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Report from Workshop 1, 1998 Ulvik/Oslo, Norway 11-15 May 1998

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Project Leader

Air Quality Management and Planning System for Guangzhou

(NORAD Project CHN 013)

Participating Institutions:

P.R. China: GMSTC, GEPB, GRIEP, GEMC
Norway: NILU, IFE, CICERO, ECON

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Guangzhou Air Quality Management and Planning System

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Ulvik/Oslo, Norway, 11-15 May 1998

1. Introduction

The Sino-Norwegian cooperation project "Guangzhou Air Quality Management and Planning System" holds two workshop per year. The 1st workshop in 1998 was held in Oslo and Ulvik in Norway on 11-15 May. The arrangement of this workshop in Norway was according to the final overall Project Plan, and it was arranged according to the agreement about this made between the partners, at the 2nd workshop in 1997 in Guangzhou.

The workshop was attended by the full NORCE team, and from Guangzhou by the project leader Mr. Wu Zhengqi and by 6 project-associated people (including Mr. Sun from the project office). In addition a delegation consisting of altogether 7 representatives from GSTC and GEPB attended the workshop. The delegation also had a program visiting various institutions in Oslo working on air pollution monitoring and control (see Appendix 2). The workshop was also attended by the SSTC representative at the PRC Embassy in Oslo, Mr. Luo Delong.

The workshop participants from Guangzhou arrived on Friday 8 May. On 9 May the participants transferred by train to Ulvik, and Sunday 10 May was used for sightseeing and workshop preparations.

Before the workshop, the task teams had prepared status reports, which were to contain the following points:
1. Work performed since last workshop (November 1997);
2. Problems and proposed solutions;
3. Modifications to the detailed work plan of each task;
4. Plan for the next 6 months.

The status reports were given to all participants before the start of the workshop. They are included in chapter 4 in this report.

During the workshop it became apparent that there was a need for a clear reporting of the task interrelationships and how and when they would deliver the needed input/output between tasks. This was necessary to see clearly how the task/time schedule presented at the last workshop for arriving at a first version of an action plan by the end of the year, could be met. Each task team thus produced a summarized report about this, found in Chapter 2.3 in this report.

This workshop report contains the following:
- Chapter 2: Proceedings of the workshop;
- Chapter 3: Conclusions and recommendations;
- Chapter 4: Status reports.

2. Proceedings

2.1 Program and participants

The program which was proposed before the workshop was modified somewhat during the course of the workshop. The final program is given in Annex 1. The main contents was as follows:

Monday 11 May:	Opening Preparatory task work Presentation of task status reports (for Tasks 1-8)
Tuesday 12 May:	Continued presentation of task status reports (Tasks 9-12) Discussion Meeting in the Project leading group
Wednesday-Thursday 13-14 May:	Partly task work, partly visit to ECON and to other institutions in Oslo
Friday 15 May:	Visit to IFE and NILU Closing session, with presentation of updated task status, and discussion Evening: Workshop closing dinner

The list of participants is included on the next page. It includes 14 persons from the Guangzhou side (7 from the project and 7 from the delegation), and 11 persons from the NORCE side, in addition to the representative from the Embassy of PRC.

Guangzhou-NORCE Project, Workshop 1 1998
List of participants

Guangzhou Team:

Name		Title	Institution
Wu	Zhengqi	Director, Project Leader, GZ	GRIEP
Sun	Dayong	Project Office Leader	GEMC
Cui	Xia	Task Leader	GRIEP
Fan	Changzhong	Task Leader	GRIEP
Fang	Xingqin	Task Leader	GRIEP
Jian	Jianyang	Task team	GESI
Yu	Jican	Task Leader	GRIEP

NORCE Team:

Name		Title	Institution
Larssen	Steinar	Project Leader, NORCE	NILU
Aunan	Kristin	Task Leader	CICERO
Gram	Frederick	Task Leader	NILU
Henriksen	Jan F.	Task Leader	NILU
Krogh	Thomas	Task Leader	IFE
Riise	Atle	Task Leader	NILU
Slørdal	Leiv Håvard	Task Leader	NILU
Tønnesen	Dag	Task Leader	NILU
Vennemo	Håkon	Task Leader	ECON
Yaeger	Andy	Task Leader	IFE
Zhao	Xu	Task team	ECON

Delegation Team:

Name		Title	Institution
Zeng	Shidu	Director	GSTC
Ma	Xiaoming	Vice Director (Section)	GSTC
Liu	Zhenyong	Director (Section)	GSTC
Lie	Zengbiao	Vice Director	GEPB
He	Rongyou	Vice Director	GEPB
Wang	Liping	Vice Director (Section)	GEPB
Feng	Lin	Translator	GEPB

Luo	Delong		Embassy of PRC, Oslo

2.2 Summary of workshop deliberations

Monday, 11 May

OPENING SESSION

Mr. Larssen, NORCE Project Leader, welcomed the participants to the workshop, and expressed a special welcome to the Delegation of representatives from GSTC and GEPB, and the project representatives from the Guangzhou side, especially the GZ Project Leader, Mr. Wu and leader from the Project Office, Mr. Sun.
He said all the NORCE side was almost completely represented at this workshop. There has been some changes in the NORCE team, and the new participants, including those who had not participated in the workshops before, were presented:

- Mr. Leif Håvard Slørdahl, NILU has replaced Mr. Riise as Task Leader for Tasks 3 and 5. Mr. Riise is leaving NILU for at least one year, starting 1 July, 1998.
- Mr. Thomas Krogh, IFE is assisting Mr. Yager on Tasks 2 and 7.
- Mrs. Kristin Aunan, CICERO, Task Leader for Task 6.1 participated directly in workshops for the first time.
- Mrs. Xu Zhao, ECON is assisting in ECON's work on Tasks 8,9 and 10.

Mr. Zeng Shidu, Director of GSTC, the leader of the delegation, in his opening address described some of the recent developments in Guangzhou of importance to the air pollution situation in the city. Extensive road construction (inner/outer ring roads), subway lines and reorganizing of the port activities would lead to improved traffic conditions, while on the other hand the strong increase in traffic, transport demand and number of cars continues.
Some recent regulations of large interest:

- Unleaded gasoline is now available all over Guangzhou;
- Gasification of buses (and trucks?) is under way. Public vehicles will come first.

The government of Guangzhou puts large emphasis on our project in their continued work to improve the air pollution situation in the city.

Mr. Larssen presented an overview of the project plan for 1998, and commented on related issues.
A summary of the overall project plan is represented by the task/time schedules made during the last workshop in Guangzhou (see the Annual report 1997), see the figures on the next 2 pages. The first figure gives some of the important connections between the tasks, and the time sequence of the information flow between them. The second figure gives the task/time schedule for the development of the abatement strategy and the action plans.

GZ AIR Quality Management & Planning System

Task / time schedule, information flow

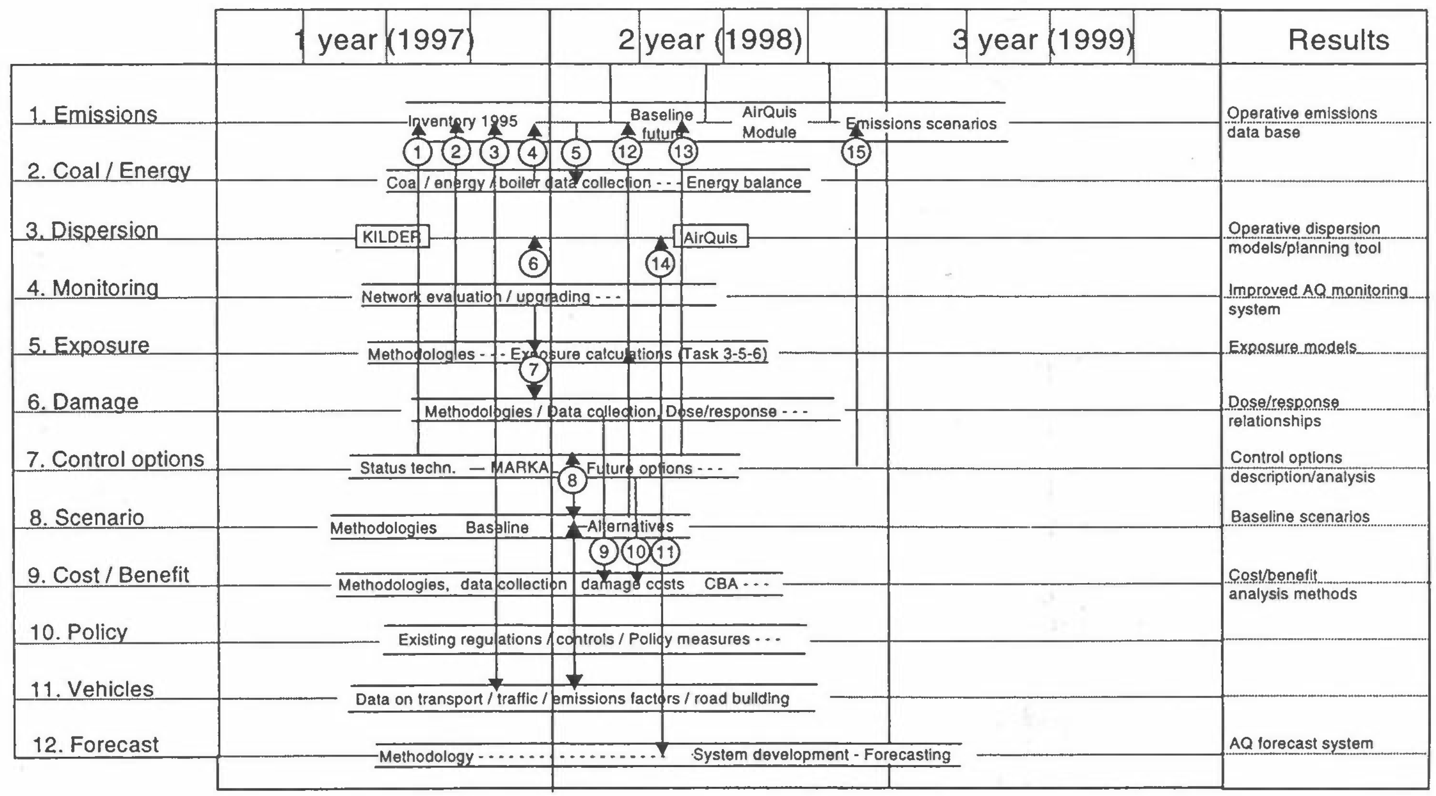

Figure 1: GZ AIR Quality Management & Planning System. Time/task schedule information form

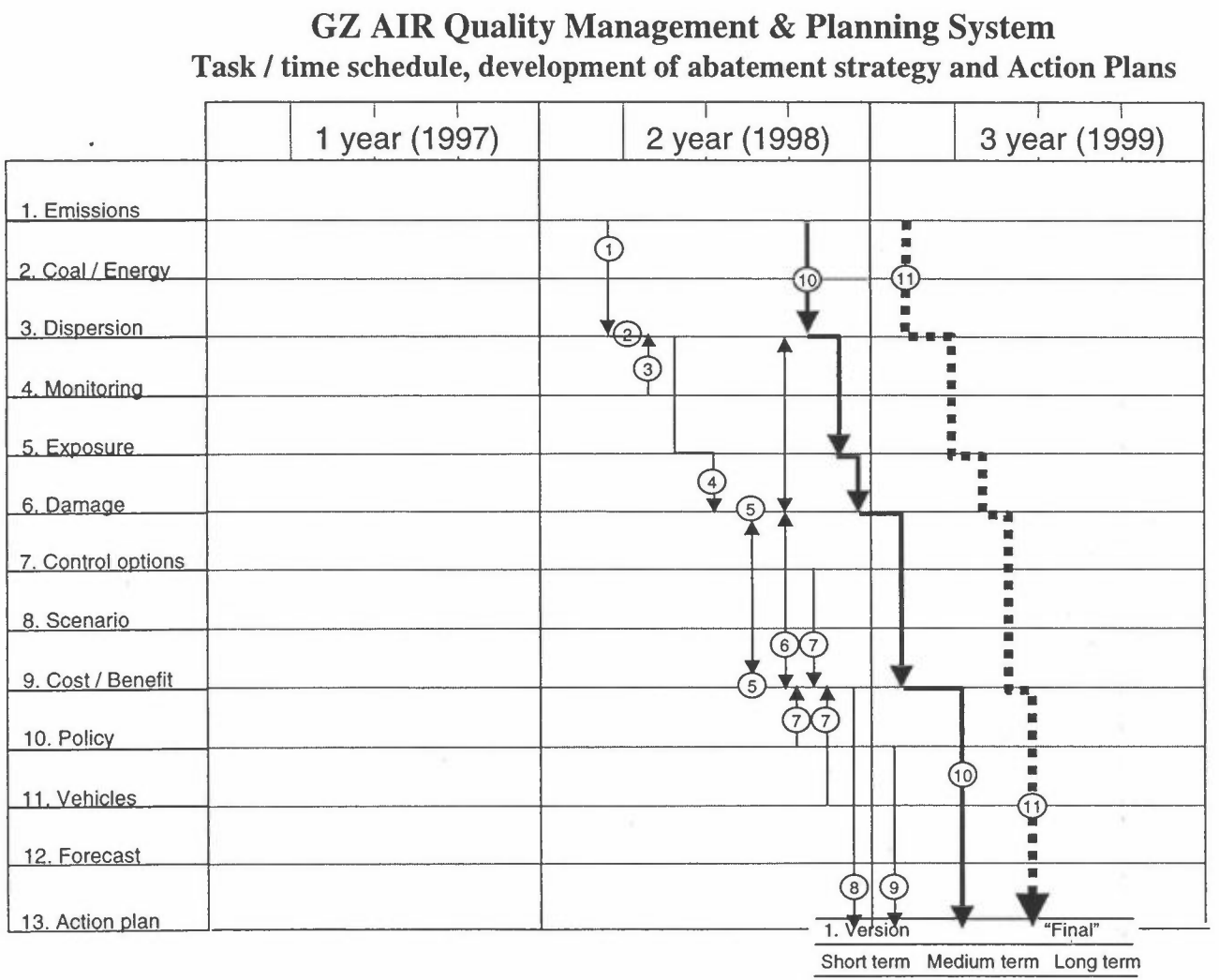

Figure 2: GZ AIR Quality Management & Planning System. Time/task schedule development of abatement strategy and Action Plans

In 1998, the first version of an action plan will be developed, based upon the first AQMS analysis sequence. The purpose of this first analysis sequence is for all task teams to gain experience on how to carry out such an analysis. Because of the delay in the delivery of the AirQUIS system, the first analysis will be carried out using the KILDER modeling system. This is not considered a major drawback, since the main purpose at this stage is to gain experience in carrying out the analysis sequence.

Mr. Larssen stressed the importance that all task teams follow the time schedule, and delivers to the other teams what is necessary for them to do their job.
He said that much progress has been made and intensive work carried out on many tasks, and that the status presentations should bring out problems that might be critical for keeping the overall time schedule.

Other points mentioned:
1. The applications for more funds, for Task 6.1 and for Exchange, were not accepted by NORAD and the annual meeting. This means that to cover the Exchange costs, the total available funds for the project must be re-distributed.
2. The activities of the UNDP project on NOX reductions in Guangzhou, which is going on parallel with our project, deals with many similar topics as our project. The activities in these two projects should be coupled to the extent possible, and essential results from the UNDP project should be reported to our project, through the status reports of our 12 tasks, were appropriate.
3. The reports produced in our project should be collected, numbered and listed in various report series, with similar front pages for each type of series such as: Mission reports, Task subject reports, Workshop and annual reports.

Guidance on this will be proposed by the project leaders.

