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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-first Meeting
Geneva, 5-7 July 2000

PROJECT PROPOSALS: INDIA

This document consists of the comments and recommendations from the Fund Secretariat on the following project proposals:

Foam

•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Alka International Ltd.	UNDP
•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Nindra Foams	UNDP
•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Pinnacle Industries Ltd.	UNDP
•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Pyarelal Coir Products Ltd.	UNDP
•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at R.H. Industries	UNDP
•	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Raipur Agencies	UNDP

• Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at SR Poly-steel P. Ltd.	UNDP
• Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded and from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Enkay Foam P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Crown Industries	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Enertech Engineering P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Evershine Plastic Industry	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at M-Plast	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Naorang Plast	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Ramakrishna Moulders	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Sanjay Industries	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam spray and insitu insulation at sixteen enterprises	UNDP

Process Agent

• Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala	UNIDO
• Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Humnabad	UNIDO
• Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet	UNIDO

Production

• CFC Production sector gradual phase-out project - 2000 Annual Programme	World Bank

Refrigeration

• Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Aarkay Industries	World Bank
• Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Saikrupa Industries	World Bank
• Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sarkar Refrigeration Industries	World Bank
• Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sidwal Refrigeration Industries P. Ltd.	World Bank
• Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration equipment at Fedders Lloyd Corporation Ltd.	UNDP

Solvent

• Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Blue Star Ltd., Thane	UNIDO

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (1998): 2,403 ODP tonnes

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

Project Titles:

(a) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Alka International Ltd.
(b) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Nindra Foams
(c) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Pinnacle Industries Ltd.
(d) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Pyarelal Coir Products Ltd.

Project Data	**Integral skin**			
	Alka	**Nindra**	**Pinnacle**	**Pyarelal Coir**
Enterprise consumption (ODP tonnes)	18.50	11.00	13.00	18.45
Project impact (ODP tonnes)	18.50	11.00	13.00	18.45
Project duration (months)	36	36	36	36
Initial amount requested (US $)	229,698	185,460	219,180	229,301
Final project cost (US $):				
Incremental capital cost (a)	65,000	55,000	72,000	60,000
Contingency cost (b)	6,500	5,500	7,200	6,000
Incremental operating cost (c)	147,198	127,866	155,215	146,801
Total project cost (a+b+c)	218,698	188,366	234,415	218,801
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	218,698	185,460	219,180	218,801
Cost effectiveness (US $/kg.)	12.42	16.86	16.86	11.53
Counterpart funding confirmed?		Yes	Yes	
National coordinating agency	Ministry of Environment and Forests			
Implementing agency	UNDP			

Secretariat's Recommendations				
Amount recommended (US $) Project impact (ODP tonnes) Cost effectiveness (US $/kg) Implementing agency support cost (US $)				
Total cost to Multilateral Fund (US $)				

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (1998): 2,403 ODP tonnes

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

Project Titles:

(e) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at R.H. Industries

(f) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Raipur Agencies

(g) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at SR Poly-steel P. Ltd.

Project Data	**Integral skin**		
	R.H. Industries	**Raipur Agencies**	**SR Poly-steel**
Enterprise consumption (ODP tonnes)	11.25	16.30	14.85
Project impact (ODP tonnes)	11.25	16.30	14.85
Project duration (months)	36	36	36
Initial amount requested (US $)	189,675	195,694	191,857
Final project cost (US $):			
Incremental capital cost (a)	57,000	50,000	57,000
Contingency cost (b)	5,700	5,000	5,700
Incremental operating cost (c)	132,052	129,694	118,157
Total project cost (a+b+c)	194,752	184,694	180,857
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US $)	189,675	184,694	180,857
Cost effectiveness (US $/kg.)	16.86	13.33	12.18
Counterpart funding confirmed?	Yes		
National coordinating agency	Ministry of Environment and Forests		
Implementing agency	UNDP		

Secretariat's Recommendations			
Amount recommended (US $) Project impact (ODP tonnes) Cost effectiveness (US $/kg) Implementing agency support cost (US $)			
Total cost to Multilateral Fund (US $)			

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam | ODS use in sector (1998): 2,403 ODP tonnes

Sub-sector cost-effectiveness thresholds: Multiple sub-sector: US $12.34/kg* (see below); Rigid: US $7.83/kg

Project Titles:

(h) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded and from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Enkay Foam P. Ltd.
(i) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Crown Industries
(j) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Enertech Engineering P. Ltd.
(k) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Evershine Plastic Industry
(l) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at M-Plast

Project Data	**Multiple-subsectors**	**Rigid**			
	Enkay	**Crown Industries**	**Enertech**	**Evershine**	**M-Plast**
Enterprise consumption (ODP tonnes)	17.65	24.35	17.00	17.50	14.10
Project impact (ODP tonnes)	16.63	22.51	15.76	16.18	13.04
Project duration (months)	36	36	36	36	36
Initial amount requested (US $)	167,695	135,321	123,416	105,180	102,072
Final project cost (US $):					
Incremental capital cost (a)	120,000	60,000	95,000	22,500	60,000
Contingency cost (b)	12,000	6,000	9,500	2,250	6,000
Incremental operating cost (c)	83,623	63,821	25,845	74,930	36,956
Total project cost (a+b+c)	215,623	129,821	130,345	99,680	102,956
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	167,695	129,821	123,416	99,680	102,072
Cost effectiveness (US $/kg.)	*	6.01	7.83	6.50	7.83
Counterpart funding confirmed?	Yes	N/A	Yes	N/A	Yes
National coordinating agency	Ministry of Environment and Forests				
Implementing agency	UNDP				

Secretariat's Recommendations					
Amount recommended (US $)					
Project impact (ODP tonnes)					
Cost effectiveness (US $/kg)					
Implementing agency support cost (US $)					
Total cost to Multilateral Fund (US $)					

*Composite cost-effectiveness is US $12.34/kg. Cost-effectiveness of integral skin foam component is US $16.86/kg and of rigid foam component is US $7.83/kg.

