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DANIDA

EIMP Phasing-out Phase, 2003-2004

End of Mission Report, Air Quality
Monitoring, Mission 01, March 2003

Bjarne Sivertsen



Environmental Information
and Monitoring Programme



Norwegian Institute
for Air Research

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List of Abbreviations:

ASU	:	Ain Shams University
CAIP	:	Cairo Air Improvement Programme
CCC	:	Central Cairo Centre (EEAA)
CD	:	Central Department (EEAA)
CEHM	:	Centre for Environmental Hazard Mitigation
Danida	:	Danish International Development Assistance
DKK	:	Danish Currency Unit
EEIS	:	Egyptian Environmental Information System
EIA	:	Environmental Impact Assessment
EIMP	:	Environmental Information and Monitoring Programme
ESPS	:	Environmental Sector Programme Support
GD	:	General Directorate (EEAA)
GIS	:	Geographical Information System
GOE	:	Government of Egypt
IGSR	:	Institute for Graduate Studies and Research (Alexandria)
NILU	:	Norwegian Institute for Air Research
NIS	:	National Institute for Standardisation
NO ₂	:	Nitrogen dioxide
PM ₁₀	:	Particles with diameter less than 10 micrometer
RDE	:	Royal Danish Embassy
SO ₂	:	Sulphur dioxide
QA / QC	:	Quality Assurance / Quality Control
TA	:	Technical Assistance
ToR	:	Terms of Reference

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1 Introduction

The EIMP component was launched in 1996 with the Egyptian Environmental Affairs Agency (EEAA) as the implementing agency for an environmental information and monitoring programme covering institutional support, coastal waters, air pollution, point sources emissions and the development of reference laboratories for improvement of the quality of monitoring data.

The development objective of the EIMP (1996 - 2001) has been *"To establish detailed knowledge of the ambient air and coastal water quality in Egypt for the relevant authorities to act to improve the ambient environmental quality in Egypt"*. This would be achieved through compilation of high quality environmental monitoring data series, which will constitute the basis for appropriate political actions to be taken.

The EIMP project is funded by Danida and headed by COWI. NILU was as sub-consultant to COWI responsible for the design, installations, training and operations of the national air quality monitoring system for Egypt, to be operated by experts in EEAA. The design, installations and training of the monitoring network were completed covering 42 sites all over Egypt in July 2000. The 19th and last mission was undertaken to Egypt in October 2000. (Sivertsen 2001)

The work undertaken during the Autumn 2000 included training, audits, data retrieval and data base testing, QA/QC controls and reporting of various kind. Most of the time was spent training the different teams in data retrieval, data evaluation, data statistics and reporting. A field study was undertaken in Cairo using a number of passive samplers for measuring SO₂ and NO₂ over the urban area. Several newsletters were prepared and presented.

The EIMP Phasing-out Phase has been formulated to consolidate EIMP achievements, while gradually integrating the EIMP activities and staff into the existing EEAA administrative and organisational structure.

Another objective is to produce relevant data reports on ambient air and coastal water quality as well as input to EEAA's State of the Environment reports in the form of reliable monitoring data in order to provide a sound basis for EEAA policy and decision-making.

During the Phasing out Phase we will also prepare and maintain newsletters, internet web-site(s) and other relevant data dissemination media in order to ensure that EIMP data be made available to a larger segment of society and thus be used

for developing a demand among the wider public for implementation of appropriate environmental policies and regulations

The first Mission during the EIMP Phasing out Phase Air Quality component was undertaken during 1 to 17 March 2003. Responsible for the Mission was Bjarne Sivertsen, who had meetings with the Monitoring institutions, the Reference laboratory and other partners involved in the air quality monitoring programme. People met during the mission are presented in Appendix A.

Some major references to previous presentations and summary reports are given in the Reference list. A complete list of reports prepared during the EIMP 1996-2001 programme is presented in Appendix A.

2 EIMP air quality monitoring after 2001

The air quality monitoring system is presently operating 43 stations all over Egypt with the last station established in Kaha in October 2001. Station Manager and System Manager software for air data management is operating satisfactorily as is the equipment, which is maintained by CEHM.

From the EIMP Phasing-out Phase, 2003-2004, End of Mission Report, Institutional Support, Mission 01 report it was stated that:

”Out of a total of some 60 monitors, 4-5 are currently taken in for repair meaning that the overall operational efficiency of the equipment is in the order of 90% which is considered very satisfactory.”

The following conclusions were presented at the end of the consolidation phase:

C 1: Design monitoring programmes

Design of the monitoring network is completed covering 42 sites all over Egypt. A new site at Qalubya (Kaha) has been decided.

C 2: Procurement and installation of equipment

Procurement of equipment is completed. However the automatic (permeation tube) calibration of equipment is costly and EEAA wish to shift to calibration by use of external gas cylinders which is considerably less expensive to operate

C 3: Establish databases, data transfer system and presentation formats

The development and installation of data transmission software and hardware are completed.

C. 4: Training needs assessment and training of staff

It should be stressed that there is a need for up-grading the technical or engineering expertise within EEAA in order to be able to supervise the work of the monitoring institutions. Concerning this issue the EEAA counterparts are very junior and have also changed considerably over the past phases.

C 5: Establish QA/QC procedures

A QA/QC system is documented and being implemented. The reference laboratories regularly monitor the monitoring institutions as well as the monitoring stations.

C 6: Undertake ambient air monitoring programme

The programme has been fully established.

3 The Monitoring programme, 2003

The following research institutions are contracted to undertake the air quality monitoring work:

- Institute for Graduate Studies and Research (IGSR), Alexandria,
- Cairo University, Centre for Environmental Hazard Mitigation (CEHM), Cairo,
- National Institute of Standardisation (NIS), Cairo.
- Ain Shams University (ASU), Cairo,

Meetings were held with the monitoring institutions at Cairo University, CEHM, and with Alexandria University, IGSR to update the status of the monitoring programme.

We also participated in a seminar on Audit programme results given by NIS.

3.1 CEHM monitoring status

The objective of the meeting was to go through the air quality monitoring programme with all operators present. A summary of the meeting is presented in Appendix B1. The status report as presented by Dr Tarek ElAraby is presented in Appendix B2.

Site status, instrument status and failures as well as the operations of the programme was discussed.

The list of status for each station has been prepared by Dr Tarek, and is attached the memo. Some major conclusions are presented in the Programme status report, Appendix B2.

Several NO_x monitors have been taken to the calibration laboratory at CEHM because of errors. Most of them are missing the cooler. This spare part has been ordered from CTS 3 months ago. Seven monitors were observed for service at the laboratory.

3.2 IGSR monitoring status

Meetings with the staff at IGSR were held on 9 and 10 March 2003. First of all it is worth mentioning that the staff of experts that had been trained to undertake the EIMP measurements in Alexandria and in the Delta has not changed. The same staffs are still operating the system, which has been important for keeping up the quality of the measurement programme.

Some problems leading to periods of missing data were observed. Some of these examples are:

- Meteorological data were missing due to translator problem from October 2002 till 6 March 2003.
- AirMetrics problems has lead to that observed concentrations ranging higher than the Hi-vol samplers
- NOx monitors are out of operations due to coolers missing from the spare part storage. Orders from CTS have been delayed and the problem is general for the whole EIMP programme
- Some of the shelters need urgently repair due to leakages from corrosion problems

Some proposals for changes to the monitoring programme were discussed. For further details see Appendix C1.

In a meeting with Prof. Dr. ElRaey we summarised the measurements carried out at IGSR. We also discussed possible changes in the programme, which will have to be discussed with EIMP/EEAA. These inputs will also be valuable in the evaluation of the design of a future national air quality monitoring programme for Egypt. For further details see Appendix C2.

3.3 Sequential samplers

The SO₂ concentrations reported by the sequential samplers have been reported very low, especially in areas with high dust concentrations (e.g. cement factories in Helwan). These low concentrations have been reported both from CEHM and from IGSR.

A study was undertaken by IGSR in 2002, based on measurements during one week comparing SO₂ concentrations from monitors with simultaneous measurements using sequential samplers. From these measurements it was concluded that the sequential sampler concentrations were about 77 % of the concentrations obtained with the SO₂ monitor at Kafr El-Zayat. For more information see Appendix D.

We will have to find out the reasons why the impregnated filters show so low concentrations. The analyses carried out by the ion chromatographs seem to be under control. Further investigations are to be undertaken as indicated in Appendix D2.

3.4 VOC sampling

Some samples of VOC have been collected by CEHM. The VOC sampling programme has been delayed due to personnel problems at the laboratory at CEHM. Also the instruments were not properly prepared.

We have, however, not yet seen the results of the few samples of VOC that have been collected. Both CEHM and IGSR have been asked to go ahead and collect samples and start analysing these. NILU will evaluate the results, and methods for presenting these data will be presented at the next seminar.

3.5 Meteorological data

The wind directions at some sites (Tabbin and Aswan) are showing too small range in directions. This problem will have to be looked into. Some sensors may have to be changed. Training on Met sensors maintenance, repair, and calibration will be taken into consideration during the next visit of Mr. Rolf to Egypt.

Calibration kits for the Met-one sensors are available at the CAIP programme. We will approach the CAIP programme responsible to use this equipment for calibrations for the EIMP met stations if this is possible. The meteorological measurements in the greater Cairo area will have to be co-ordinated. The measurements at Kaha were already discussed and CAIP will remove their station in this area.

3.6 Upgraded calibration system

The original site calibration system was based on the use of permeation tubes. This system has proven instable and the lifetime of the tubes varied, leading to a large consumption of such tubes.

NILU proposed and the end of EIMP 1996-2001, phase 1, to use travelling standard gas cylinders for the field calibration instead of permeation tubes. This transfer has been discussed and proposed at the end of the consolidation phase. It has been approved by the project management and was about to be ordered during the first Mission (March 2003).

The by far cheapest solution is a UK supplier, which with a promised discount of 20%, can keep the necessary delivery within the budget of 375,000 DKK provided by Danida. Consultations between COWI and Danida in Copenhagen and the RDE in Cairo have confirmed that the funds are available and can be disbursed through the ESP.

The EIMP staffs have been informed about this and the go-ahead for up-dating the quotation and implementing the procurement has been given. However, the discussion about local suppliers and the experience from previous deliveries postponed the order.

4 Reference Laboratory

4.1 Audit programme

Audit programmes are now being performed on a routine bases, and a schedule for these Audits have been made available to the Monitoring Institutions. It is important that the site visits from the Reference Laboratories are communicated with the field operators to avoid visits to sites where instruments are down due to malfunctions or major errors at e.g. air conditioning units.

A seminar to present the results of Audits conducted in 2002 was called at NIS on 1 March 2003. Dr Adel B Shehata (Quality Manager at NIS) presented the conclusions from the Audit to air quality monitoring stations during the last 3 months of 2002. He stated that after the end of the fifth year of operations of the EIMP programme much experience had been gained. For further details of this seminar see Appendix E1.

4.2 Proficiency test

The Reference Laboratory at Ain Shams University has also performed some simple proficiency tests. Synthetic samples on filters of lead and SO₂ were given to the chemical laboratory at CEHM. The results have been presented.

The last proficiency test has indicated that the SO₂ analyses performed by CEHM are systematically about 13 µg/m³ higher than those specified by Ain Shams. The question about possible contamination of SO₂ as “background” on blank filters has been raised. This issue will have to be solved, and Ulla Lund is going to audit the Reference Laboratory before any other action is taken at CEHM.

4.3 Gas cylinder leakages

In the meeting at NIS for presenting the Audit results the question of leakages or quickly falling pressures in standard gas cylinders was raised. The problem of leakage from the primary and travelling standard gas cylinders delivered by Linde was later discussed in several meetings. The pressure at one of the SO₂ primary cylinders fell from 200 bars to 70 bars through 6 measurements only. A similar drop was recorded on a NO primary cylinder. The concentrations stayed constant at the certified level. A further investigation of this problem will have to be undertaken as indicated in Appendix E2.

5 Reports

5.1 Daily reports

The EIMP team is producing daily reports on air quality in Cairo. The reports are presenting one-hour average daily maximum concentrations of SO₂, NO₂, PM₁₀, CO and Ozone. These concentrations are being compared to typical concentrations measured during one specific air pollution episode. An example of such report issued on 28 February 2003 is presented in Appendix F1.

5.2 Monthly reports

The EIMP team produces two different types of reports on a monthly basis. The monthly status report is produced in English. The report issued for February 2003 is presented in Appendix F2.

A data summary report issued every month in Arabic language presents the air pollution concentrations based on preliminary data, which are not finally quality assured by the monitoring institutions. Normally the data should only be fully trusted after the evaluation of the Quarterly reports, when the Monitoring Institutions have been evaluated the data through the complete QA/QC systems.

A memo was prepared based on the monthly data report for January 2003 as presented in Appendix F3. The evaluation of this report revealed errors in some of the wind data as well as some errors in the presentation of air quality data. Some of these errors have been corrected; others are still being investigated at the end of the Mission.

5.3 Quarterly reports

Quarterly reports were presented for the last quarter 2002 by CEHM and by IGSR. These reports were proof read and discussed in length with the responsible authors. Several corrections and changes were made and final version of the reports would be available around the time of the end of Mission.

5.4 Newsletters

One new newsletter was produced during Mission 01. The input to this newsletter is presented in Appendix F4, and the newsletter itself is shown in final form in Appendix F4. The newsletter describes one of the air pollution episodes that

occurred over Cairo on 7 to 8 January 2003. The episode was characterised with low variable winds and was mainly caused by a change in weather.

5.5 Reporting episodes

Air pollution episodes occur over Cairo caused by meteorological conditions and by the presence of dust storms. One such episode presented in Appendix F5, indicated high concentrations of PM₁₀ in the city centre of Cairo on 25-26 October 2002.

The suspended dust seem to be originating from local sources inside the city of Cairo, and may include traffic, local waste burning and energy sources.

6 A national air quality network

The air quality monitoring networks undertaken by CEHM and CAIP will be assessed to prepare a comprehensive plan for a future National Air Quality Monitoring Network (combining existing the two existing networks). Another objective will be to identifying future needs.

EEAA has expressed a need for a comprehensive assessment of the overall requirements for establishing a complete national air quality monitoring network. Once a plan has been elaborated EEAA will seek funding from relevant sources, including international donors, but there is not necessarily any commitment from Danida's side to support further development of Egypt's air quality monitoring network. The regularly occurring air pollution "episodes" in Cairo has further accentuated this need during the autumn season. The activities will include:

- Assessment of current EIMP and CAIP air quality monitoring networks.
- Establishment of EEAA objectives for a complete national air quality monitoring network.

6.1 Assessment of the CAIP programme

A meeting was arranged with Dr. Ekhlas to discuss the present CAIP air pollution monitoring programme. The objective was also to discuss the quality of the measurements as well as get access to data from CAIP measurements as input to evaluate a total national monitoring programme for Egypt. Minutes from this meeting including a summary of data collected during the month of October 2002 is presented in Appendix G.

The PM₁₀ /PM_{2.5} monitoring programme in the greater Cairo area has been reduced from 36 to 20 sites. A lot of AirMetrics instruments are in store at EEAA. These instruments are considered spare parts for the ones in operation.