Rest of time before lunch

Discussions in each task, preparations for presentations of final status reports.

SESSION AFTER LUNCH: STATUS REPORTS

The status of task 1-8 was presented (see status reports in chapter 4). The status will not be summarized here, only some important observations related to progress and missing information are noted below:

Task 1, Emissions:
The GZ team had brought with them substantial amounts of data on emissions, which so far had not been known to the NORCE team. The task team said the first version of the emission inventory will be finished by the time Mr. Jian returns to GZ (8 June).
There was a question whether emissions from construction and from industrial processes should be included. They are not included so far. These emissions may be quite important, and it is important that they are at least estimated.

Task 2, Coal pollution (presented with Task 7 the next day).

Task 3, Dispersion:
It is important to get on the way with the development of the wind field library. It is important that the server by sent from China as soon as possible, so this won't delay the installation of AirQUIS. The Embassy in Oslo will help with that.

Task 4, Monitoring:
Ozone data from GZ are not available, since the monitors have just arrived. The question is whether ozone data may be available from other places in the area, for instance Hong Kong.

Task 5, Exposure:
It is important to clarify finally what Task 5 is to do related to Tasks 3,6,8,9. This must be done during the training period now in Norway, before 8 June.

Task 6.1, Health
The need for various types of data (air quality, health statistics, meteorology, etc.) was stressed. This must be clarified in detail and finally as soon as possible, and specifications sent to the other tasks providing the data.

Task 6.2, Materials:
Also here the need for air quality data must be clarified in detail, and specifications sent to the other tasks.

Task 6.3, Vegetation:
(same as for tasks 6.1 and 6.2).

Tasks 2 and 7, Coal pollution and Control Options:
Their time schedule conforms with the total task-time schedule. Much of the needed clarifications relative to the other tasks must be done during the training period, before 8 June.

Task 8, Scenarios:
In this task, 5 reports have been (almost) completed, as a basis for the scenario descriptions. The basic scenario for the AQMS analysis, the TREND scenario, will be finished during the training period in Oslo (before 20 June). Data are still needed for baseline traffic and transport development and needs.

Tuesday, 12 May
MORNING SESSION, STATUS REPORTS

Continued presentation of task status.

Task 9, Cost-benefit:
Important in this task is to start to think about the candidate abatement measures that should be analyzed for cost-benefit. A first list should be provided by the GZ Task 13 team.

Task 10, Policy instruments:
Nothing to note.

Task 11, Motor Vehicles:
This task is still not completely integrated into the project, and the GZ and NORAD teams have some different ideas about the contents. The data from the dynamometer tests in Beijing are very important. Also, task 11 should provide the transport, road and traffic development data to the project.

Task 12, Forecasting:
The GZ team stresses the need to provide possibilities for air pollution forecasting as soon as possible (due to the requirements from the SEPA), while in the original project plan, forecasting should be ready by the end of our project. Task 12 must now very soon clarify how forecasting possibilities can be provided, and how soon.

Task 13, Action Plan development, and project administration, GZ side:
The status report for this task was given to the NORCE side after the end of the 2nd workshop day in Ulvik, and it was not presented in plenary.
The report summarizes the status regarding transfer of models and tools, and methods and materials, and lists specifically the points were something is lacking, and existing problems, as seen from the GZ side. The NORCE side will consider all these points thoroughly.

Summarizing of status, and closing remarks

Mr. Wu made the following remarks:

- There has been deep discussions between tasks this time;
- It is important to continue the task discussions, especially between tasks, while the trainees are in Norway;
- Regarding proposal of abatement measures and policies, the GZ side will give their opinion, and the NORCE side should give theirs;
- At the next workshop, the tasks should put more emphasis to present achievements, and to prepare the research reports from the task work.

Mr. Larssen made the following remarks:

To simplify our understanding of the status of this rather complicated project, it is important to keep in mind the 3 different objectives of the project, and also to keep in mind which side has the main responsibility for fulfilling the objectives:

	Main responsibility
1. a: Transfer of tools and methods	NORCE side
1. b: Transfer of knowledge and training	NORCE side
2. Development of Action Plans, including carrying out the analysis sequence of cost-benefit	Guangzhou side
3. Improvement of monitoring network	Guangzhou side

On each of the objectives, there is full cooperation between the two sides, and the Detailed Work Plans for each task contains the details of how the two sides are cooperating and sharing the work.

Regarding the overall status, it is difficult from the brief presentations today to get a full overview of the status, and to pinpoint where there might be critical tasks that may now cause a delay in the progress of the project as a whole. The tasks are fully integrated into the analysis sequence of cost-benefit (see the previous figures). At this point in time it is very important to pinpoint possible, specific problems with tasks/subtasks that may cause delay in the project as a whole.

To help in this overall evaluation of status, and also to assist each task further in understanding the interrelations between them and the importance of delivering results in time, each task was instructed to present the following overview in the final workshop plenary session on Friday afternoon:

1. How does the task contribute to the AQMS analysis sequence?
2. When will they deliver the needed input?
3. Are there any critical delays?

Project Leading Group meeting

The group met for a closing discussion after the workshop plenary.

Present: GZ side: Mr. Wu, Mr. Sun, Ms. Fang, Ms Feng (interpreter).
NORCE side: Mr. Larssen, Mr. Vennemo, Mr. Yager, Mrs. Aunan.

The GZ side distributed a copy of their Task 13 Status report. The report contains a list of achievements, and also a list of problems and parts of deliverables that had not been delivered from the NORCE side. These problems were repeated in Mr. Wu's account. Although much substantial work had been done since the last workshop, they expressed some concern about the progress of the project. Mr. Wu said that the plan since the last workshop was to have a first action plan ready at

this workshop. However, the NORCE side replied that this was a proposal from the NORCE side put forward at the PLG meeting in Guangzhou in November last year, but this was considered by the GZ side to be too optimistic, so the proposal was withdrawn.

Mr. Wu expressed that specific requirements have to be given to each task team for their continued work this year. The GZ Project Office evaluates the work of the task teams regularly, and each team is required to report on progress every month.

The NORCE side put emphasis on the substantial work which has been done on most tasks, and although there are some delays, they believe that the time schedule for 1998, to carry out the first sequence of AQMS analysis by the end of the year, will be achieved. They will look closely into all the points and problems stated by the GZ side, and correct what should have been done that has not already been carried out. NORCE agreed that specific requirements be given to the task team for their work in the coming months, so that the time schedules can be followed.

One particular point made by the GZ side regarded the air pollution forecasting (Task 12). The emphasis on this task in the project has been increased relative to what was anticipated by the NORCE side during the planning of the project. The reason for this increased importance is that Guangzhou in one of the test cities selected by SEPA last year to start air pollution forecasting, as soon as possible. The NORCE side will do what it can to speed up this task, which, according to the Project plan, should be concentrated on the 2nd and 3rd year.

Another point raised by the GZ side was the need for more meteorological data which had been specified during this workshop. This need has always been there as an implied part of the work which were to be done and described in the Detailed work Plans for the Tasks 6.1,6.2 and possibly 6.3, but it has not been detailed so clearly before.
They raised the question of who should pay for those data. These are local data which are necessary to collect in order to develop local dose-response relationships, to be used by the Guangzhou authorities and research institutions also in their further AQMS work.
The NORCE side said that this could not be paid with NORCE funds. All local data collection is the responsibility of the GZ side, and there are no provisions in the NORCE budget for purchase of data. It should be noted here that the amount of data needed is limited. Only data from one station is needed, not from many stations, as was the case for the 1995 meteorological data. This will be clarified by Task 3.

NORCE proposed that the GZ side should make a first list of candidate abatement actions, such as the ban on new MCs, which was said by Mr. Zeng to be a new, current regulation.
More generally, the NORCE side think it is very important for our project to be informed about such new air pollution relevant regulations, when they are planned, or indeed when they are passed in legislation. This should be part of the Task 10 status reports.

Mr. Sun said that the delay of the AirQUIS system is important for the GZ side. He said they have carried out C/B analysis before with tools corresponding to the KILDER system. The NORCE side would be very interested to see the results of these calculations, since they can be used as a starting point for the calculations in this project. Still, NORCE maintains that the 1st sequence of analysis using KILDER is very important as a learning experience for the GZ teams participating in our project, since they have not done this before. The next sequence with AirQUIS will be much of the same exercise, only with a different air quality assessment tool.

At this time the meeting had to be closed, because the bus was leaving for Voss and Oslo.
One last item was decided:

Time and place for the next workshop:
This will be held in Guangzhou in the period 5-15 November.

Wednesday - Thursday, 13-14 May

These days were used for task work and for visits to various institutions.
The task work included preparing an updated status report for the Friday session.

Friday, 15 May

Before noon: Visits to IFE and NILU.

CLOSING SESSION OF THE WORKSHOP (1300-1600)

Overview of AQMS analysis sequences, 1998-1999

Before the presentation of the updated task status reports, Mr. Larssen presented his opinion regarding how the analysis sequences leading to the Air Quality Management Strategies (AQMS) and Action Plans are to be carried out in 1998 and 1999. It is necessary that this is clarified, so that all tasks and participants have a common understanding of the various analysis sequences that shall be carried out.

Figure 3 below gives an overview of this. It corresponds to the sequences in Figure 2.

	Model System	Scenario	Abatement measures
1st sequence June-Nov. '98	Disp.: KILDER D/R: Existing?	1995 situation (or BASELINE)	First list
2nd sequence Jan.-June '99	Disp.: AirQUIS D/R: Local GZ	TREND	Additional feasible measures
Later sequences 1999 ⇒	"	"	Different packages of measures

Figure 3: Overview, AQMS analysis sequence

The 1st sequence is a "trial" sequence, using the KILDER system. In this sequence, the task teams will get rained in the analysis. The situation to be analyzed is the 1995 situation, which we can call "baseline". Dose-response (D/R) relations from the literature may have to be used. Abatement measures from the first list of measures (to be proposed as soon as possible by the GZ side) will be analyzed in the following way:

- If those measures were to be introduced fully today (1995), what would be the cost, and what would be the benefits in terms of reduced damage?

This sequence must be carried out during June-November, and it will produce a first version of an Action Plan.

The 2nd sequence will use the AirQUIS model system and the TREND scenario, and will analyze the situation in a future year (2005 or 2010). Local dose-response relationships shall be used to the extent possible. A more developed list of abatement measures shall be developed. This sequence shall be carried out in January-June, 1999.

Later sequences can be carried out, depending upon the results from the 2nd sequence. Packages of abatement measures may be analyzed as a whole, in an attempt to find least-cost packages that will produce an air pollution situation that will comply with given environmental objectives.

The analysis sequences are to be carried out by the GZ task teams and leadership, with full support from the NORCE team, within the limits of the project plan. The support will be strong during the 1st sequence. Later the need for support will be less.

Updated, summarized task status reports

Each task presented a status containing the following points:

1. How does the task contribute to the AQMS analysis sequence?
2. When will they deliver the needed input?
3. Are there any critical delays?

Copies of these updated status reports are given in chapter 2.3. All the reports presented specifications and time schedules for the data needed from other tasks, the data to be delivered to other tasks, and noted possible critical delays. The reports in chapter 2.3 provides the details. The following gives some important observations. **Very important items are in bold types.**

Task 1:
Preliminary complete emission inventory: By May '98;
Final emission inventory for KILDER: By August '98.
Work on AirQUIS emission inventory must start soon after that.

Task 2 and 7:
The tasks will provide needed emission factors to Task 1 during May/June.
Task 2 will finish coal boiler data collection during May/June.
Task 7 discussions and data delivery to Tasks 8 and 9 are planned during May/June.

Task 3:
Task 3 has made a detailed task/time schedule for KILDER and AirQUIS calculations, for Tasks 5 and 6.
The availability of ozone data is a problem. This is needed for NO2 calculations.
NO_2 data are needed from Task 4.
Meteorological data are needed for dispersion calculations, and must be provided. The time periods must be specified.
Task 3 was asked to speed up, if possible, the delivery of concentration data for the first cost-benefit analysis.

Task 4:
AQ report will be available in June. New monitors will be put in operation during this summer.
Specifications of the data needed by other tasks must be specified and ordered by the other tasks, as soon as possible. Responsible: Each task needing data.

Task 5:
A detailed task/time schedule has been made (as in Task 3).
Coding details re. the Interview study must be clarified. Responsible: Task 6.1.

Task 6.1:
A task/time schedule was provided.
There is still need to clarify this task in terms of:
- data needs and output re. the providing of existing dose-response relationships, and the calculation of damage;
- data needs and output re. the development of local dose-response.

Task 6.2:
Damage assessment based on dose-response (D/R) functions from the literature will be ready only in Nov./Dec. '98 due to the work on establishing the building materials inventory in GRIDS. Can this be speeded up?
D/R functions for GZ for steel and zinc will be finished when the necessary environmental data from the exposure sites and for the GZ area are available.

Task 6.3:
Reports on various items and damage assessments are to be delivered in Aug.-Dec., according to plan. **Clarification of how Task 6.3 will contribute to the C/B analysis is still needed.**

Task 7: (see above).

Task 8:
This task will keep its schedule, provided other give their input before end of June. **Data from Task 11 are especially important (development of traffic and roads, and transport demand).**
Responsible: Task 11.

Task 9:
A first list of candidate abatement measures should be proposed by Task 13 as soon as possible. First proposal: From Guangzhou side, to be discussed in Norway during the training period in May-June.
Benefit estimates can be delivered during June-November, for health, materials and vegetation damage, and cost estimates for control measures in November.

Task 10:
This task will evaluate feasibility of the proposed measures, in terms of policy instruments. Results scheduled for November-December. **This should be speeded up. Results are needed before the next workshop, in mid November.**

Task 11:
This task has promised to provide:
- complete emission data by May '98;
- vehicle pollution development forecast by June '98;
- control options by September '98.

The pollution development forecast must include forecast of traffic on the main (future) road network, with spatial distribution (for each main artery, i.e. ring roads and arteries to/from the city).

Task 12:
A concept for providing forecast possibilities was presented. **This must be clarified and detailed further, as soon as possible.**

Overall evaluation of updated status

This exercise of updating the task status with a direct view to the plan to carry out the first AQMS analysis sequence before the end of 1998 (and most of it before the next workshop) was very useful, and it showed that all teams have a good understanding of what they need to do. Their subtask-time schedules link up with each other to a large extent.

It is now extremely important that each task goes through the schedules of the tasks they are linked up with, looks again at their own schedules, to see:
- Is the subtask/time coordination between the tasks as it should be?
- Do we deliver what is expected of us?
- Have we forgotten something?

The comments noted in **bold** types above must be reacted upon, by those that should take care of each of them.

Each task must consider itself a link in a chain. If subtasks are delayed, the whole chain is broken, and the analysis will not be finished by the next workshop. The next 6 months are extremely important for the success of our project. Each task team must take full account of its task/time schedule in their work plans for the next 6 months.

2.3 Updated summaries of task status reports

TASK 1, Emission Inventory

Input/Output	From	To	When	Comments
Emission factors from fuel use		7	End May 98	
Emission factors for sectors		8	End May 98	
Emission factors from traffic	11		End May 98	SO_2, particles missing
Preliminary emission data for 1995 (for KILDER)		3	End May 98	SO_2, NO_x, CO, particles. Other compounds?
Population distribution 1995		5	End May 98	
Final emission data 1995		3	August 98	
Baseline scenarios 2010 by sectors	8		June 98	
Emission factors 2010 for scenarios	7			
Emission data 2010		3		
Population distribution 2010		5		
Point source technologies		2	August 98	

Report from Task 2 and Task 7

- Task 2 and 7 are responsible to provide emission factors for industrial sources to Task 1. A discussion with participants from Task 1 take place next week. This work will be finished in the end of May.

