United Nations Environment Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/8/20
15 September 1992

ORIGINAL: ENGLISH

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

Eighth Meeting
Montreal, 19-21 October 1992

PROJECT PROPOSALS: EGYPT

MINISTER OF CABINET AFFAIRS &
MINISTER OF STATE FOR ADMINISTRATIVE DEVELOPMENT

Dr. Omar El-Arini,
Chief Officer,
Interim Multilateral Fund.
1800 McGill College Avenue
27th Floor
Montreal (Quebec)
Canada H3A 3J6

September 5th, 1992.

Dear Dr. El-Arini,

As a signatory of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer and in view of its commitment to these Conventions, the Arab Republic of Egypt has undertaken the preparation of a comprehensive strategy to phaseout the use of the regulated substances. The initial strategy statement is expressed in the Country Programme for the Phaseout of Ozone-Depleting Substances (ODS) which has recently been finalized and which is being presented to the Multilateral Fund for consideration at its Executive Committee meeting planned for October 1992. The Country Programme outlines the strategy which is being adopted by Egypt and identifies key interventions which are required to minimize the economic and social welfare impacts of eliminating the use of those substances.

In addition to the Country Programme, we are pleased to present to the Multilateral Fund a number of ODS phaseout projects most of which have been prepared with the assistance of the United Nations Development Programme. These projects form the first block of projects to be presented for funding by the Multilateral Fund. Additional projects, which are presently at the concept stage, are being researched and will be prepared for presentation at a later time.

Accept, Dr. El-Arini , the assurances of my highest consideration.

with my best wishes

Yours Sincerely,

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

EGYPTIAN ODS PHASEOUT

PROJECTS

MISR COMPRESSOR MANUFACTURING CO.
(MCMC)
S.A.E.

Cairo, August 31, 1992

PROJECT FOR MODIFICATION OF MCMC COMPRESSORS FOR UTILIZING THE HFC 134a

COUNTRY OR REGION : EGYPT
CALCULATED ODS CONSUMPTION:
PROJECT TITLE : CONVERSION OF REFRIGERATING COMPRESSORS TO HFC 134a BY MISR COMPRESSORS MANUFACTURING CO. (MCMC)
PROJECT DURATION : 18 MONTHS
SECTORS COVERED : HOUSE HOLD REFRIGERATORS & SIMILAR APPLIANCES
PROJECTED ODS PHASE-OUT FROM PROJECT : 324 TONS/YEAR
PROPOSED BUDGET : U.S.$ 2,800,000
IMPLEMENTING AGENCY : WORLD BANK -IFC.
NATIONAL COORDINATING AGENCY: EEAA

PROJECT SUMMARY

According to the spirit of the MONTREAL protocol, and Egypt's COUNTRY PROGRAM for phase out of ODS's (MCMC) guided by EEAA have prepared this project to replace the CFC-12 used in house-hold refrigerators ,and similar appliances by HFC-134a . The project will be able to phase out more than 324 ton/ODS's/year . To achieve this target MCMC have to adapt new designs to the local condition and modify its factory to produce a family of compressors which use HFC-134a. The total cost of the project is about U.S.$ 2.8 million ,and shall be executed over 18 months namely 1992,1993 .

UNIT ABATEMENT COST OF PHASING OUT CFC R-12:

$$= \frac{\text{Total cost in U.S. \$}}{\text{Amount Phased out in Kg X Project life in years}}$$

$$= \frac{2\ 800\ 000}{324\ 000 \times 15}$$

= $ 0.576 / Kg

MISR COMPRESSOR MANUFACTURINGCO.
[M C M C]
Cairo,August 31,1992

PROJECT FOR
MODIFICATION OF MCMC COMPRESSORS
FOR UTILIZING THE HFC- 134 a

A - INTRODACTION

This report include the necessary facility and technical support for manufacture of a newly designed HFC-134a refrigerator compressors in MCMC project which had been designed for CFC-12 compressors . This proposal was prepared by MCMC with the help and guidance of the Egyptian Enviromental Affairs Agency [EEAA].

B-PRESENT CONSUMPTION OF CFC-12 IN EGYPT

The total number of house hold refrigerators,freezers, water coolers ,dosplay cabinets and similar appliances in use in Egypt is about 7000000 seven million units while the normal production is about 1000000 one million per annum . The production capacity of MCMC Factory is 1800,000 compressors per annum. This amount of compressors will be used for satisfying the requirement of the Egyptian local market and for export, helping to phase out an amount of CFC-12 as follows:

1800 000 X 0.00018 = 324 ton/annum

C - OBJECTIVE

The implementation of this project will provide a local source of refrigerator compressors needed to accomplish an optimum phaseout of ODSs in Egypt in accordance with EGYPT's COUNTRY PROGRAM and the spirit of the MONTREAL PROTOCOL . The size of production of these compressors shall satisfy the Egyptian market needs ,and part of the requirement of the Arab market.

D- OUTCOME OF THE PROJECT

MCMC yearly production of about 1.8 million HFC-134a compressors will phase out about 324 tons of CFC-12 yearly in Egypt .It will also participate in helping the same purpose in other countries difined under the Montreal Protocol by exporting to them an additional number of HFC-134a compressors. This will increase the total phased out amount of CFC-12 by MCMC compressors.MCMC probable export market within the countries defined under the Montreal Protocol are as follows :-

Italy(1)	126000	
Syria	13000	
Jordan	60000	
Morroco	125000	
Tunisia	80000	
Nigeria	150000	
Russia	150000	
Total	821000	compressors per annum

(1)According to the Licence Agreement the Licensor should buy a minimum of 7% of MCMC annual production for his own use.

E- INFORMATION ON MCMC

E.1 MCMC is an Egyptian share holding company incorporated in February 1988 under Egyptian laws 43 of 1974 and 230 of 1989. The articles of incorporation and the statutes of the company were approved by the presidential decree no. 17 of 1988 and published in the official gazette no.43 dated Feb.20th,1988. MCMC has been commercially registered under no.(59948) on March 20th,1988,its tax card is no.2207 dated April 26th,1986. MCMC has full powers to own the properties and to own and to carry on the business which it owns and carries on and proposes to own and to carry on the purpose of the project. The first share holders meeting was held on 25.2.1988. The construction of the factory buildings and the utilities is about to be finished on its owned land of 89900square meters, in the industrial area A-2 in the Tenth Of Ramadan town. The land contract had been rigestered

DISTRIBUTION OF THE PAID CAPITAL

NO	DESCRIPTION	1000 L.E		NO OF SHARES	CURRENCY OF PAYMENT	NATIONALITY
		TOTAL	PAID IN			
1	THE EGYPTIAN ABROAD FOR INV.& DEV. CO.	2500	2500	25000	E.POUND	EGYPTIAN
2	DELTA INDUSTRIAL CO. " IDEAL"	5000	5000	50000	"	"
3	SUEZ CANAL BANK	7055	7055	70550	"	"
4	MISR IRAN BANK FOR DEVELOPMENT	2500	2500	25000	"	"
5	MISR INSURANCE CO.	2500	2500	25000	"	"
6	EGYPTIAN GULF BANK	7000	7000	70000	"	"
7	DALLAH INTERNATIONAL HOLDING CO.	50800	50800	508000	US$	"
8	SHEIKH KHALIED AL KHALIFA	2500	2500	25000	US$	BAHRENIAN
9	DR. SALAH EL DIN IBRAHIM EL-DEEB	5	5	50	E.POUND	EGYPTIAN
10	MR. AHMED SHAHANDI YASSIEN	40	40	400	"	"
11	MR. SAIED AHMED SHAMANDI	30	30	300	"	"
12	MISS MAI AHMED SHAMANDI	20	20	200	"	"
13	SOFICOCO.	5000	5000	50000	US$	"
14	ENG. MOHAMED SALAH EL DIN EL-DEEB	18	18	180	E.POUND	EGYPTIAN
15	MR. MAGDI SALAH EL DIN EL DEEB	18	18	180	"	"
16	MRS. MONA SALAH EL DIN EL-DEEB	14	14	140	"	"
17	IFC	9900	9900	99000	US$	INTERNATIONAL
18	SAUDI EGYPTIAN INDUSTRIAL INVESTMENT CO.	11100	111000	111000	E.POUND	EGYPTIAN
	TOTAL	106000	106000	1060000	E.POUND	

EGYPTIAN OWNERSHIP OF SHARE EQUITY = 88.07547 %

F - TECHNOLOGY OF THE PROJECT

1 - MCMC has a technical assistance and licensing agreement with WHIRLPOOL ITALIA of Italy which itself is 100 % owned by WHIRLPOOL CORPORATION, U.S.A, one of the largest compressor manufacturers in the world . MCMC factory is designed to manufacture about 1.8 million refrigerator compressors in seven different sizes working with CFC-12 . Replacing the CFC-12 by the none ozone depleting HFC-134a must be combined with using ESTER or POLYESTER oil to secure capatibility.

2 - The development of the seven compressors to use HFC-134a and the polyester oil will include :

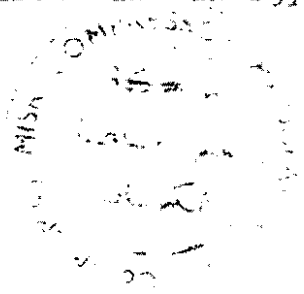
(1) Modifying the design of the compressors to over come the drop of performance due to the nature of the new gas , the modifications will include :

a-Bigger stroke by :
- New eccentricity of crank shaft .
- New piston (new position of piston pin)

b - Reduction of the dead volume by :
- Thinner valve plate
- Smaller discharge port
- New suction valve

c - Readjustment of the present electrical motors probably by change of the wire diameters or the number of windings turns or by both .

(2) Ensure material compatibility which will require the use of new kind of insulation, a problem to be solved by the local Egyptian wire manufacturer at the cost of MCMC . (The manufacturing of the standard double coated enamelled copper wire had been developed for the first time in Egypt for MCMC).



3-a- Manufacturing the modified compressor will require new tools jigs,fixtures, mechanical gauges, master gauges for electronic & pneumatic measuring equipment, new and additional laboratory equipment ,new pattern sets ,new dies,etc

b - As using paraffins and waxes shall be prohibited to avoid obstructions in the appliances , specially in the capillary,this will require new washing machines for the incoming parts, such as screws , springs piston pins , oil pick up , muffler covers , and other parts which will be obtained from suppliers to clean them from these substances.

c - Where the manufactured parts can not be washed such as electric windings the machines should be developed to use hydraulic oil compatible with both the HFC-134a and the POLYESTER oil.

d - It will be necessary to add a new storage supply , pumping and metering system for the POLYESTER oil separate from the system of the standard present oil . The attached drawing is the new modification of the oil system which contains two separate plants to allow using two different oils .

e - Producing two different compressors will require doubling some of the testing equipment to avoid bottle necks in the flow of testing and production.

G- CUSTOMER'S SERVICE

To complete the conversion of refrigerators and similar appliances to HFC 134a,it will be necessary to modify these appliances and readjust it to perform satisfactorily with the said gas and the new oil . MCMC should carry out in its laboratories the necessary experimental investigations on these appliances using its newly developed compressors to provide their manufacturers with the required technical advice to reach this primary target . Applying this solution will enable the manufacturers of refrigerators and similar appliances to convert them to HFC-134a and give them the time required for optimizing the designs of the concerned appliances to their satisfaction technically and economically . MCMC also may take part of this final target of optimization.

H-PROJECT REQUIREMENTS FOR CONVERTING TO HFC-134a

- Table (1) contains a list of equipment , personnel , and technology transfer requirements necessary for MCMC to accomplish the timely and cost effective change of MCMC refrigeration compressors to support use of HFC-134a .
- Technology is to be obtained from WHIRLPOOL ITALIA ,a subsidiary of WHIRLPOOL CORPORATION [U.S.A.] ,one of the major leading manufacturers of compressors in the world ,who will provide on-site expert supervision of all conversion works directly required for or encountered with changing to HFC-134a.

