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

Ninth Meeting
Montreal, 8-10 March 1993

PROJECT PROPOSALS: EGYPT

MINISTER OF CABINET AFFAIRS &
MINISTER OF STATE FOR ADMINISTRATIVE DEVELOPMENT

January 27, 1993
6

Dear Dr. El-Arini,

With reference to the Egyptian Country Programme and Projects for the Phase-Out of Ozone Depleting Substances (ODS), we would like to enclose herewith four Egyptian project proposals to be submitted for approval during the next Executive Committee Meeting of the Interim Multilateral Ozone Fund due to be held in Montreal - Canada during March 8-10, 1993 .

Hoping to maintain our mutual cooperation for the benefit of our common environment .

Wishing you all the best.

with my best regards

Yours Sincerely,

Dr. Atef Ebeid,
Minister of Cabinet Affairs &
Minister of State for
Administrative Development.

Dr. Omar El-Arini,
Chief Officer,
Interim Multilateral Ozone Fund
for the Implementation of
the Montreal Protocol,
Montreal - Canada.

PROJECT COVER SHEET

COUNTRY OR REGION:	Egypt
SECTOR COVERED:	Foam
ODS CONSUMPTION IN AFFECTED SECTORS	722 metric tonnes of CFCs used to make foams in 1991
PROJECT TITLE:	Phaseout of the use of CFC-11 in Molded Polyurethane Foam Manufacturing at TAKI-VITA
PROJECT DURATION:	Two years
PROJECT IMPACT: ODS REDUCTION	50 tonnes per year reduced CFC-11 use
PROPOSED BUDGET:	40 % of Project Cost US$ 196,000 Operating Cost US$ 48,750
IMPLEMENTING AGENCY:	UNDP with technical input from USEPA
NATIONAL COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)

PROJECT SUMMARY

Egypt has developed a national country programme for the phase out of ozone depleting substances. One key sector is CFC reduction and phase-out in foam manufacturing. In this sector, TAKI-VITA, a joint venture private sector company, is the largest foam manufacturer, producing polyurethane flexible and rigid foams. The company has already phased out the use of CFCs in its main production, flexible polyurethane slabstock. Under this project, the company will phase-out CFC-11 in the manufacture of molded flexible, semi-rigid, and rigid foams.

PROJECT OF THE GOVERNMENT OF EGYPT

REDUCED CFC-11 USE IN FOAM MANUFACTURING

1. Sector Data

Two major types of foams used in Egypt are polyurethane foams (PUF) for insulation, cushioning, packaging and automotive applications; and polystyrene foams for insulation and food packaging. In 1991, an estimated 722 metric tonnes of CFCs were used for foam manufacture, with approximately 500 tonnes of this amount used to make insulation for refrigerators. This project will reduce CFC-11 use by 33 tonnes per year. Total CFC reduction under this project would amount to approximately 5% of 1991 usage in foams.

2. Background

One of the major uses of CFC-11 in Egypt is in the manufacture of foams. The Government of Egypt, in its draft country programme for the phaseout of ozone-depleting substances (ODSs), includes the reduction of CFC-11 from foam manufacture as a key element in its action strategy. This project, by facilitating the reduction of CFC-11 in foam manufacture, will assist Egypt meet its ODS phaseout targets under the provisions of the Montreal Protocol thereby contributing to the global reduction of ODSs.

The UNDP Team mission was informed by TAKI-VITA that British VITA is a minority partner of TAKI-VITA. British VITA is not involved in the day to day operations and management of TAKI-VITA. No technology transfer agreements have been entered into.

This project, at the largest foam manufacturer in Egypt - the TAKI-VITA Company - will reduce CFC-11 used in foam production. TAKI-VITA produces about 4,000 tonnes/year of slabstock polyurethane foam. The use of CFCs in this production is already phased out through the use of methylene chloride. The company also produces 300 tonnes/year of molded PUF in which CFC-11 continues to be used. These 300 tonnes comprise the following:

a) 200 tonnes/year of molded semi-rigid and flexible foams used in furniture, automotive seats, shock absorption/padding, headrests and armrests.

b) 100 tonnes/year of rigid insulating and flotation foams used as insulation panels, water heater insulation, and water buoys.

3. Project Objectives

The objectives of this project are:

a) eliminate CFC-11 in the production of semi-rigid and flexible foams; this would amount to 16 tonnes/yr of reduced CFC usage.

b) reduce the use of CFC-11 in the manufacture of rigid foams by at least 50%; this would amount to 8.75 tonnes/yr.

c) eliminate residual use of CFC-11 in rigid foams in a subsequent stage; this would amount to 8.75 tonnes/yr.