CAIP will also during the year exchange all the operating 20 sites with a new generation AirMetrics instruments. It will thus be time to establish a close co-operation so that some of the CAIP PM₁₀ samplers could be used as spare parts for the original EIMP programme and also at new sites selected in other areas of Egypt where PM₁₀/PM_{2.5} measurements may be needed.

6.2 EEAA objectives for a national air quality network

The objectives of a national air quality network for Egypt will have to be formulated in co-operation with representatives from EEAA. The information collected so far from the EIMP programme and from the CAIP programme will be used to formulate this programme.

Several comments have already been given by the EIMP staff at EEAA as well as from the experts at the monitoring institutions at CEHM and IGSR. These comments and discussions are valuable input to the design of one national programme for EEAA.

Further evaluations and formulations will be developed during our next Missions to Egypt.

7 Air pollution management

In a meeting with Dr Mawaheb on 1 March 2003 it was stated that the air quality data that are being collected by the EIMP programme as well as those reported from the CAIP programme will have to be used in the future to improve the air quality of Cairo.

Dr Mawaheb asked directly:

- What are the reasons for the “black episodes”? and
- What can we do to reduce the impact during these episodes.

The answers is not straight forward and easy, but one possible approach will be to start preparing the tools for performing an air quality management system to present a master plan for air quality in Cairo. (See Appendix J1)

One of the main challenges in today's society is to have timely and appropriate access to relevant and good quality environmental data. The aim is to enable actions whenever environmental requirements and limits are violated.

One such system that meets the requirements of modern air quality assessment is the AirQUIS system, which was developed by NILU to handle a number of air pollution tasks and challenges. It is based on a Geographical Information System (GIS). The main objective of a modern environmental surveillance platform like AirQUIS is to enable direct data and information transfer and obtain a remote quality control of the data collection.

The total AirQUIS system contains a number of modules, which may be selected individually or as a total package. The modules contains:

- Geographical Information System (GIS)
- Automatic Data Acquisition System (ADACS)
- Measurement
- Statistical and Graphical Presentation Tools
- Emission Inventory
- Emission Model
- Wind Model
- Dispersion Model
- Exposure Model

A short description of the system is presented in Appendix H.

8 Training needs assessment

Needs for further training by all personnel participating in the air quality monitoring programme for Egypt has been identified. Seminars and workshops will be prepared to give general presentations of the background and content of the data collected. On-the-job training will be given to the operators of instruments and equipment.

A modern air quality monitoring and information system has been established for Egypt as part of the EIMP programme. The measurements combine on-line monitoring and standard sampling methods of the most important air pollutants and meteorology. The selected pollutants are in accordance with the air quality standards given in the environmental laws of Egypt, and are also similar to the internationally recognised air pollutants as given by e.g. the World Health Organisation.

A seminar is being planned to update the participants on the air quality monitoring programme for Egypt established as part of the Danida EIMP programme developed for EEAA.

The seminar will present the background for the selection of measurement sites and indicators. It will show measurement results, discuss the air quality of Egypt and look into the future for air quality assessment and planning. A GIS based database has been requested from EEAA and will be presented as part of the seminar.

A proposed seminar programme for a 3-day seminar is presented in Appendix I.

9 Administrative work

Several meetings were held during Mission 1.

In the meeting with Dr Mawaheeb she asked directly:

- What are the reasons for the “black episodes”?
- What can we do to reduce the impact during these episodes?

The merging of data from the EIMP and from the CAIP programme was discussed as a basis for establishing one unified air quality monitoring programme for Egypt. Air quality management and the use of data collected are also of great interest for EEAA. These needs have to be further discussed, and a solution to the problem of the limited use of the existing database. The Minutes from the meeting can be seen in Appendix J1.

A meeting was also held with Dr M.A. El-Shahawi, who had presented comments to the selection of sites in Cairo. We explained the background and reasons for the sites selected in Cairo and the reasons that we have used different types of microenvironment in our selection process. Dr Shahawi was not aware of the fact that we also operated 4 meteorological stations in the greater Cairo area. His analyses using only airport data would therefore be very limited compared to the analyses that is performed by the EIMP programme. We promised to give him the latest annual report as soon as it was available.

Due to delayed deliveries of spare parts from CTS a meeting was called with Dr ElSoueini to discuss possible ways of speeding up the process. It was agreed that all spare parts would be in Cairo before the end of March if an agreement on the payments were established. This was agreed upon two days after the meeting on 13 March 2003.

Staff meetings were held every Saturday at 10:00 hrs. The Minutes from the first meeting on 1 March is shown in Appendix J2.

Based on a discussion of air pollution episodes in Cairo during the winter 2003 a Newsletter was prepared as seen in Appendix J3.

The Mission ended 17 March 2003. A Memo was prepared for the final meetings held at EEAA with Mr Ahmed Abou Elseoud and Haytham Ahmed. Some of the items and tasks identified during the Mission was summarised as presented in Appendix J4.

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Appendix A

Institutional support

A.1 People we met and colleagues (Spring 2003)



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Appendix B

Status CEHM measurements

Appendix B1 Meeting with CEHM 3 March 2003



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

Meeting

Date: 3 March 2003

Present: Dr. Tarek and the crew from CEHM, Ashraf EIMP and Sivertsen

Referent: Bjarne Sivertsen

Meeting with CEHM – monitoring programme

Introduction

The objective of the meeting was to go through the air quality monitoring programme with all operators present. Site status, instrument status and failures as well as the operations of the programme was discussed.

The list of status for each station has been prepared by Dr Tarek, and is attached this memo. Some major conclusions is presented in the following.

Summary comments

SO₂ monitors

Most SO₂ monitors are working, but the zero level has been identified to be too high at some of the data. As for Aswan the zero level during calibration was 7.1 ppb, which is outside the accepted rang. The zero line will have to be adjusted in the database down to a level corresponding to about 6 µg/m³, which is assumed background concentration level.

The variation in SO₂ concentrations seems strange at some sites (Maadi). Could there be a problem at the sites without air intake manifold, when air is taken directly in to the monitor? The Teflon filter in front of the monitor is changed every second week.

NO_x monitors

Several NO_x monitors have been taken to the calibration laboratory at CEHM because of errors. Most of them are missing the cooler. This spare part has been ordered from CTS 3 months ago. Seven monitors were observed at the lab.

Dr Tarek was asked to push Dr El Soueini at CTS to get the NO_x monitors into operation again.

Ozone monitors

Most of the ozone monitors are working well. In some cases the calibration has been reported out of range (Kaha). The span level was more than 25 % out of range. Could this be due to problems with the pump?

PM₁₀ monitors

There are still problems with some pumps at the PM₁₀ monitors. The Wedding instrument is easier to repair, while the new Eberline instrument is easier to operate.

PM₁₀ high volume samplers

CEHM are now using only pumps with brushes. The brushes can be purchased locally, and they are easy to change. The locally obtained brushes last about one month. The price, however, is reasonable.

Brushes have been sent to IGSR, but they have not requested new ones for several months. The procedures at IGSR will have to be checked. (BS)

PM₁₀ AirMetric

Most of the AirMetric instruments are working well.

SO₂ sequential samplers

The SO₂ concentrations reported by the sequential samplers are very low, especially in areas with high dust concentrations (cement factories in Helwan). We have to find out the reasons why the impregnated filters show so low concentrations. The analyses carried out by the ion chromatographs seem to be under control.

Check SO₂ levels

SO₂ Passive Sampling will be performed in all stations using SO₂ sequential samplers (Nasr City, Tabbin South, 6 October, 10 Ramadan, Luxor, and Kom Ombo) to compare the analysis results. The study will be performed three times for a period of 15 days every time.

VOC samplers

Training on VOC's data interpretation will be taken into consideration during the next seminar that will be performed by EIMP.

Met sensors

The temperature sensors at some of the sites seem to stop recording at nighttime. This could be due to increased relative humidity, or what?

The wind directions at some sites (Tabbin, Aswan?) are showing too small range in directions. This problem will have to be looked into. Some sensors may have to be changed. Training on Met sensors maintenance, repair, and calibration will be taken into consideration during the next visit of Mr. Rolf to Egypt.

New site studies

The location of instruments at the sites in Suez and in 6October City will be re-evaluated. Visits will be paid to these sites during the next Mission.

Appendix B2 Air Quality Programme Status



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)

3 March 2003

	Site	Area type	Parameter	Status	Responsible	When?
1	El-Kolaly	Urban centre	AC	okay	Ahmed	25 Feb 03
				okay	Yassin	
2	El-Gomhoriya.	Street canyon	SO ₂ 145 PM ₁₀ TSP	at CEHM for repair		
				okay		
				okay		
				okay		
				okay		
2	El-Gomhoriya.	Street canyon	Tel. AC NO _x SO ₂ 145 CO PM ₁₀ (A) VOC	okay	Kamla	
				okay		
				at CEHM for calibration	Yassin	2 Mar 03
				at CEHM for calibration	Yassin	2 Mar 03
				okay		
		at CEHM for calibration	Yassin	2 Mar 03		
		okay				
		already started (waiting for analysis results)				

	Site	Area type	Parameter	Status	Responsible	When?
3	Abbasseyia	Residential.	Tel. AC SO ₂ Perm tube O ₃ Met PM ₁₀ PS (NO ₂)	okay okay okay no perm tube okay okay okay okay	Kamla	
4	Nasr City	Roadside/Res	SO ₂ BS NO ₂ PM ₁₀ (s)	okay okay okay	Mahmoud	
5	El-Maadi (EEAA)	Residential	Tel. NO _x SO ₂ 145 PM ₁₀ (S)	okay at CEHM for Repair (Cooler needed) okay okay okay	Maher Yassin	13 Aug 02
6	Tabbin	Industrial	Tel. AC NO _x SO ₂ 145 Met PM ₁₀ TSP	okay okay okay okay okay okay okay okay	Maher	
7	Tabbin south	Industrial	SO ₂ BS TSP DF PS (NO ₂) VOC	okay okay okay okay already started (waiting for analysis results)	Maher	
8	Fum Al-Khalig	Road /urban	Tel. AC NO _x SO ₂ 145 CO PM ₁₀	okay okay okay okay okay questionable due to deficiency of gases and frequent power breaks okay	Kamla Yassin	
9	Abu Zabel	Industry/Res	PM ₁₀ DF PS (S+N)	okay okay okay	Adel	

	Site	Area type	Parameter	Status	Responsible	When?
10	Shoubra El-Kheima	Industrial	Tel. AC	okay okay	Kamla	
			SO ₂ Perm tube Met	okay no perm tube okay		
			NO ₂	okay		
			TSP PM ₁₀ (A) DF	okay okay okay		
			VOC	already started (waiting for analysis results)		
11	Giza, Cairo University	Residential	Internal Tel AC	okay okay	Ahmed	
			NO _x	at CEHM for Repair (Cooler needed)	Yassin	29 Sep 02
			SO ₂ O ₃ Met	okay okay WD sensor not working	Maher	
12	Kaha	Regional Background	Tel. AC	okay okay	Kamla	
			NO _x O ₃ Met	okay okay there is a loss of Temp. records every day due to a sensor malfunction	Maher	
			PM ₁₀	okay		
13	6 October	Res/industrial	SO ₂ BS NO ₂ PM ₁₀ (S) DF	okay okay okay okay	Adel	
14	10 Ramadan	Residential	SO ₂ BS PM ₁₀ (S) DF PS (NO ₂)	okay okay okay okay	Adel	
15	Suez	Res/urban	Tel. AC	okay okay	Ahmed	
			NO _x	at CEHM for Repair (Cooler needed)	Yassin	25 Jul 02
			SO ₂ 145	okay okay		
			TSP DF PS (S+N)	okay okay okay		

	Site	Area type	Parameter	Status	Responsible	When?
16	Port Said	Residential	PM ₁₀ (A) PS (S+N)	okay okay	Adel	
17	Ismailia	Residential	PM ₁₀ (A) PS (S+N)	okay okay	Adel	
18	El Fayum	Urban	PM ₁₀ (A) DF PS (S+N)	okay okay okay	Mahmoud	
19	El Minya	Urban/Res	PM ₁₀ (A) DF PS (S+N)	okay okay okay	Maher	
20	Assyut I	Res/Urban.	Tel. AC	okay okay	Maher	
			NO _x SO ₂ 145 Met	okay at CEHM for repair (finished) okay okay	Yassin	23 Feb 03
			PM ₁₀	at CTS for repair. A spear monitor was installed but not working due to battery charging problems	CTS	17 Feb 03 19 Feb 03
21	Assyut II	Residential	DF PS (S+N)	okay okay	Maher	
22	Naga Hammadi	Industrial/res	PM ₁₀ (A) DF PS (S+N)	okay okay okay	Mahmoud	
23	Luxor	Urban/res	SO ₂ BS DF PS (S+N)	okay okay okay	Mahmoud	
24	Edfu	Urban.	PM ₁₀ (A) DF PS (S+N)	okay okay okay	Mahmoud	
25	Kom Ombo	Industrial	SO ₂ BS PM ₁₀ (A) PS (S+N)	okay okay okay	Mahmoud	
26	Aswan	Urban/res.	Tel. AC	okay okay	Mahmoud	
			SO ₂ Perm tube O ₃ Met	okay no perm tube okay okay (WD data will be checked with Met Authority data)		
			DF PS (NO ₂)	okay okay		
27	Ras Mohamed	Background	O ₃ PM ₁₀ (A) DF PS (S+N)	Not working (Pump repair kit needed) okay okay okay	A. Ibrahim Maher	Tu 11 Mar

Other Matters

SO₂ Passive Sampling will be performed in all stations using SO₂ sequential samplers (Nasr City, Tabbin South, 6 October, 10 Ramadan, Luxor, and Kom Ombo) to compare the analysis results (this will be done three times for a period of 15 days every time).

CTS (Dr. Amr El-Souni) must be contacted to find out the actual delivering date of spare parts (according to CTS quotation it was scheduled to be at EIMP store on 6 Feb 2003).

A MEMO on the status of gases must be written and delivered to EEAA.

Procedures for ordering new gas cylinders especially CO must be carried out immediately and seriously.

Passive sampling programme must be updated.

A new location must be selected for Suez Station.

A visit to Kaha station must be performed to find out the area type for this station (representatively)

Maher will visit IGSR station on TH 6 Mar 03 to install the Translator of the Met Tower and the WD sensor of the same station.

PM₁₀ of El-Mahalla Station is ready to transferred to its station. (Alex consultant will bring the pump of this monitor on SA 8th Mar 03 to test it before transferring for installation).

Three NO_x Monitors belonging to Alex Consultant stations are waiting for the spare parts (Cooler) (IGSR, from 13 Dec 02; Kafr El-Zayat, from 8 Feb 03; Mansoura, from 22 Feb 03).

One SO₂ Monitor belonging to IGSR station (Alex Consultant) is waiting for spare parts (Triger and Flasher supply Board).

Training on VOC's data interpretation will be taken into consideration during the next seminar that will be performed by EIMP.

Training on Met sensors maintenance, repair, and calibration will be taken into consideration during the next visit of Mr. Rolf to Egypt.

EIMP Passive sampling programme

Updated Oct 1999

	Site name	Area type	Quarterly samples				monthly	Passive		Other		
			Jan	April	July	Oct		NO2	SO2	SO2	M	df
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		A	
	Tahrir Sq.Am.Un.	Urban					x	NO2	SO2			
	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.

