Final Component Description

KIMA Fertiliser and Ferrosilicon Plant

Pollution Prevention and Control

Environmental Sector Programme Support

Egypt

Ref. No. 104. Egypten. 806 **March 2000**

COMPONENT DESCRIPTION

COVER PAGE

Country	:	Egypt
Sector	:	Environment
Title of SPS Document	:	Environmental Sector Programme Support
Title of Component	:	KIMA Fertiliser and Ferrosilicon Plant Pollution Prevention and Control Project, Phase 2: Construction Implementation, Training and Motivation Phase, and Phase 3: Project Consolidation Phase.
National Agency	:	None
Duration	:	Phase 2: 3 years, Phase 3: 1 year
Starting Date	:	Upon fulfilment of Phase (1)
Government Contribution	:	LE 17,521,000 (December 98 fixed prices). Funds from KIMA covering local expenses.
Danida Contribution	:	LE 31.968,000 (December 98 fixed prices) equivalent to DKK 61,059,000 at December 1998 exchange rate. Funds covering foreign expenses plus local software components.

DESCRIPTION

The present Component has been designed as a second and third step in the prevention and control of pollution from the KIMA fertiliser and ferrosilicon plants. This Component form phase 2 and 3 out of 3 Component phases. Phase 1 aims at establishing an environmental management system at KIMA to initiate pollution abatement and create awareness of risks of pollution and of increasing occupational safety and health amongst all KIMA employees. At the end of phase 1, detailed design and tender documents for Component works at both the fertiliser and the ferrosilicon plant and a tender evaluation report with recommendation of ranking of bidders will have been produced. The EMG Component will assist in commencing a dialogue with the public in Aswan. Phase 2 comprises the implementation of all project works as well as a continuation of the software components started during Phase 1. Phase 3 will be used for consolidation and phase out of the project.

The Component will benefit the employees of KIMA and their families living in the neighbouring residential area. The employees will have a significant improvement in their working condition concerning occupational health, which will eventually lead to improvement of their physical health. The residential area counting about 10-15,000 people will have significantly less air and water pollution from the plant.

A major impact of the Component will be that the KIMA factories will remain operational until a new plant running on natural gas instead of electricity will have been established. This will in the first place benefit the 2,400 employees who can retain their jobs, but it may benefit around 10 times more people who are indirectly dependent on the well-being of KIMA (schools, shops, services etc.). Furthermore, the fertiliser plant produces around 10% of the fertiliser in Egypt and is the only one in Upper Egypt. The availability of cheap fertiliser is a prerequisite for farmers to make a living and therefore KIMA is considered one of the most important industries in Aswan.

Signatures:

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List of Abbreviations

CAN plant	Calcium-ammonium-nitrate fertiliser plant. A plant producing calcium ammonium nitrate from lime, ammonia and nitric acid. The term is normally used for N-fertiliser produced with Dolomite in an amount of 200 kg/tonne.
CIF	Cost, insurance, freight.
EEAA	Egyptian Environmental Affairs Agency.
Efaco	A public owned ferrosilicon producer in Edfu. The largest plant in Egypt with a capacity of 45,000 tonnes/year of 75% silicon alloy.
h	Hour
KIMA	Egyptian Chemical Industries.
kWh	Kilo Watt Hour.
mg	Milligramme.
min	Minutes.
N-fertiliser	A fertiliser containing only nitrogen in the form of ammonium nitrate, urea or a combination of both.
ppm	Particles per m^3.
TCOE	Technical Co-operation Office for the Environment. Established under EEAA with a professional staff of about 20 to support and co-ordinate donor funding.

EXECUTIVE SUMMARY

OVERALL AIM OF THE ESPS

The overall objective of the SPS will be to provide technology, infrastructure and strong local institutions to assist the poor in improving and maintaining the quality of the environment, in which they live and work.

The KIMA Component has been designed prior to preparations for the SPS, but as the Components fits in the overall aim of the SPS Danida's commitments to KIMA will be continues completed under the SPS.

COMPONENT OBJECTIVES AND OUTPUTS

The present Component has been designed as a second and third step in the prevention and control of pollution from the KIMA fertiliser and ferrosilicon plants. This Component form phase 2 and 3 out of 3 Component phases. Phase 1 focuses on detailed design and preparation of the activities at KIMA on pollution prevention and control. Phase 2 is the construction implementation, training and motivation phase, and phase 3 the consolidation phase. Phase 1 aims at establishing an environmental management system at KIMA to initiate pollution abatement and create awareness of risks of pollution and of increasing occupational safety and health amongst all KIMA employees. At the end of phase 1, detailed design and tender documents for Component works at both the fertiliser and the ferrosilicon plant and a tender evaluation report with recommendation of ranking of bidders will have been produced. The EMG Component will assist in commencing a dialogue with the public in Aswan.

Phase 2 is a construction phase, which may take up to three years. New equipment will be installed, and cleaner production initiated. Phase 3 is a consolidation phase of one year after which the oil in wastewater at factory outlet is reduced to an insignificant level, the factory discharge of polluted wastewater into Elsail or other canals is eliminated, and the fertiliser and ferrosilicon stack emissions are reduced to acceptable levels.

Danida will grant the funds for the imported part of the hardware investment. Danida will also provide the needed technical design, engineering and procurement back up as well as the funds and resources for training and awareness creation within KIMA personnel.

KIMA will provide the funds for the domestic part of the investment and other activities, and for protective clothing and equipment (both domestic and foreign). It will also provide the local workforce for the implementation, when possible using its own personnel. KIMA's ability and willingness to make its personnel available is necessary for the implementation.

POVERTY REDUCTION AND CROSS-CUTTING ISSUES

KIMA is the biggest industrial plant in Aswan Governorate. Other big industries include Komombo Sugar Mill, Efaco ferrosilicon plant, and an aluminium plant. The residential area of KIMA consists of 1,150 apartments rented to workers of the plant at subsidised prices. The total number of people employed by KIMA is 2,400, so including the indirect effect of KIMA on Aswan, around 10 times more people may well be dependent on the well-being of KIMA (schools, shops, services etc.). Furthermore, the fertiliser plant produces around 10% of the fertiliser in Egypt and is the only one in Upper Egypt. The availability of cheap fertiliser is a prerequisite for farmers to make a living and therefore KIMA is considered one of the most important industries in Aswan.

FINANCIAL AND ORGANISATIONAL SUSTAINABILITY

The Egyptian Government through the Holding Company will benefit from the Component improvements within the plant and the preparation for privatisation, which make KIMA more valuable and more suitable for the desired privatisation. This in turn will assist to ensure KIMA as a viable industry, which is of importance for the whole of Aswan.

The viability analysis presented in the Appraisal Report concludes that KIMA within its present technology will be a viable operation for the next 10 years. After 6-7 years from today (1996) the natural gas is planned to reach Upper Egypt and it will take 3-4 years to build a new natural gas based fertiliser plant. The Appraisal Team considers it unlikely that the Government will close down the KIMA fertiliser production through increased electricity prices before a new plant is ready for production.