- Task 2 need information/data on coal boilers provided by Task 1. There is some missing information about the installed capacity, efficiency-rates and production profiles. Task 1 and Task 2/7 need to discuss how to collect the missing information. Discussion is planned next week and the work will be finished in the end of May.

- Exchange of information between Task 7 and Task 8 regarding baseline scenario development of technological sectors. Task 7 has received drafts from Task 8 regarding the social and economic development and a meeting with Task 8 is planned as soon as possible to discuss the exchanging.

- Task 7 provides control cost data to Task 9.

TASK 3

	Input/Output	From	To	When	Questions and comments
a. Kilder	• Emission data for 1995	1		End May	Components: (NO_2, NO_x, SO_2, PM_{10})
b. Kilder	• Measured Ozone data	4		End May	
c. Kilder	• Annual mean conc. in grid for 1995		5	End June	Components: (SO_2, PM_{10}) Are O_3 measurements available from the area?
d. Kilder	• Air Quality data for model validation (long term conc.) 1995	4		End June	Components: (NO_x, NO_x, SO_2, PM_{10})
a. AirQUIS 2.0	• Emission data for AirQUIS 2.0 for 1995	1		End Aug.	Components: (NO_2,SO_2, PM_{10})
b. AirQUIS 2.0	• Emission data for AirQUIS 2.0 for 1996, 1997, 1998	1		End Sep.	Components: (NO_2,SO_2, PM_{10})
c. AirQUIS 2.0	• Air Quality data for model validation (hourly/daily) (Also met. data and hourly ozone data) for 1995.	4		End Sep.	Components: (Hourly NO_2, SO_2 and PM_{10}) Hourly met. and ozone data.
d. AirQUIS 2.0	• Model validation calculations (hourly/daily) for 1995.	4		Oct. 98.	Components: (NO_2,SO_2, PM_{10})
e. AirQUIS 2.0	• Emission data for 2010 (baseline scenario, trend scenario, target scenario) and for various measures for 1995 and 2010	1		End Nov.	
f. AirQUIS 2.0	• Daily concentrations in districts for their mortality and hospital admissions studies (1996).		6.1	Dec. 98	Components: (NO_2,SO_2, PM_{10}) Who pays for the met. data for 1996?
g. AirQUIS 2.0	• Daily concentrations in receptor points (Sep. 1997 – March 1998) for their interview study		6.1	Dec. 98	Who pays for the met. data for Sep.97- March 98?
h. AirQUIS 2.0	• Hourly / Daily concentration calculations for 1995		5	Jan. 99	Components: (Hourly NO_2, SO_2, and daily PM_{10}) Hourly met. and ozone data.
i. AirQUIS 2.0	• Concentration data for 2010 (baseline scenario, trend scenario, target scenario) and for various measures for 1995 and 2010		5, 6.2, 6.3	March 99	As requested by other tasks

TASK 4

1. Contribution to the AQMS analysis:
   - Air Quality overview report
   - Air quality and meteorology data to other tasks

2. When will this be available:
   - Air quality report: June 98
   - Data to other tasks:
     - These are specified to some extent in the updated reports for Tasks 3, 5, 6.1 and 6.2.
     - **Specified, written requests for data must be sent to Task 4 (Guangzhou Team, contact person: Mr. Sun and Mr. Dong, GEMC), as soon as possible.**

3. Critical delays: AQ and meteo. data for 1996, 1997, 1998 are critical for development of GZ dose-response.

TASK 5

	Input/Output	From	To	When	Questions and comments
a. Kilder	• Annual mean concentration for 1995	3		End June	Components: NO_2,SO_2 and PM_{10}
b. Kilder	• Annual mean concentration for 1995, combined with population, giving the number of people in conc. intervals (in grid). Using KILDER		6.1	End July	
a. AirQUIS 2.0	• Coding Interview study Receptor points				To be clarified
b. AirQUIS 2.0	• Population distribution 2010	1		End Nov.	
c. AirQUIS 2.0	• Hourly / Daily concentration for 1995	3		December.	
d. AirQUIS 2.0	• Annual, daily or hourly concentration for 1995, combined with population, giving the number of people in conc. Intervals		6.1	Jan. 99	In both grid and districts.
e. AirQUIS 2.0	• Concentration data for 2010 (baseline scenario, trend scenario, target scenario) and for various measures for 1995 and 2010	3		March 99	As requested by other tasks
f. AirQUIS 2.0	• Annual, daily or hourly concentration combined with population, giving the number of people in conc. Intervals. This will be given for the year 2010 (baseline scenario, trend scenario, target scenario) and for various measures for 1995 and 2010		6.1	April 99	In both grid and districts.

TASK 6-1 Health damage assessment

Input	Output	When	Notes/delays
From Task 5: Daily population exposure profiles in 8 districts 1996: Part,. NO_2 , SO_2: Daily average (SD), daily max. (mortality and HA)	Dose-response functions for GZ: – crude mortality – HA – acute respiratory symptoms – chronic resp. diseases	 Nov. Nov. Nov.	NB: Meteorological data must be provided for: 1996 and Sept.-97 - March -98: ⇓
Exposure assessment for interviewees from Sept. - 97 - March -98: NO_2 (hourly), part. (day), SO_2 (hourly av. max):		Nov.	Delay?
From Task 5: Scenario exposure assessment	To Task 9:		
Phase 1: Annual population exp. profile for particles 1995 (baseline) and scenario year(s);	Effect of abatement plan on mortality, HA, acute and chronic resp. sympt./diseases	Feb. -99(?)	The output of phase 1 depends on what components will be available from KILDER AQG violation? Directly from Task 5 to Task 9 …..
Phase 2: Daily population exp. profile for particles (and NO_2 ,SO_2?)	Effect of abatement plan on mortality, HA, acute and chronic resp. symptoms/diseases	?	

TASK 6-2

Status:

- Lifetime equations
  - Use existing equations
- Spatial distribution of Lifetime in GRIDs
  - Based on KILDER
- Classify and distribution of building types in GRIDs DONE
- Prices for material and work DONE
- Collecting climatic data DONE
  - pH not reported to NILU
- Calculating the amount of materials

Problems:

- O_3: Yearly average of O_3 outside Guangzhou city.
  - Does data exist?
- Amount of materials: new detailed description of the method will be worked out by NILU next week and sent to GRIEP after discussion with Mr. Yu.

First delivery: Nov./Dec. 1998 to Task 9.

TASK 6-3 Vegetation

Input	Output	When	Notes/delays
Monitoring data for selected sites (is collected)	1. Veg. assessment in urban area	Nov.	Quantitative?
	2. Report on pollutant-resistant plants	Dec.	
Ozone: AOT40	3. Crop damage assessment	?	Quantitative?
	4. report in Baiyun mountain	Nov	Quantitative?
	5. Report on veg. and heavy metals	Aug.	Quantitative?
	6. report on veg. and acid rain	Dec.	Quantitative?

TASK 8

1. How Task 8 contributes to the sequence?

- ***Required information from other tasks***

  Task 1, 11

  $EF_{(1995)}$=**Emission amount**/production Value (For every sector)

  Task 2, 7, 11

  $EF_{(1995\text{-}2000\text{-}2010)}=EE_{(1995\text{-}2000\text{-}2010)}\times ED_{(1995\text{-}2000\text{-}2010)}$

  (For the emission abatement measures of the trend scenarios)

  EE $_{(1995\text{-}2000\text{-}2010)}$=Emission amount/Energy consumption

  $ED_{(1995\text{-}2000\text{-}2010)}$=**Energy consumption**/production value

⇓

- Task 8

Based on the emission factors provided by task 1, 11, 2, 7 and other relevant data Task 8 can construct:

Baseline Scenarios (for every sector)	***END 1998***
Trend Scenarios (for every sector)	***END 1998***
Target Scenarios (for every sector)	***1999***

⇓

- ***Assistances provided for other tasks by Task 8***

  Task 1 (Data on the activity indicators and emission scenario) (finished)

  Task 1 (Data on the industries' spatial variation) (provided)

  Task 5 (data on the inhabitants' living spatial variation) (provided)

  Task 13 (Final Research results) (1999)

  Task 11 (Data on vehicle pollution development) (doing)

2. When they will deliver the needed input

In order to smoothly complete Task 8' works, other tasks should provide the relevant data before July 1, 1998 at least.

3. Critical delays

Up to now Task 8 have no any critical delay. nevertheless, Task 8 worry about other tasks cannot provide the data in time and that will make the work progress of Task 8 delay.

TASK 9

1. How Task 9 contributes to the sequence of analysis

   Inputs from
   - task 6.1, 6.2, 6.3 (benefit)
   - task 7, 11 (cost)
   - task 7, whole project (list of possible measures)

2. When to deliver the needed input
   - benefit
     - 6.1: June, November
     - 6.2: october/November
     - 6.3: November
   - cost
     - 7: November (first case study), 1999
       - topic decided during exchange stay (today?) (abatement coal power plant?)
   - list of possible measures
     - when???

3. Critical delays

   Up to now there are no critical delays. The next 6 months are very important.

TASK 10 Pollution Control management and Policy Instruments

Input:

1. Task 10 need input, e.g. measures selected from Task 7 and evaluate the feasibility of them.
   (Hope to be finished in time)
2. Survey the feasibility of economic instruments such as imposing a tax rate on fuel oil, toll road etc.

These are the most used measures regarding emission control from traffic worldwide.
(Scheduled to be finished by October)

Output: Feasible measures to Task 9
(Scheduled to be finished by December)

TASK 11 - Vehicles

1. Provide complete emission data to Task 1 - May '98.
2. Provide vehicle pollution development forecast to Task 8 - End June '98 (incl. EF).
3. Provide control options to Task 9 - Sept. '98.

TASK 12 - Forecasting

This task is a "stand-alone" task in the sense that it does not provide input to the project for the purpose of making an action plan. The task will, however, contribute to make the project visible.

Elements of the performed statistical analysis performed so far (on air quality measurements) should be beneficial to task 3. The task depends upon input from task1 (emission inventory), task3 (dispersion model) and task4 (data to perform forecast evaluation).

There are no delays yet, but based upon the original project plan, the task work is difficult to accelerate. A procedure for preliminary forecasting is scetched below: Based upon the KILDER-system emission inventory, combined with average time variations, preliminary hourly pollution emission fields can be made. Based upon a general wind direction and windspeed forecast, uniform windfields for the next 12-24 hours can be generated. These two input sources can be fed into the EPISODE dispersion model to provide a pollution forecast. The forecast must be made for NO_x , particles and SO_2. Based upon the statistics of NO_2/NO_x ratio the NO_x-forecast can then be transformed to an NO_2-forecast.

3. Conclusions and recommendations

3.1 Conclusions

1. The 1st sequence of AQMS analysis shall be carried out before the next workshop.
   The tasks are closely linked together in the analysis sequence. It is of the utmost importance that each task keep its schedule as agreed at the workshop, so that other tasks are not delayed in their work.
   Responsible: All task leaders

2. Co-ordination meetings must be held in May-June, during the time that trainees are in Norway.
   The following meetings, and may be more, must be held:
   - Tasks 1,2,7,11 regarding emission factors and emission inventory. **Responsible: Task 1**
   - Tasks 3,5,6 (all),9 regarding the calculation of damage, and the input to the C/B analysis. **Responsible: Task 9**
   - Tasks 2,7,8,11 to complete the scenario development. **Responsible: Task 8**
   - Tasks 7,9,10 (and probably other tasks as well) to discuss list of abatement measures, and how they should be analyzed and ranked. **Responsible: Larssen and Vennemo**
   - Tasks 3 and 12 regarding forecasting. **Responsible: Task 12**
   - Tasks 5 and 6: Responsibility for coding re. exposure estimating.
   - Task 6 and 9: Responsibility for coding of medication use.

3. Ozone data: Such data are necessary for NO_2 calculations, and it must be investigated were such data (time series or statistics) may be available.
   Responsible: Task 4, GZ side.

4. Data from Task 4: All tasks needing air quality data must specify in writing, and request the data from Task 4 directly. Contacts: Mr. Sun and Mr. Dong.
   Responsible: Each task needing data.

5. Meteorological data are also needed, for model calculations.
   Task 3 can clarify and acquire these data.

6. Abatement measures: A list of candidate measures must be provided as soon as possible, and before 10-15 June.
   Responsible: First proposal from GZ side.
   This will be discussed further by the NORCE side, who will form a NORCE Task 13, with the objective to help the GZ Task 13 with the Action Plan development.

7. Our project and the UNDP project are in many respects parallel projects dealing with the same topics. The NORCE side assumes these projects are well coordinated on the GZ side, but the NORCE side has little information about the UNDP project work.

The NORCE side should be well informed about the UNDP work.
The GZ side is asked to provide the NORCE side with the relevant reports and documents from that project, and to include results from the UNDP project in the status reports for our project, when it is appropriate.

8. Many reports are produced in our project. The reports should be presented in different report series, with similar lay-out and front page.
   Report series:
   - Research/project reports from each task;
   - Mission reports;
   - Workshop and annual reports.

   The project leading group should agree on these issues.
   Responsible: First proposal: Mr. Larssen.

9. The next workshop will be held in Guangzhou in the period 5-15 November. The workshop itself will have 1-week duration, while task work can be done in addition, before and/or after the workshop itself.

3.2 Recommendations

Preparation for the next workshop:

We have acquired experience now from 3 workshops on status reporting. All teams are now well acquainted with their job as part of the overall project. We should try to make our workshops more effective, by simplifying the long sessions were all 14 tasks present their status in detail, which is already made available in their written reports.

Also, it is important for the evaluation of the whole project that the degree of fulfilment of goals and objectives for each task is more clearly expressed.

We therefore recommend at that the next workshop we take note of the following, in our preparations for the workshop:

1. Preparation of the status report:
   In addition to the items covered normally, the report should contain each task's evaluation of degree of fulfilment of the 3 main objectives:
   - Transfer of knowledge and tools;
   - Contribution to the development of the Action Plans;
   - Improvement of monitoring system (only for Task 4).

2. The reports are to be prepared well in advance of the workshop, in both languages where necessary, and **sent to all other tasks not later than 2 weeks before the workshop.**

3. We will expect that all participants thus knows the contents of the status reports when they come to the workshop.

4. Reporting in plenary at the workshop:
   The presentation shall contain:
   - Summary of status;
   - Degree of fulfilment of goals;
   - Clarification of any critical delays, i.e. those that effect other tasks;
   - Co-ordination needed.

5. It is possible that we will find it efficient to separate into 2 parallel sessions during part of the workshop:
   - Air Quality Assessment (Tasks 1,3,4,5,12);
   - Economic (C/B) Assessment (Tasks 6,7,8,9,10).

   It is also possible that this is not beneficial, since all tasks are part of the same sequence, so this will be discussed further.

4. Status reports, Tasks 1-13

4.1 Task 1: Emission Inventory. Status Report per April 1998

by Huang Qingfeng, GEMC and Frederick Gram, NILU

4.1.1 Work performed December '97-April '98

In connection with the workshop in Guangzhou in November '97 Mr. Gram discussed the work with the members of the different subtasks and a detailed work plan was set up. He got a diskette with task data from Project Office, and plots from the GZ Traffic Study. During the period the data has been studied at NILU, and a lot of preliminary results and questions has been sent the different GZ task members.

In March '98 Mr. Gram came to GZ in order to finalize a first emission report. During the travel through China he and his wife got a serious pneumonia, and they had to stay in hospital in GZ for 5 days. They will both express their gratitude to GEMC, GRIEP and the task members for all assistance during their illness. Mr. Gram discussed the point source data with Mr. Jiang the first day, but was not able to discuss the other data. After the recovery he has sent lot of questions to the task members, a lot of these seems to be solved according to the report below.