Appendix C

Status IGSR measurements

Appendix C1 IGSR-meeting 10 March



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

Meeting

Date: 9-10 March 2003

Present: Dr. Elsayed Shallaby, Dr. Shawkat Guirguis,
Dr Zekry Ghatass, Dr Ashraf Zahran, Dr Mohammed Rashad,
Mr Hossam A Said, Mr Bjarne Sivertsen
Referent: Bjarne Sivertsen

Meeting with IGSR – monitoring programme

Introduction

The objective of the meeting was to go through the air quality monitoring programme with all operators present. Site status, instrument status and failures as well as the operations of the programme was discussed.

The list of status for each station had been prepared, and is attached this memo. Some major conclusions are presented in the following. On the second day the Quarterly reports was reviewed, corrected and discussed.

Summary comments

SO₂ monitors

The SO₂ monitors seemed in general to work adequately. Some missing data during the last few months were identified due to monitors at CEHM for calibration. The monitor from Kafr El-Zayat had been at CEHM for maintenance and had to be returned to the network without calibration. The reason had been that no standard gases were available at CEHM. (?)

The SO₂ monitor at IGSR has been at CEHM for repair since 20 November 2002. Spare parts have not been available since.

NO_x monitors

Similar to the case at CEHM several NO_x monitors have been taken to the calibration laboratory at CEHM because of errors. Most of them are missing the cooler. Spare parts have been ordered from CTS 3 months ago. Seven monitors were observed at the lab.

A meeting has been called with Dr El Soueini at CTS to get the NO_x monitors into operation again.

Ozone monitors

The ozone monitor at Alex regional was calibrated at NIS at the end of August 2002. It has an alarm on the intensity cell. The instrument was cleaned (Maher) on 16 January and on 6 March 2003. Data look okay, but the instrument should be taken in for calibration again soon.

PM₁₀ monitors

The PM₁₀ monitors operated by IGSR seem to work adequately. New paper rolls are needed for Kafr El-Zayat.

PM₁₀ high volume samplers

PM₁₀ samplers using pumps with brushes need to obtain more brushes from CEHM. IGSR claim they did not receive additional brushes from CEHM. Hossam will order brushes from CEHM on 10 March. The brushes are easy to change. The locally obtained brushes last about one month.

PM₁₀ AirMetric

Some problems were recorded in the PM₁₀ AirMetric instruments. The AirMetric sampler from El-Shouhada has been sent to CEHM for repair. The AirMetric at El-Asafra was sent to Damanhour, where it is working now. The levels measured by the AirMetrics seem to be generally higher than those measured by HiVol samplers. This should be studied in more details by parallel measurements.

A comment concerning the use of batteries at the AirMetric samplers indicated that the batteries are not working properly because they are mounted in a vertical position.(?)

SO₂ sequential samplers

The SO₂ concentrations reported by the sequential samplers are very low at all sites in the Alexandria region. SO₂ Passive Sampling will therefore be performed in all stations using SO₂ sequential samplers (ElMax, ElAsafra, Gheat ElEnab, Tanta, Damietta and Kafr Dawar). Results from the passive samplers will be compared to the results from sequential samplers and reported as part of the quarterly report.

VOC samplers

The VOC sampler will be brought to CEHM (Hossam) for recharging, cleaning and preparations. A new training in the use of the sampler will have to be received from CEHM, and sampling will start in ElMax, Kafr El-Zayat and Damietta as soon as possible. Training on VOC's data interpretation will be taken into consideration during the next seminar that will be performed by EIMP.

Met sensors

Problems have led to a large number of missing meteorological data at Alex Regional site. The translator has been out of operation since October 2002. It was finally re-installed on 6 March 2003 and wind direction and speed as well as temperatures and humidity are being recorded again. From data read on the Station Manager on 10 March it seems like the wind is recorded okay, there are problems with the temperature readings, while relative humidity seems okay.

Shelters

The shelters at Tanta, Kafr El-Dawar and El-Mansoura had been reported to EEAA several months ago to have leakages due to corrosion. Expensive instruments may be damaged, so it is important that these leakages are repaired as soon as possible.

NH₃ measurements at Abu Qir

The measurements of NH₃ are not any more performed properly, and IGSR suspect that the data are not correct. We proposed to take the NH₃ monitor out from the Academy, send it to CEHM for maintenance, (change sensor?) and use it in the future by trained experts at IGSR. There are many areas in Alexandria where NH₃ measurements could be of great interest.

New site studies

IGSR has proposed that measurements at the Abu Qir Academy will continue using only passive samplers. The shelter as well as the sequential sampler will be used at a new site. The site study for this movement will be undertaken during the next expatriate mission. The process of getting the permission to take out the equipment from the Academy will start immediately.

The instruments at AlAsafra may also be considered used in a new site in the Alexandria area. Areas proposed were Hagar, El-Nawateya, El-Awayed, Abis, South Alexandria and Sidi Krir.

Further recommendations

In discussions with the IGSR crew included Dr ElRaey it was mentioned that due to complaints with odours in southern Alexandria it might be necessary to start measurements of H₂S. In this case new monitors or samplers will have to be considered.

VOC measurements will be started as mentioned above. Also NH₃ sampling may give some indications of area source impacts. PM₁₀ filters should also be analysed for selected elements. These analyses could be undertaken by AAS at IGSR.

To add specific measurement linked to complaints and air pollution exposure to people the future air quality programmes should consider specific measurements and samples. Great interests in impact assessment and air quality planning using the GIS based **air quality planning system AirQUIS** was stressed by several of the researchers at IGSR.

EIMP Air Quality Project Summary of status of the measurements by IGSR

Prepared date: 3 March 2003

IGSR Team:

1. Dr.Elsayed A.Shalaby
2. Dr. Shawkat Guirguis
3. Dr. Zekry Ghatass
4. Dr.Mohamed Rashad
5. Eng.Hosam Said

A summary about the status of the IGSR air quality monitoring programme is enclosed in the following table:

EIMP Monitoring and Sampling Program Status, IGSR

I.D	Alexandria Sites	Area type	Param	Stat	Responsible	Comments
28	Abu Qir	Industrial	SO ₂ (PS) NO ₂ (PS) NO ₂ (SS) NH ₃	Ok Ok Ok Ok	M.Rashad	NH ₃ does not give correct readings. The instrument will be collected by IGSR
29	El-Max Petrogas	Industrial	SO ₂ (SS) NO ₂ (SS) PM ₁₀ (HV) DF	Ok Ok --- Ok	M. Rashad	PM ₁₀ needs a new pump. This is the first request for this instrument
30	IGSR, Alex	Urban	NO _x (M) SO ₂ (M) PM ₁₀ (M) CO (M) SO ₂ (PS) NO ₂ (PS)	--- --- Ok Ok --- Ok	Heba Said.	Sent to CEHM for repair Sent to CEHM for repair
.	El-Asafra-	Residential	SO ₂ SS PM ₁₀ (AM) SO ₂ (PS)	Ok Ok Ok	M.Rashad	PM ₁₀ sent to Damanhour

I.D	Alexandria Sites	Area type	Param	Stat	Responsible	Comments
32	Gheat El-Inab	Residential	SO ₂ (SS) NO ₂ (SS) PM ₁₀ (HVS)	Ok Ok Ok	M. Rashad	
33	Alexandria regional	Regional	Met Ozone (M)	----- Ok	Heba Said	Translator at CEHM for repair and urgently needed Alarm gives low intensity for Cell A . reported to Eng. Maher
41	El Nahda	Industrial Semi urban	PM ₁₀ (HV) DF	--- Ok	M. Rashad	PM10we sent a Fax to Eng. Ashraf
42	El-Shohada Square Station	Traffic	SO ₂ (M) NO ₂ (M) PM ₁₀ (AM) SO ₂ (PS) NO ₂ (PS)	Ok Ok --- OK OK	M.Rashad	PM ₁₀ Air Met. Sent to CEHM

	Delta Area	Area type	Param	Stat	Responsible	Comments
34	Damanhour	Urban	PM ₁₀ (AM) SO ₂ (PS) NO ₂ (PS)	--- Ok Ok	H. Ahmed	AirMetrics still in operation
35	Kafr El Zayat Kafr Elnasrya	Industrial/res.	SO ₂ (M) NO _x (M) PM ₁₀ (M) DF SO ₂ (PS) NO ₂ (PS)	---- OK OK OK Ok Ok	H. Ahmed	Sent to CEHM for repair. PM10 needs a filter tape – Dr. Tarek promised to send one. PS lost this week.
36	Tanta	Urban	SO ₂ (SS) PS (N) PM ₁₀ (AM)	Ok -- Ok	H. Ahmed	Shelter need repair. We sent a fax to Eng. Ashraf. And urgent needed a repair
37	El-Mahalla	Industr/res.	SO ₂ (M) PM ₁₀ (M) DF	Ok --- OK	H. Ahmed	Still at CEHM for repair.
38	El-Mansura	Indust/res.	Met NO _x (M) SO ₂ (M) DF	Ok --- Ok Ok	Ashraf Zahran	NO _x sent to CEHM for repair .
39	Damietta	Urban/resid	SO ₂ (SS) PM ₁₀ (HV) NO ₂ (PS) DF	Ok Ok Ok Ok	Ashraf Zahran	-Electricity was disconnected by the school administration. Our operator solved this problem.
40	Kafr Dawar	Urban/industry	SO ₂ (SS) PM ₁₀ (AM) SO ₂ (PS) NO ₂ (PS) DF	--- Ok Ok Ok Ok	H. Ahmed	Shelter needs repair. Sometimes a loss of PS.

General comments

1-We suggest to move Elasafra shelter to another site such as Hagar Elnawatia or Elras Elsouda which are believed to be exposed to high levels of air pollution.

2- A fax has been sent to remind for winter season.

IGSR Project Manager
Elsayed Shalaby

Appendix C2 Discussions with Prof. ElRaey at IGSR



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

Meeting

Date: 10 March 2003

Present: Prof M. El Raey, Dr. Elsayed Shallaby, Dr. Shawkat Guirguis, BS

Referent: Bjarne Sivertsen (BS)

Discussions with Dr. ElRaey at IGSR

Introduction

In a meeting with Prof. Dr. ElRaey we summarised the measurements carried out at IGSR. We also discussed possible changes in the programme, which will have to be discussed with EIMP/EEAA. These inputs will also be valuable in the evaluation of the design of a future national air quality monitoring programme for Egypt.

General comments and proposed improvements

In the discussions it was stated that the network has been working efficiently and that further progress is foreseen. Upon discussions with the team and based on complaints received from inhabitants of Alexandria, Prof. ElRaey has suggested some improvements, which he hoped that could be brought forward in the EIMP Phasing out Phase programme. The following items were discussed:

1. We recommend measuring H_2S near the International Garden and the Air Port south of Alexandria. High levels of H_2S are smelt at several sites and are brought to the city and surrounding environment by sea breeze and land breeze. Many people have complained.
2. It is also recommended to measure levels of volatile organic compounds (VOC) at a number of stations such as Kafr El Zayat, Elmax and IGSR. The site of SUMED terminal at Sidi Krier with the town of Sidi Krier downwind is a serious situation, which has to be monitored. Again we have received many complaints.
3. We recommend transferring the shelters of Elasaфра and Gheat Elenab to other sites expected to receive more intensive air pollution than the above-mentioned sites.
4. We recommend to measure sulfate (SO_4) at some selected sites to follow up the fate of SO_2 in the atmosphere.
5. We recommend carrying out analysis of total suspended matter or particulate matter less than 10 micron, which proved to be the most

important air pollutant among our measurements. Particulate matter could be causing health hazards by itself and might contain some toxic compounds more dangerous than particulates.

Most of the changes and comment given above seem reasonable and adequate.

H₂S measurements could be added to a SO₂ monitor, but it would be better and we would recommend buying a brand new monitor for this reason and locating it as well downwind from source areas as possible preferably in the maximum impact zone.

VOC measurement should be undertaken intermittently with the equipment, which is already part of the EIMP programme. A campaign for VOC measurement at several sites both in Alex, the delta and in Cairo has been proposed during the meetings. VOC measurements have started in Cairo and will start as soon as possible by IGSR. (See minutes from meeting at IGSR monitoring lab).

Measurement of SO₄ is important. Such analyses have been undertaken on a few filters during the EIMP Phase 1996-2001. As a continuation of these studies high volume samplers should collect specific filters for SO₄ sampling during selected periods. In this case it is possible to use the relatively inexpensive EMEP filter intake for these kind of measurements. See <http://www.nilu.no/niluweb/services/np/> The European Monitoring programme developed a simple intake and pump for these measurements.

Air quality impact and planning

To add specific measurement linked to complaints and air pollution exposure to people the future air quality programmes should consider specific measurements and samples.

Great interests in impact assessment and air quality planning using the GIS based **air quality planning system AirQUIS** was stressed by several of the researchers at IGSR. There are many reasons for installing a new and more modern database system for the EIMP programme.

The main objective of a modern environmental surveillance platform of this kind is to enable direct data and information transfer and obtain a remote quality control of the data collection. The system combine monitoring, data presentation and modelling in one package, which enable the user not only to present and evaluate the present situation, but also to undertake environmental planning for a sustainable future. The GIS platform, on which the system is operated, provides easy access to the data and gives a perfect and easily understandable data presentation tool.

The software system AirQUIS has been adapted to meet the needs of different users. The system normally includes data retrieval, databases, and data presentations, modelling and air quality management systems. A complete AirQUIS system could be adjusted to meet the needs of EIMP/EEAA. A special offer has been given for the measurement database only.

Appendix D

Sequential sampler comparisons

Appendix D1 Comparison Monitor/Sequential sampler (Kafr ElZayat)



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

Memo

Date: 12 March 2003

To: Ahmed Abou Elseoud (AAE),

Copy: Haytham Ahmed (HAA),

From: Bjarne Sivertsen (BS)

Comparison Monitor/Sequential sampler (Kafr ElZayat)

Introduction

At several meetings during Mission 01 for air quality component of the EIMP Phasing out Phase, it has been mentioned that the concentrations measured with sequential samplers seem lower than those collected by passive samplers and monitors.

One study was performed in Kafr ElZayat from 20 February 2002 till 28 February 2002. Daily samples were collected and the results are presented below.

Comparison results

The measurement data are presented in the following Figure. SO₂ concentrations ranged from 9 to 100 µg/m³ using the monitor and from 3 to 75 using the sequential sampler.