4. Project Activities

In order to be certain that the objectives of this project will be met, it is important that the technology transfer for the CFC elimination in flexible and semi-rigid foams, and CFC reduction in rigid foams, be done in a way which assures that good quality and cost competitive production levels are achieved quickly. It is also important that the new CFC-free technology be cost effective versus the anticipated market prices. There is currently sufficient technology available to implement phases one and two immediately. Phase three will require extensive prototyping to evaluate and to adjust new technologies for customer specifications.

ACTION		TIMING
	PHASE 1 (1 YEAR):	
1.	DEVELOP SCOPE OF WORK, EQUIPMENT REQUIREMENTS, AND SPARE PARTS	3 MO
2.	ORDER, INSTALL, AND PRESTARTUP CHECKS	6 MO
3.	STARTUP, PROCESS/QUALITY/TESTING	3 MO
	PHASE 2 (1 YEAR):	
4.	NEW TECHNOLOGY EVALUATIONS AND IMPLEMENTATION OF CORRESPONDING PROCESS CHANGES	12 MO

5. Technology Discussion

TAKI-VITA currently produces molded polyurethane foams on three production units, utilizing two-component systems. Component A comprises a mixture of polyol and all additives required. This includes 8% CFC-11. The latter component acts as a:

- physical blowing agent
- viscosity reducing agent
- softening agent
- thermal insulator (rigid foams only).

CFC-11 can be replaced through the combination of another polyol and a different blowing agent. However the viscosity of Component A would increase, requiring equipment modifications. It is proposed to replace the existing (low pressure) foaming units by high pressure models that can manage the required viscosities with an adequate margin for process variability. However, in rigid foam, the thermal insulation properties will deteriorate. The proposed replacement technology, therefore, only allows replacement of CFC-11 in rigid foam up to a level of 50%.

There are several options for further reduction in rigid foams while maintaining acceptable insulation standards. These include:

- replacement by other physical blowing agents
- replacement by carbon dioxide generated in situ by the water/isocyanate reaction concurrent with changes in product thickness and/or product density.

The new equipment would be versatile enough to allow the incorporation of such changes.

The replacement process would proceed in two stages:

1) Installation of new equipment: This equipment would, after proper training and with start-up assistance from equipment and raw material suppliers, replace the current equipment, result in an elimination of the use of CFCs in flexible PUF (16 tonnes/year) and a reduction of 50% in the use of CFCs in rigid PUF (8.75 tonnes/year).

2) After stabilization of the new production process, TAKI-VITA would proceed with the evaluation of technologies that offer a complete elimination of CFCs in rigid PUF. Existing personnel would be utilized in combination with assistance from chemical suppliers. Technologies utilizing no ODP agents will be preferred, i.e., if possible, no HCFCs.

6. Cost Effectiveness Estimate - (See Attachment A)

7. Project Timeframe & Budget

Details of the key project steps, which are amplifications of the schedule above and their timing are shown below:

PHASE	ACTION	TIME TO COMPLETION	ONGOING COSTS	ONE-TIME COSTS
I	1	3 MO	-----	-----
	2	6 MO	-----	$480,000 (a)
	3	3 MO	-----	$ 10,000 (b)
II	4	12 MO	(see Attachment A)	----- (c)
I&II	**1-4**	**24 MO**	**----**	**$490,000**

(a)

3 high pressure foaming units @ $100,000/unit	$300,000
1 high pressure foaming unit @ $140,000	$140,000
Installation, training, and freight @ $10,000/unit	$ 30,000
1 oven for heating barrels	$ 10,000
Total Equipment and Installation	$480,000

(b) It is anticipated that the company may have to reimburse raw material suppliers for some assistance and trial material

(c) The company anticipates 15% higher material costs related to the introduction of CFC-free technology. On annual chemical costs of $325,000 this would amount to $48,750 per annum or $97,500 over the two year project period.

ARTHUR ANDERSEN

ARTHUR ANDERSEN & Co SC

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4 November 1992

Our ref JPP/JAG/NE/0538N

Your ref

Direct line 061 200 0263

Mr A Borolossy
Taki Vita SAE
10th of Ramadan
EGYPT

Dear Mr Borolossy,

Following Mr R H Sellers' letter to yourself dated 3 November 1992, and in support of your UNDP application, we can confirm, as auditors of British Vita PLC, that British Vita PLC is a 40% shareholder in Taki Vita SAE, does not receive royalties or other technical payments from Taki Vita SAE but does receive dividends and payments for directors' fees and products supplied to Taki Vita SAE from British Vita PLC's European operations.

We can also confirm that British Vita PLC is not involved in rigid foam production in any of its operations.

