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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-third Meeting
Montreal, 12-14 November 1997

PROJECT PROPOSALS: MEXICO

This documents includes the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam

- | | |
|---|------|
| • Conversion to CFC-free technology in the manufacture of integral skin foam at Moldecor | UNDP |
| • Conversion to CFC-free technology in the manufacture of rigid polyurethane foam (spray) at group project Pumex | UNDP |
| • Conversion to CFC-free technology in the manufacture of polyurethane shoe soles at Group Project (Orca) | UNDP |
| • Conversion to CFC-free technolog in the manufacture of rigid foam at Valsa Panel | UNDP |
| • Conversion to CFC-free technology in the manufacture of rigid foam (spray) and integral skin foam at Con Espuma | UNDP |
| • Conversion to CFC-free technology in the manufacture of integral skin foam at Air Design | UNDP |

Refrigeration

- Phasing out of CFC at Vendo S.A.
- Phasing out of CFCs at Torrey S.A.
- Phasing out of CFCs at Nieto S.A.
- Phasing out of CFCs at Criotec S.A.

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PROJECT EVALUATION SHEET **MEXICO**

SECTOR: FOAMS ODS use in sector (1989): 1,629 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Rigid US \$7.83/kg

Project Titles:

- a) CON ESPUMA - conversion to CFC-free technology in the manufacture of Rigid Foam (Spray) and Integral Skin Foam
- (b) AIR DESIGN - conversion to CFC-free technology in the manufacture of integral skin foam
- (c) MOLDECOR - conversion to CFC-free technology in the manufacture of integral skin foam
- (d) GROUP PROJECT (ORCA) - conversion to CFC-free technology in the manufacture of polyurethane shoe soles
- (e) GROUP PROJECT PUMEX - conversion to CFC-free technology in the manufacture of Rigid Polyurethane Foam (Spray)
- (f) VALSA PANEL conversion to CFC-free technology in the manufacture of rigid foam

Project Data	General	Integral Skin			Rigid	
	Con Espuma	Air Design	Moldecor	Orca	Pumex	Valsa
ODS phase out (ODP tonnes)	11.4	5	9	185.5	167.7	2
Proposed project duration (months)	24	24	24	24	24	2
Incremental capital cost (US\$)	88,000	104,500	143,000	1,415,000	759,000	104,50
- including contingency (%)	10	10	10	10	10	1
Incremental operational cost (US\$)	8,100	20,000	15,000	150,000	683,000	15,00
Total project cost (US\$)	96,100	124,500	158,000	1,565,000	1,442,000	119,50
Local ownership (%)	100	100	100	100	100	10
Export component (%)						
Amount requested (US\$) {Original}	96,100	84,300	151,740	1,565,000	1,313,000	119,50
{Revised}						
Cost effectiveness (US\$/kg.)	8.43	16.86	16.86	8.44	7.83	4.9
National Coordinating Agency	Ozone Protection Unit, National Institute of Ecology					
Implementing Agency	UNDP	UNDP	UNDP	UNDP	UNDP	UND
Technical review completed?	Yes	Yes	Yes	Yes	Yes	Ye
Secretariat's Recommendations						
Amount recommended (US \$)	96,100	Pending	Pending	Pending	Pending	Pendin
Project Impact (ODP tonnes)	11.4					
Cost effectiveness (US \$/kg)	8.43					
Implementing Agency support cost (US\$)	12,493					
Total cost to Multilateral Fund	108,593					

PROJECT DESCRIPTION

Foam Sector Profile

Sector ODS consumption (1989) reported in country programme	1629 tonnes ODP
Most recent consumption data	not available
ODS to be phased out in approved projects (as at July 1997)	894 tonnes ODP
ODS reported to have been phased out (as at July 1997)	112 tonnes ODP
ODS to be phased out in current proposed projects	438 tonnes ODP
Latest (1995) CFC-11 consumption reported according to Art.7	2186 tonnes ODP