The ferrosilicon plant including the environmental investments implemented under the Component will probably have a considerably longer lifetime than the present fertiliser plant, at least 20 years from now (1996).

The fertiliser plant with its present technology will become non-viable the moment the electricity price is increased, even marginally. However, the Appraisal Team believes that the plant is attractive for an anchor investor within the domestic fertiliser industry and that the Government for social reasons (KIMA is the largest industry in Aswan) will do its utmost to ensure the future of KIMA.

The major part of the Component's financial investments in the fertiliser plant will be useful also in a new plant based on natural gas as raw material.

MAJOR OUTSTANDING ISSUES, ASSUMPTION, UNCERTAINTIES, RISKS

Before the start of the Component KIMA will have to meet a number of preconditions. These include the recruitment of an environmental manager, the transfer of KIMA's part of the Component financing to a separate bank account and, in case KIMA finances its part of the Component funding through a loan, signing of the loan documents.

Successful implementation of the Component is based on a number of key assumptions. These include acceptance by the Egyptian government of a low (feasible) electricity price to KIMA until natural gas will be available in Upper Egypt. Also, no interference is assumed from the Holding Company in the use of KIMA funds (or loan) for Component purposes and support from the Holding Company for the move towards more investment autonomy to KIMA (and/or the privatisation process). Other key assumptions relate to tax exemption for imported items under the Component and the release by KIMA, upon request, of employees from their daily duties to take part in Component activities.

1 INTRODUCTION

1.1 Background

Egyptian Chemical Industries (KIMA) is located 5 km east of the city of Aswan. Its main products are ammonium-nitrate fertiliser (260,000 tonnes/year) and ferrosilicon used for steel production (6,600 tonnes/year). The number of employees is in the range of 2,400. The mayor environmental concerns with the company are its untreated effluents being discharged into a canal flowing directly into the Nile and the NO_x and ferrosilicon dust emitted from its facilities.

KIMA is a share holding company with the majority of its shares (55%) owned by the Chemical Industries Holding Company controlled by the Ministry of Public Enterprises.

The present Component has been designed as a first step in the prevention and control of pollution from the KIMA fertiliser and ferrosilicon plants. This Component forms phase 2 and 3 out of 3 Component phases. Phase 1 focuses on detailed design and preparation of the activities at KIMA on pollution prevention and control. Phase 2 is the construction implementation, training and motivation phase, and phase 3 the consolidation phase. Phase 2 will last approximately three years and Phase 3 about 1 year.

1.2 Events and Processes leading to the Component Description

In April 1996 a team from Danida visited Egypt in order to undertake a feasibility study of proposed Danish support to KIMA for introduction of internal and external pollution abatement through environmental protection measures and cleaner production processes comprising the fertiliser plant as well as the ferrosilicon plant. At the end of the team's visit an "Aide Memoire" dated 18.4.96 was presented to the Holding Company, KIMA and Danida.

The resulting feasibility study report is entitled "Feasibility Study, KIMA Fertiliser Factory. A Study of Pollution Prevention" and dated June 1996.

The report recommends Danida support for a project with an investment cost of around 60 million LE (106 million DKK) and that the financing is split approximately 50/50 between Danida and KIMA.

After scrutiny and some minor comments, KIMA's Board accepted the report's conclusions and recommendations in a letter to the Danish Embassy in Cairo dated 30.5.96.

During the period November 27, to December 7, 1996 a Team from Danida visited Cairo and Aswan in order to appraise the proposed project.

At the start of the Appraisal the Team met with the Chairman of the Holding Company for Chemical Industries. At the final meeting which took place on Saturday 7.12.96 with the chairman/managing director of KIMA an Aide Memoire was presented as basis for the debriefing.

The Team submitted its draft Appraisal Report and Project Document 20 December 1996. Detailed comments to the Report and Document from KIMA were received by the Danish embassy in Cairo 16 March 1997. The comments were discussed in letter correspondence

between Danida/Danish embassy, Cairo and KIMA ending up with a decision for the parties to meet again in Cairo to sort out the outstanding issues.

At the termination of the meeting an Agreed Minutes were established and signed. The Agreed Minutes have formed an important input to finalisation and final editing of the Appraisal Report with Project Document as presented by the Team in late August 1997.

As proposed in the Appraisal Report and supported by the Agreed Minutes Danida undertook some detailed preparatory technical investigations at KIMA during the period 22 to 27 September 1997 including:

1. The possibilities and methods, including costing of disposing the nutrient laden waste water from the fertiliser plant.

2. Stop of the mercury exposure through replacing the present cells in the chloralkali unit by membrane cells. The suitability of the existing peripheral equipment needs to be studied as well as the cost of the actually required cell configuration.

3. The ferrosilicon furnace hood and electrode design and costing, and the solutions' impact on stack gas temperature and composition, on workplace conditions, and on the dust removal by filtering. Costing of ferrosilicon dust filtering and recovery.

Danida decided that the results of the investigations should be worked into the Final Appraisal Report and Project Document. This was consequently done by the Appraisal Team resulting in a final version number 2 of December 1997.

After the submittal of this report, discussions continued with KIMA on issues brought up by the Appraisal Team. Especially the solution recommended to eliminate mercury emission was debated and question marked.

Finally, Danida accepted to allow a postponement of the decision on how to eliminate the mercury emission in order for KIMA to come up with other acceptable alternatives within a defined period.

The Appraisal Team was asked to work this and other minor changes into the Appraisal Report and Project Document, and final version number 3 of June 1998 was produced superseding the 2 foregoing versions.

A draft Project Document for Phase 1 of the Project – Detailed Design and Preparation was submitted to Danida in December 1998, and for Phase 2 – Construction, Implementation, Training and Motivation, and Phase 3 – Project Consolidation, in March 1999. After that, the project has been incorporated as a Component of the ESPS.

1.3 Outcome of the Appraisal Phase

KIMA is the biggest industry in the Aswan area and the fertiliser production is of critical importance for agriculture in Upper Egypt. Thus KIMA must be considered a strategic industry; but at the same time KIMA has for many years been considered a "Black Spot" from the environmental point of view. To this must be added the considerable problems encountered at KIMA with regard to the working environment and occupational health hazards to workers and staff.

KIMA's financial viability is very sensitive to increases in the tariff for electrical power. KIMA was established originally to gainfully utilise surplus power from the Aswan High

Dam and still is favoured by a low power tariff in spite of the fact that the power surplus is now outdated. Even a small increase in power costs would make KIMA's fertiliser plant uneconomical whereas the ferrosilicon plant can absorb an increase to a level similar to the tariff paid by the Edfu Ferrosilicon Plant. KIMA is a major employer in the area (approximately 2,400 employees) and an important manufacturer of nitrogen fertiliser in the area. Therefore, it is expected that KIMA will be given operating conditions by the Government, which makes it possible to continue a financially viable operation until a new production unit can be established. Such a unit will be based on natural gas as a raw material for ammonia production.