TOTAL PROJECT COST

-	EQUIPMENT	1,978,000
-	PERSONNEL	231,312
-	TECHNOLOGY TRANSFER	321,600
-	CONTINGENCY	269,088
		2,800,000

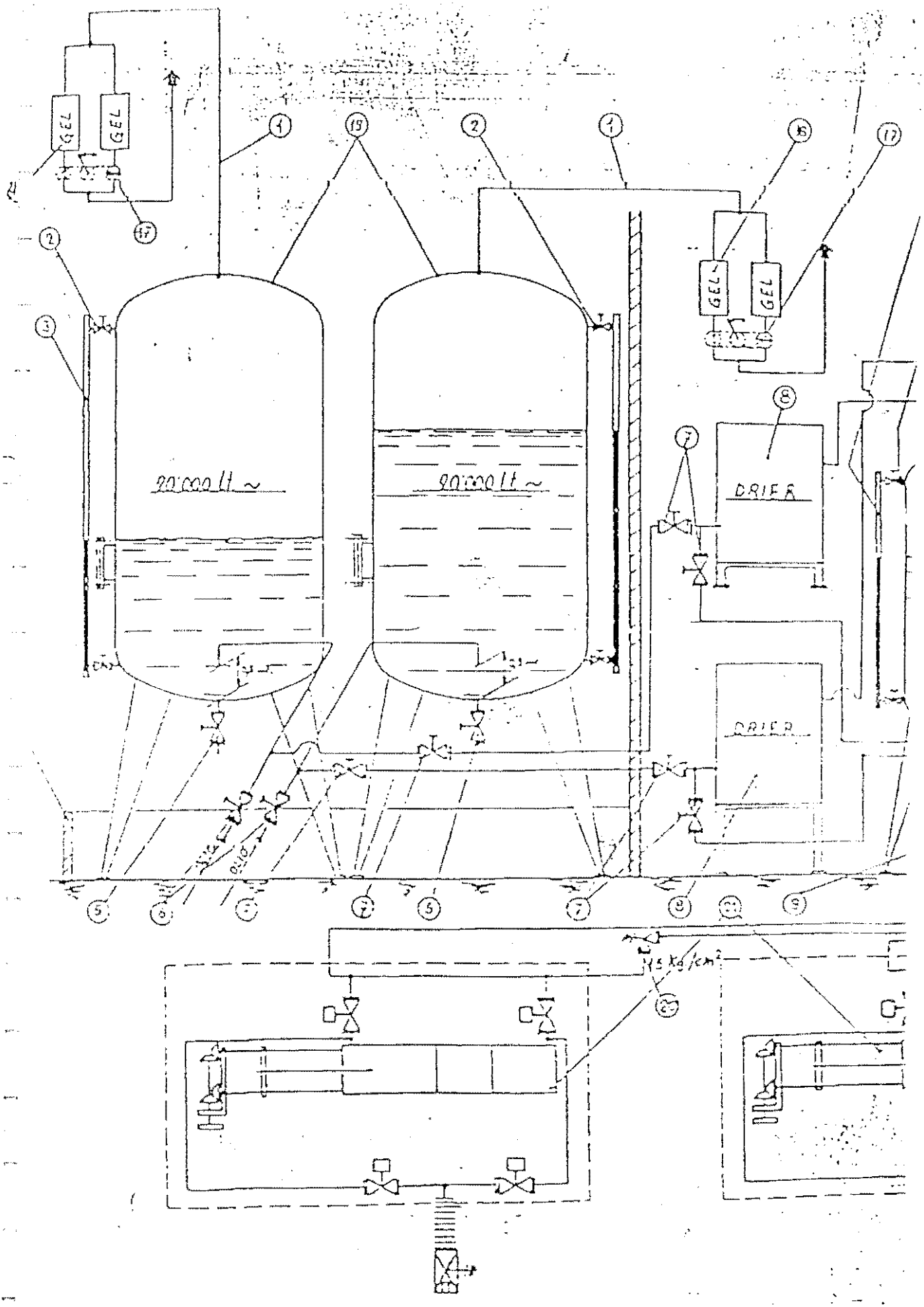
I - PROJECT EXECUTION SCHEDULE

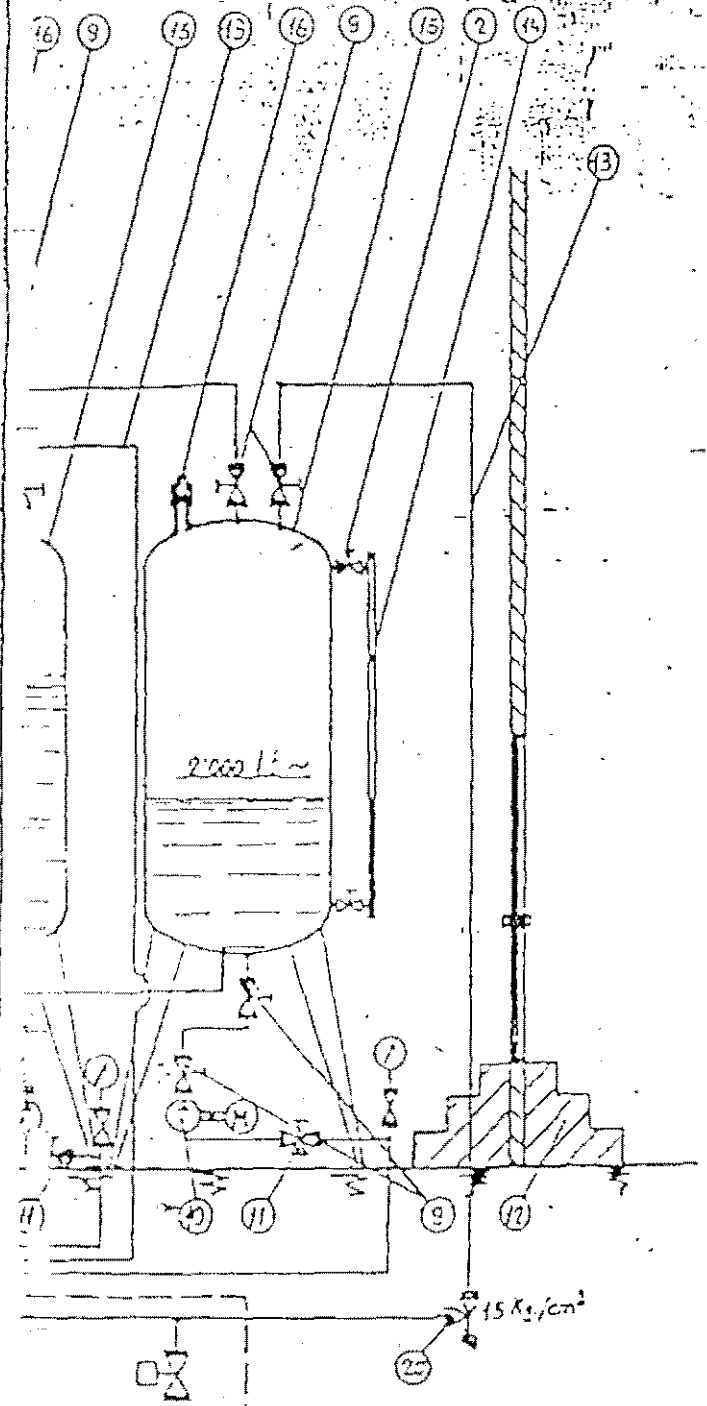
1. According to plan MCMC factory shall be in production during the third quarter of 1993 ,hence it is necessary to start immediatly modifying the works and placing the orders of additional supplies required for the conversion to HFC-134a.
2. Starting production during the transition period from CFC-12 to HFC-134a MCMC have dicided to convert its production as follows:

[1] To be ready to produce both HFC-134a and HFC-12 compressors from the first day of normal production.

[2] The size of production of HFC-134a compressors shall be decided according to a plan to be agreed upon with the customers under the umbrella of EEAA,and will be gradually increased within the said plan until the full production capacity shall be reached and no more CFC-12 compressor shall be produced .

[3] MCMC shall be able to phase out the use of HFC-12 in newly produced house-hold refrigerators and similar appliances in Egypt within two years from the date of starting production ,that is early during 1996.


GEL
GEL
GEL
GEL
DRIER
DRIER
15 Kg/cm²



2	TAPS 3/8" USUALLY CLOSED
3	LEVELS (TRANSPARENT PLASTIC)
4	WALL TANK TO CREATE A CONTAINING VOLUME m³ 30
5	TAPS 1 ½"
6	TAPS 4"
7	TAPS 1 ¼"
8	OIL DRYING PLANT
9	TAPS 1"
10	PUMP-RANGE 600 l/h AT 15 Kg/cm²
11	3 WAY TAPS 3/4" FOR DRAWING OIL
12	WALL TANK TO CREATE A CONTAINING VOLUME m³ 4
13	PIPE 3/4"
14	LEVELS (TRANSPARENT PLASTIC)
15	STAINLESS STEEL TANK IT INTERNAL LOW PRESSURE PROBE
16	BREATHER VALVE (CALIBRATED AT 0,5 Kg/cm²)
17	TAPS 1 ½"
18	BREATHER DEVICE CONNECTED WITH DRYING SALTS. THE TAPS MUST BE MECHANICAL CONNECTED EACH OTHERS IN SUCH A WAY THAT WHEN IS OPEN THE OTHER IS CLOSED AND VICE VERSA
19	IRON TANK TREATED OR STAINLESS STEEL
20	BACK PRESSURE VALVE
21	OIL CHARGING APPARATUS

			NUMBER 229 001 3042
SYM	CHANGE	DATE BY	SCALE 1:1
	DESCRIPTION SCHEME FOR TREATMENT AND DISTRIBUTION OF NUMBER AND TYPES OF TRANSFORMER'S INSULATING OIL	29/01/92	SHEET 01

PROJECT COVER SHEET

COUNTRY OR REGION	: Egypt
SECTOR COVERED	: Foamed Plastics
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 the manufacture of flexible PUF at Misr Foam Co.
PROJECT DURATION	: Four months
PROJECT IMPACT (ODS REDUCTION)	: 121 tonnes per year reduced CFC-11 use (1991)
PROPOSED BUDGET	: 415,000 US$ Project Cost 22,000 US$/year Organizing Cost
IMPLEMENTING AGENCY	: UNDP
NATIONAL COORDIANTING 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 the CFC reduction and phaseout in the manufacture of foamed plastics.Misr Foam CO. accounted in 1991 for 14% of CFC consumption in this sector.Under this project,the company will compeletly phase out the use of CFC-11 by 1993.

The following was set up for the implementation of the replacement of CFC-11 by methylene chloride:

a) collection of expertise
b) reformulation of all foam qualities
c) implementation of equipment modifications and safety measures
d) training of management and employees.

The company has already started on this program and is ready to implement measures to protect its workers' health and safety.

3. Project Objective

Complete phaseout of CFCs while providing for the health and safety of workers and allowing for future emission restrictions.

4. Technology Discussion

MISR Foam Co. currently produces flexible PUF slabstock on one production unit, utilizing the "Varimax" process. This process -- licensed to MISR -- allows for maximum production yields. After production the blocks of foam are cured in a secured area. The average density is rather low (largest production: 16kg/m^3), requiring large amounts of auxiliary blowing agent (ABA). The replacement of CFC-11 as ABA by methylene chloride was attempted from January 1992 and went relatively smoothly. The formulation transfer process for all qualities took about three months, during which increased defects in products occurred. In April, product quality normalized, indicating that the new technology was successfully implemented. However, the unacceptably high workplace concentration of methylene chloride required immediate action.

The company designed a plan to
- Implement improved ventilation and encapsulation
- Provide personal protection
- Train for adequate emergency response.

One of the features of this plan is to collect process emissions through a central exhaust. In case of future restrictions on emissions, it will be relatively easier to attach collection and recovery equipment to this channel. The company's proposed measures to provide adequate worker safety are unique in Egypt and deserve high commendation.

5. Cost Effectiveness Estimate-(see Attachment A)

The company may expect some cost savings, based on the lower price of methylene chloride compared for CFC-11. These savings will offset higher costs of catalysts, handling, and maintenance.