GENERAL FOAMS

(a) CON ESPUMA - conversion to CFC-free technology in the manufacture of Rigid Foam (Spray) and Integral Skin Foam

1. Con Espuma will phaseout the use of CFC-11 in the manufacture of rigid foam for sprayfoam applications for cars and integral skin foam. The company currently has: eight Gusmer high pressure dispensers, six of which are model FF-1600 (1988-1992), while the other two are model H-2000 (1992). The company also uses one Elastogran P-30 (1980).
2. The project uses HCFC-141b as an interim solution for the rigid foam, and water based formulation for integral skin foam. The capital costs include: retrofit of the six FF-1600 dispensers (US \$30,000), the two H-2000 (US \$20,000) and also the P-30 (US \$5,000). Trials, technology transfer and training amount to US \$25,000. Contingency costs of US \$8,000 are also included. Incremental operating costs of US \$8,100 are expected based on the use of the following chemicals: 12.2 tonnes CFC-11; 6 tonnes MDI and 7 tonnes HCFC-141b.
3. Incremental operational cost of all the projects was calculated using the following prices (where applicable): CFC-11: US \$2.20/kg; MDI: US \$2.10/kg except in the case of Air Design where US \$3.00/kg is used; HCFC-141b: US \$2.70/kg, premix charges: US \$0.25/kg; polyol systems: US \$2.50/kg.

Justification for the Use of HCFCs

4. Con Espuma has chosen to implement HCFC-141b as an interim solution for the spray foam applications until a permanent solution technology becomes available in Mexico.

INTEGRAL SKIN/FLEXIBLE MOLDED**(b) AIR DESIGN - conversion to CFC-free technology in the manufacture of integral skin foam**

1. The company Air Design will convert from the use of CFC-11 in the manufacture of integral skin molded polyurethane foam for automotive parts. Air Design operates: one low pressure machine, Truioma (1985) with capacity 25 kg/min; and 6 high pressure dispensers: one Elastogran (1989); two Cannon H-100 (1990 and 1996); one Cannon A-40 (1997); one Cannon A-100 (1997), and one Admiral (1997), with capacities 50 kg/min; 100 kg/min; 100 kg/min; 40 kg/min; 100 kg/min, and 100 lit/min.
2. Air Design is substituting water blown formulations for CFC-11 as an auxiliary blowing agent. The capital cost of conversion involves the replacement of the low pressure Trusioma dispenser by a high pressure dispenser of output 20 kg/min (US \$80,000). The capital cost associated with trials, technology transfer and training is US \$15,000, while the cost of contingency is US \$9,500. Incremental operating costs of US \$20,000 are expected on the basis of the use of the following chemicals: 5 tonnes CFC-11; 7.5 tonnes MDI.

(c) MOLDECOR - conversion to CFC-free technology in the manufacture of integral skin foam

1. Moldecor will phaseout the use of CFC-11 in the manufacture of integral skin molded polyurethane foam for picture frames and mirrors markets. The company currently has one Kymofoam low pressure machine (1990) with a capacity of 80 kg/min
2. The manufacturing operations are to be converted to water blown technology. The capital costs include the replacement of the low pressure dispenser by a high pressure dispenser with output 100 kg/min (US \$110,000). Trials, technology transfer and training amount to US \$20,000. Capital costs also include contingency (US \$13,000). Incremental operating costs of US \$15,000 are expected based on the use of the following chemicals: 9 tonnes CFC-11; 13.5 tonnes MDI.