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (1998): 2,403 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US $7.83/kg

Project Titles

(m) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Naorang Plast
(n) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Ramakrishna Moulders
(o) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Sanjay Industries
(p) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam spray and insitu insulation at sixteen enterprises

Project Data	**Rigid**			
	Naorang	**Ramakrishna**	**Sanjay**	**Sixteen enterprises**
Enterprise consumption (ODP tonnes)	14.60	17.00	17.20	227.89
Project impact (ODP tonnes)	13.50	15.72	15.90	211.09
Project duration (months)	36	36	36	36
Initial amount requested (US $)	69,020	103,039	116,581	1,173,777
Final project cost (US $):				
Incremental capital cost (a)	50,000	27,500	65,000	340,000
Contingency cost (b)	5,000	2,750	6,500	34,000
Incremental operating cost (c)	14,020	72,789	45,081	799,777
Total project cost (a+b+c)	69,020	103,039	116,581	1,173,777
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	69,020	103,039	116,581	1,173,777
Cost effectiveness (US $/kg.)	5.11	6.56	7.33	5.56
Counterpart funding confirmed?				
National coordinating agency	Ministry of Environment and Forests			
Implementing agency	UNDP			

Secretariat's Recommendations				
Amount recommended (US $)				
Project impact (ODP tonnes)				
Cost effectiveness (US $/kg)				
Implementing agency support cost (US $)				
Total cost to Multilateral Fund (US $)				

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	11,736.70	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	6,681.00	ODP tonnes
- Consumption of Annex A Group I substances for the year 1998	5,264.60	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,391.00	ODP tonnes
- Consumption of CFCs in foam sector in 1998	2,403.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US $23,389,349.00	
- Quantity of CFC to be phased out in foam sector as of end of 1999	2,753.80	ODP tonnes
- Quantity of CFC phased out in foam sector as of end of 1999	2,459.14	ODP tonnes
- Quantity of CFC to be phased out in foam projects approved in the year 1999	648.60	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 1999	US $5,254,919.00	

Flexible Molded and Polyurethane Foams

1. Seven companies (listed below) produce flexible molded and polyurethane foam seat cushions for automobiles, using low and high-pressure dispensers as indicated in the table below. The density of the molded foam is stated to be 42 kg/m^3. All the companies were established between 1979 and 1994. They purchase CFC-11 premixed in the polyol at a CFC-11 proportion of about 9% by weight. The companies will convert the production to fully water-based systems. The costs of these conversions include the retrofit of low and high pressure dispensers at US $25,000 and US $15,000 per machine respectively, replacement of fiberglass molds at US $1,000 per mold, mold heating at US $10,000, technical assistance at US $10,000 per project, and training at US $5,000 per project. Incremental operating cost for each project consistent with the amount of CFC-11 to be phased out is requested. The incremental operating costs of the flexible molded foam projects include the cost of 14.3% of systems due to claims of 14.3% increase in foam density following conversion to water-blown technology.

The table 1 below provides a profile of the six enterprises.

Table 1: Profile of the flexible molded foam producing enterprises

Name of enterprise	CFC Phase out	Baseline dispensers*	No. of molds	I.C.C.** (US$)	Contingency (US$)	I.O.C.*** (US$)
Alka Inter.	18.50	H.P. 30 kg/min Elastogran	30	75,000.00	7,500.00	147,198
Nindra	11.00	L.P. 30 kg/min Local	15	70,000.00	7,000.00	127,866.00
Pinnacle	13.00	L.P. 90 litres/min Cannon	32	87,000.00	8,700.00	155,225.00
Pyarelal	18.45	L.P. 32 litres/min Shanbhag	20	75,000.00	7,500.00	146,801.00
Raipur	16.30	H.P. 80 litres/min Elastogran	15	60,000.00	6,000.00	129,694.00
R.H. Ind.	11.25	H.P. 30 litres/min Elastogran	22	67,000.00	6,700.00	132,052.00
SR Poly-steel	14.85	H.P. 80 litres/min Elastogran	22	67,000.00	6,700.00	118,157.00

*L.P. low-pressure, H.P. high-pressure
**I.C.C.: Incremental capital cost, including 10% contingency.
***I.O.C.: Incremental operating cost, including costs associated with 14.3% increase in foam density.

Rigid Foams

2. Seven enterprises (listed below) produce rigid foam for various applications. Six of the enterprises (Crown, Evershine, M-Plast, Naorang, Ramakrishna and Sanjay) produce thermoware products with foam density stated to be 32 kg/m^3. Fifty per cent of Enertech's production is rigid polyurethane foam slabs, boards, pipe sections of density 32-35 kg/m^3 while the other 50% is sandwich panels of density 40 kg/m^3. All the enterprises were established in 1983-1989. Four of the enterprises (Crown, M-Plast, Sanjay and Enertech) operate low-pressure dispensers, while two (Evershine and Ramakrishna) operate high-pressure dispensers. One enterprise (Naorang) uses manual mixing techniques. All the enterprise will convert to HCFC-141b.

3. The cost of conversion includes replacement of low-pressure dispensers with medium pressure dispensers for three of the enterprises (Crown, M-Plast, Sanjay) at US $45,000 each, and the replacement of a low-pressure dispenser with a high-pressure dispenser at US $80,000 (Enertech). Two of the enterprises will be retrofitting their existing high-pressure dispensers at US $7,500 (Evershine, Ramakrishna). Naorang will replace hand-mixing techniques with a medium-pressure dispenser at US $30,000, excluding company contribution of about 33% of the cost of the machine for technology upgrade. Incremental operating cost is requested for each project consistent with the amount of CFC-11 to be phased out. The incremental operating cost includes the cost of 7.5% of the systems to account for claims of 7.5% increase in density when the production is converted to the use of HCFC-141b.

4. The table 2 below provides a profile of the seven enterprises.

Table 2: Profile of the rigid foam producing enterprises

Name of enterprise	CFC Phase out	Baseline dispensers*	Conversion Action	Total I.C.C.** (US$)	I.O.C.*** (US$)
Crown	22.51	L.P. 10 kg/min Polycraft	Replace w/M.P.D.	71,500.00	63,821.00
Enertech	15.76	L.P. 90 litres/min SAIP	Replace w/H.P.D.	110,000.00	25,845.00
Evershine	16.18	H.P. 7kg/min Glaskraft	retrofit	30,250.00	74,930.00
M-Plast	13.04	L.P. 10 kg/min Camol	Replace w/M.P.D.	71,500.00	36,956.00
Naorang	13.50	none, hand mixing	Replace w/M.P.D.	55,000.00	14,020.00
Ramakrishna	15.72	H.P. 7kg/min Gusmer	retrofit	30,250.00	72,789.00
Sanjay	15.90	L.P. 10 kg/min Rank	Replace w/M.P.D.	71,500.00	45,081.00

*L.P.: low-pressure; H.P.: high-pressure, H.P.D.: high pressure dispenser; M.P.D.: medium pressure dispenser.
**I.C.C.: Incremental Capital Costs, including 10% contingency.
***I.O.C.: Incremental operating cost, including costs associated with 7.5% increase in foam density.