It is estimated that natural gas may reach Aswan in 6 to 7 years. Then, a new 1000-tonnes/day fertiliser plant could be operational some 10 to 12 years from now making most of the existing fertiliser plant redundant. However, most of the equipment investments (in money terms) proposed under this Component will be useful also in the expected new plant.

The proposed Component at KIMA is a **Pollution Prevention and Environmental Improvement** Component with limited direct financial benefits resulting from the interventions. The Appraisal Team found a clear commitment within the KIMA management to the environmental issue which is backed by the Company's commitment to finance about 50% of the hardware investment from their own funds.

According to plans, KIMA will at the end of the Component period in year 2001 comply with the existing environmental standards in Egypt, and the working environment will be improved to an acceptable level by Egyptian standards. KIMA may become privatised within the near future and the factory is on the list of the Public Enterprise Office of the Ministry of Public Enterprise Sector for privatisation in 1998. This seems however not to be a realistic time schedule.

The efficient planning and implementation of the Component requires a well-structured Component organisation. The KIMA Managing Director will be Component Director, the Environmental Manager will be in charge of the Component software components, and the Factory Manager will be in charge of the hardware sub-components of the Component. A Danida Component Adviser based at the factory will support both. It is assumed that KIMA management is given full autonomy from the Holding Company to plan and implement the Component once the overall plan and budget has been approved.

The Component includes interventions at both plants, fertiliser and ferrosilicon, and has a total cost estimated at 54.2 million LE with a foreign component of 36.0 million LE (or DKK 73.1 million). The foreign component is to be financed by Danida, the local component by KIMA.

The first steps in the Component implementation process on the Egyptian side will be that:

- KIMA establishes the proposed Component Steering Committee with the Factory Managing Director as its Chairman.

- A strong environmental department will be formed with a Manager reporting directly to the Managing Director.

- Clarifications are obtained regarding on-lending terms for sub-components financed from Denmark and terms for locally raised financing as well as possible exemption for payment of taxes and duties on imported components.

- Further, KIMA embarks on an immediate clean-up and "greening" sub-component of the factory grounds.

On the Danish side, early steps will be:

- Finalisation of approval procedures with the Danish financial authorities,
- Recruitment of the Danida Component Adviser,
- Preparations for engaging consultants for specialised studies to be undertaken prior to Component approval, and
- Engaging consulting engineers to undertake detailed design and supervision.

1.4 Outstanding Issues

Government to government agreement still remains to be signed.

2 VISION OF OUTCOME

2.1 Development and Immediate Objectives of the Component

The development objectives or the objectives to be reached within the total component period of 5 years are defined as follows covering the external and internal environment respectively:

> Improved protection of the external environment from industrial pollution and improved occupational health of industrial employees in Egypt through, among others, the demonstration effect from the KIMA project.

Immediate objectives:

> Sustainable compliance of KIMA with Egyptian environmental laws on waste water effluent and stack emissions
>
> Sustainable satisfactory occupational health conditions within the KIMA factories

2.2 Windows of Opportunity for Continued Danida Involvement

2.2.1 Problems Addressed

Reference is made to the Problem Analysis presented in the Appraisal Report. The main problems facing KIMA (apart from the uncertainty about the future electricity price) and the reason for the company to seek support from Danida are:

> Non-compliance with Egyptian environmental standards on waste water effluents and stack emissions, and
>
> Adverse occupational health conditions

The former is mainly caused by:

1. Oil in waste water at factory outlet, fertiliser;
2. High nutrient content in waste water at factory outlet, fertiliser;
3. High dust concentration in stack emissions, fertiliser and ferrosilicon.

The latter is due to:

1. Mercury in air, fertiliser;
2. High noise exposure of workers, fertiliser;
3. High concentrations of harmful gases and fumes, fertiliser;

4. High content of dust in air, ferrosilicon;

5. High heat exposure of workers, ferrosilicon;

6. Insufficient use of protective clothing and equipment, fertiliser and ferrosilicon.

KIMA lacks environmental management, including lack of environmental monitoring and environmental protection/pollution abatement investments. The lack of environmental investments is due mainly to the reluctance of the Holding Company to approve any investments:

(1) It has doubts about the medium to long term technical viability of KIMA, and

(2) Is in the midst of a privatisation process of all its affiliated companies (including KIMA).

Another important factor is the lack of pressure from the public exposed to KIMA pollution for environmental improvements. Such pressure has eased decisions on pollution abatement investments in other parts of the world.

The adverse occupational health situation is partly due to the internal environment and partly to the insufficient use of protective clothing and equipment among the employees within the factories. Protective clothing and equipment are available although not all up-to-date, and the company has rather strict rules and regulations for the use of it. However, the management is not enforcing the rules and the workers disregard the health hazards of working unprotected. Some even speculates in the relatively high insurance compensation for occupational health damages.

2.2.2 Expected End of Component Situation

At the end of the total (5 years) Component period, KIMA is expected to comply with the Egyptian environmental laws concerning both the internal and the external environment. Environmental management is institutionalised in the company involving all stakeholders: management, workers, and workers' association. Environmental management system is established.

Where necessary all workers use protective clothing and equipment. Awareness on the health hazards of not using this is high amongst the workers themselves, their association and the management. The association together with the management are prepared to take strong measures towards those employees who are not following the rules and regulations of the company in this respect.

There is a general awareness amongst the public in Aswan exposed to KIMA pollution on the risk of pollution, and one or more NGOs are actively dealing with environmental protection issues. (These results are obtained under the EMG Component).

KIMA is prepared for privatisation or probably already privatised.

2.2.3 Component Suitability for Danida Support

The Danish-Egyptian co-operation in the field of the environment started in 1991. More than 20 studies have been prepared for possible Danida funding covering planning, institutional support, pollution abatement, and environmental awareness raising. Among others, EEM has started to prepare environmental sector strategies including industry. Danida has decided to

support industrial waste management demonstration Components on pollution abatement and introduction of cleaner technologies in industrial sub-sectors, where Danish expertise is particularly strong (Danida, 1995).

Danish support will be relevant in a few selected industrial sectors, in which Denmark can offer particular know-how and technology, and contribute to demonstration Components and visible short-term actions. Danida has decided to be a participating, but not co-ordinating donor in the industrial sector in Egypt; the reason being that many other larger donor countries are currently involved in this sector (Danida, 1995). Consequently, Danida regards the industry sector as a sector of secondary involvement within the following three key areas:

1. 'Black spots': Delivery of environmental equipment to large scale industries identified as 'black spots', e.g. KIMA;

2. Cleaner Technology: Industrial symbiosis[1] , and environmental management and auditing within the 'new-cities approach'[2] ;

3. 'Target sectors': Environmental audits and cleaner production in a few selected industrial sectors, e.g. fertilisers.