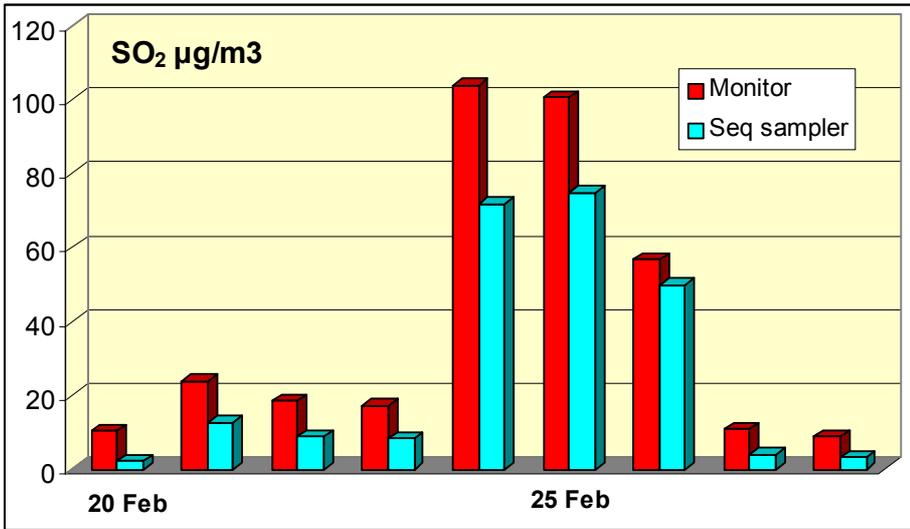


Figure 1: SO₂ concentrations measured from 20 to 28 February 2002 in Kafr ElZayat using monitor and sequential

A direct comparison as presented in Figure 2 indicate that the sequential sampler measures concentrations of SO₂, which are normally lower than those recorded by the monitor.

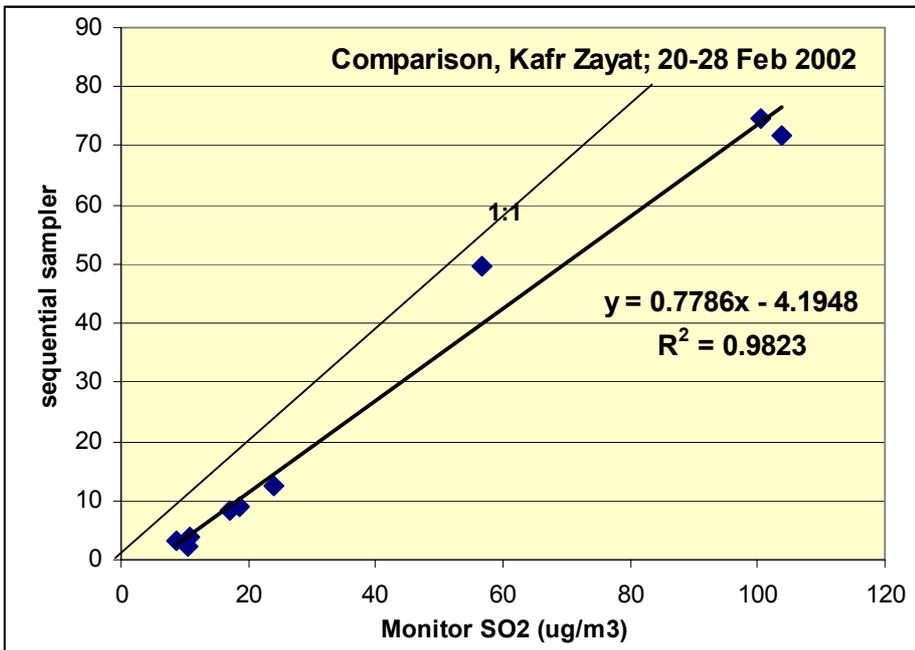


Figure 2: Comparisons between the sequential sampler and the monitor data for SO₂ for 24 hour average data collected from 20 to 28 February 2002 at Kafr El-Zayat.

A linear regression indicate that the correlation coefficient between the two data series were 0,98.

The Sequential sampler concentrations were about 77 % of the concentrations obtained with the SO₂ monitor at Kafr El-Zayat.

Appendix D2



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

Memo

Date: 15 March 2003
To: Dr Tarek,
Copy: Ahmed Abou Elseoud (AAE), Haytham Ahmed (HAA),
From: Bjarne Sivertsen (BS)

Sequential samplers, low SO₂

Introduction

At several meetings it has been mentioned that the concentrations measured with sequential samplers seem lower than those collected by passive samplers and monitors. A study performed in Kafr ElZayat from 20 February 2002 till 28 February 2002 indicated that the sequential sampler observed systematically about 70 % of the monitor. This results was reported in e memo dated 12 March 2003-03-15

Several actions will be started to investigate the reasons for low concentrations measured by the sequential samplers.

Inter comparisons

To evaluate the ratio of sequential sampler concentrations to passive samplers SO₂ will be measured using passive samplers in all stations where SO₂ sequential samplers are installed; (Nasr City, Tabbin South, 6 October, 10 Ramadan, Luxor, and Kom Ombo). This study will be undertaken three times for a period of 15 days every time. The results will be reported in specific memos and in the Quarterly Report.

The SO₂ concentrations reported by the sequential samplers are also low at the sites in the Alexandria region. SO₂ Passive Sampling will therefore be performed in all stations using SO₂ sequential samplers (ElMax, ElAsafra, Gheat ElEnab, Tanta, Damietta and Kafr Dawar). Results from the passive samplers will be compared to the results from sequential samplers and reported as part of the quarterly report.

Test sequential sampler itself

One assumption to explain the low concentrations measured by sequential samplers is that the absorption capacity of the filters may have been reduced. This could happen if the relative humidity drops too low. Check that glycerol is being used in the impregnation solution!

By using a double filter holder, the pre-filter and the impregnated filter should not get in contact with each other. This should avoid SO₂ to be absorbed on alkali particles. filters.

The problem may also be checked by locating an absorption bottle after the filter holder. The absorption solution should contain 0.3 % H₂O₂. If this test is done we will have to see that the liquid solution is not evaporated due to heat.

SO₂ concentration measurement of this kind in very hot and dry conditions may be a problem. We selected to use impregnated filters with glycerol instead of absorption bottles to avoid the evaporation problem.

Appendix E

Audit from NIS

Appendix E1 Audit seminar at NIS



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

Meeting

Date: 1 March 2003
Present: Representatives from; EEAA/EIMP, CEHM, IGSR and NIS
Referent: Bjarne Sivertsen

Audit seminar at NIS

Introduction

Dr Adel B Shehata (Quality Manager at NIS) presented the conclusions from the Audit to air quality monitoring stations during the last 3 months of 2002. He stated that after the end of the fifth year of operations of the EIMP programme much experience had been gained.

He further went through all sites audited and presented the conclusions as well as the corrective actions proposed and fulfilled.

Some site comments

At **Assyut** there has been some confusions concerning the field calibration of SO₂ and NO_x monitors. The station operator has changed the background (zero line) as well as the calibration based on the travelling standard gas levels. According to NIS the operator should NOT be allowed to do this. The operators have to stick to the certificate.

There was a long discussion on whether the operator should adjust the monitors, or just report the levels to the monitoring laboratory.

At **Suez** there has been no recorded visits between 18 Sep to 3 Oct 2002. Visit log has to be updated.

At **Aswan** there were no field calibrations performed during 2002.

At **Kaha** the span level at the ozone monitor has deviated about 25 % from level stated in the calibration? This is "normal" and is due to problems with the pumps.

Can Rolf look into this problem? The error cannot be identified by the calibration performed at NIS. Could there be influences from telecommunication activities in the area?

The **EIMansura** NOx monitor deviated from the travelling standard gas level. The monitor is at CEHM for repair.

At **Damietta** the PM₁₀ monitor was out of order due to electrical error. This may have been repaired.

Third party audits

The third party audits concerns management, calibration routines and maintenance. A management review meeting was held on 17 December 2002. It was stated from NIS that not all elements of ISO17025 had been covered by the audits.

The records of training background for the monitoring institutions especially concerning the field operators have not been identified. It was proposed to prepare one certificate for all seminars and workshops held during the EIMP programme. Deadlines for corrections are often not specified. Sequential samplers and passive sampler filters are being delayed in transport before analysed. NIS specified that analyses have to be undertaken as soon as possible after collection.

A plan for changing of consumables has to be established for the whole year of 2003.

CEHM

Some chemicals have been identified floating outside a bottle at the chemical lab.

There is no record for training of operator Ahmed Fathy. Calibration certificates were missing at Suez, Assyut, Maadi and Kafr ElZayat. This problem has been taken care of.

Gas cylinders for field calibrations

It was stated from NIS that one should stick to gas from Scott, which is the best. CEHM had problems with cylinders delivered via local dealer (from England?). After 5 calibrations the bottle was empty. What was that? Which gas?

Calibration of gas monitors – comment from Leif.

From Leif Marsteen we have received the following message concerning calibration of gas monitors:

With reference to the OPERATIONAL LEVEL DOCUMENTATION PART 1 manual, the section TRACEABILITY IN THE CALIBRATION SYSTEM describes how and when to perform calibrations as well as who can do it. Table 3 CALIBRATION OF GAS MONITORS states that two-point calibration of gas monitors should be performed every 3 months at the station by the Monitoring laboratory using a travelling standard. The second paragraph below Table 3 states that the calibration involves the adjustment of the monitor.

The calibration is recorded in a form, which is stored in the Monitoring Laboratory.

Hence CEHM is allowed to change the zero and span response of the monitors!

O₃ monitors are not calibrated in the field because there are no travelling standards for O₃ (third paragraph below Table 3). O₃ monitors are calibrated once a year in the Reference Laboratory (Chapter 4.5.1 CALIBRATION OF MONITORING LAB PRIMARY REFERENCE STANDARDS).

Ozone level – comments from Rolf

The flow does not influence on the O₃ measurement as long as it is above minimum described in the Manual. This problem may come from the UV-lamp generating O₃ when a weekly span is performed. This lamp is emitting less light over time and O₃ goes down. Another possibility is a leak in the O₃ generator system inside the monitor that dilutes the O₃ generated.

Telecommunication does not normally influence on O₃-monitors unless the monitor is placed directly on top of a transmitter or in front of a directional antenna.

Appendix E2 Leakage of gas from standard gas cylinders



Environmental Information
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Phasing out Phase
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Memo

Date: 15 March 2003
To: Dr. Tarek
Copy: Ahmed Abou Elseoud (AAE), Haytham Ahmed (HAA), Ulla Lund
From: Bjarne Sivertsen (BS)

Leakage of gas from standard gas cylinders

Introduction

The problem of leakage of gas from the primary and travelling standard gas cylinders delivered by Linde has been discussed in several meetings. The pressure at one of the SO₂ primary cylinders fell from 200 bars to 70 bars through 6 measurements only. A similar drop was recorded on a NO primary cylinder. The concentrations stayed constant at the certified level.

The only reason for this, as we can see it, is that gas had leaked out of the bottles. Some comments were given by Leif to try to solve the problem.

Possible action to identify the problem

Close the main valve on top of the cylinder and disconnect the regulator from the cylinder. Add soap water around the main valve to cylinder connection, valve outlet, valve adjustment knob and elsewhere. If you observe bubbles there is a leak.

Dry the cylinder valve outlet properly before proceeding to avoid soap water from entering the regulator! Reconnect the regulator. Close the regulator output needle valve and main valve. Open the cylinder valve. Open the regulator main valve. Add soap water to all connections and junctions on the regulator. If you observe bubbles there is a leak.

If you still have not found any leakage try using another regulator and see if the pressure still drops

We have earlier detected at NIS or CEHM that the seal inside one of the regulator nuts have been missing. It was hanging outside the regulator fixed with tape.

To find out whether this could be the problem:

Disconnect the regulator from the gas cylinder and check the seal inside regulator nut. The seal is normally white and made of PE, PVC or some plastics. It is round with a hole in the middle to let the gas through. If it is broken or missing replace it.

Appendix F

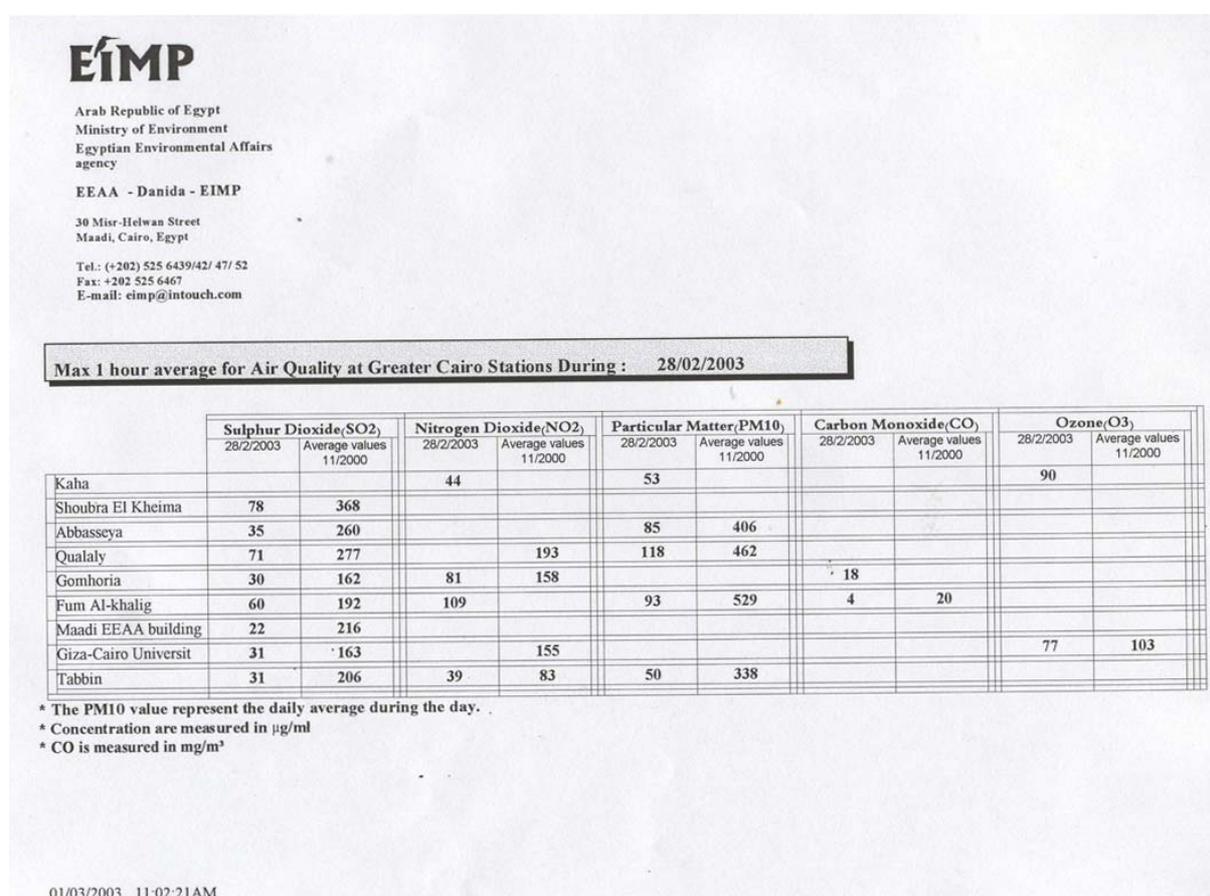
Reports

Appendix F1 Daily report issued by the EIMP team



Daily report issued by the EIMP team

Daily report as presented on 28 February 2003 is shown in the first Figure.