Group Project for Sixteen Enterprises

5. Sixteen enterprises with CFC-11 consumption ranging between 9 and 22 tonnes per year undertake rigid polyurethane spray and in-situ work for the transportation and construction industries, such as spray insulation of tanks, pipes, cold stores, roofs and in-situ foaming of trucks and bus bodies. All the enterprises are Indian-owned and commenced foam production between 1981 and 1994. Thirteen of the enterprises operate 18 Gusmer high pressure sprayfoam machines (15 Gusmer FF-1600, 2 Gusmer H-2000 and one Gusmer H-II). Four Polycraft dispensers (Polycraft HD-2250 and FC-1650) and one Glascraft MP are used by other enterprises. The enterprises will convert their production to the use of HCFC-141b. This will involve retrofit of the baseline machines at US $5,000 per machine. Other capital costs include technical assistance and training at US $7,500 per enterprise, trials at US $5,000 per machine. The total incremental capital cost is US $374,000 including 10% contingency. Incremental operating costs amount to US $799,777, which include cost associated with 5% increase in density of the HCFC-141b foam, however the density of the foams currently produced is not stated. Table 3 provides a summary of the project data.

6. The table 3 below provides a profile of the six enterprises.

Table 3: Profile of the sixteen enterprises

Enterprise	Location	CFC-11 Use (tonnes)	Incremental Capital Costs* (US $)	Incremental Operating Costs** (US $)	Total Project Costs (US $)	ODS Phase-out (ODP kg)	C.E (US $/ kg)
Alpine Industries	Delhi	16.50	19,250	57,903	77,153	15,284	5.05
Ashish Enterprises	Mumbai	9.00	19,250	31,583	50,833	8,337	6.10
Associated Insulation	Vadodara	21.00	30,250	73,710	103,960	19,452	5.34
Cellotek Insulation	Delhi	15.65	41,250	54,920	96,170	14,497	6.63
Cool Foam Industries	Delhi	10.14	19,250	35,584	54,834	9,393	5.84
Exelite Insulations	Mumbai	12.00	30,250	42,111	72,361	11,116	6.51
Insitu Foam	Delhi	18.60	30,250	65,272	95,522	17,229	5.54
Induco	Delhi	11.60	19,250	40,716	59,966	10,745	5.58
Mangraon Insulation	Chandigarh	12.00	19,250	42,111	61,361	11,116	5.52
Multi Products	Vadodara	9.50	19,250	33,345	52,595	8,800	5.98
Natraj Industries	Ghaziabad	11.80	19,250	41,409	60,659	10,930	5.55
New Era Insulation	Rewari	18.00	19,250	63,167	82,417	16,673	4.94
Perfect Insulation	Rohtak	22.10	19,250	77,555	96,805	20,471	4.73
Sai Industries	Delhi	11.20	19,250	39,304	58,554	10,375	5.64
Teknix Industrial	Mumbai	18.00	30,250	63,167	93,417	16,673	5.60
Vista Insulation	Gurgaon	10.80	19,250	37,908	57,158	10,004	5.71
TOTAL		**227.89**	**374,000**	**799,765**	**1,173,765**	**211,095**	**5.56**

* Includes 10% contingency.
** Includes costs associated with 5% increase in foam density.

Multiple Sub-Sector

Enkay Foam

7. Enkay used 17.65 ODP tonnes of CFC-11 in the production of flexible molded polyurethane foam seat cushions for automobiles and rigid polyurethane foam slabs, pipe sections, panels, etc. The densities of the flexible molded and rigid foams are stated to be 42 kg/m^3 and 32-35 kg/m^3 respectively. The company operates two low pressure dispensers, 40 kg/min Elastogran and 15 kg/min home-made dispensers. The company's rigid foam production accounted for 13.5 ODP tonnes of the CFC-11 consumption, while the flexible foam production utilized 4.15 ODP tonnes. The company purchases CFC-11 premixed in the polyol with the proportion of CFC-11 being about 9% by weight for the flexible molded foams. Under the project, the production is to be converted to fully water-based systems and HCFC-141b-based systems (as an interim technology) for flexible molded and rigid foams respectively. The project will include the retrofitting of one foam dispenser (US $15,000), replacement of one foam dispenser (US $60,000), mold upgrade (US $15,000), mold heating (US $10,000), trials (US $5,000), technical assistance (US $10,000) and training (US $5,000). Incremental operating cost for two years for US $48,240 is requested. Incremental operating costs attributed to 14.3% and 7.5% increase in densities of the flexible molded and rigid foams respectively are included in

the IOC calculation. The project costs are calculated for each sub-sector. The cost of each component is within the relevant threshold limit.

Source of chemicals

8. All the 30 enterprises for which projects were submitted purchase premixed systems (CFC-11 premixed in the polyol) from local polyol producers.

Justification for the use of HCFC-141b

9. Justification for the use of HCFC-141b by all the rigid foam producing enterprises converting to HCFC-141b has been provided in each project document and as annexes to the document, including projected "techno-economic" impact. It is stated that detailed discussions on issues associated with the use of HCFC in Multilateral Fund projects were held with the enterprises prior to the preparation of the projects, and this informed their choice of the technology.

10. A sample of the justification annexed to the projects and the letter of the Government of India supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

11. A total of 425.18 ODP tonnes will be phased out from the 15 foam projects. This will eliminate 6.4% of India's baseline consumption of Annex A Group I substances.

12. There will be a residual consumption of 26.96 ODP tonnes as a result of the use of HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat identified issues relating to the costs of retrofitting low pressure dispensers when converting to water-blown technology as well as issues relating to the cost of technical assistance and training.

2. Projects were submitted for 31 enterprises in three main production sectors, namely flexible molded foam cushions for automobiles, sprayfoam and thermoware. Conversion involves two technologies which have become standard conversion technologies for flexible molded and rigid insulation foams, namely water-blown and HCFC-141b respectively. Against this background the Fund Secretariat and UNDP discussed the costs of retrofits as well as technology transfer and training costs and agreed on their rationalizations as follows:

- The retrofit cost of high pressure dispensers be taken as US $10,000.
- The retrofit cost of low pressure dispensers be taken as US $15,000.

- Training costs be considered as part of the technical assistance and training. For individual projects the amount of US $10,000 will be used instead of US $15,000, while for the Group project it should be US $80,000 instead of US $120,000.

3. Based on the above considerations the capital costs of the projects were agreed. These are indicated in the table below.

Enterprise	Incremental Capital Cost US $	10% Contingency US $	IOC	Total Project Cost*
Integral Skin				
Alka International	65,000	6,500	147,198	218,698
Nindra	55,000	5,500	127,866	188,366
Pinnacle	72,500	7,250	155,225	234,425
Pyarelal	60,000	6,000	146,801	212,801
R.H. Industries	57,000	5,700	132,052	194,752
Raipur	50,000	5,000	129,694	184,694
S.R. Poly-Steel	57,000	5,700	118,157	180,857
Multiple Sub-sectors				
Enkay (total of components)	120,000	12,000	83,623	215,623
Integral skin component	50,000	5,000	48,240	103,240
Rigid component	70,000	7,000	35,383	112,383
Rigid				
Sixteen Enterprises (Group)	300,000	30,000	799,777	1,129,777
Crown	60,000	6,000	63,821	129,821
Enertech	95,000	9,500	25,845	130,345
Evershine	22,500	2,250	74,530	99,680
M-Plast	60,000	6,000	36,956	102,956
Naorang	45,000	4,500	14,020	63,520
Ramakrishna	22,500	2,250	72,789	97,539
Sayjay	60,000	6,000	45,081	111,081

*Incremental operating costs include costs associated with increase in foam densities – 14.3% for flexible molded foam, and 7.5% for individual rigid foam projects and 5% for the Group (Sprayfoam) project.