KIMA can immediately be classified to fall in categories Nos. 1 and 3 of Danida's involvement within Egyptian industry, and although KIMA is not located in a "new city" the same principle arguments can be applied for KIMA as for the "new-cities" approach. Furthermore, Danida is currently supporting environmental management capacity building in the Aswan Governorate.

Specifically, KIMA is named to fall within the scope of Danida funding for Components under this programme, particularly with regard to wastewater.

Independent engineering for the ferrosilicon investment component is not available in Denmark, but is found in Norway. It might also not be possible to find independent engineering for the fertiliser investment component in Denmark, in which case it can be found in Finland and probably also Norway.

Supplies and contracting for the ferrosilicon component can be found partly in Denmark and partly in Norway, while 2-3 Danish companies will be able to handle supplies and contracting of the fertiliser component.

For the technical assistance and ad hoc consultancy for the software components, the needed expertise is available in Denmark.

2.3 Effects on Primary Stakeholders

The Component will benefit the employees of KIMA and their families living in the neighbouring residential area. The employees will have a significant improvement in their working condition concerning occupational health, which will eventually lead to

[1] Industrial Symbiosis is a term used to describe an industrial co-operation in which one company uses the waste material from another company as raw material for its own production.

[2] The New Industrial Cities is one of the new EEAA/TCOEs subsector strategies (TCOE, 1995). It is aimed at fulfilling the original ambitions for these new areas, and at applying new environmental management concepts like industrial symbiosis and clean technologies in these cities.

improvement of their physical health. The residential area counting about 10-15,000 people will have significantly less air and water pollution from the plant.

Residents in other areas of Aswan exposed to KIMA pollution will also benefit from the reduced pollution of the Nile and the air from the plant.

2.4 Impact on Poverty and Other Cross Cutting Issues

KIMA is the biggest industrial plant in Aswan Governorate. Other big industries include Komombo Sugar Mill, Efaco ferrosilicon plant, and an aluminium plant. The residential area of KIMA consists of 1,150 apartments rented to workers of the plant at subsidised prices. The total number of people employed by KIMA is 2,400, so including the indirect effect of KIMA on Aswan, around 10 times more people may well be dependent on the well-being of KIMA (schools, shops, services etc.). Furthermore, the fertiliser plant produces around 10% of the fertiliser in Egypt and is the only one in Upper Egypt. The availability of cheap fertiliser is a prerequisite for farmers to make a living and therefore KIMA is considered one of the most important industries in Aswan.

2.5 Impact on Organisations' Capabilities

The Egyptian Government through the Holding Company will benefit from the Component improvements within the plant and the preparation for privatisation, which make KIMA more valuable and more suitable for the desired privatisation. This in turn will assist to ensure KIMA as a viable industry, which is of importance for the whole of Aswan.

2.6 Future Use of Possible Investments and Funding of Future Operation and Maintenance

Reference is made to the detailed viability analysis presented in the Appraisal Report. This analysis concludes that KIMA within its present technology will be a viable operation for the next 10 years. After 6-7 years from today (1996) the natural gas is planned to reach Upper Egypt and it will take 3-4 years to build a new natural gas based fertiliser plant. The Appraisal Team considers it unlikely that the Government will close down the KIMA fertiliser production through increased electricity prices before a new plant is ready for production.

The ferrosilicon plant including the environmental investments implemented under the Component will probably have a considerably longer lifetime than the present fertiliser plant, at least 20 years from now (1996).

The fertiliser plant with its present technology will become non-viable the moment the electricity price is increased, even marginally. However, the plant may be attractive for an investor within the domestic fertiliser industry, so the Government for social reasons (KIMA is the largest industry in Aswan) may do its utmost to ensure the future of KIMA.

A major part of the Component investments in the fertiliser plant will be useful at a new plant based on natural gas as raw material.

2.7 Obstacles Impeding Achievement of the Vision

No major obstacles impeding achievement of the vision have been identified.

3 COMPONENT MANAGEMENT

3.1 Management and Authority Structure of the Component

There is no Government involvement in this Component. Management is entirely the responsibility of the Consultant contracted by Danida and the management of KIMA.

The Component will be executed by KIMA through a Component Steering Committee assisted by a Danida Component Adviser being an environmental management expert. The Committee will be composed of the following members:

1. KIMA managing director;
2. KIMA factory manager;
3. KIMA environmental department manager;
4. KIMA chief accountant;
5. KIMA chief of Component department;
6. KIMA chief of research & development department;
7. KIMA occupational physician;
8. KIMA manager of ferrosilicon production;
9. Representative of employees in the fertiliser plant;
10. Representative of employees in the ferrosilicon plant;
11. Representative of Royal Danish Embassy in Cairo;
12. Danida Component Adviser.

The KIMA managing director will be the Component Director. The software components will be implemented by the environmental department assisted by the Danida Component Adviser recruited and in position at the beginning of phase 1. The hardware components will be implemented during phase 2 by the factory manager in co-operation with the Danida Component Adviser. Disagreements on implementation issues between the Component Director and the Danida Component Adviser shall be brought forward to the Component Steering Committee for decision.

Technical assistance for carrying out the software activities will take place as ad hoc consultancy defined by the Danida Component Adviser in co-operation with the environmental department and approved by the Component Director and the Steering Committee. The consultancy will be under the Danida Component Adviser.

Two consulting engineers – one for fertiliser and one for ferrosilicon – will be engaged early in phase 1. Tendering for these positions will be in Denmark and, if necessary, in Norway and Finland for undertaking detailed design, tendering, and supervision for the hardware investments and activities. The consulting engineers will report to the factory manager who is assisted by the Danida Component Adviser.

The Steering Committee will establish relevant tender committees for the local contracts under fertiliser and ferrosilicon, respectively. The committees will have maximum 5 members of which the Danida Component Adviser and the factory manager are born members.

Danida will manage the Danish/international tendering for consulting engineering, supplies and contracting (see *Section 5.1*).

The Danish Component Adviser will be present throughout the Component period (5 years).

3.2 Inputs from KIMA

KIMA will make the funds available for the domestic part of the investment and other activities, as well as for protective clothing and equipment (both domestic and foreign). It will also provide the local workforce for the implementation, when possible using its own personnel. KIMA makes its personnel available to implement the component.

4 LOGICAL FRAMEWORK

4.1 Development Objective

Reference is made to the Logical Framework Sheet. The Development Objectives or the objectives to be reached after project termination is defined as follows:

> Improved protection of the external environment from industrial pollution and improved occupational health of industrial employees in Egypt through, among others, the demonstration effect from the KIMA project.

