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DANIDA

Environmental Information and Monitoring Programme (EIMP). Air Quality Monitoring Component

Mission 18 Report

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1 Introduction

The 18th mission to Egypt was undertaken in March-April 2000. The EIMP project is funded by Danida and headed by COWI.

The work undertaken during the spring 2000 included training, audits, repair and final preparations of measurement stations, data retrieval and data base testing, QA/QC developments and reporting of various kind. A comprehensive amount of time was spent with the Monitoring Institutions to undertake training in data retrieval, data evaluation, data statistics and reporting. The first annual report was outlined for EEAA, but could not be finalised due to inadequate statistics available in the database.

The Air Quality Monitoring Team consisted of Bjarne Sivertsen, Rolf Dreiem, Haytham Ahmed and Hebatalla Fathy. The main task for the mission was to finalise training and reporting. In addition to the scheduled tasks, the last sites had to be designed, the measurement network was inspected again, the database was tested and found inadequate, reporting was improved at the institutions and a 3 day seminar was conducted as part of the training in understanding air quality.

Rolf Dreiem audited the monitoring stations and undertook calibrations and checks of instruments. He also continued on-the-job training of personnel at monitoring institutions.

With reference to the work programme the following tasks have been undertaken:

A. Institutional support
   Tested databases, and performed training of counterpart and Monitoring Laboratories.
B. Design of monitoring programme
   Finalised site design in Alexandria.
C. Procurement
   Specified additional equipment needed, finalised spare part lists, prepared NH_3 samplers and instrument for AbuQuir, and ordered the rest of the $PM_{10}/PM_{2,5}$ AIRmetrics samplers.
D. Data management
   Discussed data retrieval, databases, data availability, data quality and data transfer to EEAA.
E. Training
   Continued the on-the-job training at the Monitoring Laboratories including data retrieval, data interpretation, reporting, calibrations, repair, maintenance, operation and chemical analyses.

F. QA/QC
Continued the implementation of the QA/QC procedures at all levels. On-the job training in understanding the importance of QA/QC and personal communications at all levels of the QA/QC process.

G. Monitoring
Continued weekly and biweekly meetings at the institutions to train the monitoring institutions in operation of the programme. Gave support to the laboratory at CEHM in maintenance, service and repair. Evaluated data, developed reports at Monitoring Laboratories and reports and newsletters at EEAA.

H. Reference Laboratory
Update personnel and equipment for monitor calibrations. Supported the Reference Laboratory in travelling standards calibration.

I. Component Co-ordination
Prepared memos and reports, newsletters, monthly status reports, meetings etc. Prepared and conducted the 3 day seminar on "understanding air pollution".

The responsible personnel at the various institutions involved, as well as some of the persons we met during mission 18 are presented in Appendix A.

2 A. Institutional support

2.1 Activity A.2.2 Assist in describing work functions for new experts

During the testing of the database programme at the Monitoring Institutions problems were identified in the data import/export as well as lacking statistical routines.

This lead to withdrawal of the version 1.2 already installed, and further modifications and development started at the computer component of EIMP/EEAA. The first version, 1.01 will be used at CEHM and IGSR until the new version is fully developed and tested at EEAA.

Tasks to be undertaken by the Counterparts were discussed in weekly meeting. A summary of tasks to be undertaken after the Mission was discussed at a meeting before departure. A memo prepared is presented in Appendix A.2.1.

The remaining input from NILU to the EIMP project was discussed and will be finally specified after the report from the Danida Review Mission has been presented and discussed.

A memo was also prepared to describe the need for further work. (Appendix A.2.2)

3 B. Design of monitoring programme

The air quality monitoring programme was again assessed during the mission. Visits and discussions were undertaken at the AbuQuir military academy in Alexandria, to manage the updating of this site.

The last AIRmetrics samplers for PM_{10} measurements were added to the programme. Three additional samplers were ordered to fulfil the designed programme.

A complete updated description of the programme was developed and presented in Appendix B2.1.-2.4..

3.1 Activity B.2.1 Select representative monitoring sites for air quality measurements

Already during the last mission to Egypt it was decided to move the monitors originally located at AbuQuir, east of Alexandria, to the city centre of Alexandria. The new site was selected at ElShouhada Square (near the main railway station). All permissions have been taken to install the shelter and start measurements. The process was, however, delayed due to problems at Abu Quir College.

Further discussions and modifications to the programme in Alexandria is presented in Appendix B.2.1

A new site for measurements of particles by High volume sampler and dust fall collector, and gases by passive samplers was started at ElNahda in the Amryia District south of Alexandria, close to the Carbon Black factory.

As a final result of the establishment of an air quality monitoring programme for Egypt the EIMP programme has installed a total of 42 stations in Egypt. There are 14 sites in the greater Cairo area, 7 sites in Alexandria, 8 sites in the Delta, 3 sites in the Canal area, 9 sites in upper Egypt and 1 site in Sinai.

4 C. Procurement of equipment, hardware and software

Some procurement activities remained into this mission. However, most of the procurement has already been finalised. Discussions of additional samplers as well as consumables and spare parts represented the main part of these activities.

4.1 Activity C.2.1 Procure instruments and equipment

A system for purchasing spare parts and consumables had been discussed and presented in October 1999. However it is felt that these procedures have to be simplified.

A system working through the Monitoring Institution at CEHM has improved the procedures somewhat. A better follow-up procedure versus CTS, and an improved communication concerning spare parts had to be enforced. Procedures for ordering instrument parts and calibration equipment are indicated in Appendix C.2.1.

A list of spare parts that were available in the storage as of March 2000 was developed and can be seen in Appendix C.2.2. The ordering of gases for VOC analyses has been a long process, and it was still not finalised at the end of this mission.

A new instrument for measuring NH3 at Abu Quir was requested. One possible instrument was identified and ordered as seen in Appendix C.2.3-2.4.

The need of reference gases for the operations of monitors both at the Monitoring institutions and at the Reference Laboratory was identified. The needs and procurement requests are shown in Appendix C 2.5-2.7.

5 D. Data management

The database developed by EIMP at EEAA was tested and modifications were started during the Mission. A need for up dating of software applications was identified, and the development will continue.

5.1 Activity D.1.1 Specify data collection and data transfer

Data collection procedures have been specified for data collected by passive samplers, sequential samplers and for automatic monitors. Procedures for use of high-volume samplers for TSP and PM_{10} have also been specified and established at the monitoring institutions.

5.2 Activity D.1.2 Specify data retrieval and local data base at Monitoring Laboratory

The data retrieval and data storage at the Monitoring Laboratory is based upon the use of the System Manager. Data scaling, data storage, data quality control etc. has been discussed as part of the training of the Monitoring Laboratory personnel.

Training of expert personnel for these operations continued during Mission 18. Routine control of all data retrieved is essential on an every day basis. The programme manager and the system manager programmes have been the basis for the data retrieval process.

Installation of the air quality database developed at EEAA/EIMP, was undertaken at the monitoring institutions during January 2000. However, this did not work properly at the institutions and the main part of the presentations of the quarterly and annual reports at the Monitoring Institutions were still performed using a preliminary database including a simple graphical and statistical tool was developed based upon Excel. The Monitoring Laboratory experts were trained in the use of this tool for preparing the quarterly reports

5.3 Activity D.1.3 Specify data quality check and control procedures

Data quality controls apply both to the automatic monitoring data and to semi automatic and manually collected data.

Quality control descriptions, manuals and reporting procedures were finalised in April 2000. Logbooks have been established for each instrument. The laboratory routine data monitoring, retrieval, storage and quality control are undertaken under supervision of an auditing system established at the Reference Laboratory.

5.4 Activity D.1.5 Telecommunication lines

Obtaining good quality telephone lines have been a great challenge at some of the automatic monitoring sites. Some data had to be collected with diskettes. However, during the end of 2000 it is believed that all monitoring sites will be equipped with adequate telephone lines.

The possibilities of using mobile telephones have been evaluated. Meetings with the Click Company have been arranged, as seen in Appendix D.1.1-D1.2. After discussions at EEAA it was decided, however, to use the normal telephone network. However, there were still sites at the end of the Mission, which not were adequately equipped with telephone connections.

5.5 Activity D.2.1 Prepare database for manually analysed data

A laboratory database for samples of inorganic compounds was prepared during Mission 10. A database for VOC samples was supposed to be established in October 1999, but due to personnel problems at CEHM, this work has been postponed till October 2000.

The use of the local database for manually analysed data was checked and discussed with new chemists at the CEHM laboratory. The routine work seems to be operating satisfactory.

5.6 Activity D.2.2 Local database for monitor data at the Monitoring Laboratories

A first version of the EEAA/EIMP developed air quality database was presented during January 2000. It was given to the institutions without a final testing at EEAA. This created extra work and the database programme had to be taken back for further development at EEAA.

The status of the database at CEHM was presented in a memo on 27 March 2000 (Appendix D.2.2). Some of the problems faced at IGSR were summarised in a Memo also dated 27 March 2000 (Appendix D 2.3.).

A local database for the data retrieved from the monitoring system is part of the System Manager. The details and content of this database has been the basis for the QA/QC procedures implemented at the monitoring institutions. The final local

database will, however, be based on the final version of the EIMP/EEAA developed air pollution database. Developments were still under way at the end of Mission 18.

5.7 Activity D.3.1 EEAA data base

The development of the air quality database, which has been presented above as the Monitoring Institution database is the same as the one that is being developed for EEAA experts.

The databases and air quality statistics was tested and will have to be finalised during the end of 2000. The statistical procedures for data treatment were still under development at the end of Mission 18. Statistical programmes such as wind roses, Breuer diagrams and some frequency distributions were discussed and specified for the computer experts. Dean Jones also presented the status in January 2000. Selected pages from this report are presented in Appendix D.3.1.

Data reporting at EEAA started using the first version of the database programme in March 2000.

6 E. Training

The training need assessment is completed and counterpart training is ongoing. The training included assessing and planning of training for the staff from EEAA, IGSR, Cairo University and the reference laboratory for air during 1999-2000. The need for further basic training workshops and seminars was evaluated. A training programme in understanding air pollution was planned and designed.

6.1 Activity E.2.2 Training programme for instrument operation and maintenance.

The training continued both at the Reference Laboratory and at the Monitoring Laboratories and will continue into fourth and last phase of the project. An on-the-job training programme has also been completed for daily instrument checks, calibration and maintenance.

The following topics have been included in the training programme for instrument operations and maintenance:

- Instrument installations,
- instrument calibrations,
- control and maintenance,
- data transfer procedures ,
- data retrieval programme,
- data handling at the Monitoring Laboratory,
- data storage and presentation.

An important part of the training undertaken in 1999-2000 was to learn how to install, operate, calibrate and maintain the various types of monitors.

6.2 Activity E.2.3 On-the-job training at the Monitoring Laboratories

On-the-job training was undertaken during the year for personnel both at the Monitoring Laboratory and at the Reference Laboratory

Several seminars and workshops have been undertaken since the beginning of the programme. The monitoring institutions as well as the EEAA counterpart have received training in interpreting and understanding the air quality data collected. Basic training in air quality work has been given to the Team leader counterparts partly in the process of producing newsletters, monthly and annual reports.

Installation and use of monitors as well as controls was undertaken as on-the-job training efforts at the Monitoring Laboratories, as mentioned before.

6.3 Activity E.2.4 Support training to Reference Laboratory personnel

Several training programmes was designed and given to the Reference Laboratory-air staff:

- QA for monitors, including validation and control routines
- Complete training in external calibration, including documentation
- Auditing of monitoring stations/field check of calibration
- Completion of Reference Laboratory quality system documentation as regards technical issues

Training in wet chemistry methods for analysis of manually collected filter samples was also offered to the Reference Laboratory personnel, but only one person attended only one session.

Audit basics and theory behind auditing was presented during the first workshop in 1999. The first Audits were undertaken in 1999, and followed up in the spring 2000. Meetings between the Reference Laboratory personnel and the Monitoring institution were arranged to summarise the experience gained from the first Audits performed.

6.4 Activity E.5.1 Use of the System Manager

Training in the use of the System Manager at the Monitoring Laboratories started in 1997. The main part of this training, including practical use of the system, remote calibrations, data quality controls, cleaning of data, data plots and storage of raw data started at the Monitoring Laboratory in 1999. Several training sessions have been undertaken both by the data retrieval supplier and by the EIMP staff.

The complete utilisation and understanding of the application of the System Manager will still have to be repeated throughout the whole year 2000. This will also be dependent upon a fully operational database system.

6.5 Activity E.5.2.Training in use of EEAA data base

The EEAA ambient air pollution database will include statistical programmes designed for air quality data and report generators. Some training in the use of the first version was undertaken in 1999 and 2000. (See Appendix E.5) However, the full version was still not available at the end of Mission 18. Further training will thus be needed.

It is anticipated that an operational database may be ready at the end of 2000.

6.6 Activity E.6.1 Sample preparations

A final training programme for the preparation and use of various filters for sequential samplers and for passive samplers was undertaken in February 1999. Further practical training in filter preparations and analyses was repeated in October 1999.

The training programme for preparing the VOC samplers was also started in October 1999, but was postponed due to personnel problems at CEHM

6.7 Activity E.6.2 Chemical analyses of various filters

Filter analyses have been undertaken at CEHM since March 1998. However, some problems in understanding some of the very high concentrations of SO_2 and NO_2 and some consistently low levels recorded in Alexandria were discussed during in 1999. Additional filters were collected and brought back to NILU for analyses. Results and procedures were discussed again in March 2000.

6.8 Activity E.7.1 Air quality data interpretation

The modern air quality monitoring and information system that has been established for Egypt as part of the EIMP programme is now producing data. The measurements combine on-line monitoring and standard sampling methods and it is important to understand the background and the quality assurance of these data before presenting them.

The selected pollutants measured are in accordance with the air quality standards given in the environmental laws of Egypt. As a background for understanding the air pollution concentration values, as well as understanding the relationship between emission sources, dispersion meteorology and air quality a seminar was planned and conducted in April 2000. The seminar lasted for 3 days and was held at the Palmera Beach Resort at the Red Sea. The 14 selected experts who participated in the seminar are presented in Appendix E.7 together with the programme. A textbook was also issued as part of the training seminar (Sivertsen, 2000).

Work was also conducted during Mission 18 as an on-the-job effort to support the understanding of the air quality data through preparation of monthly reports, newsletters and preparation of the annual report.

7 F. QA/QC

7.1 Activity F.2.1 Instrument calibration procedures

All measurement and sampling procedures (SOP; Standard Operation Procedures) has been developed and finalised in April 2000. The procedures have been tested in 1999-2000. They seem to have been understood by the field personnel, but the follow up and the applications of the system still lack some consistency among the different experts.

A further follow up of these procedures has been described as part of the Audit programme.

7.2 Activity F.2.2 Design QA / QC procedures at Monitoring Laboratory

Updating and verification of the QA/QC system with relevant documentation and procedures was performed during the year. Auditing of the systems started by the Reference Laboratory-air. The air pollution component experts supervised the first Audits.

QA/QC programmes have been prepared for all types of data collected. The procedures are quite different. It is important that the responsible laboratory team is committed to include QA/QC as routine also as part of their tasks. A check of the routines was performed in October 1999 and repeated in March 2000. They seem adequate.

For the monitoring system QA/QC system has been designed both for CEHM and for IGSR in co-operation with the QA adviser together with the EIMP instrument expert. A Memo summarising the status of the QA/QC system is presented in Appendix F.2.2.

7.3 Activity F.3.1 QC and calibration routines as part of the on-the-job training

The Monitoring Laboratory personnel is now operating monitors and samplers using all the SOPs and manuals developed throughout the development of the programme. On-the-job training in the use of these routines has been an ongoing process through the installation| until the completion in June 1999. A training

schedule for maintenance and calibration was presented in March 2000, as shown in Appendix F.3.1.

7.4 Activity F.4.1 Input from Reference Laboratory- Air

For the sampling system the EIMP Reference Laboratory manager was supposed to support the design of QA/QC procedures for the analytical programme. This task has not been completed yet. As part of input to the QC procedures developed at CEHM, the scope of this work has been presented in Appendix F.4.1.

Auditing of the systems started by the Reference Laboratory-air. The air pollution component experts supervised the first Audits.

8 G. Monitoring

The EIMP/EEAA air quality monitoring and sampling programme should be operated on a routine basis from January 2000. The Monitoring Laboratories have been trained and have adapted most of the standard operation procedures and maintenance of the network. Further development of reporting formats as well as adjustment of procedures and registration of the performance started during Mission 18.

8.1 Activity G.2.3 Monitoring programme updated

Most of the monitoring programme installations were finalised in July 1999. The programme needs a continuous evaluation and updating. Some sites were already changed in 1999-2000, such as:

- the monitoring station at El-Gomhoriya , which was moved to another room at the ground floor,
- the AbuQuir site, which was turned into a sampling site with passive samplers and one sequential sampler for NO_2 ,
- a new site at ElShouhada square in Alexandria, which was set up as a new monitoring site.

Some other smaller changes were also undertaken to improve the whole programme. The use of simple particle samplers, by AIRmetrics instruments for PM10 and PM2,5 sampling, was discussed, and the sampling programme was designed and started.

A summary of the air quality monitoring programme update is presented in Appendix G.2.3. Status reports at IGSR from January 2000 and for the EIMP programme as of March 2000 are also presented in Appendix G.2.3.2.

A summary of supplements and modifications to the EIMP monitoring programme included the additional PM_{10} sampling programme and changes undertaken in the Alexandria area is presented in Appendix G.2.3.3. A short status from the instrument expert as of 8 April 2000 is given in Appendix G.2.3.4.

8.2 Activity G.3.3 Start monitors in Delta and Upper Egypt

Several sites in the Delta had reported problems during the winter and spring 2000. The EIMP instrument experts visited the sites during March-April 2000. Power problems as well as data manager and monitor problems had given bad quality data for many months. The EIMP instrument experts solved most of these problems, as can be seen from the work notes in Appendix G.4.5. However, it is felt that follow-up "audits" by monitoring experts will be needed also after July 2000.

8.3 Activity G.4.1 Maintenance, calibration and operation of the monitoring stations

ISGR in Alexandria is responsible for the sites in Alexandria and in the Delta. CEHM at Cairo University is responsible for the rest of the stations in Egypt. Extra training was given to these laboratories in 1999-2000 concerning the maintenance programme. The status of the programme as seen from CEHM on 11 April 2000 is presented in Appendix G.4.1.1. A similar report is presented for a biweekly meeting at IGSR on 26 March 2000 in Appendix G.4.1.2.

The importance of a good maintenance programme, as well as keeping up and following the SOPs that have been developed was stressed all through the training undertaken during the spring 2000. Examples of standard sheets for following up the routine maintenance programme is shown in Appendix G.4.1.3. It will also be of great importance that the Audit programme follow up these procedures and check that they are actually followed. The air quality component counterpart at EEAA is regularly visiting the sites to identify maintenance needs, as seen from two reports presented in Appendix G.4.1.4.

Also the EIMP instrument expert visited most of the monitoring sites during Mission 18 as of an audit and maintenance procedure. Work notes from these visits are presented in Appendix G.4.1.5. A draft for a complete maintenance schedule will be developed in June 2000.

8.4 Activity G.4.2 Service and repair

The need for more knowledge about service and repair was identified during 1999. Special support and training was given in particular to some of the best-qualified experts at CEHM in December 1999 and during Mission 18. In this way we improved the capability of simple repairs to avoid instrument "failures" in the programme. These turned up to be minor failures that could remain for months without being repaired.

Spareparts were identified as a problem, as long as the instrument supplier was not able to support some of the parts. A survey of spare parts needed for service and repair of monitors, samplers and meteorological equipment was developed, and checked out with the supplier at CTS.

One action taken to improve the service and repair procedures called for a meeting with Dr. ElSoueini at CTS. The objectives were to improve the procedures, to decrease the delay time and to obtain spareparts directly to CEHM. The conclusions are presented in Minutes from the meeting in Appendix G.4.2.1. Even

if CTS promised, as a service to CEHM, to support any questions and problems "absolutely free of charge" the outcome has not proven to change the procedures indicated above.

Monitors and samplers will be taken to the laboratory for repair when ever necessary. In some cases simple repairs will be undertaken at the station. Repair reports are produced from the Monitoring Institution, as shown in Appendix G.4.2.2.

8.5 Activity G.5.1 Data retrieval and data evaluation

For data collected continuously with monitors the System Manager is used daily for control of calibration factors and span checkpoints, errors, peak values, false data and other peculiarities in the retrieved data. The procedures for these data controls and presentations were developed in October 1999, and finalised and presented through an on-the-job training programme in March 2000.

Errors in the data are being corrected on a daily and weekly basis. However, the follow up of these procedures from the QA responsible at the Monitoring Institutions was not satisfactory during Mission 18. Repeated training improved the procedures, but this will have to be repeated again.

Training in the judgement of concentration levels and units was part of this training. The system, the feedback reporting and the use of graphical tools for QA/QC has to be followed up, and will be evaluated in October 2000 again.

Daily control routines were also introduced to IGSR in Alexandria in March-April 2000. They have had some problems in operating the System Manager, so these procedures will also have to be repeated.

8.6 Activity G.5.2 Data presentation and evaluation

The air quality data collected through the System Manager or by chemical analyses in the laboratory are presented in graphical form on paper every week for quality evaluations. Some simple statistics may be presented to verify levels and inter-comparisons. Appendix G.5.2 shows an example of a comparison between PM_{10} concentrations measured with the AIRmetric samplers and the Beta Gage PM_{10} monitor. The average difference was in this case only about 1 percent.

After the first air quality data have been evaluated, and the QA/QC procedures have been undertaken and verified, the data will be finalised in the System manager and then transferred to the database.

8.7 Activity G.6.1 Sample selection and preparation

For some samples collected on filters, additional analyses will performed. One component of this kind is lead. Several filters have been selected from the first half year 1999. However, no analyses have been performed so far. A new selection of filters to be analysed for lead was undertaken during Mission 18.

The list of PM_{10} and TSP filters shown in Appendix G.6.1 a) was presented to the CEHM laboratory on 15 April 2000.

The VOC sampling programme has been delayed due to personnel problems at the laboratory at CEHM. A memo indicating the necessary preparations is presented in Appendix G.6.1 b). A fax indicating all necessary equipment, Appendix G.6.1 c) was sent to EEAA 10 February 2000. The necessary equipment was still not available at the end of Mission 18.

8.8 Activity G.6.3 Passive sampling

Passive sampling became a routine part of the EIMP programme. Measurements of SO_2 and NO_2 using passive samplers are being performed at a number of sites to collect additional information about the average air pollution concentrations. Results from the passive sampling programme have been reported in the Quarterly Reports.

During the changes of the monitoring programme at AbuQuir in the Alexandria area, a combination of sequential samplers and passive samplers are to be used. A passive sampling programme consisting of 5 sites for measurements of NO_2, SO_2 and NH3 was designed as shown in Appendix G.6.3.

The first two sets of weekly samples were collected in April 2000, and the results of the analyses performed at NILU are also presented in Appendix G.6.3. The NO_2 concentrations were surprisingly homogeneously distributed in the area at about 30 μg/mr. SO_2 concentrations ranged from 30 to 63 μg/m3, while the concentrations of NH3 were very hugh ranging between 127 and 516 μg/m3.

8.9 Activity G.7.1 Monthly and Quarterly reports

The air quality staff at EEAA produces monthly reports, while the development of the Quarterly Reports is the responsibility of the Monitoring Institutions. During 1999-2000 these reports have been generated using the simple excel based statistical routines. When the air pollution database programme is finalised and installed at the monitoring institutions, further evaluation of the data will be undertaken during the preparation of quarterly reports.

Only after the evaluation of the Quarterly reports, can the data be considered finalised (through the QA/QC systems). The description of the technical background, data availability, data quality and the data itself will be part of these quarterly reports.

The first monthly data reports have been produced based on preliminary data from the Monitoring Institutions in 1999-2000. Since May 1999 monthly reports have been presented by the EEAA staff every month. Examples of monthly reports for January and February 2000 are presented in Appendix G.7.1. Also the first Annual reports were presented by the Monitoring Institutions in 1999 and by EEAA in the spring 2000.

The reports available at the end of Mission 18 can be found in the list of References.

9 H. Reference Laboratory

9.1 Activity H.2.1 Training

Training of the Reference Laboratory personnel continued in 1999-2000. Selected experts had also been invited to participate in the Air component training programme, such as seminars (April 2000), workshops and on-the-job training. The latter has included operation, calibration and maintenance of monitors

9.2 Activity H.3.1 Check field monitors

The responsibilities of the Reference Laboratory Air were defined during 1999. An overview of standard gases used at the Monitoring Institutions and at the Reference Laboratory has been established. The calibration equipment for high volume samplers was summarised by the EIMP instrument expert (see Appendix H.3.1 a)).

During calibration procedures a discrepancy between standard gases at the Reference Laboratory (NIS) and the Monitoring Institution (CEHM) was identified. (see Memo in Appendix H.3.1.b)). The problem was investigated both from the Reference Laboratory point of view and by the two EIMP expatriate experts (Appendix H.3.1 c))..

After comprehensive studies of the gas calibration equipment at CEHM and at NIS, it was concluded that the calibrators were within 4% of each other, as long as the EMPA calibration of the NIS calibrator was taken into consideration. At NIS two leaks were found at the NO_x monitor. Maintenance of the instruments at NIS has to be improved.

Originally it was reported that SO_2 concentrations at NIS were at least 25% higher than at CEHM. When correcting for leakage and EMPA calibration results, this difference was reduced to about 4 %. See Appendix H.3.1 d).

9.3 Activity H. 3.2 Audit programme

The Reference Laboratory personnel have participated in workshops and seminars concerning QA/QC. Air quality audits started in 1999 supervised by the instrument experts at EIMP. The first Audits have been reported during the spring 2000, and a list of non-compliance was produced (Appendix H.3.2). The items of this list was further discussed in weekly meetings at the Monitoring Institutions, and corrections were prepared by the filed personnel, whenever needed. Also procedures and documents were updated, and will need further follow-up in the future.

A part of the QA/QC programme will also include proficiency tests. These tests started in 1999 with water samples. Also filter analyses performed at CEHM will be part of these tests in the future. The Reference Laboratory at Ain Shams University offers these proficiency tests. However, routines for the air quality sampling programme had not started until at the end of Mission 18. Tests have been performed for the EEAA Coastal Water programme, and some plans have been presented to the Air Pollution component as seen in one example in Appendix H.3.2.a.

Investigations also started to identify real filter samples for inter-comparison/ proficiency testing of filter analyses. NILU has prepared artificial samples for sulphur comparisons within the European EMEP programme, as seen in Appendix H.3.2.b.

10 I. Component Co-ordination

Sub-component administration includes co-ordination with internal/external activities, ad-hoc working group meetings, preparation of annual action plans, annual reports and service of the EIMP project management to facilitate interface checks. The basis for the work has been the updated revised logical framework matrix, as presented in Appendix I1. A list of expected output have also been presented as part of the EIMP plans (Appendix I.1.b.)

The EIMP Air component programme was summarised, and changes and up-dates were reported in a memo prepared 10 April 2000 (Appendix I.1.c)

10.1 Activity I.2.1 Follow up and administration

A number of meetings were held during Mission 18. Comments to questions related to air quality or to other related matters linked to the EIMP programme have been prepared. The Danida Review Mission visit 9-19 April was prepared, and presentations and discussions were scheduled (Appendix I.2.1)

A summary of the Air Quality Monitoring Component missions to Egypt was prepared (Appendix I.2.2).

One specific topic that was discussed during the Mission was the possibilities of using the EIMP air quality data for early warning systems to be developed for Cairo. A Memo was prepared (Appendix I 2.3) based on presentations that had been performed by OPSIS in Sweden (Appendix I.2.3.b).

Weekly staff meetings and weekly air quality project meetings are reported, and presented as an input to the operation of the programme. An example is given in Appendix I.2.4 which presents the Minute from a staff meeting held at the end of Mission 18.

External co-ordination with relevant and other donor programmes (e.g. CAIP) has been part of the tasks also during this Mission. The Egyptian Meteorological Authority prepared a list of weather observation data available for explaining episodic air pollution occurrences available. (Appendix I.2.5.)

A seminar was prepared and held at Suez in April 2000. This was a one week training seminar on "Understanding Air Pollution" based on data and information collected during the operation of the EIMP programme. (See Appendix E.7.1.)

Air quality data have been presented in various forms and for various purposes during Mission 18. Three Newsletters have been prepared. These described briefly:

- Air pollution episodes in Cairo,
- Dust storms in Egypt,
- SO_2 levels in Cairo

The Newsletters are presented in Appendix I.2.6.

Summary reports about the Air Quality of Egypt have been prepared for the seminar in April 2000. Two more abstracts for papers were developed in June 2000. The content of a web page on air quality was discussed based on a memo presented in Appendix I.2.7.

A list of reports available from the EIMP air pollution monitoring component is presented in Chapter 11, References.

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Appendix A

Institutional support

A.1

EIMP

People met and colleagues (Spring 2000)

EIMP office, 3 EEAA Building, 30 Helwan Str.Maadi, Cairo (behind Sofitel hotel) ,
Tel. 202 525 6442, Fax: 202 525 6467 ,E-mail: eimp@intouch.com
Staff: Mohammed Fathi,(tel: *0122141759*), Joergen Simonsen (PM) Dina, Lydia, Hassan, Mahmoud, Emad, Ahmed AlSeoud (EEAA. *tel: 0123102068, 5721289), M Ali (Lydia) 0101412666*
Air: B Sivertsen (Task Manager), tel. 351 1615, Dreiem, L Marsten, Haytham Ahmed (p: 320 2078)
CEHM / Cairo Univ, tel 571 9688, Fax; 571 9687: Dr Sharkawi, Dr. Yehia Abd El Hady
Dr Tarek El Arabi (Project Manager) mob: *0123484050*, Dr. Hesham ElArabi (QA)
Staff:Ashraf Saleh (data retrieval), Essam Abdel Hallin (data retrieval), Mahir Sayed Hafez (Tabbin st.), Ahmed Sayd (Qualaly, Gemhoroya), Yassin Fathi (Giza CU, Fumm al Kahlig), Kamela (Mon.lab., Shoubra), Ahmed Sulamen (Chem lab head), Ameni Taher (Chem. Anal.).
IGSR Alex Univ, tel:03422 7688, lab: 03 422 5007, Proj. tel: 424 1485,
Fax 203 421 5792
Dr M El-Raey tel: *0123109051 (elraey@cns.sisnet.net)*, Dr. El Sayed Shallaby, Ashraf A Zahran, Shawkat K. Guirguis (QA) (*aplab@igsrnet.net*), Mohamed Mamdoua, Mohamed Rashad, Sekri,
Data Management: Jacob Andersen, Mohammed Zaki, Ayman El Maazawy, Dean
Procurement: Anwar Ahmed
Coastal Water: Arne Jensen, Erling, Ole
Reference Lab: Ulla Lund, (Street 13 Maadi) tel: 012 312 0951, Mai EzzEldin Ahmed (counterpart), Fleming Boysen, Kirsten, Suzanne, Jill, Vibecke.
EEAA,Dr. Ibrahim Abdel Gelil (Chairman)
Dr Ahmed Gamal
Mr Ahmed Abou ElSeoud (EIMP PM)
Dr. Mohamed el Zarka (EIMP counterpart)
Dr. Abdil Latif Hafez (Air Quality respons.), , (Env. researcher).
Mrs Hoda Hanaffi (head of GIS),
SharmElSheik, EEAA Nat. Park Office, Dr. Omar Hassan,
Sofitel Hotel: Maadi, Tel: 526 06011, Fax: 202 526 1133
Ambassader:
Norge: Al Gazira al Wusta str.
Amassadør: Mette Ravn, 2.sekr. Siw Boetker, tel.340 3340 , fax: 342 0709
Danmark: 12 Hassan Sabri, Zamalek, John Carstensen 378 2040
COWI: 00 45 45 97 22 11
USAID - CAIP: Jim Howes, Monir Labib, Jennifer Baker (Training) , Kirk Stopenhagen
CTS: Amr ElSoueini, tel: 378 2908, Fax: 350 4977, *Mobile: 012 216 6670*, Ali Hamed, Mike Buckley
EMC(Env. Monitoring Company inc.): Bill Hayes, Steve Gersh (Vice President), Fax:805 544 1824, (sgersh@emcslo.com)
Mohammed Nasar (AQ) , tel 351 5174, Canal Street 3, Maadi
Giza Pyramids: Dr. Hawas, Ahmed El Hagar
Sakkara: Mohammed Hagras, Hamdi Amin
Leif Marsteen /Rolf Dreiem: 10 street 86, apt. 10, Maadi, Cairo, tel 351 3226, Magde 351 1359, Maadi contact: Espen Alstad
Leilighet: 103 street , Maadi, Cairo, tel 525 7444, Mahmoud Taha: 0123413899, home: 5251777
Taxi Saddam: 319 0619, Mahmoud Nasr: 0123529446

A.2.1

EIMP

Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF
From Bjarne Sivertsen
Date: 16 April 2000

Meeting at departure, 16 April 2000

The main objectives for Air Quality expatriate Mission 17, March-April 2000, was to finalise annual reporting at the Monitoring Institutions and at EEAA, to audit repair and upgrade monitoring sites as well as explaining air pollution and preparing newsletters at EEAA. At the final phase of the project a seminar on "Understanding Air Pollution" was also planned, prepared and undertaken.

The EIMP air pollution monitoring programme has been a long process of repeated training of several counterparts, on-the job training, repeated siting studies which all have delayed the original plans. (See Memo of 10 April on "finalising the EEAA....")

Several tasks will have to be followed up in the future:

1. **Delays in obtaining spare parts** and consumables, which has been felt by the Monitoring Institutions have to be minimised. The improvement may have to be undertaken at several levels, and will have to be discussed openly.
2. A better **follow-up procedure versus CTS**, and an improved communication concerning spare parts may be one possible improvement. (HAA, AAE)
3. A **printer for the CEHM** laboratory/calibration workshop has been requested and approved. The printer is in the Storage and will have to be transferred to CEHM. (HAA)
4. Sequential samplers delivered to **NIS for "flow calibration"** have to be returned to the institutions no later than the next day. It should be possible to discuss the possibility to return it after waiting during the calibration? We wrote in December: Sequential samplers to be calibrated at NIS annually. NIS should be contracted to return the samplers on the same day?
5. Equipment and gases for **VOC measurements**, training and installation is still lacking a few parts. Haytham has to follow up the matter, and give information to NILU as soon as everything is available. Did Dr. Lavendi order the gases? Get written approval. (HAA)
6. **Tabbin station** will have heat problems again this summer. Renovation and new air condition system has to be installed soon! (HAA)
7. Finalise **AIRmetrics** installations, order 3 more samplers? (HAA)

8. The "catalogue" of sites including **complete site reports** has to be finalised. The report will include UTM references, maps (where available) and photos. (HAA).
9. Passive **sampling at the Pyramids** is not started. Check approvals! (Heba/Haytham)
10. The layout for an **annual report from EEAA** has been prepared and discussed with Heba. A comprehensive statistical evaluation still is remaining. Results should be discussed directly with BS via E-mail. (Heba)
11. **Check quality** of sequential sampling data and AIRmetrics analyses at CEHM lab. Follow up the meeting at CEHM on 15 April 2000 (Heba)
12. Get results for **lead analyses** from CEHM (mail results to BS). There is a special Excel template for presentation of results, developed by Oddvar. (HAA)
13. The responsible person at the **Chemical Lab. at CEHM** is Dr. Gihad. Check that he actually is following up the analytical programme at CEHM (HAA/HA).
14. Introduce QA/QC procedures to Chem. lab at CEHM (Ulla/May?)
15. A **NH3 instruments** will be obtained for measurements downwind from the fertiliser industries at AbuQuir (Alex). The location and use of the instrument has to be discussed at organised. IGSR experts should also have access to using the instruments during passive sampling campaigns.
16. The **database** programme version 1.2 will have to be **fully tested** at EEAA/EIMP (Heba!) before installed at the monitoring institutions. The old database version will have to be used in the meantime.
17. **Data transfer every day to EEAA** has been discussed with CEHM, for the purpose of daily reporting. This will be possible from 15 April 2000. However, the implications preparing daily reports at EEAA has to be discussed. (HA)
18. The **telephone lines** for Maadi and IGSR will have to be finalised.
19. The "problem" of **calibration** discrepancies between NIS and CEHM will have to be solved. Rolf will do what he can before he leaves, and Leif may have to take over when he arrives in May. However, we have indicated a last procedure for identifying the correct solution. (By re-calibrating a given travelling standard cylinder outside Egypt).
20. The use of EIMP data for **early warnings and air quality planning** has not been discussed in details with EEAA (due to shortage of time or willingness?). I would very much like to participate in the discussion of the application of the data that I have developed and created, but feel somehow that a lot of "strange" developments are taking place "above my head".
21. To follow-up the development including data quality, passive sampling evaluation at AbuQuir, mission reporting and annual reporting the Team Leader will need to have access for the use of **more hours at "home office"** at NILU.
22. A plan for **passive sampling of SO_2 in Cairo** will be prepared for the next visit (in October?). The objective is to develop a complete concentration distribution added to the monitoring network. At least 50 sites will be selected. CEHM personnel have been requested to participate.

A.2.2

EIMP
Environmental Information
and Monitoring Programme
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30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: Joergen Simonsen
From Bjarne Sivertsen
Date: 10 April 2000

EIMP Air Quality Monitoring Component
Finalising the input to EEAA

Introduction

The siting, procurement, installation, training and operations necessary to meet the objectives of the EIMP Air Quality Monitoring Programme have met several obstacles during the development. Some of these are described below, and require that additional input from the expatriate experts is needed to assure the sustainability of the programme.

Additional siting studies

The first siting studies were based upon using the Health Authorities Laboratory at Embaba as the Monitoring Institution for the EIMP/EEAA air component. This was changed after one year and all the investigations had to be undertaken again.

Change of Counterparts

The Air Quality Counterpart has been changed three times during the project. This has lead to extra training efforts and delays in the establishment of monitoring station infrastructure, such as shelters, telephones and electricity.

Daily reporting of data

From 1 November 1999 EEAA has required daily air pollution reports to be presented to the Management of the Agency. These efforts strongly affected the development and the progress of the EIMP project at several levels.

While EIMP was only pleased to deliver whatever data reports were requested from the project, the workload and the requirements had to be in accordance with the possible technical apparatus and staff available to undertake the task. This was not the case at the end of 1999, which lead to delays.

Workshop for repair and maintenance

Repair of instruments as part of operations and maintenance was supposed to be undertaken at the instrument supplier's laboratory. However, the delays and problems in obtaining adequate spare parts and qualified repair work eventually led to the conclusions that EAA and the EIMP were better off with developing, establishing and training the Monitoring Institution at Cairo University (CEHM) to undertake these tasks themselves. This also added efforts, training and delays to the project implementation.

Change of staff at CEHM chemistry laboratory

Installation, start up and training for the EIMP VOC (Volatile Organic Compound) sampling programme was scheduled to be undertaken in October-November 1999. During the first phase of this training period all staff at the laboratory left the laboratory for jobs outside the CEHM laboratory. All training was stopped, and the VOC programme has to be initiated from the beginning again during the year 2000.

Reporting from Monitoring Institutions and final databases

Development and training in preparing various reports at several levels were originally scheduled for the Monitoring Institution and for EEAA personnel. The envisaged one Monitoring Institution was replaced by TWO institutions (CEHM and IGSR) during the second phase of the establishment of the EIMP programme. This lead to repeated training and double work in the establishment of Quality Assurance procedures, Quarterly Reports and Annual Reports. The Quarterly reports have been designed and are now being delivered on a routine basis.

The Annual Reports, however, rely on the second version of the database, which still is not available at the institutions. The first version is working, but this does not include the necessary statistics for the Annual report. Training has thus not been finalised at the Monitoring Institutions.

Reporting at EEAA

Report formats at several levels are also being prepared for the EEAA counterparts. The daily reports to the Minister Office were originally not part of the EIMP programme, as stated above. Monthly reports to EEAA and to the Governerates are now delivered on a routine basis. Several Memos and Newsletters are also delivered. The annual reports, however, are not finalised, and additional training is needed. This also will rely on an enhanced database programme, which is still not to be developed.

General Training

The training programme was designed to include an Introductory Seminar, several workshops on Air Quality, Quality Assurance and instrumentation as well as a final seminar on "Understanding Air Pollution". All these training efforts have been undertaken. In addition four papers have been presented at various conferences in Egypt. The main training programme, however, has been the continuos on-the-job training, which is not finalised due to delays, new counterparts, and new staff at CEHM and limited possibilities to train CEHM and IGSR in annual reporting.

Appendix B

Design

B.2.1

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF, HAA, HF
From Bjarne Sivertsen
Date: 24 March 2000

The EIMP air quality measurement programme, instrument supplements and modifications

Additional PM_{10} samplers

Three more PM_{10} samplers are needed to complete the EIMP measurement programme. A request has been placed at NILUProducts who are presently developing a new generation sequential samplers, which will measure both PM_{10} , SO_2, soot and NO_2 in the same sampler.
The single SO_2 /soot sampler will be available very soon. However, the PM_{10} combined sampler will not be available before the very end of this year.
We have thus decided to order 3 more AIRmetrics samplers. This will have to be undertaken immediately.

Changes in Alexandria

AbuQuir

The measurement site at AbuQuir will be changed from 1 April 2000. Following the agreement from a meeting with the Defence College representatives on 12 March 2000, a new shelter has been ordered for location at the roof of a security room in the southwestern corner of the College area. The site will be equipped with a sequential sampler for NO_2 (24 h average values).

Passive sampling of SO_2 and NO_2 will be undertaken at 5 points surrounding the shelter on a weekly basis. In addition passive sampling of NH3 will be undertaken at the same points in April.

A hand held monitor for high level concentrations of NH3 is also being investigated for use during episodes when ammonia can be smelled.

Alexandria City centre

A new monitoring site has been identified at the bus station/railway station in the city centre of Alexandria. The monitoring shelter located previously at AbuQuir will be moved to this site. It will be equipped with monitors for SO_2 and NO_2 (1 h average concentrations). Data will be transferred via telephone lines.

An AIRmetrics sampler will be used for measuring PM_{10}.

New site at El Amreya (near Carbon Black factory)

A new site has been established south of the industrial complex in El Amreya south of Alexandria.
The site will primarily sample particles of all sizes and long term average concentrations of gases, using:

- High volume sampler for PM_{10}
- Dust fall collector for large particles
- Passive samplers for SO_2 and NO_2 .

B.2.2

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

From Bjarne Sivertsen
Updated: 20 November 1999

Sampling Programme for VOC, PM_{10} (AIRmetrics) and Passive samplers

The programme for use of simple samplers for VOC, PM_{10} and SO_2 /NO_2 will be flexible and may be modified as the results from measurements are analysed and evaluated. The following design represents the start up of this sampling at the end of 1999.

VOC samplers

A total of 5 VOC samplers are available for the EIMP programme. The measurement programme at the start of measurements will be as follows.