4. The eligible incremental operating costs of the projects could not be determined in view of the claim for density increases in all the projects. The eligible incremental operating cost and the total project costs will be determined following a decision by the Executive Committee on how to treat foam densities in rigid and flexible molded foam projects.

5. In view of the issue of foam density, all the projects are submitted for individual consideration pending a decision by the Sub-Committee on Project Review.

ANNEX I

Additional Justification for use of HCFC technology

The implementing agency expert appraised the prospective recipient enterprise, Crown Industries in February 2000, prior to the preparation of this project document and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.

2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by Crown Industries.

3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.

4. It was emphasized Crown Industries, that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.

5. It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by Crown Industries.

Crown Industries indicated their preference for selection of HCFC-141b based technology, in their manufacture of rigid polyurethane foam insulated thermoware and offered the following justifications:

1. The only zero-ODP technology options are hydrocarbons (pentanes) and water-based systems. The storage and handling of hydrocarbons requires compliance with extensive and stringent local safety regulations, in view of the flammability of hydrocarbons and the fire, explosion and security hazard they present. In the present premises of Crown Industries, located in a densely populated industrial area, such compliance is not possible. It would not be cost-effective or viable for Crown Industries to relocate their manufacturing facilities to ensure such compliance. Water based systems do not meet the critical product technical requirements on density and thermal conductivity and applying this technology will make their products un-competitive. This might lead to unviable operations and even closure of the plant.

2. Since hydrocarbons cannot be pre-mixed in polyols due to the safety hazard they present in transportation, additional investments on in-house premixing equipment will be required. Considering the volume of production at Crown Industries, such investments are not economically viable.

In view of the above, Crown Industries have selected HCFC-141b based systems as the conversion technology, as this technology would ensure phase-out of substantial ODP (over 89%) cost-effectively, with no safety hazard, while maintaining the product and processing characteristics at acceptable levels.

Projected Techno-economic Impact of Zero-ODP Technologies

The following summarizes the projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project.

Pentane (n, iso, cyclo) based systems meet most selection criteria and are the preferred option, when safety issues can be addressed cost-effectively. The relatively high investments for safety costs tend to limit pentane use to relatively large CFC users. In addition, the use of pentane is limited to those enterprises whose facilities can be adapted to meet safety requirements, and can be relied on to maintain safe operations in the long term. In case of this enterprise, use of pentane-based systems will require introduction of in-house blending, extensive plant modifications and also the relocation of the premises, to ensure safe operation conforming to local regulations. There also expected penalties on density and thermal conductivity with respect to HCFC-141b technology. The additional costs involved with pentane-based systems include cost of plant relocation (US$ 500,000), safety systems (US$ 100,000), retrofitting foaming equipment (US$ 80,000), investments on in-house premixing (US$ 80,000) and costs on account of increased foam density and thermal conductivity (US$ 65,000). The benefits include savings due to lower cost of pentanes (US$ 35,000). **The net additional impact on project costs with pentane based systems, is expected to be about US$ 780,000 with respect to HCFC-141b technology.**

Water-based systems are an alternative in cases where pentane is not feasible due to safety concerns, cost efficiency or availability. Water-based systems are, however, more expensive than other CFC-free technologies due to reductions in insulation value (requiring larger thickness) and lower cell stability (requiring higher densities). Water-based systems can be applied where insulation performance is relatively less critical. But in case of this enterprise, which manufactures insulation products, thermal conductivity is crucial. Moreover the presently available water based systems lead to an unacceptable increase in density. Due to these reasons, applying water-based systems in this project will make the enterprises' products un-competitive and may even lead to closure of the operations. The additional costs of implementing water-based systems include costs due to increased foam density and thermal conductivity (US$ 100,000). The cost of plant closure would be at least about US$ 600,000. **Thus, the net additional impact on project costs, with water based systems, is expected to be about US $700,000 with respect to HCFC-141b technology.**

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Liquid HFC based systems do not meet requirements on maturity and availability at the present time.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

भारत सरकार
पर्यावरण एवं वन मन्त्रालय
ओज़ोन सैल
Government of India
Ministry of Environment and Forests
Ozone Cell

Atul Bagai
Director (O)

RECD

F. No. 5/1/2000-OC
May 5, 2000

'MAY 0 6 2000

Dear Jacques,

We are pleased to convey the recommendation of the Ministry of Environment and Forests for submitting the following foam and commercial refrigeration project for consideration of the XXXI Meeting of the Executive Committee in July 2000.

Foam Sector:

S. No.	Name of the Company	Amount Recommended	ODP MT
1.	Crown Industries	135,321	22.51
2.	Enertech Engineering Pvt. Ltd.	123,416	17.0
3.	Evershine Plastic India	104,180	17.5
4.	M-Plast	102,072	14.1
5.	Naorang Plastq	74,020	14.6
6.	Ramakrishna Moulders	103,039	17.0
7.	Sanjay Industries	116,581	17.20
8.	Group Projects (16 Spray Foam Projects)	1,173,777	211.094
9.	Alka International Ltd.	229,698	18.5
10.	Pyarelal Coir Production Ltd.	229,301	18.45
11.	Raipur Agencies	195,694	16.3
12.	Sawhney Seating Systems	278,016	28.9
13.	SR Poly – Steel Pvt. Ltd.	191,857	14.85

Contd..2..

Commercial Sector:

S. No.	Name of the Company	Amount Recommended	ODP MT
1.	Sandlass Air-Con Systems	200,531	18.2
2.	Fedders Lloyd Corporation	258,111	20.4

2. Reference Foams Projects of India submitted for consideration of the 31st Executive Committee Meeting in July 2000. It is stated in accordance with the Decision 27/13 of the Executive Committee that the specific situations involved with Foam projects in Sr. No. 1 to 8 and HCFC commitments under Article-2F, has been reviewed and determined that, at the present time, the following projects need to use HCFCs for an interim period. The companies are aware that no funding would be available for the future conversion for their projects.