6. Project Activities, Cost and Timing

Details of the key project steps and their timing are shown below :

ACTION	TIME FOR COMPLETION	COST (ONE TIME)
1) Formulation transfer and process trials	completed	$ 65,000
2) Plan transfer system for methylene chloride	completed	$ 8,000
3) Safety equipment per attachment	2 mos.	$ 108,000
4) Process encapsulation and (including installation)	4 mos.	$ 130,000
5) Training per attachment	12 mos.	$ 60,000
6) Consultation	12 mos.	$ 24,000
7) Contingency	na	$ 20,000
Total		$ 415,000

ATTACHMENT A AND B

Attachment
A: RECOMMENDED SAFETY EQUIPMENT

QUANTITY	DESCRIPTION	UNIT PRICE	PRICE
25	Respirators	$ 300	$ 7,500
50	Cartridges	40	2,000
7	SCBA s	2,000	14,000
2	VOC Monitors (specified for methylene chloride):		
	- one digital monitor		5,000
	- one tubes monitor		3,000
12	Chemical protective suits	60	720
1	Sprinkler system (including diesel generator)		75,000
TOTAL			$108,000

B: TRAINING

1) Training visit for 10 working days to the USA for Plant Manager and a Safety Engineer (visit methylene chloride supplier, visit foam manufacturer).

Air tickets	$ 9,000
Hotels, Meals	$ 9,600
Training Feess	$ 7,500
Miscellaneous Expenses	$ 3,900
SUBTOTALS	$ 30,000

2) Medical screening $ 10,000

3) On-site training for emergency response (miscellaneous hardware) $ 20,000

TOTAL $ 60,000

ATTACHMENT C

ANNEX C

ATTACHMENT D

MANUFACTURING
& SUPPLYING EQUIPMENTS
4, ABD EL AZIZ St. - ABDINE - CAIRO
P.O.B. 2732 CAIRO TLX 20730 - 20731
TL. 3907309 FAX 3907309
3911771

سريم ميا - تصنيع وتوريد معدات
٤ ش عبد العزيز - عابدين - القاهرة
ص.ب ٢٧٣٢ القاهرة - تلكس ٢٠٧٣٠ - ٢٠٧٣١
تليفون ٣٩٠٧٣٠٩ - فاكس ٣٩٠٧٣٠٩
٣٩١١٧٧١

Our Ref. FAX 729258
Your Ref.

كتابنا رقم
كتابكم رقم

Cairo in 28/7/92 القاهرة في

HISR FOAM Co
32 H. HORAD STREET
GIZA- EGYPT

RE: VENTILATION SYSTEM
FOR FOAMING FACTORY

Dear Sirs,

REFERRING TO OUR OFFER OF YESTERDAY 27/7/92, AND AFTER DISCUSSION FOR THE SAFETY OF THE UNIT, WE HAVE THE PLEASURE TO OFFER YOU 2 CENTRIFUGA FANS OF 40000M³/HR EACH INSTEAD OF ONE OF 70000 M³/HR. IN THIS CASE PRICE WILL BE INCREASED FOR THE AMOUNT OF 17500,- US DOLLARS WITH THE SAME CONDITIONS.

HOPPING THAT OUR OFFER MEET YOUR SATISFY, WE REMAIN.

MIA Co
MOH. IBRAHIM.

شركة ميا
لتصنيع وتوريد المستلزمات

DOW

DOW MIDEAST AFRICA/EASTERN EUROPE

JOHNNY KHAMISSE
Commercial Manager
Thermoset Resins

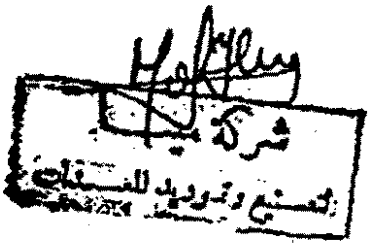
A Division of Dow Europe S.A.
Bachtobelstrasse 4
CH-8810 Horgen
Switzerland

Phone 01 - 728 21 11

Direct Phone 01 - 728 31 54
Fax 01 - 728 30 61
Telex 826 940

TECHNICAL SPECIFICATIONS FOR FANS

- NUMBER	2
. TYPE	VP - DOC CENTRIFUGAL DOUBLE INLET FAN BELT DRIVEN
. CAPACITY	40000 M^3/HR
PRESSURE	50 CE
CASING	GALVANIZED
SPEED	435 RPM
MOTOR CAPACITY	11 KW IP 54



ATTACHMENT E

M*IA FOR MANUFACTURING
& SUPPLYING EQUIPMENTS
4, ABD EL AZIZ St. - ABDINE - CAIRO
P.O.B. 2732 CAIRO TLX 20730 - 20731
TEL. 3907309 FAX 3907309
3911771

شركة ميا لتصنيع وتوريد المعدات
٤ ش عبد العزيز - عابدين - القاهرة
ص.ب ٢٧٣٢ القاهرة تلكس ٢٠٧٣٠ - ٢٠٧٣١
تليفون ٣٩٠٧٣٠٩ - فاكس ٣٩٠٧٣٠٩
٣٩١١٧٧١

Our Ref.
Your Ref.

كتابنا رقم
كتابكم رقم

Caire in 27/7/92 القاهرة في

HISR FOAM Co
32 H. MOURAD STREET
GIZA - EGYPT

RE: VENTILATION SYSTEM
FOR FOAMING FACTORY

FOR THE KIND ATTENTION OF MR USSAMA

DEAR SIRS,

FURTHER OUR TODAY MEETING TO OFFER YOU A NEW PROPOSAL FOR THE SUPPLY AND ERECTION AND START UP A VENTILATION SYSTEM TO EXHAUST THE CHEMICAL VAPOURS PRODUCED DURING REACTION OF FOAMING PROCESS, WE HAVE THE PLEASURE TO OFFER YOU OUR NEW OFFER BASED ON BUILT A TUNNEL ARROUND YOUR M/CHS

1) GIVEN DATA:

IT IS REQUEST TO VENTILATE AND EXAUST VAPOURS DURING PRODUCTION FOR ABOUT 1.5 TIMES EACH MINUTE, THROUG A TUNNEL BUILT ON THE M/CH.

LENGTH OF EXISTING TUNNEL	20 M.
LENGTH OF OVERALL THE M/CH	40 M.
HEIGHT OF THE M/CH	3.5 M.
HEIGHT OF THE SHEAR	5.0 M
WIDTH OF THE M/CH	4.0 M.
OF THE SHEAR	5 M.

2 DESIGN DATA:

- EXAUSTING SYSTEM IS DOING THROUG A DUCT SUSPENDED ON THE CEILLING OF THE TUNNEL
- A TUNNEL WITH GLASS PANNELS IS BUILT AROUND THE M/CN.
- A STRONG STRUCTURE MAINTAINS THESE PANNELS
- SOME PANNELS ARE SUPPLIED WITH LIGHT (FLUEORECENT REFLECTORS)
- 6 DOORS ARE SUPPLIED.
- EXAUSTING IS MADE WITH A BIG CENTRIFUGAL FAN OF 70000 M^3/HR.
- PANNECS / DUCTS ARE MADE OF GALVANIZED STEEL SHEETS OF 1.5 MM.
- SUFFICIENT STRUCTURE TO SUPPORT THE FAN, ARE MADE FROM STANDARD PROFILES.

3) DELIVERIES

- GALVANIZED STEEL PANNELS
- WINDOWS
- DOORS
- REFLECTORS
- FAN (CENTRIFUGAL) 70000 M^3/HR.
- STACKS
- DUCT
- STRUCTURE.
- ELECTRICAL CONTROL CABINET
- ERRECTION AND START UP

) PRICES:

TOTAL PRICE FOR ABOVE INSTALLATION 89148,- #

THIS PRICE INCLUDES: - ALL CUSTOM DUTIES
- TRANSPORT TO THE PLANT

A 10% FOR SALING TAXES MUST BE ADDED

5) PAYMENT CONDITIONS:

50% DOWN PAYMENT

25% ON DELIVERY

15% AFTER ERECTION

10% AFTER START UP.

6) DELIVERY.

3 MONTHS AFTER RECIEVING THE 50% DOWN PAYMEX

7) ORIGING:

. FANS ARE IMPORTED FROM AIRAP (FRANCE)

- ALL METAL WORKS ARE MADE IN OUR WORKSHOPS IN EGYPT.

8) GUARANTEE:

6 MONTHS AFTER START UP.

9) VALIDITY:

OUR OFFER IS VALID TILL 30/9/92

10) NOT INCLUDE IN OUR PRICES

- TRANSPORT AND HANDLING WHEN ERRECTION IN YOUR SI
- CIVIL WORKS
- SALING TAXES (10%)
- HOPPING THAT OUR OFFER MEET YOUR SATISFY.

We REMAIN.

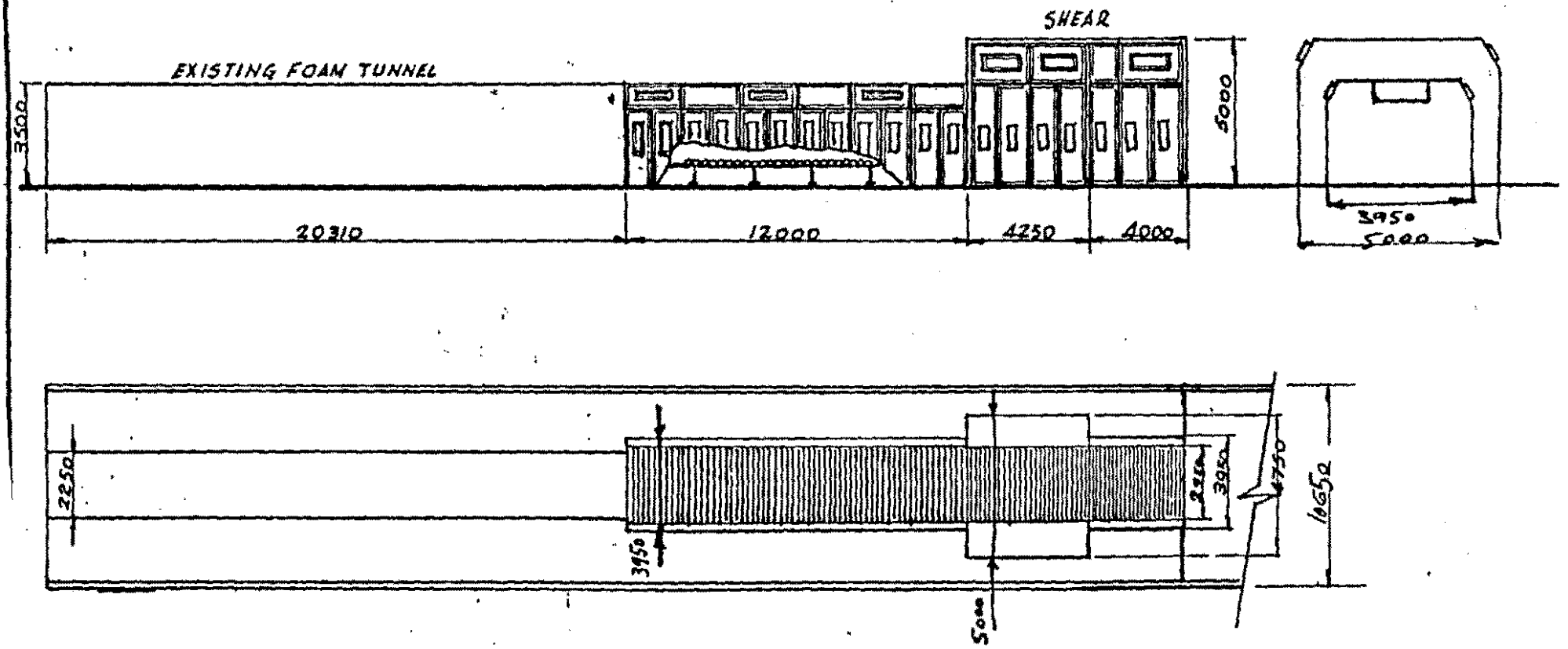
MIA CO

MOH. IBRAHIM

3/

TECHNICAL SPECIFICATIONS FOR FAN

- NUMBER	1
- TYPE	VP - Doc CENTRIFUGAL DOUBLE INLET FAN BELT DRIVEN
- CAPACITY	70000 M^3/HR
- PRESSURE	50 CE
- CASING	GALVAIZED
- SPEED	435 RPM
- MOTOR CAPACITY	18.5 KW
	IP 54


SHEAR
EXISTING FOAM TUNNEL
3500
5000
20310
12000
4250
4000
3950
5000
2250
3950
5000
16650

1. **Misr Foam cost for its measures to reduce the use of ozone depleting substances:**

1.1	Production loss	53.078	$
1.2	Air compressor	7,550	$
1.3	Foreign experts for technology tramsfere	8.000	$
1.4	Training program for Misr Foam factories manager for one month about up to date messures to reduce the use of ozone depleting substances	2.500	$
	Total Cost For Transfer to MC	63.578	$
	For Transfer expire	7,550	$

1.1 **Production Loss:**

1.1.1 From the first day of January to the end of March (about three months) technology transfere period. Misr foam produced about 600 tons of sponge (200 tons/month).