Max 1 hour average for Air Quality at Greater Cairo Stations During : 14/03/2003										
	Sulphur Dioxide(SO ₂)		Nitrogen Dioxide(NO ₂)		Particular Matter(PM10)		Carbon Monoxide(CO)		Ozone(O ₃)	
	14/3/2003	Average values 11/2000	14/3/2003	Average values 11/2000	14/3/2003	Average values 11/2000	14/3/2003	Average values 11/2000	14/3/2003	Average values 11/2000
Kaha			78		55				109	
Shoubra El Kheima	158	368								
Abbaseya	163	260			355	406			112	
Qualaly	99	277	65	193	297	462				
Gomhoria	76	162	126	158			6			
Fum Al-khalig	78	192	152		240	529	6	20		
Maadi EEAA building	40	216								
Giza-Cairo Universit		163		155						103
Tabbin	89	206	51	83	167	338				

* The PM10 value represent the daily average during the day.
 * Concentration are measured in $\mu\text{g}/\text{m}^3$
 * CO is measured in mg/m^3

The one-hour average daily maximum concentrations of SO₂, NO₂, PM₁₀, CO and Ozone is being compared to typical concentrations measured during one specific air pollution episode.

Appendix F2 Progress report February 2003



Progress report February 2003

Air Pollution Monitoring

Procurement

Number of items of spare parts has been delivered to CEHM from EIMP-AIR storage room.

The spare parts ordered from CTS have not been received by EIMP – Communications with the company are being made to know the status.

Data management

Generally the data management undertaken by the Monitoring Laboratories is in good routine and according to arrangements with EIMP.

Reporting

Daily Reports were prepared on the air quality in Greater Cairo area during February 2003.

Daily Reports on PM₁₀ in Greater Cairo area were provided to EEAA early warning system.

Draft monthly report has been prepared by Air component on the Air Quality in Egypt during the month of Jan 2003.

Draft report for the 4th quarter of the year 2002 has been prepared by CEHM on the air quality in Greater Cairo and Upper Egypt.

Monitoring

The following stations are working properly:

Kolaly ,Fum Khalig, Abbassya, Tabbin, Tabbin south, Nasr City, Shoubra,

6th October, 10th Ramadan, Abu Zabel, Kaha, Ismailia, Port Said, El Fayum,

El Minya, Assyut 2, Naga Hammadi, Luxor, Edfu, Kom Ombo, Aswan, El Max, Alasafra, Abu Keir, Gheat El Inab, Alexandria regional, *El Shohada*, Damietta, *Kafr El Zayaat*, Kafr El Dawar and Tanta.

Gomhoryia

The NO_x monitor has been repaired and returned back to the station. The rest of the equipment are working properly.

Nasr City

PM₁₀ high volume sampler pump is being repaired by CEHM maintenance Engineer. All the other equipment are working properly.

Maadi

The annual calibration for SO₂ monitor has been done during the month. NO_x monitor is being repaired by CEHM maintenance team.

Giza

NO₂ monitor is in repair. All the other stations are working properly.

Suez

NO₂ monitor is in repair. All the other stations are working properly.

10 Ramadan

All equipment have been calibrated during the month.

6 October

all equipment have been calibrated during the month.

Assuyt 1

The PM₁₀ monitor is being repaired and has been replaced by another one.

Aswan

SO₂ monitor need to be checked, this will be done during the next visit.

IGSR

NO₂ and SO₂ monitors are in repair.all the other equipment are working properly.

IGSR regional

The ozone monitor is working, the meteorological station has problems, which will have to be repaired.

Mansura

NO₂ monitor is being repaired by CEHM maintenance team.

Mahalla

PM10 monitor is being repaired by CEHM maintenance team. All the other equipments are working well.

Damanhour,

PM₁₀ airmetrics battery still in repair.

Appendix F3 Monthly report January 2003 – Summary



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

Memo

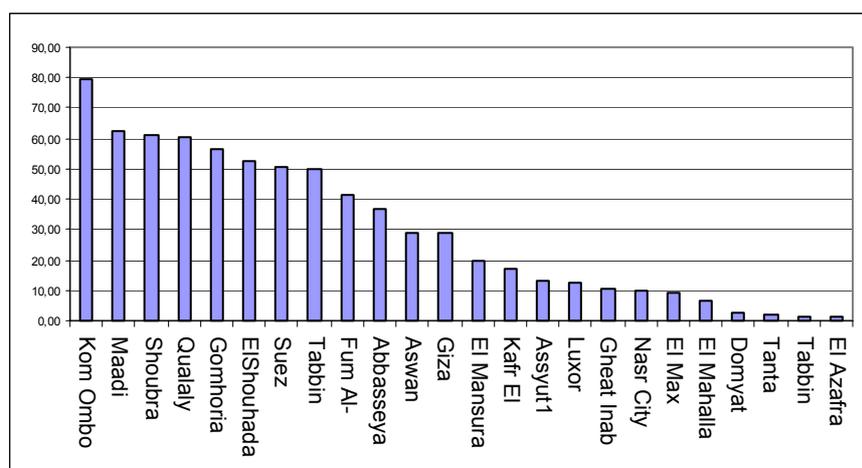
Date: 1 March 2003
To: EIMP Phase out
From: Bjarne Sivertsen and Haytham Ahmed

Monthly report January 2003 - Summary

Introduction

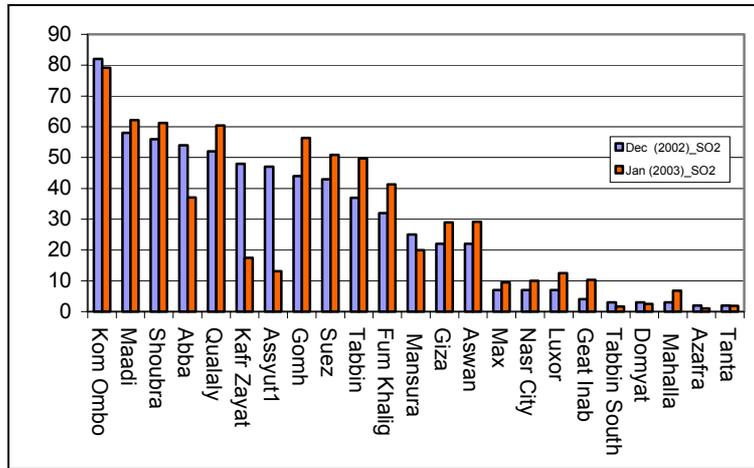
The following short summary and comments have been based on the monthly report for January prepared by Haytham Ahmed. The report was originally prepared in Arabic language.

SO₂ concentrations



Monthly average SO₂ concentrations at all sites in Egypt, January 2003

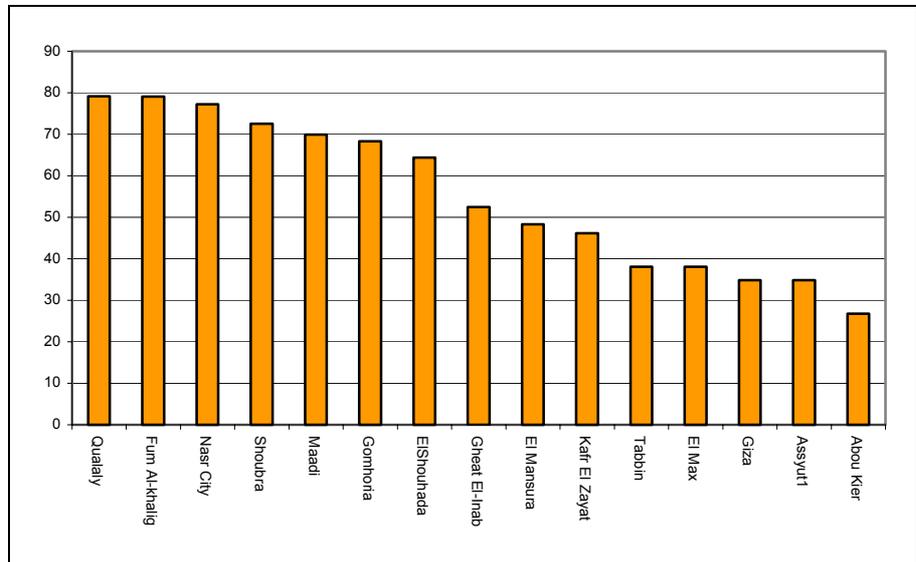
Except for Comombo the SO₂ levels measured by sequential samplers (ElAzafra, Tanta, Domyat, ElMax, Nasr City, Gheat elInab and Luxor) are much lower than the concentrations measured by monitors.



Monthly average SO₂ concentrations measured in January 2003 compared to concentrations of December 2002.

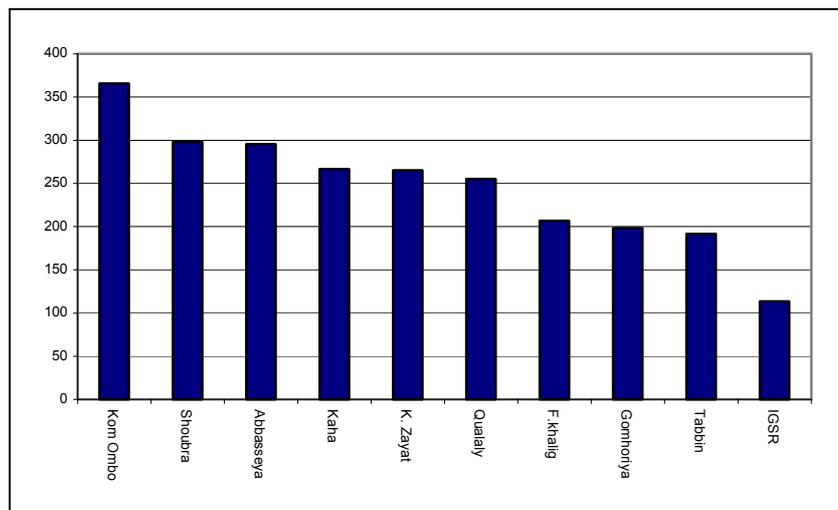
Similar patterns were seen in December 2002 and in January 2003. Concentrations at Qualaly in the Cairo city centre were higher in January.

NO₂ concentrations



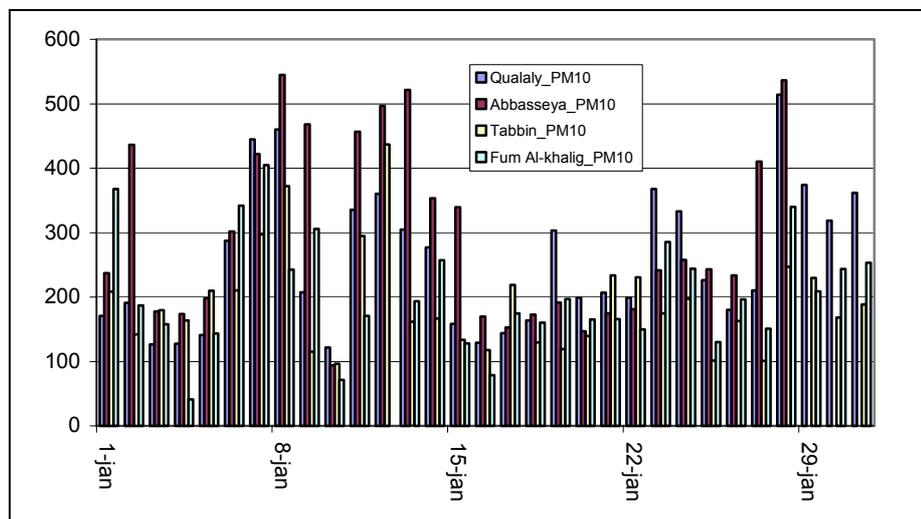
Monthly average NO₂ concentrations from 15 sites in Egypt, January 2003

The NO₂ concentrations were on the average highest in the city centre of Cairo with monthly average concentrations ranging between 65 and 80 µg/m³. The data from Maadi are not real, as this site did not have a NO_x monitor during this month.



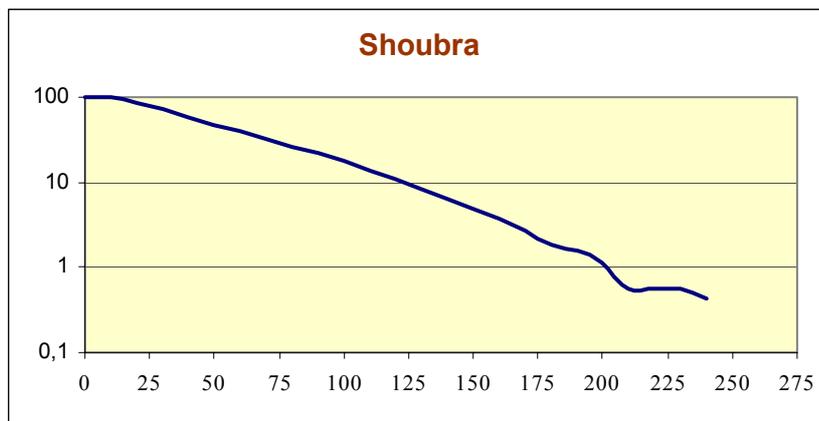
Monthly average PM₁₀ concentrations

PM₁₀ concentrations are exceeding national and international air quality limit values at all sites in Egypt. Monthly average concentrations between 250 and 350 µg/m³ are common.



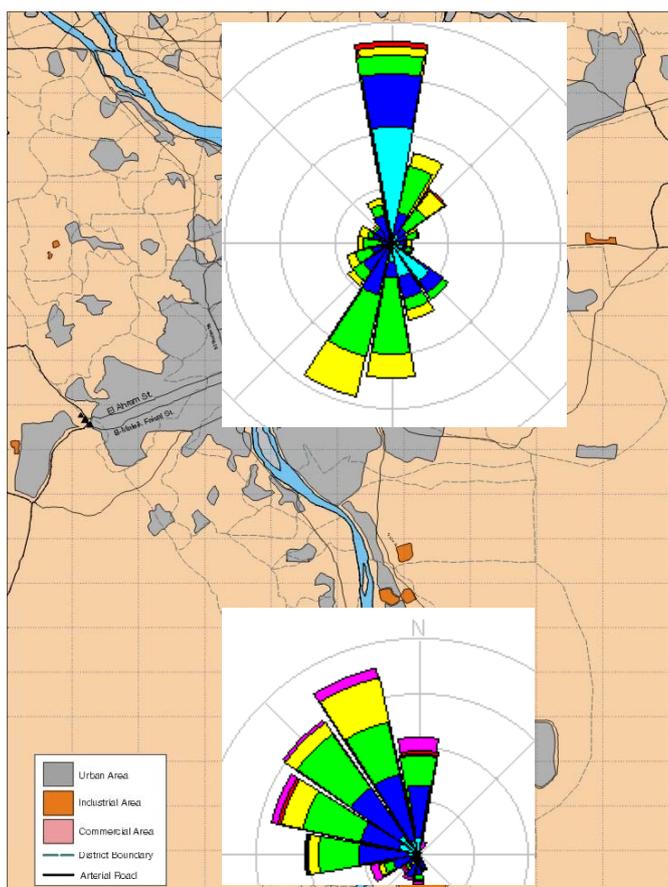
Daily average PM₁₀ concentrations at 4 sites in the Cairo area.

On a few days the 24-hour average PM₁₀ concentrations exceeded 400 µg/m³ at the sites in Cairo city centre. On 28 January both Qualaly and Abbaseya had levels exceeding 500 µg/m³.