With regards,

Yours sincerely,

(ATUL BAGAI)

Mr. Jacques Van Engel,
Regional Programme Coordinator,
Montreal Protocol Unit,
1 UN Plaza, Room No. Ff-9918
New York NY 1007, USA
Fax : 001-212-906-6947

भारत सरकार
पर्यावरण एवं वन मन्त्रालय
ओज़ोन सैल
Government of India
Ministry of Environment and Forests
Ozone Cell

Atul Bagai
Director (O)

F.No. 5/1/99-OC
May 31, 2000

Ref: Your fax of 30th May, 2000 regarding letter of justification for use of HCFCs for M/s Enkay Foam (P) Ltd.

Dear Frank

Reference Foams Projects of India submitted for consideration of the 29th Executive Committee Meeting in November, 1999. It is stated in accordance with the Decision 27/13 of the Executive Committee that the specific situations involved with the Foam project of M/s Enkay Foam (P) Ltd. and HCFC commitments under Article-2F, has been reviewed and determined that, at the present time M/s Enkay Foam (P) Ltd. needs to use HCFCs for an interim period. This company is aware that no funding would be available for the future conversion for their projects.

Taking into account the above statements the foam projects of M/s Enkay Foam (P) Ltd. submitted, may kindly be considered for approval in the 31st Meeting of the Executive Committee in July, 2000.

Regards

Yours sincerely

(Atul Bagai)
Director (O)

Mr. Frank Pinto
Technical Adviser and Chief,
Montreal Protocol Unit,
UNDP, New York,
Fax: 001-212-906-6947
E-mail: frank.pinto@undp.org

जोन चार बी, द्वितीय मंजिल, इंडिया हैबिटाट सैंटर, लोदी रोड, नई दिल्ली- ११० ००३
CORE-4 B, 2ND FLOOR, INDIA HABITAT CENTRE, LODHI ROAD, NEW DELHI - 110 003

PROJECT EVALUATION SHEET
INDIA

SECTOR: Process agent ODS use in sector (1998): 5,500 ODP tonnes

Sub-sector cost-effectiveness thresholds: US $/kg

Project Titles:

(a) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala
(b) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Humnabad
(c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

Project Data	**Process agent**		
	Alpha	**Satya**	**Svis Labs**
Enterprise consumption (ODP tonnes)	69.70	27.92	54.17
Project impact (ODP tonnes)	69.70	27.92	54.17
Project duration (months)	18	18	12
Initial amount requested (US $)	286,310	463,120	403,577
Final project cost (US $):			
Incremental capital cost (a)			
Contingency cost (b)			
Incremental operating cost (c)			
Total project cost (a+b+c)			
Local ownership (%)	49%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US $)			
Cost effectiveness (US $/kg.)			
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency	Ministry of Environment and Forests		
Implementing agency	UNIDO		

Secretariat's Recommendations			
Amount recommended (US $)			
Project impact (ODP tonnes)			
Cost effectiveness (US $/kg)			
Implementing agency support cost (US $)			
Total cost to Multilateral Fund (US $)			

PROJECT DESCRIPTIONS

(a) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala

6. Alpha Drugs India Ltd. is a manufacturer of bulk drugs and bulk drug intermediate chemicals. The enterprise is 49 percent Indian-owned with the balance of 51 percent owned by DSN Andeno of the Netherlands. Over the period from 1997 to 1999 Alpha Drugs India Ltd. consumed an average of 69.7 ODP tonnes of carbon tetrachloride (CTC) per year as a process agent in the manufacture of an average of 173 tonnes per year of a pharmaceutical intermediate product, D (-) phenyl-glycine-chloride hydrochloride. The enterprise reduced its consumption of CTC in 1998 after installing drying equipment as an emission control measure and is seeking retroactive payment for the cost of this equipment.

7. Alpha Drugs India now proposes to complete the phase-out of CTC by replacing the present process agent which is an equal parts combination of CTC and the non-ODS ethylene dichloride (EDC) with trichloromethane (chloroform).

8. The chemical process with the new process agent is similar to the baseline process. However, the rate of the reaction with trichloromethane is 25% slower than the rate of reaction achieved with the present CTC and EDC combination (30 hours versus 24 hours). In addition, a larger amount of trichloromethane is required in each batch of chemicals processed. Therefore, to maintain the same level of production capacity, costs are sought to enlarge certain of the items of process equipment.

9. The major cost items are US$ 102,326 for a dryer with a solvent recovery system (requested retroactively), US $ 73,137 for one reaction vessel and one holding tank, US $13,950 for modifications to an existing reaction vessel and US $11,630 for installation, piping and electrical work. Incremental operating costs are sought for a period of four years at a level of US$ 330,159. The IOC arise mainly from the higher cost of the new process agent, and increased power costs associated with the new process. The requested grant of US$ 286,310 is based on the above costs taking into account the local ownership portion of 49%.

10. The project document explains that there will be no further projects for this application in India since Alpha Drugs is the only enterprise producing this product with CTC as the process agent. One other company produces the same product but does not use CTC.

11. The project document contains an explanation of the rationale for the choice of new process agent. It includes a brief analysis of the emission control measures taken during 1998 which reduced CTC consumption by around 50 percent, but indicates (without detailed analysis) that measures to further reduce CTC emissions would be more costly than changing the process agent. It also points out that in view of the likely phase-out in production of CTC, the enterprise wishes to give priority to changing the process agent.

(b) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Humnabad

12. Satya Deeptha Pharmaceuticals is a wholly Indian-owned company which manufactures the pharmaceutical drug Ibuprofen. In the period 1997 to 1999 the enterprise consumed an average of 27.92 ODP tonnes of CTC annually as a process agent in the production of an average of 100.9 tonnes annually of Ibuprofen.

13. It is proposed that CTC be replaced as a process agent by ethylene dichloride (EDC), a non-ODS substance. The chemical process with the new process agent is similar to the baseline process. However, the rate of the reaction is slower. In addition, a larger amount of EDC is required in each batch of chemicals processed. Therefore, to maintain the same level of production capacity, costs are sought to enlarge certain of the items of process equipment. Modifications to heating and cooling systems are also required to cater for the different physical and chemical properties of EDC.

14. The main capital cost items requested are four new reactors (US$ 53,203), a high vacuum distillation system (US$ 35,700), refrigeration plant (US$ 17,440), civil construction (US$ 20,652), an effluent treatment plant (US$ 46,512), and training and trials (US$ 15,000). Incremental operating costs arising mainly from additional quantities of the replacement process agent, and additional cost for power for heating and cooling of the process are requested for four years at a level of US$ 203,938.

15. The project document provides information on the pharmaceutical sub-sector additional to that contained in the original process agent sectoral profile submitted to the Executive Committee at its 28th Meeting through the World Bank. Four enterprises are listed as having already converted, three enterprises are listed as still using CTC (one of these has already been found to be ineligible for funding) and one enterprise in the original sectoral profile has closed down its production.