1.1.2 80% of the product is low density sponge i.e 480 tons.

1.1.3 About 10% of this product with defects i.e 48 tons. statistical survey showed that:

40% second grade sponge

58% Scrap sponge

2% Loss sponge

1.1.4 Prices of saecond grade 4.000 L.E. i.e 1208,4$/ton

1.1.5 prices of scrap 3000 L.E. i.e 906,3$/ton

1.1.6 Total price= 19.2 x 1208,4 + 27,48 x 906,3 = 48.432$

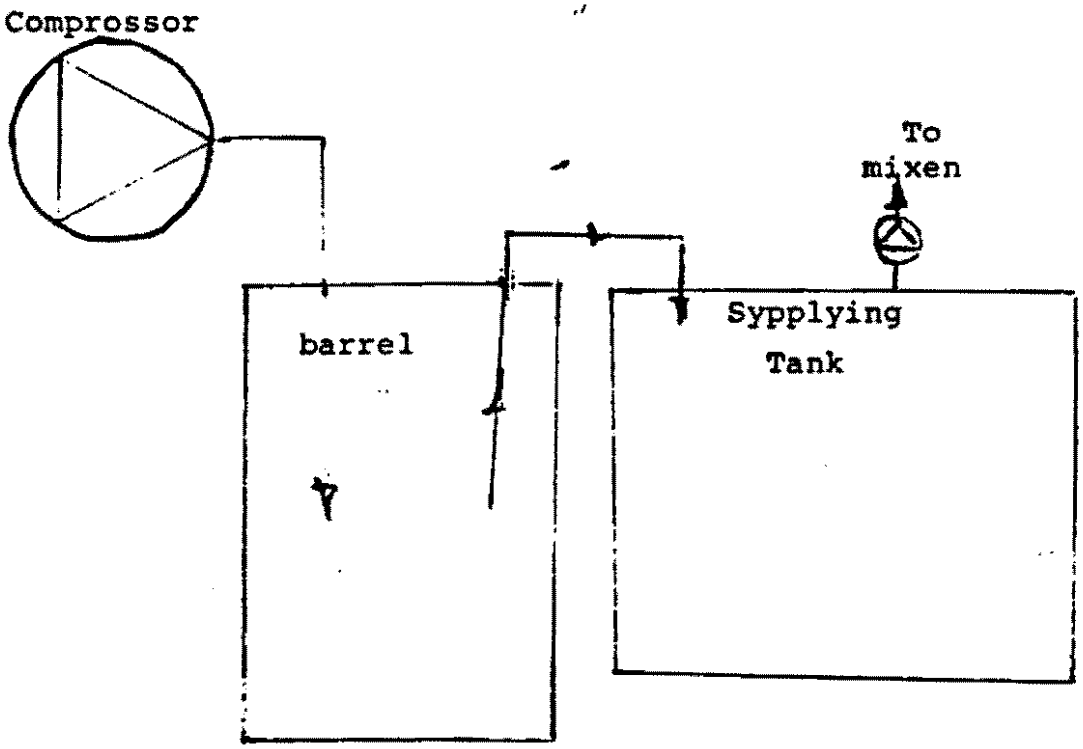
Original Cost= 48 x 2114.8 = 101.510$

first grade

Misr Foam cost = 101.510 - 48.432 = 53.078$

1.2 Air compressor:

. Misr Foam design a simple system for suitable handling of methylene chloride as shown below



Cost of Production of Sponge
Using CFC11 and Methylene Chloride

A- Raw Materials Summary:

Survey showed that:

- Misr Foam cost to produce 1 ton sponge density 16 kg/m3 using CFC11 = $ 2,086.8
- Misr Foam cost to produce 1 ton sponge density 16 kg/m3 using M.C. after conversion = $ 2,095.00
- Misr Foam Incremental Cost (loss) = 2095.0-2086.8 after conversion = $ 8.20/ton
- Misr Foam produces 200 tons sponge / months average 80% with low density i.e. 160 t/month in which methylene chloride be used.
- Extra cost after conversion for one year = 8.2 x 160 x 12 = $ 15,744/year.

At first the company expected some cost saving based on the lower price of mythylene chloride ($ 0.60/kg) compared to price of CFC11 ($ 1.06/kg). But after conversion, the Egyptian market showed that sponge with M.C. is softer and to meet the same specification using CFC11,it is necessary to increase the index number of T80 from 108 to 115 (i.e increase of amount of T80 from 392.69 kg/ton to 417.71 kg/ton). This is the main reason not only for increasing the cost when using M.C.

B- Production :

Statistical Survey showed that :

About 2.5 % extra second grade will be produced i.e. 4 tons / month.

- Price of second grade $ 1208.4/ton.
- Cost of second grade $ 2095.0/ton loss =(2095.0 -1208.4)x 4
  = 886.6 x 4
  = 3546.40/month

Misr Foam thinks that the formulator Engineer will gain the experience as with CFC11 within 2 years minimum.
i.e. loss = 3456.4 x 12 x 1
= $ 42,556/year.

Total loss/year due to difference in cost of raw material and experience loss = $ 42,556 + 15,244
= $ 58,300 (Say $ 60,000)

Basis of Calculation

A- Basic Formula for producing sponge using M.C. :

Polyol	100	kg
H20	5	kg
Silicon	1.3	kg
Stoct	0.3	kg
Amine	0.05	kg
M.C.	8.75	kg
T80	64.16	kg
	179.56	kg

*(-H20) = 174.56 kg
12% gas loss

Raw material use 174.56 x 0.88 = 153.6 kg product .
153.6 kg sponge comes from 100 kg polyol.
1000 kg sponge comes from an amount of polyol used in 1 ton = 651.04 kg and so on.

Raw Materials	Cost $/ton	Kg used to produce 1 ton sponge density 16kg/m3	$ Cost to produce 1 ton sponge density 16kg/m3
Polyol tons	1528.7	651.04	995.2
T 80 ton	2323.3	417.71	970.46
Amine kg	15.4	0.33	5.1
Silicon kg	8.2	8.46	69.37
Snoctoal kg	10.6	1.95	20.67
Methylene Chloride	0.6	56.97	34.2
Total			2095

1 cost for producing 1 ton sponge using methylene chloride $ 2095.

B- Basic Formula for Producing Sponge Using CFC11 :

Polyol	100 kg
H20	5 kg
Silicon	1.3 kg
Stioct	0.25kg
Amine	0.05kg
F11	12.5 kg
T 80	60.25kg
H20	174.35kg

12% Gas Loss.

Raw material use = 174.56 x 0.88 = 153.43kg amount of raw materials used for 1 ton calculated as explained before.

Raw Materials	Cost $/kg	kg used to produce 1 ton sponge density 16kg /m3	$ Cost to Produce 1 ton sponge density 16kg/m3
Polyol ton	1528.7	651.76	996.3
T80 ton	2323.3	392.69	912.3
Amine kg	15.4	0.33	5.08
Silicon kg	8.2	8.47	69.45
St.oct kg	10.6	1.63	17.28
CFC11	1.06	81.47	86.36
Total			$ 2086.77

The total cost for producing 1 ton sponge using CFC11 = $ 2086.77

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:	US $490,000
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.

* Distribution of Capital Ownership :

Taki	60 %	40 %

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**

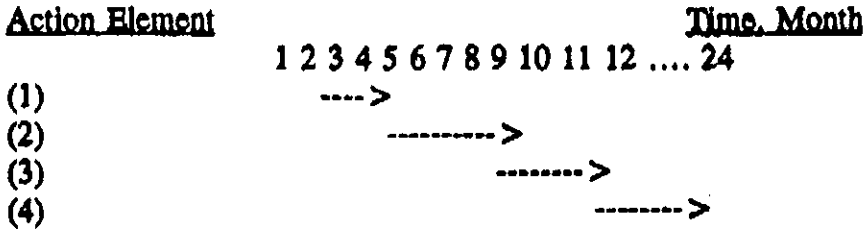
(a)

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.

SCHEDULE



ATTACHMENT A

FINANCIAL ANALYSIS — TAKI VITA

NOTE: FINANCIALS ARE IN $K U.S. / ODS IS IN THOUSANDS OF KG

YEAR	INVESTMENT	OPERATING COST	TOTAL OUTLAY	MLF $ OUT	ODS W/O PROJ	ODS W/PROJ	ODS SAVED
0	490	0	490	490	34	34	0
1		34	34	34	36.5	18.5	18
2		65	65	65	39	9	30
3		90	90	90	42	0	42
4		90	90	90	45	0	45
5		90	90	56	48	0	48
6		90	90		51	0	51
7		90	90		55	0	55
8		90	90		55	0	55
9		90	90		55	0	55
10		90	90		55	0	55
TOTALS	490	819	1309	825	515.5	81.5	454

MAX INCR COST
AT PROJ LIFE
OF 10 YR AT 10% — 971.44079

AT FULL PROJECT IMPLEMENTATION

INVESTMENT PAYOUT /YR — 79.745243
OPERATING COSTS — 90
TOTAL — 169.74524

CFCS SAVED/YR — 50

UNIT ABATEMENT COST — 3.3949049

END

PROJECT COVER SHEET

COUNTRY OR REGION:	Egypt
SECTOR COVERED:	Flexible & Rigid Foams
ODS CONSUMPTION IN AFFECTED SECTORS:	722 metric tonnes of CFCs in 1991
PROJECT TITLE:	Elimination of CFC-11 in the Manufacture of Molded Polyurethane Foams at Technopol
PROJECT DURATION:	24 months
PROJECT IMPACT: ODS REDUCTION	55 tonnes per year reduced CFC-11
PROPOSED BUDGET:	US $645,000 Project Cost $ 45,000 Ongoing Cost
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)

PROJECT SUMMARY

Technopol Egypt SAE, a private sector company, manufactures a range of molded polyurethane foam products. Main markets are the automotive industry (steering wheels, car seat cushions, bumpers, spoilers) and consumer products (office furniture, outdoor furniture). The production process currently uses CFC-11 as a blowing agent and/or a viscosity cutter. Under this project, Technopol will eliminate its CFC consumption by 95%. This goal will be achieved through the installation of new equipment, allowing for an immediate decrease of CFC use by 50%. Subsequent implementation of new technologies would allow for a further decrease at Technopol of up to 95%, based on current consumption patterns. Replacement of low pressure equipment and modification of equipment on order will phase out CFC's completely and prevent future use.

PROJECT OF THE GOVERNMENT OF EGYPT

REDUCTION OF CFC-11 IN THE MANUFACTURE OF MOLDED POLYURETHANE FOAMS

1. Sector Data

There are two basic types of foam plastics produced in Egypt: polyurethane foams for cushioning, insulation, and automotive applications and polystyrene foams for insulation and food packaging. CFCs continue to be used as the preferred agent by the manufacturers of these foams to

- decrease viscosities of reaction mixture
- decrease hardness of the foams
- act as a blowing agent
- reduce the temperature caused by the exothermic reaction.