By the end of April '98, the GZ members of subtasks have performed work as below:

Subtask 1: Industrial Sources

A. Subtask 1 has finished the investigation of the fuel users in the researching area (52*56km, including parts of SHUNDE and NANHAI outside GUANGZHOU). All the original data obtained have been put into an EXCEL-database, which is to be a mother database (EXCEL file) for the purpose of data processing and calculation. The main work performed includes: recovering the investigation forms, putting the original data into computer, checking and confirming the coordinates of every emission source, re-examining the original data, making investigation outside GUANGZHOU, working out the code-sets necessary, doing the final arrangement for the content inside the mother database, etc.

B. According to the request of KILDER model, an input file (.DAT file) has been successfully worked out from the mother database.

C. Studying lots of information from various sources, a database of point emission factors has been finished, as well as the corresponding input file (a .DAT file). Mainly included are: collecting and studying all the useful information available, deciding the means to estimate the emission factors, doing the classification and statistics for the measuring results already at hand, calculating and inputting the factors, making the input file, etc.

D. Putting the finished input files into the KILDER model, a primary calculation has been successfully done.

Subtask 2: Domestic Sources:

A. Data collection of the population inside the administrative districts and streets has been finished.

B. Distribution of the population in the big and small grids done, the corresponding input files (.DAT files) have also been finished.

C. Investigation of the domestic fuel usage has been made.

D. Emission factors for the domestic fuels have been decided, and then combined with the industrial emission factors, to make the .DAT input file.

E. A map with the districts borders has been worked out, as well as the input file of the population data (.DAT file).

Subtask 3: Traffic Sources

A. Data collection of the traffic roads inside the researching area finished.

B. Data and information collection of 24-hour traffic volume for several main crosses finished.

C. Information collection of the takeoffs and landings in the airport ended.

D. Primary emission factors for vehicles have been made.

4.1.2 Problems and Proposed Solutions

(1) Problems concerning the KILDER model:

A. The calculation of point source emissions failed to reach the area of 52*56 km; the trial only can reach 50*50 km at most.
B. The figure length after decimals of some emission factors can not meet the preset length of the model (mainly in the factors for piping gas).
C. Calculating program of population distribution has a greatest coverage of 21 grids, this does not fit the actual case in GUANGZHOU, as the greatest grid numbers can reach 159 (in BAIYUN district).

SOLUTION: the KILDER experts from NORCE are expected to do some corresponding modification to the original parameters of the model.

COMMENT: A: It is correct that the maximum grid size for the KILDER models is 50 x 50. For the 52 x 56-grid it is already decided that we shall use 2 km-squares, and this gives a 26 x 28-grid. In connection with modelling around our new airport we will need a 50 x 70-grid with 100 m-squares, and some of the programs are changed according to this. If you want me to change the whole KILDER-package, please tell me. The programs will take some more space in the computer, but I dont think this should be a serious problem.

B: In the emission factor file EMISFACT.DAT the emissions are given as kg/unit. For gases the unit is given as m3, but the emission factors are given in g/m3. This is taken care of by the factor DENS. The use of this factor is explained in the manual, but obviously not good enough.

C: When we discussed the population distribution in November '97 I realized that we would get into trouble for the Baiyun district with 21 grids/district. I have bade a new version of the program POP-FIE which I brought with me to Guangzhou in March, but we did not catch to disduss this before we had to go to the hospital, and later we forgot it.

(2) Due to the delay of the AIRQUIS model, it remains unknown that how to use the output files from KILDER in the AIRQUIS model.

SOLUTION: The NORCE side should better finish the final version of AIRQUIS and deliver it to GUANGZHOU side as soon as possible; and it is expected that both sides should enhance the communication about the utilization of this model.

COMMENT: We all agree that it is a pity that the AIRQUIS-model is delayed. The model system is totally re-written, based upon experience from the first version, but the process has been more complicated than originally expected. In May we will get a version which has to be controlled by a lot of people, and errors must be corrected before the model will be installed in Guangzhou. With respect to data to the two models, they use basically the same data. The two models supplies each other, but they are using different time units. KILDER is a program system to evaluate long-term emission,

(3) Problems such as time variation of fuel consumption in industrial sources, purifying percentage of pollutants for cleaners, as well as the process emissions, have not been considered when making the input files.

SOLUTION: the specific technology to solve these problems is to be decided through the communication afterwards between both sides.

(4) The emission factors for traffic sources are lack of the figures concerning SO_2 and particles.

SOLUTION: to neglect these two items?

COMMENT: In the MOBILE 5a model which has been used in GZ, emissions of SO2 and particles are not calculated. However, in the URBAIR-study the emissions of particles from traffic was one of the most important sources for the particle exposure, and even if gasoline and diesel fuel has a relatively low S-content, the consumption is so high that the emissions can be important. The traffic emissions are emitted close to the ground, very often in narrow street canyons, and the concentrations can be high.

(5) The achievements of subtask 3 (traffic sources) have not been delivered yet.

SOLUTION: they are under the final preparation.

(6) The explaining text of making procedure for the delivered emission factors has not been finished simultaneously.

SOLUTION: it is to be done in a shortest time.

4.1.3 Modification to the Detailed Work Plan

Due to some actual conditions in GUANGZHOU, it is a great difficulty to collect data or information on some aspects. It is suggested that the following problems should no longer be taken into account when making Emission Inventory:

A. Agricultural emission sources;
B. Construction emission sources;
C. Non-fuel consuming emission sources in industry, namely the process emission sources.

COMMENT: I agree that agricultural and construction emission sources could be leaved out in a first phase. But in the data from Statistical Bureau both are included as sectors with energy consumption, and we can use emission factors from other places.

With respect of industrial emissions many of the sectors has emissions not only from fuel use, but also from the processes themselves. For instance the cement industry will have a higher dust emission than from fuel use, but this is reduced by cleaning devices. On the other hand, much of the sulphur in the fuel will be absorbed to CaSO4, and the SO2-emission will be smaller. This can be taken into account by using special emission factors for the process industry. The China "Production of Industrial Pollutiants" handbook will be of valuable help here.

4.1.4 Plan for the Next 6 Months

1. Complete the emission factors for traffic sources. Make a final combination with the factors for other sources. Prepare an overall input file of emission factors. Finish the explaining text of making procedure for the factors.

2. All original data and information of traffic sources are to be ready, and from them the input file(s) must be made.

3. If any, additional new data or information of emission sources is also to be collected.

4. On the basis of a good modification to the KILDER model, make an overall calculation for the industrial, domestic and traffic source emissions respectively.

5. In order to deal with time variation and purifying percentage in a good way, the communication between both sides should be done. Necessary modifications to the data of emission sources concerned are also to be made, on the basis of common approvals.

6. Study on the AIRQUIS model, when it is delivered to GUANGZHOU side. Using the files from KILDER, run the concerned calculations.

7. According to the feedback data and information from other tasks, combining with our own calculating results from the models, establish Emission Inventory finally.

8. Make the final working report and technical report for the Emission Inventory.

4.2 Task 2: Coal/energy. Work Progress Report of 1998

by Ms. Zhong Jieqing, GRIEP and Andy Yager, IFE

4.2.1 Project progress survey (from Nov. 1997 to May, 1998)

In accordance with the project outline, our task group is responsible for collecting, regulating, processing and sorting out part of the data of energy consumption and coal smoke polution provided by Task 1. At the same time, collect and sort out those relevant data of energy consumption from Guangzhou Statistics Bureau and analyze and gather these information from Guangzhou Environment Protection Agency on energy consumption and coal smoke pollution.

In the working process, our task group has tried its best to investigate and discuss on the task. We went to many unit to learn from authorities and persons from the same trade. On the other hand, we choose some classic profession and relevant plants such as Huangpu Power Plant, Guangzhou Paper Plant, Guangzhou Nitrogen Fertilizer Plant, Guangzhou Petroleum Chemical Engineering Plant to make an investigation. The research point is locus on collection of important pollutant sources and synthesizing. We also participated the eleventh ODA/NEPA training "industry, energy and atmosphere" and attend some academic conferences.

From Nov. 11 to Dec. 12, 1997 our task group and the numbers of task 7, task 8 had a training on Modal Markal under the direction of Mr. Yager and Mr. Unander. In that period, Chinese trainee learned the data input form of Markal Model and a general introduction on the interface and structure of the model as well as its using were given. China side and Norway side discussed on the collection and regulating of the information and summed up the one-week training.

In the period of Mr. Krogh's staying in Guangzhou (from March 31 to April 9), he and our task group and the members of task 7, task 8 had a discussion on data collected about energy consumption and coal smoke pollution, moreover, they

exchange their experience on data process, arranging and gathering. They reached an agreement that in the folowing days these data must be added and modified to present a report of higher level. On one hand, we should offer task 7 with the input data of energy consumption, environment and expense, on the other hand, an analyzed report on the energy consumption and coal smoke pollution should be compiled by our task group.

4.2.2 Completion of the work plan

1. Current situation and historic data of different type of energy and energy consumption in different line and department in Guangzhou area are finished.
2. Raw data about most of the pollutant sources distribution of coal-fired and emission have been collected, analyzed and put together, including:
   2.1 Pollutant sources distribution
   2.2 Pollution emission conditions of coal-fired boiler and furnace
   2.3 Investigation data on important pollutant sources
   2.4 Relevant data on energy consumption and basic energy installation status

4.2.3 Work not completed and existing problems

Up till now, our task group haven't analyzed and put together the relevant data and transferred them to task 7 because task 1 haven't offered us with the total raw data of energy consumption and coal smoke pollution especially those data of civil sources, communication sources and coal smoke pollution. Also the report edited by our task group with the title "Analytical report of energy consumption and coal smoke pollution in Guangzhou city" have to be delayed. We hope both China and Norway and every task group strengthen the co-operation and exchange their informaiton as frequently as possible so that the work plan can be completed on schedule.

4.2.4 Work Plan for latter half-year of 1998

According to the detailed work plan of 1998, this task group has practically completed the original plan of 2.1 subtask. The existing question is that the data provided by task 1 cannot meet the demands and need more modification especially about the data of civil sources, communication and source and coal smoke pollution

The subtask that will be carried out of the latter year of 1998 is listed below:

Subtask 2.2: Current situation of energy consumption and utilizing of GZ which give priority to coal smoke and advancement forecast of 2000 and 2010.

This can be complicated though the collection of basic information of energy valance and emission list as well as base plan, then the emission amount of pollutant produced in the procedure of coal combustion can be calculated on this basis.

Main content of this research:
Arranging input and output data, including the 4 following aspects:
1) Data of energy consumption and joining data of pollutant source
2) Monitored data of air environment quality and its forecast data.
3) Data of social economic statistics and data of pollution control technology.
4) Data of energy supply and consumption statistics together with forecast data of coal for industry.

Subtask 2.3: ***On the basis of the relevant data about energy balance and present coal-fired process as well as future control scheme, an investigation and analysis of the typical coal-fired boiler will be made and the result will be transferred to task 7.***

Detailed task, work progress and the result reports:

Sub task no.	Representatives	Participants	Duration		The result report
			Start	End	
2.1	Zhong Jieqing, Li Kangmin	Wang Daoming, Chen Hao	Nov. 1, 1997	May 1, 1998	Analytical report on energy consumption and coal smoke pollution in Guangzhou city
2.2	Zhong Jieqing, Li Kangmin	Wang Daoming, Chen Hao	May 1, 1998	Sep. 1, 1998	
2.3	Zhong Jieqing, Li Kangmin	Wang Daoming, Chen Hao	Sep. 1, 1998	Dec. 1, 1998	Investigation report on typical coal-fired power plant

Data or information provided by related task groups:

Subtask no.	Related task group	Data to be provided	Deadline
2.1	Task 1	See 2.1	Apr., 1998
2.2, 2.3	Task 1,3,4,7,8	See 2.2, 2.3	June, 1998

4.3 Task 3: Dispersion Modelling. Status report per April 1998

by Fang Xingqin, GRIEP and Atle Riise, NILU

4.3.1 Work Performed December '97-April '98

GZ part

- Finished the DWP for 1998.
- Finished the digital topography data, big area with 1km*1km resolution, small area with 500m*500m resolution; product: data on file.

- Purchased the meteorological data for base year 1995 and also for year 1994 needed for wind establishment, pre-treated these data; product: sets of data on file, with one set conforming with the format required by KILDER model.
- Sent the existing digital map data on compressed file by e-mail to NILU, but there are still some problems (as stated later in Problems).
- Decided the hardware and software solution of the AirQUIS server and clients, giving concrete requirements guiding the purchase of these machines.
- Run some modules of KILDER, solved the problem with stability (Mr. Gram made a pre-processor that will convert cloud cover and height of cloud data to stability, but the height of cloud data are not available in GZ input data, so we edited and compiled a new subroutine that will convert total and lower cloud cover data to stability, the results are successful), finished the meteorology data treatment for the base year 1995 and reviewed part of the task 1 emission data, preparing for the first KILDER long time estimate.
- Prepared and sent one week's meteorological data to NILU in early 1998, hoping to get indications from Mr. Tonnesen about how to develop the wind field library for EPISODE model.
- Made presentation for the 1st Workshop of 1998.

NORCE part

- Finished the DWP for 1998.
- Received and converted map data for GZ. Specified what was missing and requested a complete set of data.
- Decided the hardware and software solution of the AirQUIS server and clients, giving concrete requirements guiding the purchase of these machines.
- Received one week of meteorological data for the Guangzhou area. Started the work on constructing a method for wind field library generation.
- Supporting GRIEP in the development of a pre-processor for stability data.

4.3.2 Problems and proposed solutions

GZ part

- For the subtask ' adaptation of the existing map data for use in AirQUIS', the responsible institution is GRIEP, the data with .MIF format have been copied to NILU for test. The coordinates are in 'longitude/latitude' instead of 'GZ coordinate system'. Dr. Cui found they couldn't be converted with MapInfo.

  Proposal:
  Hoping NORCE helps to converted with ArcInfo or ArcView.

- For the subtask 'generate and test...the EPISODE model', the responsible institute is GRIEP, it was agreed that NORCE should give the methodology and give the software. GRIEP sent the test meteorological data to NULI in early 1998, but didn't send the topography data. This work was delayed because NILU has been waiting for the topography data while Guangzhou side didn't know the topography data were so necessary for the development of the

method for wind field library. GZ sent the topography data on 23 April 1998 to NILU. These data were on a grid with 1km x 1km grid squares. NILU has specified a region for which more detailed topography (500m x 500m). GRIEP has not yet finished the generation of these data.

Proposal:
Hoping the methodology of how to generate the wind field library for EPISODE to be indicated as soon as possible, proposing the deadline of this subtask be deferred a bit.

NORCE part

- The development of AirQUIS is further delayed. This will give a delay in the installation at GRIEP of about 3 months, moving this milestone to the end of September 1998. This delay will also influence the quality of the AirQUIS training in connection with the first workshop in 1998.

4.3.3 Modification to the Detailed Work Plan

GZ part

None

NORCE part

Due to the problems mentioned above, there are some delays in the time schedule for the task. The table below contains suggested new deadlines for the affected tasks:

Sub Task	*Sub Task Name*	*Responsible institution*	*Time Limit*	*Product*
1.	Digital topography data	GRIEP	by the end of May 1998	Data on file
2.	Existing digital map data	GRIEP	by the end of May 1998	Data on file
3.	Transfer and storage of meteorological data	NILU	by the end of June 1998	Software, hardware, and documentation
4.	Installing AirQUIS and EPISODE at GRIEP	NILU	by the end of September 1998	AirQUIS installation, report
5.	Training in the use of AirQUIS and EPISODE at GRIEP	NILU	by the middle of October 1998	Documentation
6.	Wind field library	GRIEP	by the end of July 1998	Data on file

4.3.4 Plan for next 6 months

GZ part

- First KILDER long time estimation by the end of June 1998, analyzing the results.
- Generate and test of wind field library and selection software for use with the EPISODE model.
- Training in the use of AirQUIS and EPISODE at NILU and at GRIEP.
- Installing AirQUIS and EPISODE at NILU and at GRIEP.
- Establishing the technical solution for transfer and storage of meteorological data from GEMC.
- Perform model calculations and model parameter adaptations for all dispersion models for the base year 1995, write report of the results.
- Perform model calculations with data representing suggested scenarios, write report of the results.
- Write status report for 1998.

