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Executive Committee of
the Multilateral Fund for the
Implementation of the Montreal Protocol

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Bangkok, 10-12 November 1993

PROJECT PROPOSAL: EGYPT

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Egypt

PROJECT TITLE: Conversion to CFC-11 free technology in the manufacture of flexible PUF at Dekheila Chemical Industries Corporation

BUDGET: US \$650,000

INCREMENTAL COSTS: US \$650,000

ODS PHASE-OUT: 130 ODP tonnes of CFC-11

COST EFFECTIVENESS¹: US \$5.00 per Kg. ODP saved

PROJECT DURATION: 1 year

IMPLEMENTING AGENCY: UNDP

NATIONAL COORDINATING AGENCY : Egyptian Environment Affairs Agency (EEAA)

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. This project uses the "Hypercure" system which eliminates the need for an auxiliary blowing agent for cooling purposes. This process is used for the production of flexible polyurethane foam utilizing only chemically generated carbon dioxide as a blowing agent. Hypercure or related systems are now in production in about 15 facilities in the U.S.A. and Europe. A similar system was recently approved for a project in Tianjin, China.
2. This project entails the purchase of hypercure technology equipment, an emission filtration system, and various start-up costs. Operational costs are not claimed as any additional cost is expected to be offset by elimination of the costs needed for the purchase of CFCs.

SECRETARIAT'S RECOMMENDATION

3. The Secretariat recommends final approval and funding in the amount requested, i.e., US \$650,000. This is in addition to US \$84,500 for UNDP's support costs.

¹ Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$/ODP_{kg}). For CFC-11, ODS=ODP

PROJECT COVER SHEET

COUNTRY: Egypt

PROJECT TITLE: DEKHEILA CHEMICAL INDUSTRIES CORP.
Conversion to CFC-free Technology in the
Manufacture of Flexible Polyurethane Foam

SECTOR COVERED: Foamed Plastics

ODS USE IN SECTOR: 722t CFCs (722t ODP) in 1991

PROJECT IMPACT: Phaseout of the use of 130 tons/year CFC-
11 (1993) in the manufacture of flexible
polyurethane foam (slabstock)

PROJECT DURATION: One year

PROJECT ECONOMIC LIFE: 10 years

TOTAL PROJECT COST: USD 650,000 Incremental Capital Cost

PROPOSED MLF GRANT: USD 650,000

COST EFFECTIVENESS: USD 0.50/kg/y (unit abatement cost)

COORDINATING
NATIONAL BODY: Egyptian Environment Affairs Agency
(EEAA)

IMPLEMENTING AGENCY: UNDP

APPRAISAL DATE: September 16, 1993

PROJECT SUMMARY

Dekheila Chemical Industries Corporation ("Dekheila") manufactures flexible polyurethane foam (slabstock) in a facility in Alexandria. The company operates the only "Vertifoam" machine--an advanced foam manufacturing process--in Egypt. Products are in own facilities converted to mattresses, furniture and other products.

Under this project the company will complete the phaseout of CFCs in its production process, leading to an annual reduction of up to 130t ODS/y.

The company has selected the "Hypercure" system, an accelerated curing system, to achieve this. This process is recently commercialized for vertifoam equipment. A similar process was recently applied in a project under the MLF in Tianjin, China.

PROJECT OF THE GOVERNMENT OF EGYPT
DEKHEILA CHEMICAL INDUSTRIES CORP. CONVERSION TO CFC-FREE
TECHNOLOGY IN THE MANUFACTURE OF
FLEXIBLE POLYURETHANE FOAM (SLABSTOCK)

1. PROJECT OBJECTIVE

The objective of this project is to phaseout the use of CFCs in the manufacture of F-PUF at Dekheila Chemical Industries Corporation ("Dekheila").

2. SECTOR BACKGROUND

The CFC consumption in 1991 in the Egyptian foam sector--excluding foams for domestic and commercial appliances--has been established at 722 tons, with an annual growth rate of 15-20% (Egyptian Country Program). Uninhibited growth would lead to an estimated CFC consumption of 1,000 tons in 1993 and 2,050 tons in the year 2000. EEAA, with assistance of UNDP has designed a strategy for this sector, targeting annual consumption reductions beginning 1993. Finalization of the projects submitted so far to the MLF would bring the actual implementation of this strategy well in line with the target. A complete phaseout of the use of CFCs in the foam sector could be reached in 1998.

3. ENTERPRISE BACKGROUND

Dekheila Chemical Industries Corp. ("Dekheila") is one of the leading flexible slabstock PUF manufacturers in Egypt. The company was established under Law 159/1981 as a private sector enterprise and is 100% Egyptian owned.

Principle products are flexible foams and products made with flexible foams such as mattresses and furniture.

Annual production is currently about 1000t, for which about 130t auxiliary blowing agents are needed.

The company is currently constructing a new facility in an industrial zone in El Arab City, 35 km from Alexandria. The foam production will be moved to this facility that will operate as a fully owned subsidiary under the name "Alexandria Foam Furniture & Furnishings Corporation".

4. PROJECT DESCRIPTION

Dekheila operates the only "Vertifoam" production unit in Egypt. The Vertifoam Process is an advanced production process uniquely suited for the containment of emissions and for the fast curing processes that reduces or eliminates the use of auxiliary blowing agents (ABAs). The company currently uses about 130t ABAs/y.