4.2 Immediate objective

The Immediate Objectives or the objectives to be achieved within the entire project period cover the external and internal environment respectively. They are defined as follows:

1. Sustainable compliance of KIMA with Egyptian environmental laws on waste water effluent and stack emissions.

2. Sustainable satisfactory occupational health conditions within the KIMA factories.

4.3 Outputs

To achieve the immediate objectives for Phase 2 and Phase 3 the outputs listed below must be fulfilled. The outputs are further detailed under Phase 2 and 3 of the component:

4.3.1 Related to immediate objective (1), (External environment):

Fertilizer Plant:

1.1 Oil in waste water at factory outlet reduced to insignificant level.

1.2 Factory discharge of polluted waste water into Elsail or other canals eliminated.

1.3 PPM in fertilizer stack emission reduced to comply with Egyptian standards.

Ferrosilicon Plant:

1.4 PPM in ferrosilicon stack emission reduced to comply with Egyptian standards.

Environmental Management:

1.5 Environmental management institutionalised. Environmental management system including efficient environmental monitoring established.

1.6 KIMA prepared for possible privatisation.

4.3.2 Related to immediate objective (2), (Internal environment):

Fertilizer Plant:

2.1 Noise exposure of employees reduced to a not harmful level (Egyptian standards).

2.2 Use of mercury in production terminated.

2.3 Fugitive emissions of harmful gasses and fumes reduced to comply with Egyptian standards.

Ferrosilicon Plant:

2.4 Quartz and coke dust reduced to comply with Egyptian standards.

2.5 Heat exposure of employees reduced to a not harmful level (Egyptian standards).

Environmental Management:

2.6 Awareness increased amongst all employees (and the workers association) including management regarding the risks of not using protective clothing and equipment

2.7 Environmental management institutionalised. Environmental management system including efficient environmental monitoring established.

2.8 KIMA prepared for possible privatisation

4.4 Activity Outline

4.4.1 External Environment

To achieve the defined outputs of Phase 2 and Phase 3 the below listed activities must be carried out. The three digit numbers show the relation to the outputs.

Fertilizer Plant:

1.1.1 Establish oil separation ponds with oil skimming devices at eight waste water sources.

1.2.1 Redirect the 20-25% ammonia containing stream from the ammonia plant into the neutralisers in the fertilizer plant.

1.2.2 Minimise of residual waste water volume and for reverse osmosis process for treatment of waste water streams with high nutrient content.

1.3.1 Install air injector in the nitric acid plant stack.

Ferrosilicon Plant:

1.4.1 Install a bag filter system on the ferrosilicon plant stack.

Environmental Management:

1.5.1 Continue from Phase (1) to liaise with local environmental NGO(s) for undertaking environmental awareness activities

1.6.1 Continue from Phase (1) to support through training of employees at all levels, and institutional development, efficient environmental management within KIMA

1.6.2 Continue from Phase (1) to train KIMA staff in utilising the pollution measuring and monitoring equipment installed during Phase (1)

1.6.3 Continue from Phase (1) the support to the establishment of efficient pollution monitoring system within KIMA

1.6.4 Continue from Phase (1) to establish (negotiate with and get approved by Holding Company) a future model for KIMA pollution abatement investment autonomy

1.7.1 Prepare KIMA for possible privatisation.

4.4.2 Internal Environment

Fertilizer Plant

2.2.1 Continue from Phase (1) to reduce noise exposure of KIMA staff to a not harmful level through increased use of hearing protection means.

2.2.1 Shut down the present chloralkali plant and implement the possible alternative solution chosen and designed during Phase (1); or if such alternative has not been found, purchase the needed hydrocloric acid and caustic soda for regeneration duties.

2.3.1 Continue from Phase (1) to reduce the fugitive emission of ammonia gas and nitrous oxide to air through a leak prevention programme and effective maintenance and housekeeping routines, and by replacing barometric condensers with surface condensers.

Ferrosilicon Plant:

2.4.1 Possibly, encapsulate the quartz crushing and conveying operations and converting the receiving and handling of quartz to a wet process

2.4.2 Encapsulate the coke crushing and conveying operations, or – alternatively – use size classified coal as reducing agent.

2.4.3 Remove the dust settled in and around the ferrosilicon plant area with some of the topsoil and pave the area for easier cleaning.

2.4.4 Install a better hood system for the tapping operation.

2.5.1 Reduce the heat exposure of workers from the ferrosilicon furnace through improved (mechanical shielding) and provision and use of protective gear for workers.

Environmental Management:

2.6.1 Continue from Phase 1 to train, inform and motivate all KIMA employees (and the workers association) including management on the use of - and the risks of not using - protective gear.

2.6.2 Continue from Phase 1 to support efficient enforcement measures for the use of protective gear acceptable to the workers and the workers' association.

2.6.3 Continue from Phase 1 to procure where needed up-to-date protective gear.

2.7.1 See Activities 1.6.1, 1.6.2 and 1.6.3.

2.7.2 Continue from Phase (1) improved housekeeping through programming, and training of KIMA staff.

2.7.3 Continue from Phase (1) the cleaning up and greening of the plant area.

4.4.3 Fertilizer Plant

Elimination of Oil in Waste Water

Implement the oil separation ponds with oil skimming devices in accordance with the detailed design prepared in Phase (1). It comprises the following:

- Two systems in the air separation plant (east and west)
- Four systems in the ammonia plant compressor area. The existing oil collectors to be rebuilt or modified
- One system in the boiler area
- One system in the drain from the fertiliser area to enable the removal of settled silt as well as the maintenance of the oil skimmers while the system is in operation, the oil separation and solids settling pond at the plant outlet (gate area) shall be partitioned into two parallel independent chambers, each equipped with an oil skimmer (one additional needed).

  The oil collecting from the skimmers to drums or transport containers shall be rearranged for easier operation.

  A purification system with moisture removal, clay treatment and filtering or equivalent shall be designed to recycle the lubricating oils recovered by the skimmers

Treatment of Waste Water with High Nutrient Content

Implement the redirection of the 20-25% ammonia-containing stream into the neutralisers in the fertilizer plant and/or partly into the planned ammoniators in front of the ammonium nitrate evaporators in accordance with the detailed design prepared during Phase 1.

In order to reduce to feasible levels the volumes to be handled, replace all barometric condensers with surface condensers thus separating the condensates and the circulating cooling water. Reduce the volume of the drain water and remove oil from it. Operate the process in a manner minimising the nutrient content in the effluents. Especially, the content of free ammonia in the neutraliser and evaporator effluents should be minimised by running the neutralisation closer to the stoichiometric ratio of ammonia and nitric acid in the feed.

In order to avoid acidic conditions in the evaporator, an ammoniation step should be added to the evaporator feed in accordance with the detailed design prepared during Phase 1.

Implement the reverse osmosis process designed during Phase 1.

Reduction of NO_x Concentration in Nitric Acid Plant Stack Emission

Install the missing air injector which will dilute the tail gas concentration also in the last stack to the level which is accepted for old plants in Egypt.

Elimination of Mercury in Air

Shut down the present chloralkali plant and implement the possible alternative solution chosen and designed during Phase (1), or if such alternative has not been found, purchase hydrocloric acid and caustic soda for the regeneration duties.The requirement of closing down the chloralkali plant relatively early in the project period shall be maintained.