Yours faithfully,

Arthur Andersen

PROJECT COVER SHEET

COUNTRY OR REGION	EGYPT
SECTOR COVERED	FOAMED PLASTICS
ODS CONSUMPTION IN AFFECTED SECTOR	722 METRIC TONS OF CFCs USED TO MAKE FOAMS IN 1991
PROJECT TITLE	PHASEOUT OF THE USE OF CFC12 IN THE MANUFACTURE OF EXTRUDED POLYSTYRENE FOAM.
PROJECT DURATION	15 MONTH
PROJECT IMPACT (ODS REDUCTION)	196 TONS (CFC 12) / YEAR (1991)
PROPOSED BUDGET	PROJECT COST 475,000 US$ ONGOING COST 414,000 US$/year
IMPLEMENTING AGENCY	UNIDO
NATIONAL COORDINATION AGENCY	EGYPTIAN ENVIRONMENT AFFAIRS AGENCY

PROJECT SUMMERY

Egypt has developed a draft national country program for the phase out of ozone depleting substances. One key sector is the CFC reduction and phase out in the manufacture of foamed plastics, Advanced Chemical Engineering Systems company accounted in 1991 for 27% of the CFC consumption in this sector under this project, the company will completely phase out the use of CFC 12.

This project will eliminate all CFC 12 used in our factory and use instead a mixture of (HCFC 142b & HCFC 22), that has been experienced on various PS foam board installation and that in Europe is widely accepted by the Montreal convention and acceptable alternative according to the UNEP technical committee.

Project of the Government of Egypt phasing out CFC in PS boards manufactured in Advanced Chemical Engineering Systems Co.

1. Sector Data

Two major types of foamed plastics produced in Egypt are Polyurethane foam (PUF) for insulation, cushioning, packing and automotive applications, and Polystyrene foams for insulation and food packaging.

In 1991 an estimated of 722 metric tones of CFC's were used for foam manufacture, this project will reduce CFC 12 use by 196 tons per year. Total CFC's reduction under this project would amount to approximately 27% of 1991 usage in foams.

2. Background

ADVECHEMS is a manufacturer for extruded polystyrene foam boards for thermal insulation, the company head office is situated in Cairo, the factory is in Sadat city 90 Km from Cairo on the Cairo - Alexandria desert road. Number of employees is 100 employee.

The production line is from LMP IMPIANTI (ITALY), the company use a mixture of freon gas F12/F22 (70/30 %) as a blowing agent summing up to 280 tons/year (reduce density), this mixture deplete the ozone layer.

This project by facilitating the reduction of CFC12 in the manufacture extruded polystyrene foam will assist Egypt to meet its ODS phase out targets under the provisions of the Montreal protocol thereby contributing to the global reduction of ODS.

Advechems has proactvely pursued a solution for the phase out of CFC's, foreign experts have been contacted finally decided on the replacement by a mixture of (HCFC 142b + HCFC 22) as the following was setup for the implementation of the replacement of (CFC 12 by HCFC 142b) in the mixture.

Important Remarks

LMP Impianti supplied the factory and licence advised Advechems that the only possible solution is the use of a mixture of (HCFC 142b & HCFC 22), that has been already experienced on various PS foam boards installations and that in Europe is widely accepted by the Montreal convention.

LMP informed us :

"For what regards alternatives to freon as blowing agent for the board production, we inform you that the only solution is the use of a mixture of HCFC 142b & HCFC 22, that has been experienced on various PS foam board installation and that, in Europe is widely accepted by the montreal convention."

Unfortunately the CFC alternative replacement cost per kilogram is very high, at the same time the m3 price of Advechems extruded polystyrene foam boards is about triple the cost of expanded PS foam boards

However the government of Egypt and the owners of the factory recognize an urgent need to pursue replacement technology in this major sector in order to successfully phase out of CFC's.

Advechems is willing to absorb a deal of the cost.

The cost mainly on the losses due to higher cost of the alternative (mixture of HCFC 142b & HCFC 22) and difficulty to pass any portion of the price to the customers.

Advechems suggest to be funded by the multilateral fund only three years of the cost difference and ready to complete the challenge after.

a. Collection of expertise.
b. Reformulation of all PS foam qualities.
c. Implementation of equipment modifications.
d. Training of management and employees.

3. Project Objective

To eliminate the use of all CFC 12 in the production of Extruded Polystyrene Foam boards, this would amount to 196 tons/year of reduced CFC usage for current production in Advechems factory in 1993.