Under this project the company would replace these ABAs through water-blown technology in conjunction with a fast curing process to eliminate the related temperature increase in the process. The remaining emissions will be treated through an activated charcoal filter. The final result is emission of carbon dioxide alone.

It is difficult to calculate in advance as a detailed product by product conversion will have to be made. Literature, however indicates this technology to be comparable or only marginal higher in costs (see also an approved project for Tianjin, China), and the company has decided to refrain from requesting the reimbursement of incremental operating costs.

5. TECHNOLOGY

5.1 SELECTION

There are numerous options to replace CFCs in the manufacture of F-PUF slabstock. Annex-A gives an overview on these as well as a UNDP evaluation of their applicability under the MLF stipulations.

Dekheila originally selected the use of methylene chloride as the most economic solution for its foam production line. As this technology proved difficult for the extreme low densities that Dekheila manufactures, it was decided to review other technologies, resulting in the choice of the "Hypercure" technology, an accelerated curing system allowing for 100% water-blown foams.

The technology is intended to be implemented with safeguards for environment (emissions) and workers safety (exposure).

In addition, the company intends to install the capability to use softening additives. There are no eligible capital costs related to this installation.

Hypercure or related systems are now in production in about 15 vertifoam facilities, mostly concentrated in the USA and Europe.

5.2 IMPACT ON PRODUCTION PROCESS

The use of softening additives requires only the installation of storage and metering equipment. The substances are non hazardous and no special safeguards are needed.

The installation of a fast cure system will reduce the need for curing space. The available space is sufficient and suitable in location to house the "Hypercure" system. The plant relocation will facilitate installation and keep the related costs down. A backup generator to avoid fire risk in case of a power outage is already in place.

Safety and production training is scheduled to follow installation, prior and during start-up. Start-up will be supervised by the contractor and an international process expert.

6. PROJECT COSTS

6.1 CAPITAL COSTS

The following is a summary of the expected costs of investment and related activities:

DESCRIPTION	SUBTOTAL (USD)	TOTAL (USD)
HYPERCURE TECHNOLOGY		
Equipment.....	390,000	
Freight.....	10,000	
Installation.....	40,000	440,000
EMISSION FILTRATION		
Equipment.....	125,000	
Freight.....	5,000	130,000
START-UP		
Trial Materials.....	15,000	
Reimbursement for usable material	(5,000)	
Technology transfer (process specialist).....	15,000	25,000
CONTINGENCY AND ROUNDING.....		55,000
TOTAL.....		650,000
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Supporting documentation is provided in annex-B.

6.2 INCREMENTAL RECURRENT COSTS/SAVINGS

The expected annual operating costs will differ only marginally from the current costs (see calculations Tianjin project, Annex-C). The company will not claim any reimbursement and therefore no specific calculations have been made.

6.3 UNIT ABATEMENT COSTS

a)	ODS Reduction Project Costs	USD	650,000
b)	Annual Incremental Costs (Benefits)	USD	-,-
c)	Project Useful Life		10 years
d)	ODS Reduction/Y (Base 1991)	kg	130,000
Unit Abatement Costs [(a/c + b)/d]		USD/kg/y	0.50

7. FINANCING PLAN

The company requests reimbursement of the full project costs in the amount of

USD 650,000.
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8. PROJECT IMPLEMENTATION

8.1 MANAGEMENT

UNDP will be the implementing agency for the project and will work with the company (Dekheila) on project execution, under the guidance of the Government (EEAA). The project will be carried out at the Alexandria FF & F facilities in El Arab City.

8.2 PROCUREMENT

UNDP will oversee the procurement of this project, following UNDP guidelines and regulations.

8.2 SCHEDULE

The following schedule is developed for this project, following date of approval:

TASK	TIME FOR COMPLETION					
	Q1	Q2	Q3	Q4	Q5	Q6
Hypercure Purchase order Arrival, Customs clearing Installation, Start-up	x		xx x			
Training Trials, Technology transfer				x xx		

9. PROJECT IMPACT

This project will result in the elimination of the use of annually 130 tons CFC-11, based on 1993 consumption. In view of the current and expected growth in the Egyptian market, this figure has to be increased by at least 10% for every subsequent year.

10. ANNEXES

- Annex-A: Overview of Options for the phaseout of CFCs in the Manufacture of Flexible PUF (Slabstock).
- Annex-B: Price Documentation.
- Annex-C: Incremental recurrent cost calculation for a comparable project (Tianjin)

THE RESOURCE POOL

Consulting in: Environmental and
OSHA Compliance.
Urethanes Process and
Machinery Technology.

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DEKHEILA CHEMICAL INDUSTRIES CORPORATION

SCOPE

The project is concerned with the replacement of CFC 11 in the manufacture of flexible polyurethane foam (slabstock).

RECOMMENDATION

The project is supported.

RELEVANCY AND ADEQUACY OF INFORMATION

The information is adequate.

TECHNICAL SOUNDNESS

The chosen route of CFC 11 replacement by accelerated curing/heat dissemination is one of the recommended options for flexible slabstock (UNEP Technical Committee, EPA brochure). This option requires backup electricity to address safety concerns. This is included in the project.

COMPARABLE PROJECTS

There is one comparable project in Tianjin, China. This project is still in implementation phase and much larger in scope. Unit abatement costs, however, are comparable (USD .50 vs. .60).

ENVIRONMENTAL ISSUES

Zero ODP option chosen. The generated carbon dioxide has a low GWP and is considered non-toxic.