Site	Bi weekly 1)	Monthly	Comment
El-Gomhoriya	X		Inside new room or at $_{PM10}$ monitor?
Tabbin south	X		VOC in shelter, intake through wall
Shoubra	X		Intake through wall, VOC in room
ElMax	X		VOC in shelter, intake through wall
Damietta	X		VOC in shelter, intake through wall
Next: Fum El-Khalig	x		VOC in shelter, intake through wall, this site should be used while waiting for El-Gomhoriya to be finalised

1) sampling days as PM_{10} or TSP samplers

The programme should start as soon as possible. Due to lack of canisters, samples will only be exposed every second week from the beginning.

PM_{10} sampling with AIRmetrics

The EIMP air quality monitoring programme has presently designed 20 sites for PM_{10} sampling. Eleven of these are using AIRmetrics Minivol air sampler.

A proposed future use of AIRmetrics samplers from Cairo Air Improvement Project (CAIP) initiated an evaluation of the suspended particulate sampling programme within EIMP. It has been demonstrated that fine particles (PM_{10} and

$PM_{2,5}$) may represent a major health hazard to the population in the greater cities and in industrialised areas of Egypt. It may thus improve the quality of the EEEA permanent air quality monitoring programme to extend the PM measurements in the future.

The sampling using the AIRmetrics PM_{10} samplers will start with the following programme:

Site	Weekly 1)	Monthly	Comment
10 Shoubra	x		CAIP box with stand on roof
16 Port Said		x	CAIP box with stand on roof
17 Ismailia		x	CAIP box without stand on roof
19 El Minia	x		? CAIP box with stand on roof
22 Nag Hammadi		x	CAIP box with stand on roof
25 KomOmbo	x		sampler in shelter, intake from roof
27 RasMohamed		x	CAIP box with stand on roof
31 ElAzafra	x		sampler in shelter, intake from roof
34 Damanhour		x	CAIP box
36 Tanta	x		sampler in shelter, intake from roof
40 Kafr Dawar	x		sampler in shelter, intake from roof
41 El Amraya district	x		CAIP box with stand on roof
3 Met. Authority	x		site for future measurements, if more samplers are obtained from CAIP
7 Tabbin South	x		for future
15 Suez	x		for future
18 ElFayum		x	for future
23 Luxor	x		for future
26 Aswan	x		for future
33 Alex Regional	x		for future
11 Giza, Cairo Univ	x		for future
			for future

1) sampling days as PM_{10} or TSP samplers

The total particle programme consists of :

- PM_{10} monitors beta gauge, PMB
- PM_{10} high volume samplers, PSH
- PM_{10} sampling with AIRmetrics PAIR
- TSP high volume, TSP
- Soot from sequential samplers, SSS
- Dustfall DUF

In addition $PM_{2,5}$ and PM_{10} is being measured by the CAIP programme

The total measurement programme for particles in air is presented in the Table below.

The total particle measurement programme of EIMP/EEAA

			PMB	PSH	PAIR	TSP	SSS	DUF	CAIP
1	Cairo c.Qualaly	Urban centre ☎	X			X			A
2	El Gemhoroya st.	Street canyon	X						
3	Meteorological Inst	Residential. ☎			O				
4	Nasr City	Roadside/Residential		X			X		
5	Maadi EEAA	Residential ☎		X					
6	Tebbin	Industrial ☎	X			X		X	
7	Tebbin south	Industrial			O	X	X	X	A
8	Fum Al-Khalig	Road side/urban	(X)						A
9	Abu Zabel	Industry/res						X	
10	Shoubra	Industrial ☎			X	X		X	
11	Giza, Cairo Univ.	Residential			O				
12	Gizapyramid	Regional							
13	6 October	Res/industrial		X			X		A
14	10 Ramadan	Residential		X			X	X	A
	Canal area								
15	Suez	Res/urban. ☎			O	X		X	
16	Port Said	Residential			X				
17	Ismailia	Residential			X				
	Upper Egypt								
18	El Fayum	Urban			O			X	
19	El Minya	Urban/Res			X			X	
20	Assyut 1	Res/Urban. ☎	X						
21	Assyut 2	Residential						X	
22	Naga Hammadi	Industrial/res			X			X	
23	Luxor	Urban/residential			O		X	X	
24	Edfu	Urban.						X	
25	Kom Ombo	Industrial			X		X		
26	Aswan	Urban/resident. ☎			O			X	
	Sinai Area								
27	Sharm ElSheik	Background			X			X	
	Alexandria								
28	Abu Keir College	Industrial ☎		X				X	
29	El-Max Petrogas	Industrial		X			X	X	
30	IGSR, Alex	Urban/road side☎	X						
31	El-Azafra-	Residential			X		X		
32	Gheat El-Inab	Residential		X			X		
33	Alexandria regional	regional ☎			O				
41	El Amraya district	industrial			X			X	
	Delta Area								
34	Damanhur	Urban			X				
35	Kafr el Zayet	industrial/res. ☎	X					X	
36	Tanta	urban			X		X		
37	ElMahalla El Kubra	industrial/res. ☎	X					X	
38	El Mansura	industrial/res. ☎						X	
39	Domyat	Urban/residential		X				X	
40	Kafr Dawar	urban/industr			X			X	
	Total amount of instruments		8	8	12	5	12	21	

O = future AIRmetrics sites

The passive sampling programme

The passive sampling programme has been finally designed and discussed with the monitoring institutions. The measurements will start at all sites from November 1999. Most of the sites have already been working for many months.

In addition Passive sampling will be undertaken every quarter around the AbuQuir factories.

EIMP Passive sampling programme

Updated Oct 1999

			Quarterly samples									
	Site name	Area type	Jan	April	July	Oct	monthly	Passive		Other		
	Cairo											
3	Meteorological Inst	Residential.	x	x	x	x		NO2		SO2	M	
7	Tabbin south	Industrial					x	NO2		SO2		df
9	Abu Zabel	Industry/res					x	NO2	SO2			
12	Gizapyramid	Monument					x	NO2	SO2			
	Sakkara	Monument	x	x	x	x		NO2	SO2			
	Tahrir Sq.Am.Un.	Urban					x	NO2	SO2		A	
	Shoubra (Kamela)	Residential	x	x	x	x		NO2	SO2			
	Helwan (Maher)	Residential	x	x	x	x		NO2	SO2			
	Nasr City (Tarek)	Residential	x	x	x	x		NO2	SO2			
	Heliopolis (Tarek)	Residential	x	x	x	x		NO2	SO2			
	AinShams (Ahmed)	Residential	x	x	x	x		NO2	SO2			
	Canal area											
	Suez industrial	industrial/res.					x	NO2	SO2			df
16	Port Said	Residential					x	NO2	SO2		A	
17	Ismailia	urban/resid					x	NO2	SO2		A	
	Upper Egypt											
18	El Fayum	urban					x	NO2	SO2		A	df
19	El Minya	Res./ Industrial					x	NO2	SO2		A	df
21	Assyut 2	residential/urban					x	NO2	SO2		A	df
22	Naga Hammadi	industrial/res					x	NO2	SO2		A	df
	Luxor, Karnak	monument	x	x	x	x		NO2	SO2			
	Luxor, Temple	monument	x	x	x	x		NO2	SO2			
24	Edfu	Industry/urban.					x	NO2	SO2		A	df
25	Kom Ombo	Industrial					x	NO2		SO2	A	p
26	Aswan	urban/residential.					x	NO2		SO2	A	df
	Sinai Area											
	Sharm ElSheik	city, tourist	x	x	x	x		NO2	SO2			
27	Ras Mohamed	background					x	NO2	SO2		O3	df
	Alexandria											
33	IGSR, Background	Urban regional					x	NO2	SO2		O3	M
	AlAzafra (Shallaby)	Residential	x	x	x	x		NO2	SO2			
	Roman theatre	Monument	x	x	x	x		NO2	SO2			
	Delta Area											
40	Kafr Dawar	industrial					x	NO2		SO2	A	df
34	Damanhur	industrial/res					x	NO2	SO2		A	df
	Kafr el Zayet south	industrial					x	NO2	SO2		A	df
36	Tanta	urban					x	NO2		SO2	A	
39	Domyat	resid					x	NO2		SO2	A	df

A = AIRmetrics PM10 sampler
df = dust fall collector

In addition Passive sampling will be undertaken every quarter around the AbuQuir factories.

B.2.3

EIMP Air Quality Monitoring Programme

Location of instruments (updated April 2000)

										Samplers									
	Site name	**Area type**		SO2	NOx	PM	O3	CO	Met	PM	TSP	VOC	SO2		NO2	PA	PS	DF	
	Cairo																		
1	Cairo city El Qualaly	Urban centre	S	1	1	1					1								
2	El Gemhoroya street	Street canyon		1	1	1	1	1				1							
3	Abbasyia	Urban / Res.	ss	1			1		1								1		
4	Nasr City	Road side/res.								1			1		1				
5	Maadi EEAA building	Residential		1	1					1									
6	Tebbin	Industrial		1	1	1			1		1								1
7	Tebbin south	Industrial	Sc								1	1	1				1		1
8	Fum Al-Khalig	Urban/road	Sc	1	1	1		1											
9	Abu Zabel	Industry/res															2		1
10	Shoubra el Kheima.	Industrial		1					1		1	1			1	1			1
11	Giza, Cairo University.	Residential		1	1		1		1										
13	6 October	Res/industrial	ss							1			1		1				
14	10 Ramadan	Res/industrial	ss							1			1				1		1
	Canal area																		
15	Suez	Urban/res.	S	1	1						1								1
16	Port Said	Residential														1	2		
17	Ismailia	Residential														1	2		
	Upper Egypt																		
18	El Fayum	urban															2		1
19	El Minya	Res./ Industrial														1	2		1
20	Assyut 1	urban/industrial	S	1	1	1			1										
21	Assyut 2	Residential/urban															2		1
22	Naga Hammadi	Urban/ind.														1	2		1
23	Luxor	urban/residential	ss											1			1		1
24	Edfu	urban/industrial	ss														2		1
25	Kom Ombo	industrial	ss											1		1	1		1
26	Aswan	urban/residential.	S	1			1		1								1		1
	Sinai Area																		
27	RasMohamed	background					1									1	2		1
	Number of instruments *(this page)*			11	8	5	5	2	6	4	5	3		6	3	7	24		15

EIMP Air Quality Monitoring Programme

Location of instruments

										Samplers								
Site name	**Area type**		SO2	NOx	PM	O3	CO	Met	PM	TSP	VOC	SO2	NO2	Pa	PS	DF
Alexandria																
28 Abu Keir College	Industrial/backgr	ss											1		5	
29 El-Max Petrogas	Industrial	ss							1		1	1	1			1
30 IGSR, Alex Univ.	Urban/road side	S	1	1	1		1								2	
31 El-Azafra	Residential	ss										1		1		
32 Gheat El-Inab	Residential	ss							1			1	1			
33 Alexandria regional	regional	ss				1		1								
42 El Shouhada	urban/traffic	S	1	1										1		
Delta Area																
34 Damanhur	urban/industr													1	2	
35 Kafr el Zayet	industrial/res	S	1	1	1											1
36 Tanta	urban	S										1		1	1	
37 ElMahalla El Kubra	industrial/res.	S	1		1										1	1
38 El Mansura	industrial/res.	S	1	1				1								1
39 Domyat	residential	ss							1		1	1			1	1
40 Kafr Dawar	urban/industr	ss										1		1	1	1
41 ElNahda	industrial								1						1	1
Instr. Alex+Delta			5	4	3	1	1	2	4	0	2	6	3	5	14	7
Instr Cairo+C+UE+S			11	8	5	5	2	6	4	5	3	6	3	7	24	15
Instr. at Ref Lab			1	1		1	1									
Instr. at Mon Lab			1	1	1		1		1							
Instr. at other institutions			1	1		1		1								
Backup instr.			1	1		1		1			1		1			
Number of instruments needed			18	14	9	7	5	8	9	5	5	13	7	12	38	22
	Instrum ordered		18	14	9	7	5	7	10	5	5	13	7	12		22

S = shelter; (2.0m x 2.3m x 2.1 m)
Sc=shelter (joined with CAIP) (2.1mx3.0m.2.1m)
ss =shelter for samplers (1.5mx1.5mx2.1m)

B.2.4

EIMP Air Quality Monitoring Programme, Operated March 2000

		Indicators								
Site name	**Area type**	**SO2**	**NOx**	**PM**	**VOC**	**O3**	**CO**	**TSP**	**DF**	**Met**
Cairo										
1 Cairo city El Qualaly	Urban centre	m	m	m				s		
2 El-Gomhoriya	Street canyon	m	m	m	s	(m)	m			
3 Abbassya.	Urban / Res.	m	p			m				w
4 Nasr City	Roadside/Res.	s	s	s						
5 Maadi EEAA building	Residential	m	m	s						
6 Tabbin	Industrial	m	m	m				s		w
7 Tabbin south	Industrial	s	p		s			s	s	
8 Fum Al-Khalig	Urban/road	m	m	(m)			m			
9 Abu Zabel	Industry/res.	p	p	(a)					s	
10 Shoubra el Kheima.	Industrial	m	s	a	s			s	s	w
11 Giza, Cairo University.	Residential	m	m			m				w
13 6 October	Res./industrial	s	s	s						
14 10 Ramadan	Res./industrial	s	p	s					s	
Canal area										
15 Suez	Urban/res.	m	m					s	s	
16 Port Said	Residential	p	p	a						
17 Ismailia	Residential	p	p	a						
Upper Egypt										
18 El Fayum	Urban	p	p	(a)					s	
19 El Minya	Urban/Res.	p	p	a					s	
20 Assyut	Urban/ind	m	m	m						wp
21 Assyut 2	Res/urban	p	p						s	
22 Naga Hammadi	Urban/Industr.	p	p	a					s	
23 Luxor	Urban/res.	s	p						s	
24 Edfu	Urban/Industr	p	p	(a)					s	
25 Kom Ombo	Industrial	s	p	a					s	
26 Aswan	Urban/res.	m	p			m			s	w
Sinai area										
27 Ras Mohamed	background	p	p	a		m			s	
Alexandria										
28 AbuQuir			s							
29 El-Max Petrogas	Industrial	s	s	s	s				s	
30 IGSR, Alex University	Urban/road	m	m	m	s		m			
31 El-Azafra-El Azhar Univers.	Residential	s	s	a						
32 Gheat El-Inab school	Residential	s	s	s						
33 Alexandria regional 42 ElShouhada	Urban/traffic	m	m	s		m				
Delta area										
34 Damanhour	Urban/industr.	p	p	a						
35 Kafr ElZayat	Industrial/res.	m	m	m					s	
36 Tanta	Urban	s	p	a						
37 El Mahalla	Industrial/res.	m	p	m					s	
38 Mansura	Industrial/res.	m	m							w
39 Domyat	Residential	s	p	s	s				s	
40 Kafr Dawar	Urban/industry.	s	p	a					s	
41 El Nahda, Amraya	Industrial	p		a					s	

m = monitors, s = samplers, a = AIRmetrics sampler,
p = passive samplers, w = automatic weather station, () = future installation

Appendix C

Procurement

C.2.1 a) Note - From Cairo Univ. to Haytham Ahmad/Heba Fathy - Requirements for sequential samplers filter holders

C.2.1 b) Note - Procurement of calibration equipment for High volume samplers

C.2.1 c) Mail fra O. Hermansen to Heba Fathy -

C.2.2 The list of spare parts for the Air component in the Storage

C.2.3 a) Memo - Automatic NH3 instrument

C.2.3 b) Fax from B. Sivertsen to NILU Products - Order for NILU Products

C.2.4 Memo from Haytham Ahmed to NILU Products - Order for Automatic NH_3 instrument

C.2.5 Memo from Haytham Ahmed to JFS, AAE, MF, MEA, BS - The need of Air Quality Management programme From Calibration Gases

C.2.6 Note from Leif Marsteen to Anwar Ahmed - Procure equipment for gas cylinder regulators

C.2.7 Memo from Haytham Ahmed to JFS, AAE, MF - The spare parts delivered to CEHM from 1 Jan 2000 up till now

C.2.1 a)

Cairo University
Center for
Environmental Hazard Mitigation
Air Pollution Monitoring Project

جامعة القاهرة
مركز الحد من المخاطر البيئية
مشروع رصد تلوث الهواء

TO: Haytham Ahmad
Heba Fathy
EIMP Air Counterpart

Requirements for sequential samplers filter holders from NILU Products AS. Mr. Bjarne or Ove can get it during next visit to Cairo.

Item	PN#	Description	Quantity
Filter backing, 40mm	9658	For SO_2 filter holder	100
Clamping ring, 40mm	9659	For SO_2 filter holder	100
O-rings, 41mm silicone	9651	For SO_2 filter holder	100
O-rings, 50mm nitrile	9652	For SO_2 filter holder	100
Protection cover	9653	For SO_2 filter holder	100
Stoppers to glassinter sampler		For NO_2 filter holder (red caps) (protection cover)	100
Silicon Tube		For NO_2 filter holder (used with stopper to close both end of galssinter)	10m

Project Manager
Dr. Tarek El-Araby

CAIRO UNIVERSITY
Hazard Mitigation Center
Air Pollution Monitoring Project
28 FEB 2000

تليفون: ٣٤٨٤٠٥٠ (٠١٢) تليفون/فاكس: ٥٦٧٤٨٤٨ البريد الالكتروني: tmelaraby@hotmail.com ص.ب: ٤٥٣ الأورمان - الجيزة - الرقم البريدي: ١٢٦١٢ - ج.م.ع
Tel: (012) 3484050 Tel/Fax: 5674848 E-mail: tmelaraby@hotmail.com P.O. Box: 453 Al Orman - Giza - Postal Code: 12612 - Egypt

C.2.1 b)

EIMP

Note

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6442
Fax: +(202) 525 6467

E-mail: eimp@intouch.com

Subject Procurement of calibration equipment for High volume samplers

Date 8 December 1999

To Anwar Ahmed

Copy Jørgen Simonsen, Haytham A. Ahmed, Mohamed Fathy, Mai Ahmed, Ulla Lund, Bjarne Sivertsen, Rolf Dreiem

From Leif Marsteen

Can you please procure the following equipment for calibrating high volume samplers:

Item No. 1
3 pcs 16-0-16 inches or 0-32 inches flexible tube manometer.
The price should be around Le 500 each

Possible model:
Dwyer, Slack-tube manometer, model no. 1211-36, 18-0-18 inches

Supplyer:
Dwyer Instrumenst, Inc.
P.O. Box 373
Michigan City
Indiana 46360
USA
Fax: 219/872 9057

Item no. 2
3 pcs electronic thermometers
The price should be around Le 100 each

Possible model:
Simple electronic thermometer for indoor use

Item no. 3
3 pcs barometer
The price should be around Le 100.

Possible model:
Simple type for indoor use with adjustment possibilities

Distribution of equipment
One set consiting of a manometer, thermometer and barometer should be distributed to each of the Monitoring inst. and the Ref.lab.

The equipment is needed urgently as calibration of High volume samplers can not be performed without it.

C.2.1 c)

From: Ove Hermansen <oh@nilu.no>
To: bs@nilu.no <bs@nilu.no>
Date: 15. februar 2000 16:39
Subject: Kopi av mail til Heba

Her er kopi av mail til Heba:

Hello Heba!

Here are some information for the CEHM.

The extension cables are just normal cables to connect the VOC samplers for charging the batteries. The samplers must be connected as soon as they come back to the laboratory, all at the same time. The last time I was there, we had to borrow some cables from some instruments in the lab. If the instruments are in use, we get to few cables, we can not charge all the samplers fast enough and we will not be able to get all of our samples.

The Nupro-valve is not in the production range of Hoke because it is made by Swagelok, not by Hoke. The name and the address of the supplier is:
Cairo Valve & Fitting Ltd.
78 Amar Ebn Yasser St.
Heliopolis, Cairo
Egypt
(20) (2) 249-1701 Phone
(20) (2) 249-1701 Fax

If they have to by the valve from Hoke instead, they can order a valve with catalog number 4172G4Y.
The name and the address of the supplier is:
Target Engineering
14 Street 286, New Maadi beside El Garayer Square
Cairo
Egypt
Telephone #: +202-516-7711
Fax # : +202-516-4044
Contact: Abdelmomen Helmy, Executive Director
E-Mail: targeng@ie-eg.com

The pressure gauge should be possible to connect to the 1/4" tubing. If it can not be connected directly, they will have to get some suitable adapters. The size of the dial is not important. The gauge material should be stainless steel and there should be no grease or packings in contact with the gas flow. It must be possible to do the readings of the pressure with a precision better than 0,1 bar.

Ove Hermansen

C.2.2

EIMP

The list of spare parts for the Air component in the Storage

tem	Description	No	Part No.
1	Motor cycle (Yamaha) (delivered to EEAA and IGSR)	6	Motor No.46371 chassis No.46736 Motor No.46414 chassis No.46759 Motor No.46504 chassis No.46732 Motor No.46773 chassis No.46729 Motor No.46415 chassis No.46761 Motor No.46358 chassis No. 46735
2	Air Condition Split unit	2	CCR16
3	Stabilizer 1000VA	1	
4	Gas Regulator	1	RSC
5	Calibration Kit for PM10 sampler with manometer	2	
6	wires for Met. tower		
7	Pump Repair Kit	54	41732
8	Tubing set	10	40807
9	a set of fuses	9	
10	Cleaning brushes	2	40306
11	Nickel-Cadmium Battery	6	
12	Thermal paper rolls	107	40482
13	Tubing set	1	40028
14	Filter real for PM10 monitor	1	
15	Gasket set	17	400806
16	Pressure calibrator	1	
17	Bearings	16	1808
18	Potentiometer assembly	2	2017
19	Bearings	12	1055
20	Relative Humidity chip		820200
21	Battery assembly	1	KBGAE316
22	Thermal fuses	2	14950
23	O-rings	5	4802
24	VICI parts(lab. Environmental equipment for NIS	2	14977
25	VICI parts (lab. Environmental equipment for NIS	2	14978
26	VICI parts (lab. Environmental equipment for NIS	2	14819
27	VICI parts (lab. Environmental equipment for NIS	2	12190
28	O-rings for SO2 and NO2	1	4808
29	O-rings for all monitors	4	4800
30	Glass chambers	4	6652
31	O-rings for Ozone monitor	5	8579
32	Gasket for Ozone	1	8549
33	Washer teflon for Ozone	1	8548

C.2.2

tem	Description	No	Part No.
34	Gaskets made from veton for NOx	2	4341
35	O-rings for NOx	1	4803
36	O-rings for NOx	1	4822
37	O-rings for NOx	1	4806
38	O-rings	1	4821
39	O-rings for NOx	5 sets	9212
40	Ozonator lamp for O3	2	8645
41	Set of fuses 2 Amp.	3	4509
42	Set of fuses 3 Amp.	4 sets	4510
43	Photometer lamp for ozone monitor	1 set	8540
44	On-Off switches	2	
45	O-rings for SO2	1 set	4811
46	O-rings for SO2	1 set	4820
47	O-rings for SO2	1	4831
48	O-rings for SO2	1	4829
49	O-rings for SO2	2 sets	4830
50	Capillary 10 ml	1 Pack	4121
51	Capillary 15 ml	1	4127
52	Capillary 18 ml	1	7336
53	Capillary 8 ml	1 Set	4118
54	Capillary 8 ml	1	4119
55	Capillary 13 ml	1 set	8919
56	NOx Pump Kit	9	9267
57	Pump Repair kit for SO2	18	8606
58	Solenoid valve for Ozone and SO2	1	8573
59	Pump Repair kit for calibrator 145	4	5013
60	Cleaner assembly for Ozone	4	9788
61	FID-ring	2	11029
62	IR source	3	7361
63	Filter elements for 145	2 sets	4314
64	Pipe heating cable (item NN)	2	5369
65	Filter elements	20	4070
66	Molecular sieve for hydrogen generator	4	
67	ignitor for 55C	4	18074
68	de-ionizer bags	4	22963
69	Compressor repair kit for PM10 monitor	4	8193
70	Charcoal	7	4158
71	Purafil	2	7075
72	Glass fiber filters	1	40355
73	Quartz filters for PM10 and TSP	18	40354
74	gaskets PM10 and TSP	8	40274
75	Blind flinches		
76	Gaskets for pm10 and TSP monitor	8	40275
77	Racks	1 set	
78	Gaskets for pm10 and TSP monitor	8	40276
79	Inlet oil for pm10 monitor	4	40401
80	chart for pressure recorder	18	40310

C.2.2

tem	Description	No	Part No.
81	Gaskets	8	40277
82	set of Gaskets and o-rings for PM10 and grease and silicon compund	3 sets	40806
83	chart recorder	40	40403
84	flinches for pm10 and TSP samplers	4	41007
85	Gaskets for pm10 and TSP samplers	8	40270
86	Manometer	1	40421
87	Pressure recorder pin arm	4	40404
88	Pressure recorder (wedding associates)	3	
89	Scrubber assembly	3	4293
90	Scrubber assembly for charcoal	3	4291
91	Gaskets for high volume samplers	6	40282
92	Filter gaskets assembly for high volume samplers	5	
93	dayton shaded pole blower	4	
94	intake filters openers	10	
95	Brushes for PM10 high volume samplers		40307
96	Air intake components (plastic tubes)	11	9624
97	Air intake (item K)	8	9621
98	Nylon Brushes	17	9613
99	Plastic connection for Air intake(item I)	8	9612
100	Nulon coupling with O-rings(Air intake) (item cc)	5	9616
101	Plastic fitting	23	9625
102	T-connection (adaptor)	7	9608
103	Elbow with reduced end glass		
104	Plastic connections	7	9618
105	Air intake connection (Brushings) (item H)	16	9611
106	Fittings	1	9609
107	Plastic supports	13	4176
108	Plastic connections with O-rings	2	5029-10
109	Networks for Air intake	12	9605
110	2 glass headers with connections	4	
111	Metallic support	9	9601
112	metallic support assembly	8	9602
113	fittings (item y)	11	9631
114	metallic Brushes (u-v items)	10	9629-9630
115	O-rings	8 sets	9633
116	Gaskets	8	9622
117	brushes for Air intake (item R)	9	9626
118	Stopper-Plug	10	9615
119	flinches	3	9623
120	Fixation belt	10	9632
121	Shield for intake	4	9614
122	Item L	2	9600
123	Transformer 230-150	1	
124	Wind speed sensor	3	1812-1

C.2.2

tem	Description	No	Part No.
125	Humidity meter calibrator with LiCl and	1	51007-0
	NaCl cans		
126	Relative humidity sensors	2	083-135
127	Relative humidity shield	1	820-200
128	B-rings	10	1898
129	Permeation calibrator 145	1	S/N : 145-60002-325
130	Lead recycled battery	1	390061
131	NOx monitor	1	S/N :42c-57751-314
132	Radiation sheild	3	0768-11
133	wind direction sensor	2	2106
134	wind speed sensor with carrier	1	
135	Radiation shield (samll)	1	5980
136	package for power supply of met. tower	1	
137	wind direction sensor with carrier	1	
138	Net-Radiator	3	
139	Metallic Support for weather station	3	193
140	plumbing assembly with 2 valves	2	
141	Plumbing assembly with 3 valves	1	
142	Solenoid valves for air intake 24V-dc	3	
143	Special-cable for air intake	5	
144	HP-laser jet printer	1	
145	glassware for air intake	3	item d-9608
146	glass bottles for air intake	3	item g
147	galss bottles for air intake	3	item F
148	glass bottles for air intake	3	item M
149	data logger modules	1	
150	Fax-modem	1	
151	Complete set of computer with data logger	1	
152	Complete set of Teflon tubing (different diameters)		
153	CO-cylinder 500 ppm	1	
154	N2-cylinder	1	
155	Hydrocarbon cylinder (methane - propane)	1	
156	Air Inrakes		
157	Tool-Box (complete -set)	1	
158	Met.tower parts(different sizes)		
159	Air intake for seq. Samplers	17	
160	Antenna-mast tripod for airmetrics	18	
161	Petri-slide	10	
162	Rotometer and another sapre	1	
163	Pump for sequential sampler	3	
164	timers for sequential sampler	2	

C.2.2

The list of spare parts for the Point Source component in the Storage

tem	Description	No	Part No.
401	Flow -tube	2	
402	Cyclone Bybass	2	
403	Filter holder stainless steel	1	
404	Check weight 100g	1	
405	Check weight 100mg	1	
406	Check weight 10 g	1	
407	Check weight 1g	1	
408	Interface cable for ISCO flow meter	1	IS-602544-026
409	Stopper ends	2 boxes	
410	Ultera-sonic transducer	1	6031140124110
411	FEP-lined poly ethylend tubing	1	
412	Velocity - Probe	1	603254001

C.2.3 a)

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF, HAA, HF
From Bjarne Sivertsen
Date: 8 April 2000

Automatic NH3 instrument

During the discussions at AbuQuir College (see Memo 24 March 2000), it was stated that very high concentrations of ammonia could be detected down wind from the fertiliser industries. NILU (The Norwegian Institute for Air Research) was asked to identify a proper instrument for direct measurements of high NH3 concentrations.

One such instrument could be the **Gasman II gas detector** from:
Crowcon in England.
The price quotation received at NILU was NOK 11 000 (LE 4500,-)
The measurement Range is 0-50 ppm
Accuracy: ± 2 % of range
Cell lifetime 3-5 years
Operates on Battery: 3xAA alkaline
Operation period (if every day operation): about 1 year
Weight 260 g
The instrument can be delivered at NILU within 4 weeks after order and is available from Lexow a.s. Fax +47 22 08 75 70.

C.2.3 b)

Fax from Cairo nr.110

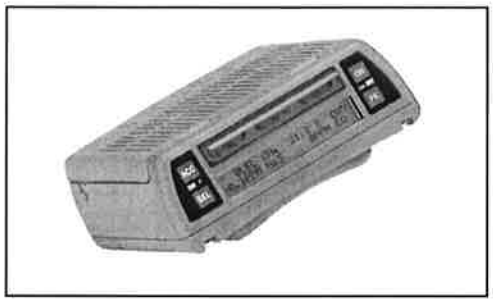
EIMP
Environmental Information and Monitoring Programme
EEAA Building, 30 Misr Helwan St, Maadi, Cairo, Egypt
Email: eimp@intouch.com, Tel. 202 525 6442 Fax: +202 526 6467

To: NILUProducts **Fax: + 47 63 89 80 50**
Date: 10.4.2000
Att: PB, SS, HFJ, HW,LM **No pages: 1**

Order for NILUProducts

Referring to earlier correspondence we would like to request NILUProducts to support the following item:

Automatic NH3 instrument
An automatic instrument for measuring high concentrations of Ammonia down wind from a fertiliser factory has been requested by the Egyptian Environmental Affairs Agency (EEAA).



EEAA would like to purchase:
Gasman II gas detector
(From Crowcon in England).
The measurement Range: 0-50 ppm
Accuracy: ± 2 % of range
Cell lifetime 3-5 years
Operates on Battery: 3xAA alkaline
Operation period (if every day operation): about 1 year
Weight 260 g

Please give us a quotation for the above mentioned instrument and confirm the delivery time, which was indicated at 4-6 weeks after order.

Please address the quotation as soon as possible to:
The EIMP programme
Egyptian Environmental Affairs Agency (EEAA).
EEAA Building, 30 Misr Helwan St,
Maadi, Cairo, Egypt

Yours sincerely

Bjarne Sivertsen
EIMP Task Manager

C.2.4

EIMP
Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To : NILU Products
Att. : Heidi Fjeldstad
Date : Haytham Ahmed, Air Quality Counterpart.

Order for Automatic NH_3 instrument

Dear Ms.
Referring to the discussions between you and our Task Manager concerning the need of EIMP to buy an automatic NH_3 instrument. NILU was asked to identify the specification of the instrument and based on this request EIMP has received the following specifications:

Product No.	Description	Price	Total
100051	Gasman II gas detector	8063,05	8063,05

These specifications were found to be reasonable and meet the purpose of the project, so EIMP wants to purchase this instrument.

Please confirm that:
- The Consignee and delivery address must be EEAA-EIMP
- Proforma Invoice / invoice must be addressed to Danida/EEAA-EIMP.

Yours sincerely
Haytham Ahmed.
Haytham Ahmed
EIMP Air Quality Counterpart.

C.2.5

EIMP

Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To : JFS, AAE, MF,MEA, BS
From :Haytham Ahmed
Date : 8 April 2000

The need of Air Quality Measurement programme From Calibration Gases

Reference Gases

During the year 2000, The Multi-point calibration will be done at CEHM, this may increase the need of CEHM from reference gases.
But CEHM had a complete set of Refrence gases approved by The Air Counterpart and the Project Manager on 5 Dec. 1999.
This complete set will take at least 1 year to be consumed however taking into consideration that it is the first time for CEHM to do the Multi-point calibration, this period may be decreased to 10 or 11 Months.

So the need of CEHM from the Reference gases during this year is as follows:

1 cylinder of SO_2
1 cylinder of NO
1 cylinder of CO
1 cylinder of HC

This cylinders are not urgent to get now but may be after 3 or 4 months from now.

Travelling Standard Gases

Based on the estimation done by The Ref. Lab. Task Manager, each institution of Air Monitoring need 1 cylinder from each type of gases to be used for the calibration done in the site every 3 months. These gases will be consumed after one year.
For CEHM due to the distribution of the Air Monitoring stations all over Egypt this number may increase to 2 for each type.
CEHM has received a complete set of travelling gas standards for two point calibration last June (10 months ago), this set will be cosumed within 2 months from now.

The travelling standard cylinders needed for the year 2000 is as follows:

C.2.5

1 cylinder of SO_2 (IGSR)
2 cylinder of SO_2 (CEHM)
1 cylinder of NO (IGSR)
2 cylider of NO (CEHM)
1 cylinder of CO(IGSR)
1 cylinder of CO (CEHM)

C.2.6

EIMP

Note

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6442
Fax: +(202) 525 6467

E-mail: eimp@intouch.com

Subject Procurement of connectors for gas cylinder regulators

Date 12 December 1999

To Anwar Ahmed

Copy Jørgen Simonsen, Haytham A. Ahmed, Mohamed Fathy, Bjarne Sivertsen, Rolf Dreiem

From Leif Marsteen

Can you please procure the following equipment for gas cylinder regulators:

Item No. 1
15 pcs Male elbow ¼" - ¼", Swagelok part no. SS-400-2-4
5 pcs Reducing union , ¼" - 1/8", Swagelok part no. SS-400-6-2

Supplyer:
Swagelok
USA

By a mistake the output connector dimension was not specified when the last gas cylinders and regulators was ordered. Because of this the regulators was delivered without output connectors.

The equipment should be distributed as follows:

- CEHM: 7 pcs Male elbow, 2 pcs Reducing union
- IGSR: 2 pcs Male elbow
- NIS: 2 pcs Mae elbow
- Storage: Remaining equipment

The equipment is needed urgently as calibration of gas monitors can not be performed without it.

C.2.7

EIMP
Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To : JFS,AAE,MF.
From : Haytham Ahmed.
Date : 17 April 2000.

The spare parts delivered to CEHM
From 1 Jan 2000 up till NOW.

According to the Contract between the project and CEHM, EIMP is responsible for getting the spare parts needed to repair the instruments of the Air Quality network in order to keep these instruments in good conditions. To meet this purpose the project has delivered some spare parts to CEHM during the last few months.
Some of these spare parts have been approved by The Air Counterpart and by the project manager to be taken from the storage and the rest have been bought from CTS.

The spare parts taken from the storage:
Upon request from CEHM, the following items of spare parts have been delivered to CEHM to be used in the repair of the Air Quality equipment.

The description of these spare parts is as follows:

Item no.	Description	Quantity
1	Pump Repair kit	2
2	Source lamp for (O_3)	2
3	25 Pin Plug (male)	5
4	Charcoal Scrubber	2
5	Silica Jel Scrubber	1
6	Ozonator lam (146)	1
7	Glass chamber for (145)	2
8	Solenoid valve (O_3)	1

The spare parts bought from CTS:
The following spare parts have been bought from CTS during the period from 1 jan up till now.

Item no.	Description	Quantity
1	P/N 8551 Pump for models 43C and 49C	4
2	P/N 92621 Pump for models 42C	3
3	Correlation wheel (CO)	1

4	Flash supply board 43C	1
5	P/N 9974 Ozonator Transformer	1
6	P/N 9973 Ozonator	1
7	P/N Flash lamp for model 43C	2

I can understand that the project has approved things to be bought more than what are included in this list but all of these things are considered to be consumables.

Appendix D

Data Management

D.1.1

EIMP

Note

Subject	Modem communication using the mobile telephone network
Date	8 December 1999
To	Jørgen Simonsen
Copy	Tarek El Araby(CEHM), Maher Ibrahim (CEHM), Heba Fathy, Haytham A. Ahmed, Mohamed Fathy, Ahmed Seoud, Bjarne Sivertsen
From	Leif Marsteen

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

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E-mail: eimp@intouch.com

Meeting with Click

On 7 December Maher Hafez (CEHM), (EEAA) and Leif Marsteen (EIMP) visited the mobile telephone network operator Click in Maadi. We met with A.K. Ramzy, Director of engineering, and Omar El Sanhoury, Value added services manager.

The background for the meeting was EIMP's wish to use the GSM net for transmission of data from air quality monitoring stations where traditional telephone lines are not available.

Mr. Ramzy was positive and ment it was possible to connect the Station Manager PC to the GSM net and call it from CEHM using traditional telephone lines. The maximum data transfere speed in the GSM net is 9600 baud.

In the meeting we agreed that CEHM will transfere one Station Manager datalogger PC to Click. Click will install the necessary software and hardware. CEHM will then try to call the datalogger from the System Manager using normal polling routines. Prices or costs for doing the test and later installing the system was not discussed.

Maher Hafez will be the contact person at CEHM and responsible for providing Click with the necessary datalogger equipment. The contact person at EIMP will be Heba Fathy.

Names, telephone numbers e.t.c. at Click

A.K. Ramzy
Tel. 529 2402, fax 529 2499, e-mail abdelkerim.ramzy@clickgsm.com
Mobile 10 500 9322

Omar El Sanhoury
Tel. 529 2435, fax 529 2100, e-mail omar.sanhoury@clickgsm.com
Mobile 10 120 0004

Click, tel. 529 2000

D.1.1

Plan for EIMP for the test

- Provide CEHM with one Station Manager datalogger with modem.
- Costs concerning the test must be clearified with Click.

Plan for CEHM for the test

- Install the necessary datalogger software and load some real data into it.
- The datalogger must be given a station name, e.g. Click and defined on the System Manager.
- The maximum data transfere rate in the GSM net is 9600 baud. The modem at the System manager computer must be able to match this rate. This must be checked.
- To be shure the datalogger and System Manager is working properly the datalogger must be connected to the normal telephone network and polled from the System Manager.
- A date must be agreed upon with Click to transfere the datalogger to Click. Maher will support Click in installing the datalogger at Click.
- After installation of Click software and hardware the PC will be polled from the System Manager at CEHM.

D.1.2

EIMP

Fax Transmission

To	Click GSM
Fax no.	529 2499
Attention	A. K. Ramzy
From	Leif Marsteen
No. of pages	2 (incl. this page)

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6442
Fax: (+202) 525 6467

E-mail: eimp@intouch.com

Date
9 Dec 1999

Dear Mr. Ramzy

SUBJECT: Data transfere using the GSM net

Thank you for an interresting meeting on 7 December where we discussed the possibilties of transfering data from our air quality monitoring stations using the GSM net.

I would like to present some information to you regarding our project and I need some information from you regarding costs.

1. The EIMP project
The EIMP project (Environmental Information and Monitoring Programme) is funded by DANIDA, the Danish aid agency. The executing agency in Egypt is the Egyptian Environmental Affairs Agency (EEAA). In Cairo Center for Environmental Hazard Mitigation (CEHM) at Cairo University is responsible for maintenace and data collection.

2. The data collection system
The measurment stations include both manual and automatic methods for sampling air quality data. The automatic methods consist of a monitor which outputs air quality data continously. The monitor is connected to a data logger which stores the data at the station. The data logger is connected to a modem and a ground based telephone line. Once every night the data logger is polled automatically from a central computer located at CEHM and data is transfered to the central computer. The amount of data transferred is normally less then 10 Kbytes.

The data logger is a Pentium PC running Windows 95 operating system. The data logger software is called EMC Station Manager. The central computer runs Windows NT. The central computer polling software is called EMC System Manager.

At some of the stations ground based telephone lines are not available. If possible we would like to use a GSM modem or GSM telephone for data transfere at these stations. The central computer will always use ground based telephone lines.

D.1.2

3. Test of data transfere using the GSM net
Before we install a GSM system at our stations we must know that the system is working. As we agreed upon in the meeting CEHM will install one data logger PC at Click. After Click has installed the necessary software and hardware the data logger will be polled from the central computer at CEHM to see that the communication really works.

3. Costs
Before we start the test installation I need to know if there are any costs involved. Will you charge anything and if so how much for performing the test installation?

What is the cost for equipment and installation necessary to have a GSM data transfer system working at one station?

I would appreciate if you can give me a cost estimate before 14 December.

4. Contact persons in the EIMP project
Responsible for installation of test data logger at Click:
Maher Ibrahim, CEHM, tel. 570 0088, mobile 012 335 9245

Administration:
Heba Fathy, EIMP, tel. 525 6442 ask for EIMP project, mobile 010 152 0997

I will leave Egypt on 17 December.

Best regards,

Leif Marsteen

D.2.2

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF, BS

(i)From Hebatalla Fathy

Date: 28 March 2000

Based on the visit to CEHM on 27 March 2000 by Mohammed Zaki, Naglaa Darwesh and Hebatalla Fathy.

The status in the SQL version of the database At CEHM:

- When choosing two parameters in the parameter analysis chart form, the connection timed outs and program stopped.
- The old server computer is still working as system manager server and used in polling and doing consolidation from it (when the new server computer is up and running, this will speed up the process).
- Problem in exporting files from the new database, it's a very slow (for a record of reading it could take 2-3 seconds imagine if we have 2000 records for example).
- Cannot export specific site, user have to export all the sites (the option exists on the form but disabled).
- Wind speed required to be for the first decimal (example: ws = 5.4).
- They still can work on only one client (required another two clients, it's supposed to be a client – server application).

D.2.3

Alexandria 27 March 2000

To EEAA, EIMP Programme
Data system management

Concerning the data retrieval system and data base at IGSR

IGSR has operated the data retrieval system (Station Manager/ System Manager) for more than one year now and the Data Base system for some months. There are still remaining properties and inadequate operations that we would like to point out, and which we hope to receive support from the EEAA experts to solve.

Data retrieval

The pulling of data in to the System Manager from monitoring stations can only be adequately undertaken when proper telephone lines and modems are available and are working according to specifications. The reasons for this are:

- The setting of the Station managers (for manual import to the System Manager) are in monthly modes, which means that if manual pulling (by diskettes or by LAN/PC Anywhere) is undertaken every week we will have to duplicate data bases and waste space,
- The requirement of daily quality control and feedback to station operators can not be met,
- The weekly quality assurance by the Quality Assurance Officer can not be undertaken

For sites where retrieval of data is undertaken via telephone lines, the system work perfectly and data can be checked and introduced to the System Manager every day.

The Data base programmes (old and new)

Version 1

The first version of the Data base programme has been tested and used for several months. The main problem presently is the updating of data files (one site or one parameter). If changes of "errors" or flagging of errors are undertaken after quality control in the System Manager, these data can only be updated in the Database by importing ALL data from all sites again. This is a time consuming and not very inspiring. Quality Assurance may in the long run suffer from this inadequacy.