4. Project Activities

1. Techno - Economic study for engineering - equipment needed for new technology.
2. Installation, start up and testing.
3. Training of technical stuff on job training

Work Plan

Action	Timing
1- Consultant for carrying techno economic study, preparing tender specification.	1 month
2- Purchase of equipment	7 months
3- Installation, start up & testing	5 months
4- On job Training	1 month
5- Fellow ship for one person	1 month

Cost of Custom duties and different taxes is not included in our phase out project, and its value is 34,000 US$.

Our phasing out technology not depend on replacement of the main machine, but just improvement of our machine, for this reason there is no slavged cost.

Unit abaiment cost

- Incremental costs	1,715,000 $
- Reduced ODS (annual saving)	196 tons
- Project useful life	10 years

- Cost invested per Kg reduced =

(1,715,000 US$/10 years)/196,000 Kg =

= 0.875 US$/Kg

5. Technology Discussion

5.1 The technology of manufacturing PS boards depends mainly of heating and incorporating the PS and additives in a twin screw extruder and to blow a mixture of CFC 12 & HCFC 22 with definite flow rate and pressure to shape the board through a die with lips on a steady state conditions.

5.2 The screw elements will be redesigned with different and special profile.

5.3 One static homogenizer complete with connecting flange and oil thermo control unit needed

5.4 One injection system needed including:

Main pump, pressure indicator, filter and cartridge, battery, valve, service pump, pump support and flow meter.

6. Cost Effectiveness Estimate

7. Project Time frame And Budget

Details of the key projects steps, which are amplifications of the schedule above and their timing are shown below:

Phase	Action	Time to Completion	Ongoing cost	One Time Cost
I	1	1 Month		
	2	7 Month		
	3	5 Month		
	4	1 Month		
	5	1 Month		
I	1-5	15 Months		

A)	Consultant for techno - economic studies	25,000 $
	Needed equipment and accessories Including Freight, Installation, new operating conditions, two experts, for 10 working days	305,000 $
	Fellow ship training and implemented new technology inspection	20,000 $
	Start up cost, for the use of new alternative, for scraped raw material and product.	100,000 $
	Local training for technical stuff	25,000 $
	Project cost	475,000 $
B)	Ongoing costs	414,000 $/year

START UP COST ANALYSIS

TESTING PERIOD	10 WORKING DAYS
RATE OF LINE FEEDING	205 Kg/hr
PRODUCT DENSITY	36 Kg/m3
METER CUBE PRESENT PRICE	155.20 $/m3

QUANTITY OF RAW MATERIAL USED IN TESTING :

= 10 (working days) * 24 (hours) * 205 (Kg/hr)

= 49,200 Kg

PRODUCT QUANTITY IN RESPECT TO RAW MATERIAL USED :

= 49,200 (Kg) / 36 (Kg/m3)

= 1,366.666 m3

50% SCRAP :

= 1,366 m3 * 0.50

= 683 m3

EQUIVALENT PRICE TO SCRAPED RAW MATERIAL :

= 683 m3 * 155.20 $/m3

= 106,001.6 $

THE DIFFERENCE IN COST BETWEEN PRESENT BLOWING AGENT AND ALTERNATIVE ANALYSIS

TO CALCULATE THE WORKING DAYS :

- 1 YEAR = 52 WEEKS
- PUBLIC HOLIDAYS = 13 DAYS
  = 2 WEEKS
- LINE MAINTENANCE = 5 WEEKS
- WORKING WEEKS = 45 WEEKS

TO CALCULATE THE QUANTITY OF BLOWING AGENT USED :

MATERIAL USED = 45 (WEEKS) * 7 (DAYS) * 24 (HOURS) * 205 (Kg/hr)
= 1,549,800 Kg

BLOWING AGENT NEEDED = 0.18 OF RAW MATERIAL WEIGHT

BLOWING AGENT USED = 0.18 * 1,549,800 Kg
= 278,964 KG

BLOWING AGENT PRESENT PRICE (USED) = 3.64 $

ALTERNATIVE PRICE IN ITALY = 4.10 $

PRICE REACHING FACTORY IN SADAT CITY = 4.10 $ * 1.25
= 5.125 $

DIFFERENCE IN PRICE = 1.485 $

OVERALL DIFFERENCE FOR 1 YEAR = 1.485 ($) * 278,964 (KG)
= 414,261.54 $

ONGOING COST/YEAR = 414,000 $/YEAR

PROJECT COVER SHEET

COUNTRY:	Egypt	
PROJECT TITLE:	Elimination of CFC-12 in the manufacture of extruded polystyrene foam at Al Sharif Plastic Factories	
SECTOR COVERED:	Foamed Plastics	
ODS USE IN SECTOR:	722 tons CFCs (722 tons ODS) in 1991	
PROJECT IMPACT:	75 ton CFC-12 per year, based on 1993 consumption	
PROJECT DURATION:	One year, from funding availability	
PROPOSED BUDGET:	Total Project Cost	USD 1,700,000
	Operating Cost (Cash Value)	USD 240,000
	Proposed Grant	USD 1,460,000
IMPLEMENTING AGENCY:	UNDP	
COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)	

PROJECT SUMMARY

Al Sharif Plastics Factories, a private sector company, is Egypt's largest manufacturer of extruded polystyrene foam sheet. The product is mainly used for food service and packaging applications.