The estimated CFC consumption in this sector in 1991 was 722 tonnes with a 15-20% annual growth. The Egyptian Government has submitted projects aimed at a substantial reduction of the use of CFCs. These projects, involving all main factories, would implement a 75% reduction in national consumption of ODSs in this sector.

2. Background

Technopol Egypt SAE, an Egyptian owned private sector company, manufactures a range of molded PUF products. Main markets are the automotive industry and specialty furniture. The company produces

- car bumpers
- spoilers
- automotive seat cushions
- steering wheels
- outdoor furniture
- office furniture.

Technopol is the only company in Egypt that employs the RIM (reaction injection molding) process for polyurethane. This is a highly sophisticated molding process allowing for the production of structurally superior products. In addition, the company produces self skinning (integral) semi-rigid and flexible molded foams.

Commercial expansion in this sector is concentrated on the production of foam cushions for passenger cars. The car industry in Egypt has recently been experiencing substantial expansion, through foreign auto manufacturers, such as Chrysler and Peugeot, who have signed agreements to produce in Egypt. This is expected to provide further opportunities for foam manufacturers, and other local producers.

The project is aimed at a virtual phaseout of CFCs in the current production. In addition, pending orders for equipment would be adapted to ozone-safe technologies. It is expected that the equipment changes to be made under this project will additionally allow a complete phaseout of CFCs as alternative technology is made commercially available.

3. Project Objectives

Short-term: To reduce the use of CFC 11 by 50% (22.5 tonnes/yr of CFC-11).

Long-term: To phase out the use of CFC 11 entirely and to prevent its future use (22.5 tonnes/yr of CFC-11).

4. Technology Discussion

Technopol currently employs the following equipment:

- One high-pressure metering unit, feeding four mixing heads
- One low-pressure metering unit, feeding one mixing head
- Three variable angle mold carriers (for RIM production)
- One carousel with 10-20 mold carriers (for all other production).

In addition, two low-pressure foaming units are on order.

Annual production is currently about 500 tonnes but will rise by ca 25% per year after the arrival of the new equipment. About 90% is currently manufactured through the high-pressure process. One of the raw material compounds for this process contains 15% CFC-11. The function of this chemical is to

- decrease the viscosity of the compound
- act as a blowing agent.

Additional CFC will be mixed in, depending on formulation requirements. The current total use of CFC-11 amounts to approximately 30 tonnes/yr and would increase to 45 tonnes/yr in 1994 if no phaseout measures were taken. Replacement of this equipment by a piston metering unit would allow for an immediate reduction in the use of CFC-11 by 50%. It would also allow the company to assess newly developed CFC-free technologies and to implement these if satisfactory performance is demonstrated. This would allow for a further reduction of 45%.

Elimination of the remaining 1.5 tons/yr would require the replacement of the second (low pressure) metering unit, extensive testing and prototyping. However, this is also the area where Technopol growth is concentrated and where the two units on order will be employed. Without addressing this area, the remaining CFC-11 use is estimated to grow quickly to about 16.5 tonnes in 1994.

Proactive action would require both the replacement of the current low pressure metering unit by a high pressure one and a modification of the two models on order to meet the existing equipment requirements.

Technopol does not currently have in-house testing facilities. These are required to monitor the changes in properties resulting from the reduction and phaseout of the use of CFC-11, and have to be calculated into the overall project.

5. Project Activities

The project would proceed in the following phases:

PHASE	ACTION	TIME
I	Reduction of CFCs by 50%	
	a) Installation of a piston metering unit	9 mos.
	b) Installation of testing facilities	6-9 mos.
II	Reduction of CFCs by additional 45%	
	a) Assessment of new CFC-free technologies	18 mos.
	b) Implementation in current products	24 mos.
III	Phaseout of residual CFC and planning to avoid future applications	
	a) Respecification for the pending order for two metering units	1 mos.
	b) Replacement of low pressure metering unit	3 mos.
	c) Assessment of new technologies	18 mos.
	d) Implementation in new products	24 mos.

6. Cost Effectiveness - (see Attachment A)

Based on expected scarcity and increasing prices for CFC 11, these costs should be sustainably competitive. In addition, it should be noted that the project will prevent the use of substantial amounts of CFC's in future applications.

7. Project Timeframe and Budget

Details of the key project steps, which are amplifications of the above mentioned actions, and their timing, are shown below.

PHASE	ACTION	TIME FOR COMPLETION	ONE-TIME COSTS
I	(a)	9 mos.	$355,000 *
	(b)	6-9 mos.	50,000
II	(a)	18 mos.	-----
	(b)	24 mos.	-----
	(c)	1 mos.	240,000 **
	(d)	3 mos.	
	(e)	18 mos.	
	(f)	24 mos.	
I - II			$645,000

*

One piston metering unit	$300,000
Freight, installation	10,000
Training	20,000
One chiller	25,000
TOTAL	$355,000

**

One high pressure metering unit	DM 150,000
Freight, installation	DM 10,000
Incremental costs to convert the order of two low pressure metering units into high pressure	DM 200,000
TOTAL	DM 360,000 = $240,000

ATTACHMENT A

FINANCIAL ANALYSIS — TECHNOPOL

NOTE: FINANCIAL ARE IN $K U.S. / ODS IS IN THOUSANDS OF KG

YEAR	INVESTMENT	OPERATING COST	TOTAL OUTLAY	IMLF $ OUT	ODS W/O PROJ	ODS W/PROJ	SAVED ODS
0	405	0	405	405	30	30	0
1		28	28	28	37.5	22.5	15
2	240	28	268	268	46.8	5	41.8
3		45	45	45	55	5	50
4		45	45	45	55	0	55
5		45	45	17	55	0	55
6		45	45	17	55	0	55
7		45	45		55	0	55
8		45	45		55	0	55
9		45	45		55	0	55
10		45	45		55	0	55
TOTALS	645	416	1061	825	554.3	62.5	491.8

MAX INCR COST
AT PROJ LIFE 850.34849
OF 10 YR AT 10%

AT FULL PROJECT IMPLEMENTATION

INVESTMENT PAYOUT /YR		104.97078
OPERATING COSTS		45
	TOTAL	149.97078
CFCS SAVED/YR		55
UNIT ABATEMENT COST		2.7267414

TECHNOCOM
Mahmoud M. Hassan

تكنوكوم
محمود محمد حسن

Facsimile Cover Sheet

cc FP

To: Mr. Clinton J. Norris
Company: The Norris Group
Phone:
Fax: (212) 906-5385

From: M. Hassan
Company: Technocom
Phone:
Fax:

Date: 08/07/92
Pages including this cover page: 9

Comments:

Dear Clint,

I am enclosing the Kiriazi project as agreed and would be grateful for any help you and Frank Pinto may be able to provide. A copy of this report has been faxed to Bert Veenendaal and we will submit the original to the EEAA. This, however, will only take place after August 15, which I hope will not be too late.

Kind regards

Mahmoud

١٤ شارع جزيرة العرب ـ المهندسين ـ القاهرة ـ مصر ت: ٣٤٥٠٦٣٤ تلكس: ٢٢٤٠٩ فاكس: ٣٤٤٧٧٨٢ (٠٠٢)
14 Gezirat El Arab Street Mohandessin _ Cairo _ Egypt Tel: 3450634 Telex: 22409 Fax: (002) 3442782

KIRIAZI
REFRIGERATORS MANUFACTURING Co.
S.A.E.

شركة إنتاج الثلاجات المنزلية
كيريازي
ش.م.م.

Kiriazi Refrigerators Manufacturing Co.,
10th Ramadan City
Area B2 - Egypt.

Country or Region: EGYPT.

Calculated ODS Consuption: CFC-11

for insulation of refrigerators of average insulation 6 Kg per unit

annual production is 150,000 Refrigerator unit and 70,000 unit of deep freezer

total amount of CFC 11: 220,000 unit X 6 Kg of insulation/ unit X %15 CFC-11/Kg of insulation = 198,000 Kg per year

for charging cooling cycle of CFC - 12

total amount of CFC 12: 220,000 unit X 0.2 app. Kg
= 5000 Kg for maintenance
= 60000 Kg per year

Projects title:

1- Recovery and recycling of CFC-12 from house hold refrigerators and freezers.

2- Tooling and machines required for the option to reduce or eleminate CFC in insulation foam.

3- Substitution of CFC-12 by HFC-134a in house hold Refrigerators and Freezers.

4- Recovery and recycling of HFC - 134a in house hold Refrigerators and Freezers.

Projects Duration : 7 years

Sector covered : house hold Refrigerators and freezers.

Projected ODS Phase-out from Project:

1- 198000 Kgs of CFC-11

2- 55000 Kgs of CFC -12

Proposed Budget : 18,245,000 U.S.D.

National Coordinating Agency:

E.E.A.A. - working group.

As per following projects summary:

Kiriazi

10th of Ramadan City - Area B_2
Isr & Sudan St., Lots (4 & 5) M
Tel: (015) 360653-360635 364736
P.O. BOX 90 - C.R. 52764
TLX: 23776 KRZI UN - FAX 364200

العاشر من رمضان - المنطقة الصناعية B_2
شارع مصر والسودان - قطعة (٤ ، ٥) M
ت : ٣٦٠٦٥٣ - ٣٦٠٦٣٥ (٠١٥) ٣٦٤٧٣٦
ص . ب : ٩٠ العاشر
تلكس : ٢٣٧٧٦ - فاكس : ٣٦٤٢٠٠

KIRIAZI REFRIGERATORS MANUFACTURING CO.

PROJECT 1

Recovery/ recycle of CFC-12 from house hold refrigerators and freezers

Recovery and recycling appears to be the least costing way at present of reducing ODS emissions in the short run and it is generally accepted in the refrigerator service industry, in spite of first think of project financing would not be fairly justified.

This project objects to recovery and recycling plus recharging of CFC 12 on maintenance of house hold refrigerators and freezers. Recycling machines with a higher degree of automation tends to lower the risk of service technician error.

In general the main safety risk posed by recycling machines is the potential overfilling of CFC tanks. Safe filling levels are determined by weight. fully automatic systems reduce the risk of over filling by controlled tank levels.

The project consists of the following components:

	Component description	NO.Req.	budget U.S.D.
a.	Recovery only machines to be used on service trucks it weighs approx. 18 kg which are 12 machines	12	20,000
b.	Recovery/recycling machines to be used at the central service shop	1	8,000
c.	Soft ware computer program for the IBM Computer for tracking the effectiveness and efficiency of the project machinary.	1	17,000
c.	Technical assistance for training Maintenance technicians at the central service shop to operate the recovery and recycling machine and all the service truck technicians. Training will be provided by an engineer from the selected company with support materials provided by the manufacturer of the recycle machines.		50,000
	TOTAL BUDGET .....U.S.D.		95,000#

Kiriazi Kiriazi

كريازى

KIRIAZI REFRIGERATORS MANUFACTURING CO.,

ROJECT 2

Reducing or eliminating CFC-11 in insulation foam.

Foam used for insulation of refrigerators, on which all tests and design are made consists of 12% of CFC 11. For changing to another insulation foam different in its composition due to the elemination or reduction of CFC 11 will be different also in coefficient of insulation, and harder in viscosity necessated to substitute the following machines and components.

	Component description	No.Req.	budget U.S.D.
a.	High pressure insulation injection machines complete with all accessories one for refrigerator cabinet and the other for the freezer cabinet.	2	400,000
b.	High pressure insulation injection machines complete with all accessories one for refrigerator doors and the other for freezer doors.	2	300,000
c.	Instruments for measuring and testing the insulated parts.	set	50,000
	New injection moulds for refrigerator cabinets which are 5 moulds for every type of the 3 types produced by kiriazi company.	15	3,000,000
	New injection moulds for freezer cabinets which are 2 moulds for every type of the 3 types produced by Kiriazi company	6	1,200,000
f.	New injection moulds for refrigerator doors which are 5 set of moulds for double doors regulatable for the 3 types of refrigerators.	5	750,000
g.	New inject moulds for freezer doors which are 5 moulds regulatable for the 8 types of freezers.	5	500,000
h.	New vacuum forming moulds for the two type of refrigerators use the polethylene formed cabinet.	2	600,000
	New vacuum forming mould for the 3 type of refrigerator doors used.	2	320,000
	New moulds for the presssimbly line with the new internal dimension of cabinet.	set	80,000

TOTAL Budget U.S.D.....7,200,000

KIRIAZI REFRIGERATORS MANUFACTURING CO.,

PROJECT 3

Substitution of CFC-12byHFC-134A in house hold refrigerators

As Kiriazi Companys refrigeratore manufarturing plant has been excauted with the principal of using CFC-12 in it's products
All know how with primary refrigeratore tests has been made by Italian Company (Zerowatt) in Italy.