Some of the paramter settings in the Station/System/Database system is not consistent. This will have to be corrected by the EEAA data management. (See separate list)

New version

The new version of the Database programme was installed about one month ago. We have tried to use it; to import data, to look at data and to present some data.

One major problem to day is that we have to operate TWO Database programmes. The reason is that the new version does not work adequately. The following comments will have to be considered and the programme will have to be completed before we can use it:

- We have tested the import of data from the System Manager (monitors) for January and February 2000. This seems to work.
- We have tried to import sampling data, but we feel that we have not received adequate training to do this.
- We have by trial and errors succeeded to get some sampling data into the database, but we can not "see" the data. We can not use them.
- The time spent to only set up the sampling import features is far too long. It can not be accepted to wait for several minutes before you can import one parameter. This will have to be corrected.
- The procedures for specifying sampling data are not user-friendly. The procedures are far too complex and require too detailed knowledge of the basic excel sheets. It has to be simplified for application on a routine basis.
- We have tested the frequency distribution on some of the monitoring data. Linear frequencies may work. However, the cumulative frequency distribution can not produce log-normal distributions as specified for presentation in the annual report.
- Software for producing wind roses is not available in the programme.
- Software for Breuer diagrammes (average concentrations as functions of wind directions) is not available in the programme.
- The problem of importing minor changes undertaken in the System Manager is the same as mentioned in the old version. ALL data have to be re-consolidated.

In general, when the Database programme has been finalised, we would ask for more support and adequate training to enable the use of the programme.

Conclusion

1. Telephone lines and modems HAVE to be installed and operated adequately at ALL sites where monitors are operated!
2. The reconsolidation of parts of the database; single sites or single parameters has to be investigated and modified,
3. The retrieval of "manual" sampling data has to be developed properly and tested at EEAA before the new installation at IGSR,
4. The log-normal distribution will have to be investigated. Is it possible to develop this feature?
5. Wind roses and Breuer diagrammes will have to be part of the Database before it is installed at IGSR.

EEAA will have to understand that the import and quality control of air quality data is a continuous process, and we can not accept to operated more than ONE Database! Please support us in obtaining a final version, and support adequate training to this database!

D.3.1

From Database mission report by Dean Jones:

4 Air Quality Monitoring Database

4.1 Introduction

The Air Quality database should fulfil the following requirements;

- To integrate hourly readings from EMC's System Manager with Sequential Sampler and Mobile Met Tower data.
- To provide an automated mechanism for data communications between the MI's and EEAA.
- To allow the EEAA and MI counterpart staff to analyse the readings from all sources across the country.
- To provide consistent methods for data validation, filtering, and automated extraction routines as a basis for the MI and EEAA standard reports.

4.2 Initial Design

The database schema was originally designed, using MS Access, to meet the specifications discussed with the Air Quality component.

The plan was to implement early versions using MS Access as a data storage mechanism, then migrate to SQL server. In both cases the application software would be written "in-house" using Visual Basic.

The development strategy of using one contractor and one EEAA database specialist was adopted from the beginning.

The database was designed to allow for future enhancements to the monitoring program without major redesign.

4.3 Development and Implementation

Nermeen Serag was recruited from ITI in April, to work with Naglaa Darwish.

The initial "Beta Test" version was released in July to Cairo University.

Version 1 was released to both MI's in October, still using MS Access, and included all initially required features, except for Sequential Sampling and Met. Tower data entry.

The migration to SQL server was delayed by 3 months due to various factors;

- Late implementation of a Server at IGSR
- Lack of SQL Server experience within EEAA data management staff.
- Problems with the Visual Basic tool-set for SQL Server, that required an upgrade.

Version 1.2 (SQL server version with Sequential Sampling and Met Tower data entry modules) completed all tests in December, and is now ready for deployment. The further development of the database was handed over to EEAA data management at this point.

Development was started on version 1.4 (wind rose diagrams and joint frequency distribution) during December, and was handed over to EEAA data management before completion.

4.4 Implementation of EMC's System Manager

Aside from the development of our database, EEAA data management have also had to provide technical support and installation for the EMC system manager product.

This has gone far beyond the initial estimate for technical integration of the two databases, and has become a large drain on data management resources. A further complication is that EEAA do not have a complete System Manager environment to allow them to gain experience with the product.

Integration between the two databases (EEAA and System Manager) was a relatively trivial task, aided ~~by the~~ technological similarity of the two applications.

4.5 Current Status and Future Plans

- Version 1.01 implemented most of the initial requirements and has proved stable over the last 3 months.
- The initial analysis tools are satisfactory for all current standard reporting requirements, and allow the manipulated data to be exported to virtually any other format.
- Version 1.2 covers all initial data entry requirements of the system.

D.3.1

- Due to unforeseen extra loads on the component staff, they have not been able to allocate resources for user acceptance of Version 1.2. This may need some small enhancements during the first half of 2000.

- The requirements for statistical analysis, graphical presentation, Executive Information (EIS) and external integration features will increase during 2000 and 2001. EEAA must be prepared for continuous development over the next 2 years.

- The system will require a full-time developer until the end of 2001(at least), if the best use is to be made of the initial development.

D.3.1

EIMP 2 April 2000

Concerning Air Data base

Input to the Staff Meeting on 8 April 2000:
Referring to the Staff meeting 25 March 2000, we should confront the data base responsible M Zaki with the following statements sited directly during the meeting:

- "In my point of view the air data base is working"
- "The wind roses will be finished this week"
- "The data base will be working Monday 27 March"
- "Wind roses will be available at the end of this week , no later than 30 March"

Appendix E

Training

E.5.2 Data Management training for IGSR and CEHM
E.7.1 Seminar and workshop programme

E.5.2

EIMP

Memo

Title: Data Management training for IGSR and CEHM

Date: 4 Mar. 2000

To: Ahmed, Jorgen

Copy: BS

From: MZ

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6452/53/39/95
Fax: +202 525 6467

E-mail: eimp@intouch.com

The data management component had arranged 2-days training for CEHM and IGSR teams. The training was on various topics about the data management:

- Windows NT backup/restore utility
- Windows scheduling utility; to run tasks automatic
- How to setup Database connection for System Manager
- MS-SQL Server Backup/restore and maintenance , and
- Using AQMON 1.2

The following table shows the trainees attendance

Name	Agency	Job	Remark
Tarek El Arabi	CEHM	PM	
Hesham El Arabi	CEHM	QM	1-day
Essam	CEHM	Data Expert	
Asharf Saleh	CEHM	Data Expert	
Maher	CEHM	Physical Eng.	1-day
Yaseen	CEHM	Technical Manger	
Mohamed Hassan	CEHM		Did not fill evaluation
Zekry	IGSR	Computer Expert	
Hussam	IGSR	Electronic Eng.	

Form the training discussion and the evaluation forms we found the following:

- Dr.Tarek Elarbi was keen to attend the training and understand the training points clearly, this because the above topics were applied in a limited scope until now and he found them very important.

E.5.2

- Most of trainees requested more training for MS-SQL server, for to reason (a-) to manage the database effectively (b-) to have a facility to manipulate the Air data and bypassing the System Manager limited facility. We indicated that by-passing the data manipulation modules of the System Manager could be dangerous and could affect the quality of the data.

- A practical example was successfully applied on the Tabeen and Gomhoria Station Database

Conclusion

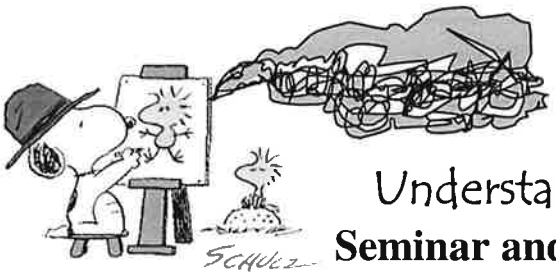
- We will follow-up on applying all procedures for backup and maintenance with both agencies on regular bases

- We may hold another session with CEHM staff as per their request on the MS-SQL server.

- Please refer to the trainees evaluation form for detail about the trainees

E.7.1

EIMP



Understanding Air Pollution
Seminar and workshop programme

A Seminar prepared for the participants in the EEAA/EIMP Air Quality Monitoring Programme.

Sunday 2 April 2000

1000	Welcome address and opening of the seminar
1015	Presentation of participants Introduction to the Seminar
1045	-coffee break
1115	The complete air pollution monitoring system (an introduction) sensors - data transfer – data control -data bases –statistical and numerical models – geographical information systems – user friendly presentations)
1200	Planning and Design
1220	Site studies – site characteristics
1300	Break (lunch or/and relaxing)
1400	Instrumentation; Samplers and Monitors Environmental Indicators – why are they selected?
1500	Data retrieval, QA/QC requirements
1545	-coffee break
1600	Why calibrate? Look at raw data.
1630	Questions, discussions and summing up day 1 A task for the participants to solve (*Design monitoring programme)*

Monday 3 April 2000

0900	Sources of air pollution Categories and pollutants, point-line-area
1000	Emission inventories - main sources in Egypt? (brain storming)
1100	- coffee break
1120	Report from "source inventorying"
1130	Air pollution dispersion Wind – Turbulence -Stability
1300	Break (Lunch and/or relax)
1400	Dispersion models
1500	The single source Gaussian model (to understand the physics) Input data to the model, how do we get them?
1600	- coffee break
1620	How to find max. concentration and distance
1640	A task for the participants based on day 2

Tuesday 4 April 2000

0900	The Air we breath
0930	Air Quality Standards, Guidelines and Limit Values (future trends?)
1000	Presenting Air Quality Data, What is in it?
	Air Quality data – meteorological data – the two together
1100	- coffee break
1120	Air pollution in Egypt
	Examples – discussions – explanations
1230	What are the episodes, how and why do they occur?
1300	-Break (Lunch and/or relax)
1400	Effects on air pollution on Health – Materials - Nature
1430	The Air Quality Management System, early warnings and planning
1500	Abatement strategies for a better air quality.
1530	Coffee - Questions, comments
1600	Summarising the Seminar – Finale!

E.7.1

EIMP

Fax Transmission

To	PALMERA BEACH RESORT
Fax no.	3937060
Attention	Mrs. Noha Safwat
No. of pages	1 (incl. this page)

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6452/53/39/95
Fax: +202 525 6467

E-mail: eimp@intouch.com

Date
28 Mar. 2000
Our ref.

Dear Noha :

The room listing:

1- Dr. Ahmed Abu El Seoud

2- Mr. Mohamed Fathey

3- Mr. Haytham A. Ahmed

4- Mr. Bjarne Siversten

5- Mr. Hesham El Arabi

6- Mr. Tarek El Arabi

7- Dr. Said Shalaby

8- Ashraf Salah

9- Shawkat Gergas

10- Hani Mohamed Nabil

11- Saied Abd Rabou

12- Mai Ezz El Din

13- Heba Fathey

And Dr. Ahmed Gamal will check in 1 April and check out 2 April .

Thanks for great help

MOHAMED SALAH

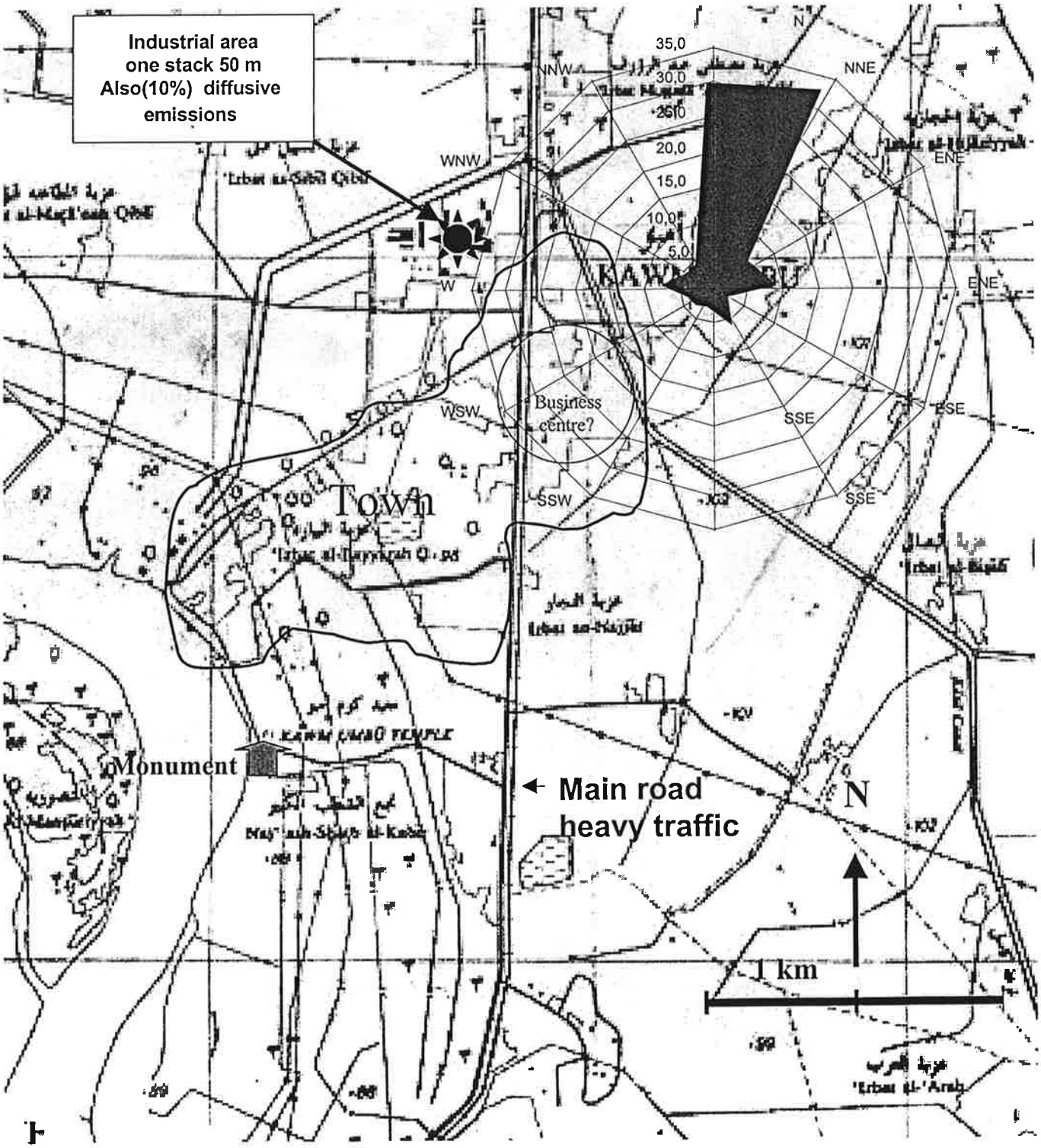
Financial Executive

Siting study

E.7.1

Locate 3 sites !

You have monitors for: SO2 (BS) (2) and NOx (1) and Ozone (1)
Samplers for: PM10 (1) and TSP (1)
One meteorological stations (10 m tower) five passive samplers for SO2 and NO2



E.7.1

Egyptian Environmental Affairs Agency Danida

Environmental Information and Monitoring Programme

Certificate

Haytham Ahmed

has successfully completed the training seminar

Understanding Air Quality

held at the Palmyra hotel Ain Sokna

on 2 -4 April 2000

Bjarne Sivertsen	Jorgen F. Simonsen	Ahmed Abou El Seoud
EIMP Air Quality Task Manager	EIMP Project Manager	EIMP Egyptian Project Manager

Appendix F

QA/QC

F.2.2 Status QA/QC system in the Air component
F.3.1 Training activities
F.4.1 Quality manual

F.2.2

EIMP

Note

Subject: Status QA/QC system in the Air component

Date: 16 December 1999

To: Ulla Lund

Copy: Mai Ahmed, Heytham Ahmed, Bjarne Sivertsen, Rolf Dreiem

From: Leif Marsteen

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

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Operational level documentation

The final draft version of the Operational level documentation was handed over to the monitoring institutions and the Ref. lab on 15 December. One copy is left at the EIMP office. It is still a draft because the page numbering is wrong. This will be fixed and a final version will be ready early next year.

The documentation is divided into four parts:

- **Operational level documentation** - Description of the documentation, how it is organised and updated.
- **Traceability in the calibration system** - Description of the traceable chain of calibrations for each type of instrument, including calibration schedules.
- **Station inventory lists** - There is one list for every station listing the equipment at the station and their serial numbers. The lists are not complete but can be used for referenece in the audit planning.
- **Standard operations procedures** - Procedures and forms for all operations in the monitoring network including maintenance, field calibrations, lab calibrations, performance acceptance criteria, station audits and preparation of new SOPs.

Equipment and procedures still missing

During the revision of the documentation the following procedures and/ or instruments where found to be missing still:

- **Equipment used during Performance evaluation audit of PM_{10} monitors** - There is only one flow rate calibrator and mass calibration foil available. It is at CEHM. It will be used by CEHM during field calibration of monitors every three months (incl. Alexandria). The Ref. lab does not have this equipment which they need during the performance evaluation audits. The Ref. lab also need one mass calibration foil for the calibration of the β-particle counter.

Flow calibrator p/n AWAAXXX2 Cost in 1996: DKK 18 285
Calibrator adaptor p/n AWAAXXX1 Cost in 1996: DKK 844
Mass calibration foil

Priority: High.

- **SOP for the calibration of the PM_{10} monitor flow calibrator** - The procedure is described in the Traceability in the calibration system section but neither the SOP nor the form exist and the procedure that is outlined has not been tested. The Ref. lab should be able to write the proceudre themselves.

  Priority: High.

- **SOP for the calibration of the Mon. lab gas calibrator at the Ref. lab** - The procedure is described in the Traceability in the calibration system section but neither the SOP nor the form exist and the procedure that is outlined has not been tested.

  Priority: High.

- **SOP for the maintenance of the gas calibrator** - Neither the SOP nor the form exist. Maintenance is described in the instrument manual and this may be sufficient.

  Priority: Low.

- **SOP for the maintenance of the O_3 calibrator** - Neither the SOP nor the form exist. Maintenance is described in the instrument manual and this may be sufficient.

  Priority: Low.

- **SOPs for the calibration of temperature and pressure sensors used during field calibration of the high volume sampler** - The procedure is described in the Traceability in the calibration system section but neither the SOP nor the form exist and the procedure that is outlined has not been tested. The Ref. lab should be able to write the proceudre themselves.

  Priority: High.

- **Calibration of high volume samplers** - A cheap and robust thermometer and manometer will be used as travelling standards during field calibration and audits of high volume samplers. The sensors will have to be calibrated at the Ref. lab periodically. The thermometer and barometer used for measuring the laboratory environment at the Ref. lab can be defined as primary reference standards. The reference standards will have to be calibrated periodically at a not identified institution. One set of travelling standard thermometer and barometer must be procured for each of the monitoring institutions and the Ref. lab.

Travelling standard thermometer 3 pcs	Cost app. Le 50/pcs
Travelling standard barometer 3 pcs	Cost app. Le 100/pcs

Heitham Ahmed is responsible for procuring the equipment.

Priority: High.

- **Periodical check of the zero air generators (scrubbers) used during zero/ span checks and field calibrations** - CEHM raised the question on how to know when the scrubbers should be changed. In a monitoring network the scrubbers are usually changed according to a fixed interval, e.g. once a year, but not checked. We agreed that the scrubbers should be checked every three months during the field calibration by installing fresh scubbers and comparing the zero response on the monitor.

  This procedure has not been included in the current version of the SOPs.

  Priority: High.

- **QC of AirMetrics PM_{10} samplers** - No documentation has been prepared for the AirMetrics sampler. CEHM has long experience in using the sampler in the CAIP project. I suggest that CEHM prepares the necessary documentation based on this experience.

  Priority: High.

Calibration of sequential samplers

The original plan for the sequential samplers was to calibrate them once a year at the Ref. lab and never calibrate them in the field. Because the monitoring institutions so far have not return the samplers to the Ref. lab for calibration it was suggested to introduce field calibrations and performance evaluation audits at the station. This requires one set of gas meter and rotameter at each of the monitoring institutions as well as one set at the Ref. lab. Also procedures must be developed for both field calibration and performance evaluation audits.

During discussions with Tarek ElAraby he agreed to start returning sequential samplers to the Ref. lab for yearly calibration provided NIS do not delay the calibrations. I suggest that the sequential samplers are calibrated according to the original plan. That is they are calibrated once a year at the Ref. lab and never calibrated in the field. The latest version of the QC documentation follows this scheme. If we agree upon the original plan no changes are necessary.

Priority: High.

Training

Neither the monitoring institutions nor the Ref. lab have trained on field calibration of the high volume sampler. This is due to missing travelling standards. The calibration is documented in a SOP and is not difficult to perform. When the travelling standards arrive the Ref. lab should cooperate with the monitoring institution at CEHM and train on field calibrations.

Priority: High.

F.3.1

Training Activities

The on-the-job training has been fulfilled when operations and routine maintenance at all the sites are concerned. At each site there is an activity schedule as shown below for Tabbin.

Activity plan

All activities at the stations and in the laboratories are done according to the activity plan. The activity plan shows for each station what Standard Operations Procedures must be performed and when. There is a special plan for each station depending upon the instrumentation at the station and the environment surrounding the station.

There are usually three levels of activities, the routine maintenance peformed once a week, the field calibration and other maintenance performed every 3 months and finally the dynamic calibration and yet other maintenance which are perform yearly.

Activity plan for the Tebbin Station

SOP	Loc.	Perio
Routine maintenance on a TEI model 43C SO2 monitor	Field	7 day
Routine maintenance on a TEI model 42C NOx monitor	Field	7 day
Routine maintenance on a TEI model 650PM10 PM10 monitor	Field	7 day
Routine maintenance on a TEI model 610 TSP high volume sampler	Field	7 day
Routine maintenance on a NILU SF1 Dust fall sampler	Field	1 mon
Field calibration of a TEI model 43C SO2 monitor	Field	3 mon
Field calibration of a TEI model 42C NOx monitor	Field	3 mon
Field calibration of a TEI model 650PM10 PM10 monitor	Field	3 mon
Field calibration of a TEI model 610 TSP high volume sampler	Field	3 mon
Routine maintenance on an Air intake and manifold	Field	3 mon
Dynamic calibration of a TEI model 43C SO2 monitor	Lab	1 yea
Dynamic calibration of a TEI model 42C NOx monitor	Lab	1 yea
Field calibration of a TEI model 650PM10 PM10 monitor	Lab	1 yea
Field calibration of a TEI model 610 TSP high volume sampler	Lab	1 yea
Routine maintenance on a MO Meteorological tower and sensors	Field	1 yea

F.4.1

Quality Manual (EIMP Activities in CEHM) Monitoring Laboratory-Air	Section : 0
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	Date : 31-3-2000
	Issue no : 1

1- Scope and field of application

The scope of this quality manual is to implement all quality control and quality assurance procedures specified by the client (EIMP) which follow the international regulations of ISO 17025 & ISO 10013 to the whole activity carried out by Cairo University Center for Environmental Hazard Mitigation (CEHM) including the following

- Air monitoring procedures for both automatic and manual instruments.
- Calibration of the instruments.
- Chemical analysis
- Weighting procedures
- Data handling assessment
- Instruments maintenance
- Reporting and documentation

The proposed time to complete and update all manuals of the quality system to suit the achieved processes and activities by the EIMP is **December 2000**.

Prepared by : Quality Manger	Revised by : Program Manger	Consultant director
Dr. Hesham EL-Araby	Dr. Tarek EL-Araby	Prof. Dr. Yehia Abdelhady

F.4.1

Quality Manual (EIMP Activities in CEHM) Monitoring Laboratory-Air	Section : 0
	Page : 2 of 14
	Date : 31-3-2000
	Issue no : 1

2- Policy and objectives :-

The policy of CEHM is to conduct its activities in the EIMP in accordance with accepted internationally agreed principles of quality and environmental management to achieve the following objectives:

- Producing high quality trustable data by applying the EIMP quality control procedures using the available resources.
- To be able to defend the truth of the produced data.
- To acquire high standard performance level that will help to increases the credibility of the whole monitoring on the international level .

Prepared by : Quality Manger Dr. Hesham EL-Araby	Revised by : Program Manger Dr. Tarek EL-Araby	Consultant director Prof. Dr. Yehia Abdelhady

Appendix G

Monitoring

G.2.3	Memo - Air Quality Monitoring Programme Update as of April 2000
G.2.3.2 a)	Memo Based on meeting at IGSR 18-19 January 2000. The Status of the Monitoring Programme at Alex. and Delta
G.2.3.2 b)	Status report Air Quality Monitoring March 2000
G.2.3.3	Memo - The EIMP air quality measurement programme: Instrument supplements and modifications
G.2.3.4	Memo - Status at Monitoring Stations as of 8 April 2000-09-07
G.3.3.1	Work notes
G.4.1.1	EIMP Monitoring and Sampling Air Quality Programme Status. Minutes from Meeting at CEHM (cairo University 11 April 2000
G.4.1.2	Minutes from Meeting at IGSR 26 March 2000 - Summary about the status of all stations Weekly Meeting 5 April 2000
G.4.1.3	Routine maintenance samplers
G.4.1.4 a)	Memo - Site visit 5 March 2000 - Status of the Air Quality Monitoring stations at 6th of October
G.4.1.4 b)	Memo 23 February 2000 - The Recommended Plan for installation of PM_{10} Airmetrics
G.4.1.5	EIMP instrument expert - Monitoring programme audits and maintenance - Work notes March and April
G.4.2.1	Memo - Meeting with CTS, 13 March 2000
G.4.2.1 b)	Fax from CTS dated 25 March 2000 - Warrenty repair
G.4.2.2	Repair Report (1 February - 29 February)
G.5.2	AIRmetrics/BGI Measurements Comparison

G.6.1 a)	**Memo - Filters selected for lead analyses, April 2000**
G.6.1 b)	**Memo dated 10 November 1999 - VOC-method, necessary preparations before training**
G.6.1 c)	**Fax dated 10 february 2000 - Ove Hermansen next mission**
G.6.3	**Map sketch - Passive sampling at AbuQuir**
G.7.1	**Air Quality Monthly Report, April 2000**

G.2.3

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF
From Bjarne Sivertsen
Date: April 2000

Air Quality Monitoring Programme Update as of April 2000

The Air Quality Monitoring programme has been revised and updated as of March 2000.

The following pages show the distribution of monitors and samplers for the following indicator parameters:

- SO_2 (Sulphur dioxide)
- NO_x (Nitrogen oxides, including NO_2 and NO)
- PM_{10} (Particles with diameter < 10 micrometer)
- VOC (Volatile Organic Compounds)
- O_3 (Ozone)
- CO (Carbon Monoxide)
- TSP (Total Suspended Particles)
- DF (Dust fall)
- Met (Meteorological parameters: Wind speed, wind direction, temperature, relative humidity, net radiation)

Instruments used

The following monitors are being used:

Pollutants	SO_2	NO/NO_2	PM_{10}	CO	O_3
Concentration units	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(mg/m^3)	($\mu g/m^3$)
Measurement technique	Pulsed UV-Fluorescens	Chemilumin-escence	Beta attenuation of particles collected on a glass filter tape	Gas filter correlation (Infrared Absorption)	UV-photometric Absorption
Instrument type	Thermo Environmental (TEI) M 43 C	TEI M 42 C	Graseby-Andersen beta gauge monitor	TEI M 48 C	TEI M 49 C

Sequential Air Samplers

The NILU semi-automatic sequential samplers (FK type) is equipped with 8 filter packs in a series for 24-h average (adjustible) sampling continuously for one week. The sampler has been widely used, especially in Europe, for daily average SO_2, NO_2, and PM/Black Smoke (BS) sampling.

SO_2

The FK Air Sampler for SO_2 collects aerosol and gas in ambient air in a filter pack, which consists of an aerosol pre-filter and an impregnated filter mounted in a filter holder. The flow rate is about 2,5 l/min. The first filter can be used to analyse soot (Black smoke, BS) concentrations and in some cases sulphate.

NO_2

NO_2 is collected with a flow rate of about 0.5 l/min. Air is drawn through an air intake (inverted funnel) and a glass filter impregnated with sodium iodide (NaI) and sodium hydroxide (NaOH). Nitrogen dioxide is absorbed in the filter and the iodide reduces NO_2 to nitrite.

PM_{10} HiVol sampler

TEI model 600 PM_{10} (Thermo Environment)
Flow rate 68 m^3/h
US EPA approved

PM_{10} AIRmetrics sampler

The MiniVol Portable AirMetrics sampler is an ambient air sampler for particulate matter and non-reactive gases. The EIMP programme is using it for 24-h average PM_{10} sampling every six day through a 7-day programmable timer.
The flow rate is about 5 l/min.

TSP HiVol sampler

TEI model 610 TSP HiVol (Thermo Env)
Flow rate 68-102 m^3/h
Glass fiber filter (5 year consume 1 000,- SR)
Concentrations of selected elements (PB, Zn, Cd, As etc.) may be performed
US EPA approved

Summary of flow rates:

	Flow rates			
Instrument	m^3/min	m^3/hour	m^3/day	m3/week
Thermo HiVol TSP/PM_{10}	1,13	67,8	1627,2	11390,4
Thermo PM_{10} monitor	0,0189	1,134	27,216	190,512
NILU FK NO_2	0,0005	0,03	0,72	5,04
NILU FK SO_2	0,0025	0,15	3,6	25,2
Airmetrics	0,005	0,3	7,2	50,4

Passive samplers

NILU/IVL passive samplers
Sampling time one to four weeks
Analyses in the laboratory by Ion chromatographs

Dust fall

NILU international standard dust fall collectors
30 days sampling periods
Samples analysed in laboratory
ISO recommended sampler

Automatic weather station (AWS):

In addition to air quality monitors also meteorological data are being recorded as the most important parameters for explaining the air quality data. An Automatic Weather Station (AWS) is recording:

- Wind speeds,
- Wind direction,
- Temperatures (preferably at 2 levels),
- Solar radiation,
- Relative humidity and

EIMP

EIMP Air Quality Monitoring Programme, Operated March 2000

		Indicators								
Site name	Area type	SO2	NOx	PM	VOC	O3	CO	TSP	DF	Met
Cairo										
1 Cairo city El Qualaly	Urban centre	m	m	m				s		
2 El-Gomhoriya	Street canyon	m	m	m	s	(m)	m			
3 Abbassya.	Urban / Res.	m	p			m				w
4 Nasr City	Roadside/Res.	s	s	s						
5 Maadi EEAA building	Residential	m	m	s						
6 Tabbin	Industrial	m	m	m				s		w
7 Tabbin south	Industrial	s	p		s			s	s	
8 Fum Al-Khalig	Urban/road	m	m	(m)			m			
9 Abu Zabel	Industry/res.	p	p	(a)					s	
10 Shoubra el Kheima.	Industrial	m	s	a	s			s	s	w
11 Giza, Cairo University.	Residential	m	m			m				w
13 6 October	Res./industrial	s	s	s						
14 10 Ramadan	Res./industrial	s	p	s					s	
Canal area										
15 Suez	Urban/res.	m	m					s	s	
16 Port Said	Residential	p	p	a						
17 Ismailia	Residential	p	p	a						
Upper Egypt										
18 El Fayum	Urban	p	p	(a)					s	
19 El Minya	Urban/Res.	p	p	a					s	
20 Assyut	Urban/ind	m	m	m						wp
21 Assyut 2	Res/urban	p	p						s	
22 Naga Hammadi	Urban/Industr.	p	p	a					s	
23 Luxor	Urban/res.	s	p						s	
24 Edfu	Urban/Industr	p	p	(a)					s	
25 Kom Ombo	Industrial	s	p	a					s	
26 Aswan	Urban/res.	m	p			m			s	w
Sinai area										
27 Ras Mohamed	background	p	p	a		m			s	
Alexandria										
28 AbuQuir	industr/backgr	p	s							
29 El-Max Petrogas	Industrial	s	s	s	s				s	
30 IGSR, Alex University	Urban/road	m	m	m	s		m			
31 El-Azafra-El Azhar Univers.	Residential	s	s	a						
32 Gheat El-Inab school	Residential	s	s	s						
33 Alexandria regional	Regional					m				w
42 El Shouhada	Urban/traffic	m	m	a						
Delta area										
34 Damanhour	Urban/industr.	p	p	a						
35 Kafr ElZayat	Industrial/res.	m	m	m					s	
36 Tanta	Urban	s	p	a						
37 El Mahalla	Industrial/res.	m	p	m					s	
38 Mansura	Industrial/res.	m	m							w
39 Domyat	Residential	s	p	s	s				s	
40 Kafr Dawar	Urban/industry.	s	p	a					s	
41 El Nahda, Amraya	Industrial	p		a					s	

m = monitors, s = samplers, a = AIRmetrics sampler,
p = passive samplers, w = automatic weather station, () = future installation

EIMP Air Quality Monitoring Programme
Location of instruments, updated April 2000.

									Samplers							
Site name	Area type		SO2	NOx	PM	O3	CO	Met	PM	TSP	VOC	SO2	NO2	PA	PS	DF
Cairo																
1 Cairo city El Qualaly	Urban centre	S	1	1	1					1						
2 El Gemhoroya street	Street canyon		1	1	1	1	1				1					
3 Abbasyia	Urban / Res.	ss	1			1		1							1	
4 Nasr City	Road side/res.								1			1	1			
5 Maadi EEAA building	Residential		1	1					1							
6 Tebbin	Industrial		1	1	1			1		1						1
7 Tebbin south	Industrial	Sc								1	1	1			1	1
8 Fum Al-Khalig	Urban/road	Sc	1	1	1		1									
9 Abu Zabel	Industry/res														2	1
10 Shoubra el Kheima.	Industrial		1					1		1	1		1	1		1
11 Giza, Cairo University.	Residential		1	1		1		1								
13 6 October	Res/industrial	ss							1			1	1			
14 10 Ramadan	Res/industrial	ss							1			1			1	1
Canal area																
15 Suez	Urban/res.	S	1	1						1						1
16 Port Said	Residential													1	2	
17 Ismailia	Residential													1	2	
Upper Egypt																
18 El Fayum	urban														2	1
19 El Minya	Res./ Industrial													1	2	1
20 Assyut 1	urban/industrial	S	1	1	1			1								
21 Assyut 2	Residential/urban														2	1
22 Naga Hammadi	Urban/ind.													1	2	1
23 Luxor	urban/residential	ss										1			1	1
24 Edfu	urban/industrial	ss													2	1
25 Kom Ombo	industrial	ss										1		1	1	1
26 Aswan	urban/residential.	S	1			1		1							1	1
Sinai Area																
27 RasMohamed	background					1								1	2	1
Number of instruments *(this page)*			11	8	5	5	2	6	4	5	3	6	3	7	24	15

									Samplers							
Site name	**Area type**		SO2	NOx	PM	O3	CO	Met	PM	TSP	VOC	SO2	NO2	Pa	PS	DF
Alexandria																
28 Abu Keir College	Industrial/backgr	ss											1		5	
29 El-Max Petrogas	Industrial	ss							1		1	1	1			1
30 IGSR, Alex Univ.	Urban/road side	S	1	1	1		1								2	
31 El-Azafra	Residential	ss										1		1		
32 Gheat El-Inab	Residential	ss							1			1	1			
33 Alexandria regional	regional	ss				1		1								
42 El Shouhada	urban/traffic	S	1	1										1		
Delta Area																
34 Damanhur	urban/industr													1	2	
35 Kafr el Zayet	industrial/res	S	1	1	1											1
36 Tanta	urban	S										1		1	1	
37 ElMahalla El Kubra	industrial/res.	S	1		1										1	1
38 El Mansura	industrial/res.	S	1	1				1								1
39 Domyat	residential	ss							1		1	1			1	1
40 Kafr Dawar	urban/industr	ss										1		1	1	1
41 ElNahda	industrial								1						1	1
Instr. Alex+Delta			5	4	3	1	1	2	4	0	2	6	3	5	14	7
Instr Cairo+C+UE+S			11	8	5	5	2	6	4	5	3	6	3	7	24	15
Instr. at Ref Lab			1	1		1	1									
Instr. at Mon Lab			1	1	1		1		1							
Instr. at other institutions			1	1		1		1								
Backup instr.			1	1		1		1				1	1			
Number of instruments needed			18	14	9	7	5	8	9	5	5	13	7	12	38	22
	Instrum ordered		18	14	9	7	5	7	10	5	5	13	7	12		22

S = shelter; (2.0m x 2.3m x 2.1 m)
Sc=shelter (joined with CAIP) (2.1mx3.0m.2.1m)
ss =shelter for samplers (1.5mx1.5mx2.1m)

G.2.3.2 a)

EIMP

MEMO

Based on meeting at IGSR 18-19 January 2000

The Status of the Monitoring Programme at Alex. and Delta

Abu Quir Station

A meeting was held with the manager of the environmental department of the Air defence college . During this meeting I have delivered a sample for the passive sampler and a letter describing the specification of these samplers. I had also a promise that we can move our shelter to the new site after getting approval from the Leadership of the Air Defence by the end of next week.

Another meeting was held with the manager of the tele-communication institution of Misr station area and he agreed on that, after removing the shelter to the new site he will start the connection of the telephone line.

El Max Petrogas Station

The measurements are working perfectly. The filters are collected on routine basis. The samplers are working properly.

IGSR Station

- A power failure was recorded at the station due to problems at IGSR building but now working properly.
- Some problems with NO_x monitor has been observed and it will be transffered to CEHM for repair.
- The pump of PM_{10} monitor has been repaired and now working properly.
- All the other monitors are working perfectly.

Al Asafra

- Airmetrics sampler will work after receiving the filters from CEHM
- The other samplers are working adequately

Gheat El Inab Station

- Collection of filters are done on routine basis. The samplers are working properly.

Alexandria Regional

- Ozone monitor are working properly but it gives low readings, it has to be checked.
- The Met. tower is working perfectly but it gives high values for humidity but it is normal for Alex. Area in winter.
- The shelter has to be re-novated because it is going to be rusty.

Kafr El Zayat

- Power failure was recorded at the station caused by the electricity company.
- A/C problems were recorded and repaired and now working properly.
- Data retreival has been failed after the installation of the new station manager.
- All the monitors are working properly

Tanta Station

- The samplers are working properly. No power failure recorded in the station since the installation.

El Mahalla Station

- Some problems with the UV lamp of SO2 monitor have been recorded and it was replaced by CEHM and now working properly.
- The PM_{10} monitor gives strange data and it will be transffered to CEHM to be rapaired.

El Mansura Station

- The installation of the modem failed and it needs wired telephone line.it has to be arranged with the environmental department of the governorate.
- All the monitors are working properly.

Domyat Station

- The Samplers are working perfectly. No problems were recorded at the station.

Kafr El Dawar

- All the samplers are working properly. The filters are collected on routine basis.

Damanhur

- The passive sampling are done according to the schedule.

General Notes

- Problems with using the database were reported during the meeting and a request to use the old method by Excel but this has to be discussed with the task manager.The EIMP database team has to start fixing this problem ???
- The station manager of the monitoring stations still make problems in collecting data from monitors.
- The installation of Pm_{10} Airmetrics samplers will be done after receiving the connectors from EIMP (next week).
- The sampling has been started at El Amryia station with dust fall sampler.

G.2.3.2 b)

EIMP

Status report Air Quality Monitoring March 2000

Procurement
Thermohygrograph has been delivered to cehm to be used in the laboratory.

Data Management
Generally the data management undertaken by the Monitoring Laboratories is now in routine and according to instructions .

Reporting
Daily Reports on the Air Quality inside Greater Cairo area have been prepared by the component.
Reports on the Air Quality in the governorates have been continued.

Monitoring
Qulaly,Nasr City,Tabbin south, Abu Zabel, Shoubra, Giza, 10 Ramadan, Suez,Port Said, Ismailia, El Fayum, El Minya, Assyut2,Nag Hammadi, Luxor, Edfu, KomOmob, RasMohammed, El Max, Gheat El Inab, Alexandria regional, Damanhur,Mansura, Domyat, Kafr Dawar. **OK**

Gemhoryia
145 need to be checked. PM_{10} monitor still at CEHM need to be repaired (The spare parts can be get from CTS) .The NMHC still at the monitor lab. All the other equipment are working under routine basis.

Abbasyia
Ozone gives low values (The Solenoid valve needs to be replaced). SO_2 monitor need to be checked (The flash lamp need to be changed). The other equipments are working under routine basis.

Maadi
SO_2 monitor gives constant value (need to be chacked) .NO_x monitor is at CEHM for repair.

Tabbin
PM_{10} still in repair, the PM_{10} monitor of the monitor lab has been transffered to the station.145 calibrator need to be checked. All the other equipments are working properly.

Fum El Khalig
The PM_{10} monitor has been repaired and it will be returned back to cehm to be operated in the station. Water droplets have been noticed inside the shelter, the renovation will be started this month. All the other instruments are working properly.

6th of October
The renovation of the infrastructure of the station has been finished.

Aswan
The SO_2 monitor is transferred to CEHM for repair. All the other instruments are working properly.

Abu Keir
An agreement with the Air Defence College has been done to t install a new shelter with NO_2 sequential sampler inside the college.The shelter is ready to be moved. The old shelter will be moved to El Shouhada Square with all the equipment.

IGSR
NOx monitor is working now properly after being calibrated in CEHM. All the other instruments are working properly.

Azafra
Water droplets have been observed in the station and the renovation of the station will be done during this month. All the other equipments are working properly.

Kafr El Zayat
The AC has been repaired during the month and now working properly.All the other equipments are working properly.

Tanta
The renovation of the station has been done during the month.

Damanhur
A letter for getting approval for installing the PM_{10} Airmetrics has been prepared.

G.2.3.3

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF, HAA, HF
From Bjarne Sivertsen
Date: 24 March 2000

The EIMP air quality measurement programme, Instrument supplements and modifications

Additional PM_{10} samplers

Three more PM_{10} samplers are needed to complete the EIMP measurement programme. A request has been placed at NILUProducts who are presently developing a new generation sequential samplers, which will measure both PM_{10} , SO_2, soot and NO_2 in the same sampler.
The single SO_2 /soot sampler will be available very soon. However, the PM_{10} combined sampler will not be available before the very end of this year.
We have thus decided to order 3 more AIRmetrics samplers. This will have to be undertaken immediately.

Changes in Alexandria

AbuQuir

The measurement site at AbuQuir will be changed from 1 April 2000. Following the agreement from a meeting with the Defence College representatives on 12 March 2000, a new shelter has been ordered for location at the roof of a security room in the southwestern corner of the College area. The site will be equipped with a sequential sampler for NO_2 (24 h average values).

Passive sampling of SO_2 and NO_2 will be undertaken at 5 points surrounding the shelter on a weekly basis. In addition passive sampling of NH3 will be undertaken at the same points in April.

A hand held monitor for high level concentrations of NH_3 is also being investigated for use during episodes when ammonia can be smelled.

Alexandria City centre,

A new monitoring site has been identified at the bus station/railway station in the city centre of Alexandria. The monitoring shelter located previously at AbuQuir will be moved to this site. It will be equipped with monitors for SO_2 and NO_2 (1 h average concentrations). Data will be transferred via telephone lines.

An AIRmetrics sampler will be used for measuring PM_{10} .

New site at El Amreya (near Carbon Black factory)

A new site has been established south of the industrial complex in El Amreya south of Alexandria.
The site will primarily sample particles of all sizes and long term average concentrations of gases, using:

- High volume sampler for PM_{10}
- Dust fall collector for large particles
- Passive samplers for SO_2 and NO_2 .