CFC-12 is currently utilized in the production process as a blowing agent. Under this project, Al Sharif will eliminate the use of CFCs in this process through replacement by butane. Appropriate safety measures are planned to address the flammability of this substance.

To maintain flexibility in the most economic choice of resin, the company has the capability to switch the process to polyethylene. This conversion will maintain that potential.

PROJECT OF THE GOVERNMENT OF EGYPT

ELIMINATION OF CFC-12 IN THE MANUFACTURE OF EXTRUDED POLYSTYRENE FOAM AT AL SHARIF PLASTICS FACTORY

1. Project Objective

The objective of this project is to phase out the use of CFCs in the manufacture of extruded polystyrene/polyethylene foam sheet at Al Sharif Plastic Factories.

2. Sector Background

The CFC consumption in the Egyptian foam sector in 1991, is estimated at 722 tons. Annual growth is currently 15-20%. Projects to eliminate about 250 t/y CFCs, are in the mean time approved by UNEP. Other projects, amounting to an additional 350 t/y reduction, are currently in preparation.

The remaining use is mainly concentrated in the refrigeration sector. The EEAA is currently working with manufacturers and chemical suppliers on a phase-out strategy for this area.

3. Enterprize Background

Al Sharif is the largest plastics manufacturer and one of the largest private enterprises in Egypt. Founded in 1958, the company has grown to a conglomerate of 52 subsidiaries (19 are joint stock companies) worth an estimated L.E. 2 billion. Its various business operations include the following: investments; trade; housing and development; agriculture, reclamation and land management; public services (25% of its profits are invested in hospitals, schools and other social services); and industries such as plastics manufacturing,building and construction materials, food products, and chemicals.

Al Sharif consumed in 1992 about 60 tons of CFC-12 in the manufacture of extruded polystyrene and polyethylene (EPE/EPS) foam sheet. This is significantly more than in 1989, when the company used only 30 tons. In 1993 it expects to reach a consumption level of 75 ton.

4. Project Description

Al Sharif will eliminate the use of CFC-12 in the manufacture of extruded polystyrene foam sheet (EPS) by replacement with butane. This technology is available through original equipment manufacturers. It incorporates in, addition to machine modifications, the relocation of the supply tank for the foamant, explosion proof electrical equipment and spark protectors within the manufacturing area. The project also foresees in extensive production and safety training for the operators and maintenance crew.

The company has currently the capability to convert to the use of polyethylene. This allows it to choose at any time the most economic resin, and is important in a very competitive environment. The project include modifications to maintain this capability.

5. Technology Selection

There are several options to replace CFC-12 in the production of extruded polystyrene/polyethylene, such as:

- o Nitrogen gas
- o Carbon dioxide gas
- o Hydrocarbons (N-pentane, isopentane, butane)
- o The "Berstroff" technology
- o HCFC-22
- o HFC-134A
- o HFC-152A
- o HCFC-142B
- o Liquid petroleum gases (LPG)

Butane is selected by the company as an economic attractive alternative that is acceptable for food service, and will perform for polystyrene as well as for polyethylene. The use of butane is widely accepted in industrialized countries, if applied with the necessary safety precautions to mitigate the risks, originating from the high flammability of the substance. Storage facilities will be generally located outside, or in a separate building, all electrical equipment in the extrusion area has to be explosion proof, the area itself must be separated from other production areas,spark arresters must be utilized, VOC monitoring is virtually mandatory, and an static dissipating agent should be added to the resin mixture. In addition safety and awareness programs have to be implemented for all workers involved. A significant part of the conversion cost are related to these measures.

The use of butane is in some countries restricted, based on its photochemical activity. In Egypt,no such restrictions are currently in place, or are expected in the foreseeable future.

6. Project Costs

6.1 Investment Costs

The following is a summary of the expected costs of investment and related activities, such as installation, freight, technology transfer and training.