Reduction of Fugitive Emission of Ammonia Gas and Nitrous Oxide to Air

Continue from Phase (1) to support the programme to repair or replace leaking seals and joints in the equipment and piping to eliminate ammonia gas and nitrous oxides in the workplace air. Ammonia stripped in the air from the circulating cooling water will be reduced when the barometric condensers are replaced by surface condensers separating the ammonia containing condensates from the cooling water.

In addition to the leak prevention programme implement effective maintenance and housekeeping routines.

4.4.4 Ferrosilicon Plant

Reduction of Dust Content in Ferrosilicon Plant Stack Emission

Install the bag filter system, complete with storage silos and a bagging facility using big bags as designed during Phase (1). When the suction in the tapping area is improved, connect the duct from the blower to the furnace duct upstream of the filter.

Reduction of Quartz and Coke Dust to Air

If decided and designed during Phase 1:

- convert the receiving and handling of quartz to a wet process,
- encapsulate the crusher and equip it with an effective suction system including a filter or a scrubber,
- design a casing for all conveyors with suction connected to the same system, and
- arrange the depositing of the quartz fines to a place where they can be contained without being released into the atmosphere. If such a place can be found within the plant area, pump the fines there as sludge and design a two compartment settling pond.

If decided and designed during Phase (1), implement the similar encapsulation and dust suction system as for quartz. Build a better collection, storage and loading system with dust prevention for the coke fines to be sold as second grade outside the company.

Remove the dust settled in and around the ferrosilicon plant area with some of the topsoil and pave the area for easier cleaning.

Reduction of Ferrosilicon Dust in Air

Install in accordance with the design prepared during Phase (1) a better hood system being at the same time a shield against radiation and sparks exposure for the tapping operation, which is the main source of dust and vapour contamination of the workplace air. Install a new, more effective suction blower and connect the ducting to the furnace flue gas stack before the dust filter.

Provide better personal protective gear like a hood with fresh air ventilation and spark resistant clothing for the tappers.

Reduction of Heat Exposure of Workers from Furnace

The same protection needed against dust and vapours will also protect the tappers from heat and UV radiation exposure. Test (eventually after mechanisation) the use of the shields provided in the furnace charging area or provide better personal protective gear for manual poking and better shields for the pneumatic pushers.

Enhance awareness of the workers of the risks of the exposure and enforce the use of the protective devices.

4.4.5 Environmental Management

Institution Building, Environmental Management

Continue from Phase (1) the establishment of a strong environmental department within KIMA dealing with environment, safety, and occupational health. The chief executive (preferably a newly educated environmental engineer) shall be responsible directly to the managing director.

Based on the environmental policy for KIMA defined during Phase (1) continue to support the establishment of an environmental management system, and an environmental management manual. All relevant personnel shall be trained in environmental management principles.

The environmental department shall be responsible for implementation of all project software activities supported by a Danish expert in environmental management engaged under the project as the Danida Project Adviser.

Measuring and Monitoring Equipment

Complete if necessary the installation of measuring and monitoring equipment procured under Phase (1).

Environmental Pollution Monitoring

Provide any necessary monitoring equipment in addition to those listed in 6.4.2 above under the project. Continue from Phase (1) to train the staff in the use and maintenance of the equipment.

Publish the current monitoring results for all company employees and other relevancy stakeholders.

Awareness Creation and Motivation amongst KIMA Employees

Plan and implement the project in a participatory process. Concerned personnel and other stakeholders shall be directly involved in planning and implementation of project activities.

Conduct information and training seminars for all KIMA employees on environmental, safety and occupational health issues.

Increased Use of Protective Clothing and Equipment

Continue the efforts of Phase (1) with the aim to obtain increased use of protective clothing and equipment, first and foremost through information and motivation. Provide state-of-the-art clothing and equipment, where the existing material is old fashioned in order for the workers to feel as comfortable as possible when using it.

Scrutinize and correct/amend if needed present rules and regulations for wearing protective clothing and equipment in close cooperation with the concerned employees and the workers association. Define disciplinary measures in case of violation of rules through mutual agreement and efficient information and publication.

Motivate KIMA management and workers association to enforce the agreed rules and regulations.

Improved Housekeeping

Continue from Phase (1) to enhance the awareness of the workers of the importance of continuous and unprompted effort to stop and avoid leaks and spills by tightening and/or replacing valve bonnet and pump shaft seals and flange gaskets whenever leaking are noticed.

Follow up on the Phase (1) instructions of (1) immediate removal of spills and droppings instead of flushing them down to drain and (2) all casings to be kept tightly shut and if leaking, repaired immediately.

Greening of Factory Area

Continue from Phase (1) to organise a general clean up and collection of discarded materials and scrap preceding a program of planting trees and bushes and growing grass and flowers in the plant area.

Complete if necessary the Phase (1) installation of a fixed supply piping network for the nutrient containing, but otherwise suitable, waste water streams to be used for irrigation purposes.

Increased Autonomy for KIMA, Preparation and Possible Implementation of Privatisation

KIMA shall be in charge of the project investments without interference from the Holding Company.

After project implementation, KIMA shall also enjoy an increased investment and maintenance autonomy in order for the project investments and results to sustain. This will

occur either through increased autonomy under the Holding Company or through privatisation.

Continue, if necessary, the Phase 1 negotiations with the Holding Company about increased autonomy for KIMA concerning future investments within defined yearly budget limits. Work out a model for delegation of management from the Holding Company to KIMA.

If requested, assist KIMA in preparation for privatisation, e.g. evaluation of assets and liabilities, separation of accounts for the fertiliser and ferrosilicon plants, income statement and cash flow forecasts, possible organisational and production rationalisations, preparation of sales and stock market prospects, etc. If wanted by the Holding Company also assist in possible negotiations with interested buyers.

4.5 Inputs by Danida

Danida will grant the funds for the imported part of the hardware investment. Danida will also provide the needed technical design, engineering and procurement back up as well as the funds and resources for training and awareness creation within KIMA personnel and the outside community.

For sub-components involving new technologies and design, engineering, and procurement of imported equipment expert support will be sought predominantly from Denmark or the other Nordic countries. Danida will support the Component Steering Committee by employing suitable engineering companies or specialist consultants.

Ad hoc consultancy might be needed within water treatment, waste gas treatment and solids handling and within instrumentation and process control and data processing for the environmental monitoring programme.