G.2.3.4

EIMP
Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 378 5137, Fax: 202 378 5478

Memo

To: JFS, AAE, MF,BS,HAA,LM
From: Rolf Dreiem
Date: 8 April 2000

Status at Monitoring Stations as of 8 April 2000.

During my 2 weeks stay in Egypt I have visited 8 monitoring stations. The background for these visits was a request
from CEHM and IGSR who stated they need help with the instrumentation.
At almost every station the problems were easy to detect, but as always it is time-consuming.
The most frequent findings were problems with the dryers. Silica Gel is used as drying agent for monitors and calibrators. If the Silica Gel is not changed when getting white, the lifetime for Monitors and Calibrators is shortened and permeation tubes might be destroyed.
Second on the list is paperwork at stations. Station visit log, calibration certificates (gas cylinders), multipoint calibration certificates and other paper were missing.

Conclusion:

Without proper paperwork, correctly filled in and stored in the correct files at stations, it is hard to maintain QA/QC.
Maintenance has to be done according to SOP`s every time a visit to the site has been undertaken. Special attention has to be paid to the air dryers and cleaning of cooling air intake to instruments.

G.4.1.1

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

EIMP Monitoring and Sampling Air Quality Programme Status
Minutes from Meeting at CEHM (Cairo University)

11 April 2000

	Site	Area type	Parameter	Status	Responsible	When?
1	Cairo c.Qualaly	Urban centre ☎		Tel. okay	Yassin	
			NO_x	okay		
			SO_2	okay		
			145	okay		
			PM_{10}	okay		
			TSP	okay		
			VOC	will be installed Mar 2000	CEHM	
2	El Gemhoroya st.	Street canyon ☎		Tel. okay	Ahmed	
			NO_x	okay		
			SO_2	okay		
			145	okay		
			CO	okay		
			PM_{10}	at CEHM for repair (need spare parts)	CTS	
3	Abbasyia	Residential.☎		Tel. okay	Kamla	
			SO_2	okay (alarm, Flash lamp need to be changed	CTS	
			Perm tube	okay (need check)	Yassin	3rd week of April
			O_3	gives low values (spare parts needed)	EIMP	
			Met	okay		
	Nasr City	Roadside/Res	SO_2 BS	okay	Ahmed	
			NO_2	okay		
			PM_{10}	okay		
5	Maadi EEAA	Residential ☎		New Tel line needed!!	EIMP Maher	
			NO_x	okay		
			SO_2	okay		
			145	okay		
			PM_{10}	okay		
6	Tabbin	Industrial ☎		Tel. okay	Maher	
			AC	unstable, hot! need extra?	EIMP	
			NO_x	okay		
			SO_2	okay		
			145	okay		
			PM_{10}	at CTS for repair		
			Met	okay		
			TSP	okay		

7	Tabbin south	Industrial	SO_2 BS TSP DF	okay okay okay	Maher	
8	Fum Al-Khalig	Road /urban ☎	 NO_x SO_2 145 CO PM_{10}	Telephone line (No Tone) okay okay need check okay at CTS (already repaired)	EIMP Kamela Yassin Yassin	 3rd week of Apr 2nd week of Apr
9	Abu Zabel	Industry/res	DF PS (S+ N)	okay okay	Kamela	
10	Shoubra	Industrial ☎	 modem AC SO_2 Perm tube Met NO_2 TSP PM_{10} DF	Tel. okay Need to be checked again need to be installed okay need check okay (WD need Check) okay okay at CEHM for repair okay	Kamela Maher Yassin Maher	 3rd week of Apr 3rd week of Apr
11	Giza, Cairo Univ.	Residential	 NO_2 SO_2 O_3 Met	Internal Tel. okay okay okay At NIS for Calibration okay	Yassin	
12	Giza pyramid	Regional	PS (S+N)	will be started (permission needed)	Yassin/BS Haytham	
13	6 October	Res/industrial	SO_2 BS NO_2 PM_{10} DF	At NIS for Calibration At NIS for Calibration okay okay	Mahmoud	
14	10 Ramadan	Residential	SO_2 BS PM_{10} DF	okay okay okay	Kamla	
	Canal area					
15	Suez	Res/urban ☎	 NO_x SO_2 145 TSP DF	Tel. okay okay okay okay okay okay	Ahmed	
16	Port Said	Residential	PS (S+N) PM_{10}	okay okay	Maher	
17	Ismailia	Residential	PS (S+N) PM_{10}	okay okay	Maher	
	Upper Egypt					
18	El Fayum	Urban	DF PS(S+N)	okay okay	Mahmoud	
19	El Minya	Urban/Res	DF PM_{10} PS(S+N)	okay will be installed okay	Ahmed	 4th week of Apr

20	Assyut 1	Res/Urban.☎	NO_x SO_2 145 PM_{10} Met	Tel. okay at CEHM (need spare parts) okay (need check) ??? need repair Check WD Wiring	Ahmed EIMP	
21	Assyut 2	Residential	DF PS(S+N)	okay okay	Ahmed	
22	Naga Hammadi	Industrial/res	DF PM_{10} PS (S+N)	okay okay okay	Mahmoud	
23	Luxor	Urban/res	SO_2 BS DF PS(S+N)	okay okay need permission	Mahmoud EIMP	
24	Edfu	Urban.	DF PS(S+N)	okay okay	Mahmoud	
25	Kom Ombo	Industrial	SO_2 PM_{10} PS(S+N)	okay okay okay	Mahmoud	
26	Aswan	Urban/res.☎	SO_2 Perm tube O_3 Met DF	Tel. okay okay okay okay okay okay	Mahmoud	
	Sinai Area					
27	RasMohamed	Background	O_3 DF PM_{10}	okay okay okay		

Other Matters

NIS requested a schedule for calibrating all O_3 monitors, SO_2 , NO_2 sequential samplers and 7 selected monitors (NO_x, SO_2, CO from El-Gomhoriya st. station & NO_x and SO_2 from Assyut1 station & SO_2 from El-Shohada Station & NO_x from IGSR Station) to be performed during this year.

The passive sampling programme

The passive sampling programme has been finally designed and discussed with the monitoring institutions. All measurements have to start at all sites from November 1999. Most of the sites have already been working for many months.

EIMP Passive sampling programme

Updated Oct 1999

			Quarterly samples										
	Site name	Area type	Jan	April	July	Oct	monthly	Passive		Other			
	Cairo												
3	Meteorological Inst	Residential.	x	x	x	x		NO2		SO2	M		
7	Tabbin south	Industrial					x	NO2		SO2			df
9	Abu Zabel	Industry/res					x	NO2	SO2				
12	Gizapyramid	Monument					x	NO2	SO2				
	Sakkara	Monument	x	x	x	x		NO2	SO2				
	Tahrir Sq.Am.Un.	Urban					x	NO2	SO2		A		
	Shoubra (Kamela)	Residential	x	x	x	x		NO2	SO2				
	Helwan (Maher)	Residential	x	x	x	x		NO2	SO2				
	Nasr City (Tarek)	Residential	x	x	x	x		NO2	SO2				
	Heliopolis (Tarek)	Residential	x	x	x	x		NO2	SO2				
	AinShams (Ahmed)	Residential	x	x	x	x		NO2	SO2				
	Canal area												
	Suez industrial	industrial/res.					x	NO2	SO2				df
16	Port Said	Residential					x	NO2	SO2		A		
17	Ismailia	urban/resid					x	NO2	SO2		A		
	Upper Egypt												
18	El Fayum	urban					x	NO2	SO2		A		df
19	El Minya	Res./ Industrial					x	NO2	SO2		A		df
21	Assyut 2	residential/urban					x	NO2	SO2		A		df
22	Naga Hammadi	industrial/res					x	NO2	SO2		A		df
	Luxor, Karnak	monument	x	x	x	x		NO2	SO2				
	Luxor, Temple	monument	x	x	x	x		NO2	SO2				
24	Edfu	Industry/urban.					x	NO2	SO2		A		df
25	Kom Ombo	industrial					x	NO2		SO2	A		p
26	Aswan	urban/residential.					x	NO2		SO2	A		df
	Sinai Area												
	Sharm ElSheik	city, tourist	x	x	x	x		NO2	SO2				
27	Ras Mohamed	background					x	NO2	SO2		O3		df
	Alexandria												
33	IGSR, Background	Urban regional					x	NO2	SO2		O3		M
	AlAzafra (Shallaby)	Residential	x	x	x	x		NO2	SO2				
	Roman theatre	Monument	x	x	x	x		NO2	SO2				
	Delta Area												
40	Kafr Dawar	industrial					x	NO2		SO2	A		df
34	Damanhur	industrial/res					x	NO2	SO2		A		df
	Kafr et Zayet south	industrial					x	NO2	SO2		A		df
36	Tanta	urban					x	NO2		SO2	A		
39	Domyat	resid					x	NO2		SO2	A		df

A = AIRmetrics PM10 sampler
df = dust fall collector

In addition Passive sampling will be undertaken every quarter around the AbuQuir factories.

G.4.1.2

EIMP
Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Minutes for Meeting at IGSR

Date: **Sunday, 26 March 2000**

Time: **11:00 P.M.**

Attendance:

From IGSR:

1- Dr. Elsayed Shalaby.
2- Dr. Zekry Ghattas.
3- Eng. Ashraf Zahran.
4- Eng. Hossam Ahmed.
5- Eng. Mohammed Mamdouh.
6- Eng. Arwa Ashour.

From EIMP:

1- Prof. Bjarne Sivertseen.

The meeting started by giving a total summary about the status of all stations. This summary is enclosed in the following table:

EIMP Monitoring and Sampling Programme Status, IGSR

	Site	Area type	Param	Status	Responsible	Comments
	Alexandria					
28	Abu Qir College	Industrial	SO2(M) NOx (M) PM_{10}(HVS) DF	Not in operation Not operation Not operation At Amraya	Instruments at IGSR	- The shelter should be moved to El- Shouhada Square. - We need a ladder for the station 3-5 or 4 m neo. Eng. Haitham. but Dr. Sayed will chat with Air defence firstly. - We have to decide the sites of passive samplers. - Abu Qir NO_2 SO_2 will be replaced with No_2 S.S. PM10 will be removed, 5 passive samplers for ammonia will be installed at the same place of SO_2 & NO_2.
29	El-Max Petrogas	Industrial	SO_2 (SS) NO_2 (SS) PM_{10} DF	Okay Okay Okay Okay	Eng. M. Rashad IGSR	- Data could not be retrieved on a weekly basis because samples are sent for analysis to CEHM every 2 weeks.
30	IGSR, Alex	Urban/ road	NOx (M) SO_2 (M) PM_{10} (M) NMHC(M) CO (M)	Okay Okay Okay Stopped Okay	IGSR Eng. Houssam	- we can get the spare parts of NMHC device to re-operate it again (responsible: Yassin and Tarek & Housaam) - No2 , Nox and NMHC could be drawn in one chart to facilitate the comparison between data. - Chargeable batteries for PM10 are still needed. We have to send a singed request to Yassin as soon as possible. (responsible: Houssam) - Co Monitor should be checked by Rolf, because of low span values.
31	El-Asafra-	Residential	SO_2 SS NO2 (SS) PM_{10} (AM)	Okay Okay Okay	Eng. Houssam IGSR	- There is a hole in the station roof causes percolation rain water inside the station , we can use silicon or foam to avoid this problem.
32	Gheat El-Inab	Residential	SO_2 (SS) NO_2 (SS) PM_{10} (HVS)	Okay Okay Okay	Eng, M.Rashad IGSR	
33	Alexandria regional	Regional □	Met Ozone (M)	Okay Okay		- Temp. should be kept not more than 24 °C , so the air condition should be checked . - Eng . Haitham will take the responsibility of changing the electrical circuit of the air conditions before summer.
41	El Amraya district (EL- Nahda)	Industrial	PM_{10} (AM) DF	not installed ~~AIRmetrics~~ have been taken from Abu Qir	CHEM IGSR	- High V.S. will be moved from Abo Qir We took the permission to put the samplers in the middle of the square. It has to be fixed to avoid wind blowing down . We can more it next week. (1 st week) of April NO2 P.S.

	Delta Area	Area type	Param	Status	Responsible	Comments
34	Damanhur	Urban	PS(S+N)	Okay		
35	Kafr El Zayet	industrial/res. □	SO_2 (M) NO_2 (M) PM_{10} (M) DF	Gives low voltage values due to bad contact inside the device. Okay Okay Okay	Eng. M. Mamdouh	M Mamdouh will check it
36	Tanta	Urban	SO_2 (SS) PS (N) PM_{10} (AM)	Okay Okay Okay	M.K Eng. Houssam S.	
37	ElMahalla El Kubra	industr/res. □ □	PM_{10} (M) SO_2 (M) PM_{10} (M) DF	Okay okay Okay Okay	MK Eng. M. Mamdouh	
38	El Mansura	indust/res. □ □	Met NOx (M) SO_2 (M) DF	Okay Okay Okay Okay	Eng. Ashraf Zahran	
39	Domyat	Urban/resid	SO_2 (SS) PM_{10} (HVS) DF	Okay okay okay	Eng. Ashraf Zahran	
40	Kafr Dawar	urban/industr	SO_2 (SS) PM_{10} (AM) DF	Okay Okay okay	Eng. Houssam S. MK	
	Damanhour					

Annual Report 1999

- Major changes from the last report: is to update the table of parameters.
- Chapter 2: needed to be more summarized because new stations will be added.
- Chapter 3: "Data Availability".
- Chapter 4: "Data Quality".
- Chapter 5: "Meteorological Data".
  It is better to include the figures into the text. We have to find the frequency less than 2 m/sec.
- Chapter 6: "Air Quality Measurements".
  Alex Sites.
  Delta sites.
  We have to create Figures for NO2 & O3 from Aug. to Dec.
  The report should include black smoke average concentrations.
- We need to purchase a campass in order to determine the wind direction as accurate as possible.
- Concerning the frequency distribution, it should be drawn for all parameters for all monitoring stations.

Project Manager
Elsayed Shalaby.
Dr. ElSayed Shalaby

WEEKLY MEETING

Date: 5- April- 2000

Time: 12:00:00 PM

Attendance:

1- Dr. El- Sayed Shalaby.

2- Dr. Shawkat Guirgis

3- Dr. Zekry Ghettas.

4- Eng. Ashraf Zahran.

5- Eng. Hossam Ahmed.

6- Eng. Mohammed Mamdouh.

7- Eng. Arwa Ashour.

Dr Shalaby suggested that calibration should be done before making any modifications for the results.

Calibration should be done with travelling cylinder on weekly basis.

Calibration and maintenance should be performed for all sequential samplers during April 2000 (responsible: Dr. Sayed and Eng. Houssam).

Results from sequential samplers must be retrieved every month by e-mail (responsible: Dr. Sayed, Dr. Shawkat and Dr. Zekry)

Concerning the annual report 2000, comparing between 99, 2000 data is essentially needed.

The problem of monthly archived data for the year 1999 should be solved as soon as possible (responsible: Eng. Mohammed Zaki)

El Sayed Shalaby

General comments:

- Concerning the quarter report (Oct.- Dec.99): it was very good except:
- Some data breaks appear in the charts, to avoid the existence of these breaks data should be retrieved every week. Then data should imported to the DataBase and printed out from Excel software.
- We should get sequential sampler data from Cairo University every month to be processed with DataBase, through Dr. Zekry.
- Dr. Shalaby, Prof. Bjarne, Dr. Ahmed Gamal, and Eng. Ahmed Abou El-Soud have visited Abu Qir Company. They met the General Mohamed Awad the director of Air Defense Faculty and decided to move the monitors to El-Shouhada Square and replace them by sequential samplers in Abu Qir station in addition to portable ammonia monitor.
- Dr. Elsayed Shalaby and Dr. Shawkat Guirguis will attend a workshop at Elein El- Sokhna during 2,3,4 of April- 2000.

Project Manager

Dr. ElSayed Shalaby

Elsayed Shalaby

G.4.1.3

Routine maintenance. TEI model 610 TSP sampler

Station name	Station Id.	Instr. ser.no.

			Before sampling	After sampling
Maintenance		Date		
		Time		
Elapsed time		Reading		
		Net min.	Reading before - Reading after	
Pressure chart		Loaded		
		Collected		
Filter		Loaded		
		No.		
		Collected		
Sampling	Start	Day no.		
		Time		
	Stop	Day no.		
		Time		
Sampler programmed				
NB!	Roof closed			
	Latch seccured			
	Power connected			
	Door closed			
Comments				
Signature				

Routine maintenance. NILU model FK SO2 sequential sa[illegible]ler

Station name	Station Id.	Instr. ser.no.

Maintenance

	Date	Time
Before		
After		
Corr. factor		

Maintenance

		Before	
Active chn		After	
Relay latched			
Timer	Time	Time	
		Adjusted	
	Switch	Time	
		Adjusted	

Air volume [m^3] = Corr. factor * 24 * (Start + Stop) / (2 * 1000)

From		To		Chn No	Air flow [l/h]		Air volume	Remarks
Date	Time	Date	Time		Start	Stop	[m3]	
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				

NB!	Rotameter tube capped		AV/PÅ on (lit)		Correct active filter		Door closed	
	Timer switch in clock position		Timer time correct			Sign.		

Samples received lab.		REMARKS FOR THE LAB. - ONLY THE LAB FILLS IN HERE	Proof read	
Date	Sign.		Date	Sign.

Routine maintenance. NILU model FK NO2 sequential sa. ,ler

Station name	Station Id.	Instr. ser.no.

Gas meter reading at start and stop

	Date	Time	Gas meter reading
Start			After _____,___
Stop			Before _____,___
Total hours exposed			Tot.air vol. _____,___
Corr. factor			Vol. corr. _____,___

Tot. air vol. [m^3] = After - Before Vol. corr. [m^3] = Corr. factor * Tot. air vol.

Air volume [m^3] = 24 * Vol. corr. / Total hours exposed

Maintenance

Active chn		Before	
		After	
Relay latched			
Timer	Time	Time Adjusted	
	Switch	Time Adjusted	
Particulate filter changed			

From Date	From Time	To Date	To Time	Chn No.	Control Flow	Air volume [m^3]	Remarks
				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			

NB!	Rotameter tube capped		AV/PÅ on (lit)		Correct active filter		Door closed	
	Timer switch in clock position		Timer time correct			Sign.		

Samples received lab. Date	Sign.	REMARKS FOR THE LAB. - ONLY THE LAB FILLS IN HERE	Proof read Date	Sign.

Routine maintenance. NILU model SF 1 dustfall collector

Station name	Station Id.

		Before sampling	After sampling
Maintenance	Date		
	Time		
	Days		
Surroundings Ok			
Collector	Lid off		
	Stand at correct height		
	Collector top horisontal		
	Water inside		
	Lid on		
Comments			
Signature			

Routine maintenance. IVL model SO2/ NO2 passive samp

From		To		Sampler type		Station			Remarks
Date	Time	Date	Time	SO_2	NO_2	Name	Id.	Position	

	Sign.

Samples received lab.		REMARKS FOR THE LAB. - ONLY THE LAB FILLS IN HERE	Proof read	
Date	Sign.		Date	Sign.

G.4.1.4 a)

EIMP

MEMO

Site visit 5th March 2000

The Status of the Air Quality Monitoring station at 6th of October.

Haytham A. Ahmed
Air Quality Counterpart

General Information :

- Station ID : AQ13
- Date of visit: 1 of March. 2000
- Inspector from EIMP: Chemist. Haytham A. Ahmed
- Responsible from CEHM: Mr. Yassin Fathy
- Equipment mentioned in the Air Quality Monitoring Programme: PM_{10} high voulme sampler.NO_2 and SO_2 sequential samplers.

Status :

- Access: ladder to the shelter.
- The wooden cover of the door is not fixed.
- The filters of the sequential samplers and the high volume samplers were thrown away inside the shelter.
- The shelter is going to be rusty in certain parts.
- The equipment present in the station are: SO_2 and NO_2 sequential samplers, PM_{10} high volume sampler.
- Station manuals are present.
- The PM_{10} sampler is clean comparing to the TSP at tabbin south station.
- The station guard was not present during the visit.

Required Action :

1-EIMP

- The shelter and the ladder need to be re-painted
- the wooden cover need to fixed.
- Install a new lamp.

2-CEHM

- The equipment inside the shelter need to be re-organised and the shelf need to be cleaned.

G.4.1.4 b)

EIMP

MEMO

23th February 2000

The Recommended Plan for installtion of PM_{10} Airmetrics

Haytham A. Ahmed
Air Quality Counterpart

Sampling Programme for PM_{10} :

The EIMP air quality sampling programme for PM_{10} consists of 20 sites, 8 of them are operating with PM_{10} high volume samplers, and the rest will work with Airmetrics Minivol sampler.

The status of the equipment needed for installation :

Many things have been prepared for the installation of Airmetrics instruments :

1-Filters enough for one year operation have been ordered with the shipment of the samplers and delivered to CEHM to start the operation.
2- CAIP boxes with stand have been installed in the following sites : Shoubra, Port Said, Isamilia and Nag Hammadi
3- 3 more boxes with stands are needed for the installtion in the following sites : El Minia, Ras Mohammed, Damanhur and only stand is needed in El Amrya district.
4- grease for the operation (to eliminate particles more than 10μm in diamter) has been borrowed from CAIP and it will be ordered by CEHM.

The sampling Programme using AIRmetrics PM_{10} samplers as recommended by the task manager:

Site	Sampling time		status	Date of installtion	Comment
10 Shoubra	Weekly		Installed	Nov.1999	CAIP box with stand
16 Port Said		Monthly	Installed	16 Feb. 2000	CAIP box with stand
17 Isamilia		Monthly	Installed	16 Feb. 2000	CAIP box with stand
19 El Minia		Monthly	In progress	9 Mar. 2000	CAIP box with stand
22 Nag Hammadi			In progress	24 Feb.2000	CAIP box with stand
25 Kom Ombo	Weekly		In progress	25 Feb.2000	Sampler in shelter
27 Ras Moahmmed		Monthly	In progress	4 Mar. 2000	CAIP box with stand
31 El Azafra	Weekly		Installed	Nov. 1999	Sampler in shelter
34 Damanhur		Monthly	In progress	8 Mar. 2000	CAIP box with stand
36 Tanta	Weekly		In progress	23 feb 2000	Sampler in shelter
40 Kafr Dawar	Weekly		Installed	16 Feb. 2000	Sampler in shelter
41 El Amrya district	weekly		In progress	15 Mar.2000	CAIP box with stand

The measurement on weekly basis will be done in the sampling days for PM_{10} or TSP high volume samplers and in co-ordination with CAIP.

G.4.1.5

EIMP

EIMP instrument expert Monitoring programme audits and maintenance

Work Notes March 2000

270300 Travelling from Norway to Cairo, Egypt. Arrived in Maadi at 0130 in the night.

280300 Office work. Tried to summarised status at stations in Egypt.
Went to Maadi and Tabin stations to sort out the problems Yassin had in making the 145 Calibrator work properly.
At Maadi the airflow was to low and at Tebin corrosion destroyed the temperature sensor in the chamber.

290300 To CEHM in the morning.
Started to run NO-NO2 titration's with O3 to teach Yassin how to run a converter check on NOx monitors.
Went to Gomorayha station and sorted out another 145 Calibrator problem. By mistake the instrument was running on 120 V instead of 220 V.

Work notes April 2000

010400 Staff meeting. Office work. Made preparation (spare parts etc.) for my travel to Alexandria tomorrow.

020400 Went to Alexandria and started a short meeting in the office to make a work plan for the next 2 days.
Went to Abu Qir (AQ 28). Found 5 places in different directions from Fertiliser Company to Abu Qir Collage.
A map of this is given to BS. Passive samplers for NO2, SO2 and NH3 was put up at these 5 sites. The samplers will be changed on 9th mars and 2. Set of samplers are taken to IGSR on 16th mars. On 17th mars all 10 samplers are transported to me in Cairo and I will bring all samplers to NILU on 18 March.

030400 Started on the problem of Alex. Reg Station. Wind direction does not work. A loose cable was found in a junction box at Meteorological mast. This kind of problem was found in November last year and the responsible person for the station was trained to solve the problem but had forgotten it by March this year.

Work notes April 2000 (cont.)

030400 Next station visit was IGSR.

1. CO travelling standard gas cylinder was mistaken by CO Working standard cylinder. First cyl. has 50 ppm CO and second one has 500 ppm CO. This gave the result of only3-5 ppm of CO instead of 50 ppm when performing calibration.
2. 145 Calibrator did not work properly. No gases, SO2 or NO2 was emitted from the calibrator. After inspected the calibrator I found the permeation chamber wet and the Silica Gel white and not working properly as a dryer.
3. There has been some problems with Silica Gel dryer on NOx monitor not getting white (or absorb humidity). In the shelter it is so dark behind the rack that it was difficult to see the colour of Silica Gel. In this case Silica Gel needed to be regenerated but the responsible for this station did not see the colour of the drying agent.

I had a quick look at the Motor Bike, which did not run well. After some adjustments on the throttle cable the Motor Bike was working like a new one.

040400 Went to Kafr Zayat station. There was no response on the 145 Calibrator. After some trouble the conclusion was a leak in the lid of the dryer column. This was tighten, leak tested and the Calibrator performed well.
Went on to El Mahalla to investigate a difference in calculated Value from display and analogue voltage on the PM10 Monitor. Analogue voltage is 2.6 times higher then on the monitor display. To solve the problem the monitor has to be transported to CEHM, run in parallel with another PM10 and decide if display or analogue voltage is correct. After this you know where the Problem is and it can be corrected.
Went back to Cairo in the evening.

Conclusions.

Almost all problems at IGSR stations and at CEHM stations visited so far on this mission is due to lack of maintenance and QA/QC.
This maintenance is documented in SOP and has to be Followed or the reliability and lifetime of the instruments will be shortened.

Work notes April 2000 (cont.)

050400 To storage with spare parts from Alexandria trip and to CEHM with a SO2 monitor from IGSR.
Trained Yassin in adjusting the micro switches on a SO2 Sequential Sampler.
Office work.

060400 Thursday.

070400 Friday.

080400 Staff meeting. Office work.

090400 Office work. Some spareparts taken from the storage. (small parts to be considered as consumable).

The following items is delivered:

Air filters P/N 4070	6 pc.
Charcoal PN 4158	4 pc.
145 pump filter inlet PN 5013	2 pc
NOx pump kit PN 9267	4 pc.
145 pump kit PN 5013	4 pc.
Gen. Mon. pump kit PN 8606	4 pc.
145 cal. Glass tube PN 6652	2 pc.

100400 Went to CEHM. Yassin and I made calibration curves above1000 ppb. Top of the curve was 1400 ppb. The curve sometimes bend down after passing top of range at 1000 ppb.
At 1500 ppb the monitor read 1467 ppb. This is a very good result and is not the reason for the differences between CEHM and NIS.
Had a meeting with Danish Commission at CEHM.

110400 Went to Alexandria at 0700 in the morning. Meeting at IGSR.
All stations was discussed in details, and we had a lot of comments on QA/QC at station and at IGSR.
After the meeting I went to Alex. Background station and checked Wind Direction. WD was approximately
3 degrees from N. (357)
Made an arrow on the roof and found a building 1 km away.
Standing on this arrow, looking on the building through the mast the WD- tube is pointing to the N if it has the same direction as you are looking.
Afterwards I went to IGSR station to check all the work I had asked Hossam to do as soon as possible. Everything was done.

Work notes April 2000 (cont.)

120400 Went to NIS in the morning. NIS had prepared 146 Multipoint Calibrator and SO2 monitor. Yassin from CEHM arrived, bringing SO2 Ref. Standard and Travelling standard gases.
Stared to inspect gas cylinders, Teflon lines and fittings. No error was found.
The following **TEST** was made.

1. Run 1000 ppb on SO2 monitor, NIS Ref. Standard.
2. Run 860 ppb travelling standard.
3. Run 1000 ppb on SO2 monitor, CEHM Ref. Standard.
4. Run 860 ppb travelling standard.

The result from run 2 and 4 was

2. 1137 ppb.
4. 1150 ppb.

This is well within the limits of expected values.
Later the same day Yassin made the same test at CEHM on my Request. He came up with the same results as earlier, 950 ppb.
Earlier I have inspected gas cylinders, Teflon lines and fittings at CEHM, and no error found.
The work of NIS and CEHM is also found to be according to SOP.

G.4.2.1 a)

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: JFS, AAE, MF, HAA, HF
From Bjarne Sivertsen
Date: 14 March 2000

Meeting with CTS, 13 March 2000

Participants: Amr ElSoueini
Tarek El Araby
Bjarne Sivertsen

Three topics were discussed:
1. Procedures for repairing/replacing the 2 PM_{10} monitors presently at CTS
2. Return of NMHC monitors. What can we get in return from CTS/Thermo?
3. Maintenance/service manuals for monitors

ad.1:
The following procedure was agreed upon concerning the PM_{10} monitors:
The Tabbin PM110 will be repaired with spareparts available, and returned to the EIMP programme before **14 April 2000**.
The (new) PM_{10} assigned for Fum El-Khalig will be evaluated, and we will have a decision on whether it will be repaired or replaced before **1 April 2000**. An eventual replacement with a new may take a month extra.

ad. 2:
Alternative a) Four NMHC monitors may be returned to CTS and a new Thermo instrument (meaning a gas monitor) was offered at half price as a compensation. We considered this a bad deal as long as our priority is a PM_{10} monitor.
Alternative b) Four NMHC monitors may be returned to CTS. In return CTS offered a new version of the PM_{10} monitor from Eberline at half price which is 8500 US $. However, it turned out that this deal only applied if ALL PM_{10} monitors in the EIMP programme were to be changed.
Alternative c) The NMHC monitors will be kept at CEHM and used as spare parts in the EIMP programme. We can use the zero generators and other parts for repairing the CO monitors.

As long as we will have to "pay" for returning the NMHC monitors, I will propose that we chose the solution indicated in Alternative c). However, it would be

tempting to get a new version Eberline PM_{10} monitor. This may be considered but will cost EIMP another 8500 US $

ad. 3) The maintenance and service manuals at CTS/Thermo are company secrets, and can not be given or sold to CEHM. However CTS promised, as a service to CEHM, to support any questions and problems they may face "absolutely free of charge!"

New batteries for the VOC samplers (which have a limited lifetime) will be supported to CEHM as soon as possible.

G.4.2.1 b)

CHEMICAL & TECHNICAL SERVICES
شركة الخدمات الفنية و الكيميائية

FAX

Page # 1 of 1

To	Dr. Tarek El-Araby	CEHM
CC.	Eng. Mohamed Fathy	EIMP
From	Dr. Amr El-Soueni	C.T.S.
Fax. #	15/2000	
Date	Mrch 25, 2000	

SUBJECT: Warranty repair for Model 650 S/N 580-315Beta Gauge PM-10 monitor and repair cost for Model 650 S/N 58036-315

Dear Gentlemen

We are pleased to advise you that Model 650, S/N # 580-29-315 is being repaired and is ready for operation. This has been repaired free of charge under warranty.

Model 650, S/N # 58036-315 cost LE 4,250.00 for repair, please advise of your approval so that we can proceed with the repair.

If you have any other unit of Model 650 which is defective, please bring it over for repair.

Looking forward to receiving your approval.

Best Regards

Dr. Amr El-Soueni

OK for payment of repair cost by EIM
EEAA for PM10 monitor S/N # 58036-315
26/3 2000

New Correspondence Address
Burg No. 1, Abrag El-Canal
El-Canal Str. Extension
Thakanat El-Maadi - Cairo - Egypt
Tel.: 3782908 - 3784973 Fax.: 3504977

عنوان المعاملات
برج رقم (١) ابراج القنال - امتداد شارع القنال
ثكنات المعادي - القاهرة
ت: ٣٧٨٢٩٠٨ - ٣٧٨٤٩٧٣ فاكس: ٣٥٠٤٩٧٧

G.4.2.2

EIMP

Repair Report Based on Information from
Center Of Environmental Hazard Mitigation Center
(1 February-29 February)

(Haytham Ahmed)

The following Monitors have been repaired at the Center of Environmental Hazard Mitigation Center during the period from 1 February till 29 of the same month.

No	Type	S/N	Station	Received	Repaired	Malfunction
1	NO_X	42C-57880-315	Gomhorya	-	t the tation	Negative values is displayed on the Computer
2	SO_2	43C-61006-329	Mahalla	1 feb 2000	2 Feb 2000	Low lamp voltage
3	O_3	94c-60929-329	Abbassyia	-	At NIS	High fluctuation During calibration

Calibration Report

No	Type	S/N	Station	Received	Repaired	Remarks
1	SO_2	43C-61006-329	Mahalla	1 feb 2000	2 feb 2000	After Repair (low lamp voltage)
2	SO_2	43C-61653-332	Dafr El - zayet	14 feb 2000	17 feb 2000	After Repair (Low lamp Voltage)
3	NO_x	42C-57601-314	IGSR	20 feb 2000	21 feb 2000	Annual calibration
4	NO_x	42C-57611-314	Abu Keir	24 feb 2000	26 feb 2000	Annual calibration
5	SO_2	43C-58164-316	Kolaly	19 feb 2000	20 feb 2000	Annual calibration
6	NO_x	42C-57604-314	Kolaly	19 feb 2000	21 feb 2000	Annual claibration
7	NO_x	42C-57866-315	Fum El Khalig	15 feb 2000	15 feb 2000	Annual calibration
8	SO_2	43C-56196-316	Fum El Khalig	13 feb 2000	14 feb 2000	After repair of Pump malfunction & annual calibration

9	CO	48C-57596-317	Fum El Khalig	15 feb 2000	15 feb 2000	After repair of correlation wheel & annual calibration
10	CO	BLM003505	Cairo Uni.	28 feb 2000	28 feb 2000	Quarterly calibration
11	SO_2	B121231F	Cairo Uni.	21 feb 2000	21 feb 2000	Quarterly calibration

G.5.2

Table III-I-1. AIRmetrics/BGI Measurements Comparison

Sampling Date	PM10, ug/m3		Difference, %
	AIRmetrics	BGI	
16-Jun-99	151.5	164.7	-8.3
22-Jun-99	190.8	212.5	-10.8
4-Jul-99	114.2	138.4	-19.2
10-Jul-99	156.1	176.7	-12.4
16-Jul-99	264.2	251.3	5.0
28-Jul-99	108.2	105.3	2.7
3-Aug-99	122.8	104.9	15.7
9-Aug-99	139.6	147.8	-5.7
15-Aug-99	133.5	110.5	18.9
21-Aug-99	232.4	185.8	22.3
27-Aug-99	97.2	81.0	18.2
2-Sep-99	132.6	144.8	-8.8
8-Sep-99	131.9	121.5	8.2
14-Sep-99	108.1	120.1	-10.5
20-Sep-99	218.1	202.9	7.2
2-Oct-99	95.8	111.2	-14.9
14-Oct-99	148.2	122.0	19.4
1-Nov-99	234.2	244.9	-4.5
19-Nov-99	382.2	419.2	-9.2
25-Nov-99	98.3	98.7	-0.4
1-Dec-99	171.0	151.7	12.0
13-Dec-99	196.1	188.0	4.2
19-Dec-99	102.2	82.2	21.7
25-Dec-99	96.4	101.9	-5.5
31-Dec-99	204.2	198.5	2.8
24-Jan-99	251.5	288.8	-13.8
30-Jan-99	122.5	132.1	-7.5
Average Difference, %			1.0
Standard Deviation of Differences			12.6
Maximum Difference			22.3
Minimum Difference, %			-19.2

G.6.1 a)

EIMP

Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

From Bjarne Sivertsen
15 April 1999

Sampling Programme
Filters selected for lead analyses, April 2000

The following **PM_{10} filters** should be analysed.
There is a specific Excel template for presentation of results developed by Oddvar!

	Site	Filter from day		Conc.		Aver conc	
		first priority	second priority	µg/m³		µg/m³ tot	
4	Nasr City	20 nov 99	8 dec 99			224	287
5	Maadi	23 nov 99	9 dec 99			273	240
13	6 October	14 nov 99	21 nov 99			237	214
14	10 Ramadan	19 nov 99	7 dec 99			140	106
28	AbuQuir						
29	ElMax	9 dec 99	4 dec 99			160	137
32	Gheat ElEnab	23 nov 99	22 nov 99			195	190
39	Domyat	19 dec 99	8 oct 99			182	123

The following **TSP filters** should be analysed

	Site	Filter from day		Conc.		Aver conc	
		first priority	second priority	µg/m³		µg/m³ tot	
1	Kolaly	11 nov 99	24 oct 99			1191	841
6	Tabbin	13 dec 99	6 nov 99			1676	834
7	Tabbin south	24 dec 99	19 oct 99			2827	1295
10	Shoubra	20 nov 99	20 dec 99			1051	959
15	Suez	18 nov 99	13 oct 99			1808	1269

G.6.1 b)

EIMP

Environmental Information and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: Joergen Simonsen
Haytham Ahmed
Dr. Tarek El Araby CEHM
Dr. Gehad Genidy CEHM
From: Ove Hermansen
Date: 10 November 1999

VOC-method, necessary preparations before training:

At least two persons with the experience needed to operate the gas chromatograph must be available all time during next visit. They must have a good understanding of the operation of the gas chromatograph since all the time for training activities have to focus on the VOC-method.

Necessary items:

Calibration gases:

ppm hydrocarbon mixtures (C_2-C_6) can be ordered from Scotty gases

Tubing and connectors:

Provided by Swagelok or Hoke (Gyrolok) (attachment: Tube connectors and adapters)

Purge & Trap unit:

External coolant, CO_2-cylinder with regulator
Manuals for the P&T (may be somewhere in the laboratory, if not; should be provided by the local supplier)

Gas chromatograph:

Helium cylinders & regulator (attachment: offer from ETICO GAS)
Chromatographic column (Al_2O_3/KCl PLOT coloumn, 50 m, 0.32 mm ID) provided by Chrompack. (Local distributor: Group Engineering & Scientific Systems.,
PO Box 1024, Al Maadi – Cairo)
Manuals for the GC-software (may be somewhere in the laboratory, if not; should be provided by the local supplier)

VOC-samplers:

Extension cables for all samplers
All batteries not working must be replaced

G.6.1 c) EIMP

Fax Transmission

To CEHM

Fax no. 202-5674848

Attention Dr.Tarek EL-Araby

No. of pages (Incl. this page)

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6452/53/39/95
Fax: +202 525 6467

E-mail: eimp@intouch.com

Subject: Ove Hermansen next mission

Dear Dr. Tarek

Date
10 Feb. 2000
Our ref.

I would like to inform you that Eng.Ove Hermansen next visit to CEHM will be on 13th March 2000, so we need to check for these things before he come to Cairo:

- Have the lab. got any hydrocarbon calibration gases? Nil, capacity?. Samir Lavendi. NO!
- Have the lab. got the tubing and connectors needed? last two valves pressure gauge ordered.
- Have the lab. got the CO 2-cylinder (external coolant) for the purge & trap unit? Yes (two) regulator ord.
- Have the lab. got the manuals for the purge & trap unit? within 2 days.
- Have the lab. got the helium-cylinders and regulators for the gas chromatograph? 2. He cylinder regulator ordered places.
- Have the lab. got the chromatographic column for the gas chromatograph? At air port - coming soon'. Ordered long time ago.. Dr.Hweni
- Have the lab. got the manuals for the GC-software? NO manual available! At the HC. help file.
- Have the lab. got the extension cables needed for the VOC-samplers? Will be bought locally.
- Have the lab. got new batteries for the VOC-samplers? ? important ?.

Please confirm as soon as possible.

Thank you for your co-operation.