Cumulative frequency distribution of SO₂ at Shoubra el Kheima

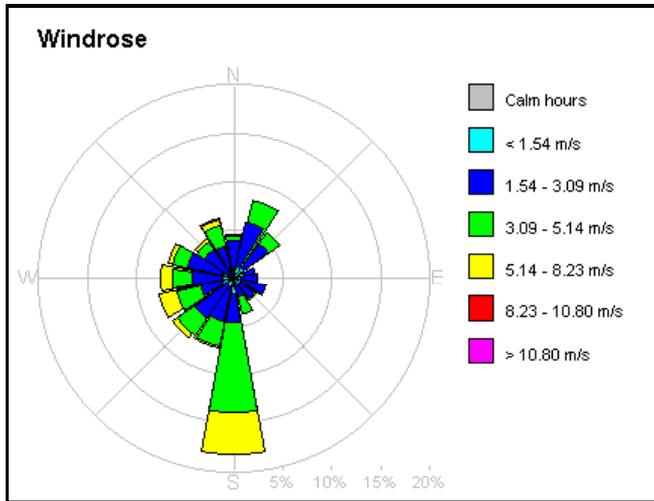
The cumulative frequency distribution of hourly SO₂ concentrations measured at Shoubra EIKheima show that the 99-percentile concentration was 200 µg/m³ in January 2003. The hourly limit value of 350 µg/m³ was never exceeded.



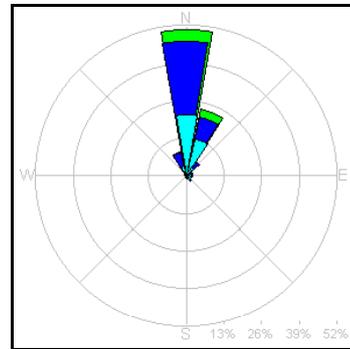
Wind roses for Tabbin and Abbaseya.

The wind direction frequency distributions (wind roses) for Abbaseya and Tabbin show large differences, which may be caused by a malfunction of the sensor at

Tabbin. Errors in the measurements at Abbaseya were also detected during a short period of too much recorded winds from the north.



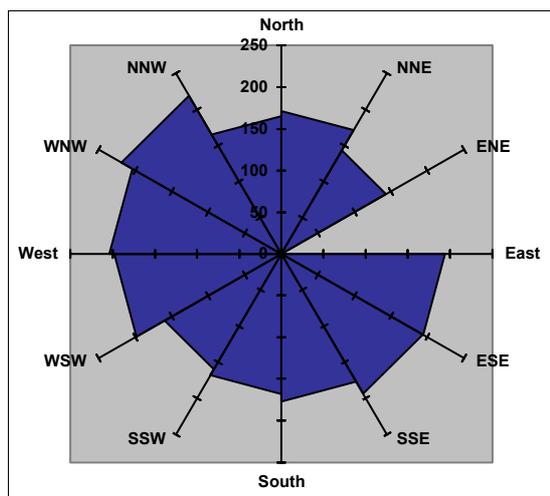
Wind rose for Kaha Station north of Cairo



Wind rose for Aswan

The wind frequency distribution for Kaha seems to be the most representative measurement of wind directions during January 2003. Winds were prevailing from southerly directions.

The wind directions measured at Aswan also looks suspect. The wind direction sensor will have to be checked at this site.



Breuer diagramme PM₁₀ at Tabbin

The average concentrations of PM₁₀ as function of wind directions at Tabbin will not represent a correct picture as long as errors have been detected at the wind sensor.

The Breuer diagramme could be produced using wind directions from Kaha.

*The wind direction sensor at Tabbin is being investigated and will be corrected.
Some errors at Abbaseya have been corrected after this memo was prepared.*

Appendix F4 Air pollution over Cairo 7-8 January 2003



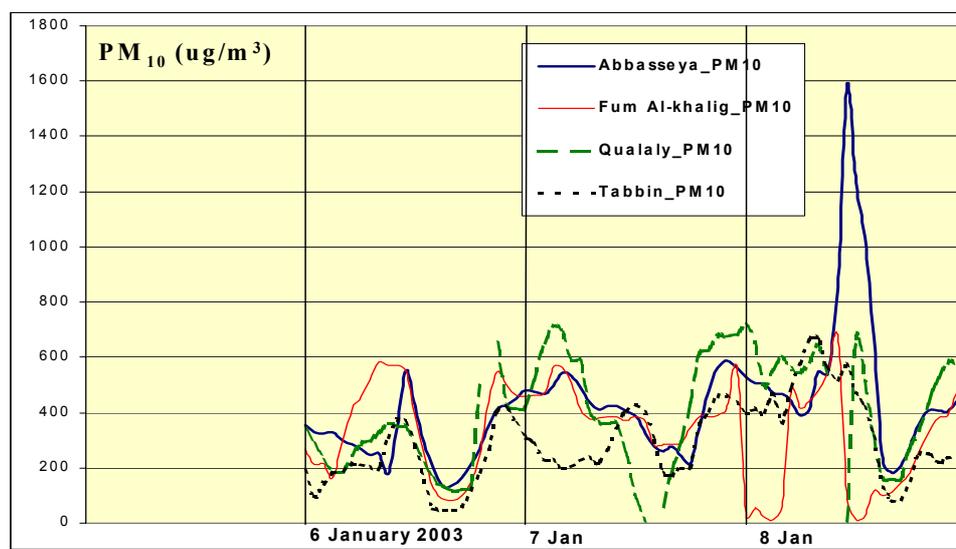
Air pollution over Cairo 7-8 January 2003

High air pollution was observed over the city centre of Cairo on 7 January in the morning.



*Photo taken from Maadi towards Cairo
between 07 and 08 on 7 January 2003 (J Simonsen)*

The dark cloud seemed to move slowly from north southwards. The pollution level was lifted during the morning hours and it was clearing up during the late morning hours.

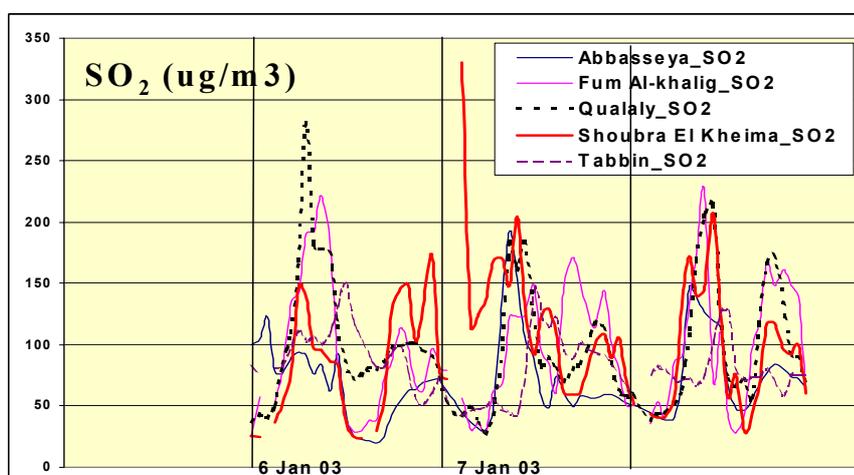


Hourly average PM₁₀ concentrations recorded at 4 sites in Cairo from 6 to 8 January 2003.

As seen from the observations the PM₁₀ concentrations reached 550 to 700 µg/m³ in the morning hours of 7 January. The peak at Tabbin occurred later in the day at around at noon. The concentrations here were about 400 µg/m³.

The morning hours of 8 January were even more polluted, and the level stayed at around 500-650 µg/m³ till noon at all sites. Between 11:00 and 13:00 hrs the level reached between 1000 and 1600 µg/m³ at Abbaseya.

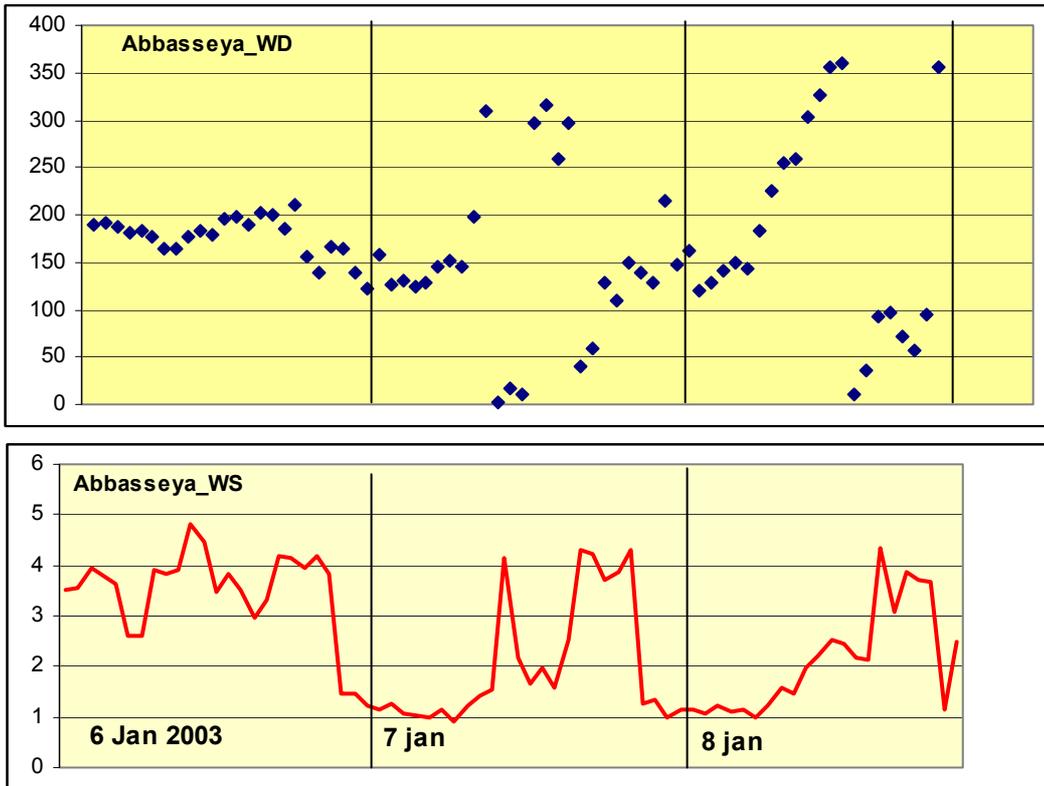
The SO₂ concentrations did not seem to reach very high concentrations during this episode.



SO₂ concentrations measured at 5 sites in Cairo on 6 to 8 January 2003

However, concentrations of around 100 to 200 µg/m³ were prevailing during these days. The diurnal pattern seemed to be typical for the city centre of Cairo with maxima during late morning and afternoon hours.

The episode can be explained by very low wind speeds occurring in the morning hours of 7 and 8 January 2003. The wind directions also changed from the normally prevailing southerly winds at this time of the year to northerly winds. The wind started to blow from north at Kaha already in the evening of 6 January.

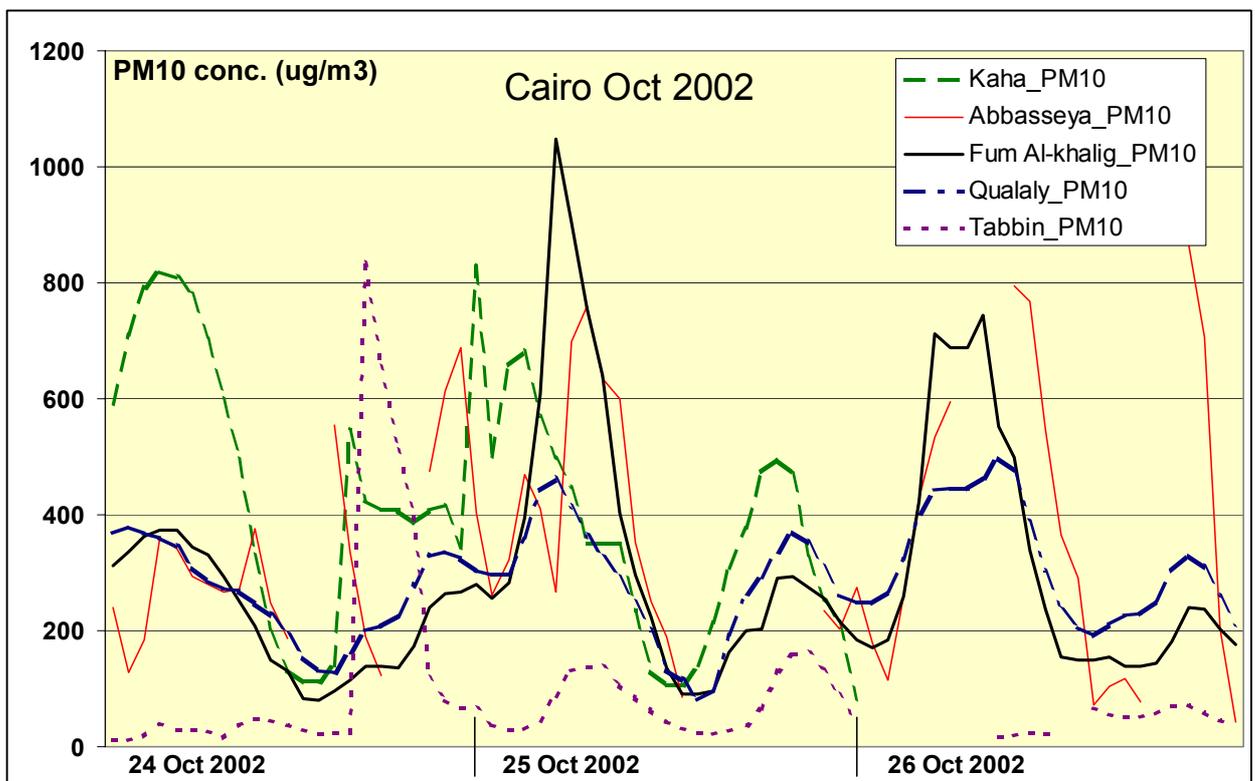


Wind directions and wind speed measured at Abbasseya 6 to 8 January 2003.

Appendix F5 Dust episodes in Cairo October 2002



Dust episodes in Cairo October 2002



High concentrations of PM_{10} were observed at all sites in the Cairo area. The patterns in the morning of 25 and 26 October seem to reflect local generated PM_{10} originating mainly from traffic.

The concentration pattern outside Cairo city centre, at Kaha and Tabbin, varies differently from that inside the city. The highest concentrations are observed in and along streets.