4.6 Implementation strategy

The Component is designed based on the following strategy elements:

- Concentration of efforts on internal and external environmental improvements, leaving out energy savings measures and investments for higher productivity and enhanced product quality (as proposed in the original Component proposal);

- Awareness creation concerning the risks from internal and external environmental pollution from KIMA production amongst employees and the general public exposed to the pollution;

- Motivation of all KIMA employees to take precautions against internal environmental pollution;

- Establishment of a strong environmental department within KIMA and training of all relevant personnel in environmental management;

- Implementation of the needed physical investments and activities in order for KIMA to comply with the environmental laws of Egypt;

- Motivation and training of all KIMA employees in improved housekeeping and greening of the factory area;

- Training of relevant KIMA personnel in operation and maintenance of pollution monitoring equipment and the investments undertaken under the Component;

- Support through the EMG component to local environmental NGO(s) to increase the public awareness in Aswan on environmental issues;

- Assistance to the management of KIMA in preparation and possible implementation of KIMA privatisation;

- A five years Component period to ensure Component sustainability;

- Participatory Component implementation involving all concerned employees in planning and implementation of individual Component activities;

- Technical assistance provided under the Component from Denmark whenever needed;

- Phasing of the Component and definition of milestones in order for the software components (awareness, motivation, autonomy) to keep track with the hardware components (investments).

The Component will be implemented in 3 phases:

1. Detailed design and preparation phase;

2. The construction implementation, training and motivation phase;

3. The Component consolidation phase.

Phase 1 will last approximately one year, phase 2 about three years and phase 3 around one year.

The detailed design and preparation phase governed by this present Component Document will start up all the software sub-components presented in *Section 4.4*. This includes:

- Establishment of a strong environmental management department;

- Establishment of pollution monitoring;

- Awareness creation and motivation amongst KIMA employees on environmental issues, including occupational safety and health;

- Improved housekeeping and greening of factory area;

- Awareness creation amongst the public in Aswan exposed to KIMA pollution.

Implementation of the software sub-components is a prerequisite for the sustainability of Component results. The software components aim at integration and local ownership through improved in-house environmental management, training, and information of staff and

awareness creation amongst the public. It is imperative that the software sub-components are launched as early as possible in the Component period to reach the needed impact.

Phase 1 will be presented separately to the Danida Board for funding.

Phase 2 and 3 will be included as a component of the Danida Sector Programme Support for environmental matters in Egypt. It comprises the implementation of all Component works as well as a continuation of the software components started during phase 1.

Phase 3 will be used for consolidation and phase out of the Component.

4.7 Plan of Implementation

Phase 2 will start when all main contracts for the hardware activities have been awarded. The Phase will last approximately 3 years, which is the estimated time to finalise all contract deliveries and works tendered during Phase 1. The actual time schedule for implementation of the works will be prepared by the consulting engineers for fertiliser and ferrosilicon, respectively, during Phase 1.

Phase 2 is considered completed, when the last contract is commissioned. It might happen before the planned lapse of the phase, which would result in a shorter Phase 2 period than scheduled.

The task of the consulting engineers on the project are expected to be completed at the end of Phase 2. Any involvement of the engineers during Phase 3 will be ad hoc, since that phase for the contracting works constitutes the guarantee period.

The software activities will continue throughout Phase 2 and be consolidated during Phase 3. The Danida Project Adviser will plan, promote, and supervise these activities during the entire project period (Phase 1, 2 and 3). A more detailed time-line will be prepared by the Adviser in co-operation with KIMA and the Danida supported environmental sector programme during Phase (1).

The overall Component time schedule and milestones are presented in the table below.

The time involved in engagement of the Danish Component Adviser and the consulting engineers is not counted as Component period time. Component period is supposed to start when the Danida Component Adviser is in place at KIMA and ready to concentrate on Component tasks. One to two weeks from arrival in Aswan are expected to be used by the Adviser to accommodate him/herself in the town and within the KIMA factory.

4.8 Budget

Table 4.1 Overall Budget

No.	Comment	Foreign Danida -000-LE -000 DKK-	Local/KIMA -000-LE	Total -000-LE
(1)	Elimination of oil in waste water, fertiliser	168 *320*	1,668	1,836
(2)	Treatment of waste water with high nutrient content, fertiliser	13,671 *26,111*	5,175	18,846

No.	Comment	Foreign Danida -000-LE -000 DKK-	Local/KIMA -000-LE	Total -000-LE
(3)	Reduction of nitrous oxides concentration in tail gas, fertiliser	...	...	...
(4)	Dust filtering and recovery from stack gas, ferrosilicon	4,687 *8,952*	4,370	9,057
(5)	Reduction of fugitive emissions of gases and fumes to air, fertiliser	168 *320*	575	743
(6)	Reduction of quartz and coke dust in air, ferrosilicon (optional)	-	3,910	3,910
(7)	Reduction of ferrosilicon dust and fumes in air	112 *213*	460	572
(8)	Reduction of heat exposure of workers in furnace area, ferrosilicon	-	115	115
(9)	Measuring and monitoring equipment	1,004 *1,918*	115	1,119
(10)	Improved housekeeping, baseline	-	345	345
(11)	Greening of factory area	-	1,150	1,150
(12)	Protective clothing and equipment	1,116 *2,132*	1,150	2,266
(13)	Consulting engineers	6,696 *12,789*	-	6,696
(14)	Danida Component Adviser	4,464 *8,526*	-	4,464
(15)	Ad hoc consultancies	2,232 *4,263*	-	2,232
(16)	Training and motivation of KIMA staff	1,116 *2,132*	-	1,116
(17)	Training and support to NGO(s), public awareness	(i)	-	
	Sub-TOTAL	35,434 *67,676*	19,033	54,467
(18)	Taxes and duties	-	...	...
(19)	Contingencies 10%	3,627 *6,928*	1,898	5,525
	TOTAL	39,061 *74,604*	20,931	59,992

(i) The costs involved will be financed under the EMG Component of ESPS.

4.8.1 Overall Component Budget

The table above presents the overall summary budget for the total Component for both hardware investments and software activities - which for some budget items include materials and equipment. More details are presented in the Appraisal Report and the Additional Studies Report.

The budget figures, which in the Appraisal Report and the overall Component Document are based on December 1996 prices have in the budgets below been inflated to December 1998 prices. The 2 years price escalation has been assessed at 5% for the foreign and 15% for the local components.

The total estimated hardware investment [item (1) to (9)] (excl. contingencies) is thus **LE 36.2 million.**

KIMA's part of this is estimated at **LE 16.4 million**.

Savings and additional incomes from the investments are estimated at **LE 2.8 million** (December 1996 prices).

The total estimated software budget [item (10) to (17) is **LE 18.3 million** exclusive contingencies.

Contingencies are fixed at 10% equal to **LE 5.5 million**.

This results in an overall Component budget of **LE 60.0 million** equal to DKK 114.6 million.

4.8.2 Overall Budget Financing

KIMA will finance the following (at a total cost of about **LE 21 million** exclusive taxes and duties on imported items):

- all local costs of the hardware investments and other activities;
- taxes and duties on all imported items (if not exempted for payment). KIMA estimates the average charging to be around 5-10%.

Danida will finance the remaining budget items (at a total costs of **LE 39.1 million or DKK 74.6 million**) including the following:

- all foreign costs of the hardware investments and activities;
- the cost of the Danida Component adviser;
- the cost of the consulting engineers;
- all technical assistance under ad hoc consultancies;
- the cost of training, information and motivation;
- the support to local NGOs (under the EMG Component).