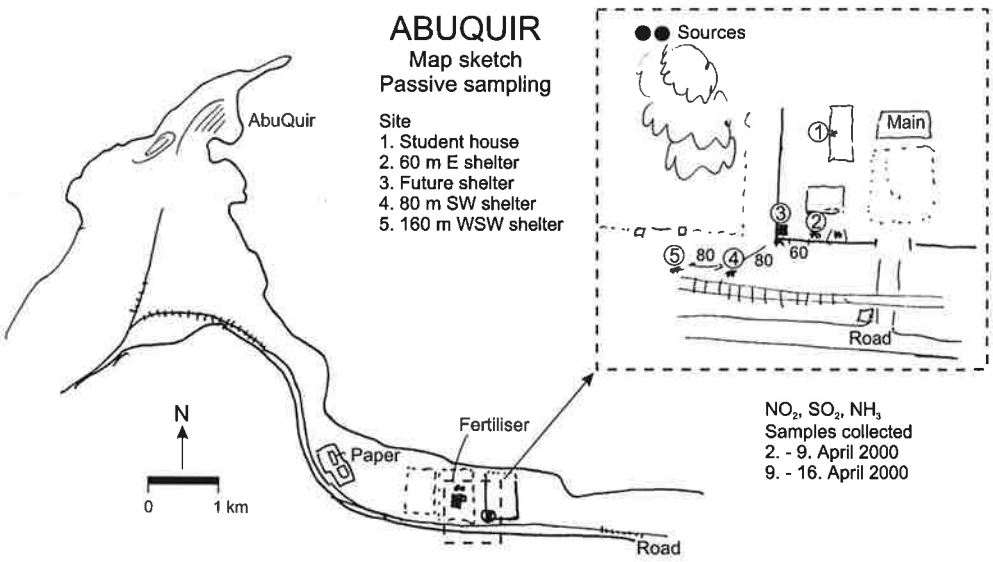
Sincerely

Eng. Hebatalla F. Ahmed

Air Quality Counterpart

G.6.3

Map sketch



G.6.3

EIMP

Passive sampling at AbuQuir

Prøveidentifikasjon	Journal nummer	Fradato	Tildato	Antall døgn	NO_2-N µg N/ml	NO_2-N µg N/m³	NO_2 µg/m³
Cairo 1	00-34	2.4.00	9.4.00	7	0,468	8,3	27
Cairo 2	00-34	2.4.00	9.4.00	7	0,376	6,7	22
Cairo 3	00-34	2.4.00	9.4.00	7	0,439	7,8	26
Cairo 4	00-34	2.4.00	9.4.00	7	0,503	8,9	29
Cairo 5	00-34	2.4.00	9.4.00	7	0,510	9,0	30
Cairo 1	00-34	9.4.00	15.4.00	6	0,289	6,0	20
Cairo 2	00-34	9.4.00	15.4.00	6	0,426	8,8	29
Cairo 3	00-34	9.4.00	15.4.00	6	0,425	8,8	29
Cairo 4	00-34	9.4.00	15.4.00	6	0,441	9,1	30
Cairo 5	00-34	9.4.00	15.4.00	6	0,426	8,8	29

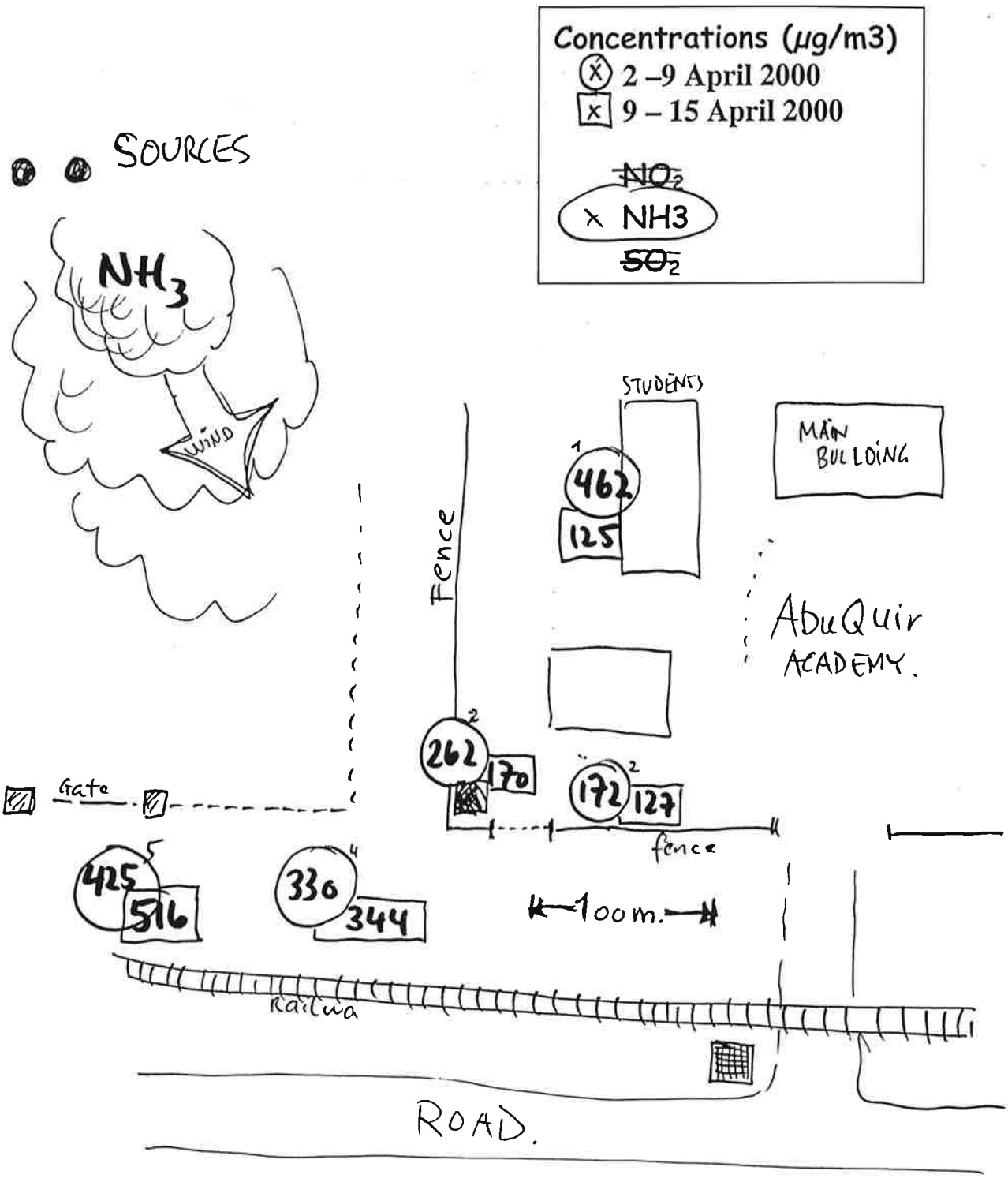
Prøveidentifikasjon	Journal nummer	Fradato	Tildato	Antall døgn	NH_4-N µg N/ml	NH3-N µg N/m³	NH_3 µg/m³
Egypt 1	00-34	2.4.00	9.4.00	7	35,4	380	462
Egypt 2	00-34	2.4.00	9.4.00	7	13,2	142	172
Egypt 3	00-34	2.4.00	9.4.00	7	20,1	216	262
Egypt 4	00-34	2.4.00	9.4.00	7	25,3	272	330
Egypt 5	00-34	2.4.00	9.4.00	7	32,6	350	425
Egypt 1 Merket FBL	00-34	9.4.00	15.4.00	6	8,23	103	125
Egypt 2 Merket FBL	00-34	9.4.00	15.4.00	6	8,33	104	127
Egypt 3	00-34	9.4.00	15.4.00	6	11,1	140	170
Egypt 4	00-34	9.4.00	15.4.00	6	22,6	283	344
Egypt 5	00-34	9.4.00	15.4.00	6	33,9	425	516

Prøveidentitet	Journal nummer	Fradato	Tildato	Antall døgn	SO_4-S µg S/ml	SO2-S µg S/m³	SO_2 µg/m³
Cairo PD-IVLA Nr. 1	00-34-11	2.4.00	9.4.00	7	1,01	20,8	41,7
Cairo PD-IVLA Nr. 2	00-34-12	2.4.00	9.4.00	7	0,73	15,1	30,1
Cairo PD-IVLA Nr. 3	00-34-13	2.4.00	9.4.00	7	0,93	19,2	38,4
Cairo PD-IVLA Nr. 4	00-34-14	2.4.00	9.4.00	7	0,86	17,7	35,5
Cairo PD-IVLA Nr. 5	00-34-15	2.4.00	9.4.00	7	1,06	21,9	43,7
Cairo PD-IVLA Nr. 1	00-34-16	9.4.00	15.4.00	6	1,30	31,3	62,6
Cairo PD-IVLA Nr. 2	00-34-17	9.4.00	15.4.00	6	0,61	14,7	29,4
Cairo PD-IVLA Nr. 3	00-34-18	9.4.00	15.4.00	6	0,81	19,5	39,0
Cairo PD-IVLA Nr. 4	00-34-19	9.4.00	15.4.00	6	0,95	22,9	45,7
Cairo PD-IVLA Nr. 5	00-34-20	9.4.00	15.4.00	6	0,69	16,6	33,2

G.6.3. a)

EIMP

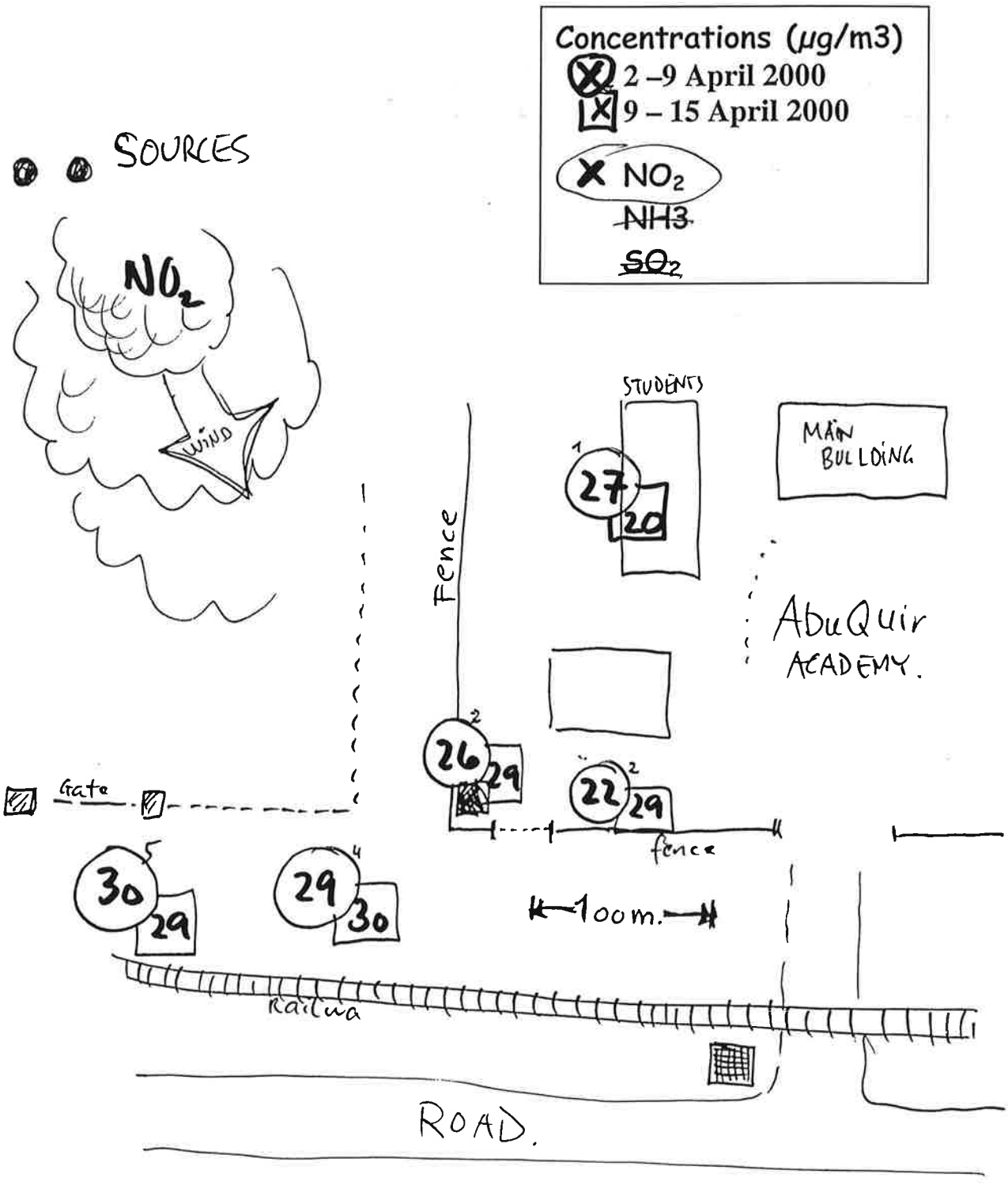
Passive sampling at AbuQuir



G.6.3 b)

EIMP

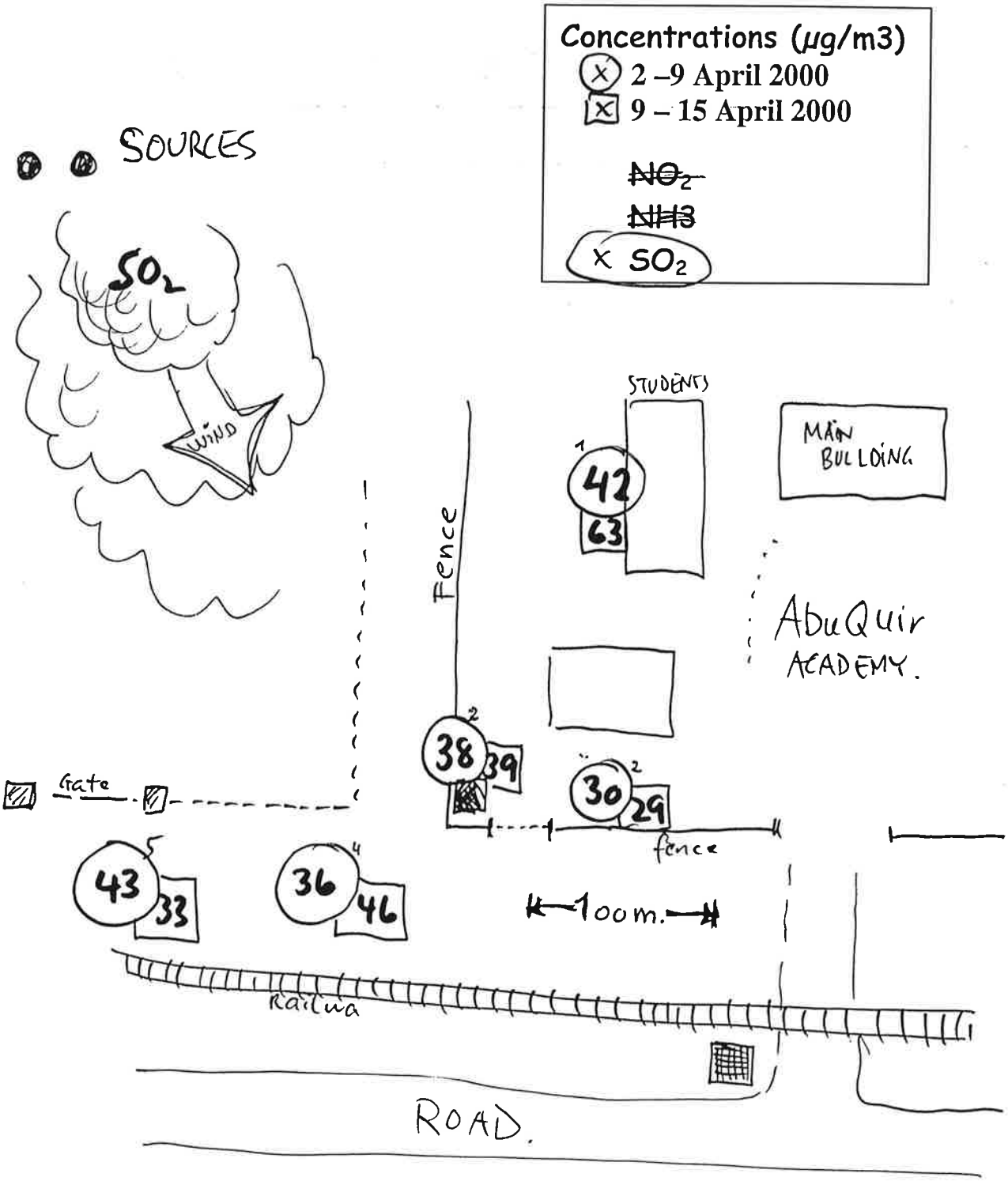
Passive sampling at AbuQuir



G.6.3 c)

EIMP

Passive sampling at AbuQuir



G.7.1

Egyptian Environmental Affairs Agency

EEAA

Air Quality in Egypt, April 2000

EIMP Environmental Information & Monitoring Programme (EIMP)
Air Quality Monitoring Component

Air quality in Egypt, April 2000
Table of Content

EIMP

Air Quality Monthly Report

Air Quality in Egypt, April 2000

1.Introduction

This monthly report is based upon preliminary data collected for EIMP/EEAA by the Monitoring Laboratories at the Centre for Environmental Hazard Mitigation (CEHM) at Cairo University and the Institute of Graduate Studies and Research (IGSR) at Alexandria University. The monitoring program has been designed and established by EIMP. The construction and installation of the measurement programme have been finalised by the middle of 1999. These monthly data have been pulled from the database at an early stage in the various processes of data quality assurance. The QA/QC on the data has not been finalised, and some of the data may include errors.

2. Sites

During April 2000, 26 measurement sites were operated by CEHM and 13 sites were operated by IGSR. These sites are all part of the EIMP/EEAA Air Quality-Monitoring Programme. The number of sites for each district in Egypt and for each area type is presented in Table 1.

Table 1: Number of sites in each area and district of Egypt.

Area type	Cairo	Alex.	Delta+ Canal	Upper Egypt.	Sinai	Total
Industrial	3	2	3	2		10
Urban	1	1	3	4		9
Residential	4	2	2	2		10
Street/road	3					3
Regional/backgr	1	1			1	3
Mixed areas	2		2	1		5
Total	14	6	10	9	1	40

3. Egyptian Air Quality Limit values

Air Quality Limit values are given in the Regulations of the Environmental Law no. 4 of Egypt.

These Air Quality Limit values are Presented in Table2.

Table 2: Ambient Air Quality Limit values as given by Law no.4 of Egypt (1994).

Pollutant	Maximum Limit	Averaging Time
Sulfur Dioxide (SO_2)	350 $\mu g/m^3$	1 Hour
	150 $\mu g/m^3$	24 Hour
	60 $\mu g/m^3$	Annual
Carbon Monoxide (CO)	30 mg/m^3	1 Hour
	10 mg/m^3	8 Hour
Nitrogen Dioxide (NO_2)	400 $\mu g/m^3$	1 Hour
	150 $\mu g/m^3$	24 Hour
Ozone (O_3)	200 $\mu g/m^3$	1 Hour
	120 $\mu g/m^3$	8 Hour
Black Smoke (BS)	150 $\mu g/m^3$	24 Hour
	60 $\mu g/m^3$	Annual
Total Suspended Particulate (TSP)	230 $\mu g/m^3$	24 Hour
	90 $\mu g/m^3$	Annual
Suspended Particulate (PM10)	70 $\mu g/m^3$	24 Hour
Lead (Pb)	1 $\mu g/m^3$	Annual

4.April 2000 Air Quality data

4.1. Monthly Averages

The monthly average SO_2 concentrations are presented for April 2000 from 24 sites in Egypt Figure 1. There is no Monthly Air Quality Limit value given for Egypt. However, based upon the annual average limit of 60 $\mu g/m^3$ and assuming that the concentrations are log-normally distributed, the monthly concentrations should not exceed more than about 80 $\mu g/m^3$.

The Maximum monthly average concentration was observed at Shoubra ElKheima station due to high emissions from smelters and industrial areas located in this area. The monthly average at this site was 97 $\mu g/m^3$. Exceedances of 80 $\mu g/m^3$ were found only in this station.

The next highest concentrations were observed Kom Ombo, which was 99% of the estimated limit for the monthly concentration.

In Kom Ombo stations the high value of SO_2 could be emissions of the sugar factory which is operating during this time of the year.

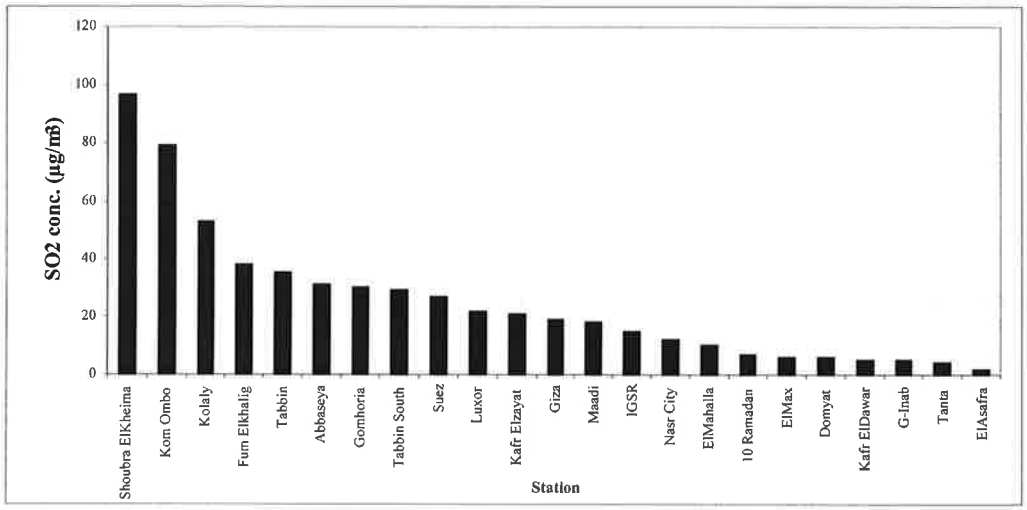


Figure 1: Monthly average concentrations of SO_2 ($\mu g/m^3$) at 24 sites in April 2000.

The next high concentration was recorded at Qualaly station, which was 70% of the estimated limit for the monthly concentration. Emissions of SO_2 from diesel buses may explain the high SO_2 concentrations there.

The highest concentration of NO_2 recorded on monthly basis was found at five stations, which are Gomhoreya, Fum Elkhalig, Suez, Kolaly and IGSR Alex stations, ranging from 141 to 65 $\mu g/m^3$. Figure 2 represents the Monthly average concentrations of NO_2 at 16 stations.

For Fum Elkhalig, Gomhoreya and Kolaly stations the high concentrations may be because these station are street canyons and are considered as high traffic areas.

For Suez station, it is located in a bus station, and represents the normal concentrations occurred in bus station.

For IGSR station, it is also considered as high traffic area in Alexandria and that could explain the high NO_2 concentration recorded there.

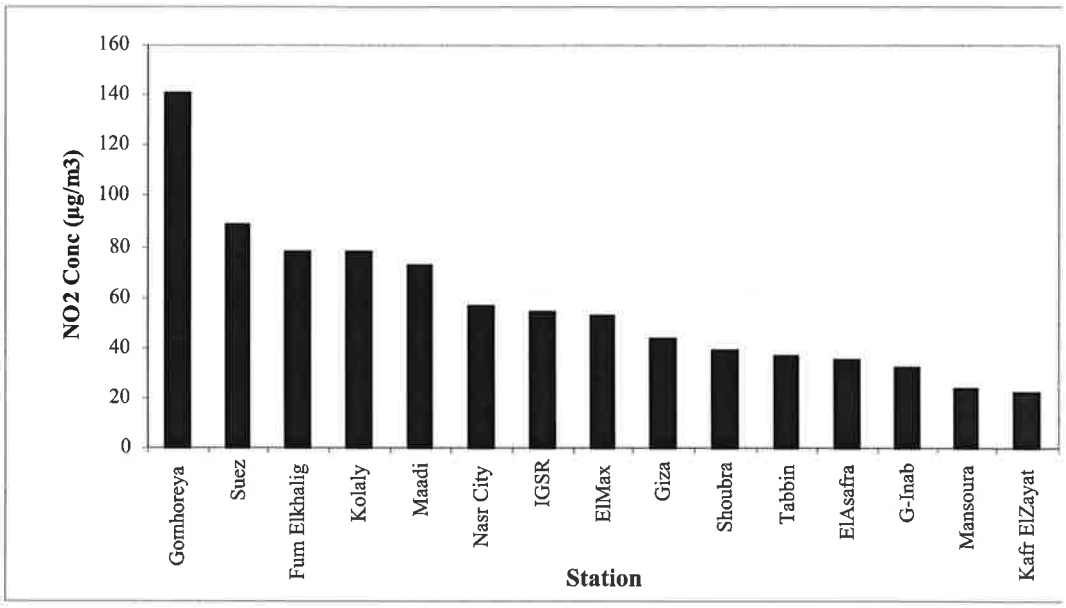


Figure 2: Monthly average concentrations of NO_2 ($\mu g/m^3$) at 16 sites in April 2000.

4.2 24 hour average concentrations

A summary of the highest 24-hour average concentrations of SO_2, NO_2 , PM_{10} , ozone , CO and soot measured in April 2000 is presented in Table3 based upon data from 23 sites operated in the Greater Cairo area, Alexandria, Delta and Upper Egypt.

Table 3: Maximum 24-h. average concentrations measured in Egypt during April 2000

Site	SO2	NO2	PM10	Ozone*	CO*	Soot
1 Qualaly	92	111	667'			
2 Gemhoroya street	83	184			24	
3 Abbaseya	86			129		
4 Nasr City	12	57	99■			39
5 Maadi	60	123	120■			
6 Tabbin	133	70	1299'			
7 Tabbin South	29					41
8 Fum Khalig	82	135			9	
10 Shoubra ElKheima	210					
11 Giza, Cairo Univ.	27	71		123		
13 6 Oct.			128■			
14 10 Ramadan	7		100■			16
15 Suez	71	108				
23 Luxor	22					60
24 Aswan	35			119		
25 KomOmbo	79					845
27 Sharm ElSheikh				114		
29 El Max	15	78	646■			
30 IGSR	47	75	670'		8	
31 Azafra	9	56	441A			
32 Gheat Inab	15	73	84■			
33 Alex. Regional				102		
34 Mansoura		50				
35 ElMehalla Elkoubra	21		577			
36 Tanta	9		146A			
37 Kafr ElZayat	87	36	984			
39 Domyat	16		58■			
40 Kafr Dawar	14		183A			
Air quality Limit value	150	150	70	120	10**	150

** Maximum 8-hr average concentrations.' Recorded on 19 April 2000*
*** Units of measurement of CO is mg/m3.■ Measurements were taken once a week.*
A: Air Matrix N.B. Shoubra Elkheima station worked only for a week during April 2000.

4.2.1 SO_2 concentrations

The 24-hr average concentrations of SO_2 ranging from 6 $\mu g/m^3$ at Asafra to 210 $\mu g/m^3$ at Shoubra ElKheima station.

The highest concentration was recorded in Shoubra Elkheima most probably due to emissions from smelters and the industrial area located there.

Fum Elkhalig, ElGomhoreya, and Qulaly stations located near street and roads in the central part of Cairo with very high traffic density. Emissions of SO_2 from diesel buses may explain the high SO_2 concentrations there.

Tabbin Station recorded a high concentration of SO_2 only when wind was blowing from south and south-south-west, this high concentrations could be from the industrial area located in tabbin south.

The high concentration recorded in Kom Ombo could be due to the emissions from the sugar factory located near the station.

From the concentrations shown in Table 3 we can conclude that:

- The Air Quality Limit value was exceeded in April 2000 at Shoubra ElKheima Station which recorded 210 $\mu g/m^3$
- The concentration at Tabbin was about 89 % of the Air Quality Limit value.
- In the streets in central Cairo such as Qulaly, Gomhoreya and Fum Elkhalig the concentrations was about 61% of the Air Quality Limits
- Abbaseya station recorded a high concentration of SO_2 about 55% of the Air Quality Limit during the Khamasine periods.
- None of the sites inside Alexandria and the Delta area exceeded the Air Quality Limit value.

Figure 3 represents SO_2 concentration versus wind direction in tabbin station. It's clearly pointed to the location of high SO_2 concentrations observed.

The high SO_2 concentrations observed when wind directions were south-south-west and east-south-east.

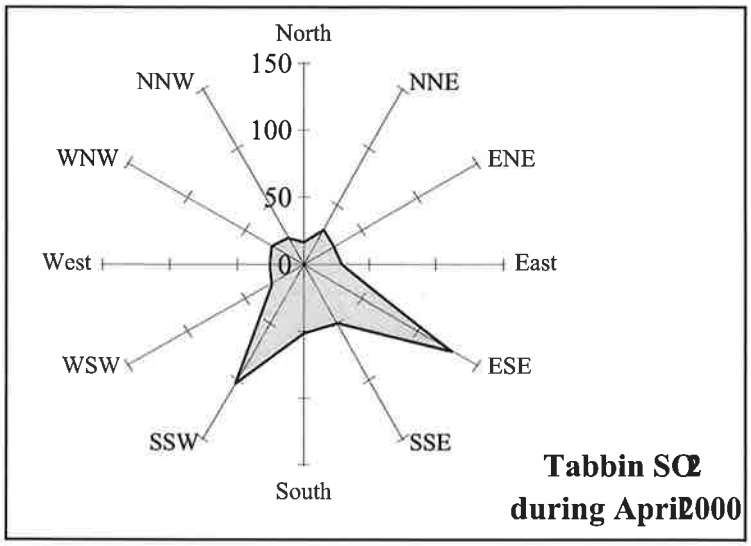


Figure 3: Breuer Diagram represents the SO_2 concentration at Tabbin during April 2000.

The sources located on these two directions are either lead smelters located south east of the station that uses mazot as fuel. Also brick factories are located there.

4.2.2. Soot concentrations (Black Smoke, BS)

Analyses of soot as 24-h average concentrations are also presented in Table 3. The analyses show that the concentrations at Kom Ombo and Gheat Inab exceeded the limit values of 150 $\mu g/m^3$.

- For Kom Ombo it could be because of emission of dust and soot from the sugar factory.
- For Gheat Inab it may be a result of open-air waste burning, but this has not been confirmed.
- At Domyat station, the concentration was about 81% of the Air Quality Limit, it may be also a result of open air burning, but this also has not been confirmed.

4.2.3. NO_2 concentrations

From the 24-h average of NO_2 concentrations presented in Table 3, we can conclude:

- During April 2000, there was one exceedance of the Air Quality Limit values for NO_2 at Gomhoreya Street which recorded 184 $\mu g/m3$.
- Also at the other traffic-influenced sites like Qulaly, Fum Elkhalig and Nasr City stations in greater Cairo, the NO_2 concentrations were relatively high reaching 90% of the Air Quality Limit.
- At Alexandria, the high NO_2 concentrations were observed at IGSR station, which is traffic-influenced station, recorded 75 $\mu g/m^3$ and ElMax petrogas station which recorded 63 $\mu g/m^3$ and considered as industrial area.

Generally, the NO_2 concentrations in April were relatively high, could be due to the high temperature occurred during this month that catalysis the formation of NO_2 as a result of reacting NO and ozone.

4.2.4. PM_{10} & TSP concentrations

PM_{10} concentrations were high during this month, the 24 average concentrations at Tabbin and Kolaly stations is shown in Figure 4. The concentration at Tabbin was ranging from 55 $\mu g/m^3$ to 1280 $\mu g/m^3$ and at Qulaly from 53 $\mu g/m^3$ to 800 $\mu g/m^3$. The air quality limit value of 70 $\mu g/m^3$ was exceeded most of the measurement time.

The highest 24- hour average concentration in Kolaly station, Tabbin station located in Cairo, Kafr Elzayat station, ElMehalla Elkobra station located in Delta and IGSR-Alex station located in Alexandria, were observed in 11-12 April 2000 and 18 –19 April 2000 in which all Egypt experienced a Khamasine at this two periods as shown in figure 4, 5. (Discussed in details later in this report)

The 24-average concentrations at Delta and Alexandria stations are shown in Figure 5. The concentration at Kafr ElZayat station was ranging from 55 $\mu g/m^3$ to 1280 $\mu g/m^3$, at ElMehalla Elkubra station was ranging from 53 $\mu g/m^3$ to 800 $\mu g/m^3$ and at IGSR- Alex station was ranging from μg/m3 to μg/m3. The air quality limit value of 70 $\mu g/m^3$ was exceeded most of the measurement time.

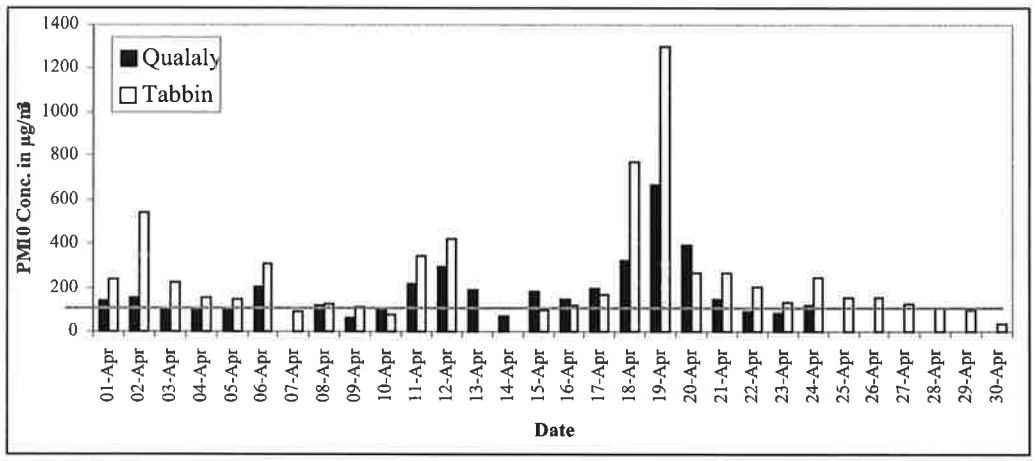


Figure 4:Daily average concentrations of PM_{10} measured at Tabbin and Kolaly stations (which represents Greater Cairo) in April 2000

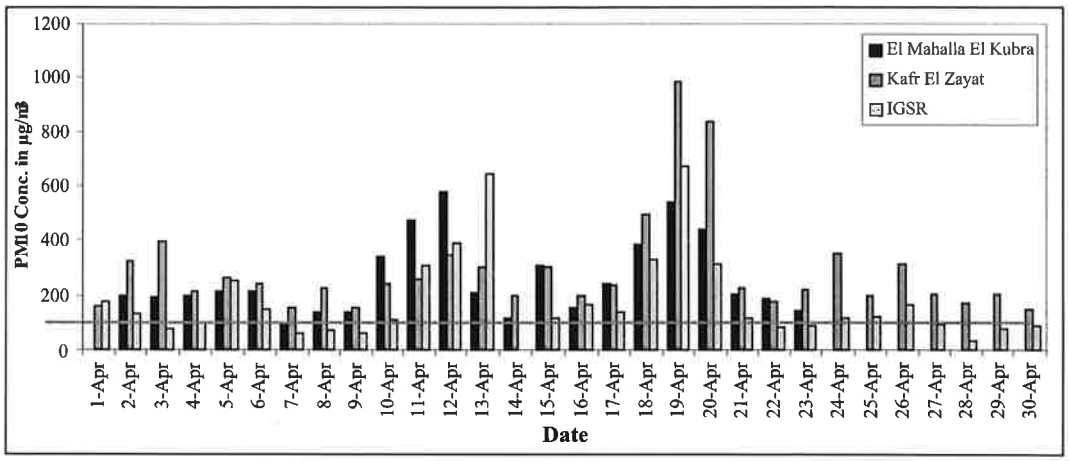


Figure 5: Daily average concentrations of PM_{10} measured at IGSR - Alex, ElMehalla ElKubra and Kafr Elzayat stations (which represents Alexandria and Delta) in April 2000

TSP concentrations were measured in weekly basis in five stations, which are Kolaly, Tabbin, Tabbin South, Shoubra Elkheima and Suez stations.

Table 4: The maximum TSP concentration during April 2000

Station	TSP ($\mu g/m^3$)
1. Kolaly	863
6. Tabbin	600
7. Tabbin South	661
10. Shoubra ElKheima	1468*-
15. Suez	1081*
Air quality Limit value	230 $\mu g/m^3$

** Recorded in 11-12 April 2000.*
- Shoubra ElKheima worked only for a week.

All the stations were exceeded the Air Quality Limit value during April 2000, the highest TSP concentration were observed in Shoubra ElKheima station and Suez station recorded in 11 April 2000 in which all Egypt experienced a Khamasine.

Also TSP ocncentrations in Tabbin and Tabbin south were exceeding the Air Quality Limit could be due to the cement industries located in this area.

4.2.4 Dust fall concentrations

Dust fall concentrations were measured at Abo Zabal, Shoubra ElKheima, 10 Ramadan, Suez, Fayoum, El-Minya, Assiut2, Nag Hammadi, Luxor, Edfu, Kom Ombo, Aswan and Ras Mohammed.

Table 5: Dust fall measurements during April 2000

Station	From	To	Weight (g/m3 . 30 days)
Abu Zabal	1/4/2000	2/5/2000	33
Shoubra ElKheima	1/4/2000	2/5/2000	40
10 Ramadan	1/4/2000	2/5/2000	12
Suez	4/4/2000	2/5/2000	15
Fayoum	3/4/2000	30/4/2000	16
Air Quality Limit value			10 g/m3. 30 days

There is no Air Quality Limit value for Dust Fall concentrations in law no. 4, however the international limit is 10 g/m3 in 30 days.

All the Dust Fall concentrations were exceeded the Air Quality Limit value except four stations.

The Dust Fall concentrations at Shoubra ElKheima were about 4 times the international limit. Also in Suez it was about 3.3 times the international limit.

4.2.6 Ozone concentrations

Ozone measurement was undertaken at Abasseya and Giza stations in Cairo, Alex regional stations in Alexandria and Sharm ElSheikh in Sinai. The last two stations considered to be a background stations

The maximum 8-hr concentration of ozone exceeded the Air Quality Limit values at Abbaseya station and Giza station during April 2000. This Ozone high concentrations could be because of high temperature experienced during this month that catalysis the formation reaction of ozone from hydrocarbons and NOx at daytime.

Ozone concentration in Alex regional station, which considered as a background station were 85% of the Air Quality Limit.

Ozone concentrations at Sharm ElSheikh in sinai also were high reaching 95% of the Air Quality Limit, also this could be due to the high temperature experienced in this month.

4.2.7 Carbon monoxide concentrations

Carbon monoxide measurement was taken at Fum Elkhalig, Gomhoreya stations in greater Cairo and IGSR-Alex station in Alexandria.

The maximum 8-hr concentration of carbon monoxide was exceeded the air quality limit at Gomhoreya street which become a real street canyon station recorded 24 mg/m3.

Fum Elkhalig station, The maximum 8-hr concentrations of CO concentrations were relatively high reaching 90% of the Air Quality Limit.

4.2.8 Passive sampling measurement

Passive sampling measurement were undertaken in several places inside or outside Cairo, the concentrations carried out from these measurement is shown in table 5

Table 5:Passive sampling measured concentration during March\2000

Station	From	To	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Abu Zabbal	1/4/2000.	2/5/2000.	41	49
El-Fayom	3/4/2000.	30/4/2000.	37	50
Nagh	29/3/2000	3/5/2000.	58	37
Hammadi	.	3/5/2000.	46	77
Luxor	19/4/2000			
	.			
Air Quality Limit Value			150 $\mu g/m3$	150 $\mu g/m3$

4.3 Maximum one-hour average concentrations

The maximum one-hour average concentrations of SO_2, NO_2 , PM10, CO and Ozone are presented in Table6.

Table 6: Maximum 1-hour average concentrations measured in Egypt during April 2000

Site	SO_2	NO_2	CO*	O_3	PM_{10}
1 Qulaly	210	182			1297**
2 Gemhoroya street	152	416	36		
3 Abbasyia.	247			135	
5 Maadi	144	238			
6 Tabbin	322	145			1832**
8 Fum Khalig	144	265	12		
10 Shoubra Elkheima	346				
11 Giza, Cairo Univ.	69	182		148	
12 Suez	141	160			
26 Aswan				147	
27 Sharm ElSheikh				125	
30 IGSR	162	118	13		1078**
31 Alex Regional				118	
32 Kafr ElZayat	202	66			1211**
34 ElMehalla ElKubra	48				1441**
38 Mansoura		88			
Air quality Limit value	350	400	30	200	-

* *Units of measurement of CO is mg/m3.*

** *Measured in 19 April 2000*

The maximum hourly average SO_2 concentrations were fairly high at all sites located inside the greater Cairo area

The maximum hourly average PM_{10} concentrations were very high during the Khamasine period especially the second one which was in 18-19 April 2000.

Some conclusions from the above table are:

- The Air Quality Limit value of SO_2 of ($350\mu g/m^3$) was not exceeded in April 2000.
- At Shoubra Elkheima, the SO_2 concentration was very high reached 99% of the Air Quality limit value because of emissions from the smelters and small workshops that are located there although it worked only for a week.
- The SO_2 concentrations along streets like Qulaly, Gomhoreya Street and Fum Elkhalig were fairly high but inside the Air Quality limit ranging from 144 μg/m3 to 210 μg/m3 as a result of emissions from diesel buses passed through these streets.
- At Tabbin station, high value of SO2 was recorded in 19 April 2000 comparing with the whole month, when observing the meteorological data of this day, it was found that wind is blowing from south west so this high value could be due to emissions from the industrial area located at Tabbin south and the concentrations at the station were 92% of the Air Quality Limit value.
- The Air Quality Limit value of NO2 of (400 μg/m3) was exceeded only once during April 2000 at Gomhoreya Street.
- The NO2 concentration was high along streets, reach about 46-66% of the Air Quality Limit in Kolaly and Fum Elkhalig streets.
- The NO2 concentrations were relatively high at the rest of the stations. This could be due to the high temperature experienced during April 2000.
- PM_{10} concentrations were very high at all stations especially during 11-12 April 2000 and 18-19 April 2000.
- The highest PM_{10} concentration which recorded in Kolaly and Tabbin stations were recorded in 18 April 2000, in which Cairo experienced a Khamasine phenomena at this day. (Discussed in details later in this report).
- High PM10 concentrations were recorded in the stations distributed all over Egypt during the Khamasine phenomena occurred in 11-12 April 2000 and 18-19 April 2000 especially on the last one. It was the worst one of these periods.
- CO concentration exceeded the Air Quality limit value in Gomhoreya Street due to the frequent traffic jams occurred in this area recorded 36 mg/m3.
- Ozone concentrations were not exceeded the Air Quality Limit.
- Ozone concentrations were relatively high during April 2000.

5. Meteorology and air Quality during April 2000:

5.1 Wind frequency distribution in Greater Cairo:

During April 2000 the wind was most frequently blowing from around north, north west at all 3 sites located in Greater Cairo. At Giza the winds were more widely distributed; blowing from north plus/minus 30 degrees, while at Abbasyia the winds were blowing from north and north east as well as, during 15% of the time, from west. At Tabbin the most frequent wind directions were from north-northwest and north. The winds observed during April 2000 seem to be representative for this time of the year in Cairo.

Southerly winds during April were observed especially in Khamasine phenomena and it's seen that about 10-20 % of the time winds was blowing from south, south –west.

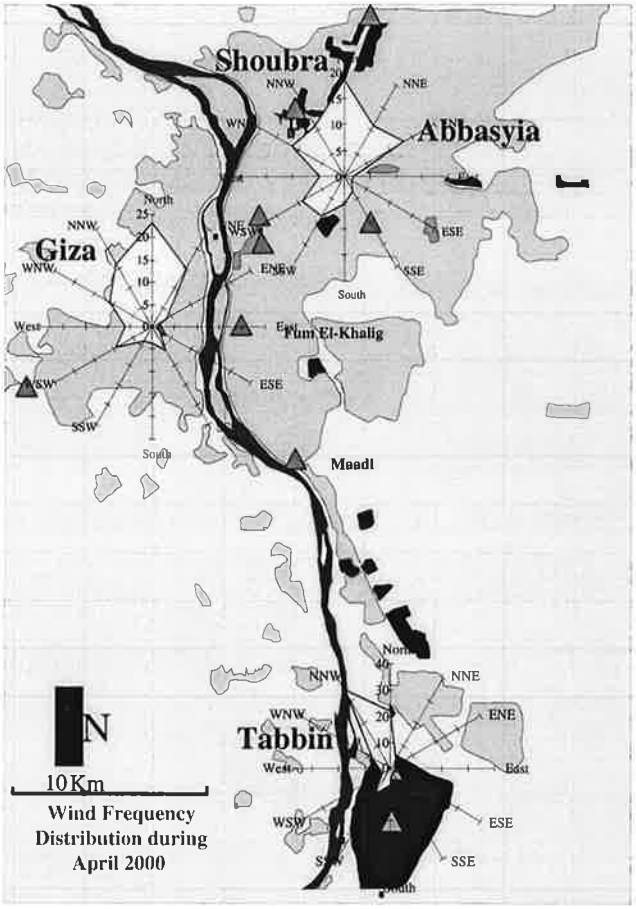
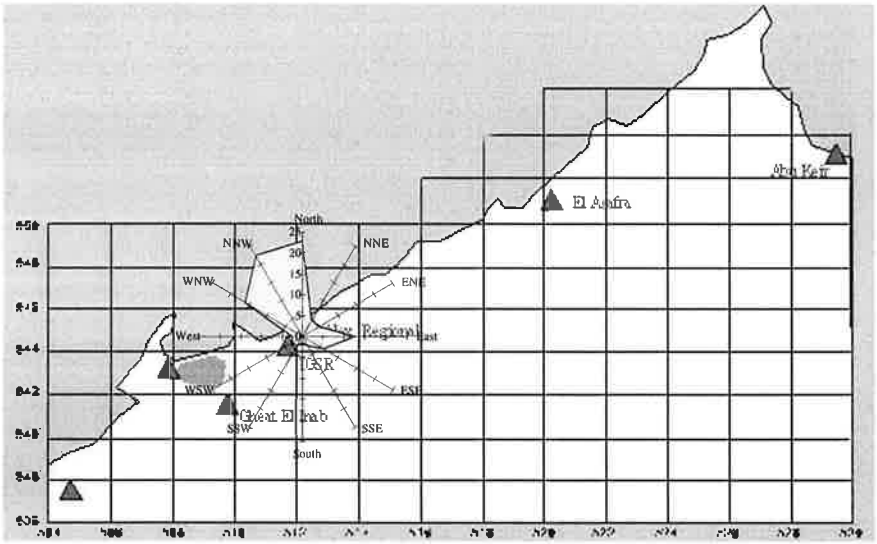


Figure 6: Wind frequency distribution in Greater Cc April 2000.