Redesign of refrigerators and chest freezers with the substitution of CFC-12 by HFC-134a, which comprised developement test facility that will accelerate the introduction of substitute refrigerats in the products. The facility would be needed to provide baseline performance teste of current(CFC-12) models as well as prototypes of alternate models to ensure that performance standards are maintained with the substituted refrigerants.

The proposed design changes should not be executed until their impact on the Refrigerator or freezer performance has been confirmed through testing in a controlled ambient test cell confirming to the International Standards Organization (ISO) requirments.
for substituting the CFC 12 by HFC-134a in production, it necrates the following machines and components to be changed

	Component description	No.Req.	Budget U.S.D
a.	Charging machanes for HCF-134a	3	150,000
b.	Charging pump from tanks to charging machine.	2	24,000
c.	Vaccum pumps in production line and maintenance	36	360,000
d.	Controlled ambient test cell with 4 tested refrigerators and freezers	1	320,000
e.	Technical assistance for training for use of test cell		60,000
f.	Increase in prices due to change of coolant in refrigerators and freezers in period of 4 years.	880,000	10,000,000
	TOTAL Budget U.S.D.....		10.914,000#

Kiriazi Kiriazi

كيرياتى

KIRIAZI REFRIGERATORS MANUFACTURING CO.

PROJECT 4

Recovery and recycling of HFC-134a from house hold refrigerators and freezers:

The new relativly expensive coolant have to be treated in similar way as the substituted of refrigerant (CFC-12) specially all maintenance and production technicians will be well trained to use similar equipment for recovery and recycling of CFC-12.

Similar project options and similar project components as that used for CFC-12 will be applied for the new refrigerant HFC-134a.

The project consists of the following components:

Component description	No.REq.	budget U.S.D.
a. Recovery only machines to be used on service trucks it weighs approx. 18 Kg which are 12 machines	12	24,000
b. Recovery/recycling machines to be used at the central service shop.	1	10,000

TOTAL Budget. U.S.D............ 34,000$

Kiriazi Kiriazi

قريازي

KIRIAZI REFRIGERATORS MANUFACTURING CO.

TABLE SHOWING THE INDICATIVE IMPLEMENTATION SCHEDULE OF THE VARIOUS PHASES OF THE PROJECT

	DESCRIPTION	TOTAL BUDGET U.S.D.	1st PHASE Sept.92-Mar.93	2nd PHASE Abr.93-Dec.93	3rd PHASE Jan.94-Sept.94
*	Project 1: Recovery/recycle of CFC-12 from house hold refrigerators and freezers:				
1-a.	Recovery only machines to be used on service trucks it weighs approx. 18 Kg which are 12 machines	20,000	20,000		
1-b.	Recovery/recycling machines to be used at the central service shop	8,000	8,000		
1-c.	Soft ware computer program for the IBM Computer for tracking the effectiveness and efficiency of the project machinary.	17,000	17,000		
1-d.	Technical assistance for training maintenance technicians at the central service shop to operate the recovery and recycling machine and all the service truck technicians. Training will be provided by an engineer from the selected company with support materials provided by the manufacturer of the recycle machines	50,000	50,000		
*	Project 2: Reducing or eleminating CFC 11 in insulation foam.				
2-a.	High pressure insulation injection machines complete with all accessories one for refrigerator cabinet and the other for the freezer cabinet.	400,000	400,000		
2-b.	High pressure insulation injection machines complete with all accessories one for refrigerator doors and the other for freezer doors	300,000	300,000		
2-c.	Instruments for measuring and testing the insulated parts.	50,000	50,000		
	GR. TOTAL U.S.D..	845,000	845,000		

`COM

تكنـــوكـــوم

محمود حسن

acsimile Cover Sheet

cc FP

To: Mr. Clinton J. Norris
Company: The Norris Group
Phone:
Fax: (212) 906-5385

From: M. Hassan
Company: Technocom
Phone:
Fax:

Date: 08/07/92
Pages including this cover page: 9

Comments:

Dear Clint,

I am enclosing the Kiriazi project as agreed and would be grateful for any help you and Frank Pinto may be able to provide. A copy of this report has been faxed to Bert Veenendaal and we will submit the original to the EEAA. This, however, will only take place after August 15, which I hope will not be too late.

Kind regards

Hahmoud

١٤ شارع جزيرة العرب ـ المهندسين ـ القاهرة ـ مصر ت: ٣٤٥٠٦٣٤ تلكس: ٢٢٤٠٩ ناكس: ٣٤٤٢٧٨٢ (٢٠٢)
34 Gezirat El Arab Street Mohandessin _ Cairo _ Egypt Tel.: 3450634 Telex: 22409 Fax: (202) 3442782

PROJECT OF THE GOVERNMENT OF EGYPT

. . . . . PHASING OUT CFCS IN REFRIGERATION SYSTEMS AT KOLDAIR

1. Sector Data

In 1991 an estimated 775 tons of CFC-12 were consumed in the manufacture and maintenance of refrigeration systems nationwide. Koldair utilizes 18 tons per year of CFC-12 which amount to 2.3% of the country total use of CFCs for this sector.

2. Background

Koldair was founded in 1946. It's the oldest company working in the field of air conditioning, refrigeration, ventilation, and humidification in Egypt. It has three plants; one produces air conditioning units of different types and sizes; the second plant produces drinking water coolers, display cabinets, and washing machines. The third plant produces standardized and specialized equipment to meet customer specifications such as cooling towers, a/c plants, walk-in cold storage, ventilation, and humidification of textile industries. This section is specialized in the design, building, commissioning, and maintaining contract jobs. All Koldair products are of their own design and they have the facilities for producing their own proprietary jigs and fixtures in a specialized shop, including prototyping.

Production and sales have been growing steadily up to the recent economic recession in Egypt and have since been depressed for the past two -three years, and are now beginning to show a recovery. Anticipated growth for next year will be approximately 15%.

For the past three years, all new products were designed to use replacement technologies, e.g.-milk coolers, 40 GPH water coolers, packaged chillers were designed to use HCFC-22.

This project will address existing products in the installed equipment base, it will replace all existing CFC-12 products with either HCFC-22 or HFC-134a, furthermore, the project will address the replacement of CFC-12 in the installed after market base.

3 Project Objectives.

Short-term: To eliminate the use of all remaining CFC-12 in Koldair factories in 1993.

Long-term: To use the maintenance program, including the use of recycling technology, to phaseout the use of CFC 12 in the installed water cooler after market.

4 Technology Discussion

Koldair currently uses HCFC-22 in their air conditioning product manufacturing units, and in their newer, larger sizes of water coolers. Existing 17gph and 9gph watercoolers use CFC 12.

The intent of this project is to convert manufacturing completely to CFC alternative technology for the manufacture of watercoolers. The 17 gph water cooler will be redesigned to use the smallest available HCFC 22 compressor, and its evaporator, capillary tube, condenser, condenser fan and motor will be redesigned to suit the new capacity of the selected compressor.

The 9 gph water cooler will be redesigned to use HFC 134A, and its system components will also be redesigned to suit the new material and compressor. Associated manufacturing support equipment, e.g.-charging unit, leak detector, and other test equipment, will also be installed to accomodate the new process.

This new capability, combined with the availability of alternative compressor and support equipment, will allow Koldair to initiate a maintenance program that introduces the alternatives to the installed aftermarket. The installation of CFC 12 recovery and recycle equipment under this project will also allow additional CFC reductions in both the manufacturing and the maintenance operations.

Koldair services a large base of centrifugal chillers containing CFC-11. Their plan is to develop conversion options for customers to initiate those conversions at the rate of about 10-15 chillers per year. Chiller conversions can be costly but Koldair and the Egytian Government feel that this is an important project.

5. Project Activities

ACTION	TIMING
DEFINITION OF EQUIPMENT NEEDED	UNDERWAY
DESIGN	COMPLETE
COMPLETE DRAWINGS	2 MONTHS
TENDER OFFER AND SELECTION OF SUPPLIER	2 MONTHS
RECEIVE SAMPLES AND MANUFACTURE PROTOTYPE	4 MONTHS
TEST PROTOTYPE AND MAKE NECESSARY ADJUSTMENTS	5 MONTHS
COMPLETE FINAL DRAWINGS AND DESIGN NECESSARY DIES, JIGS AND FIXTURES	7 MONTHS
MANUFACTURE TOOLS, JIGS AND FIXTURES.	9 MONTHS

	9 MONTHS
PLACE ORDERS, OPEN L/C'S AND RECEIVE IMPORTED COMPONENTS	
START PILOT RUNS	10 MONTHS
CHANGE PLANT MANUFACTURING PROCESSES TO PRODUCE CFC FREE WATER COOLERS	12 MONTHS

6 Project Budget

In the REFRIGERATION SECTOR, the CFC's are generally tightly contained, the amount emitted is generally small, and the CFC alternative replacement cost per kilogram is normally high. However,the Government of Egypt recognizes an urgent need to pursue replacement technology in this major sector in order to successfully phase out of CFC's. Koldair and the Government feel this is an important project, and for that reason, are willing to absorb a great deal of the incremental costs, and pass through another significant portion to the customer, as shown in the table below.

Attachment A gives details of the total project on-going cost break-down. In addition to the cost shown in Attachment A, the water cooler maintenance programme, expected to cost $880,000 per year, will be borne by the customers as they are converting to CFC-free water coolers.

INVESTMENT TOTAL	$272,200
DESIGN, PROTOTYPE, TEST	14,000
DIES, JIGS, FIXTURES	19,200
CHARGING EQUIPMENT	60,000
R-134A LEAK DETECTORS	13,000
RECYCLE/RECOVER STATION	145,000
TRAINING	21,000

ONGOING COSTS BREAKDOWN

PROJECT ELEMENT		AVERAGE COST/YR
1)	Water coolers	
	Total cost	$597,000
	Multilateral Fund	$387,000
	Difference	$210,000

Difference to be paid by customers and Government/Koldair as follows:

Government/Koldair portion	$140,000
Customer portion	$ 70,000

2) Package centrifugal chillers $1,450,000

All costs will be borne by Koldair and customers.

3) Water cooler maintenance $880,000

All costs will be borne by customers as they convert to CFC-free water coolers.

7. Cost Effectiveness estimate - (see Attachment B)

ATTACHMENT A

FINANCIAL ANALYSIS- KOLDAIR

MP PORTION

NOTE: FINANCIALS ARE IN $K U.S. / ODS IS IN THOUSANDS OF KG

YEAR	INVESTMENT	OPERATING COST	TOTAL OUTLAY	IMLF $ OUT	ODS W/O PROJ	ODS	SAVED ODS
0	272.2	387	659.2	659.2	18	0	18
1		387	387	387	18	0	18
2		387	387	387	18	0	18
3		387	387	387	18	0	18
4		387	387		18	0	18
5		387	387		18	0	18
6		387	387		18	0	18
7		387	387		18	0	18
8		387	387		18	0	18
9		387	387		18	0	18
10		387	387		18	0	18
TOTALS	272.2	4257	4529.2	1820.2	198	0	198

MAX INCR COST
AT PROJ LIFE 3037.1475
OF 10 YR AT 10%

AT FULL PROJECT IMPLEMENTATION

INVESTMENT PAYOUT /YR	44.299296
OPERATING COSTS	387
TOTAL	431.2993
CFCS SAVED/YR	18
UNIT ABATEMENT COST	23.961072

ATTACHMENT B

aeon service

26, avenue du Petit Parc
94683 Vincennes Cedex
Tél. : (1) 43.98.75.00 + SDA
Télex : 262959 Gazfroi
Télécopie : (1) 43.98.21.51

KOLDAIR
Giza
P.O. Box 431 Cairo
ARAB REPUBLIC OF EGYPT

Paris, 24/03/92

Attn : Mr ALY FAHMY EL-SAWAH

Dear Mr SAWAH,

As we had planned during your visit of the Bry sur Marne factory, we send you a project for the development of the recovery and recycling of CFCs.