Appendix G

CAIP data



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

Meeting

Date: 11 March 2003
Present: Mrs Ekhlas Gamel EIDin, Mr Said, Ashraf Saleh Ibrahim, BS
Referent: Bjarne Sivertsen (BS)

CAIP data

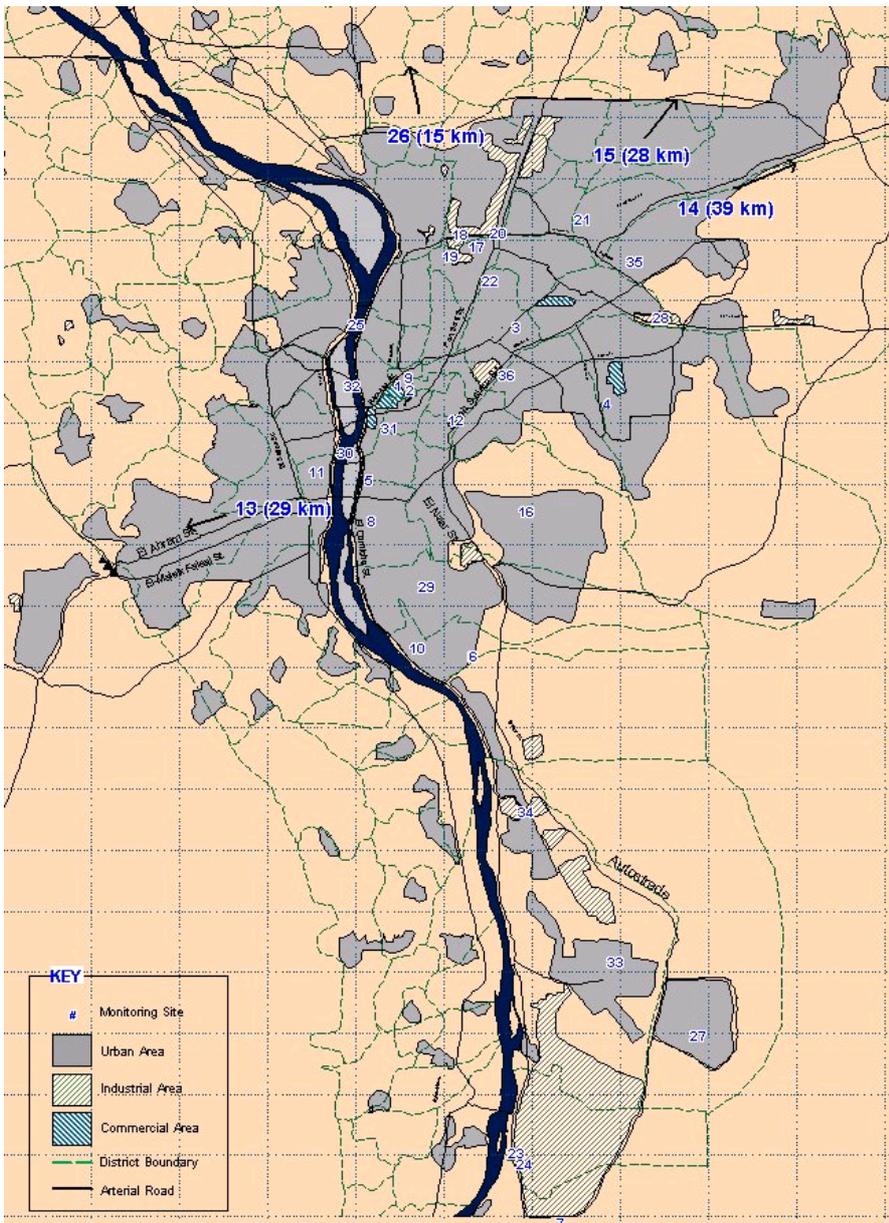
Introduction

A meeting was arranged with Dr. Ekhlas to discuss the present CAIP air pollution monitoring programme. The objective was also to discuss the quality of the measurements as well as get access to data from CAIP measurements as input to evaluate a total national monitoring programme for Egypt.

Monitoring programme

The PM₁₀/PM_{2.5} monitoring programme in the greater Cairo area has been reduced from 36 to 20 sites. A map in Figure 1 indicate the positions of the following sites:

i.d.	Site name	i.d.	Site name
1	El Qualaly Square	22	El Waily
3	Kobry El Kobba	25	Imbaba
7	Tebbin South	26	Kaha
11	Giza/AGL	29	Basateen
10	Maadi/EEAA	31	Tahrir sq.
13	6th October City	32	Zamalek
16	Mokatam	33	Helwan
18	Shobra Kheima/MYC	34	El Massara
19	El Sahel	35	Heliopolis
21	Matarya	37	Abu Zabal



Measurement sites for PM_{10} and $PM_{2.5}$ using AirMetrics samplers in Cairo area (CAIP programme)

Sampling is undertaken every six day. The analyses have been undertaken at the Institute for Geological Surveys. Monthly reports are being prepared, but are delayed by about 5 months. The analyses take 2 months to finalise. This “problem” are being looked into and would be solved if analyses was to be undertaken at EEAA.

The AirMetrics samplers that have been collected when reducing the programme are presently being stored at EEAA and used as spare parts. These spare instruments could in the future unit EEAA air quality measurement programme also be used to supply the EIMP part of the programme. These possibilities will have to be discussed and solved as soon as possible.

The CAIP programme also operates 4 meteorological stations (simple Met1 instruments). The meteorological stations are located at: Kaha, Aby Zabal, Maadi and Tabbin South.

Examining the possibilities of retrieving the raw data from these station have shown that the software supplied by these instrument do NOT allow hourly data for longer periods to be imported into a database from which these data could be used for statistics with air quality data. This will also have to be studied in more details. Solutions may be found using another database system for storage.

Some comments on the data were presented. The Shoubra site together with Abu Zabal is considered very important data for information. The highest lead concentrations are also found in this area.

Also Tabbin South is considered an important measurement area due to the high exposure of suspended dust to the population here.

The Kaha site should according to the objectives represent a “background” area. However, there are so much activities, open air burning etc. in that area that the concentrations of PM₁₀ is on the same level as in the city of Cairo.

CAIP data for October 2002

Typical concentrations of PM₁₀ and PM_{2,5} measured by the Cairo Air Improvement (CAIP) project for October 2002 is presented in the following table.

	PM2.5	PM10
Abu Zabal	138,9	249,7
Shobra Kheima/MYC	105,7	218,3
Imbaba	123,6	215,5
El Waily	120,5	213,8
El Qualaly Square	93,9	203,2
Kaha	118,0	189,1
Matarya	96,7	174,7
Giza/AGL	111,0	170,4
El Massara	63,5	168,6
Basateen	77,9	164,6
Kobry El Kobba	99,3	148,4
Maadi/EEAA	67,3	135,6
Helwan	54,1	119,3
6th October City	61,6	114,5
Heliopolis	64,7	108,9
15th May City	55,2	100,3
Tebbin South	93,6	a

The five sites where the highest concentrations of PM₁₀ and lead (Pb10) were measured during October 2002 are presented in the following tables.

TOP 5 PM10

Site_No	Site_Code	Easting	Northing	Average
37	Abu Zabal	342637	3350930	249,69
18	Shobra Kheima/MYC	332797	3332591	218,28
25	Imbaba	328829	3329039	215,46
22	El Waily	337635	3330857	213,80
1	El Qualaly Square	330594	3326603	203,23

TOP 5 Pb10

Site_No	Site_Code	Easting	Northing	Average
21	Matarya	337635	3333406	2,0
1	El Qualaly Square	330594	3326603	1,5
34	El Massara	335395	3309097	1,1
18	Shobra Kheima/MYC	332797	3332591	1,0
37	Abu Zabaal	342637	3350930	1,0

Summary from the October CAIP report

The October 2002 average ambient PM_{2.5} concentration for all sites was 90.9 µg/m³. This average was higher than the average for September 2002 of 62.4 µg/m³. Increases in the October 2002 PM_{2.5} levels were recorded at a number of sites. Sites with the most significant increases are Abu Zabal (122.8%), Kaha (115.3%), Besateen (80.6%) and Matarya (57.1%). The maximum PM_{2.5} concentration recorded during October 2002 was 140 µg/m³ at Site No. 37, Abu Zabal. While The maximum PM_{2.5} concentration recorded during September 2002 was 112 µg/m³ at Site No. 03, Kobry El Kobba.

Sites with the most significant decreases are Kobry El Kobba (-11.3%), Old Maadi (-7.2 %), and El Qualaly Square (-2.4%).

Appendix H

What is AirQUIS?

What is AirQUIS?

The AirQUIS system was developed by institutions dealing with air pollution, information technology and geographical information systems (GIS). The combination of on-line data collection, statistical evaluations and numerical modelling enable the user to obtain information, carry out forecasting and future planning of air quality.

The system can be used for monitoring and to estimate environmental impacts from planned measures to reduce air pollution.

The AirQUIS system contains the following modules:

- Geographical Information System (GIS)
- Automatic Data Acquisition System (ADACS)
- Measurement
- Statistical and Graphical Presentation Tools
- Emission Inventory
- Emission Model
- Wind Model
- Dispersion Model
- Exposure Model



On-line measurement system

A measurement system of modern on line sensors for selected air pollution indicators can be designed specific for the area concerned.

A specially designed data logger for meteorology and air quality is included in the system. The logger is robust and may serve as a local backup storage in case of line break down. The measurements are automatically transferred from the monitoring sites to a central data base for quality control.

Data quality control is performed at different levels in the data collection process; in field during automatic and manual calibrations and controls, at the central data collection base, and in the approvals of the final storage database, where statistics and data graphics are used to check the validity and representativity of the data.

The emission inventory database

A modern database for the air pollution emission inventory has been developed. The emission module is a flexible system containing a user friendly map oriented inter phase to treat the main sources for emission to air such as industry, traffic, energy (consumption of fossil fuels) and emissions related to other mobile sources such as airport and harbour activities.

The industry emission module allows the user to select sources related to specific activities or areas. The time variation of emissions can be entered specific for each source or for groups of sources. Based on emission factors, emissions can be calculated from consumption data.

The traffic module is the most complex part of the emission module, includes road types, vehicle type distribution, traffic time variation and emission factors dependent on parameters such as vehicle type, traffic speed and road type.

Atmospheric dispersion models

The models included in the AirQUIS system covers air pollution on all scales; along s

roads, industrial emissions, gridded pollution from household etc. within the urban areas and on a regional scale.

The NILU developed source oriented numerical dispersion model EPISODE calculates spatial distribution of hourly concentrations of SO₂, NO_x, NO₂ and suspended particles. The NILU models ROADAIR and CONTILENK are used to estimate sub grid concentrations close to roads within the square grid. A puff-trajectory model, INPUF, is used to calculate the influence of point sources. All model results are displayed using the integrated GIS Module.

Exposure

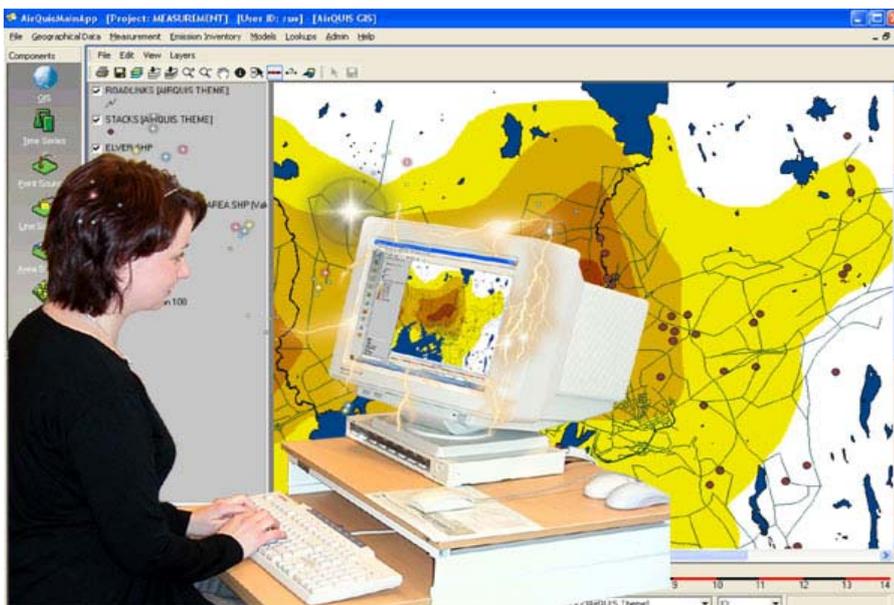
Based on concentration calculations and population distribution, exposure estimates for human health can be performed. The exposure estimates can be related to air quality guidelines or other air quality indicators used for the component considered.

The Geographical Information System

The integrated geographical information system is used as a platform for integrating the presentation of measurements, emission inventory and results from model estimates. The geographical information system is directly linked to the databases, from which statistical evaluations, graphical presentations and spatial distributions of emissions and model results can be presented.

Air Quality Planning

One main application of the AirQUIS system will be as an effective tool for air quality abatement strategy. The contribution of air pollution from different source categories such as traffic, household and industry to the population exposure in an urban area can be calculated based upon data on emissions, dispersion and population distribution. Different recommended measures to reduce air pollution can be evaluated due to population exposure and cost-benefit or cost-efficiency analyses. A priority list of the selected measures can be developed, taking into account air pollution exposure, health aspects and related costs.



Appendix I

Seminar



**Environmental Information
and Monitoring Programme
Phasing out Phase
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt**



Seminar

Air Quality Monitoring and Assessment in Egypt

The seminar will update the participants on the air quality monitoring programme for Egypt established as part of the Danida EIMP programme developed for EEAA.

The seminar will present the background for the selection of measurement sites and indicators. It will show measurement results, discuss the air quality of Egypt and look into the future for air quality assessment and planning.

A modern air quality monitoring and information system has been established for Egypt as part of the EIMP programme. The measurements combine on-line monitoring and standard sampling methods of the most important air pollutants and meteorology. The selected pollutants are in accordance with the air quality standards given in the environmental laws of Egypt, and are also similar to the internationally recognised air pollutants as given by e.g. the World Health Organisation.

The key features of the modern environmental information system is the integrated approach that enables the user in a user friendly way to not only access data quickly, but also use the data directly in the assessment and in the planning of actions. The demand of the integrated system to enable monitoring, forecasting and warning of pollution situations has been and will be increasing in the future.

Results of the monitoring programme with on-line data input may serve as information to politicians to planners and to the public. Simple forecast procedures have been established based on air quality statistics. Data have been reported daily to EEAA. These procedures may be further developed to serve as information to the public.

Further developments of the databases linked to emission inventory models and atmospheric dispersion models could further be applied to perform Environmental

Impact Assessment and air quality planning. The seminar will indicate some of the possibilities in this field.

Presentations have to be designed to meet the specified needs for different users such as:

- ◆ Authorities at different levels (municipal, regional, national, international),
- ◆ Industrial users,
- ◆ Schools, universities and the scientific community,
- ◆ Various organisations,
- ◆ The public and media.

The air quality monitoring network in Egypt comprises 43 sites covering all Egypt. The most advanced programme is undertaken in the Cairo and in the Alexandria area. Sites have also been selected in the Delta, in the Canal area and in Upper Egypt. A specially designed simplified sampling programme has been designed to cover industrial areas and sites of specific interest.

The Monitoring Institutions selected to serve the programme in Egypt is the Centre of Environmental Hazard Mitigation (CEHM) at Cairo University and the Institute of Graduate Studies and Research (IGSR) at the University of Alexandria.

Presentations of the results seen from a political point of view, and compared to national and international standards of the environment will be presented during the seminar. Examples of reports produced by the programme as well as discussions of specific problems and air pollution episodes will be part of the seminar.

Contents of the seminar

The contents of the seminar are presented below, based on a duration of 3 days. The topics indicated may be discussed and the participants will be asked to request and discuss matters of specific interest.

Day 1:

Introduction

Monitoring Programme design

- Objectives
- Design the programme
- Site selection, the sites in Egypt
- Indicators selected for Egypt (EIMP)
- About some of the instruments.

Monitoring operations

- Data retrieval and QA/QC
- Data Quality Objectives
- Data retrieval and storage
- Data retrieval via telephone lines

Data presentations

- Daily reports

- Monthly reports
- Annual reports

Day 2

Data presentations (contin.)