NORCE part

The plans for the next 6 months will be as specified in the Detailed Work Plan, with the adjusted deadlines as described above. In short, the work for this period includes:

- Construct and test method for wind field library generation and software for wind field selection.
- Training in the use of AirQUIS and EPISODE at NILU and at GRIEP.
- Installing AirQUIS and EPISODE at NILU and at GRIEP.
- Establishing the technical solution for transfer and storage of meteorological data from GEMC.
- Support GRIEP in performing the various model calculations.
- Write status report for 1998 and Detailed Work Plan for 1999.

4.4 Task 4: Monitoring. Status Report per April 1998

by Sun Dayong and Dong Tianming, GEMC and Steinar Larssen, NILU

The status report follows the items listed in the Detailed Work Plan (DWP) for task 4 for 1998.

First we present a summary of status and continued work plan for 1998:

1. Description of existing network
   - 1.1 Air quality data to NILU — March '98
   - 1.2 Air quality report — June '98
2. Improvement plan for the network
   - 2.1 Proposal from GZ team — June '98
   - 2.2 Evaluation by NILU — June and Sept. '98
   - 2.3 Final plan for new network — Oct.-Dec. '98
3. Establish new stations/monitors

3.1 Purchase, operation	April '98
3.2 Guidance from NILU	June and Sept. '98
4. Data to other tasks	
4.1 1995 data → Task 3	Finished
4.2 1997/98 data → Task 6	To be done

4.4.1 Work performed December '97 - April '98

1. Detailed description of the existing network

1.1 Air quality data to NILU

A proper evaluation of the existing network must be based upon a detailed overview over the existing network and air quality data from recent years.

GZ team:

The network and stations were described in 1997, by completing station description tables for each of the 6 automatic stations and each of the 37 manual stations.
The air quality data requested by NILU were transferred to NILU during the period from November '97 to March '98. The data transferred were:

1. 1995 data: Monthly and quarterly averages for SO_2, NO_x, CO and TSP, for both automatic and manual stations. The data for the manual stations are reported per district only, not for each station. There are typically 4 stations in each district .
2. 1995 data: Also max. 24-hour and 1-hour average of SO_2, NO_x, NO_2 , CO, and max. 24-hour average for TSP, for the automatic stations.
3. Trend data: 1990-1995. Annual averages of SO_2, NO_x, CO and TSP for the automatic and manual stations. The manual stations: Per district only.
4. Typical short-term (hour-by-hour) variations: Data for Guangya (#1) station was given for SO_2, NO_x and CO: Hourly data for one week (13-19 December, 1995).

The data were given in the form of tables, and plots.

NILU team:

The data were received in several shipments, and completing of the data delivery were requested. According to the DWP, these data were to be sent to NILU before 15 January 1998, but this proved to be a too strict time schedule. When the data delivery was almost complete in March '98, evaluation of the data started.
Concerning the short-term variation data, we requested data for one week for all the automatic stations. So far we have received such data only for station #1 (Guangya).

1.2 Air quality report

According to the detailed work plan, a first draft was going to be produced by the Guangzhou team. This first draft is 50% finished, by means of the tables and figures made by the GZ team. The report is presently being finalized by NILU, based

upon the received material. The report will give an overview of the spatial variations and time trends of air quality in Guangzhou. It will be available in June '98.

2. Improvement plan for the network

2.1 Proposal from the GZ team

GZ team:

GEMC has made a general technical proposal to NEPA on a new monitoring system for Guangzhou, and which was approved. GEMC is making a more detailed proposal of the new network, including station locations, compounds to be measured, QA/QC etc. When making this detailed proposal, GEMC waits for the proposals for system modifications that NILU would give.

The GZ proposal to NEPA must be translated and sent to the NORCE Task 4 team as soon as possible.

NILU team:

NILU was to make an evaluation of the network and propose modifications based upon the network description, the AQ data and map and population information. Also emission distribution data are important in the evaluation of the network.
Now that the complete AQ data are available, NILU is in the process of making the network evaluation. According to the DWP, NILU would make a first proposal in a note before 30 January, but this could not be done since sufficient AQ data were not available until March '98.
A preliminary proposal for location of some of the PM10 and Ozone monitors were made during the 2nd workshop '97 in GZ (November '87), in order that when the monitors would arrive, some of them could be put in operation at some stations as soon as possible, since the data are needed as soon as possible by other tasks.
The following proposal was made by NILU:

- PM_{10} monitors: At GEMC, at GRIEP and at a background station outside GZ.
- Ozone monitors: At the same stations, and at Luhu station.

The location of the background station outside GZ was also discussed then, in detail. It was decided that Longui would probably be a suitable location.
The first note on network evaluation and modification will be available from NILU before the end of June 1998). The final evaluation and proposals from NILU should be available in September, according to the DWP, so that a final plan for network can be available by December as written in the DWP (or may be even by the 2nd workshop '98 in GZ in October/November).

3. Establish new stations/equipment

GZ team:

All instruments purchased in 1997 have arrived at GEMC (by 23 April). The purchased instruments are:

	Model	Gvt. funds	Task 4 funds	GZ/NORCE funds	Total
SO_2	TE 43C		3	1	4
NO_x	TE 42C	2	4	1	7
CO	TE 48C		2		2
O_3	TE 49C		5		5
PM_{10}	TE 65	8			8
PM_{10}	RP 1400A		1		1
Meteo	MET ONE		1		1
Dyn. calibr.	TE 146		1		

The monitors are presently being run in at the GEMC laboratory.

NILU team:

According to the DWP, NILU should propose a draft QA/QC plan early in 1998. When discussing this with the QA/QC expert at NILU, Mr. Thor Christian Berg, he felt that he would need to visit GZ specifically to study in more detail the present QA/QC procedures in GZ, before proposing a QA/QC plan. This trip should be made after the new monitors had arrived. Then Mr. Berg would make a draft QA/QC plan after returning to NILU, and then return to GZ to discuss it in detail, and finalize it in close cooperation with the GZ team. It is now planned that Mr. Berg will make his first trip to GZ in June this year.
Mr. Sun should discuss QA/QC matters with Mr. Berg during his stay in Norway now in May.

4. Provide data to other tasks

4.1 Historical data

GZ team:

Task 3 has received detailed AQ data for comparison/control of air pollution concentrations calculated with dispersion models. Data given: Monthly and annual averages for SO_2, NOx, CO, TSP, all stations with data, for 1995. Hourly data for all available stations and compounds , for the whole of 1995, were also given.

Comment from NILU: Also Tasks 6.2 (damage, materials) and 6.3 (damage, vegetation) need data: monthly annual averages for 1995, and earlier years, if available.

NILU team:

The AQ data will also be given to the NORCE teams of Tasks 3, 6.2 and 6.3, in the form of the Air Quality report which is being produced.

4.2 Current data

Task 6.2 (materials) have run a materials' damage measurement program during 1997-98.
They need monthly average data for this period. They need these data rather soon.

4.4.2 Problems and proposed solutions

Network evaluation:
The Air Quality report is delayed. Now the necessary data are available, so the report is being produced, and the evaluation and proposals for modifications of it can be delivered from NILU by the time stated in the DWP, first proposal by June '98 and final comments in September '98. This way, the final plan for the network can be made during October-December '98, in accordance with the workplan.

Establishment of new stations/equipment:
This task is delayed partly since the new monitors arrived just recently. Now a plan for assistance from NILU will be made, with 2 visits to Guangzhou by QA/QC expert starting in June '98. In the meantime the GZ team are getting acquainted with the instruments, and will install some of them in some stations. It is especially important that PM10 and Ozone instruments are put into operation according to the recommendations given by NILU at the 2nd workshop '97 in GZ.

Data to other tasks:
Data shall be given to task 6.2 and 6.3 teams in GZ, and to all task teams in Norway, for information, in the form of the data quality report.

Communication:
The NILU team would like to be able to communicate directly with the Task 4 team at GEMC (with copy to the Project Office). This is not possible now.

No other problems noted.

4.4.3 Modifications to the DWP

No modifications are necessary. The delays will be corrected.

4.4.4 Plans for next 6 months

This follows from the above:
- The AQ report will be produced. A draft report will be ready in June '98.
- The evaluation and proposed modifications to the network will be made according the DWP.

- The new monitors will be put in operation at stations, and guidance will be given by NILU. Mr. Berg will visit GZ.
- Data will be given to other tasks needing them, according to the description above. Other requests for data must be sent to the GZ Task 4 team in writing.

4.5 Task 5: Exposure. Status report per April 1998

by Mr. Weng Shifa, GRIEP and Mr. Atle Riise, NILU

4.5.1 Work performed December '97 - April '98

The second conference was held in Guangzhou from Nov. 24 to 27 in 1997. At the conference, the Chinese and Norwegian partners were talking over the identified problems and other issues and working out the detailed projects for 1998.

Work performed by Guangzhou partners:
Up the now, Task 1 crew have finished the work of distributing the population data collected from various local districts to the grid system .
We have investigated the buildings along Dongfengzhong Road and Beijing Road as well as their residents, which includes the block in Dongfeng zhong Road section from Jixiang Road to Dezheng Road and the block in Beijing Road section to Zhongshan Road to Wenmin Road . These are the typical but dissimilar streets in Guangzhou. Dongfengzhong Road boasts the busiest traffic main and the broadest way for vehicles while Beijing Road is the typical commercial seat of Guangzhou. We have successfully gained the necessary data such as the height of buildings, the numbers of their storeys and the state of resident distribution.

Work performed by NORCE partners:
After the conference, Mr. Gram demonstrated KILDER model to the Chinese crew.

He trained them how to operate it so to help them have a better understanding of the model.

4.5.2 Problems and proposed solutions:

On the Guangzhou side

Co-ordination with other task:

There is some uncertainty about the method for coding addresses for Task 6.1. Task 5 would like to have a final and detailed specification of this before taking on this job.

On the NORCE side

The delivery of AirQUIS is delayed until September 1998. This will give a delay in the training in the use of AirQUIS in Guangzhou.

4.5.3 Modification to the Detailed Work Plan

There are no modifications of contents in the Detailed Work Plan. However, since the installation of AirQUIS is delayed until September 1998, the deadlines for AirQUIS training, and possibly also AirQUIS exposure calculations will have to be adjusted.

4.5.4 Plan for next 6 months

The plans for the next 6 months are given in the Detailed Work Plan for the task, with the exception of the change of deadlines mentioned above. The main points of the work is given below:

For the Guangzhou partners:

Besides the work we have done in the previous months, we still have certain part to accomplish.

1. Continue to collect building data and building population data along typical major roads . In addition to the areas of Dongfengzhong Road and Beijing Road where we have investigated, we are to choose another busy entrance and exit to the city for further survey.

2. Apply emission list data (From task 1) and the data from Task 3 to calculate 1995 annual average population exposure with the air pollution concentration (From task 3) by using KILDER.

3. Receive training on how to use AirQUIS model.

4. Calculate the amount of static exposure to people in grid squares and along typical major roads for 1995, using the AirQUIS exposure model.

5. Estimate the population exposure which other tasks as needed , as a part of Air Quality Abatement Strategy Development for the city of Guangzhou. This can be done for different scenarios and years, provided that the concentration data and population data are made available by other tasks.

6. To serve the needs of Task 6.1, Task 5 will perform the following work:
   - The population and concentration data that will be obtained from tasks 1 and 3, will be converted from the grid distribution to a distribution in the Guangzhou districts. This will be done by purely geographical considerations.
   - The addresses for all participants of the interview study of Task 6.1 will be coded in the grid system. That is, the grid indexes for each address will be found.

7. Write a Report for phase 2, including descriptions of activities, progress and results for the work that is done during this phase.

For the NORCE partners:

1. Perform AirQUIS training in Guangzhou.
2. Assist the Guangzhou partners in their work.

4.5.5 Problems needed to be resolved

1. Data structure of the population survey along roads should be discussed and decided by both Norway and Guangzhou sides together.
2. Since Norway experts are familiar with the computer model to be used in exposure calculation, the Guangzhou group hope that the NORCE group also take part in the course of data input and exposure calculation so as to finish the work together.

4.6 Task 6-1: Health Damage Assessment. Status Report per April 1998

by Li Zhiqin, GRIEP with comments from Mrs. Aunan, CICERO and Mrs. Clench-Aas, NILU

4.6.1 Work performed December '97-April '98

According to the detailed work plan for 1998 (DWP for 1998) made in Nov.1997, the work performed by May 1998 cover three major aspects:

1) performing the interview study in winter (Feb.~Mar.,1998) and beginning the data input;
2) collecting health statistics for Guangzhou; 3) establishing data base for the training in Norway.

NORCE part

Concerning interview study, Norwegian expert, Dr. Jocelyne, has provided a lot of valuable guidance and suggestion on questionnaire and implementation so that the study can be performed in a right way.

Dr. Jocelyne and Kristin Aunan also have provided Guangzhou team much useful guide on health statistics collection by e-mails.

In addtion, they also proposed a detailed training plan for Li Zhiqin's trainging.

Guangzhou part

Guangzhou group focused efforts on data collection in the first half of 1998. The needed data are collected from two paths: one is collecting information about the various symptoms of disease and reduced well-being which no existing statistics are available and have to be done by an interview study in Guagnhzou; the other is collecting statistics of deaths and respiratory hospital admission from GMPSB, GMPHB and several large hospitals. Both parts are simultaneously necessary in the study of Task 6.

1) Performing the interview study in winter (Feb.~Mar.,1998) and beginning the data input

In Guangzhou, the team of Task 6-1 successfully performed an interviewe study in February and March in 1998 cooperating with Guangzhou Statistical Information Industry Centre (GSIIC) which affiliated to Guangzhou Statistical Bureau (GSB). GZ team is responsible for printing and providing interview questionnaire and manual(Chinese version), specifying the detailed requirement of the interview study and supervising the study step by step. The GSIIC is responsible for the implementation of the interview study. The detailed work is as following:

a. Translating the questionnaire given in last November into Chinese and modifying them so that the questionnaires are more suitable in Guangzhou;
b. Printing questionnaire (over 4000 for adults and over 3000 for children);
c. Propagating the interview study by the way of local television station and newspaper;
d. Training interviewers;
e. Performing a pilot interview study for training the interviewer;
f. Performing the interview study formally

Time: from Feb.23th to Mar. 31th, 1998
Study area: (4 areas) control area, traffic area, new industrial area and old industrial area
Sample size(Study population): at least 4000 adults selected randomly form the 4 areas and about 2000 children

a. Establishing data base for the interview study such as data structure and checking the questionnaire sent back
b. Data input for the interview study (in progress)

2) Collecting health statistics in Guangzhou

The aim for collecting health statistics is to perform the analyses by establishing dose-response functions for GZ, on the other hand, based on the functions, to assess the benefit of emission reduction, which serve as a basis of Task 9. The work performed in the local is as following:

a. GZ team has contacted Statistics Section, Guangzhou Municipal Public Health Bureau (GMPHB) many times about the health statistics collecting in Guangzhou. Only annual data in 95, 96 and monthly data in 97 are available in the existing data base in the Statistics Section. Daily data of hospital admission should be collected from the case rooms (where the documents of cases are filed and kept) in large hospitals. Case rooms in two hospitals have been survey to make clear what data can be collected.

b. In addition, GZ team also has contacted Population Information Section, Guangzhou Municipal Public Security Bureau to survey the existing death registration in Guangzhou. The existing data base of death registration include sex, age, district but no detailed death causes.