Based upon our own experience in France and Europe, we have aimed at gathering in this project the necessary elements for a national action of recovery and recycling of CFCs.

You will read that this scheme both :

- sets up the necessary facilities to recover and recycle

- creates the local expertise on recovery and recycling through training.

We hope this project will meet your requirements and remain at your disposition for any further information.

Yours faithfully,

Claude BRIAN

European Development Manager

BUDGET FOR A NATIONAL SCHEME (exclusive of tax)

1. OFF-SITE RECYCLING STATION :

Setting of a recycling station with a storage capacity of 800 liters (see Appendix 1) including transportation Cost and Freight

620.000 F.F.

This includes the commissioning of the station and the training of the operators by our engineer.

2. RECOVERY MATERIALS :

As we have iniated in France the tests on the performance of recovery materials as described in the AFNOR standard E 35-421 (see Appendix 2), we recommend the use of open-compressor stations which have the advantages of recovering both liquid and gaz with a high flow rate, and of not being endangered by the acid that can exist in recovered refrigerant.

Three recovery materials : 105 000 F F

3. TRAINING :

A training session will be necessary in order to create local expertise on recovery.

This session will include a theoritical approach of recovery and the implementation of recovery on refrigeration and air conditioning systems with the three recovery materials. (see Appendix 3)

Three-day session :

Travel expenses : 10 000 F F

Engineer's cost per day 3 000 F F

One day of the first training session will be offered by our firm.

dehon service

26, avenue du Petit Parc
94683 Vincennes Cedex
Tél. : (1) 43.98.75.00 + SDA
Télex : 262959 Gozfroi
Télécopie : (1) 43.98.21.51

APPENDIX 1

RECLAMATION OF CFCs : A KNOW-HOW

The distributors of CFCs have had to cope with the ecological requirements and consequently set up a system of collection and reclamation of used CFCs.

These products must not be wasted but reprocessed to the specifications of a brand-new product. Indeed only this reclaimed product will be available to maintain the existing installations after the European production stops in june 1997.

Therefore COGAL, the engineering company of the Dehon group - leader of the distribution of refrigerants in Europe - has designed a reclamation unit based on a several years experience in this field.

This type of unit has been installed for a few months in the various filling centers of the Dehon Group in France, Belgium, Switzerland and Spain.
Each reclamation unit is made of a distillation group and a storage and mixing capacity.

The distillation system sucks out the polluted product from the recovery cylinders, under the condition that it is not a mixture which cannot be reprocessed. Then the product is separated from the oil in a distillation tank. Eventually the refrigerant is deshydrated, desodorised and filtered.

Each station, dedicated to one type of refrigerant (R 12, R 22, R 502) reclaims the product which is then analysed in our laboratory in order to check systematically that the specifications of the product meet those required by the producer.
So the product distributed always meets the original quality specifications, either it comes directly from the production plant or it is reclaimed. This is the only way to garantee to the Refrigeration and AC professionals that no impurity will pollute their installations through the refrigerant.

Lately Dehon started a station especially designed for the reclamation of
R 134a, a refrigerant which must be taken care of considering its great sensibility to contaminants such as humidity and chloride ions.

1. COMPRESSEUR AVEC SON EQUIPEMENT

- Compresseur corken de deux étages,
- Vanne acier,
- Vanne pneumatique,
- Electro-vannes,
- Clapet,
- Détendeur,
- Manomètre,
- Soupapes 1/4,
- Filtre,
- Purgeurs,
- Flexible + abouts, coudes, manchons, tubes,
- Etriers, brides, raccords,
- Coffret électrique, air comprimé,
- Soudure, divers.

2. STOCKAGE : RESERVOIR DE 800 LITRES

Stockage du produit à traiter.

Equipement :

- Brides, coudes, tubes, procédés,
- Vannes, soupapes,
- Serpentin à l'intérieur du réservoir,
- Divers.

3. FILTRATION

FILTRES TYPE CARLY

- Particules,
- Humidité,
- Acidité,
- Avec cartouches.

EQUIPEMENT

- Vannes 4 voies,
- Vannes acier,
- Vannes 3 voies,
- Clapet,
- Voyants,
- Soupapes 1/4",
- Manomètres,
- Brides, joints, boulons, tubes, raccords,
- Divers.

Recharge :

3 cartouches par éléments.

Prix : 773,00
(particules, humidité, acidité).

4. STATION DE RECUPERATION

- Châssis,
- Fer U,
- Fer carré,
- Cornière,
- Fer I

5. ENSEMBLE DE TUYAUTERIE PEINTURE

Echangeur avec équipement.

Récupération de frigories pour refroidir la sortie du compresseur.

Electricité.

Peinture de la station.

6. STOCKAGE AVEC POMPE DE REPRISE

Récupération de produits finis

- Stockage de 4 m3,
- Pompe de reprise,
- Niveau Kubler,
- Filtres,
- Soupapes,
- Vannes, tubes, brides, raccords,
- Châssis,
- Electricité,
- Divers.

Translated extract of a paper for AICVF (december 1991)

RECOVERY : TECHNICAL ASPECTS

"At the very beginning, the operation of recovery did not seem to be of any difficulty. And indeed, technicians used to consider it as the exact contrary of charging a system, and as easy.

It is only these last months that this point of view was reconsidered and this for two reasons :

- some recovery stations were tested under established laboratory conditions and proved different results than expected,

- it appeared that most of the recovered product came from large volume systems, and not from commercial ones for instance, where the global volume is huge (see figure 1).

2.1 The tests implemented :

As the need for recovery stations developed, but no established way of comparing their performances existed, a group of experts from AFNOR (French Standardisation Association) decided to write a standard and to implement it by testing the existing material on the market.

These tests are not yet completed and I shall not detail them as the AFNOR standard should be soon released but I can still give you some of the first results found by the Laboratoire d'Energétique de l'Ecole des Mines which is in charge of the project under the responsability of Mr. CLODIC.

2.1.1 Efficiency

The first type of measure is the efficiency of the station, which combines two aspects in the case of recovery :

- the liquid and/or vapor flow rate that indicate(s) with which speed the technician can expext to transfer the fluid out of a system into a cylinder

- the percentage of the refrigerant mass which is actually transfered into the cylinder.

These two notions once gathered give the possibility to compare, for different stations, which mass of refrigerant is recovered, and how fast, which is exactly what technicians require to know in order to choose a material.

To perform these tests, it is obvious that one must know which mass of refrigerant was present in the system to be able to compare what was left in the installation with what was recovered in order :
- to know exactly what was left in the system,
-to measure the mass kept inside the transfer station itself.

From the first tests implemented , two results where significant :

- one is the difference between the flow rates measured and the ones indicated,
- also interesting is the measure of the mass of refrigerant kept in the system itself : it can reach 100 % of the mass of the system if it is a small one (domestic refrigeration or air conditioning for instance) !

For a 3000 g initial mass, the results were as follows :

- recovered quantities : 64 % to 72%

- quantities remaining in the station: 9 % to 13 %

- quantities remaining in the system: 27 % to 15 %

These results do show that the efficiency of a transfer station depends very much on the size of the installation to empty.

2.1.2 Transfer of contamination :

The second serie of tests implemented concerns the transfer of contaminants through the inside system of the transfer station.

It has to be closely studied as one of the requirements to recover properly refrigerants and it appears so far that the systems tested do transfer some contamination, which seems normal as these transfer stations were in fact refrigeration systems fit to recover, which consequently inherit the contaminants from the original system.

It remains to test other transfer stations, based on quite different technics, to evaluate if theit performances are more interesting :

- liquid refrigerant pumps,
- pneumatic pumps that can extract liquid or vapor phases,
-thermic devices that heat the system to empty or freeze the recovery cylinder."

TRAINING SESSION PROGRAM ON RECOVERY

Three day program

The session is based both on theory and practice.

It aims at giving the principles of thermodynamics apllied in the operation of recovery in such a way that the trainees will be able of recovering all types of CFCs (according to their pressure rate) from any type of refrigeration and air conditioning systems (size, type of compressor).

It will cover :

1. HOW TO RECOVER:

1-1. The necessary materials involved in the recovery of CFCs (cylinders, tools)

1-2. Analysis of the recovery material

1-3. Analysis of the performances of the recovery material (flow rates, transfer of contaminants, loss of refrigerant)

2. PHYSICAL PRINCIPLES AND EXPERTISE

2-1 Thermodynamical bases

2-2 Behaviour of the oil/refrigerant mixture

2-3 Vacuum technics

3. THE PRACTICE

3-1 Implementation of the tests on the performances

3-2 Recovery on different types of systems representing the installations on the market. (Refrigerator, display cabinet, car, chiller).

PROJECT COVER SHEET

COUNTRY OR REGION:	EGYPT
SECTOR COVERED:	Primary Sector: Foam
ODS CONSUMPTION IN AFFECTED SECTORS	722 metric tonnes of CFCs used to make foams in 1991
PROJECT TITLE:	Elimination of CFC-12 in Foam Manufacturing at Al Sharif Plastic Factories
PROJECT DURATION:	One year from funding availability
PROJECT IMPACT: ODS REDUCTION	75 tonnes per year reduced CFC-12
PROPOSED BUDGET:	US $1.725 million
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)

PROJECT SUMMARY

Egypt has developed a national programme for the phase out of ozone-depleting substances. Two key sectors are CFC foam manufacturing and refrigeration. Al-Sharif Plastic Factories, a private sector company, is a large consumer of CFC-12 in the manufacture of polystyrene foam sheet. Under this project, the Company will phase out CFC-12 in the manufacture of this foam, using hydrocarbon technology with appropriate safety measures.

PROJECT OF THE GOVERNMENT OF EGYPT

ELIMINATION OF CFCS IN FOAM MANUFACTURING

1. Sector Data

Two major types of foams used in Egypt are polyurethane for insulation, cushioning, packaging and automotive applications; and polystyrene foam for insulation and food packaging. In 1991, an estimated 722 metric tonnes of CFCs were used for foam manufacture. This project will eliminate the use of 75 tonnes per year of CFC-12 by replacing the CFC as a blowing agent with acceptable substitutes and process modifications to insure that foam quality and process safety are maintained.

2. Background

A major use of CFCs in Egypt is the manufacture of foamed plastics. The Government of Egypt, in its country programme for the phaseout of ozone-depleting substances, includes the reduction and recovery of CFC's from foam manufacture as a key element in its action strategy.

Al Sharif is the largest plastics manufacturer in Egypt. Begun in 1958 as an industrial supplier, Al Sharif thirty years later is a conglomerate of 52 companies (19 are joint stock companies) worth an estimated $2 billion L.E. Its various business opertions include the following: investments; trade; housing and development; agriculture, reclamation,and land management; public service (25% of company profits are invested in hospitals, schools, and other social services); and industries such as plastics manufacturing, building and construction materials, and foodstuffs and chemical products.

Al Sharif currently consumes 75 tonnes/yr of CFC-12 in the manufacture of extruded polystyrene and polyethylene foam sheet. This is significantly greater than 1989, in which the company consumed only 30 tonnes. The company will reach a consumption level of 105 tonnes/yr before the end of 1992. Elimination of CFCs, at one of the major CFC consumers in Egypt, will reduce national consumption in the foam sector.

3. Project Objectives

Short term: Phase out 75 tonnes per year of CFC-12 used in polystyrene and polyethylene foam sheet at Al Sharif Factories.

Long term:

a) Prevent future use of CFC-12 in Al Sharif's polystyrene foam manufacturing by modification of an expansion project.

b) Act as a training, information, and demonstration center for CFC phaseout in the Middle East under the direction of EEAA.