- Air quality and meteorology
- Particles in air (PM₁₀/PM_{2.5})
- Sampling data
- Air pollution episodes

Dispersion and meteorology

- Wind
- Turbulence
- Atmospheric stability

Dispersion models

- Different types of models
- Input data needed
- Emission inventories
- Gaussian type models
- Puff trajectory models
- Numerical models

The Air Quality Management platform

- Introduction
- Model applications
- Demonstrations

Day 3

Another database ?

- Databases for on-line AQ data
- Report generators
- Statistics and data presentations

Air quality assessment

- A tool for air quality assessment
- Modelling of air pollution concentrations
- Exposure modelling
- Air quality forecasts

AirQuality planning

- Data dissemination
- Impacts assessment
- Abatement strategy planning

Appendix J

Administrative work

Appendix J1 Air quality planning for improvement



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

Meeting

Date: 1 March 2003
Present: Dr Mawaheeb, Ahmed Abou Elseoud (AAE), BS
Referent: Bjarne Sivertsen (BS)
Distribution: Participants, Haytham Ahmed (HAA)

Air quality planning for improvement

1. Introduction

Dr Mawaheeb asked directly in the meeting:

- What are the reasons for the “black episodes”?
- What can we do to reduce the impact during these episodes?

It was further stated that the air quality data that are being collected by the EIMP programme as well as those reported from the CAIP programme will have to be used in the future as a basis for improving the air quality of Cairo.

A possible approach to meet these questions will be to start preparing the tools for performing an air quality management planning system to prepare an extensive assessment study and to prepare a master plan for air quality in Cairo. The tools for such planning including optimal abatement strategy planning are available. Some of these thoughts have been presented in a memo to EEAA before and some major comments are presented in the following.

2. EIMP data presentations

Air quality data collected by the air pollution monitoring system at EIMP/EEAA will be automatically transferred to the Monitoring Laboratory. simpler data base system developed by the EIMP programme is being used to present data.

The Monitoring Laboratory produces quarterly data reports based upon analyses of data performance data availability and some simple statistics. A GIS based presentation tool has been tested based on development by EEIS (Canadian project).

The final evaluation and presentation of the results of the air quality measurements may be produced for the Authorities, for planners and for the public by EEAA personnel.

These reports do, however, not include the tools for Environmental Impact Assessment (EIA). may be used by decision makers and may support specification of measures to reduce air pollution loads.

For this work the EEAA will need a data base with statistical and numerical tools, included a Geographical Information System.

2.1 Data bases and presentation tools

The necessary tools available to meet the needs of EEAA in the future are very scarce. An investigation has revealed that most of these data bases have been specially designed to meet the well defined questions asked by specific users; institutions, authorities or organisations.

The NILU developed AirQUIS system is one of the most complete platforms for combining air quality monitoring, assessment and planning. AirQUIS operates in several modules, including ambient air quality data, air emission data, dispersion and exposure modelling and a user-friendly presentation system. It has the ability of adaptation to specific user needs.

3. AirQUIS

NILU together with COWI has applied this system in Romania, and NILU is using the system in more than 30 locations worldwide. The EIMP team leaders presented the technical background for the implementation of AirQUIS as part of the EIMP programme at an early stage of the project.

However at that time EEAA/EIMP wanted to locally develop a database only for data presentation.

The AirQUIS system is developed for air quality surveillance and planning includes:

- Module for data acquisition and quality control
- Manual data entering application
- Database for storing measured data
- Database for storing emission inventories
- Emission models
- Dispersion models
- Population exposure models
- Statistical tools and graphical presentation tools

The whole system is based on an user friendly interface including an integrated GIS (Geographical Information System) interface.

A schematic presentation of the system is given in Figure 1.

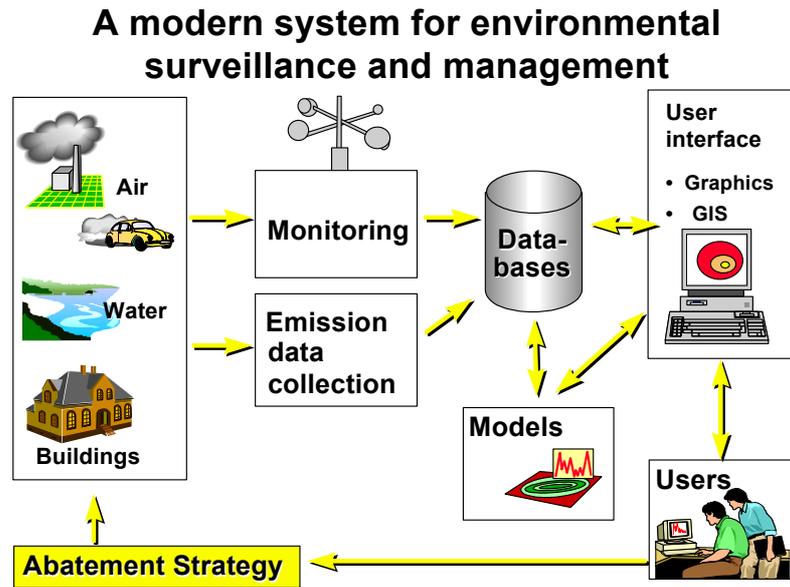


Figure 1 : A Simple layout illustrating the content of the AirQUIS system

4. EEAA needs

At present the most urgent need at EIMP/EEAA is update the capacity to store and present ambient air quality data as part of the EIMP/ EEAA programme. The AirQUIS measurement database can be used for this purpose. This database is an integrated part of AirQUIS, and is running under the same user interface as the emission database discussed above. The solution will save the users from having to relate to two different systems, and will provide them with the opportunity to present measured data and emission data with the same functionality. Financially it is reasonable to choose this integrated solution, as the installation costs should be less than that of two separate applications.

4.1 . The Ambient Air Data Base and Presentation Tool

In this document, however, we propose to install the following modules under the EIMP project:

- database for storing measured data
- data statistics and presentation tools
- user interface including integrated GIS

The emission inventory database has been taken out, but may of course be included later, also with area-distributed data and traffic data if needed. This proposal includes the installation of AirQUIS on one server and up to eight PC clients. This computer functions as an application server, serving client installations on other computers in the EEAA internal network. If such client installations are desired to make the system more available to the EEAA staff, the associated time costs and licenses should be discussed before a final agreement can be made.

4.2. Training and interfaces

In addition to installation of the above-mentioned software, 'on site' training of project personnel is needed as well as any necessary software customising to comply with given formats on input data. Also, an automatic functionality for on line transfer of measured data from the data acquisition system must be customised for communication with the measurement database.

4.3. Installations and training

The PC AirQUIS server with a complete and adapted AirQUIS installation will be brought to EEAA, and put in use. The AirQUIS Site Acceptance Test (SAT) will be performed. This task will terminate in EEAA's official acceptance of the AirQUIS installation. It is assumed that key personnel will take part in the installation of the system, so that this will constitute a part of the 'on the job' training. The training sessions will deal with both data system handling in addition to relevant theory and practical use of the system.

5. Future use

For the future use of the modules including the emission inventory system and the dispersion models a group experts will support the new emission personnel in organising and structuring the collected point source emission data. Also, support may be given in importing these data into the AirQUIS emission database and reporting the contents of the resulting point source emission inventory.

The models that can be used for impact assessment and long term planning will be the third module in the system. Training will also be needed for experts to operate the modelling system.

The dispersion models can also in the future be linked to dynamical meteorological forecast models to improve the air quality forecasts for Cairo.

It is strongly recommended that EEAA is planning in this direction, and that a proposal for this long term development is followed up by EEAA.

Appendix J2 Staff Meeting 1 March 2003



Staff Meeting

Date: 1 March 2003

Place: EIMP Office

Participants:

Ahmed Abou Elseoud (AAE), Khaled Hamdy (KH), Ayman El-Maazawy (AEM) ,
Haytham Ahmed (HAA), Mohamed Awad Shendy(MAS), Al Shabrawy
Mahmoud (SMI),
Hossam El Shakhs (HS), Mohamed Kassem (MK) , Ashraf Saleh Ibrahim(ASI),
Mai Ezz El din Ahmed (MEA) , Bjarne Sivertsen (BS)

Absent: Naglaa Darwish (NMD),

Prepared by: KH

Distribution: EIMP Staff

Component	Task Description	Start Date	End Date	Person
1- Institutional Support	Perform EIMP weekly backup;	Weekly	Weekly	AEM
	Perform Anti Virus update and Cleanup;	Weekly	Weekly	AEM
	Contact EEAA-IC to repair two Monitors for EIMP office;	1 March	5 March	AEM
	Contact CEHM regarding M.B. problems in some Monitoring stations;	1 March	5 March	AEM
	Continues doing C.W yearly reports;	1 March	5 March	MK
	Preparing report for Jacob regarding the Air Database problems.	1 March	5 March	HS
2- Coastal Water Monitoring	Continues Preparing News letter for visual observations in 2002;	1 March	5 March	SMI&MAS
	Following up with Cherman Office about C.W contract for 2003;	1 March	5 March	SMI&MAS
	Following up EIMP Payment with Admin. Dept.;	1 March	5 March	SMI&MAS
	Preapre a memo for approval to disterbuite annual report;	1 March	5 March	MAS
	Attend ArcGIS 8 in Q.S	5 March	11 March	SMI



Staff meeting (cont.)

3- Air Pollution Monitoring	Start preparing the annual report;	1 March	5 March	HAA
	Visit CEHM to review the status during the last period;	1 March	5 March	HAA&BS
	Review the 4 th quarter report of CEHM;	1 March	5 March	BS
	Follow up with IGSR to send the 4 th quarter;	1 March	5 March	HAA
	Follow up the daily work of the air quality network.	1 March	5 March	HAA
	Start preparing Feb. monthly report on the Air quality in Egypt;	1 March	5 March	ASI
	Follow up with CEHM chemical Lab to provide data at a time;	1 March	5 March	ASI
	Perform QC/QA of the monthly data with IGSR& CEHM;	1 March	5 March	ASI
	Prepare the daily report and provide data hourly.	1 March	5 March	ASI
4- Reference laboratory	Arrange with Bejarn for ordering Gas cylinders;	1 March	5 March	MAI
	Arrange for Air Seminar;	1 March	5 March	MAI & NIS
	Audit Air stations;	11 March	11 March	NIS
	Arrange with RefLab for Ulla's Mission requirments	1 March	5 March	MAI

Appendix J3 Newsletter

Air Pollution Episode over Cairo 7-8 January, 2003



15 Feb. 2003

Newsletter #7, Air Quality, Issue 4

Calm conditions caused Air Pollution episode over Cairo



The EEAA/EIMP Air Quality Monitoring Programme

A total of 42 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
- 8 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 have been observed frequently during the last few years in Cairo due to high emissions of air pollutants from different sources combined with some specific meteorological conditions. One such episode occurred 7 to 8 January 2003 when winds over Cairo dropped to almost calm conditions and the direction of wind changed from the prevailing southerly winter conditions to winds from the north.

During the morning hours of 7 January 2003 the suspended dust concentrations measured as PM_{10} reached 550 to $700 \mu g/m^3$. The peak at Tabbin occurred later in the day around noon. The concentrations there were about $400 \mu g/m^3$. SO_2 concentrations in the city center were observed in the late morning hours at about $200 \mu g/m^3$. In the morning hours of 8 January the air over Cairo was even more polluted



High air pollution levels observed over the city center of Cairo on 7 Jan in the morning with dark cloud covering the area. This cloud is shown in the above photo taken from Maadi towards Cairo between 07 and 08 AM on 6 January 2003

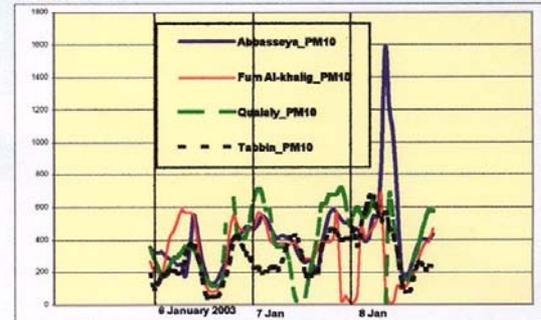


Fig1: PM_{10} concentrations at 4 sites in the Greater Cairo area

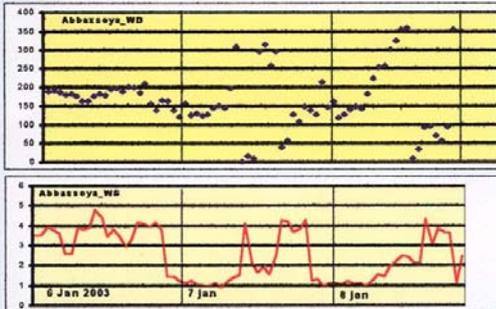


Fig2: Wind speed (WS) and wind direction (WD) at Abbasseya

The level stayed at around $500-600 \mu g/m^3$ till noon at all sites. Between 11:00 and 13:00 hrs the level reached between 1000 and $1600 \mu g/m^3$ at Abbasya. The episode can be explained by very low wind speeds occurring in the morning hours of 7 and 8 Jan. 2003. The wind direction also changed from the prevailing southerly winds to northerly wind. The episode was more critically caused by changing weather conditions than from changes in emissions.

The EIMP is implemented by the Egyptian Environmental Affairs Agency (EEAA) with support from the Danish International Development Assistance (DANIDA)

Appendix J4 Reminder



**Environmental Information
and Monitoring Programme
Phasing out Phase**

EEAA - Danida - COWI

30 Misr-Helwan Str. Maadi, Cairo, Egypt

Tel: 202 525 6442, Fax: 202 525 6467

Memo

Date: 16 March 2003
To: Ahmed Abou Elseoud (AAE),
Copy: Haytham Ahmed (HAA),
From: Bjarne Sivertsen (BS)

Reminder at end of Mission 01 from BS

Introduction

The following list is a summary of items identified during Mission 01 from B Siverten concerning the EIMP Air Quality Monitoring Programme.

1. Shelters need repair (CEHM and IGSR will identify needs and do it!) (HAA)
2. Order calibration gases as soon as possible
3. Get spare parts from CTS as soon as possible. They will be available at CTS at end of March according to Dr. ElSoueini. –additional spare parts from CEHM
4. Follow-up comparison studies at CEHM and IGSR concerning passive sampling results versus sequential samplers performance. Results will be reported in the Quarterly reports from CEHM and IGSR.
5. The NH3 sampler at AbuQir needs to be removed and transported to CEHM for maintenance. More training needed for IGSR expert.
6. Prepare moving shelter from Academy at Abu Qir (IGSR task)
7. VOC sampling programme has to be followed up. When will VOC sampling start at IGSR. Feedback on mail to BS!
8. Prepare time for Seminar during next Mission. (3 days) (BS)
9. Discuss possible changes in the programme, including new site studies during next Mission. (AAE, BS)
10. Co-ordinate met sensor calibrations with CAIP programme. Hani has calibrators and equipment for calibrations, which EIMP and CEHM do NOT have. (HAA, CEHM)
11. Follow-up proficiency test for the air component performed by Ref lab at AinShams Ulla is performing audits!
12. Check that measurements at Ras Mohamed starts again.

13. Request results of the PM₁₀ (Hivol/AirMetrics) inter comparisons