Equipment or Components to be Destroyed or Rendered Unusable

1. The low pressure machines to be replaced will be scrapped, however the method of destruction is not mentioned.

(d) GROUP PROJECT (ORCA) - conversion to CFC-free technology in the manufacture of polyurethane shoe soles

1. Orca will phaseout the use of CFC-11 in the manufacture of polyurethane foam at a group of 11 shoosole manufacturers in Mexico. The main system suppliers in Mexico are Bayer, Dow, ICI, Orca and Dong Sung (Korea). The different companies currently have:

<u>Customer Name</u>	<u>Current Equipment</u>
Hulera Hergo	LP Dong Sung (1994)
Hulera Strars	LP Mezclado (1993)
Issuzu	LP Mezclado (1993)
Suelas Frajan	LP Mezclado (1993)
	LP Mezclado (1994)
	LP Ferrari (1972)
Propulsa	LP Elastogram (1986)
HTR	LP MaqTec (1992)
	LP MaqTec (1994)
	LP Elastogran (1986)
Excel	LP MaqTec (1993)
	LP Elastogran (1988)
Tower Poliuretanos	LP Mezclado (1993)
Suelas Pulsa	LP Desma (1993)
Barajas	LP Trusioma (1995)
Calzado Tobago	LP Elastogran (1989)

2. The production is to be converted to one of several technologies, including water, hydrocarbons, or HFC-134a. The incremental capital costs for Orca itself include:

Hexane tank, 20 tonnes	US \$20,000
Polyester tank, 20 tonnes	US \$20,000
Two Blenders	
Water/Resin	US \$50,000
Hexane/Polyol	US \$70,000
Vented Filling Area	US \$10,000
Prototype Dispenser	US \$45,000
Abrasion Tester	US \$10,000

3. All equipment, with the exception of the high pressure Ferrari dispenser at Suelas Frajan are to be retrofitted. Trials, technology transfer and training amount to US \$20,000. Capital costs also include contingency (US \$25,000). The incremental capital cost for other recipients include:

Standard retrofit package/eligible dispenser

Three new pumps	US \$15,000
Ventilation/Make-up air	US \$15,000
Detection system	US \$10,000
Temperature Control	US \$10,000
Chemical Handling	<u>US \$15,000</u>
TOTAL	US \$65,000

4. Consolidated incremental operating costs amount to US \$150,000 and have been calculated based on hexane, being the most economical technology.
5. Standard conversion costs for two other alternative technologies, namely water blown and HFC-134a blown were also provided to show justification of the selection of the hexane option. The costs of the three options were as follows:

Hexane

Incremental Capital cost (as indicated in paragraph 3 above)	US \$	65,000
Incremental operating cost		<u>21,000</u>
TOTAL		86,000

Water-blown

Incremental Capital cost (3 jacketed tanks US \$30,000, mold oven US \$10,000, mold/mash replacement US \$31,500)	US \$	71,500
Incremental operating cost		<u>46,000</u>
TOTAL		117,500

HFC-134a

Incremental Capital cost (1 premixer US \$65,000, temperature control US \$10,000, chemical handling US \$15,000)	US \$	90,000
Incremental operating cost		<u>45,000</u>
TOTAL		135,000

(a) GROUP PROJECT PUMEX - conversion to CFC-free technology in the manufacture of Rigid Polyurethane Foam (Spray)

1. Pumex will phaseout the use of CFC-11 in the manufacture of polyurethane foam at a group of 19 spray foam contractors in Mexico. The main system suppliers in Mexico are Química Pumex, Aislantes Celulares, Productos Eiffel, Tecnopolimeros, Valcom, Bayer, and ICI. The different companies currently have:

<u>Customer Name</u>	<u>Current Equipment</u>
Alejandro Muñoz Guerrero	3 Gusmer FF
Espumas Ajs de Monterrey	2 Gusmer FF
Proveedora de Servicios Ensumos Ind.	1 Gusmer FF
2 Graco	
Aislantes Espumas de Poliuretano	2 Gusmer Gusmer FF
1 Graco	
Uriel E. Jabalera	1 Gusmer Gusmer FF
1 Gusmer H-II	
Jesús Antonio Padilla	2 Gusmer FF
Empresas Pandura	2 Gusmer FF
Bernardo Alcántara	2 Gusmer FF
Termoaislantes Noriega	2 Gusmer FF
Dora Elsa Rivera Hernández	2 Gusmer FF
Spra Mex	6 Gusmer FF
Pnt. y Rec. de la Laguna	1 Gusmer FF
Aislantes de Poliuretano	1 Gusmer FF
Aislantes Vere	1 Gusmer FF
Sanher Ingenieros	1 Gusmer FF
Sip Ingeniería	1 Gusmer FF
Sistemas de Poliuretana	1 Gusmer FF
Reno Refrigeración	1 Gusmer FF
Uretasa	1 Gusmer FF
2.	The production is to be converted to water based technology through interim use of HCFC-141b and HCFC-141b/22 blends.
3.	The incremental capital costs for the conversion include retrofitting of the existing dispenser units at US \$5,000 each and replacement of one dispenser (US \$30,000). technology transfer and training will be provided to the participating enterprises. Capital cost associated with the conversion of Pumex itself include pre-mix tank for polyol/HCFC-141b, storage tank for HCFC-22, an evaluation dispenser and a K Factor tester (US \$390,000). Technology transfer and training are also included (US \$30,000).
4.	Consolidated incremental operating costs amount to US \$683,000.

Justification for the Use of HCFCs

5. The above enterprises have chosen interim use of HCFC-141b until a permanent solution technology (probably water based) becomes commercially available in Mexico. HCFC-141b technology offers the lowest investment costs.

(c) VALSA PANEL conversion to CFC-free technology in the manufacture of rigid foam

1. Valsa Panel will phaseout the use of CFC-11 in the manufacture of rigid foam for doors. The company uses one Cannon H 100/2 (1992) and one Gusmer H-II (1991) dispensers. It also has two Manni presses.
2. The chosen interim replacement is HCFC-141b as blowing agent. The capital costs include retrofit of the Cannon dispenser (US \$30,000), one air system (US \$10,000), and the replacement of the other dispenser by a high pressure one (US \$30,000). Trials, technology transfer and training amount to US \$25,000. Capital costs also include contingency (US \$9,500). Incremental operating costs of US \$15,000 are expected based on the use of the following chemicals: 26 tonnes CFC-11; 17.9 tonnes HCFC-141b and 7 tonnes polyol systems.

Justification for the Use of HCFCs

3. The above enterprises have chosen interim use of HCFC-141b until a permanent solution technology (probably water based or HFC's) becomes commercially available in Mexico.

Equipment or Components to be Destroyed or Rendered Unusable

4. For all the above projects, the fate of the replaced equipment was not indicated.

Impact of Project on 1999 Freeze

5. The projects being submitted are considered vital in order to reach the goal of phasing out an additional 2,100 ODP tons per year by the year 1999, which is in accordance with the strategies stated in Mexico's Country Programme.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The project cost of Con Espuma was agreed. The other projects are still under discussion.
2. The integral skin foam projects are being discussed together with similar projects.
3. The discussion on ORCA project also involves the selection of technology for the group project.

RECOMMENDATION(S)

1. The Fund Secretariat recommends blanket approval of the Con Espuma project with the funding level and associated support cost as indicated below.

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
a) CON ESPUMA - conversion to CFC-free technology in the manufacture of Rigid Foam (Spray) and Integral Skin Foam	96,100	12,493	UNDP
(b) AIR DESIGN - conversion to CFC-free technology in the manufacture of integral skin foam	Pending		UNDP
(c) MOLDECOR - conversion to CFC-free technology in the manufacture of integral skin foam	Pending		UNDP
(d) GROUP PROJECT (ORCA) - conversion to CFC-free technology in the manufacture of polyurethane shoe soles	Pending		UNDP
(e) GROUP PROJECT PUMEX - conversion to CFC-free technology in the manufacture of Rigid Polyurethane Foam (Spray)	Pending		UNDP
(f) VALSA PANEL conversion to CFC-free technology in the manufacture of rigid foam	Pending		UNDP

PROJECT EVALUATION SHEET MEXICO

SECTOR: REFRIGERATION ODS use in sector (1993): 3,000 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial 15.21 US \$/kg

Project Titles:

- (a) Phasing out CFC at CRIOTEC SA
- (b) Phasing out CFC at NIETO SA
- (c) Phasing out CFC at TORREY SA
- (d) Phasing out CFC at VENDO SA

Project Data	Commercial Refrigeration			
	CRIOTEC SA	NIETO SA	TORREY SA	VENDO SA
ODS phase-out (ODP tonnes)	16	24.6	15.05	16.46
Proposed project duration (months)	10	10	18	10
Incremental capital cost (US \$)	98,200	140,800	128,102	37,000
- including contingency (%)			10	
Incremental operational cost (US \$)	142,594	213,176	100,063	211,524
Total project cost (US \$)	240,794	353,976	228,165	248,524
Local ownership (%)	100	100	100	100
Export component (%)		0	0	
Amount requested (US \$) {Original}	240,794	353,976	228,165	248,524
{Revised}				
Cost effectiveness (US \$/kg)	15.0	14.37	15.15	15.09
National Coordinating Agency	Instituto Nacional de Ecologia (I.N.E.)			
Implementing Agency	UNIDO			
Technical review completed?	Yes			

<i>Secretariat's Recommendations:</i>				
Amount recommended (US \$)	240,794	353,976	228,165	248,524
Project impact (ODP tonnes)	16	24.6	15.05	16.46
Cost effectiveness (US \$/kg)	15.0	14.38	15.15	15.09
Implementing Agency support cost (US \$)	31,303	46,017	29,661	32,308
Total cost to Multilateral Fund (US \$)	272,097	399,993	257,826	280,832

PROJECT DESCRIPTION

- (a) Phasing out CFC at CRIOTEC SA
- (b) Phasing out CFC at NIETO SA
- (c) Phasing out CFC at TORREY SA
- (d) Phasing out CFC at VENDO SA

1. UNIDO reported that in 1995, 1,600 tonnes of CFC-12 and 2,500 of HCFC-22 were consumed in the commercial refrigeration sector in Mexico.
2. The four enterprises are producers of commercial refrigeration systems, mainly chest and upright freezers, display cabinet and walk-ins. The combined production of the enterprises is about 107,000 units per year.
3. Criotec, Nieto and Vendo have already phased out their CFC consumption of 16 tonnes, 24.6 tonnes and 16.5 tonnes, respectively, in 1995-1996 by converting the refrigeration systems to HFC-134a and the insulation foaming to HCFC-141b-based formulation.
4. Criotec, Nieto and Vendo are requesting retroactive funding of a portion of the capital cost and the incremental operating costs for two years.
5. Torrey will pursue the same conversion technologies to phase out its 15.1 tonnes of CFCs. The enterprise is requesting a partial funding of the incremental capital cost and the incremental operating costs for two years.
6. Justification for HCFC-141b technology: Cyclopentane use for blowing is less widespread in commercial equipment. Cyclopentane would be a suitable foaming agent were it not for its acute flammability. The use of this substance would require the replacement of all of the low-pressure equipment. Rigorous safety training would be required. The local authorities are reluctant to issue license for storage and application of cyclopentane. HCFC-141b is seen as an intermediate solution.
7. UNIDO stated in the four proposals' documents that "All equipment at foaming section and refrigerators assembling lines which was operating with CFC-11 and CFC-12 will be destroyed and evidence document will be provided by the counterpart in cooperation with the local Ozone Offices".
8. UNIDO also stated that "The approval of these projects by the Multilateral Fund undoubtedly will contribute to reach the ozone freeze target of 1999".

SECRETARIAT'S COMMENT AND RECOMMENDATION

COMMENT

1. The Secretariat discussed with UNIDO the four proposals and agreed on their incremental capital and operating costs.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with associated support costs at the funding level shown in the table below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Phasing out CFC at CRIOTEC SA	240,794	31,303	UNIDO
(b) Phasing out CFC at NIETO SA	353,976	46,017	UNIDO
(c) Phasing out CFC at TORREY SA	228,165	29,661	UNIDO
(d) Phasing out CFC at VENDO SA	248,524	32,308	UNIDO