16. The project document contains an explanation of the rationale for the choice of a new process agent. It also includes a detailed discussion of emission control options to achieve a level of emissions of 1-2 percent or less, and a brief financial analysis which concludes that costs for emission control would be higher than the proposed costs for process conversion.

(c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

17. Svis Labs is a wholly Indian-owned company which manufactures the pharmaceutical drug Ibuprofen. In the period 1997 to 1999 the enterprise consumed an average of 54.17 ODP tonnes of CTC annually as a process agent in the production of an annual average of 32.3 tonnes of Ibuprofen and 216.4 tonnes of intermediate IBAP, a chemical used in the manufacture of Ibuprofen. Approximately 0.245 metric tonnes of CTC is lost in the manufacture of each 1 tonne batch of Ibuprofen, while 0.219 metric tonnes of CTC is lost in the manufacture of each 1 tonne batch of IBAP.

18. It is proposed that CTC be replaced as a process agent by ethylene dichloride (EDC), a non-ODS substance. The chemical process with the new process agent is similar to the baseline process. However, the rate of the reaction is slower. In addition, a larger amount of EDC is required in each batch of chemicals processed. Therefore, to maintain the same level of production capacity, costs are sought to enlarge certain of the items of process equipment. Modifications to heating and cooling systems are also required to cater for the different physical and chemical properties of EDC.

19. The main capital cost items requested are three glass-lined reactors (total US$ 47,212), a high vacuum distillation system (US$ 29,605), an EDC storage tank (US$ 3,488), effluent treatment, settling ponds, sludge filtration, solar evaporation (US$ 52,950), piping and flame-proof motors (US$ 21,465). Other costs include civil construction (US$ 22,930), trials (US$ 21,560), training (US$ 10,230) and safety equipment (US$ 3,700). Incremental operating costs arising mainly from additional quantities of the replacement process agent, and additional cost for power for heating and cooling of the process are requested for four years at a level of US$ 158,235.

20. The enterprise decided to convert production on its own, prior to consideration of this project. However it did so with "limited available funds" and with minimal change of equipment. Consumption of CTC ceased in October 1999. Therefore, capital costs of US $157,923 are being sought retroactively. Additional capital costs of US $64,489 are being sought to provide equivalent capacity after conversion, to replace baseline equipment which is inadequate for the new process and is rapidly corroding, and for civil construction to house the proposed new reactor vessels. incremental operating costs have not been split into retroactive and new components.

21. The project document contains an explanation of the rationale for the choice of new process agent. It also includes a detailed discussion of emission control options to achieve a level of emissions of 1-2 percent or less, and a brief financial analysis which concludes that costs for emission control would be higher than the proposed costs for process conversion.

22. The project document includes an update of the profile of the pharmaceuticals sub-sector similar to that provided in the Satya Deeptha project.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat reviewed these projects *inter-alia* on the basis of a comparison with other projects in the sector either approved or submitted, and with the benefit of advice from a specialist consultant in process engineering.

2. The updated sector profile was presented in these project documents as a UNIDO survey of the sub-sector. In response to the Secretariat's query as to whether the profile has been endorsed by the government of India, UNIDO advised that India had been provided with the

results of the survey and its response "was expected shortly." In the updated profile it was stated that UNIDO was "contacting the remaining producers whose status is not yet determined or who are to be located." UNIDO subsequently advised that it would proceed on the basis that all CTC consuming enterprises in the sector are now known to UNIDO.

(a) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala

3. Noting the sharp decrease in the level of production in 1999, the Secretariat inquired about the economic circumstances of the enterprise. UNIDO said that the drop in production was due to lower demand and competitive pricing and that the financial viability of the enterprise was not in question.

4. The Secretariat obtained expert advice that costs for major equipment items were consistent with norms for the industry.

5. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn.

6. The Secretariat discussed with the implementing agency, UNIDO, the proposed retroactive payment for the drying system installed in late 1998. UNIDO advised that the dryer was used to reduce emissions of CTC, in which case it could be eligible for funding (taking offsetting incremental operating savings into account). However consumption figures indicate that the major decrease in consumption of around 50 percent was realised in 1997/98 before the dryer was installed. Discussions are continuing and the Sub-Committee on Project review will be advised of the outcome.

(b) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Humnabad

7. Initial scrutiny of potential costs for emission control indicated that the option might have been similar in cost to process change. At the request of the Secretariat UNIDO presented additional analysis which confirmed that process change is the more cost-effective option.

8. In response to queries on the apparently high quantities of EDC required for make–up after conversion (which are reflected in IOC calculations), UNIDO re-examined and revised the quantities downwards. The Secretariat also sought and received additional assurances regarding electricity costs and chemicals prices. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn. Eligible capital costs for effluent treatment were adjusted downwards by 50 percent as there are no effluent treatment facilitates in the baseline, and incremental costs for civil works were also revised.

9. Further discussions with UNIDO are in progress and the final outcome will be advised to the Sub-Committee on Project Review.

(c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

10. The enterprise converted its production process in October 1999 to use EDC as a process agent instead of CTC. At the request of the Secretariat, UNIDO is revising its presentation of the project to split up the costs into those incurred by the enterprise before conversion (for which retroactive funding is sought) and those now proposed for funding to restore the baseline capacity and replace equipment which is currently functioning but which is inadequate for the new process (because it cannot withstand the corrosiveness of the new chemicals). The retroactive portion appears eligible for funding. The additional costs now proposed for funding may not be eligible as explained below.

11. In Decisions 19/8 and 20/25 the Executive Committee made it clear that projects similar to those in which an enterprise had already phased out on its own, without the equipment changes usually included in MLF–funded projects, but subsequently sought funding to provide this equipment, would not be considered as eligible in the future. The situation with Svis Labs is not identical because in the projects which gave rise to these decisions the enterprises had converted their production more than three years before the project was prepared, whereas Svis Labs phased out only last October. However the principle is similar and accordingly the additional costs may not be eligible. On this basis the project is being referred for individual consideration.

12. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn. Eligible capital costs for effluent treatment were adjusted downwards by 50 percent as there are no effluent treatment facilitates in the baseline, and incremental costs for civil works were also revised.

RECOMMENDATIONS

1. Pending.

1999 PRODUCTION VERIFICATION REPORT FOR THE INDIA CFC PRODUCTION PROJECT

1. Pursuant to Decision 30/51, the World Bank submitted on 24 April 2000, the 1999 Production Verification Mission Report for the intersessional consideration of the Executive Committee as a condition for the approval of the year 2000 annual programme for the CFC Production Sector gradual phaseout project in India. In this regard, the World Bank is requesting the release of US $11 million for the implementation of the 2000 annual programme and US $880,000 in support costs to the World Bank.