The first mentioned budget item will be granted by Danida to the Egyptian Government, which in turn will either grant or lend the amount to KIMA. There may be a provision in the environmental law allowing the Government to grant donor funds to enterprises if the envisaged investments are non-profitable. Since this is the case for most investments under the Component, KIMA will apply to the Government in accordance with this provision.

If the Government rejects KIMA's application the Danida funds are expected to be lent to KIMA on prevailing Government soft terms: 6% interest per annum, 2 years grace and 5 years pay back period.

KIMA has no objections to servicing such a loan.

The remaining Danida budget items will be funded directly by Danida.

4.8.3 Budget for Phase 2

The table below presents the budget for Phase 2 (three years) and Phase 3 (one year).

Table 4.2 Budget for Phase 2

No.	Component	Foreign Danida -000- LE *-000- DKK*	Local KIMA -000- LE	Total -000- LE
(1)	Elimination of oil in waste water, fertilizer	168 *320*	1,668	1,836
(2)	Treatment of waste water with high nutrient content, fertilizer	13,671 *26,111*	5,175	18,846
(3)	Reduction of nitrous oxides concentration in tail gas, fertilizer	-	...	...
(4)	Dust filtering and recovery from stack gas, ferrosilicon	4,687 *8,952*	4,370	9,057
(5)	Reduction of fugitive emissions of gases and fumes to air, fertilizer	89 *170*	345	434
(6)	Reduction of quartz and coke dust in air, ferrosilicon (optional)	-	3,910	3,910
(7)	Reduction of ferrosilicon dust and fumes in air	112 *213*	460	572
(8)	Reduction of heat exposure of workers in furnace area, ferrosilicon	-	-	-
(9)	Measuring and monitoring equipment (i)	-	-	-
(10)	Improved housekeeping, baseline (i)	-	-	-
(11)	Greening of factory area (i)	-	-	-
(12)	Protective clothing and equipment	1,116 *2,132*	-	1,116
(13)	Consulting engineers, Phase (2)	3,346 *6,389*	-	3,346
(14)	Danida Project Adviser, Phase (2) and (3)	3,417 *6,526*	-	3,417
(15)	Ad hoc consultancies	1,708 *3,263*	-	1,708
(16)	Training and motivation of KIMA staff	750 *1,432*	-	750
(17)	Training and support to NGO(s), public awareness	(ii)		750
	Sub-total	**29,064** ***55,508***	**15,928**	**44,992**
(18)	Taxes and duties	-	-	-
(19)	Contingencies 10%	2,904 *5,551*	1,593	4,497
	TOTAL	**31,968** ***61,059***	**17,521**	**49,489**

4.9 Assumptions

The main assumptions for successful Component implementation are as follows:

- The Egyptian government accepts a low (feasible) electricity price to KIMA until natural gas will be available in Upper Egypt;
- The Holding Company will not interfere in the use of KIMA funds (or loan) for Component purposes;
- The Holding Company supports the move towards more investment autonomy to KIMA (and/or the privatisation process);

- Taxes and duties on imported items under the Component will be paid by KIMA. KIMA will in turn apply to the government for exemption of payment of these amounts;

- KIMA will upon request release employees from their daily duties for them to take part in Component activities;

- KIMA will build up a strong environmental department in accordance with the advice given by the Danida Component Adviser on the subject.

4.10 Indicators and Means of Verification

The indicators for the Component are divided into two categories: quantitative and qualitative.

4.10.1 Quantitative Indicators

The quantitative indicators are;

- External environment
  - reduction of oil in waste water at factory outlet
  - elimination of polluted waste water discharge into Elsail canal
  - reduction of ppm in fertiliser stack emission
  - reduction of ppm in ferrosilicon stack emission
- Internal environment
  - termination of use of mercury in production
  - reduction of fugitive emissions of harmful gases and fumes
  - reduction of quartz, coke and ferrosilicon dust in workplace atmosphere
  - reduction of heat exposure of workers in the ferrosilicon furnace area
- Occupational safety and health awareness
  - number of KIMA employees reached with relevant messages on occupational safety and health
  - number by type, duration and participants of training, information and motivation events/seminars
- Risk of pollution awareness
  - number of people reached with relevant messages on risks of pollution
  - number of direct (public meetings) and indirect (media campaigns) awareness promotion activities
- Institutional development

- number of staff by category continuously involved in Component activities
- number of staff by category trained in environmental management
- establishment of environmental department within KIMA and definition of its roles and responsibilities

4.10.2 Qualitative Indicators

- External environment (phase 2 and 3)
  - appropriate deposit and use of recovered oil from waste water streams
  - appropriate use of waste water
  - appropriate deposit and use of ferrosilicon dust
- Internal environment
  - appropriate maintenance and housekeeping
  - appropriate deposit of quartz dust
  - appropriate deposit and use of metallurgical coke dust
  - appropriate cleaning of plant area
  - increasing greening of plant area
- Occupational health and safety awareness
  - increasing use of protective gear
  - general improving health picture for KIMA employees
- Risk of pollution awareness
  - increasing public reaction to pollution
- Institutional development
  - increasing efficiency of environmental management, including enforcement of rules and regulations
  - formation of occupational safety and health, and environmental surveillance groups within relevant KIMA departments
  - formation of environmental surveillance groups amongst the general public (under the EMG Component)

The baseline study, carried out in the beginning of the Component phase 1 will include baseline figures for relevant qualitative indicators and baseline situation description for relevant qualitative indicators.

The means of verification will be established within the Component monitoring system (see *Section 5.2*).

5 IMPLEMENTATION PROCEDURES

5.1 Administration, Accounting and Auditing

All Component procurement will follow Danida procedures and need the approval of the Danida Component Adviser. KIMA through its tender committees established under the Component Steering Committee will manage all local tendering. Danida will manager the Danish/international tendering for consulting engineering, supplies and contracting, but will consult KIMA in each case before final selection of bids are undertaken. Danida will disburse Component funds directly for payment of the Danish/international services, supplies and contracting.

Funds for all technical assistance under ad hoc consultancy will be managed directly by the Danida Component Adviser.

Danida's standard accounting and auditing procedure will be applied in the Component.

5.2 Monitoring, Reporting and Review

The overall responsibility for monitoring the Component lies with the Component Steering Committee. The Component monitoring system to be followed will be designed in detail by the Component Director, the head of the environmental department, and the Danida Component Adviser. This will take place in the beginning of the Component period and shall deal with outputs, impacts, and processes. It is important that the process monitoring facilitates that lessons learned are used to modify strategies and implementation methods on a continuous basis.

The Component Director is responsible for submittal of a monthly progress report to be presented to the Steering Committee at its monthly meeting. The reporting shall follow Danida's guidelines for progress reporting.

The Component will be reviewed once a year.