At present, the detailed problems concerning data provision are in discussion between our group and GMPSB and GMPHB.

3) Establishing data sets for the training in Norway by Guangzhou team (in progress)

a. Preparing training data sets, including
-health statistics available to-date;
-the to-date available questionnaire data entered electronically covering a variety of statistics (both adults and children, covering every study area);
b. Studying the knowledge of SPSS and EXCEL;
c. preparing for the relevant reports;
d. reviewing relevant study papers from international and domestic literature.

4.6.2 Modifications to DWP for 1998

The procedure of modification to DWP for 1998 is as following:
November 1997- at the workshop Kristin Aunan and the GZ task group made out a DWP for 1998 based on a description of available data as given by the GZ team according to primary survey. In the DWP, 3000 adult samples size and the 3 study areas were decided.

Nov.1997-Jan.23,1998- No modification opinion on the 3000 adult sample were given.

Jan.23, 1998- Dr. Jocelyne proposed the 3000 adults is not enough and should keep 4000 adult sample so as to obtained reasonable results.

Jan. 23, 1998- GZ team answered to Jocelyn that we did not agree because GRIEP had signed an agreement with GSB and had began preparation work as well as because of limited budget.

Jan. 31,1998- Jocelyn reinstated her opinion.

Feb. 4, 1998- GZ team disagreed the modification again.

Feb. 5,1998- An revised DWP was sent from Norway in which the 3000 adults and 3 sites were remained.

Feb.20, 1998- Mr. Stainner Larssen agreed to apply funding from NORAD for the added 1000 adults samples.

Feb.23,1998- Finally the interview study were justified and 1000 adults in a new area is added according to the opinion of Jocelyne's opinion. Concerning health statistics, the original data requirements were reinstated.

4.6.3 Plan for the next six months in 1998

The plan for the next six months is as given in the **Detailed Work Plan for 1998.**

4.6.4 Problems and proposed solutions

1) Information/communication

The DWP is the guide for our practical work. Therefore, the plan should be modified as early as possible based on the discussion of Norwegian and Guangzhou team before the implementation in Guangzhou. The changes in the DWP concerning the interview study was partly due to the fact that Dr. Jocelyne Clench-Aas (the epidemiologist) because of budget restrictions could not participate in the workshop in November '97.
The task suffer from limited travel budgets, for both sides. The use of e-mail, however, enhances the possibility of a relatively effective communication.

In the further work it has to be made sure that any changes in the plan is agreed upon by the Norwegian experts and Guanghzou team together based on the comprehensive description of data availability, and capacity of performing the various tasks (in terms of staff and funding) provided by GZ team.

2) Training

Li zhiqin, who is in charge of task 6-1 in Guangzhou, is expected to Norway for a training for about 6 weeks according to the plan in April to May. But the plan is postponed after mid August in 1998 because data set for training are not available before May.

3) Capacity and other problems

- *Interview study*

In the cause of interview study, because of the long adult questionnaire (about 1 hour), some adults are unwilling to continue the children questionnaire which affect the study of children.

Because of shortage of time, the data base needed for the training in April can not be finished before April 20.

On the other hand, the address code in the data base, which to be coded by Task 5, still need some time to punched in.

- *Concerning health statistics*

For Approach 1a, the aggregated data generally can be collected without big problems.
For Approach 2a, there are some problems: (the problems are proposed based on the data requirement sent by Jocelyn on Feb. 11th.)

a. Need to get permission from local authorities.

The existing death data (no death cause) are recorded by Guangzhou Municipal Public Security Bureau (GMPSB) and should be provided under the permission from GMPSB.
To date, after several times contacts, generally the GMPSB agree to provide deaths number for one year. Based on this the monthly data can be obtained.

On the other hand, any deaths and hospital admission data collected from hospitals must be under the permission from GMPHB, the local authority of public health which manage local hospitals.

We have talk about data collection with GMPHB based on the email of Feb. 11th Jocelyne sent us. As for monthly number (1997 only) and annual number of mortality and mobility, the corresponding director of GMPHB generally agree to provide because these are available in the data base(no much problem for Approach 1a). But concerning daily data for three years, the director didn't agree to provide so much detailed daily data because the daily data is not available in the statistics section at present and collecting daily data must involve a lot of hospitals and three-year data is too much which concerning so much detailed information of patients. The director agree to reconsider the problem if we reduce the amount of data.

b. Time-consuming and cost-consuming work

Daily data must be collected from the case room in large hospitals by the aid of leaders and staffs . Guangzhou is a big city with large population size. The daily data for three years are a great amount of data. Daily data collection will be a time-consuming work, in other word, a cost-consuming work because of traffic fee, contacting with the corresponding leaders of hospitals to get permission(need much time here) and paying to statisticians in case rooms of hospitals etc.

c. Computer system problem.

The computer system in each hospital is different and is unfamiliar to us. The document of cases are filed in a form which is difficult for us to transfer them into the data structure as we need exactly. The required parameter such as date, age, sex, district, death causes or admission causes etc. should be selected from several different data bases in hospitals, which pose a lot of difficulties of data collection. Now we are still exploring a resolution way.

GZ team has notified the Norway experts of the above-mentioned situation by e-mails. Jocelyne and Kristin have proposed some practical resolution plan such as collecting daily data from 3 or 4 largest hospitals for one year and assessing the their representivity. Based on their opinion, GZ team presented the data requirement again to the GMPHB. And to date, GZ team is waiting for the answer from GMPHB. Since a great amount of payment for interview study has been paid and GZ team is still not sure whether the limited budget left is enough or not before we finish final talking with GMPHB.

4) Co-ordination with other task group

Since the work of Task 6-1 is already very heavy, it is agreed that some needed information is performed and provided by Task 5. But up till now they are still not quite clear the method of data conversion and address coding. This point need to be discussed at the workshop in May 1998 among Task 3, 5 and 6 together and had best to write down the detailed description of method and requirement and inform Task 5 clearly or the data analyses by Task 6-1 will be delayed.

4.7 Task 6-2 Material Damagement Assessment

by Tian Kai, GRIEP and Jan F. henriksen, NILU

Status report of November'97-May'98

1. Work performed November'97-May'98
Based on the work plan, we have fulfilled following works:

- Classification and distribution of buildings in Guangzhou
- Finishing field test in 10 sites
- Collection of data for building material price and worker salary for maintenance.
- Collection of climate data
- The half year report

2.Problems
1) Capacity and training
Determination of materials average amounts for all kinds of typical building in Guangzhou is special difficult for us. Dose-responds equations for materials except for the test materials (carbon steel and zinc) are difficult for us. The participants in Task6-2 are short of training on these respects of ability.
2) Coordination with other tasks
Because O_3 was not monitored by Task4 during the field test time, the data of O_3 concentration
have not been obtained. Coordination with Task4 is necessary.
The GRID concentration data of pollutants were not available in April 1998, so coordination with Task3 is necessary.
3) Modification to the Detailed Work Plan
The calculation of total amount of building materials will be finished by June 1998.The dose-responds equations and lifetime equations in Guangzhou will be defined after the O3 concentrations (GRID concentration or monitoring concentration) in the test sites are obtained.
4) Plan for next 6 months

Time schedule, responsible person and the work load demanded (Guangzhou Side)

No.	Date	Task	Participant	Work load (Person.hour)
1	5/98	To finish pickling and weighting for panels and send the result to Norway. Some samples (18 pieces of samples in 3 sites) will be taken to Norway for pickling by a Chinese group.	Tian Kai, He Liangwan	80
2	6/98	To evaluate the exposure test and to compare with the existing dose-response equation and define the dose-response equation in Guangzhou	He Liangwan, Tian Kai	140
3	7/98	Calculation lifetime of materials in Guangzhou based on the information from modeling group for SO_2, O_3(1995) and field exposure test data	He Liangwan, Tian Kai	100
4	7/98	To prepare the first year report	Tian Kai, He Liangwan	42
5	7/98	To prepare the half year report	He Liangwan, Tian Kai	42
6	8 - 9/98	Calculation of the cost in GRID and total cost in Guangzhou	Tian Kai, He Liangwan	140
7	10-11/98	Calculation of the damagement cost of materials in suburb area based on estimation of materials and pollutants level for the cost-benefit analysis group	He Liangwan, Tian Kai	70
8	12/98	To prepare report to half year seminar and Norway counterpart	Tian Kai, He Liangwan	42

Time schedule, responsible person and the worktime demanded (Norwegian Side)

Date	Task	Worktime	Responsible person
6/98	Evaluation of the field exposure test	3 days	J.F. Henriksen
7/98	Contribution to the work report of 1997	3 days	J.F. Henriksen
7/98	Contribution to the first half year report and visit to Guangzhou	10 days	J.F. Henriksen
11/98	Contribution to the second half year report	2 days	J.F. Henriksen

4.8 Task 6-3 Vegetation

by Tian Kai and He Liangwan, GRIEP, with comments from Mr. Jan F. Henriksen, NILU

4.8.1 1. Work performed in the period December '97-April '98

According to the DWP 1998 of this task, the main tasks for the Guangzhou side before April this year were collection of GZ background information and obtaining information about laboratory methods and other methods needed to perform the analyses.

Subtasks work descriptions are given in the following:

1. Vegetation assessment of urban area
1.1 Before January, we have collected the air quality data from six sub-stations distributed around Guangzhou. Four monitoring sites have been selected. These are: lu hu(clean site), ji xiang lu, hai zhu district station and ti yu xi .
1.2 The South China Institute of Botany has been visited in February, some information and literature have been got from consultants and library.
1.3 Some background information has been obtained from the Forest Department of Guangzhou Government and so on.
1.4 A detailed work plan with budget of field survey and analysis of lab was prepared in the beginning of April, and was then submitted to the project office

2. Choosing anti-pollutant plants
2.1 Before January, information and literature were collected, and the preparation of the report was started.
2.2 Some consultants of the South China Institute of Botany were visited in Feb., and some literature has been collected.
2.3 The report improvement with the collected information in March.
2.4 Continue to revise the report in April.

3. Crop damage assessment
3.1 Before January of this year, the detailed requirements from task 9 were proposed by Guangzhou task 9 leader in the meeting of two tasks, and the main solution ways have been discussed.
3.2 In Feb., we visited experts at the South China Agriculture University to try to know more about the relationships between air pollutants and crop productions, and to investigate whether any studies on this issue had been performed that could be useful to the GZ project.
3.3 Based on the requirement from task 9, the needed information was searched in March.
3.4 We have continued to contact various institutions to search for relevant information and literature on crop damage in April.

4. Forest damage assessment on Baiyun mountain

4.1 Before January of this year, the input of this subtask to task 9 was agreed upon in a meeting with the Guangzhou task 9 leader. We investigated from which sources we could obtain the information that is needed.
4.2 In Feb., the forest distribution and wood production etc. were collected in the Forest Bureau of Guangzhou.
4.3 We continued to collect literature on existing research results in March.
4.4 Information on the forest vegetation and soil situation on Baiyun mountain have been collected from the management agency of Baiyun mountain.

5. Vegetation damaged by heavy metal
5.1 The relevant information was searched before January of this year.
5.2 The distributions of heavy metal areas in Guangzhou have been collected in Feb.
5.3 We have been collecting the information by visiting various institutions during March.
5.4 We began to prepare the report in April.

6. Vegetation damaged by acid rain
6.1 We investigated from which sources and how we could obtain the relevant information before January of this year.
6.2 Continue to collect the distribution map of polluted area resulting from acid rain, and the vegetation distribution map in the Guangzhou grid map during FebInformation on vegetation affected by acid rain was collected in March.
6.3 The criteria information of vegetation affected by acid rain was collected continually in April.

Plan for next 6 months
Guangzhou part:

Subtask distribution and time schedule:

Subtask		Time schedule
1.	Vegetation assessment of urban area	April-May
1.1	Selection of the field survey and ecological monitoring sitesThe four air monitoring sites are: lu hu(clean site), ji xiang lu, hai zhu district station and ti yu xi.	
1.2	Field observation and sampling	May
1.3	Analysis in lab	May-July
1.4	Data handling	Sept.-Oct.
2.	Choosing anti-pollutant plants	
2.1	Continue to collect the relevant information and literature	April-June
2.2	List a table of anti-pollutant plants of Guangzhou	July-Oct.
2.3	Submit the report to the project office, and transfer to the related departments of Guangzhou Government	Nov.-Dec.
3.	Crop damage assessment	
3.1	Continue to search the typical examples regarding the dose-response relationship for crops and air pollution.	April-June
3.2	Crop yield loss estimation based on the existing information.	July-Dec.
3.3	Transfer to task 9	Nov.
4.	Forest damagement assessment on Baiyun mountain	
4.1	Decide upon the field survey and monitoring site.	April-May
4.2	Sampling in the field	May
4.3	Analysis in lab	May-July
4.4	Data handling	Aug.-Sept.
4.5	Damage assessment	Oct.-Nov.
4.6	Transfer to task 9	Nov.
5.	Vegetation damaged by heavy metal	
5.1	Continue to collect the information and improve the report	April-July
5.2	Transfer to task 9	Aug.
6.	Vegetation damaged by acid rain	
6.1	Continue to collect the criteria information of vegetation effected by acid rain	May
6.2	Continue to collect the background information of acid rain distribution and vegetation distribution.	May
6.3	Damage assessment of vegetation and crops effected by acid rain, more focuses will be put on the forest on Baiyun mountain effected by acid rain	June-Nov.
6.4	Transfer to task 9	Dec.

4.9 Task 7: Control Options. Status Report per April 1998

by Cui Xia, GRIEP and Andy Yager/Thomas Krogh, IFE

4.9.1 Overview

According to the detailed work plan (Nov 97-May 98), the research content consists of four sub-tasks which are:

Status of technologies in use today.

This part involves collection of data on existing technologies that are sources for current air pollution in Guangzhou. Information from Task 1 is utilzed in this subtask. Collected data are:

- Power and steam production: Consumption of fuel by type, operating hours per year, age (number of years since the production started), technical levels and emission levels.
- Industry: Consumption of fuel by type, age, technical levels and emission levels.
- Commercial/service sector: Consumption of fuel by type. Where relevant also efficiency for the different devices. Emission rates of relevant pollutants.
- Agriculture: Consumption of fuel by type (if relevant: fuel and electricity use by activity: machinery, water heating, etc.). Emission rates of relevant pollutants.

Status & Development of economic activity and air pollution.

Projections of activities that generate air pollution or consume energy (for all sectors and end-uses as defined). This was discussed when a representant from IFE visited GZ in April this year. Some cooperation with Task 8 is needed in this subtask. The subject will be discussed further during the workshop and training in May.

Options for emission abatement

These options are relevant for both modifications of existing technologies and through
implementation of new technologies. The data needs for control options are in addition to the technical data described:

- investment cost
- variable and fixed operating and maintenance cost

The task has improved a paper called "Development of Future Emissions in Guangzhou: Growth and Control". This paper will be used as foundation material during the training in Norway.

Establishment of an energy system model for GZ and surrounding regions.

A model structure of the energy system in GZ is under preparation. Markal is supposed to be installed in GZ in the nearer future. An energy flow map is provided based on the energy balance. This will be the reference when start using MARKAL. A suggestion is to start with a demo version of MARKAL to get familiar with the consept.

Training program.