(1)	Implementation of modifications		$ 1,295,000
	EPS modifications	$ 250,000	
	EPE modifications	$ 400,000	
	Building modifications	$ 200,000	
	General safety precautions	$ 300,000	
	Installation	$ 90,000	
	Spare parts	$ 55,000	
(2)	Transfer of technology/training		$ 230,000
	Technology	$ 200,000	
	Training	$ 30,000	
(3)	Contingency (10%)		$ 175,000
	Total		$ 1,700,000

- o The costs are specified in attachment A
- o The training is specified in attachment B
- o The quotations that this budget is based on, are from early 1992. Some inflation related price increase is therefore to be expected. The contingency is largely included to address this.

The total project includes other costs, that are not directly related to the elimination of ODP substances, or that are not reimbursable under the rules of the Multilateral Fund. A quality control laboratory will be installed, and additional production equipment will be installed.

6.2 Operating Costs

Butane is considerable lower in price than CFC-12:

CFC-12	$ 2.98/kg
Butane	$ 0.50/kg

These prices reflect the status at December 1992, and are documented in attachments C and D. It should be stated that both prices fluctuate significantly.
The price of butane is currently regulated by the government. Prices differ significantly between residential, governmental and commercial use. Deregulation is expected in the near future, leading to a price structure similar to the international

markets. For this purpose, the lowest commercial price available was selected, under the assumption of bulk supplies (Al Sharif currently operates with returnable containers. The price difference for butane between containers and bulk justifies however the installation of a tank).
The price for CFC-12 has recently dropped, based on temporary over capacities in Europe. Consumption as well as production capacities will further drop, and the supply situation will vary between excess and shortness, causing very volatile pricing.

The use of butane requires an aging (anti shrinking) additive and an antistatic agent, reducing the price difference from $ 2,48 to about $ 2.43. A one to one substitution is assumed.
This leads to an expected annual decrease in material costs of (75,000 x 2.43):

$ 182,250

On the other side, higher costs in maintenance , safety monitoring and ongoing safety training are to be expected. It is assumed that additional maintenance costs will be 5% of the investment in equipment ($ 65,000), and that annually $ 25,000 will be spent on monitoring and training.

Consequently, an annual decrease of

$ 92,250

in operating costs is expected. Assuming an economic lifetime of seven years, a 10% discount rate, and a 50% tax rate, this would amount to a net present value (NPV) of

$ 240,000

6.3 Unit Abatement Cost

a) ODS Reduction Project Costs		$ 1,700,000
b) Annual incremental costs		$ 92,250
c) Project useful life	y	7
d) ODS reduction/y	kg	75,000
Unit Abatement costs [(a/c + b)/d]	$/kg/y	5.76

(discount rate 10)

7. Financing plan

The accumulation of incremental benefits over the project lifetime does not justify this project. The project appears therefore eligible for a grant from the Interim Multilateral Fund for the implementation of the Montreal Protocol.

Requested are reimbursement of the complete project costs ,as far as related to the ODP phase-out, under substraction of the net present value of incremental operational benefits, as calculated under 6.2:

RAPPA Inc.
104 Fieldstone Drive
La Porte, IN 46350
PH (219) 362-4450
FX (219) 326-6047

MEMORANDUM

Date : January 31, 1993
From : Bert Vaenendaal
To : UNDP
Att : Frank J.P. Pinto
Copy :

Subject: Technical review Al Sharif Project.

We have reviewed the information provided for the re-submission of the project

"Elimination of CFC-12 in the manufacture of extruded polyatyrene foam at Al Sharif Plastic Factories."

The many different versions in which this project has been presented so far, have generated considerable confusion.

The original project (USD 2,600,000) was submitted for consideration in February 1992. This proposal lacked detail, and was referred back for revision and re-submittal.

In July 1992, a delegation of UNDP assisted in the revision of the project proposal. The costs were adjusted to USD 1,785,000. This was later revised to USD 1,725,000 after UNDP was informed that contract preparation and site inspection costs in the amount of USD 30,000 each, could not be considered for reimbursement. This proposal was technically reviewed on October 10, 1992 and conditionally recommended.

On October 8, a different proposal was directly submitted to IMOF/UNEP, without knowledge of, and consequently without review by, the project consultant. From discussions with Al Sharif it is learned that the company completely misunderstood suggestions for format changes.

Al Sharif subsequently submitted a revised proposal, that was substantially identical to the UNDP supported write-up. This one was received too late for consideration, and probably only contributed further to the confusion. The project was again deferred pending preparation of a firm proposal.

We have taken the July '92 version of the project document, together with the October '92 technical review and the comments of the IMOF Secretariat as the base for a revised proposal. The non reimbursable elements--site inspection, contract preparation and laboratory--are eliminated, and close attention is paid to price verification for the blowing agents as well as proper inclusion of the consequential incremental operational benefits.

