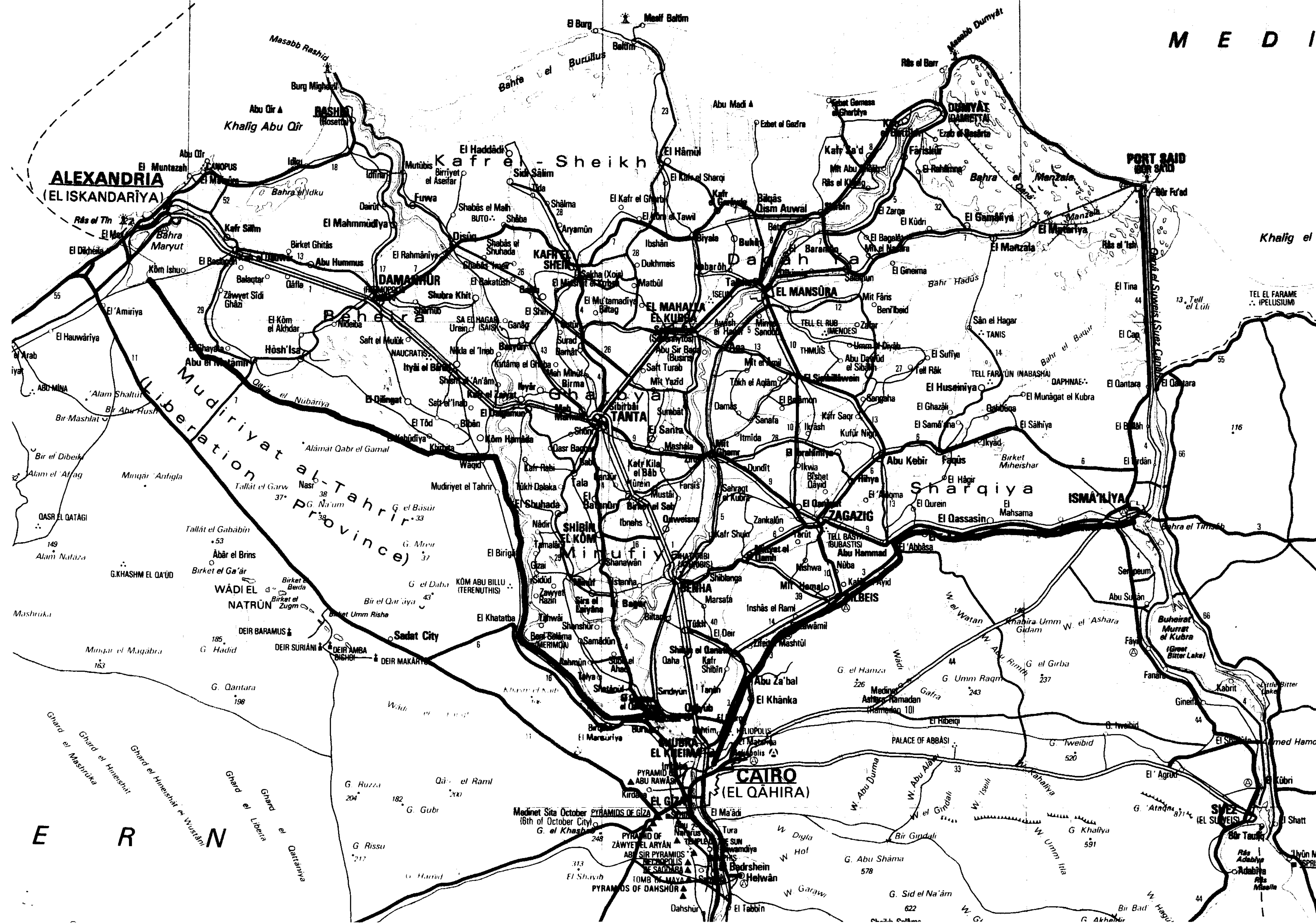
Bottom samples should be analysed on grain-size distribution, the results graphically presented in a curve showing the weight-percentage on or through the sieve (larger or smaller) versus particle diameter. Sand, silt and mud fractions must be taken into account.

Of the undisturbed samples, the wet and dry bulk density must be stated, yielding the porosity, in a tabulated form showing columns for sample number, location, wet volume, wet weight, wet bulk density, dry volume, dry weight, dry bulk density and porosity.

All measured weather parameters (air temperature, surface water temperature, humidity, degree of cloudiness) and the water temperature at the project site should be tabulated against time, the head of the table indicating location, date and relevant particulars like types of instruments, serial numbers and calibration data.

APPENDIX 4

Map of Egypt


MEDI
ALEXANDRIA
(EL ISKANDARĪYA)
CAIRO
(EL QĀHIRA)
PORT SAID
(BÛR SAʿÎD)
DUMYÂT
(DAMIETTA)
RASHÎD
(Rosetta)
SUEZ
(EL SUWEIS)
ISMÂʿÎLIYA
ZAGAZIG
EL MANSÛRA
TANTA
DAMANHÛR
KAFR EL SHEIKH
BENHA
SHIBÎN EL KÔM
EL MAHALLA EL KUBRA
EL GÎZA
Kafr el - Sheikh
Daqahlîya
Gharbîya
Sharqiya
Minufiya
Beheira
Mudiriyat al-Tahrir
(Liberation Province)
Khalîg Abu Qîr
Bahra el Burullus
Bahra el Manzala
Bahra Maryut
Bahra el Idku
Qanâ el Suweis (Suez Canal)
Buheirat Murrat el Kubra
(Great Bitter Lake)
WÂDI EL NATRÛN
Sadat City
Medinet Sita October
(6th of October City)
PYRAMIDS OF GÎZA
PYRAMIDS OF DAHSHÛR
Helwân
Bilbeis
Abu Qîr
Idku
Fuwa
Disûq
Kafr el Zaiyât
Mit Ghamr
Faqûs
Abu Kebir
El Qassasîn
El Qantara
Fâyid
Kabrit
Masabb Rashîd
Masabb Dumyât
E R N