Besides the research of 4 sub-tasks, a training program was organized in 1997. From 13 ~ 17 November 1997, Dr. Cui and Mr. Fan participated in the environmental economy program organized by NEPA, University of Hongkong and Overseas Development Agency (British).

4.9.2 Problems

- Because work of other Tasks were delayed .The part job of sub-task 1 and sub-task 2 do completely not unfold
- In 1998, task 7 must be strict cooperation and coordination with Task 1, Task 2, Task 8, and Task 11.

In general, the study of task 7 processed favorably in 1st half of 1998.

4.9.3 Work Plan (June-December 1998). Task 7: Control Options

Objective

On Jun.-Dec. 1998,our objective is evaluation of these according to their cost and abatement potential on work on Nov 1997 -May 1998. We shall establish a model structure of base year reference energy system. The results of the control option assessment will form input to the cost-benefit analysis and to the cost-effectiveness analysis of possible actions to be included in an overall air pollution abatement strategy.

Subtasks

Current situation (for base year 1995) and Future development:

Status of technologies in use today

This subtask will going on collection of traffic data existing technologies that are main souces for current air pollution in Guangzhou . For transport technologies the necessary will be provided from Task 11 (fuel use for different modes; cars, truck, buses, motor bikes, etc. If available, fuel use should be reported as a function of vehicle-km. Emission rates of relevant pollutants).

Status & Development of economic activity and air pollution

- Projections of activities that generate air pollution or consume energy
- For all sectors and end-uses as defined
- Time horizon; up to 15-25 years

Task 7 will assist Task 8 in defining data needs for establisting these projections.

Establishment of an energy system model for GZ and surrounding regions

Based on the decision of which model to use, establish a model structure of base year reference energy system. The starting point for this is the energy balance of supply, transformation and end-use of energy in the current situation. Implement data for current technologies and future options in the model. Calibrate model

Contribution to baseline emission scenario development

- Baseline Emission Scenario: Reflects a situation where no specific action or measure is taken to mitigate emissions ("Business as Usual")
- Start from current situation (Inventories for base year, input from Task 1),and use existing policy plans to project use of technologies.The responsibility of Task 7 is,in collaboration with Task 8.to specify the development of emissions from these technologies based on data on technical performance and emission factore.From the emission of the technologies the projections of baseline emissions will be calculated(in Task 8).

Identification of cost efficient control options for emission abatement

- The cost and abatement effect of separate options. This is calculatetd from the difference in emissions and costs for the entire system, including links to other options, when running the model with and without the option available. The emission levels (abatement effect) are input to the loop; dispersion-exposue-darmage assessment, and subsequently input to cost-benefir calculations. The costs of the option are direct input to cost-benefit calculations.
- Sets of control options to meet specified emission targets to a minimum cost, i.e. cost-effectiveness analysis. This analysis is only addressing cost-effective options tor meeting emission reduction targets, and mot targets for reduced exposure, damadge on buildings, etc. In order to address this itetations have to be made with the dispersion-exposue-damage assessments. This sub-task is to be coordinated with Task 9 (Cost-Benefit Analysis), and will start before 1999.

4.10 Task 8: Baseline Scenario Development. Status Report per April 1998

by Mr. Fan Changzhong, GRIEP and Dr. Haakon Vennemo and Ms. Xu Zhao, ECON

Overall task description

The objective for 1998 is to complete the task of scenario development. Based on the input from, and the cooperation with tasks 1, 2, 3, 7, 10 and 11, this task will set discuss and publish a baseline scenario (1995-2010), a trend scenario (1995-2010) and possibly a target scenario (1995-2010).

4.10.1 Work performed December '97 - April '98

GZ part

The GZ part has finished / almost finished the following reports:

1. The report of socioeconomic development status before 1995 in GZ (finished).
2. The report of socioeconomic development scenarios during 1995-2000-2010 in GZ (almost finished).
   (These reports provide a lot of useful socioeconomic data)
3. The report of air pollution control targets in GZ during 1995-2000-2010 (almost finished).
4. The report of spatial distribution variation of industries and inhabitants' living houses during 1995-2010 in GZ citywide (almost finished).
5. The report of database on the development scenarios in GZ citywide (finished).

NORCE part

1. The NORCE part has advised on, cooperated with and contributed a lot to the above-mentioned reports.
2. The NORCE part has prepared for the visit of Mr. Fan.

4.10.2 Problems and proposed solutions:

In general, the main works of sub-task 8 has been proceeding to meet the requirements asked by the DWP successfully. Up to now, sub-task 8 have not run into obstacles which are not able to be overcome.

4.10.3 Modification to the Detailed Work Plan (if necessary)

GZ part: No
NORCE part: No

4.10.4 Plan for next 6 months

GZ part

- Task description for the second half of 1998

1. Design and discuss the *baseline scenario* based on Equation 1

Equation 1 Emissions year t = activity indicator year t energy intensity 1995 * emission coefficient 1995.*

2. Collect the «trend» energy balances (consumption of energy) and the «trend» emission coefficients from task 2/7, or design them ourselves based on historical trends.
3. Design and discuss the *trend scenario* based on Equation 2

*Equation 2 emissions year t = activity indicator year t * «trend» energy intensity year t * «target» emission * coefficient «trend» year t.*

4. If possible, design and discuss the *target scenario* based on Equation 3
*Equation 3 emissions year t = activity indicator year t * «target» energy intensity year t * «target» emission coefficient year t.*

5. Finish the reports mentioned above.

- Technological output:
    1. Baseline scenario
    2. Trend scenario
    3. Target scenario

NORCE part

The NORCE part will co-operate with the GZ part, give them advisories and finish the final reports.

4.11 Task 9: Cost Benefit Analysis. Status Report per April 1998

by Mr. Yu Jican, GRIEP and Dr. Haakon Vennemo and Ms. Xu Zhao, ECON

Overall task description

The objective of the task is to perform a cost-benefit analysis and a cost-effectiveness analysis of measures suggested. The objective for 1998 is to complete the methodology for benefit valuation in the fields of health, vegetation and material damage; and to perform a pilot cost benefit evaluation of some measures in order to test the methodology.

4.11.1 Work performed December '97 - April '98

GZ part

1. Mr. Yu has discussed with task 6.3 at least three times and wrote a report named «The data demanded from Task 6.3» (finished).
2. Vegetation: We have collected market prices of 1995 for vegetables, fruits and other plants(finished).
3. Vegetation: We have collected prices for entrance tickets, prices for parking and prices for bus tickets to The Baiyuan Mountain Park. We have also collected data on total visitors (finished).
4. Vegetation: We have designed a draft questionnaire on willingness to pay for environmental quality at The Baiyun Mountain Park (almost finished).
5. Health: Translate to Chinese the questions of task 9 for the health questionnaire (finished).
6. Ask task 6 for a list of the output from their task (finished).
7. Material damage: We have collected the data required to perform estimates of the material damage.

NORCE part

1. The NORCE part has advised on and cooperated with the GZ part on each task.

2. The NORCE part has prepared for the visit of Mr. Yu.
3. Xu Zhao has finished her thesis which lays a base for the future work of Task 9.

4.11.2 Problems and proposed solutions:

GZ part: None
NORCE part: None

4.11.3 Modification to the Detailed Work Plan

GZ part: None
NORCE part: None

4.11.4 Plan for next 6 months

GZ part

According to the DWP for task 9 in 1998 and based on the work progressing, the work for the second half of 1998 are as follows:

1. Vegetation: Conduct contingent valuation study among 200 visitors at The Baiyun Mountain Park. (finished July 1).
2. Write a short report of findings (finished August 1)
3. Health: Collect data on GDP/person, cost of staying overnight in the hospital, cost of visiting physician, cost of additional medicine, and other relevant items (finished August 15).
4. Material: Collect data from the work of task 6.2 (finished October 1).
5. Write a report of health damage valuation based on the work of task 6.1 (finished October 15).
6. Write a report of material damage valuation based on the work of task 6.2 (finished October 30).
7. Write a report of vegetable damage valuation based on the work of task 6.3 (finished Nov. 15).

NORCE part

1. Co-operate with the GZ part and finish the final reports.
2. Advise on establishing a draft worksheet for cost-benefit evaluation and advise on a pilot cost-benefit study.

4.12 Task 10: Pollution control Management and Policy Instruments. Status Report per April 1998

by Mr. Liang Yujie and Ms. Ge Yi, GRIEP and Mr. Knut Aarhus and Mr. Torleif Haugland, ECON

Overall task description

On the basis of our previous work of task 10 in 1997 on relevant policies and regulations of air pollution control, we will in 1998 survey and assess the effects of environmental protection policies, regulations and administrative methods and identify main achievements and problems with present systems and regulations in Guangzhou. In addition we will study successful experiences from other cities in China or abroad which are relevant for Guangzhou.

4.12.1 Work performed December '97 - April '98

GZ part

According to the DWP of 1998, the work of the 1st half focused on survey of effects and existing problems caused by the implementation of present regulations and policies in industry, motor vehicle & energy sectors. The main works included:

1. Investigated the status of air pollution control regulations and policies in industry and energy sectors. The main works included:
   - NEPA, policies regarding air pollution control and emission standards.
   - Guangzhou EPB, status of air pollution control in Guangzhou; plan of Total Amount Control of air pollution caused by industry in Guangzhou and the enforcement plan of pollution charge; Surveyed of the implementation and problems of industrial environmental regulations.
   - Liwan District EPB, industrial air pollution control status, problem and plan in district level; industrial technological improvement and layout planning in the old urban areas.
   - Guangzhou Power Plant & Huangpo Power Plant, major emission treatment facilities and present SO2 control measures; emission permit and total amount control in the region; future desulphur plan and preparation.
   - Collected and analyzed the information of domestic and international industrial pollution control regulations and economic policies.

2. Regarding motor vehicle emission, task 10 collected information about command & control, economic policies of motor vehicle emission control in Canada, U.S. & Mexico, such as new emission standards, ridesharing, total amount control, old vehicle elimination, emission credit trade, etc.. By practical survey and data analyses, we understand not only the latest mobile source and non-road source emission abatement technologies, but also the development procedure of regulations and policies, e.g. content of standards and regulations, detailed implementation course of economic, technological & administrative policies, effectiveness and problem of policies, future emission

control plan, etc.. Meanwhile, we studied present emission control policies, especially the latest administrative regulations in Guangzhou. All of these will be helpful for the understanding of emission formation course and emission control trend in future.

3. Task 10 modified and supplemented reports of sub-tasks 3 and 4 which were performed in 1997, plans to bind them soon.

4. We have started our training courses of environmental economics and environmental management as planned.

* The work of the first half of 1998 only focused on data collection and survey, therefore there are no reports available. The work is basically progressing well.

NORCE part

Assessed effectiveness and cost-efficiency of environmental regulations in the transport sector on the basis of description of specific regulations in sub-task 10.4 (finished).

4.12.2 Problems and proposed solutions:

GZ part: None
NORCE part: None

4.12.3 Modification to the Detailed Work Plan

GZ part: No
NORCE part: No

4.12.4 Plan for next 6 months

GZ part

1. Assess effectiveness and cost-efficiency of environmental regulations and policies for control of air pollution from industry and power sectors (scheduled to be finished by August)
2. Investigate relevant domestic and international experiences with policies, regulations and administrative strategies for environmental protection, especially experiences of introducing economic instruments into pollution prevention and control. e.g. assessment and comparison of economic methods and direct regulations (scheduled to be finished by October).
3. Training of environmental economics and environmental administration (from February to August).
4. Fulfill the training program.

NORCE part

1. Assess effectiveness and cost-efficiency of environmental regulations and policies for control of air pollution from industry and power sectors (scheduled to be finished by August)

2. Investigate relevant domestic and international experiences with policies, regulations and administrative strategies for environmental protection, especially experiences of introducing economic instruments into pollution prevention and control. e.g. assessment and comparison of economic methods and direct regulations (scheduled to be finished by October).

4.13 Task 11: Vehicles Emission Control Option.

by Mr. Zhu Changjian, GRIEP and Andy Yager, IFE

4.13.1 Work performed December '97 - April '98

1. Objectives of the Task work in the first half of 1998
   - Collect the information about the vehicle amount,types,traffic volume and speed in 1995,
   - Calculate the vehicle emission amount according to the emission factor,
   - Monitor the air pollution concentration especially to NOx and O_3 in GZ and its surrounding area,
   - Estimate and forecast the effect to the GZ ambient air quality caused by vehicle emission,
   - Prepare for calculating vehicle emission contribution ratio to the photochemical smog in GZ.

2. Responsibility
   The main responsibility for the Task 11 is to Mr.Zhu Changjian,GRIEP for the GZ side and to Mr.Yager,institute for Energy Technology for the NORCE side.

The main members for Task 11 are Mr. Wang Boguang,Miss Sun,GRIEP and Ms. Shuang Jurong, Ms.Mo Xiuzhen, GEMC for GZ side and Mr.Dag Tonnesen for NORCE side.

3. The following work have been finished in the first half of 1998 according to the plan:
   - Collect the information about the vehicle amount,types,traffic volume and speed in 1995 and establish the database of these data,
   - Utility USA EPA Mobile5 Model and modify partly parameters including GZ' meteorology and Chinese vehicle emission standard and GZ'vehicle age etc. to calculate the vehicle emission factor. The emission data have been provided to task 1.
   - The mainly work for task 11 is to get vehicle emission factor.In order to make emission factor more accurate and reliable,we have measured the driving condition in GZ and drawn the driving curve coming from factual transport in GZ. Now the chasyss dynamometer test is being done in Beijing and the result will be got in June. The Chinese Research Academic Of Environmental Science is mainly responsible for the work..
   - Set up Baiyun Mountain and Lianhua Mountain auto-monitoring station.The two stations are working now and we have got many useful data.The Nonggui station is being adjusted now and we think the monitoring data will be got from the station soon.

4. Coordination with other tasks
   - Traffic data have been obtained from Task 1 and meteorological data from Task 3,
   - Collect and estimate the information about the road building and economic development in GZ in cooperation with Task 8.
   - Survey vehicle emission hazard to people health and agriculture in cooperation with Task 6.
   - Task 11 has provided vehicle emission factor to Task 1.

5. The existing problem
   As the result from the chasyss dynamometer test in Beijing will be obtained in June and Task 11should provide vehicle emission factor to Task 1in March according to the plan, Task 11 can only give the emission factor which are got from MOBILE5 to Task 1.As we know, MOBILE5 is the USA model and we are not sure if it is really suitable to the actual condition in GZ. It seems the factor from the chasyss dynamoneter test will be better.

4.13.2 Detailed work plan for the second half of 1998

1. Objectives of the Task work in the second half of 1998
   - Estimate the forming condition of the photochemical smog in GZ,
   - Estimate vehicle emission contribution ratio to the photochemical smog in GZ,
   - Put forward the strategy and measure in the vehicle management and fuel using,

- Formulate total control option of vehicle emission in GZ in order to control emission discharge effectively and improve the ambient air quality and reach sustainable development of transportation, vehicle growth and environmental protection.

2. Responsibility
   The main responsibility for the Task 11 is to Mr.Zhu Changjian,GRIEPfor the GZ side and to Mr.Yager,institute for Energy Technology for the NORCE side.
   The main members for Task 11 are Mr. Wang Boguang,Miss Sun,GRIEP and Ms. Shuang Jurong, Ms.Mo Xiuzhen, GEMC for GZ side and Mr.Dag Tonnesen for NORCE side.