Price documentation for CFC-12 was obtained through the review of the latest invoices. We have attempted to obtain a firm price quotation from the (state owned) distributor for butane, but were not successful. We then asked EEAA to confirm in writing price information obtained through this agency. The prices for butane in Egypt are complex, and depending on volume (different size containers; bulk) as well as customer category (commercial; residential). We considered the lowest obtainable price, assuming bulk delivery.

The reformatted project document follows the World Bank guidelines (revision 8/20/92) in lay-out as well as cost calculations.

We remain supportive of this project, and feel that the reservations, voiced in the assessment from October 10, 1992 are now properly addressed.

We recommend this project for approval.

END

PROJECT COVER SHEET

COUNTRY:	Egypt
PROJECT TITLE:	Elimination of CFC-11 in the manufacture of molded polyurethane foams at MISR Foam Co.
SECTOR COVERED:	Foamed plastics
ODS USE IN SECTOR:	722 tons CFCs (722 tons ODS) in 1991
PROJECT IMPACT	28 tons/y CFC-11 (28 tons ODS) 2 tons/y Methylchloroform (0.22 tons ODS) (based on 1993 forecast)
PROJECT DURATION:	10 months
PROPOSED BUDGET:	US $ 275,000
IMPLEMENTING AGENCY:	UNDP
COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)

PROJECT SUMMARY

MISR Foam Co., a private sector company, manufactures a range of molded flexible polyurethane foam products. Main market is the automotive industry (car and bus seats).

CFC-11 is currently utilized in the production process as a blowing agent as well as a viscosity cutter. Under this project, MISR Foam will eliminate the use of CFCs in this process through new equipment and novel chemical systems. This will amount to an annual ODP reduction of 28 tons. The company will in addition phase out the use of another ODP agent, methylchloroform. The introduction of water based release agents will eliminate the use of 2 ton/y of this chemical.

The company produces also flexible polyurethane slabstock. The use of CFCs in this production process is currently being phased out under an UNEP approved project.

Project Costs	$ 1,700,000
Operational Costs (NPV)	$ (240,000)
Requested Grant	$ 1,460,000

8. Project Implementation

8.1 Management

Al Sharif Projects Co. will oversee the successful implementation of this project. The project will be carried out at the existing production facility for EPE/EPS.

8.2 Schedule

TASK	TIME FOR COMPLETION
General preparations	2 months
Implementation of modifications	9 months
Training	1 month
Total time of implementation	12 months

9. Project Impact

This project will eliminate the use of at least 75 tons of CFC-12 in the first year of implementation. In view of the growth rates shown by the enterprise, this may increase by 15-20% in the subsequent years. The project employs commercially acceptable technology.

10. Attachments

Attachment A: Budget proposal for Modifications to Existing 60/90 mm Tandem EPS Line to Run EPS and EPE sheet on Butane Blowing Agent.

Attachment B: Transfer of Technology and Training.

Attachment C: Price Documentation for CFC-12.

Attachment D: Price Documentation for Butane.

PROJECT OF THE GOVERNMENT OF EGYPT

ELIMINATION OF CFC-11 IN THE MANUFACTURE OF MOLDED POLYURETHANE FOAMS AT MISR FOAM CO.

1. Sector Data

The CFC consumption in the Egyptian foams sector was in 1991 estimated at 722 tons, with a 15-20% annual growth. Projects to eliminate about 250 t/y, are in the meantime approved by UNEP. Other project, amounting to an additional 150 t/y reduction, are currently in preparation.

The remaining use will be concentrated in the refrigeration sector. The EEAA is currently working with UNDP, manufacturers and suppliers on a phase out strategy for this area.

2. Background

MISR Foam is a privately owned company that manufactures polyurethane and polystyrene foams for products such as mattresses, furniture, car and bus seats, and packaging products. The company is entirely Egyptian owned, and operates four production plants, employing over 250 workers.

In the past, MISR Foam used CFCs in the production of molded and slabstock polyurethane foams. A project to phase out the use in slabstock foams was submitted to the Interim Multilateral Fund in October 1992, and approved. This constituted the major use of ODPs.
A smaller, but still significant use remained in the production of molded flexible PUF. This project will address the elimination of this use, and so with the complete phase out of the use of CFCs at MISR Foam.

The manufacture of molded PUF is an area that enjoys currently in Egypt considerable expansion. Foreign Car manufacturers, such as Chrysler, Suzuki, Peugeot and G.M. have recently signed agreements to produce in Egypt. This will provide further opportunities for the local molded foam industry.

MISR Foam is currently expanding its production capacity in molded PUF. It is still possible to adapt pending orders for equipment to CFC-free technology, and in this way to reduce the costs of an elimination program considerably.