DESCRIPTION

2. The 1999 Production Verification Mission Report submitted by the World Bank was prepared in March/April 2000, by a team composed of a chartered accountant from India and a chartered chemist from the U.K. The team was also joined by scientists from the National Chemical Laboratory (India) designated by the Ozone Cell, which was also represented in a visit to one enterprise. The report contains a summary which describes the process employed, the findings and the conclusion. The document also includes a plant-by-plant report on the verification carried out and the comments on the findings. The report concludes with a chart showing monthly CFC production in 1999. The Verification Report is annexed to this document.

COMMENTS

3. In its review of the Mission Report, the Secretariat sought advice from outside experts, as it attaches great importance to this report since it is the first time a verification has been done for a gradual CFC production phase-out programme. This will serve as a standard for future monitoring of similar programmes, not only for India but also for future annual programmes of China and the other ODS producing countries.

4. The Secretariat requested clarifications from the World Bank regarding the following:

Verification methodology

5. Whether a verification based on a selection of "a few samples of entries to trace and check the movement of materials from the stage of purchase of raw materials to the final stage of dispatch of finished goods," and a review of "the records for purchase and sales, on a sampling basis," was adequate while the industry norm is to verify the actual day-to-day production and financial data and to consolidate it in monthly totals in order to arrive at conclusions.

Plant operating pattern:

6. The feasibility of achieving very high capacity utilization (94%) by Chemplast, and Gujerat, which the report records a total of 343 days of production operation for each plant per year, divided between CFC and HCFC, considering the mandatory downtime for the switch between CFC and HCFC-22 operations.

7. Furthermore, in the case of Chemplast the report records a production of six and five tonnes of CFC in January and February 1999. The economic and technical feasibility of such low plant operation was questioned.

Information requested from the World Bank

8. In order to be able to substantiate the conclusions in the Production Verification Mission Report, the following information was requested from the World Bank:

(a) A description of the physical state of the process units and supporting documentation for days of production;

(b) Production data on a month-by-month basis. The data should include monthly accounts of raw materials consumed, inventory at beginning of month, production on a day-by-day basis, inventory at end of month;

(c) Sales data on a month-by-month basis. The data should include monthly accounts of sales to domestic customers and export sales;

(d) The financial data on a month-by-month basis. The monthly Profit and Loss statement will usually include, among other things, volume and value of sales, volume and value of raw materials consumed, fixed costs, and allocated costs.

World Bank response

9. "All companies provided monthly data on:

- Raw materials opening stocks, production or receipt of raw materials, consumption and closing stocks.
- CFC-11 and CFC-12 opening stocks, production, dispatch and closing stocks. All except Navin reported export and domestic dispatches separately, Navin's figures were combined.

10. In addition, all companies provided information that showed that they had complete daily figures from which the monthly data were compiled. All four plants are owned by companies whose accounts are regularly audited by Chartered Accountants. The records seen by our experts were such that they were generated in the normal course of business and were leading to generation of data which gave the final figures of production. These records also formed part of the records which were inter-connected to financial records. These records were also seen by the Excise department of the Central Government. Thus we find that the verification process undertaken is considered quite normal. The financial health, or otherwise, of the producers should *[not]* be of concern to the Executive Committee in reviewing the production of these plants. Allocated costs are of no value in determining the quantities of CFCs produced."

11. Upon further consultation by the Secretariat the World Bank agreed to make the data available to the Secretariat to complete its review of the request and to make it accessible to any member of the Executive Committee who may wish to review it. The Bank also agreed with the Secretariat to examine the content and format for this type of verification report so that it could be standardized and followed in future. However, at the time this document was prepared, the Secretariat had not received the data from the World Bank.

RECOMMENDATION

1. The Executive Committee may wish to take into account the above in considering the request from the World Bank for the 2000 Indian annual programme.

INDIA

CFC Production Phase – Out Project

1999 Production Verification Mission

March – April 2000

Report by :-

Mukund M Chitale
Chartered Accountant

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INDIA - CFC Production Phase-out Project
Verification Mission - March / April 2000

Summary.

The four production sites were visited during the period 27 March – 6 April 2000 in order to verify production data for 1999 , the initial " production freeze " year. All the producers were completely cooperative in providing comprehensive details on CFC 11 and 12 production. This included feedstock and product tonnages , purchase or transfer records , plant operational patterns , production logbooks , analytical records, internal and Excise audit records , packaging and sales / stock records.

With regard to HCFC 22 , REGMA had stated that this was regarded as commercially sensitive and all companies declined to provide full details , or any records that could be taken away. However, all agreed to let us see feedstock and production records which, taken together with the plant operational pattern details, provided adequate verification of plant usage. We were allowed free access to plant logbooks for both CFC and HCFC production campaigns.

We reviewed the systems of recording consumption of raw materials, production, and sale of finished product. Records of quantities of feedstocks and ancillary materials are maintained at plant level, and the effect of these quantities converted into monetary value are recorded in financial books of accounts. We selected a few sample entries to trace and check the movement of materials from the stage of purchase of raw materials to the final stage of despatch of finished goods. The entries were found to be correct, and the system of record-keeping was found to be satisfactory.

We also cross-checked the same entries in the records maintained for the Excise Department , and found that the method of recording entries was reasonably dependable. The records for Excise Dept. are open to inspection by the Excise officials at any time, and they match with the financial records.

We saw the records for purchase and sale , on a sampling basis , and these were found to be in agreement with the financial books of account. We also noticed that the books of accounts of all four companies are audited by Chartered Accountants, and the system of maintenance of books of accounts can be reasonably depended upon.

We verified the figures for production of CFCs by each company at time of visit with reference to plant logbooks and other related records, and certify that the production figures submitted by the companies are correct according to the information and explanations given by the companies. The India's total figure for 1999 is 22,411 te.

The MoEF Ozone Cell had asked the National Chemical Laboratory at Pune to consider involvement in the Project Monitoring Unit. Dr Sukumar Devotta, head of Process development Division, joined in the SRF visit , and Dr P V Rao, Senior Scientist , came to Navin and Gujerat.

Dr S Satapathy, Deputy Director of the Ozone Cell, MoEF, came on the SRF visit, and was subsequently briefed on the entire mission.

CFC Quota / Production / Despatch / Stock Summary.

[All figures in tonnes.]

	Navin	Gujerat	Chemplast	S R F	India Total
Total Quota	**7335**	**7482**	**1500**	**6271**	**22588**
Opening Stock	**608**	**759**	**181**	**431**	**1979**
Production	**7244**	**7415**	**1485**	**6267**	**22411**
Despatch	**7792**	**8104**	**1652**	**6181**	**23729**
Closing Stock	**60**	**69**	**13**	**517**	**659**
Prodn. / Quota Comparison	**- 91**	**- 67**	**- 15**	**- 4**	**- 177**

Conclusion.