5.2. Wind frequency distribution in Alex and Delta:



Fiure 7: Wind frequency distrbution in Alex regional station during April 2000.

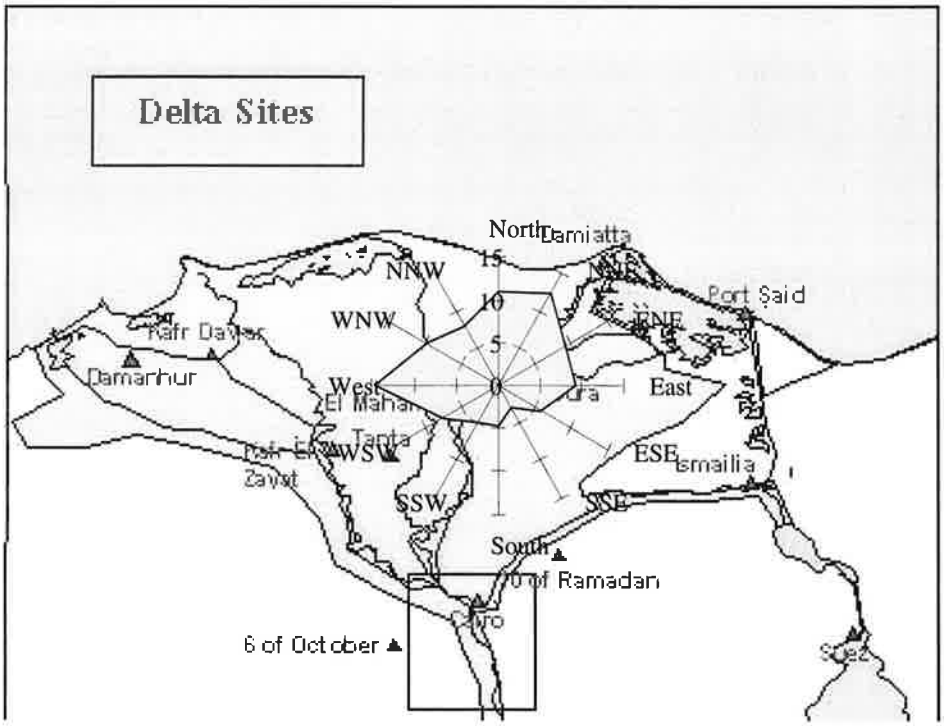


Figure 8: Wind frequency distribution in Delta during April 2000.

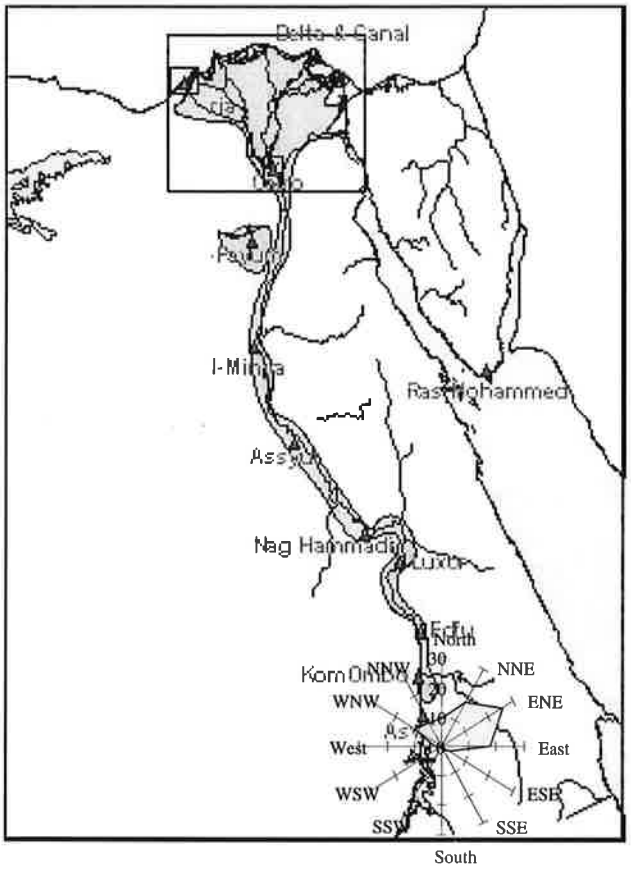


Figure 9: Wind frequency distribution in Upper Egypt during April 2000.

5.3 Dust Storms (Khamasin) in spring:

Among different weather phenomena, which occur in subtropical Africa, one is certainly most unpleasant for the population in this area, most hazardous for the transport and navigation is the Khamasin.

The phenomenon most frequently appears as a strong southerly or southwesterly hot, dry and dust laden wind. These severe sandstorms most frequently occur during spring, especially in April.

In the Arabic language "Khamasin" means fifty, referring to the period of fifty days in spring, when it is considered that this unpleasant weather most frequently occur.

Mostly Khamasin conditions in Egypt take place in association with the passage of desert depressions on the north coast from west to east. The weather features that specify what we call Khamasin weather can be summarised in descending order of importance as follows:

- Pronounced rise of temperature.
- Pronounced fall of dew point.
- Southerly wind which strengthens in some occasions giving sand rising and sandstorms.

Some of the above mentioned features may take place in Egypt individually in non-Khamasin situations.

Egypt experienced khamasine phenomena in April two times. First time was during 11-12 April and the second time was during 18-19 April 2000. Each one of these periods will be explained in details in the following section.

Khamasine in April 2000:

During 11-12 April 2000, Egypt had experienced a high concentration of PM10 with a southerly wind direction and wind speed ranging from 6-10 m/s. also a rise in temperature was observed during this period.

Not only the PM10 concentrations were high, but also SO2 recorded a relatively high concentration at Tabbin, this could be due to that wind reverse its direction and blows from south (industrial area located in Tabbin South caused the high concentrations of SO_2).

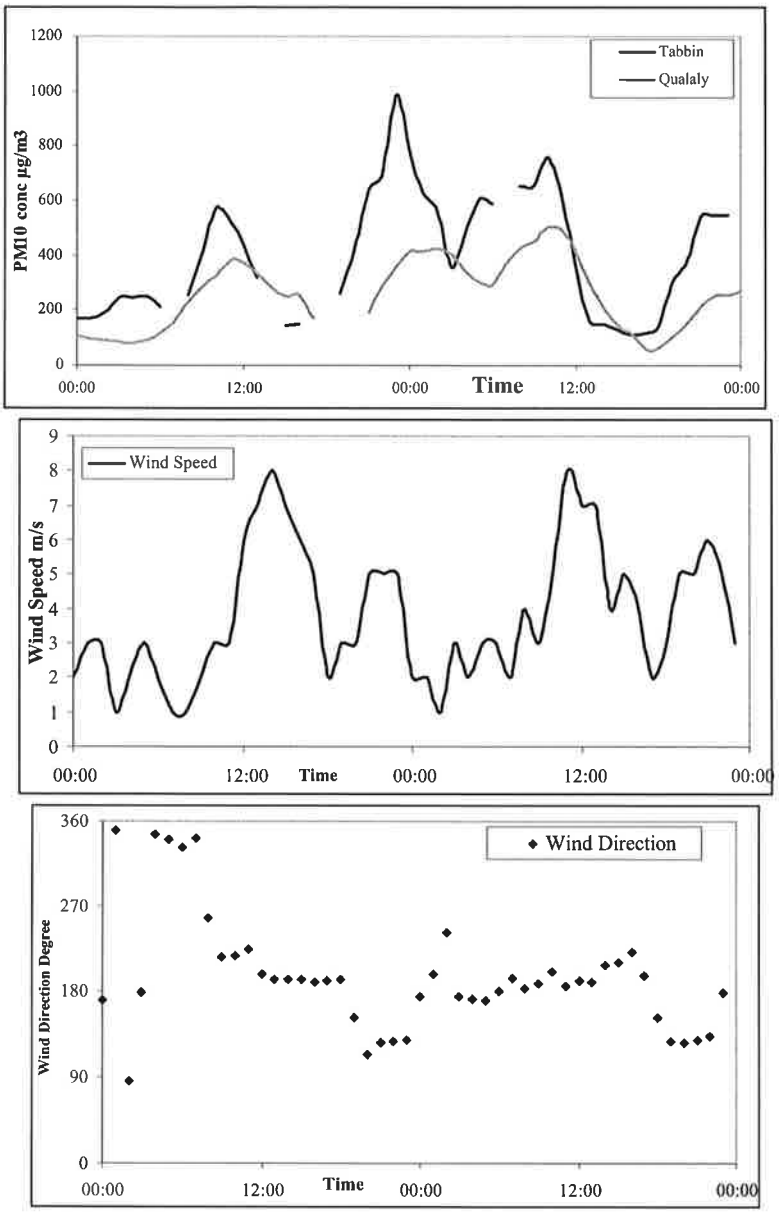


Figure 10:PM_{10} and wind measured at 11-12 April 2000.

Hourly concentration of PM_{10} measured at Qulaly and Tabbin

b) Hourly wind Speed measured at Tabbin

c) Hourly wind direction measured Tabbin.

On 18-19 April 2000, Egypt also experienced a very heavy storm of Khamasine in which the PM10 concentration reached 1800 μg/m3 in Tabbin and above 2000 in Alex. – IGSR station and Kafr Elzayat station at Delta.

During these days, the wind was blowing from south, south south west and the wind speed ranging from 6 m/s to 9 m/s. an elevation in temperature were observed during these days.

Figure 10 represents the wind frequency distribution, the PM10 concentrations in Tabbin & Qulaly stations and the wind speed experienced during these two days.

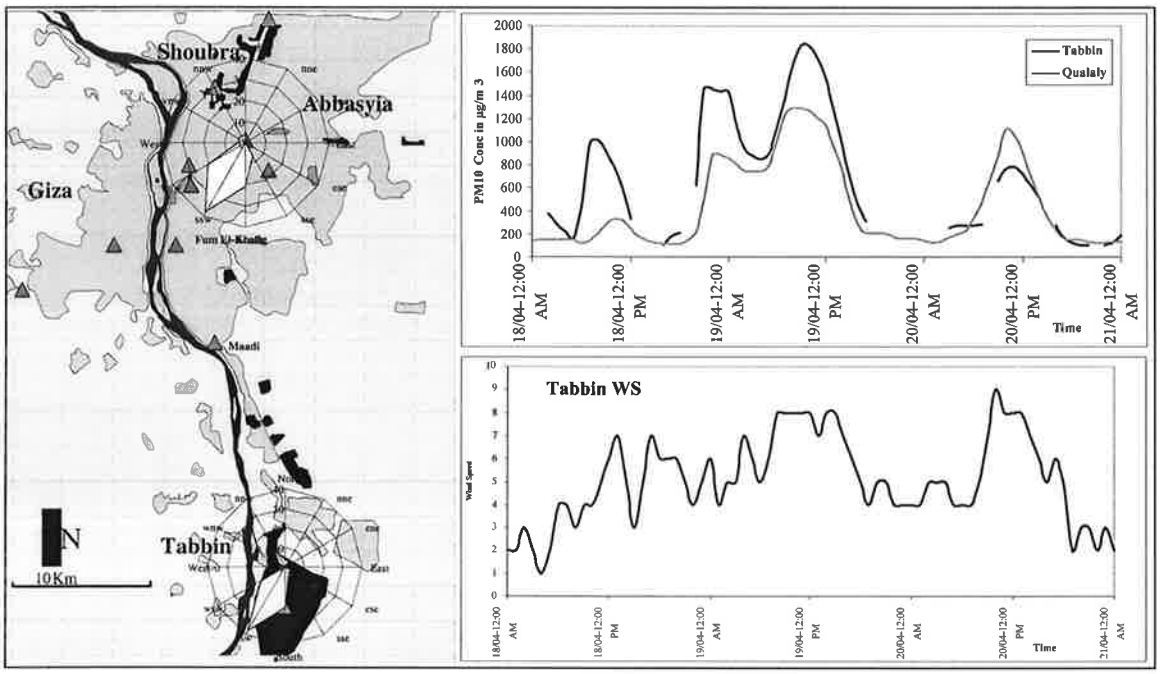


Figure 11: The wind frequency distribution for Tabbin & Abbaseya stations, the PM10 concentrations in Tabbin & Qulaly stations and the wind speed experienced during these two days.

Appendix H

Reference Laboratory

H.3.1 a)	Calibration equipment for High volume samplers
H.3.1 b)	Fax to National Institute of Standards - SO2 travelling gas standard
H.3.1 c)	Problem - difference in calibration curve
H.3.1 d)	Check of calibration done at NIS and CEHM
H.3.2	List of non-compliances
H.3.2 a)	A plan for the stabilization of ammonia containing solutions to be used in the profiency tests
H.3.2 b)	Filter samples, proficiency test

H.3.1 a)

EIMP

Note

Subject: Calibration equipment for High volume samplers

Date: 8 December 1999

To: Ulla Lund

Copy: Mai Ahmed, Bjarne Sivertsen, Rolf Dreiem

From: Leif Marsteen

Environmental Information and Monitoring Programme

EEAA - Danida - COWI

30 Misr-Helwan Street
Maadi, Cairo, Egypt

Tel.: (+202) 525 6442
Fax: +(202) 525 6467

E-mail: eimp@intouch.com

Ref Lab. Calibration

The High volume samplers will be calibrated in the field every three months by the Monitoring inst. and audited once a year by the Ref.lab. A calibration in the lab. (at NIS) will not be necessary since the Ref.lab will have to use the same equipment for calibration in the lab as they will use in the field during audits.

The field calibration includes the use of a roll-up type flexible water manometer, a thermometer and a barometer. The equipment will be used in the field and must be robust. I suggest that we use a standard flexible manometer and simple thermometer and barometer. The thermometer can be of the electroninc type that is used for measuring indoor temperature. The price should be around Le 100. The barometer can be of the kind that is used for measuring indoor air pressure. The price should be around Le 100. The barometer must be adjustable. The Monitoring inst. and the Ref.lab should have one set each of this equipment.

The travelling standard thermometers and barometers should be calibrated periodically. The Ref. lab has one electronic thermometer and barometer for measuring the laboratory environment during calibrations. These instruments shall never leave the laboratory. They can be used as reference standards for calibrating the travelling standard thermometers and barometers. The period of calibration of the travelling standards must be decided upon based on experience. The reference standards will probably have to be calibrated maby every second year.

Two SOPs for calibrating the thermometer and barometer travellings standards respectively must be prepared. I will not be able to do this during this mission. Since my time in the project is running out maby the Ref. lab could prepare these SOPs.

The calibration equipment that came with the High volume samplers is used for verifying a flow rate calibration look-up table which comes with and is unique for each instrument. This equipment will only be used on rear occasions when the look-up table seems not to be valid anymore. No SOP for this calibration will be preapred as it is well documented in the user manual.

H.3.1 b)

EIMP

Fax Transmission

To: National Institute of Standards
Fax no.: 387 6995
Attention: Dr Samir Lawandy
No. of pages: 1 (incl. this page)

Environmental Information and Monitoring Programm
EEAA - Danida - COWI
30 Misr-Helwan Street
Maadi, Cairo, Egypt
Tel.: (+202) 525 6439/42/ 47/ 52
Fax: +202 525 6467
E-mail: eimp@intouch.com

Date: 6 Mar 2000
Your ref.: 400204
Our ref.:

SO2 travelling gas standard

Dear Dr Samir

I learned this afternoon from my colleagues in the air monitoring component that there is a difference of opinion as to the concentration of SO2 in the travelling gas cylinders between NIS and the certificate, and between NIS and Cairo University. Upon checking a few calibration certificates, I have seen that there is a similar difference between your calibration results for SO2 working gases calibrated in August.

At our meeting tomorrow, I would like to discuss with you (and Dr Adel and Dr Mohamed Nour as you choose) what steps you have taken to ensure that your calibration is correct even though it differs by approximately 50% from the certificate given by Scott. Will you please ask your staff to prepare for this discussion?

Best regards

Ulla Lund

H.3.1 c)

Copy To: Bjarn Sivertson Task Manager
Dr.Tarek El-Araby Project Manager
Dr.Hesham El-Araby QC/QA Manager

Dear Mr. Rolf

In the last few Days, We were trying together to solve the Problem that there is a difference in the Calibration Curve between the ***Monitoring Laboratory*** at CEHM, Cairo University and the ***Reference Laboratory*** at NIS, and we have found that the Performance, Equipment's and the Methods at both Institutions is being done as it should be, and this was the first and most important step in the Way to know The Cause of this Difference. For the second Step you are going to make a plane for the next steps, actually I have some Observation Results being listed below, and I have a Result for these Observations, and also have some suggestion you can take into consideration when you make a plane if you would like.

Observations:

1. From the data listed in Table 1 Which has been Extracted from the Observation Curves of Some Monitors Calibrated at The **Monitoring Laboratory**, It seems that For SO_2 Readings at 800 ppb There is a difference ranges from +150 to 200 ppb Which is the same Deviation for The travelling cylinder of S/N BI21231F its reading at Mon.Lab. 919 ppb and at **Ref.Lab.** 1204 ppb However The Concentration in the SCOTT certificate was 830 ppb and the SD +/- 10%
2. From the data listed in Table 2 which has been also extracted from the Observation Curves of some NO_X Monitors Calibrated at the **Monitoring Laboratory**, It seems that for NO_X at 800 ppb there is a difference ranges from –250 to –200 ppb ,and the interesting Point is that ,the NO_X Monitor of S/N 55712-305 belongs to **NIS** was at the **Monitoring Laboratory** For Repair and adjustment and it has been adjusted and to reed 800 ppb at 800 ppb ,but when it has been transferred to **NIS**, they found that it reeds only 566 ppb at 800 ppb !?

Table 1

S/N	Station	800	600	400	200
61641-332	Abu-Keir	952	719	486	256
56068-306	Giza	944	712	491	267
60150-329	Maadi	993	757	520	289
61642-332	Suez	1002	759	509	266

Table 2

S/N	Station	800	600	400	200
58011-315	Maadi	568	427	286	138

Primary Conclusion:

1.From the previous observations we get a primary conclusion that the Cause of this Difference is the multipoint calibrator, Model 146. Although the one at ***NIS*** has been recently calibrated, its reading seems to be far from that of that in the SCOTT certificate. However that one at the ***Mon.Lab,*** its readings within the S/D limits in SCOTT certificate of the travelling cylinder.

2. Both the *Monitoring Laboratory* and *NIS* ***calibration curves*** must be the same.
3. The **Multipoint Calibrator** at each Institution has to be Calibrated at a reference third international Institution, not at each other.

Accept my pest regards

Yasin F. Mohamed
Technical Manager

H.3.1 d)

EIMP

Note

Subject	Check of calibrations done at NIS and CEHM
Date	14 May 2000
To	Ulla und
Copy	Jørgen Simonsen, Haytham A. Ahmed, Mohamed Fathy, Mai Ahmed, Bjarne Sivertsen, Rolf Dreiem, Tarek ElAraby (CEHM), Dr. Samir Lawandy (NIS)
From	Leif Marsteen

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Contents

1 Summary

A check of the gas calibration equipment at CEHM and NIS was performed to investigate the differences in results obtained from calibrations done at the two laboratories. The check included the calibration system and one NOx and one SO2 monitor at both laboratories as well as one NO and one SO2 travelling standard used as transfere standards.

The instrumentation at CEHM were found to be in good order. At NIS two leaks were found in the NOx monitor and there may have been a leak in the calibration system. More foucus must be put on maintenance of the lab instrumentation and NIS must learn how to perform trouble shooting, leak checking and small repairs.

This comparison shows that the calibrators at CEHM and NIS are within 4% of each other when the EMPA calibration of the NIS calibrator is taken into consideration. This difference may be reduced further if the CEHM calibrator is

calibrated too. Previous results show that NIS has reported SO2 values at least 25% higher then CEHM. When the calibration of the NIS calibrator at EMPA is taken into consideration this difference is reduced by 13%. When correcting for a possible leak in the calibration system at NIS this difference may be reduced further by 8%. This is only estimates and large uncertainties are probably involved.

Intercomparison excersises should be carried out maby every second month until the end of 2000 and later two times a year to maintain the quality of the results reported by the calibration systems at CEHM and NIS.

The SO2 travelling standard gases included in this report have concentrations that are up to 21% higher then their certified values. The only NO travelling standard gas included in this report have a concentration that is 15% lower then its certified value. A new supplier of travelling standard gases should be considered.

2 Introduction

A check of the gas calibration equipment at CEHM and NIS was performed to investigate the differences in results obtained from calibrations done at the two laboratories.

3 Instrumentation and calibration methods

Both laboratories have equal instrumentation consisting of a gas calibrator and monitors from Thermo (TEI), reference standard gases from Scott and travelling standard gases from Praxair. The reference and travelling standards at both laboratories were delivered in the same shipment respectively.

The reference standards together with the gas calibrator are the highest level in the traceable chain of calibrations. If the reference standards or calibrator are wrong that error will propagate to all monitors in the network. Travelling standard gases are used to check and calibrate monitors in the field periodically. Before taken to the station the travelling standard is calibrated in the laboratory using a lab monitor. Prior to calibrating the travelling standard the lab monitor is calibrated using the reference standard and gas calibrator as reference. An error in the lab monitor will propagate to the travelling standard and later to all monitors calibrated by that travelling standard.

Table 1 shows the instrumentation that is used at the two laboratories.

Table 1. Instrumentation used in the investigation.

Equipment	CEHM Serial no.	NIS Serial no.
TEI 146 Gas calibrator		57545-317
Scott NO reference standard	5701950	5701953
Scott SO2 reference standard	5701946	5701954
TEI 42C NOx monitor	57955-315	58066-316
TEI 43C SO2 monitor	57788-316	57989-316

4 Discussion of earlier results

Table 2 shows observations of monitors done at the Monitoring laboratory at CEHM. The monitors had been taken from their stations to the Monitoring lab for yearly calibration. Before the instruments were calibrated 800 ppb were fed to the monitors from the calibrator and the response observed. For SO2 monitors there is a difference ranging from 19 to 25% from the reference value. Normally the response will drop during operation due to dirt buildup. This indicates that there is at least (probably more) a 19 to 25% difference in calibrations done at NIS and CEHM. The small variation in the differences indicates that the monitors 'behave' similar and that the calibration system at NIS is stable. The results indicates that calibrations done at NIS increases the instrument response compared to calibrations done at CEHM. The monitors were calibrated at NIS without applying the EMPA correction factors.

The NOx monitor had a difference of -29% indicating that the response has fallen during operation, which is expected.

Table 2 Monitors observed at CEHM. They were originally calibrated at NIS. Taken from a note to Bjarne Sivertsen from Yasin F. Mohamed.

Monitor	Serial no.	Taken from Station	Ref. [ppb]	Resp. [ppb]	Diff [%]
SO2	61641-332	Abu-Keir	800	952	19.0
SO2	56068-306	Giza	800	944	18.0
SO2	60150-329	Maadi	800	993	24.0
SO2	61642-332	Suez	800	1002	25.0
NOx	58011-315	Maadi	800	568	-29.0

Table 3 shows the results from a gas cylinder observed at CEHM and NIS. The results from NIS had not been corrected according to EMPA's calibration of the gas calibrator. Without correction the difference between CEHM and NIS is similar to the differences found in Table 2.

Table 3. Gas cylinders observed at CEHM and NIS.Taken from a note to Bjarne Sivertsen from Yasin F. Mohamed.

Travelling standard	Serial no.	Certi-ficate [ppb]	CEHM [ppb]	NIS [ppb]	Difference [%] CEHM Cert.	NIS Cert.	CEHM NIS
SO2	BI21231F	830	919	1204	10.7	45.0	-23.7

Table 4 shows background and calibration coefficients from calibration of NIS' lab monitor at NIS. It shows good stability of the monitor between calibrations. The monitors were calibrated at NIS without applying the EMPA correction factors.

Table 4 Background and calibration coefficients recorded from calibration of NIS SO2 lab moonitor, serial no. 57989-316 at NIS on three different occasions. Taken from NIS calibration Check Report..

Date	Backgr.	Cal. coeff.
2000.03.08	22.7	0.927
2000.03.08	22.8	0.914
2000.03.11	23.0	0.916
2000.03.20	20.5	0.880

Table 5 shows results from calibration of a SO2 travelling gas standard, serial no. BI 21222F, performed at NIS. NIS measured the concentration to be about 35% higher then the certificate. The results are not corrected according to EMPA's calibration of the gas calibrator. This agrees with the differences found in Table 3.

Table 5. Results from calibration of a SO2 travelling gas standard, serial no. BI 21222F, performed at NIS. Taken from NIS calibration Check Report.

Date	Certificate [ppb]	NIS [ppb]	Diff [%]
2000.03.08	900	1207.8	34.2
2000.03.11	900	1235.0	37.2
2000.03.20	900	1217.6	35.3

Summary of previous observations, NIS values not corrected according to EMPA calibrations:

- NIS has reported SO2 values at least 20 - 25% higher then CEHM.
- NIS has measured the concentration of SO2 travelling standards 33 - 37% (45% as an extreme value) higher then the certified value.
- CEHM has measured SO2 travelling standards about 10% higher then the certified value.
- NIS always measures higher values then CEHM.
- Both CEHM and NIS has measured the concentration of SO2 travelling standards to be higher then the certified value.

5 Calibration of the NIS gas calibrator at EMPA

The mass flow controllers of the gas calibrator at NIS was calibrated at EMPA on 27 September 1999. The calibrator has two mass flow controllers, one adjusts the dilution flow while the other adjusts the gas (e.g. NO or SO2) flow. EMPA reported the following correction formulas for the two mass flow controllers:

Gas flow:CTV = 1.064 * MFC + 0.2

Dilution flow:CTV = 1.024 * MFC - 0.361

whereCTV = Conventional True Value

MFC = Mass Flow Controller in NIS calibrator

The calibration certificate from EMPA includes the data pairs which the formulas are based on, see Table 6.

Table 6. Results from comparison between dilution mass flow controller in NIS calibrator and EMPA reference. Taken from EMPA certificate dated 28 September 1999.

NIS Calibrator display [l/min]	Reference [l/min]
1.98	2.280
3.99	4.257
6.00	6.209
8.02	8.178
9.53	9.965

From Table 6 it can be seen that the NIS calibrator is reporting flow rates too low. By entering 6.00 into the dilution flow formula the following result is obtained:

CTV = 1.024 * 6.00 - 0.361 = 5.783

This is not 6.209 as is reported in Table 6.

If by chance MFC is EMPA's values the result will be:

CTV = 1.024 * 6.209 - 0.361 = 6.00

which is correct.

This indicates that the formula must be solved with respect to MFC which gives the following new formulas:

Gas flow:AV = 0.94 * NCD - 0.188

Dilution flow:AV = 0.977 * NCD + 0.353

whereAV = Actual Value of flow rate

NCD = NIS Calibrator Display

These calibration factors were used when calculating the actual flow rate during calibrations at NIS.

6 Procedure for check of calibration systems

A check of the calibration systems at CEHM and NIS was performed on 7 to 9 May 2000. The check was performed as follows:

1. A Monitor was calibrated at CEHM using the CEHM reference standard gas and gas calibrator as reference.

2. A travelling standard gas cylinder was calibrated at CEHM using the newly calibrated monitor as reference.

3. A Monitor was calibrated at NIS using the NIS reference standard gas and gas calibrator as reference.

4. The same travelling standard gas cylinder was calibrated at NIS using the newly calibrated monitor as reference.

To avoid possible artefacts connected to one kind of monitors or gases two gas cylinders containing NO and SO2 respectively were calibrated at both laboratories.

A special calibration sheet was used to document the calibration of the monitor and the calibration of the gas cylinder. The results from NIS were corrected according to EMPA's calibration of the gas calibrator.

The monitor was zero level calibrated by introducing zero air. Then 800 ppb of gas was introduced and the span level was calibrated. Now the monitor is calibrated. The monitor computes a background and calibration coefficient which it uses for calculating results. The factors are set automatically when the instrument is calibrated as described above. Ideally the background should equal zero and the calibration coeffiecient 1. An elevated background indicates an elevated zero level. Due to lack of time only one point extra at about 600 ppb was checked. The new calibration sheet calculated calibration factors based on all values except for the zero level values. This was done to get a more correct calibration of the travelling standard which was expected to have a level between 600 and 800 ppb.

Table 7 shows the travelling standards that were used during the comparison.

Table 7. Travelling standards used during comparison.

Travelling standard	Serial no.	Owner
Praxair NO	BI 12329F	CEHM
Praxair SO2	BI 21231F	CEHM

7 Results from check of calibration systems

Table 8 shows the results from calibration of the travelling standard gas cylinders at both CEHM and NIS. NIS results are corrected according to EMPA's calibration of the gas calibrator.

Both CEHM and NIS measured values that were 14 - 17% lower than the certified NO concentration and 16 - 21% higher than the certified SO2 concentration. The

difference beetwen the measurements done at CEHM and NIS are small, 2 - 4% which is good. NIS readings are always higher then CEHM.

Table 8. Results from comparison of calibrations of travelling standards made at CEHM and NIS.

Serial no.	Parameter	Certificate [ppb]	CEHM [ppb]	NIS [ppb]	Difference [%] CEHM Cert.	NIS Cert.	CEHM NIS
BI 12329F	NO	765	632.0	648.0	-17.4	-15.3	-2.5
	NOx	765	642.0	657.0	-16.1	-14.1	-2.3
BI 21231F	SO2	830	965.0	1007.0	16.3	21.3	-4.2

Appendix A - F shows details from the calibration checks.

By using the EMPA calibration factors when calibrating monitors at NIS the response was lowered by about 9%. After applying the correction there is still a difference of 4.2% (for SO2 monitors) which may be reduced if the CEHM calibrator is calibrated too. Adding together 9 and 4% NIS measurements done without correction should be about 13% higher then measurements done by CEHM. This is still lower then the 20 - 25% difference that was estimated earlier. When the SO2 monitor was calibrated at NIS using the EMPA calibration factors the response was reduced by 17%. This is more then the theoretical 9%. This indicates that there may have been a leak in the calibration system which was fixed during our calibration. Adding 8% (17 % - 9%) to 13% the total difference between CEHM and NIS adds up to about 21% which is within the estimated span of 20 - 25%.

Table 9 shows an estimate of the actual concentration of the travelling standards. Previous measurements done at CEHM are corrected by 4.2%. It indicates that the concentration of SO2 travelling standards are 15 - 21% higher then their certified values while the concentration of NO travelling standards are 15% lower then their certified values.

Table 9. Estimated travelling standard concentrations.

Param.	Serial no.	Certificate [ppb]	CEHM [ppb]	CEHM Corr. +4.2% [ppb]	NIS [ppb]	Diff. from cert. [%]
SO2	BI 21231F	830	919	958	x	15.4
SO2	BI 21231F	830	x	x	1007	21.3
NO	BI 12329F	765	x	x	648	-15.3

8 Comments on instrumentation

Calibration of SO2 monitors at CEHM are done by connecting the inlet tube directly to the monitor inlet without using a filter holder. A leak in the filter holder will not be discovered. As a test a used filter holder was connected to the SO2 monitor. The response was reduced by 50%. When investigating the filter holder

sand and dust was found inside. Sand (quartz) absorbs SO2 resulting in lower measurements. This illustrates the importance of cleaning the inlet system regularly. The monitor was finally calibrated without filter holder. The SO2 monitor at CEHM had been calibrated recently and showed little deviation. The monitor seemed to be in good order.

On NOx monitors the filter holder is an integral part of the monitor. At CEHM when changing the inlet filter before calibrations a leak was introduced in the filter holder by accident. The backing plate was inserted the wrong way. The result was a fall in response. Since the leak is before the flow rate sensor the monitor will report a normal flow rate. The NOx monitor at CEHM had been calibrated recently and showed little deviation. The leak was fixed and the monitor seemed to be in good order.

At NIS two leaks were found in the NOx monitor. The filter holder connector which is made of teflon was bent probably due to strain caused by the connected teflon tube. When the connector is bent the nut will not enter properly causing a leak. The internal filter holder was removed and an external one was fitted. The second leak was found in the capillary housing of the sample air stream. The capillary was not seated properly, the O-ring was not fixed to the teflon tube and the teflon tube was not insterted properly into the housing. By bending the teflon tube gently just before the capillary housing the concentration changed. Because the leak is before the flow rate sensor the monitor will report a normal flow rate. By fixing the leaks the response increased by 80%. By tracing changes in the background and calibration coefficients reported on earlier calibration sheets it may be possible to find out when the leaks started. The NOX monitor was calibrated and seemed to be in good order.

At NIS before calibration the SO2 monitor reported values 17% too high. The filter holder was removed and the monitor calibrated. A leak in the filter holder may have caused the elevated level. There may also have been a leak in the calibrator output connector. It is made of teflon. The nut will ride on the threads if it is tighten too hard causing a possible leak. The nut was removed and fitted again before calibration. The SO2 monitor was calibrated and seemed to be in good order. The response on the SO2 travelling standard was very slow. It rose quickly (20 minutes) to about 970 ppb then it took about 40 minutes more until it stabilised at 1007 ppb.

9 Conclusons

The calibrators at CEHM and NIS are now within 4% of each other which is good. The difference may become less if the calibrator at CEHM is calibrated too. By using the EMPA calibration factors when calibrating monitors at NIS the response is lowered by about 9%. An estimate for the total difference between the two calibrators when used before the EMPA factors where applied is 21%. This may explain the differences found in Table 2 and Table 3. An estimate for a correction factor that can be applied to previous SO2 measurements is -17%. However these estimates probably have large uncertanties attached to them. This report does not include any uncertainty estimates.

It will be difficult to calibrate the CEHM calibrator using the NIS calibrator as reference. This is due to the fact that both calibrators have two mass flow

controllers adding up to a total of four independent variables. In addition there is the uncertainties connected to the monitor which must be used as transfere standard.

The NOx and SO2 lab monitors at CEHM was in good working order.

The NOx lab monitor at NIS was not in good working order. Two leaks where found. Because of the size of the leak it is not possible to assume that it has been constant. Therefore it is not possible to apply a correction to previous calibrations performed on NO travelling gas standards.

The SO2 monitor at NIS reported values 8% higher then expected before calibration maby because of a possible leak in the filter holder or calibrator output connector.

The SO2 travelling standard gases included in this report have concentrations that are 15 - 21% higher then their certified values. The only NO travelling standard gas included in this report have a concentration that is 15% lower then its certified value. The differences are larger then the gas supplier's certified uncertainty of the analysis which is 10%.

10 Recommendations

More focus must be put on maintenance of the lab calibration equipment. NIS can not only calibrate and expect the monitors to be in good order. CEHM and NIS should establish log books and a station manual for their calibration labs and treat the lab as a station when it comes to maintenance. They should perform weekly maintenance as described in the SOPs. This will include a zero/ span check using a travelling standard to check the stability of the monitor from week to week. Leak checking must become part of the calibration procedure and performed before any calibration but after observation of responses. This is described in the instruction manuals and also in part in the field calibration SOPs.

The filter holder can be a source to both leaks and contaminations. If the inlet system and the filter holder is not cleaned regularly SO2 in particular can be underestimated. The monitors should be calibrated with the filter holder in place but the response should be checked at one level with and without the filter holder to detect leaks or contamination. This is important at both the stations and in the laboratories.

In order to determine the correct calibration of the CEHM calibrator the CEHM calibrator should be calibrated at EMPA once.

Due to the large differences from the certified values found in travelling standard gas cylinders a new gas supplier should be considered.

The Excel sheets used at NIS to record calibration of gas monitors must be updated to include the correction factors from EMPA

The following procedures should be performed to verify the results reported in this report:

1. The same SO2 and NO travelling standard gas cylinders that were used in this investigation should be calibrated as soon as possible at both CEHM and NIS to verify the results in this report. The calibration should be done without calibrating the monitors first but an observation of the response at zero and 800 ppb should be included before calibrating the gas standard. All results must be documented.

2. The lab monitors at CEHM and NIS should be calibrated to verify the monitor calibrations reported in this report. Afterwards one NO and one SO2 travelling standard gas cylinder should be calibrated at both CEHM and NIS to verify that the results still hold.

3. The CO lab monitor at CEHM and NIS should be calibrated. Afterwards one CO travelling standard gas cylinder should be calibrated at both CEHM and NIS to verify that the results hold for CO as well.

4. Intercomparison excersises should be carried out according to 2. above every second month until the end of 2000. If comparability is still good the frequency may be reduced to maby two times a year to maintain the quality of the results reported by the calibrators and lab monitors.

APPENDIX A

Results

Comparison of results. One NO gas cylinder is measured in two independent laboratories
NIS calibrator corrected according to EMPA

Cylinder no.:	BI 12329F	
Parameter:	NO	
Owner:	CEHM	

	CEHM		NIS		Dev. between monitors	
	NO [ppb]	NOx [ppb]	NO [ppb]	NOx [ppb]	NO [%]	NOx [%]
Certified conc.:	765.0	765.0	765.0	765.0		
Measured conc.:	632.0	642.0	648	657	-2.5	-2.3
Dev. from cert. [%]:	-17.4	-16.1	-15.3	-14.1		
Laboratory:	CEHM		NIS			
Monitor ser. no:	57955-315		58066-316			
Calibrator ser. no.:			57545-317			
Date:	00.05.07		00.05.08			

Comparison of results. One SO2 gas cylinder is measured in two independent laboratories
NIS calibrator corrected according to EMPA

Cylinder no.:	BI 21231F	
Parameter:	SO2	
Owner:	CEHM	

	CEHM	NIS	Dev. between monitors
	SO2 [ppb]	SO2 [ppb]	SO2 [%]
Certified conc.:	830.0	830.0	
Measured conc.:	965.0	1007	-4.2
Dev. from cert. [%]:	16.3	21.3	
Laboratory:	CEHM	NIS	
Monitor ser. no:	57788-316	57989-316	
Calibrator ser. no.:		57545-317	
Date:	00.05.09	00.05.09	

Dynamic Calibration - CHEM NOx Monitor - CHEM Calibrat

		Guest				Reference		
Owner:	Cairo U.		NO	NOx	NO2	Cal. lab:	Mon.lab.	Gas std: Scott, NO, 1%
Monitor:	TEI 42C	Range:	1000.0	1000	1000 ppb	Calibrator:	TEI 146	Ser. no: 5701950
Ser. no:	57955-315	Cal. bkg:	10.8	12	ppb	Ser. no:		NO: 100 ppm
Date:	00.05.07	Cal. cof:	1.009	1.03	0.999	Purpose:	Calibration	NOx: 102 ppm

Cal. with inlet filter

	a	b	
Gas flow:	1	0	GF = a * Zero air + b
Dil. flow:	1	0	DF = a * Gas + b

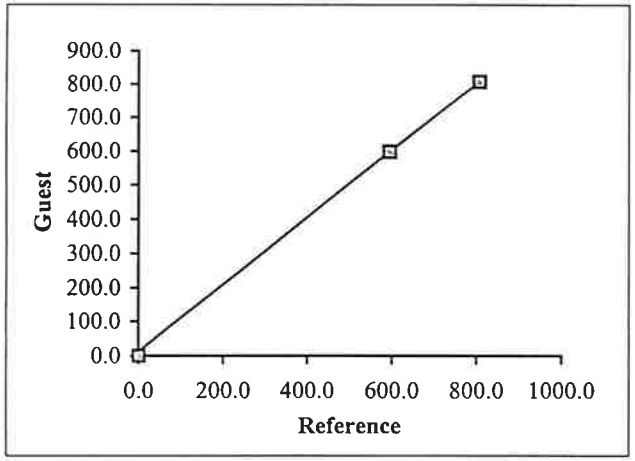
Parameter NO

1) Ref = a * Guest + b
2) Guest = a * Ref + b

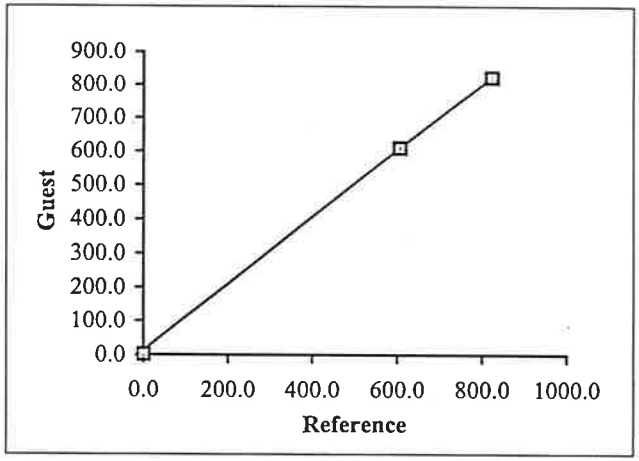
Zero air [LPM]	Gas [SCCM]	Ref. [ppb]	Guest [ppb]	G - R [ppb]		a	b	
8.00	0.0	0.0	-1.0	-1.0	Scale f:	1.015	-12.038	1)
8.00	47.9	595.2	598.0	2.8	Regression			
8.01	65.2	807.4	807.0	-0.4	Scale f:	0.985	11.856	2)
					St. error:	0.000	0.000	
					St. error y estimate:		0.000	
					r2:	1.00000		

Parameter NOx

Ref. [ppb]	Guest [ppb]	G - R [ppb]	Statistics, y=ax+b	a	b
0.0	2.0	2.0	Scale f:	1.016	-12.843
607.1	610.0	2.9	Regression		
823.6	823.0	-0.6	Scale f:	0.984	12.637
			St. error:	0.000	0.000
			St. error y estimate:		0.000
			r2:	1.00000	



Cyl. serial no:	BI 12329F	
Certificate:	765.0	ppb NO
	765.0	ppb NOx
Cylinder resp:	632.0	ppb NO
	642.0	ppb NOx
Cylinder conc:	629.7	ppb NO
	639.6	ppb NOx



Converter check

	Without O3 [ppb]	With O3 [ppb]
NO:		
NOx:		
	NO2:	NOx-NO
		Eff. (%):

Laboratory environment

Temp: _____ °C
Press: _____ mm Hg
Rel. h: _____ %

Init: CN

APPENDIX B

Dynam' 'alibration - NIS NOx Monitor - NIS Calibrator

		Guest				Reference			
Owner:	NIS		NO	NOx	NO2	Cal. lab:	Ref. lab.	Gas std:	Scott, NO, 1%
Monitor:	TEI 42C	Range:	1000.0	1000	1000 ppb	Calibrator:	TEI 146	Ser. no:	5701953
Ser. no:	58066-316	Cal. bkg:	2.3	2.6	ppb	Ser. no:	57545-317	NO:	100 ppm
Date:	00.05.08	Cal. cof:	0.809	1.017	1	Purpose:	Calibration	NOx:	102 ppm

Leaks repaired
Cal. with external filter

	a	b	
Gas flow:	0.94	-0.188	GF = a * Zero air + b
Dil. flow:	0.977	0.353	DF = a * Gas + b