3. The work plan in the second half of 1998
   Finish air pollutant existing monitoring and test research,include as follow
   - Collect the monitoring data of ambient air quality ,
   - Since the streets in the central area are narrow and the dispersion of vehicle is affected by the local topography,we will select the typical street canyon to perform the pollutant dispersion test ,
   - In Guangzhou urban area , we will choose 15-20 sits as short-term monitoring sites to make clear the spatial and temporal distribution of secondary pollutants due to vehicle exhaust. The main items include O_3 and Nox. The monitoring period is about 15days,
   - Continue to collect data from the Baiyun Mountain, the Lianhua Mountain and the Nonggui auto-monitoring station and prepare the basic work for estimating the reason of taking place high concentration pollutant and its meteorological condition.

Survey vehicle emission hazard to people health and agriculture

Forecast the development on vehicle pollution
This part includes transportation developing plan,photochemical smog pollution forecast and contribution ratio. In this research, we will estimate the reasons about how the photochemical smog pollution generated and predict the developing trend in future.These are the key tasks for Task 11.

4.13.3 Coordination with other tasks

- Task 4 will assist with the air pollutant monitoring and test research,
- Task 6 will assist with vehicle emission hazard to people healthy and agriculture,etc,
- The forecast of vehicle pollution development will cooperate with Task 8.

4.13.4 Assistance from the NORCE side

- We hope to obtain assistance from the NORCE about emission factor chasyss dynamometer test,photochemical smog pollution and typical street wind field dispersion research.

- We hope the NORCE can provide the successful example of vehicle pollution control in EUROPE.
- At last we hope the NORCE can compile the research report with Task 11 and give us technological assistance.

4.14 Task 12: Air Pollution Forecasting. Status report per April 1998

by Liu Li, GEMC and Dag Tønnesen, NILU

4.14.1 Work performed December 97-April 98

GZ part:

* Finished the detail work plan in 1998.
* Studied and defined the Meteorological data and synoptic chart needed in this task.
* Finished the work report in 1997.
* Phrased the synoptic chart from GZ Meteor-office. (in progress)
* Analysis of the air quality data for subtask4.
* Got Meteorological data from task3.(Meteor-data from 1994 to 1995)
* Sort out the Meteor-data ..

NORCE part:
Completion of workplan for 1998.
Study of one week sample of meteorological data from 1994.
Discussions with task 3 on how to coordinate the use of the data in a windfield model

4.14.2 Problems and proposed solution:

GZ: Lack of the Meteor-data from 1991 to 1993 and synoptic charts means that subtask4 will be Postponed.
Problem could be categorized in :
*Co-ordination with other task.
NORCE: An optimized method for applying the aquired data to produce windfields for the Episode model have not yet been worked out.

4.14.3 Modification to the Detail work plan:

The deadline of subtask4 will be postponed, we need two months to finish this work after getting the entire Meteor-data and synoptic charts.
The deadline of subtask5 will make corresponding changes.

4.14.4 Plan for next 6 months:

GZ part:
Finish the subtask4 (need two months to finish this work after getting the entire Meteor-data and synoptic charts).
Begin to Establish the air pollution forecasting model based on the EPISODE model, test and adjust it.
NORCE part: Complete a sample set of data to be run an tested in a windfield model.
The result of this will provide basis for the meteorological preprosessor for EPISODE and the input for the prognostic part of the preprosessor.

4.15 Task 13: Project administration/Project Office, Guangzhou side. Status Report

4.15.1 General target and tasks of 1998

Task 13 developed the work of 1998 based on each task work of 1997. The general target consists of main contents of following:

1. Supervise and check the implement of the general target description in the Project Proposal. Works must be finished in this year are the following:
    - Equipment and knowledge transfer
    - Monitoring system improvement
    - AirQUIS installation
2. Setting up the preliminary frame of AirQUIS action plan. Adjusting works of all tasks to the situations, which were suitable to the requirements of the action plan, and improved it gradually.
3. Checking the progress of each task. All of information collection should be finished. The project is going into the stage of experiment and simulation.
4. Daily management of the project, including:
    - Two workshops preparation, the first one will be in Norway, and the second one will be in Guangzhou.
    - Training plan implement.
    - Finalizing the schedule and arrangement plan for the government delegation visting in Norway.
    - Completing and submitting the status report of 1997 and the detailed work plan of 1998 to the meeting between SSTC and NORAD.
    - Work connection between both sides.

4.15.2 Task 13 work in the first half of year

Assistance to some tasks was performed by task 13 according to the general target and each task proceeding. The implement of general target description in the Project Proposal was checked as well.

- Providing assistance to task 1 to collect pollution sources out of Guangzhou region. And task 1 has finished its collection work.

- Providing assistance to task 6-1 to develop health investigation. Task 6-1 has finished this work and is performing the statistic work.
- Providing assistance to task 4 to declare monitoring equipment at customs and pick up good.
- Checking the performance of equipment and knowledge transfer, and the existing issues. The situaitons up-to-date are the following:
    - Equipment transfer is performing. The ordered monitoring equipment has been arrived at Guangzhou customs. The procedures are dealing with now. It will be put into use in May.
    - Knowledge transfer:

Model:

- AirQUIS emission data has been provided (Task 1).
- KILDER executable model and the user manual have been provided. But it still exists some problems because of lacking the source program (Task 3).
- ROADAIR executable model, user manual and source program have been provided (Task 3).
- MARKAL user interface has been provided. But the energy system model has not been provided yet. And someone of Norwegian experts indicated that it would not be provided (Task 7).
- EPISODE is going to be provided this year (Task 3, 12).
- GIS flock of AirQUIS is going to be provided this year (Task 3).
- AirQUIS wind field model is going to be provided this year (Task 3).
- AirQUIS expose model is going to be provided after improved in this year (Task 5)
- GAMS has not been provided yet (Task 7)

Methods and materials:

- Zinc board and carbon board for experiment have been provided (Task 6-2).
- The method of material life calculation has been provided (Task 6-2)
- The method of material distribution calculation has been provided (Task 6-2).
- The method of material cost calculation has been provided (Task 6-2).
- Some literature, information and demonstration of health damage assessment based on dose-response function have been provided, but the assessment methods on the list have not been provided yet (Task 6-1).
- The assessment methods of the typical epidemic research and the air pollution expose evaluation method are as same as the mention above (Task 6-1).
- Some information has been provided. But the dose-response functions for vegetation and crop damage assessment were not provided after kick-off seminar. It means there is only one function so far (Task 6-3).
- Some information of outside cost-benefit and evaluation principles as well as methods has been provided. But the international literature regarding to cost-benefit analysis methods of vegetation and material has not been provided (Task 9).
- Some simple introductions regarding to the conception distribution of policy means have been provided (Task 10).

a) Completing and submitting the status report of 1997 and the detailed wotk plan of 1998 to the meeting between SSTC and NORAD in this year
b) Finishing daily management work of the project according to the plan.
c) Drawing up the performance list of the equipment purchase budget of 1998.

Middle achievements:

- Task 1: Original database of industrial source (.xls)
- Task1: Energy consumption input file of industrial source (.dat)
- Task 1: Emission factor database of industrial source and domestic source.
- Task 1: Emission factor input file of industrial source and domestic source (.dat).
- Task 1: Population data file.
- Task 1: Population distribution file in grid.
- Task 2: Finishing the data collection of energy and energy consumption.
- Task 2: Finishing coal combustion pollution source distribution and the analysis of pollutant emission amount.
- Task 3: Finishing the meteorological data collection. Statistic analysis is performing.
- Task 3: Establishing digital topography database, and output data file.
- Task 3: Pretreatment of meteorological data and output several sets of data files, one of them conforms to the format of the KILDER model.
- Task 3: Solving the stability problem after running some of the model flock of KILDER. making out a new pretreatment program which can converse high level or low level cloudiness to stability.
- Task 3: Treating meteorological data of the basic year - 1995.
- Task 3: Sorting out meteorological data of one week, and providing to NILU.
- Task 4: Finishing exist network description.
- Task 4: Finishing the analysis report of air quality monitoring data.
- Task 4: Improving air quality monitoring equipment.
- Task 5: Finishing population and architecture data collection.
- Task 6-1: Finishing health questionnaire collections, and the statistic analysis is performing.
- Task 7: Finishing the collection of equipment technological standard and he data of each preparing reducing control program.
- Task 8: Finishing the analysis report of social economic development situation in the basic year.
- Task 8: Guangzhou social economic development scenario has been finished basically.
- Task 8: The pollution control target research report of Guangzhou air quality in 1995-2000-2010 has been finished basically.
- Task 8: The research report of industrial and dwelling space distribution variation has been finished basically.

- Task 8: The data base research report of Guangzhou social economic development has been finished basically.
- Task 10:
- Task 10:
- Task 10:
- Task 10:
- Task 12: The report of spatial correlative result of every two substations from 1991 to 1995, and the study of the ratio between NO_2 and NO_x in each sub-station of Guangzhou auto-monitoring system has been finished.
- Task 12: The spatial correlative research report of each pollutant concentration in 1991-1995 between auto-monitoring sub-station and manual monitoring site.

4.15.3 Existing problems

- Lack of communication between China and Norway in Task 11, special in the frame making of action plan.
- Some problems are existing in the project progress, because the related information collections and statistics analysis have not been finished. For instance, Task 1 (need to collect the opinions of using database from other tasks and the improved suggestions), task 5, task 6-1, task 6-3, task 8, task 9, task 10, task 11 and task 12. It is necessary for each task to speed their work, and make sure the whole task can be finished on time.
- The methods and tools should be provided by Norway have not been finished yet. For instance, MARKAL has not been provided to task 7 and task 8 so far. Problems still exist in some provided model. For instance, in task 1, the statistic region area cannot be satisfied to the task requirement when they use KILDER model. Since the source program has not been provided to Guangzhou team, the work has to be delayed. And a tool --- AirQUIS has to be installed late of this year and so on. These are the reasons resulting in the progress delayed.
- Since no source programs provided in models transferred from Norway to Guangzhou, the problems cannot be solved on time when Guangzhou team meet them. This must effect the project progress. Moreover, it is not correspondence with the forth main target of the Project Proposal: "Transfer technology and provide equipment based on the necessities, in order to let Guangzhou team continue their work on air quality management strategy in a certain area". Without source program, Guangzhou side will not continue to carry out the air quality management strategy independently.
- There were delay situations and work without deeply regarding tools provided. For instance, in task 6-1, only a little of literature, information and demonstrations regarding to health damage assessment methods based on dose-response function, epidemic research and air pollution expose assessment methods were provided, the assessment methods on the list have not been provided yet. No dose-response relationship for vegetation or crop damage assessments which are necessary to task 6-3 was provided after kick-off seminar. Only a little information has been provided. Some of literature and

information of the outside cost-benefit and environmental assessment principles and methods which are necessary to task 9 have been provided by Norwegian side. But the cost-benefit analysis for vegetation and material have not been got so far. Only a few simple introductions regarding concept distributions of policy means which are necessary to task 10 have been given. The cost-benefit analysis introductions for policy means have not been provided. the opinion from task 13, all tasks must speed up in order to achieve the target of this year (action plan draft completion). Tasks from 1 to 6 shall close to the completion before the second workshop of this year; The progress of tasks from 7-12 shall be satisfied to the requirements of action plan. So, the related methods and tools shall be provided by Norway as soon as possible, and the Norwegian experts shall strengthen the technology direction, put themselves into the project research work as well. Then the yearly target can be achieved.

- We hope we can keep the stability of the researcher in both sides, and try our best to involve ourselves in the researches.

4.15.4 Connection with other tasks:

Task 13 gets support from all tasks. The progress of project is well, and there are good co-ordination between tasks. It is necessary for task 13 to strengthen connections with other tasks, strengthen management and guarantee the project progress. Task 13 of Guangzhou side hope to strengthen the communication with Norwegian equal task. It is very important for drawing up the action plan.

Annex 1

Workshop program

Guangzhou Air quality Planning and Management System
Workshop 1/97
Ulvik/Oslo 11-15 May 1998

Workshop Programme

ULVIK

Monday 11 May		
Session 1	***:***	***0900-1200***
Chairman	*:*	*Mr. Haakon Vennemo, ECON*
0900-0930	:	Opening addresses * Representative of Delegation * Guangzhou Project Leader * NORCE Project Leader
0930-0945	:	Summary of the project Work Plan for 1998, by NORCE.
0945-1030	:	Task work: Preparation for presentation
1030-1100	:	Coffee break
1100-1200	:	Continued presentation of task status reports
1200-1300	:	Lunch
Session 2	***:***	***1300-1700***
Chairman	*:*	*Mr. Haakon Vennemo*
1300-1430	:	Presentation of Status Reports for each task, including plans for next 6 months. Presentation by either GZ or NORCE Task leader, to be decided by each task. 20 min. per task, including questions and comments.
1500-1700	:	Continued presentation of task status reports
1900	:	Dinner

Tuesday 12 May		
Session 3	***:***	***0900-1200***
Chairman	*:*	*Mr. Jan F. Henriksen*
		• Continued presentation of task status reports • Presentation of the training program • Summary discussion
Lunch	:	1200-1300

OSLO

Wednesday13 May-Friday 15 May, before noon
Task work in Oslo.

Friday 15 May, afternoon	
Closing session of the workshop.	
Chairmen:	*Representatives of the Project Leading Group will chair the meeting:* *Mr. Wu GRIEP Co-chairman* *Mr. Sun GEMC* *Mr. Larssen NILU Co-chairman* *Mr. VennemoECON*
1300-1315	Opening
1315-1445	Updated status reports from each task (5 min. per task (1 overhead)) Points to be covered: 1. How they contribute to the sequence of analysis 2. When they will deliver the needed input 3. Critical delays
Coffee/tea-break during this session	
1445-1515	Summing up the status now, and expected status by next workshop
1515	Closing of the workshop
Leading Group will meet after the workshop for closing	

Annex 2

Program for the delegation

NORCE-Guangzhou
Program for the Delegation, Mr. Wu and Mr. Sun

8 May	Friday	Arrival :	1930 hrs: Arrival at Fornebu airport Transport to Plaza hotel and apartment in Herslebsgate.	x
9 May	Saturday	:	1048 hrs: Train to Voss from Oslo S. Lunch in train. 1720 hrs: Bus from Voss to Ulvik.	x x x
10 May	Sunday	:	Sightseeing Ulvik.	x
11 May	Monday	:	Workshop Ulvik.	x
12 May	Tuesday	AM/PM :	Workshop Ulvik.	x
		Evening :	Abt. 1530 hrs: Departure from Ulvik 1648 hrs: Train to Oslo from Voss. Dinner in train. 2221 hrs: Arrival Oslo.	x x x x
13 May	Wednesday	AM :	Visit to the State Pollution Control Agency Host: Mr. Per Døvle, Dept. of International Affairs	
		PM :	Free	
14 May	Thursday	AM :	Visit to Oslo Environment Authorities * The Bureau for Environmental Protection - The AirQUIS installation in Oslo Repr.: Mrs. Gry Hanto * City Administration, Dept. of Environment and Traffic: - Discussion of Action plans for Oslo Representatives: Mr. Guttorm Grundt, Env. Coordinator Mrs. Ingjerd Fuglum, Special Advisor, Traffic * Lunch, courtisy of Oslo City Administration.	(x)
		PM :	Visit to ECON.	(x)
		Evening :	Dinner. Host: ECON.	(x)

15 May	Friday	AM :	Visit to NILU/IFE. Lunch at NILU canteen.	(x) (x)
		PM :	Closing session of workshop, at NILU.	x
		Evening :	Closing dinner, attended by Directors of NORCE institutions.	x
16 May	Saturday	:	Sightseeing Oslo. Free time.	x
17 May	Sunday Norwegian National Day	AM :	1000-1200: Children's Parade, watched from in front of the Royal Palace.	x
		PM :	1300-1500: Cruise at the Oslo Fiord including lunch	x

x : Means that the project people/trainees also participate.

(x) : Means possible participation by some or all of the project people/trainees.

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