4. Project Description

In order to achieve reduction of the country usage in the foam sector and to act as a CFC elimination information center for the Middle East, Al Sharif will conduct the following:

a) eliminate the use of CFC-12 in the manufacture of polystyrene foam sheet by replacement with hydrocarbons(i.e., butane). This technology is available through original equipment manufacturers. The technology incorporates relocation of the supply tank for the foamant, explosion proof electrical equipment and spark protectors within the manufacturing area.

b) modify the specifications for an expansion project to allow application of the "butane technology".

c) prepare a video showing the steps to be taken to successfully implement CFC-free technology in the manufacture of extruded polystyrene and polyethylene foams and make the extrusion part of the plant available for instruction purposes.

5. Technology Discussion

The foam factory at Al Sharif Factories in El Khanka, Egypt, has a production of polystyrene and polyethylene foams use of CFC-12 in production of its foamed food packaging products.

There are several options to replace this ozone-depleting compound by an alternative blowing agent:

a) Nitrogen gas: inert, nontoxic and noncombustible, but asphyxiant. The use as a blowing agent is burdened by the relatively density of the end product.

b) Carbon dioxide gas: asphyxiant, high energy consuming and moderately toxic. The use of this gas also results in a relative high density although lower than nitrogen blown foams.

c) Hydrocarbons: toxic, flammable. N-Pentane, butane, isopentane and isobutane are proven replacements. The technology is very economical and offers good quality products, however, the flammability requires severe safety precautions in the manufacturing process.

d) Berstroff technology: based on a mixture of nitrogen and alcohol. Toxicity , fire risks, and explosion limits are unknown. The resulting product has a higher density.

e) HCFC-22: non-flammable, low in toxicity, high chemical and thermal stability. This technology has been proven effective, particularly in the American food packaging industry. The compound, however, has an ODP, and could only qualify as a transition solution.

f) HFC-134A: non-flammable, low toxicity and no ODP. This technology is not yet commercially available. Pricing is expected to be high and would prevent utilization in the cost sensitive food industry.

g) HFC-152A: low toxicity, moderately flammable, and no ODP. This material may be a likely long term alternative blowing agent for extruded polystyrene sheet. However, the product is not currently cleared for food packaging uses and is expected to have higher cost than CFC 12 or hydrocarbons.

h) HCFC - 142b: (Alone or in combination with HCFC-22) represents a practical option to CFC-12 in extruded polystyrene board insulation. HCFC-142b, however, is not a technical "drop in" for any of the manufacturing process currently installed.

i) Liquified petroleum gases (LPG):toxic, flammable, no ODP. This blowing agent is currently not accepted for food packaging uses.

The currently preferred replacement technology constitutes the usage of butane. This technology is commercially available through the manufacturers of production equipment. Because of the high flammability, safety will be a major consideration. 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 has to be separated from other production areas, spark arrestors must be utilized, and VOC monitoring is highly recommended. In addition, a safety and awareness program will have to be implemented for all workers involved. A major portion of the conversion cost is associated with these safety measures. The lower price of butane will generally more than compensate for the additional production and warehouse cost related to the hydrocarbon technology.

6. Project Activities, Cost and Timing

	ACTION		TIMING	COST
(1) *	Implementation of modifications		10 mos.	$1,295,000
	1.1	PSE modifications	($250,000)	
	1.2	PEF modifications	(400,000)	
	1.3	Building modification	(200,000)	
	1.4	General safety precautions	(300,000)	
	1.5	Installation	(90,000)	
	1.6	Spare parts	(55,000)	
(2)	Installation of laboratory equipment and monitoring equipment		11 mos.	200,000
(3)	Transfer of technology/Training		12 mos.	230,000
	3.1	Technology	($200,000)	
	3.2	Training*	(30,000)	
	TOTAL		12 mos.	$1,725,000

(*) Attachment B

(*) Attachment C

7. Cost Effectiveness :

Expected cost of one kg of butane $ 2.9/kg.
cost of one kg of HCFC 12 $ 3.4/kg.

Note: Ongoing cost consist of approximately $ 37 000/year.
Cost saving in blowing agent, and approximately $ 52 000 extra cost in handling and maintenance.

It is expected to add an expansion project, quantities of HCFC expected consumed in the coming years as in attachment A.

Attachment A

SHARIF.XLS

FINANCIAL ANALYSIS **ALSHARIF**

NOTE:FINANCIALS ARE IN $k U.S./ODS IS IN THOUSANDS OF KG

YEAR	INVESTMENT	OPERATING COST	TOTAL OUTLAY	IMLF $OUT	ODS W/O PROJ	ODS W/PROJ	SAVED ODS
0	660	0	660	660	75	75	0
1	665	0	665	665	105	60	60
2	200	15	215	215	145	0	145
3	200	15	215	245	175	0	175
4		15	15	15	180	0	180
5		15	15	15	180	0	180
6		15	15		180	0	180
7		15	15		180	0	180
8		15	15		180	0	180
9		15	15		180	0	180
10		15	15		180	0	180
TOTALS	1725	135	1860	1785	1760	135	1640

Attachment B

Attachment B

APPENDIX A - AMENDMENT 2

(HEREIN THE SELLER IS REFERRED TO AS GLOBENCO AND THE BUYER AS THE CUSTOMER)

RESPONSIBILITIES OF SUPPLY

Hydrocarbons are highly flammable and potentially explosive mixtures when combined with air at predetermined levels. During the processing of EPS/EPE foam, blowing agent vapours are being released into the atmosphere throughout the whole cycle of the EPS/EPE operation.

Some stages of the life cycle of the foam will release greater amounts into the atmosphere, notably when reels are stored and aged. Each process will demand stringent safety standards to ensure that vapours released into the atmosphere are strictly controlled so that they do not reach their lower explosive limit and, that any contingencies that may arise, are adequately provided for and dealt with by trained personnel.

Hydrocarbons used in the processing of EPS foam will mainly be N/Iso pentane, butane is normally used when processing EPE foam. The characteristics of the two hydrocarbons are not that dissimilar with each meriting the same attention.

It is of paramount importance that a safety-maintenance standard is set, not only for electrical equipment, but also to maintain the integrity of the whole operation. With this in mind, Globenco have made an appraisal study of its foam extrusion system for processing hydrocarbons in accordance with :-

A. British standard BS5345 parts 1-11. This standard lays down a code of practice for selection of electrical equipment within a defined hazardous area.

B. Guidelines as given by the Health and Safety Executive of the United Kingdom.

C. Guidelines as given by ROSPA of the United Kingdom.

D. British standard 5958 parts 1 and 2 relative to release of static electricity.

The British standard BS5345 segregates into 3 categories the probability of vapour/liquid release as follows :-

Zone 0 A zone in which an explosive gas-air mixture is continuously present, or present for long periods.

Zone 1 A zone in which an explosive gas-air mixture is likely to occur in normal operation.

Zone 2 A zone in which an explosive gas-air mixture is not likely to occur in a normal operation, and if it occurs it will exist only for a short time.

Attachment B

In compliance with this standard, Gloenco also foresees a mandatory compliance by our customer/end user to ensure the integrity of the extrusion process and to satisfy the requirements of the British standard or that prevailing in the country of installation.

1.00 Zone 0 Continuous Grade of Release

Gloenco does not believe that the areas within the foam extrusion process constitute a continuous grade of release during normal foam production.

2.00 Zone 1 Primary Grade of Release

Gloenco believes operating the screen changer during normal foam production constitutes a primary grade of release due to material loss and a small vapour emission with extension into a secondary grade should seal fail.

This area must be controlled by artificially ducting at source which we see as a mandatory requirement to be provided by our customer/end user.

Customer Supply

2.01 Artificial air extraction system to be connected to the screen changer upper and lower guard enclosures to extract vapours when filter changing.

2.02 Certified flow switches to be incorporated in upper and lower extraction ducts to alarm an extraction fault.

2.03 Automatic pressurised fire extinguisher to be positioned above screen changer.

2.04 Gas detector to be strategically placed to alarm at 20% of the lower explosive limit with shut down of extrusion system at 40%.

Gloenco Supply

2.05 Upper and lower screen changer guards will be interlocked with pump system pressure and must be closed before changeover can take place.

2.06 Thermocouples on screen changer will be provided with intrinsic safe circuits with certification to British standards.

2.07 Heater cable terminals to be remote from area.

Attachment B

3.00 Zone 2 Secondary Grade of Release

Glidemo believes that the following areas constitute a secondary grade of release which must be artificially ducted at source. We see this as a mandatory requirement to be provided for by our customer/end user.

Areas :-

3.01 Secondary screw gland packing seal.

3.02 Die lip outer area/die lip inner area.

3.03 Metering system.

3.04 Material feed hopper.

Customer Supply

3.05 Artificial air extraction system to be connected to areas 3.01 and 3.02 with certified flow switches in each duct to alarm an extraction fault.

3.06 Metering pipe to be rigidly supported with barrier when pipe passes between room areas with high integrity fittings.

3.07 Area 3.03 metering system, to have gas detectors strategically placed to alarm at 20% of the lower explosive limit with shut down of metering system at 40%.

3.08 Automatic pressurised fire extinguishers to be placed over all area points.

3.09 Metering pump system to be placed in OUTSIDE building with free access of natural air ventilation equivalent to 25% of the cross sectional area of the building including roof space and 2 sides of the building walls.

3.10 Adequate ventilation by means of airflow down the extrusion line towards the winders.

3.11 An extraction hood with fan extraction above the die and covering an area of 0.75 metre downstream of the die lips to 0.50 metre upstream of the die lips. The hood to incorporate a fire trap and a gas sensor.

Attachment B

Special Note

Where customer wishes to retain visibility of the injection pressure we recommend the Foxboro pressure transmitter is removed from metering unit frame and repositioned on an adjacent wall or rigid support. Should customer have a system fitted with a mass flow meter the electronics control unit will need to be removed from the metering unit frame to a position remote from the outside building.

The free standing process control cabinet housing the chart recorder and flow indicator must also be positioned remote from the outside building.

Gloenco Supply

3.12 Area 3.01 will be provided with metal shroud with ducts for customer connection.

3.13 Material feed hopper to incorporate a certified level sensor to alarm low level with a timed shut down of metering system if fault is not rectified.

3.14 Pressure transducer fitted at primary extruder transition zone to alarm feed loss with timed shut down of metering system if fault is not rectified.

3.15 A certified automatic shut off valve to be incorporated in injection pipe at exit of metering system and interlocked with metering system.

3.16 Thermocouples at die and cooling can will be provided with intrinsic safe circuits with certification to British standards.

3.17 Facility to interlock the main supply to the extrusion line to a signal that the ventilation referred to in 3.10 and 3.11 is running.

3.18 Metering system to have flame/explosion proof pump motor with certification of all electrical equipment used on metering system to British standards.

It is Gloenco's sincere belief that the parameters as set out confine all hazardous areas within the extrusion process to their source of release and are in accordance with the United Kingdom standards as previously defined.

Gloenco does however, recommend that companies intending to process with hydrocarbons enlist expert advice to assist them in carrying out the required confirmity of their operation to the safety standards of their country.

Attachment B

In addition to the above information we would recommend :-

Customer to supply

Extrusion building is artificially ventilated at lower level.

Foam sheet is continuously cleansed with ionised air from cooling can to winder to minimise static ignition.

Fire fighting equipment is strategically placed especially at winders where fires are most likely to occur.

Good housekeeping practices are stringently observed.

High quality maintenance schedule is implemented.

Operators clothing does not attract static and shoes are suitable for the process.

Gas detectors are positioned at :-

a) the material feed hopper
b) the gas injection valve
c) the screenchanger
d) the secondary extruder seal zone
e) the metering system
f) the die head

to alarm at 20% of the lower explosive limit with shut down of extrusion system at 40% of the lower explosive limit.

Attachment C

Attachment - C -

Training:

Number of Trainees 7 persons for 3 weeks

- Tickets	7 x 600	$ 4200
- Accomodation	175$/maday	$ 25725
TOTAL		$ 29925