3. Project Objective

The aim of this project is:

1) to phase out the use of CFCs in the manufacture of molded flexible polyurethane foam at MISR Foam Co. This would amount to an annual ODS reduction of 28 tons.

2) **To phase out the use of methyl chloroform (MCF) as a solvent in the mold release agent. This would amount to an annual ODS reduction of 0.22 tons.**

4. Technology Discussion

MISR Foam currently produces molded polyurethane foam on one low pressure foaming unit, utilizing a two component system. The polyol component contains 14% CFC-11. This component act as a:

- o Auxiliary blowing agent, allowing for density and hardness reduction
- o Viscosity reducing agent

There are currently polyol systems available that allow the elimination of an auxiliary blowing agent, while maintaining desired properties. However, to allow the resulting higher viscosity of the polyol component, replacement of the current low pressure foaming unit into a high pressure model is required. In addition, the chemicals and the molds have to be conditioned (heated). An oven for barrels and a mold heating system is therefore required.

A MCF containing mold release agent is used to treat the molds prior to the pouring process. This will be replaced by a water containing substance. As the deposition is more delicate, an automated spraying device will be employed.

5. Cost effectiveness

Under the current circumstances, it is to be expected that the new polyol system will be higher priced than the existing system, leading to higher production costs. With the escalating prices of CFCs, and the increasing competition in the market for new polyol systems, it is however likely that this will be only of short duration. In addition, competitors are implementing similar changes, leading to comparable cost structures, and it is to be expected that MISR Foam can include higher material costs in the product price. The price difference in the mold release is immaterial.

6. Project Time Frame and Budget

The project is divided in three steps:

1. Preparation (issuing of tenders scheduling of installation and production transfer)

2. Replacement of existing foaming unit, installation of the new unit (currently on order, but blocked to allow for modification) and the installation of a spray robot.

3. Start-up, training, quality testing

Close cooperation with equipment supplier, chemical supplier and customers is foreseen, to assure a smooth and cost-effective transfer. It is expected that this cooperation will avoid the need of outside consulting. It also maximizes the utilization of Egyptian based expertise.

The key project steps and their timing are shown below:

	ACTION	TIME FOR COMPLETION
1.	Project preparation	1 month
2.	First installation	4 months
3.	Start-up, conversion	3 months
4.	Second installation	2 months
	Total project duration	10 months

Cost details are as follows:

a. One high pressure foaming unit	$ 80,000
b. Incremental cost to convert an existing order into a high pressure unit	$ 50,000
c. Freight, Installation	$ 15,000
d. Barrel oven, Mold heating system	$ 50,000
e. Spray robot	$ 25,000
f. Technical support for start-up	$ 20,000
g Contingency	$ 35,000
Total	$ 275,000

The costs of the foaming units are selected from quotations, made by two different manufacturers.

The price of an oven and mold heating system is indicative.

Contingency is rather high, to cover fluctuations in exchange rate (the quotes are in DM).

7. Annexes

Price quotations

MISR Foam II/2
1-21-93

RAPPA Inc.
104 Fieldstone Drive
La Porte, IN 46350
PH: (219) 362-4450
FX: (219) 326-6047

MEMORANDUM

Date : January 31, 1993
From : Bert Veenendaal
To : UNDP
Att : Mr. Frank J.P. Pinto
Copy :

Subject: MISR Molded Foam Project

We have reviewed the information provided for the project

"Elimination of CFC-11 in the manufacture of molded polyurethane foams at MISR Foam Co."

This information was composed of:

- o The project write-up, prepared with the help of UNDP,
- o A site visit,
- o Review of all quotations,
- o Several discussions with company representatives, the proposed equipment supplier and chemical supplier.

The choice of technology--change to high pressure technology, that can handle CFC-free systems--can be supported. The same technology was selected before in projects from Technopol and Taki-Vita.

The original project, as submitted by the company, asked for about USD 400,000, i.e. considerable more than the USD 275,000 in the final write-up, while providing for less. The substantial reduction in costs was realized through a close cooperation with ICI. ICI's local representation, Technocom, would under this proposal supply the equipment, arrange the installation, the training and the start-up. Outside consultant support can be eliminated in this way, and considerable reductions in equipment costs can be obtained. ICI also identified the possibility to simultaneously address the methylchloroform content in the mold release agent, and offered a good and cost effective replacement technology, that we included in the project. We see this cooperation as a unique opportunity to localize project execution and to obtain at the same time considerable cost savings.

It was agreed with MISR Foam representatives that no incremental operational costs would be requested. The company will attempt to pass on changes in material costs to its customers. This will also avoid unfair competition in the Egyptian market, as competitors like Technopol and Taki-Vita will be in the same position.

We recommend this project for approval.