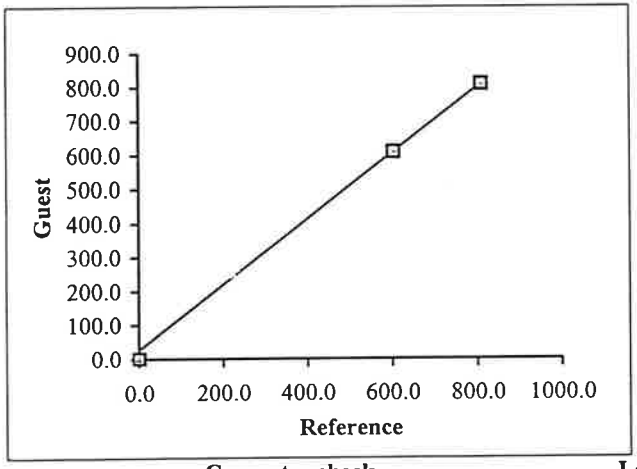
Parameter NO

1) Ref = a * Guest + b
2) Guest = a * Ref + b

Zero air [LPM]	Gas [SCCM]	Ref. [ppb]	Guest [ppb]	G - R [ppb]		a	b
8.18	0.0	0.0	0.0	0.0	Scale f:	1.034	-27.549
7.99	52.9	603.5	610.0	6.5	Regression		
8.00	71.2	810.4	810.0	-0.4	Scale f:	0.967	26.631
					St. error:	0.000	0.000
					St. error y estimate:		0.000
					r2:	1.00000	

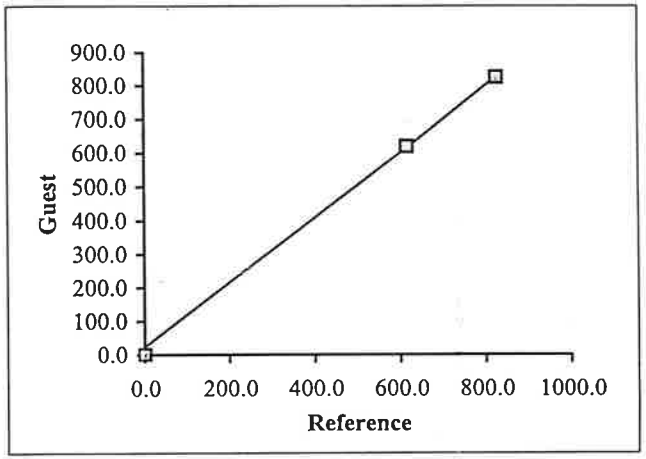
Parameter NOx

Ref. [ppb]	Guest [ppb]	G - R [ppb]	Statistics, y=ax+b	a	b
0.0	-0.1	-0.1	Scale f:	1.029	-23.725
615.5	621.0	5.5	Regression		
826.6	826.0	-0.6	Scale f:	0.971	23.047
			St. error:	0.000	0.000
			St. error y estimate:		0.000
			r2:	1.00000	



Cyl. serial no:	BI 12329F	
Certificate:	765.0	ppb NO
	765.0	ppb NOx
Cylinder resp:	648.0	ppb NO
	657.0	ppb NOx
Cylinder conc:	642.8	ppb NO
	652.6	ppb NOx

Only charcoal scrubber
connected directly to monitor
_____ ppb NO
_____ ppb NOx



Converter check

	Without O3 [ppb]	With O3 [ppb]
NO:	_____	_____
NOx:	_____	_____
	NO2:	NOx-NO
		Eff. (%):

Laboratory environment

Temp: _____ °C
Press: _____ mm Hg
Rel. h: _____ %

Init: _____

APPENDIX C

APPENDIX D

Dynamic Calibration - CHEM SO2 Monitor - CHEM Calibrator

Guest

Owner: Cairo U.
Monitor: TEI 43C — Range: 1000 ppb SO2
Ser. no: 57788-316 — Cal. bkg: 7.1 ppb
Date: 00.05.09 — Cal. Cof: 0.977

Cal. without inlet filter
Cylinder temp. ca. 30 degrees C, 110 bar at start

Reference

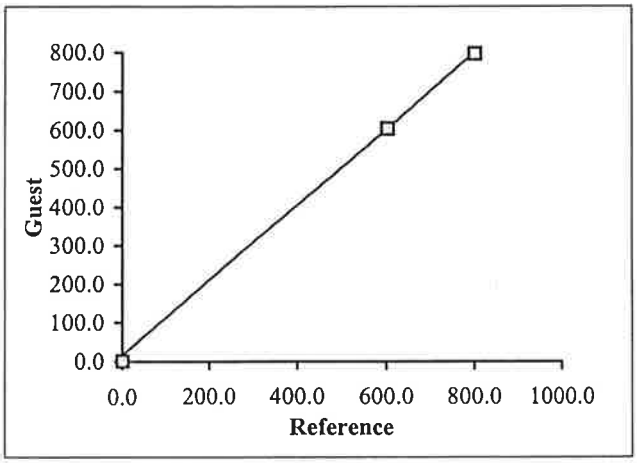
Cal. lab: Mon.lab. — Gas std: Scott, SO2, 1%
Calibrator: TEI 146 — Ser. no: 5701946
Ser. no: — SO2: 197 ppm
Purpose: Calibration

	a	b	
Gas flow:	1	0	GF = a * Zero air + b
Dil. flow:	1	0	DF = a * Gas + b

Parameter SO2

1) Ref = a * Guest + b
2) Guest = a * Ref + b

Zero air [LPM]	Gas [SCCM]	Ref. [ppb]	Guest [ppb]	G - R [ppb]		a	b
8.01	0.0	0.0	0.4	0.4	Scale f:	1.025	-15.843
8.01	24.6	603.2	604.0	0.8	Regression		
8.01	32.7	801.0	797.0	-4.0	Scale f:	0.976	15.459
					St. error:	0.000	0.000
					St. error y estimate:		0.000
					r2:	1.00000	



Cyl. serial no: BI 21231F
Certificate: 830.0 ppb
Cylinder resp: 965.0 ppb
Cylinder conc: 973.1 ppb

Internal Zero/ Span check unit

[ppb]
Zero air: _____
SO2: _____

Laboratory environment

Temp: _____ °C
Press: _____ mm Hg
Rel. h: _____ %

Init: LM

APPENDIX E

Dynamic Calibration - NIS SO2 Monitor - NIS Calibrator

Guest

Owner: NIS SO2
Monitor: TEI 43C Range: 1000 ppb
Ser. no: 57989-316 Cal. bkg: 20.4 ppb
Date: 00.05.09 Cal. Cof: 0.760

Changed filter, same response with and without filter
Calibrated without filter
With filter on zero air to calibrator
Very slow response on trv. std., ca. 1 h

Reference

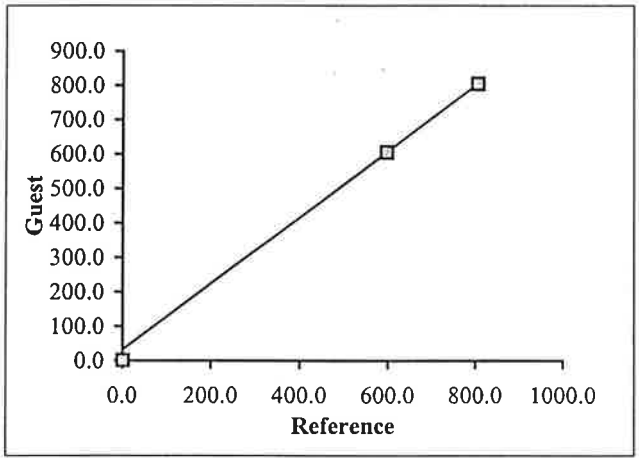
Cal. lab: Ref. lab. Gas std: Scott, NO, 1%
Calibrator: TEI 146 Ser. no: 5701954
Ser. no: 57545-317 SO2: 198 ppm
Purpose: Calibration

	a	b	
Gas flow:	0.94	-0.188	GF = a * Zero air + b
Dil. flow:	0.977	0.353	DF = a * Gas + b

Parameter SO2

1) Ref = a * Guest + b
2) Guest = a * Ref + b

Zero air [LPM]	Gas [SCCM]	Ref. [ppb]	Guest [ppb]	G - R [ppb]		a	b
8.01	0.0	0.0	0.6	0.6	Scale f:	1.041	-33.223
8.00	26.5	597.4	606.0	8.6	Regression		
8.00	35.7	805.5	806.0	0.5	Scale f:	0.961	31.925
					St. error:	0.000	0.000
8.00	35.8	807.8	942.0	134.2	St. error y estimate:		0.000
					r2:	1.00000	
8.00	35.8	807.8	807.0	-0.8			



Cyl. serial no: BI21231F
Certificate: 830.0 ppb
Cylinder resp: 1007.0 ppb
Cylinder conc: 1014.7 ppb

Only charcoal scrubber
connected directly to monitor
0.4 ppb SO2

Internal Zero/ Span check unit

[ppb]
Zero air: _____
SO2: _____

Laboratory environment

Temp: _____ °C
Press: _____ mm Hg
Rel. h: _____ %

Init: LM

APPENDIX F

Results

Internal monitor calibration factors after calibration

Monitor	Ser. no.	NO		NOx		SO2		Date of cal.	Owner
		Backgr.	Cal. coef.	Backgr.	Cal. coef.	Backgr.	Cal. coef.		
NOx	57955-315	10.80	1.009	12.0	1.030			00.05.07	CEHM
SO2	57788-316					7.10	0.977	00.05.09	CEHM
NOx	58066-316	2.30	0.809	2.6	1.017			00.05.08	NIS
SO2	57989-316					20.40	0.760	00.05.09	NIS

To: Mr. Bejarne.
CC: Haytham

H.3.2

List of non-compliances

Station	Non-compliance
1- Kafr El-Dawar	1- The SOP of the SO_2 sequential sampler is not updated. 2- PM10 monitor is included in the inventory list but not installed. 3- The SOP of PM10 is not found.
2- Kafr El Zayat	1- Field calibration of the SO_2 monitor is not performed. 2- The calibration certificate of the SO_2 monitor is not found Note: cover of the certificate is for SO_2 while results are for NO_X monitor. 3-Permeation tube for NO_X monitor is not available. 4-The ceiling of the shelter is not tightly protected against rainfall because it was noticed that there is a leakage allowed water to enter the shelter. 5- Deviation of the SO_2 monitor is 16% while the limit of the acceptance criteria is 15%.
3-El Gomhoria station	1- The inventory list is not updated. 2- All the SOPs are not of the last version. 3- The calibration certificate of the SO_2 monitor is not included in the station manual 4- NO_X and PM10 monitors are not installed in the station.
4- El- Abasia	1- There is a big fluctuation in the SO_2 monitor readings.
5- Kom-ombo	1-The SOP of SO_2 sequential sampler is not Present. 2- The inventory list needs to be updated, since it does not include the air metric. 3- The SOP and instruction manual of the air metrics are not present. 4- The Rotameter flow is not calibrated since 22 / 12 / 98.
6- Luxor	1- The Rotameter flow is not calibrated since 22 / 12 / 98.
7-Aswan	1- The deviation of the SO_2 monitor from the travelling cylinder is 21.13% while the acceptance criteria is 15%. 2- The SO_2 monitor is not calibrated

LM

	since 26-11-1998. 3- Field calibrations are performed using the same travelling cylinder of serial No. B12123IF but with two big different concentrations.

Operator wish: The shelter in Aswan needs to be furnished with chair and table

This copy is delivered to the Reg. Lab.-Air task Manager on her requist.

Q. Manager

Received
Mai Ahmed
27/3/2000

H.3.2 a)

A plan for the Study of Stabilization of Ammonia Containing Solutions to be used in the Proficiency Tests

(A) The Approach:

(1) Validation of two analytical procedures for the determination of ammonia in sea water potentiometrically using ammonia gas sensor and spectrophotometrically using indophenol method.

(2) Study of the effect of pH over a wide acidity range on the stability of the ammonia solutions.

(3) Study the effect of adding some complexing metal ions such as copper(II) on the stability of the ammonia solution.

(4) Study the effect of adding few beeds of a cation exchanger to the solution to fix the ammonium ion and to keep it bound to the exchanger until measurement.

(5) Study the situation where a concentrate of ammonia solution is provided in vials and to be added to the test solution just before measurement.

(B) Equipment

- Spectrophotometer.
- PH/mV meter.
- Ammonia gas sensor
- Combined glass/Ag/AgCl electrode.

Address : Abbassia – Cairo – Egypt.
Tel. & Fax: 4831836
Mobile : 0122162766

العنوان : العباسية – القاهرة – مصر .
تليفون – فاكس : ٤٨٣١٨٣٦
موبيل : ٠١٢٢١٦٢٧٦٦

Ain Shams University
Faculty of Science
Reference Lab.
in cooperation with
EEAA – Danida (EIMP)

جامعة عين شمس
كلية العلوم
المعمل المرجعى
بالتعاون مع جهاز شئون البيئة
المشروع الدنماركى للرصد البيئى

(C)Reagents:

- Ammonium chloride.
- Sulfuric acid.
- Hydrochloric acid.
- Phenol.
- Hypochlorite solution.
- Copper sulfate.
- Dowex cation exchanger.
- Sea water.
- Deionized water.
- Sodium hydroxide.

(D) Personnel Involved:

- Hesham.
- Ayman Helmy.
- Ahmed Sayed.

(E) Starting Date:

:
Februrary 25th.,

(F) Finishibg Date: Reporting

May 1st

H.3.2 b)

From: Jan Erik Hanssen <jeh@nilu.no> Save Address - Block Sender
Reply-To: Jan Erik Hanssen <jeh@nilu.no>
To: eimp@intouch.com Save Address
CC: Mai Ahmed <mai_ahmed@hotmail.com> Save Address
Subject: Mai Ahmed-Filter samples
Date: Wed, 15 Mar 2000 14:00:22 +0100

Dear Mai Ahmed,

It is actually very few possibilities to get real filter samples for intercomparison/proficiency studies. NILU has prepared artificial samples for sulphate on filters for the European EMEP-programme for several years, simply by dripping microlitre-volumes of water solutions on to cellulose filters.

I know that US-EPA arranged audits for lead on filters. I think those were also artificial. I may be able to give you an address in US to get such filters.

This year (for EMEP), we will try to include nitrate and ammonium also, again as artificial, but we will also borrow a special sampler, used for preparing workplace intercomparison filters, which can take 100 parallel samples. in this way we will distribute real filters for our intercomparison. Some heavy metals will be included.

Our aim is to distribute the samples for the EMEP-intercomparison in late May this year, and if you are interested it will be possible to include your laboratory.
EMEP is a program for background monitoring, and the amount on the filters will be relatively low.

Best regards,
Jan Erik Hanssen

Appendix I

Co-ordination

I.1 a)	Updated revised logical framework matrix 1999-2000
I.1 b)	Sub-component: Air Quality Monitoring
I.1 c)	Finalising the input to EEA
I.2.1	Meeting Programme for Danida Review Mission 09-19 April 2000
I.2.2	Missions 1996-97
I.2.3 a)	Air Quality Forecasting and Early Warning Systems based upon the EIMP Monitoring Programme
I.2.3 b)	The OPSIS Surveillance, Fiorecasting and Planning System
I.2.4	Minutes of Meeting 8 April 2000
I.2.5	Weather Observations available from Meteorological Authorities
I.2.6	Newsletters - Episodes - Dust storms - SO_2 levels
I.2.7	The Web page on Air Quality

I.1 a)

Air Pollution Monitoring
Updated revised logical framework matrix
1999-2000

The LFA matrix for the air pollution monitoring component is presented below

Outputs for air pollution monitoring component, Consolidation Phase:		
Project Document	**Extended Description**	**Indicators**
4 Training of EEAA staff in interpretation of monitoring finalised	**A. Institutional support** A.2 Contract between EEAA and monitoring institution continued A.3 Counterpart trained	
3 Monitoring programme adjusted based on evaluation	**B. Design of monitoring programme** B.3 Monitoring programme updated	
	C. Procurement of equipment, hardware and software C.1 Equipment, hardware and software specified C.2 Monitoring equipment procured and installed	
	D. Data management D.2 Local data bases installed at Monitoring Laboratories D.3 EEAA data base installed	
Training courses	**E. Training** E.5 Data base training E.6 Chemical analyses training E.7 Air Quality interpretation and reporting	
5 Preliminary QA/QC introduced at monitoring institutions	**F QA/QC** F.3 On the job QC/QA training continued F.4 QA input from Reference laboratory	
2. Permanent sites operated on a routine bases	**G. Monitoring** G.3 Final Monitors installed G.4 Air Quality Monitoring, system operated G.5 Data evaluation G.6 Chemical analyses G.7 Reporting	

Outputs for air pollution monitoring component, Consolidation Phase:		
Project Document	**Extended Description**	**Indicators**
	H. **Reference Laboratory** H3. Audits and controls	
	I. Component Co-ordination I.1 Planning I.2 Management I.3 Reporting	

Activities for air pollution monitoring component, Consolidation Phase		
Project Document	**Extended Description**	**Verifiable Indicators**
1.2 Training of EEAA staff on interpretation and reporting of data	**A.Institutional support** A.2.1. Assist in describing contracts A.3.1 Counterpart trained during development of the programme	• Contracts • On the job training and reporting
3. Revision of monitoring schedule	**B.Design of monitoring programme** B.2.8 Establish agreements with monitoring site owners B.3.1 Update the monitoring programme	Monitoring programme report
	C.Procurement of equipment, hardware and software C.2.1 Procure instruments and equipment if necessary C.2.2. Prepare instruments for installation	• Instruments available
	D.Data Management D. 1.5. Telecommunication lines established D.2.2. Establish local databases at D.3.1 EEAA air quality data base installed	• Data base at Monitoring Laboratory • Database available
4. Training of EEAA staff in reporting and interpretation	**E.Training** E.5.2 Training in use of EEAA data base E.6.1 Sample preparations VOC E.6.2 Chemical analyses of various samples E.7.1. Training Monitoring Laboratory and EEAA in air quality data in interpretation and reporting	• Training VOC • Filters analysed
5 QA/QC procedures	**F QA/QC** F.3.1 QC and calibration routines as part of on-the-job training F.4.1 Input QA from Reference Laboratory Air	• Manuals • Written SOPs • Audits and Quality check in use

Activities for air pollution monitoring component, Consolidation Phase			
Project Document		**Extended Description**	**Verifiable Indicators**
2	Monitoring at permanent sites a	**G. Monitoring** G.3.1 Update monitoring stations G.4.1 Maintenance and calibration G.4.2 Service and repair G.5.1 Data retrieval and data evaluation G.5.2 Data presentation	• Field reports • Data report
1.1	Writing of report based on monitoring results from phase 2 combined with "old" old material	G.6.1 Sample preparation G.6.2 Chemical analyses G.7.1 Quarterly and monthly reports G.7.2 Annual reports	• Quarterly reports • Annual reports
		H. Reference Laboratory H.3.1 Check field monitors H.3.2 Audit programme	• Calibration certificates
		I Component Co-ordination I.1.1 Annual plans I.2.1 Follow up, meetings and administration I.3.1. Annual report	

1.1 A.Institutional support and co-ordination

1.1.1 Activity A.1.1 Air Pollution Monitoring Working Group (APMWG)

The first working group meeting was held in October 1996.

The participants in the working group will have to be changed as a result of alterations in the air quality monitoring programme including changes in monitoring institutions.

Further working group meetings may be held when the instruments have been installed in Cairo and Alexandria. There is at present no need for input from the Working Group.

Discussions of details concerning the duties and responsibilities of the Monitoring Institution's functions will be held, and the support of relevant expertise to the monitoring laboratory will be discussed.

1.1.2 Activity A.2.2 Assist in describing work functions for new experts

In addition to the earlier prepared job descriptions, the work to be undertaken by the new experts to be engaged by the monitoring institution will be described.

1.2 B.Design of monitoring programme

1.2.1 Activity B.1.1 Evaluate existing measurement sites

Existing measurement sites will be further evaluated. Some of the measurement sites used by Meteorological Authority and Atomic Energy Authority could be used by the EIMP programme. The results of all evaluations will be presented in the siting reports.

1.2.2 Activity B.2.1 Select representative monitoring sites for air quality measurements

Further investigations concerning a few sites outside Cairo and in Alexandria will have to be re-visited. At some areas in the Delta and in Upper Egypt details concerning sites will have to be decided. The sites will have to cover different scales of pollution.

1.2.3 Activity B.2.2 Define site characteristics

For each monitoring site the surrounding area, local sources and possible impacts will be described..
The site descriptions will be followed by local maps, co-ordinate specifications and photos where available. A site description report will be made.

1.2.4 Activity B.2.5 Select sites for meteorological measurements

Meteorological data on an hourly basis will be needed to interpret the air quality data collected. Wind speeds, wind directions and atmospheric turbulence (stability conditions) are the most important parameters to explain the relationship between

the air pollution sources and air quality. These data are essential to understand the pollution impact.

Most of the meteorological sites have been selected. However, the detailed locations have to be reconsidered in the Delta and in Upper Egypt.

1.2.5 Activity B.2.8 Establish agreements with monitoring site owners

It will be necessary to establish some agreements with the site owners about the use of their sites. The responsibility for this work is at the EEAA counterpart Dr Nassar, who is evaluating the needs for agreement at each site. Many of the sites are Governmental buildings. A letter to some site owners has been prepared.

1.3 C.Procurement of equipment, hardware and software

1.3.1 Activity C.1.1 Evaluate existing equipment

Existing equipment already available in Egypt has been evaluated. So far no equipment has been suited for including in the EIMP monitoring programme. The evaluation has been based upon a quality evaluation. This work will continue into the third phase of the programme. Equipment available at the Meteorological and Atomic Energy Authorities has been evaluated. The equipment are of the same type as the EIMP/EEAA instruments. Repairs and calibrations have, however, to be undertaken before included in a future network for Egypt.

1.3.2 Activity C.2.1 Procure instruments and equipment

Technical evaluation of air quality monitoring equipment was undertaken in Phase 2 of the programme. Evaluations for the second and third delivery of equipment will continue in 1998. Equipment procured will be checked and calibrated upon arrival in Egypt.

1.3.3 Activity C.2.2 Prepare instruments for installation

All instruments arrived in Egypt, and stored at Tabbin institute will be checked and verified before transferred to the Monitoring Laboratory. All monitors will then be calibrated prior to the installation in the field.

1.4 D.Data management

1.4.1 Activity D.1.1 Specify data collection and data transfer

Different types of data will be collected by the monitoring programme. The first specification of the data collection procedures were developed in Phase 1. Further specifications of the various forms of data collection procedures will be established in Phase 3.

For air quality data collected by samplers, the various sampling procedures and data collection and analyses procedures will be developed during 1998.
At air quality monitoring stations each site will be equipped with a data logger unit. Hourly average data will be transferred as raw data via modem and telephone lines

to the central computer unit, the System manager, at the Monitoring Laboratory. From some of the stations, where communication lines are not available, the data will be collected on floppy disks.

Data will also be made available for the monitoring institution in Alexandria via internet. It will be made possible for ISGR in Alexandria to retrieve data from the Monitoring Laboratory in Cairo on a daily bases, and to look at the data on simple time plots. These plots will be printed weekly and stored for further evaluation.

1.4.2 Activity D.1.2 Specify data retrieval and local data base at Monitoring Laboratory

Details concerning specifications of data scaling, data storage, data quality control etc. will be established based on specifications given in the System Manager. Specifications will be developed and collected in a specification report or in manuals.

Training of expert personnel for this operation at the data retrieval computer will be based upon System Manager specifications. Some of the specifications will be undertaken as an on-the-job effort together with an adviser. Routine control of all data retrieved is essential on an every day basis.

1.4.3 Activity D.1.3 Specify data quality check and control procedures

Data quality controls apply both to the automatic monitoring data and to semi automatic and manually collected data. An initial description of the quality control procedures was prepared during Phase 1.

The Monitoring Laboratory will be equipped with reference gases. Graphical and statistical software to perform daily controls will be supported by the supplier as part of the System manager.

The technical tools will be supported by quality control descriptions , manuals and reporting procedures. Log books will be established for each instrument. The laboratory routine data monitoring, retrieval ,storage and quality control will start as soon as the first instruments are installed. The training will include all participating air quality data collecting institutions as on-the job training.

Manuals and reporting procedures for collected samples analysed in the analytical lab will be developed. This development will take place at the end of 1998. This work will also be done as an on-the-job training effort. As part of the quality controls proficiency tests will be prepared by the Deference Laboratory.

1.4.4 Activity D.1.4 Identify sources for supplementary data

Some available air quality data from Egypt was evaluated in the first phase of the programme. None of these data has a quality adequate for the EIMP/EEAA data base. In a further evaluation of such data we will have to study quality and whether the data are representative for any of the site specifications defined in the programme.

1.4.5 Activity D.1.5 Telecommunication lines

Dr M Nassar had meetings with the National Authority for Communication (NAC) concerning lines for data transfer. NAC have a network for data communication that could be used by EEAA/EIMP for transferring data from the monitoring sites to the central computer at the Monitoring Laboratory. In the future the network can also be used to transfer the data to EEAA. This solution is presently probably the best one available in Egypt. Further investigations and decisions will be taken in 1998.

1.4.6 Activity D.2.1 Prepare database for manually analysed data

A laboratory database for samples that are being prepared for chemical analyses, quality controls and calibration will be considered and prepared during 1998. Preliminary data will be entered into a data base for automatic control. Final data approvals have to be issued before the data are entered into the main data base.

Descriptions and manuals for the use of such chemical data will be prepared for use at the Monitoring Laboratory at the end of 1998.

1.4.7 Activity D.2.2. Local database for monitor data the Monitoring Laboratory

A local data base for the data retrieved from the monitoring system is part of the System Manager. The details and content of this database will depend upon specifications given by the instrument supplier The specifications will be part of the report and manuals developed for this part of the monitoring centre.

The local database will contain all one-hour average data ; concentrations of gases and particles as well as all meteorological data. These data will be quality assured and controlled in the final version of the local database. The data will represent the basis for the development of quarterly reports and aggregated data transferred to the EEAA database. The frequency and methods for this transfer will have to be decided upon during Phase 3.

1.4.8 Activity D.3.1 EEAA data base

The data base for statistical handling of ambient air quality data and preparation of annual reports is based on the same system as the EEAA emission inventory data base, AirQUIS. The ambient air pollution data base will be established at EEAA at the end of 1998.

1.5 E.Training

1.5.1 Activity E.1.1 Assess training needs for Phase 3

Training needs have been evaluated for the Monitoring Laboratory and the Reference Laboratory Air. Training started in the second phase by seminars and work shops, and will continue mainly with on-the-job training during the third phase. The need for basic training work shops and seminars will be evaluated. Further training programmes will be evaluated and implemented during the installation and operational phase at the end of Phase 3.

1.5.2 Activity E.2.1 Prepare on-the-job training

An important part of the training programme will be based upon on-the-job training. It is essential that the personnel at the Monitoring Laboratory, who will have the responsibility for the future monitoring system, will follow the installations and will be involved in operations of the monitors and samplers as soon as possible in the third phase.

Training has started both at the Reference Laboratory and at the Monitoring Laboratory and will continue into the third and fourth phase. An on-the-job training programme will also be developed for daily instrument checks, calibration and maintenance.

1.5.3 Activity E.2.2 Training programme for instrument operation and maintenance.

The following topics has been included in the training programme for instrument operations and maintenance :

- Instrument installations,
- instrument calibrations,
- control and maintenance,
- data transfer procedures ,
- data retrieval programme,
- data handling at the Monitoring Laboratory,
- data storage and presentation.

The work started in 1997, but the main part of this training will be undertaken during phase 3. An important part of the third phase training programme will be to learn to install and operate the various types of monitors.

1.5.4 Activity E.2.3. On-the-job training at Monitoring Laboratory

On-the-job training will be undertaken for personnel both at the Monitoring Laboratory and at the Reference Laboratory

Concerning the monitoring system training will be undertaken by the instrument supplier and the monitor experts from EIMP (NILU). Local experts or international experts from the suppliers will be contacted if needed.

Training in the installation and use of monitors and in check and controls will be undertaken as a on-the-job training effort at the Monitoring Laboratory after a similar introduction has been undertaken for selected experts at the Reference Laboratory.

Similar training will also be performed for selected experts from the other monitoring institutions. This training will take place with installed instruments in Cairo, and be continued in Alexandria.

Concerning the sampling equipment included in the programme, training in chemical analyses and use of laboratory equipment will be given by NILU experts for personnel at the Monitoring Laboratory. These

1.5.5 Activity E.2.4 Support training to Reference Laboratory personnel

The first training in the use of monitors and in the calibration of monitors will be undertaken during installation, tests and calibrations. Experts from the Reference Laboratory will have to participate in training given to the Monitoring Laboratory personnel.

The EIMP instrument/monitoring expert together with some of the instrument suppliers will perform this training. The Reference Laboratory personnel will have to become experts in all kind of calibration procedures, and will also have to follow some of the on-the-job training that is undertaken at the Monitoring Laboratory

1.5.6 Activity E.5.1 Use of data base at System Manager

Training in the use of the System Manager at the Monitoring Laboratory started in 1997. The main part of this training, including practical use of the system, remote calibrations, data quality controls, cleaning of data, data plots and storage of raw data has to start in the third phase, and be a major part of the tasks undertaken at the Monitoring Laboratory in 1998 and 1999.

1.5.7 Activity E.5.2..Training in use of EEAA data base

The EEAA ambient air pollution data base, including statistical programmes designed for air quality data and report generators, will be installed at the end of 1998. Some training will be given during the installation, but most of the practical work with the data base will have to be undertaken in 1999.

1.5.8 Activity E.6.1..Sample preparations

A major part of the air quality sampling programme is based on integrated sampling on various types of filters. "Clean" filters and impregnated filters will have to be prepared in the laboratory.

Training in the preparation and use of filters will be undertaken at the Monitoring Laboratory during the Fall of 1998. A possible training period at NILU for one selected expert from the Monitoring Laboratory will be considered.

1.5.9 Activity E.6.2..Chemical analyses of various filters

The analytical methods, which will be introduced for SO_2 and NO_2 analyses, have normally not been applied in Egypt before.

A training schedule will be developed, and the training will follow the introduction to preparation of filter materials.

1.6 F.QA/QC

1.6.1 Activity F.2.1 Instrument calibration procedures

Specifications for instrument calibration and descriptions of measurement and sampling procedures (SOP; Standard Operation Procedures) will be developed. This work was started in Phase 1 and 2. An introductory seminar was given by the instrument supplier company at the end of phase 2. Further elaboration of procedures will be undertaken in Phase 3 starting with filed calibration procedures.

Notes, schemes and SOPs will be developed as part of the training in calibration of monitors. A co-operation between the instrument supplier's experts, the Monitoring Laboratory experts and the Reference Laboratory experts should be established to obtain the best practical and most efficient calibration and span/zero check procedures.

1.6.2 Activity F.2.2 Design QA / QC procedures at Monitoring Laboratory

Well defined descriptions of day by day analytical routines, including quality control, are essential for generating reproducible results. The monitoring laboratory will have to handle both automatically monitored data received via telephone communication direct to the local computers and manually collected samples that will be analysed by wet chemical or other analytical methods.

A QA/QC programme will be prepared for both types of data. The procedures will be quite different. The content in the performance of work will also be quite different. The staff assigned to undertake the different tasks will have to have different backgrounds and will be working on quite different operations.

It is important that the responsible laboratory team is committed to include QA/QC as routine part of their tasks. Sufficient time and resources for this part of the work has to be provided from the start.

For the monitoring system the QA/QC adviser together with the EIMP instrument expert will undertake the necessary training relating to the data retrieved by computer aided systems.

For the sampling system the EIMP Reference Laboratory manager will support the design of QA/QC procedures for the analytical programme.

1.6.3 F.2.3 Establish Standard Operational Procedures as part of QA/QC

Standard Operational Procedures (SOP) will be developed as an important part of the QA/QC procedures.

A template (standard list of information to be collected) for the preparation of SOPs will be supplied by the Air Pollution Specialist. This can be used for checking existing procedures and form a basis for updating and supplementing the procedures.

More detailed procedures will be developed during the establishment of the monitoring and sampling programme in Phase 3.

1.6.4 Activity F.3.1 QC and calibration routines as part of the on-the-job training

The Monitoring Laboratory personnel will have the responsibility for the operation of monitors and samplers, and for undertaking weekly controls in field.

For samplers this includes flow controls, time check, cleaning, handling etc..

For samplers it includes zero and span controls, flow controls and various check lists that will be part of the on-the-job training. Manuals and check lists will have to be followed at every visit. All these manuals will be presented, used and repeated during the training in field.

1.7 G. Monitoring

1.7.1 Activity G.1.1 Prepare work plan for 1999 activities .

The detailed planning of the activities of Phase 4 covering 1999 will be made taking into account the experience gained during Phase 1 - 3.

1.7.2 Activity G.2.1 Specify sampling programme procedures

The sampling programme consists of integrated (sequential or individual) samplers, from which samples have to be collected and brought to the laboratory for analyses. A list of parameters including sampling times and frequencies was presented in Phase 1. This schedule will have to be updated, when the sampling programme starts in phase 3 (the end of 1998).

The Egyptian Air Quality Standards already indicate some of the averaging times requested for reporting the air quality in Egypt. These specifications have also been applied in the design procedures.

Frequencies and averaging time will vary dependent upon instrumentation at each site. The monitors linked to on-line data transfer will meet all requirements, while integrated sequential and manual samplers at its best will be based upon 24 h average samples.

1.7.3 Activity G.2.2 Specify monitoring programme procedures

A list of parameters including sampling times and frequencies has been developed. A complete monitoring programme for Egypt was designed at the end of Phase 2. Sites, parameters, instruments and installation schedules were indicated. The sites selected and the procedures developed for the operation of the monitoring programme meet the QA/QC requirements. Detailed procedures for operation of the programme will be developed in 1998.

1.7.4 Activity G.2.3 Start monitoring programme and data retrieval

The first monitoring stations were installed and started in 1997 at Tabbin Institute and at Cairo University. A third site at Gemoroya street has been prepared and calibrated, and will be in operation at the end of 1997/beginnin of 1998.

An important part of this phase of the monitoring programme is to train the operational personnel at Cairo University (Monitoring Laboratory) to participate in and to undertake installations and calibrations of the different type of monitors. Also personnel at the monitoring institution in Alexandria (ISGR) will participate in the installation work.

Data retrieval routines was tested and verified in 1997. The sequence for the opening of new monitoring stations depends to a certain degree upon available telephone lines. However, a schedule for installation in 1998 has been established.

1.7.5 Activity G.3.1 Establish monitoring station infrastructure

During Phase 1 a list of construction work, repair, maintenance, cleaning etc. at the selected monitoring sites was specified. During the site inspections and site visits all these tasks were described in details. The EIMP counterpart, Dr Nassar, has taken the responsibility for undertaking all these preparations. He will also be responsible for agreements, communication lines, shelters and all kind of infrastructure at the sites.

At most of the sites no telephone lines have been available. No on-line data will be possible until telephone line are installed. Discussions with the Communication Authorities started in 1997, as mentioned in Activity D.5.1.

Most of the sites have 220 V electrical power sockets. The possibility of using this has to be verified through the agreements established with the site owners.

1.7.6 Activity G.3.2 Install monitors in Cairo and Alexandria

The installation of monitors in Cairo started in 1997. The installation programme will continue according to a well defined schedule also in the third phase of the programme in 1998. The monitoring personnel from the Monitoring institutions will have to be trained in installation and calibration, and will participate in the installation programme.

At the end of 1998 they will have to share time between operation, installation, calibration and maintenance. A considerable work load may be placed on this personnel, and we will have to consider during phase 3 and 4, whether the number of people operating the system is adequate.

1.7.7 Activity G.3.3 Start monitors in Delta and Upper Egypt

Most of the installations and calibrations for the Delta and Upper Egypt will take place in 1999. All the monitors for the Delta will be installed in 1999. However, some stations such as samplers in the Delta and in the Canal area are planned to be installed at the end of 1998.

1.7.8 Activity G.4.1. Maintenance and calibrations at the monitoring stations

As soon as the measurement sites are installed and in operation there will be a continuous need for maintenance and calibration. Weekly visits will be paid to all monitoring sites from the Monitoring Institutions. ISGR in Alexandria will have the responsibility for the sites in Alexandria and in the Delta. EHMC at Cairo University will have the responsibility for the rest of the stations in Egypt.

Final arrangements concerning some of the sites will have to be discussed in Phase 3. A maintenance and visit schedule will have to be developed by the monitoring institutions, including support from institutions outside EHMC and ISGR, where this is necessary. This could be possible for Upper Egypt.

1.7.9 Activity G.4.2 Service and repair

As part of the weekly visits to the stations, together with the daily quality controls undertaken by the monitoring institutions, the need for repair and service will be evaluated by the instrument experts.

Monitors and samplers will be taken to the laboratory for repair when ever necessary. In some cases simple repairs will be undertaken at the station.

1.7.10 Activity G.5.1. Data retrieval and data evaluation

As soon as the first data are retrieved at the monitoring laboratory a data evaluation will start. Some simple tests were run already on data retrieved on discettes from Tabbin in November 1997. The continuation of this work in 1998 will be part of the on-the-job training.

First of all calibration factors will have to checked. Next span check points, errors, peak values, false data and other peculiarities in the retrieved data have to be taken out.

A time plot of the data will be produced, first of all at the Monitoring Laboratory at Cairo University but also later at IGSR in Alexandria, to evaluate the diurnal, weekly and spatial variation in concentrations.

Training in the judgement of concentration levels and units will be undertaken during 1998.

1.7.11 Activity G.5.2 Data presentation

After the first air quality data have been evaluated, and the QA/QC procedures have been undertaken and verified, the first data presentation will be prepared. The first report was originally assigned for the end of phase 2. However, very few data were available and the report will have to be delayed till the beginning of 1998.

A brief report will be written describing the background, data availability, data quality and the data itself. A validation/discussion of the results will follow the data presentations.

1.7.12 Activity G.6.1 Sample preparation

Most of the sampling programme is based on collection of particles and gases on various types of filters. These filters have to be prepared before exposed in the field.

A programme for preparation will be developed, and the operations will be initiated as part of the training programme conducted in September-October 1998

1.7.13 Activity G.6.2 Chemical analyses

The chemical analyses of samples collected will be undertaken by the chemical laboratory at the Environmental Hazard Mitigation Centre (EHMC) at Cairo University.

Preparation of samples and chemical analyses will start during the second half of 1998. An analytical expert on inorganic chemistry will undertake introduction and

training in the analytical part of the air monitoring programme, and it is anticipated that routine operations and analyses will be undertaken from the end of phase 3.

1.7.14 Activity G.7.1 Quarterly reports

Quarterly reports will developed by the monitoring institutions and delivered to EEAA as part of the data background. These reports will contain some raw data, data availability information, data quality background, and some aggregated data.

As a beginning we have assumed that selected raw data and aggregated information will follow these quarterly reports on a CD rom.

The first quarterly report will contain a very limited amount of information. During 1998 these reports will be developed to meet the requirements of EEAA.

1.7.15 Activity G.7.2 Annual reports

An annual report including some simple statistical evaluation of the data, description of the present monitoring programme and summary comments to the air quality situation in Egypt will developed during Phase 3.

Air pollution levels will be compared to Air Quality Standard values, and exceedances of the limit values will be discussed. The first fully recognised annual report will be issued at the end of 1998.

1.8 H.Reference Laboratory

1.8.1 Activity H.2.1 Training of Reference Laboratory personnel

Training will be undertaken for the Reference Laboratory Air personnel as part of the introduction and on-the-job training for the Monitoring institutions. Selected experts will be invited to participate in the training in operation, calibration and maintenance of monitors.

These activities will start at the end of Phase 2 and will continue into Phase 3.

1.9 Component Co-ordination

1.9.1 Activity I.1.1 Annual plan 1999

The annual plan for 1999 will be developed at the end of 1998.

1.9.2 Activity I.2.1 Follow up and administration

Several activities related to the Air Quality Monitoring Programme have to be undertaken during the year (Phase 3). Some of them are foreseen such as Working Group meetings, reply to questions and changes in schedules, reporting and programme evaluations.

A number of meetings are held during the task managers missions to Egypt. Comments to questions related to air quality or to other related matters linked to the EIMP programme have to be prepared.

Mission reports , as a basis for the annual reporting, and a documentation of meetings, progress, discussions, various inputs etc. have to be prepared and printed.

1.9.3 Activity I.3.1 Annual report

The annual report will be prepared at the end of Phase 3.

1.10 Work plan for Phase 3

The work plan for air pollution monitoring is given as Exhibit 4.2 overleaf

The work plan is based upon the descriptions given above. We have assumed that a data base for ambient air pollution data will be based upon the system established for the point source emission inventory; AirQUIS.

We have also included the NILU expert on sample preparations and chemical analyses, necessary to undertake the sampling programme from the second part of Phase 3.

Exhibit 4.2 Workplan for air pollution monitoring.

I.1 b)

Sub-component: Air Quality Monitoring

Immediate objectives:

1) Commissioned, operated and maintained equipment (including relevant staff training) for data collection on ambient air quality.
2) Monitoring institutions capable of collecting and producing, initially nonvalidated, and later, validated (m' accordance with ISOGUEDE, 25) and consistent data on conditions of the ambient air quality.
3) Monitoring institutions' staff capable of interpretation of air quality monitoring data.
4) EEAA capable of data storage and data management for air quality data. EEAA capable of producing environmental monitoring data reports, e. g as required for the production of EEAA's State of the Environment Reports.
5) EEAA staff capable of undertaking qualified supervision of the work contracted to the monitoring Institution(s).

Outputs during Commissioning Phase

1) Air quality monitoring network established to cover 39 locations with monitors and samplers respectively.
2) Strategic sampling programme for chemical parameters (03, NO,S02, CO, ~~NMEC~~ VOC, Pb) and particulate matter designed
3) All equipment procured, delivered and commissioned
4) Maintenance plans for all air monitoring equipment developed. Monitoring programme initiated and producing (non-validated) data
5) Air quality database established and data stored at EEAA.
6) Staff at monitoring institution(s) trained in routine operation and maintenance of sampling equipment.
7) Staff at monitoring institution(s) trained in necessary QA/QC procedures for appropriate operation of air monitoring programme
8) Monitoring institutions(s) producing non-validated data
9) workplan prepared
10) Sub-component planning, management and reporting implemented

Outputs during Consolidation Phase

1) Monitoring programme covering 39 locations in operation
2) Monitoring institution(s) producing validated (and later completely validated) data on air pollution
3) QA/QC procedures implemented in full
4) Smooth and regular transfer of data from monitoring institution(s) to EEAA
5) Workplans updated/adjusted
6) Staff at monitoring institution(s) fully capable of sampling, analysis and data interpretation
7) workplans prepared
8) Sub-component planning, management and reporting implemented

I.1 c)

Environmental Information
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Memo

To: Joergen Simonsen
From Bjarne Sivertsen
Date: 10 April 2000

EIMP Air Quality Monitoring Component
Finalising the input to EEAA

Introduction

The siting, procurement, installation, training and operations necessary to meet the objectives of the EIMP Air Quality Monitoring Programme have met several obstacles during the development. Some of these are described below, and require that additional input from the expatriate experts is needed to assure the sustainability of the programme.

Additional siting studies

The first siting studies were based upon using the Health Authorities Laboratory at Embaba as the Monitoring Institution for the EIMP/EEAA air component. This was changed after one year and all the investigations had to be undertaken again.

Change of Counterparts

The Air Quality Counterpart has been changed three times during the project. This has lead to extra training efforts and delays in the establishment of monitoring station infrastructure, such as shelters, telephones and electricity.

Daily reporting of data

From 1 November 1999 EEAA has required daily air pollution reports to be presented to the Management of the Agency. These efforts strongly affected the development and the progress of the EIMP project at several levels.

While EIMP was only pleased to deliver whatever data reports were requested from the project, the workload and the requirements had to be in accordance with the possible technical apparatus and staff available to undertake the task. This was not the case at the end of 1999, which lead to delays.

Workshop for repair and maintenance

Repair of instruments as part of operations and maintenance was supposed to be undertaken at the instrument supplier's laboratory. However, the delays and problems in obtaining adequate spare parts and qualified repair work eventually led to the conclusions that EAA and the EIMP were better off with developing, establishing and training the Monitoring Institution at Cairo University (CEHM) to undertake these tasks themselves. This also added efforts, training and delays to the project implementation.

Change of staff at CEHM chemistry laboratory

Installation, start up and training for the EIMP VOC (Volatile Organic Compound) sampling programme was scheduled to be undertaken in October-November 1999. During the first phase of this training period all staff at the laboratory left the laboratory for jobs outside the CEHM laboratory. All training was stopped, and the VOC programme has to be initiated from the beginning again during the year 2000.

Reporting from Monitoring Institutions and final databases

Development and training in preparing various reports at several levels were originally scheduled for the Monitoring Institution and for EEAA personnel. The envisaged one Monitoring Institution was replaced by TWO institutions (CEHM and IGSR) during the second phase of the establishment of the EIMP programme. This lead to repeated training and double work in the establishment of Quality Assurance procedures, Quarterly Reports and Annual Reports. The Quarterly reports have been designed and are now being delivered on a routine basis.

The Annual Reports, however, rely on the second version of the database, which still is not available at the institutions. The first version is working, but this does not include the necessary statistics for the Annual report. Training has thus not been finalised at the Monitoring Institutions.

Reporting at EEAA

Report formats at several levels are also being prepared for the EEAA counterparts. The daily reports to the Minister Office were originally not part of the EIMP programme, as stated above. Monthly reports to EEAA and to the Governerates are now delivered on a routine basis. Several Memos and Newsletters are also delivered. The annual reports, however, are not finalised, and additional training is needed. This also will rely on an enhanced database programme, which is still not to be developed.

General Training

The training programme was designed to include an Introductory Seminar, several workshops on Air Quality, Quality Assurance and instrumentation as well as a final seminar on "Understanding Air Pollution". All these training efforts have been undertaken. In addition four papers have been presented at various conferences in Egypt. The main training programme, however, has been the continuos on-the-job training, which is not finalised due to delays, new counterparts, and new staff at CEHM and limited possibilities to train CEHM and IGSR in annual reporting.

I.2.1

EIMP

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Meeting Programme
for
Danida Review Mission
09 -19 April 2000

The following meetings have been agreed by the participants at EEAA, the Monitoring Institutions, the Reference Laboratories and EIMP.

Sunday 09 April

11:00 *Briefing at EEAA*

Dr. Ahmed Gamal, Head of Environmental Quality Depepartment

Mr. Morten C. Andersen, Project Director EIMP

Eng. Ahmed A. El Seoud, Egyptian Project Manager Counterpart EIMP

Dr. Jorgen F. Simonsen, Project Manager EIMP

Eng. Mohamed Fathy, Deputy Project Manager

Dr. Mousa Ibrahim Mousa, Head of ICC, EEAA

Eng. Dahlia Lotayef, Director of Planning and Follow-Up and Technical Co-operation Department

EIMP Task Managers, Bjarne, Arne, Jacob as well as all the counterparts must be available

13:00 *EEIS*

Monday 10 April

09:00 *Ain Shams University, Central Laboratory (CL)*

(Reference Laboratory, Water)

Prof. Dr. Saad Hassan, Head of Reference Laboratory

13:00 *Centre for Environmental Hazards Mitigation, Cairo University (CEHM)*

(Monitoring Institute, Air - Cairo and Upper Egypt)

Prof. Dr. Yeiha El Said Abd El Hady, Head the Departement

Dr. Tarek Mohamed El Araby, Air Quality Programme Manager

Tuesday 11 April

09:00 ***National Institute of Fisheries, Ministry of Higher Education (NIOF)***
(Monitoring Institute, Coastal Water in the Red Sea concerning nutrients, as well as in the Red Sea and the Mediterranean Sea concerning sediments, mussels sea weeds and corals)
Prof. Dr. Ekram M. Amin, Prresident of NIOF

11:00 ***National Institute for Standardisation (NIS)***
(Reference Laboratory, Air)
Prof. Dr. Samir N. Lawandy, Head of Reference Laboratory, Air

Wednesday 12 April
Dr. Ibrahim Abdel Gelil, Chief Executive Officer

Thursday 13 April ***Suez***

10:30 ***National Institute of Fisheries, Ministry of Higher Education (NIOF)***
(Monitoring Institute, Coastal Water in the Red Sea concerning nutrients, as well as in the Red Sea and the Mediterranean Sea concerning sediments, mussels sea weeds and corals)
Prof. Dr. M. I. El Samra, Project Manager and Team Leader

Saturday 15 April ***Alexandria***

11:00 ***Institute for Graduate Studies and Research, Alexandria University (IGSR)***
(Monitoring Institute, Air Alexandria and the Delta Area as well as Monitoring Institute for Coastal Water in the Mediterranean Sea concerning nutients)
Prof. Dr. Mohamed El Raey, Head of Department, Dean of the Institute
Dr. El Sayed Shalaby, Air Quality Programme Manager
Prof. Dr. Samir Nasr, Coastal Water Project Manager and Team Leader

Sunday 16 April ***Alexandria***

9:00 ***National Institute of Fisheries, Ministry of Higher Education (NIOF)***
(Monitoring Institute, Coastal Water in the Red Sea concerning nutrients, as well as in the Red Sea and the Mediterranean Sea concerning sediments, mussels sea weeds and corals)
Dr. Mamdouh A. Fahmy, Project Manager and Team Leader

Tuesday 18 April

13:00 ***Debriefing at EEAA*** (tentative time schedule)

Jørgen F. Simonsen
05 April 2000

I.2.2

EIMP

Air Quality Monitoring Component Missions to Egypt

Missions 1996-97

Mission AQ1

12 to 22 February 1996. B Sivertsen, Task Manager. This first 1 0-day mission was to prepare the Annual Plan of Action for Phase 1.

Mission AQ2

May and June 1996, B Sivertsen visited Egypt. The visit to Egypt in May-June was part of the Phase 1 of the project. The main objectives of this visit were to undertake part A, B and C of the work programme activities. This included to:

- Analyse existing data;
- Select representative monitoring sites for A.Q measurements;
- Define site characteristics;
- Select air pollution indicators;
- Select sites for meteorological measurements;
- Specify meteorological data;
- Specify use of existing equipment;
- Evaluate existing equipment;
- Prepare list of equipment.

Mission AQ3

October 1996, B Sivertsen and Leif Marsteen. The visit to Egypt in October was part of the Phase 1 and an introduction to phase 2 of the project. The main objectives of this visit was to undertake remaining work on part A and the specified tasks of part B, C and D of the work programme activities: Prepare background for air quality monitoring working group; Job descriptions for air quality monitoring lab. personnel; Select representative monitoring sites for A.Q measurements with special emphasis on Alexandria and pending sites in Cairo; Select sites for meteorological measurements; Specify meteorological data; Specify use of existing equipment; Evaluate existing equipment; Finalise list of equipment and procurement document Specify data collection and data transfer; Specify data retrieval and local data base at monitoring lab.; Specify data quality check and controls; Data base manually analysed data

Mission AQ4

November 1996, Bjarne Sivertsen The aim was to finalise the annual report and to establish the plans for the second phase of EINT. The visit in November also

contained a continued selection of representative monitoring sites, and the first working group meeting. The objectives of this visit included the following tasks referring to the work programme activities; Prepare background for air quality monitoring working group, and conduct the first working group meeting, Finalise job descriptions for air quality monitoring lab. personnel, and support the development of contracts, Select representative monitoring sites for A.Q measurements with special emphasis on improving the sites selected in Cairo, Discuss and perform a final selection of sites for meteorological measurements, included a meeting with the Egypt Meteorological Service, Input to future activities, Discuss and assist in supporting equipment and tasks for the reference laboratory; air pollution part.

Mission AQ5

04 April-27 May 1997. Bjarne Sivertsen, Task Manager. repeated the siting studies for Cairo, Alexandria, Delta and Canal area due to change of Monitoring Institutions.

Mission AQ6

23 May- 6 July 1997. Leif Marsteen, Monitoring Specialist participated in part of the siting studies and started preparing instruments for installations and Standard Operation Procedures (SOP) for the first monitoring stations.

Mission AQ 7

1 September-9 December 1997. L Marsteen and B Sivertsen (from 15 October). Marsteen prepared and started the first installations together with the team leader counterpart Dr Nassar. The first air quality monitoring station at Tabbin Institute was opened by the Minister of Environmental Affairs on 27 October 1997. The siting studies in Upper Egypt were finalised. Time schedules and preparation for further installations and plans for Phase 3 were developed.

Missions 1998

Three expatriate missions were conducted during 1998. The expatriate staff for Phase 3 included the Task Manager, Bjarne Sivertsen and Monitoring expert Leif Marsteen, the chemical analysis expert Oddvar Royset and the instrument expert Rolf Dreiem. The missions are listed below, where "AQ" stands for Air Quality.

Mission AQ8

3 February to 12 May 1998 for Leif Marsteen 16 March to 12 May 1998 for Bjarne Sivertsen. L Marsteen installed stations and prepared the SOP manuals, B Sivertsen continued the siting studies for Cairo, Alexandria, Delta and Canal area prepared quarterly reports and continued the training of local experts.

Mission AQ9

The ninth mission to Egypt was undertaken in October -December 1998. The work included the preparations, establishment and start up of monitors, on-the-job training, training in chemical analyses, data evaluation and reporting and passive sampling. Monitors and samplers are being checked and installed in Cairo and in Alexandria.

Mission A10

The tenth mission was undertaken by Oddvar Royset in October 1998. O Royset, who is responsible for chemical analyses of all types of samples, undertook training at the Monitoring Laboratory at CEHM. Training for preparation of filters and analyses was undertaken. SOPs, manuals and local databases for the laboratory activities were prepared and presented during the mission

Missions 1999

Mission AQ11

The 11th mission to Egypt covered the period 21.2- 4.3. 1999. Senior scientist Oddvar Røyset undertook the mission in co-operation with AQ Task Manager Bjarne Sivertsen. Oddvar Røyset, chemical analysis expert, performed the focused towards the follow up of the methods implemented during Mission 10. The work included on the job training of the staff at the Centre for Environmental Hazards and Mitigation (CEHM) at the Cairo University and the Reflab. Water at Ain Shams University and NIS. The follow up work included training included sampling and chemical analysis methods for NO_2, SO_2, TSP, PM_{10}, passive sampling (NO_2, SO_2) as well as a method for collection of dust-fall from the air. New training included implementation of a method for determination of lead in air, based on EPA-procedures, and on quality control and data storage procedures.

Mission AQ 12

The twelfth mission to Egypt was undertaken in February –May 1999. The Air Quality Monitoring Team consisted of Task Manager B Sivertsen, EEAA Counterpart Haytham Ahmed, and instrument experts Rolf Dreiem. Leif Marsteen. The work undertaken during the winter and spring of 1999 included the preparations, establishment and start up of monitors, on-the-job training, training in chemical analyses, data evaluation and reporting. A comprehensive amount of time was spent with the Monitoring Institutions to undertake training in data evaluation, data statistics and reporting.

Further site studies were undertaken, as the component again, for the third time, had a change in counterpart. The new counterpart, Mr. Haytham Ahmed, has no experience in the field of air pollution, and training and education was implemented every day during each operation.

An intensified installation programme was designed, and instrument check, calibration and preparation were performed prior to installation and training. On-the-job training continued as part of the installation programme.

Mission AQ 13

This mission number 13 to Egypt lasted from 1 September 1998 to 4 July 1999. The main responsible for this Mission was Rolf Dreiem (instrument expert). The objective was to prepare and install monitors and samplers in field. Also a considerable amount of the time was spent training field operators at Centre for Environmental Hazard Mitigation (CEHM) at Cairo University and Institute for Graduate Studies and Research (IGSR) at Alexandria University.

Mission AQ 14

Leif Marsteen undertook Mission 14 in June 1999, and was supported by Rolf Dreiem who had been in Egypt for 10 months. The work included preparation of Standard Operations procedures (SOP), updating existing SOPs, check calibration procedures and meet NIS to prepare Audits to the sites.

Mission AQ 15

The 15th mission to Egypt was undertaken in October to December 1999. The team consisted of Bjarne Sivertsen, Leif Marsteen, Ove Hermannsen and Rolf Dreiem. The work undertaken during the autumn of 1999 included training, final preparations of stations, data retrieval and data base testing, as well as QA/QC developments and reporting of various kinds.
A comprehensive amount of time was spent with the Monitoring Institutions to undertake training in data retrieval, data evaluation, data statistics and reporting.
One site study was performed in Alexandria to identify a new site for the measurements in the city centre.
Air pollution episodes were identified in Cairo and reported in several memos.
A presentation of the EIMP/EEAA air quality monitoring programme was prepared the "Environment 99 International Conference and Exhibition" in Cairo. A paper was presented at one of the sessions and the air quality monitoring programme had its own stand at the exhibition.

Mission AQ 16

Ove Hermannsen of NILU was responsible for Mission 16. The main objectives were to prepare, train and install the VOC sampling equipment and analyses procedures at the Chemical laboratory at CEHM, Cairo University.
The new sampling techniques as well as analyses and SOPs for VOC sampling were prepared. Due to a complete shift of staff, as well as instrument problems at the laboratory, the work could not be finalised during Mission 16. Anothyer visit will finalise the work, when the staff and equipment at CEHM is ready.

I.2.3

EIMP

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Memo

To: JFS, AAE, MF
From Bjarne Sivertsen
Date: 6 March 2000

Air Quality Forecasting and Early Warning Systems based upon the EIMP Monitoring Programme

Introduction

Millions of people in Cairo have experienced very high levels of air pollutants during so-called air pollution episodes, which have been recorded in Cairo as a result of specific meteorological conditions. The weather conditions together with air pollution from several ground based sources, such as traffic, open-air waste burning and a large number of small enterprises releasing air pollutants near the surface, created these episodes.

Meteorology and smog

The main reason for the smog like episodes experienced by a large part of the Cairo population, are to be found in adverse weather conditions with low and variable winds, high humidity and a strong temperature inversions. The inversions may be ground based (as in the October 1998 episode) or formed some hundred meters above the surface by subsidence in the air mass (as in the October 1999 episode).

The episodes are often connected with high-pressure areas situated on the Delta or in the Mediterranean Sea. They also seem to occur most often in the late autumn from October to November.

Can we avoid the smog episodes?

Air pollution episodes have been recorded in the Cairo area at several occasions. The episodes have different physical properties and are caused by different combinations of weather and air pollution sources.

To avoid the effects of such episodes on the population, both the weather conditions and the sources have to be fully understood. The weather can not be controlled, but may be predicted and forecasted. The pollution sources can be controlled.

Forecasting the episodes

Several countries in Europe and in the industrialised world are presently developing a tool for monitoring, forecasting and regulating the air pollution in large cities. The basis for these forecasting procedures may be based upon pure statistical data and weather forecasts, or even better upon a combination of local and micro meteorological prognostic models combined with air pollution dispersion models. These tools will help the population to receive better information, not only about the present environmental conditions, but also about tomorrow's pollution levels.

The EEAA/EIMP Air Quality Monitoring programme represents an excellent starting platform for developing such an environmental information system.

Air pollution forecast models

An improved modelling system for air pollution forecasting is being developed in Norway as a result of Governmental and European requirements. The new models involve a combination of numerical forecast models and numerical air pollution dispersion models. The development is a co-operation between Norwegian Institute for Air Research (NILU) and the Norwegian Meteorological Institute (DNMI).

Typical for many urban areas are the topographically complex surroundings with rather complicated wind patterns and local/mesoscale circulations. This lead to the necessity of enabling weather forecast modelling on a very fine scale compared to the normal synoptic scale weather prediction models. For the development undertaken in two different cities the grid size selected is 1 km.

The development of the MM5 model is a continuation of a development that started at NCAR (USA) in the seventies. The PSU/NCAR mesoscale model is a limited-area, hydrostatic or non-hydrostatic, terrain-following sigma co-ordinate model designed to simulate or predict mesoscale and regional-scale atmospheric circulation. It has been continuously improved by contributions from users at several universities and government laboratories. The numerical weather forecast model giving input data to MM5 is the HIRLAM50 model with 50-km or 10-km resolution.

The weather prediction models are estimating three dimensional wind and turbulence fields which are then fed into the NILU "Episode" air pollution dispersion model.

Model evaluation

The first results of model evaluations undertaken in two urban areas of Norway indicate that the estimated wind fields as well as temperature inversions and turbulence seem reasonable. The estimated concentrations of NO_2 are slightly less that those measured. Some of these artefacts may be due to the handling of background ozone. PM_{10} concentrations also are often measured higher than the model estimates. The model is being tested against measurement data, and will be

the basis for undertaking forecasts and measures to reduce air pollution in the urban areas.

The forecast models in operational mode

The forecast models will mainly be operated during periods of expected high concentrations ("episodes"). They have been operated in Oslo since November 1999. However, this winter had, so far, no periods in which it has been necessary to undertake any actions.

Future use of the EIMP data

The main objective of installing a modern air quality monitoring and surveillance platform in a major urban area such as Cairo has been to enable direct data and information transfer and to enable fast information to the Authorities and to the public. The EIMP programme was designed to:

- Identify the impact to the population,
- Specify the levels of pollution relative to the limit values given in Law no. 4,
- Establish a basis for identifying the most important polluters as well as giving input to an abatement plan in the future.

In line with awareness and the strong focus on our environment the modern environmental monitoring and surveillance systems have also become information systems that can provide relevant information at different levels about the state of the environment, quickly and precisely. The systems combine the latest sensor and monitor technologies with data transfer, data base developments, quality assurance, statistical and numerical models and advanced computer platforms for processing, distribution and presenting data and model results.

To fulfil the need for optimal abatement planning and air pollution forecasting it will be necessary to start the development of air pollution dispersion models for Cairo. An important part of this development will be to undertake emission inventorying. Geographical Information Systems (GIS) are important tools, particularly for the presentation of data but it has also made it possible to obtain fast information on population exposures, which has become the main indicator for regulating air pollution sources.

Another requirement in the regulating process has been the possibility of performing forecasts. These models are presently being developed and tested in Norway, and seem to represent a promising future in air pollution legislation and control.

I.2.3 b)

Environmental Information and Monitoring Programme

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Egyptian Environmental Affairs Agency
Dr. Ahmed Gamal
Head of Env. Qual. Dep, EEAA
30 Misr Helwan Agricultural Road
Maadi, Cairo

Date
08 February 2000
Our ref.
27776/JFS/jfs

The OPSIS Surveillance, Forecasting and Planning System.

Dear Dr. Ahmed.

After the presentation by Mr. Hakan Törnevik on 07 February of the above system, I would like to present the following assessment of the system:

The OPSIS-system appears to be an excellent ***planning tool*** for prediction of the air quality in a planning situation. The system can be applied for estimating the consequences concerning the air quality of various mitigation measures. For example what would be the improvements after stopping the garbage burning in the streets, after establishing filters on the stacks or after reducing the emission from the traffic.

The air quality data collected by EIMP concerns the ambient air, and it is possible on the basis of the EIMP data to estimate the pollution contribution from the various sources. Thus, the OPSIS system combined with the EIMP monitoring system and the GIS tools that have already been provided by both EIMP and EEIS would make an excellent ***planning tool*** for both EEAA and the political decision makers.

However, what we need at moment is an ***early warning system,*** and the OPSIS system does not meet the requirements of an EWS. In order to establish an EWS we need a reliable ***weather forecast model.*** As mentioned at the meeting a crucial item of an early warning system is knowledge about the expected weather conditions. With reference to the episodes in Cairo late October last year - and also late October 1998 - the only difference from the usual or normal situation was the extreme weather conditions, as stated in the various notes prepared by Mr. Bjarne Sivertsen.

Conclusion: The OPSIS system is an excellent planning tool, that might well be used by EEAA for planning purposes. To meet the urgent needs for an EWS, however, we need a reliable weather forecast model to be combined with the

EIMP air monitoring data, and the OPSIS system alone ***will not meet our immediate requirements.***

Yours sincerely,

Jorgen F. Simonsen
EIMP Project Manager

I.2.4

EIMP

Minutes of Meeting

Date: 8th April 2000

Place: EIMP Office

Participants: Jorgen Simonsen (JFS), Ahmed Abou Elseoud (AAE), Mohamed Fathy (MF), Heba Fathy (HF), Arne Jensen (AJE), Jacob Andersen (JAA), Mohamed Zaki (MZ) Mai Ahmed (MEA), Shabrawi Mahmoud (SMI), Hossam El Shakhs (HS), Ayman El-Maazawy (AEM), Haytham Ahmed (HAA), Rolf Drieim (RD), Naglaa Darwish (NMD, Ole Haslund (OHH), Bjarne Sivertsen (BS), Lydia Kiriakos(LSK) , Mohamed Ali (MAS)

Prepared by: LSK **Reviewed by:** MF

Distribution: EIMP Staff

Environmental Information
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Component	Task Description	Time	Person
1- Institutional Support			
	Study the requirements to finalize the air database problems (SQL version);	This week	MZ
	Try to solve some of the air database problems;	This week	HS
	Prepare SOPs for the equipment database QA;	This week	AEM
	Update the equipment database;	Monthly	AEM
	Receive EIMP computers that have been upgraded;	This week	AEM
	Discuss the required software licences to purchase;	To day	MZ & JAA
	Give a printout of the updated equipment database to the counterparts for review;	This week	AEM
	Update EIMP web site; and	Monthly	MZ
	Update EIMP brochure and give it to the management for review.	ASAP	Counter-parts
2- Coastal Water Monitoring			
	Review SOPs submitted by NIOF & IGSR;	This week	AJE & MEA
	Follow up the release of reference material from the customs by TNT;	This week	SMI
	Submit minutes of meetings held at IGSR & NIOF to both institutes & EIMP management;	This week	SMI
	Confirm with NIOF the dates for delivering Phase 2 reports; and	This week	SMI
	Discuss the CWDB.	10 May	Data gmt & CW

3- Air Pollution Monitoring	• Finish rennovation of Alex stations(El Max, IGSR regional,Gheat El Inab, El Azafra);	This week	Contractor
	• Continue evaluating 1999 data and preparing for EEAA annual report;	This week	HF & BS
	• Continue preparing the monthly air quality report for February;	This week	HF
	• Continue arranging for the installation of PM_{10} airmetrics boxes and samplers;	This week	HAA
	• Submit the annual air quality draft report;	This week	IGSR & CEHM
	• Continue inspection of monitoring sites;	This week	RD
	• Move the shelter from Cairo to Abou Keir station;	This week	HAA
	• Continue preparing the Newsletter;	This week	HF & BS
	• Arrange for connecting the telephone line to Maadi station;	This week	HAA
	• Continue preparation of the air quality network catalagoue; and	This week	HAA
	• Follow up connecting the telephone line to El Mahala station.	This week	HF
4- Reference Laboratories	• Follow up on the prerequisites for the auditing mission in May;	This week	MEA
	• Arrange with Ain Shams for supporting IGSR in the use of the autoanalyser;	This week	MEA
	• Comments on the calibration report provided by NIS;	This week	RD
	• Submit P.T.#11 preliminary report;	This week	Ain Shams
	• Arrange with Ain Shams for Estelle's mission in May;	This week	MEA
	• Visit Ain Shams & NIS;	10 &11 May	Danida mission
	• Check the new gas cylinder required by CEHM for NIS to place an order;	This week	BS
	• Plan for 2 days consultancy for NIOF Alex;	This week	Ain Shams
	• Prepare a plan for auditing Alex. stations; and	This week	NIS
	• Deliver some consumables for both Reflabs.	This week	MEA

I.2.5

Weather Observation

A. Surface Stations
B. Upper-Air Stations
C. Observation network for the Agriculture purposes
D. Radiation Stations Network
E. Ozone Stations Network
F. Marine Stations Network
G. Hydrological Stations Network
H. Air Pollution Stations Network

The atmospheric science is known as " Meteorology " mainly to express that the basis of the work , studies and researches in this field depends on the high precision of observing the weather changes horizontally , vertically and its evolution. So , the local and inernational weather observation stations are considered as the basic milestone in presenting the data used in the meteorological field and its applications.

The general meaning of the word " meteorology " is the description and definition of the weather situations with its different elements such as temperature , wind humidity , pressure and the weather phenomena for all the atmospheric layers from the earth's surface to approximately 30 kilometers height , in addition to determining the weather phenomena that prevail at the time of observation as mist , clouds , storms of different kinds , horizontal visibility ranges and quantities and types of clouds .

The observation stations are classified into the following kind:

A. Surface Stations :

These stations observe the atmospheric elements and weather phenomena near to the earh's surface once every hour or half an hour in the international airports or when changes in the weather situation require the issuing of warnings.

in addition to the routine observation works , some stations measure other specific elements to serve certain fields as the agro-meteorology , civil and military aviation , and air pollution in addition to some other stations that serve the society and environment . The surface stations network in Egypt consists of 103 stations distributed all over the country .

Automatic Observation Station

Balloon Sounding

B. Upper -air Stations :

These stations release special kind of balloons carrying certain instruments (radiosond) to measure the weather elements in the different atmospheric layers twice daily at every location .

Usually the number of upper air stations is limited due to the high costs of the establishment and operation of these stations .

In Egypt , there are four upper air stations in Helwan , Matrouh, Aswan and El - Arish . The number of these stations will be increased in the coming few years by adding three new stations . two of them will be installed in the Western desert of Egypt and the third will be in Hurguada at the Red sea coast .

C. Observation network for the Agriculture purposes :

These stations measure the weather elements which are required for agriculture researches , like the soil temperature in different depths , in addition to solar radiation , air temperature and evapotranspiration. these stations are established in the rural areas in coordination with the Ministry of Agriculture .

Assiout Agriculture Station

D. Radiation Stations Network :

These stations observe different radiation elements as the direct radiation . Some recording instruments are used to record the data which are used for the applied researches .

E. Ozone Stations Network :

These stations observe the Ozone quantity n the atmosphere . They are located according to agreement with WMO in certain countries in the world . Two stations of this network are located in Cairo and Aswan .

F. Marine Stations Network :

These stations observe the weather elements in the marine areas including water temperature for different depths , ocean currents , water salinity , height of waves in addition to the regular weather elements .

G. Hydrological Stations Network :

These stations observe the weather elements in the water resources areas as the lake of High Dam . the evaporation measurements are taken in these areas , in addition to other weather elements .

Floating Observation Station At Nasser's Lake

H. Air Pollution Stations Network :

I.2.6

Air Pollution Episodes

EIMP
Environmental Information& Monitoring Programme

5 March 2000 Newsletter #4, Air Quality, Issue 2

The EEAA/EIMP Air Quality Monitoring Programme

A total of 40 measurement sites are being operated covering Egypt from Damietta in the north to Aswan in south.

- 14 sites in greater Cairo
- 7 sites in the Delta
- 6 sites in Alexandria area
- 3 sites in Canal area
- 9 sites in Upper Egypt
- 1 site in Sinai

The measurements cover:

- Industrial areas
- Urban areas
- Streets and road sides
- Residential areas
- Regional / background

Data are reported continuously on a daily basis and weekly to the monitoring centres at CEHM, Cairo University and at IGSR University of Alexandria.

Air Pollution Episodes in Cairo

Air pollution episodes have been recorded in Cairo at the end of October 1998, October 1999, and on November 1999, as a result of certain meteorological conditions combined with air pollution created by several ground based sources.
Typical for all episodes are the low wind speed and the formation of temperature inversions.
During these episodes, the monitors in Cairo recorded high concentrations of pollutants such as PM_{10}, SO_2, NO_2.

During the episode which occured in November 1999, very low wind speeds, less than 1m/s, were recorded during the afternoon at stations inside and south of Cairo. It was noticed, as shown in the picture, that a dark layer of pollutants was observed under about 300 m above the surface. The high level of pollutants covered large areas of Cairo.

Meteorology & Smog

During the air pollution episodes, the most important parameters influencing the rate of dilution of the air pollutants in the atmosphere are the wind speed and atmospheric stability.
During the October 1998 episode, the inversion layer was created at the surface due to radiation of heat from the ground combined with low and variable winds, this created high concentrations of pollutants at the surface.
On 23 October 1999, a high-pressure area was situated north of Egypt with its center in the Eastern Mediterranean, giving rise to a slowly movement of humid air from the north-east across the Delta into the Cairo area. Subsidence of air in the high pressure caused the formation of a temperature inversion in the lower atmosphere, which created a "Ceiling" on the Cairo air mass. Under this ceiling the wind speeds were decreasing during the afternoon to near calm conditions.

Can we avoid Episodes ?

The Air Pollution episodes have different physical properties and are caused by different combinations of weather and air pollution sources.
How can we avoid the effects of such episodes on the population in a best practical way?
The weather can not be controlled, but may be predicted and forecasted.
From forcasted weather and wind it will be possible to forecast the air pollution, and give an early warnings to the public.
Different sources of air pollution are the main reasons that Cairo occasionally experiences very high concentration levels of pollutants.
Some of the important sources are the traffic, open-air waste burning, and a number of small enterprises and industries releasing air pollution close to the surface.
Some of these may not even comply with the law and regulations concerning emissions to the atmosphere.

The EIMP is implemented by the Egyptian Environmental Affairs Agency (EEAA) with support from the Danish International Development Assistance (DANIDA)

Dust Storms in Egypt

EIMP
Environmental Information& Monitoring Programme

11 April 2000 Newsletter #5, Air Quality, Issue 3

The EEAA/EIMP Air Quality Monitoring Programme

A total of 40 measurement sites are being operated covering Egypt from Damietta in the north to Aswan in south:

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Data are reported continuously, on a daily basis and weekly to the monitoring centres at CEHM, Cairo University and at IGSR University of Alexandria.

High concentrations of PM10 caused by high wind speeds

In the newspapers in Cairo we could read that "A sandstorm closes Alexandria and clouds Cairo. A violent dust-laden wind accompanied by cold air hit Cairo on 23 March 2000, turning the Egyptian capital into a ghost city and causing low visibility on main roads leading to and out of the city."

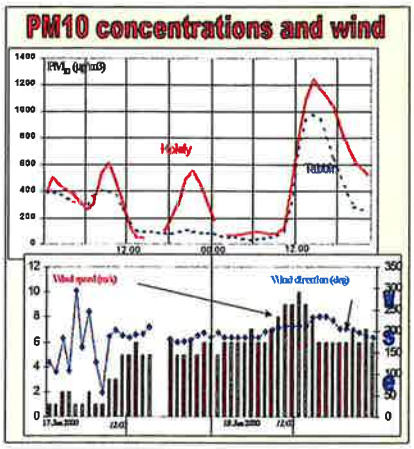
Ambient concentrations of suspended particles measured as TSP (total suspended particles) or PM_{10} (particles less than 10 micron) are frequently exceeding the limit values as stated in Law no. 4 of Egypt. At some sites in Cairo the Air Quality Limit values are exceeded during more than 90 percent of the time. Concentrations at more than 10 times the Air Quality Limit values have been recorded at some sites.

Some of this dust is man made, originating from open-air waste burning, traffic sources, such as diesel buses and from industries. Suspended dust is also being emitted to the atmosphere by high winds generating clouds of dust in the dry dessert areas surrounding Cairo.

Very high concentrations of dust occurred in the Cairo atmosphere on 18 January 2000 and on 23 March 2000, as a result of high wind speeds and front passages.

Observations of PM_{10} and winds are presented for 17 and 18 January 2000 in the figure.

On 17 January we observed typical levels of PM_{10} at Kolaly (in the city centre of Cairo) and at Tabbin (an industrial site south of Cairo). The wind varied from around south starting at 1 to 2 m/s, increasing in the afternoon to 5-6 m/s. The PM_{10} concentrations ranged from 100 to 600 µg/m3. During the morning of 18 January we observed high wind speeds at Tabbin at around 6 m/s with surprisingly low concentrations of PM_{10} at both sites. This pattern was exactly the same on 23 March, and may be due to clean air passing Cairo during the cold front passage.

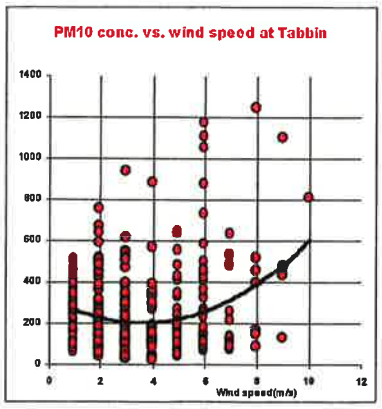


Before noon on 18 January the wind speed increased to 8-10 m/s, and a dense cloud of dust moved in to Cairo from around south west. The PM_{10} concentrations at both measurement sites increased suddenly to reach between 1000 and 1200 µg/m3.

A more closer investigation of the PM_{10} concentrations at Tabbin as a function of wind speeds for the whole month of January 2000, illustrates the importance of two main source types; the industries (or human activities) and the wind blown dust.

At low wind speeds, less than 2 m/s, the PM_{10} concentrations ranged around $300 \pm 200 \mu g/m^3$. This impact is mainly due to industrial activities in the area. At around 4 m/s the average PM_{10} concentrations decreased to 200 $\mu g/m^3$ due to a better dilution of pollutants in the atmosphere. When the wind speeds increased to 8 to 10 m/s the PM_{10} concentrations again increased to more than 600 $\mu g/m^3$. This is clearly dust generated by wind action in the dry areas.

To investigate the relative importance of man made sources of dust relative to "natural sources" further investigations will have to be undertaken at several sites in Egypt. A re-evaluation of the use of the Air Quality Limit value for PM_{10} in Egypt may have to be discussed based on the findings showing that wind blown dust play an important role in thye general level of suspended dust in Egypt.



The EIMP is implemented by the Egyptian Environmental Affairs Agency (EEAA) with support from the Danish International Development Assistance (DANIDA)

SO2 levels in Cairo

EIMP
Environmental Information& Monitoring Programme

15 April 2000 Newsletter #6, Air Quality, Issue 4

The EEAA/EIMP Air Quality Monitoring Programme

A total of 40 measurement sites are being operated covering Egypt from Damietta in the north to Aswan in south:

- 14 sites in greater Cairo
- 7 sites in the Delta
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- 3 sites in Canal area
- 8 sites in Upper Egypt
- 1 site in Sinai

The measurements cover:

- Industrial areas
- Urban areas
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- Residential areas
- Regional / background

Data are reported continuously, on a daily basis and weekly to the monitoring centres at CEHM, Cairo University and at IGSR University of Alexandria.

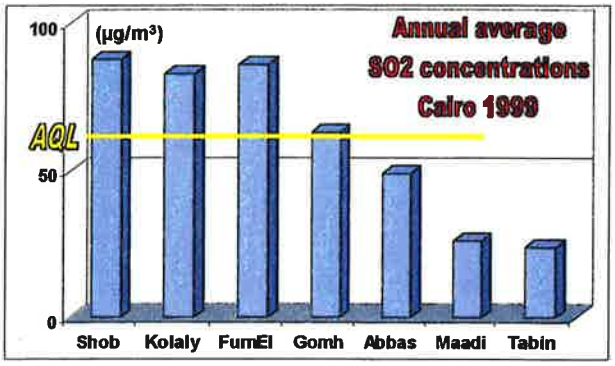
SO2 concentrations exceeded the Air Quality Limit values in Cairo

Observed concentrations of sulphur dioxide (SO_2) exceeded the Air Quality Limit value for Egypt at all measurement sites in the city centre of Cairo during 1999. The limit value as given by Law no. 4 is 350 µg/m3 as a one-hour average, 60 µg/m3 as an annual average concentration. Even the annual averages are exceeded at 4 sites in the city centre of Cairo.

Sulphur is generated by burning of fossil fuel and by some of the open-air waste burning inside Cairo. A number of small industries have been observed burning rubbish, tires and mazoot. Hundreds of small private industries including a number of smelters contribute in this way to an undesirable high pollution level, giving rise to potential health impacts. Also diesel buses contribute to the high levels of SO_2 in the streets of Cairo.

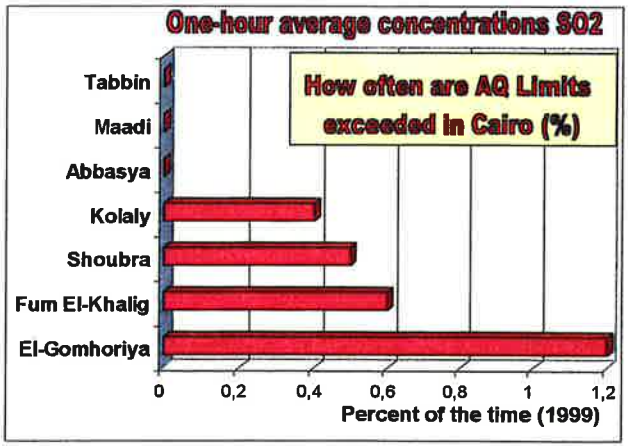
The annual average concentrations of SO_2 exceeding 60 µg/m^3 (the Air Quality Limit value) were found at 4 of the 8 monitoring sites for SO_2 in Cairo. At Fum El-Khalig, El-Gomhoriya and Kolaly diesel buses are suspected to represent the major sources for SO_2.

At Shoubra ElKheima the large number of industrial sources are the main contributors.



Short-term one-hour average concentrations of SO_2 are also exceeded at 4 of the monitoring sites in Cairo. The limit value of 350 µg/m^3 was exceeded more than 1 % of the time at El-Gomhoriya Street. At the industrial site at Shoubra ElKheima the one-hour average SO_2 concentration limit was exceeded 0,5 % of the time, which corresponds to more than 40 hours during the year.

At the city centre sites exceeding of 500 µg/m^3 of SO_2 measured as one-hour averages were observed at 3 of the sites. Many of these highest concentrations were observed during air pollution episodes in Cairo.



The EIMP is implemented by the Egyptian Environmental Affairs Agency (EEAA) with support from the Danish International Development Assistance (DANIDA)

I.2.7

EIMP

Environmental Information and Monitoring Programme
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Memo

To: M. Zaki, JFS, AAE, MF, HAA, HF
From Bjarne Sivertsen
Date: 1 April 2000

The Web page onAir Qualiy
EIMP air quality measurement programme,

The air quality Web page will have additional information compared to the existing, and should be re-organised.
This is normally the responsibility of the Web master. However, I can just indicate the following modifications.

Air Quality

- a general statement on the air
- quality monitoring programme

. A total of 40 sites covering all Egypt have been selected for measurement of various air pollutant. An additional 10 to 20 sites will be used for simplified passive sampling of SO_2 and NO_2.

The measurement network, instruments and data transfer has been established since 1998 and was in full operation since June 1999.

Map of Egypt with overview of measurement sites

Read more about the programme:

- Programme design (see already text on web pa
- More from the existing web…

Air pollution in Egypt

Status after the first year of EEAA/EIMP measurements

Air quality in Egypt- as seen from the EEAA/EIMP programme

Newsletters

- Air quality in Egypt
- Air Pollution Episodes in Cairo
- Dust in the air during high winds

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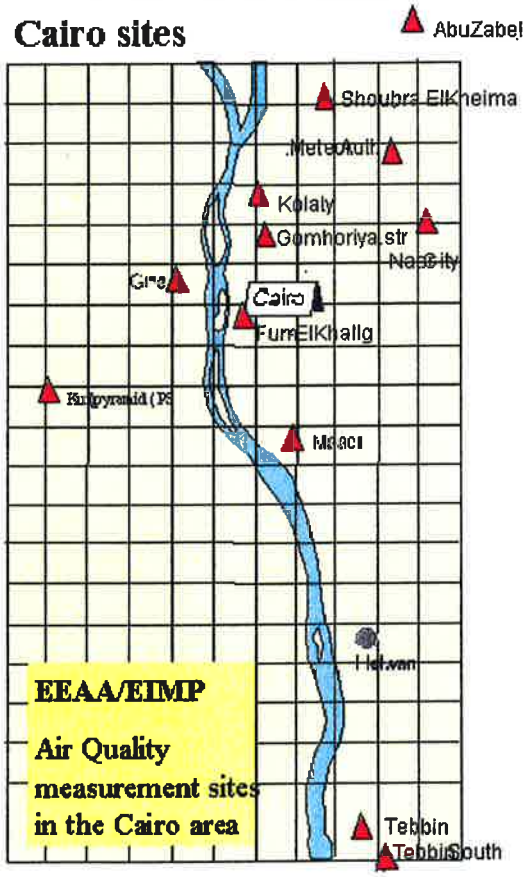
Air Pollution Monitoring

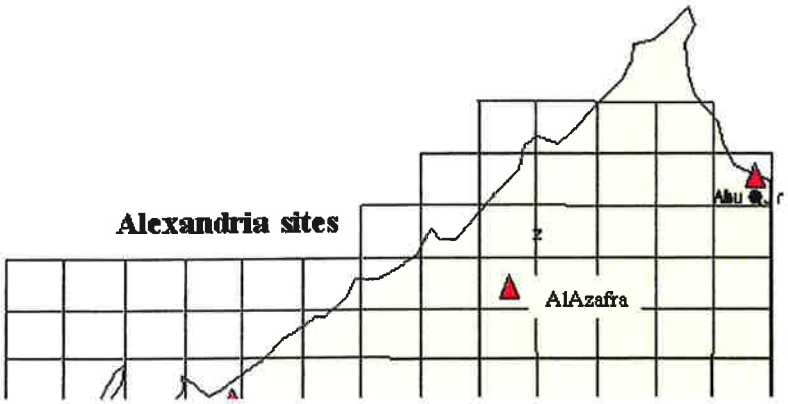
Air quality is measured at more than 40 sites in Egypt.

14 sites in greater Cairo, 7 sites in the Delta, 6 sites in Alexandria area, 3 sites in Canal area, 9 sites in Upper Egypt,and 1 site in Sinai

The measurements cover: industrial areas - urban areas - streets and road sides - residential areas - regional /background

EEAA/EIMP Air Quality Monitoring Sites:





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	NILU PROJECT NO. O-96013
AUTHOR(S) Bjarne Sivertsen and Rolf Dreiem	CLASSIFICATION * A
	CONTRACT REF.

REPORT PREPARED FOR:
COWI/EIMP
EEAA Building, 30 Misr Helwan Street
Maadi, Cairo, Egypt

ABSTRACT
The eighteenth mission to Egypt on the DANIDA EIMP programme included monitoring programme auditing, QA/QC procedures, training and reporting. Monthly and Quarterly air quality data reports were produced and presented. Training in QA/QC operations and reporting was given to the Monitoring Laboratories. Results were reported in Newsletters and a specific training seminar was given on "Understanding air pollution".

NORWEGIAN TITLE
Overvåkingsprogram for luftkvalitet i Egypt

KEYWORDS		
Air Quality	Monitoring	Siting

ABSTRACT (in Norwegian)

* *Classification*
- *A Unclassified (can be ordered from NILU)*
- *B Restricted distribution*
- *C Classified (not to be distributed)*