The total production of CFC 11 / 12 during 1999 was verified as 22,411 tonnes , compared with the allowable ceiling of 22,588 tonnes.

Signed :- *M M Chitale* *B D Joyner*

CFC Plant – Production / Closure Verification

Verification for Production Year **1999**

Date Visited **27 March 1999**

A: Plant Identification :

Navin Fluorine Industries
[Chemical Division of Mafatlal Industries Ltd.]

SRI Report Ref. SRIC Project 7866 December 1998

Date of MoEF Quota Regulation December 1999

CFC 11 / 12 Quota	Base level	5,951 te.
	Traded	1,384 te.
	Total	**7,335 te.**

Address Bhestan 395 023 , Surat , Gujerat , India.

Contact P. Roy Chowdhury, General Manager (Accounts) Chemicals

Tel. No. 00-91-22-305-2400
Fax. No. -307-0878

B: Plant Activities :

Production Capacity :	**Nominal**	**Eligible**
CFC 11 / 12	19,800 te.	13,250 te.

Other Activities : HCFC 22
AHF / Aqueous HF
Sundry Inorganic Fluorine Chemicals

C: Plant Dismantling Verification :

Plant dismantled :	No
Status of dismantling :	N / A
Can plant resume production	N / A
Has documentation of destruction of key components been verified by EBP ?	N / A

Production Verification :

Production	CFC 11		CFC 12
	2078 te		5166 te
Total		**7244 te**	
Raw Materials Usage (te)	CTC		AHF
	9335.2		2235.8
Use per tonne of 11 / 12	1.29 te		0.31

Note :- These usage figures are in the expected range.

Plant Operating Pattern (days)	Plant I	Plant II
CFC 11 / 12	51	225
HCFC 22	211	8

Records Examined :-
Purchase orders - carbon tetrachloride , chloroform
Transfer records (daily movements of AHF from own production plant)
Plant daily logbooks for both CFC and HCFC operation,
Product stock movement to Packaging / Despatch
Cylinder and Bulk filling records ; Sales despatch records
Weekly and monthly collated figures

Comments :

Detailed monthly figures for production and product movements were provided to us, from which we were able to make spot checks on the entire production and packaging processes. Sufficient detail on HCFC 22 production was made available to permit cross-checking on AHF usage and plants utilisation.
Monthly data on production are in the Table on Page 11

Navin also declared the production of 28 tonnes of CFC 113 , which was immediately converted into CFC 113a , a raw material for a Zeneca insecticide. This was a one-off order , although they are hopeful of repeat business. This operation was cleared through the Ozone Cell , MoEF, and is permitted production for feedstock use under the Montreal Protocol.

Navin Personnel :-	Roy Chowdhury	Gen. Mgr. (Accounts)
	V K Mathur	Sr. Gen. Mgr. (Works)
	Suresh Patel	Plant Mgr.
	Ketan Sablok	Dep Mgr. Accounts
	Homi Vakil	V P Commercial
Observer :-	Dr. P V Rao	National Chemical Laboratory
Auditors :-	Mukund M Chitale ,	Brian D Joyner

CFC Plant – Production / Closure Verification

Verification for Production Year **1999**

Date Visited **28 March 2000**

A: Plant Identification

Gujerat Fluorochemicals Ltd.

S R I Report Ref.	SRIC Project 7866		December 1998
Date of MoEF Quota Regulation			December 1999
CFC 11 / 12 Quota		Base level	8067 te.
		Traded	- 585 te.
		Total	**7482 te.**
Address	Village Ranjitnagar , Taluka Ghoghamba, Dist. Panchmahals , Gujarat 389 380 , India.		
Contact	Deepak Asher	Vice-President (Corporate Finance)	
	Tel. No.	00-91-265-330-057	
	Fax No.	-331-607	

B: Plant Activities

Production Capacity :	**Nominal**	**Eligible**
CFC 11 / 12	19000 tpa	18975 tpa
Other Activities :	HCFC 22 A H F	

C: Plant Dismantling Verification :

Plant dismantled	No
Status of dismantling	N / A
Can plant resume production	N / A
Has documentation of destruction of key components been verified by EPB	N / A

Production Verification :

Production		CFC 11	CFC 12
		1808 te	5607 te
	Total	**7415 te**	

Raw Materials Usage	C T C	A H F
	9608 te	2384 te
Use per tonne of CFC 11 / 12	1.295 te	0.322 te

Note :- These figures are within the expected range.

Plant Operating Pattern (days)

CFC 11 / 12	166
HCFC 22	177

Records Examined
AHF plant production – totally for captive use
Purchase orders - AHF (top up), carbon tetrachloride , chloroform
AHF transfer records (daily movements of AHF from own plant)
Plant daily logbooks for both CFC and HCFC production , QC records
Product stock movement to Packaging / Despatch
Cylinder and Bulk filling records
Sales despatch records
Weekly and monthly collated figures.

Comments :
From detailed monthly records for feedstocks , ancillaries , production and product movements we were able to make spot checks on the complete production and packaging processes. Sufficient detail on HCFC production was provided to enable us to cross-check on AHF usage and plant utilisation.

Monthly breakdown figures on production are in the Table on Page 11.

Gujerat personnel :-	Deepak Asher	VP, Corporate Finance
	Joseph Titus	Chief General Manager
	P S Parameswaran	General Manager (Technical)
Observer :-	Dr. P V Rao	National Chemical Laboratory
Auditors :-	Mukund M Chitale	Brian D Joyner

CFC Plant - Production / Closure Verification

Verification for Production Year **1999**

Date Visited **30 March 2000**

A : Plant Identification :

Chemplast Sanmar Ltd. Caustic - Chlor Division

SRI Report Ref. SRIC Project 7866 December 1998

Date of MoEF Quota Regulation December 1999

CFC 11 / 12 Quota

Base level	1926 te
Traded	- 426 te
Total	**1500 te**

Address Raman Nagar , Mettur Dam – 636 403
Salem District , Tamil Nadu , India.

Contact S D Sankaralingam Executive Vice-President

Tel. No. 00-91-44-827-3333
Fax No. -826-9359

B : Plant Activities

Production Capacity :	**Nominal**	**Eligible**
CFC 11 / 12	4100 te	4100 te

Other Activities : Chlorine / Caustic ; Chloromethanes
HCFC 22

C : Plant Dismantling Verification :

Plant dismantled	No
Status of dismantling	N / A
Can plant resume production	N / A
Has documentation of destruction of key components been verified by EPB	N / A

Production Verification :

Production		CFC 11 335 te	CFC 12 1150 te
	Total	**1485 te**	
Raw Materials Usage		C T C 2077 te	A H F 495 te
Use per tonne of CFC 11 / 12		1.398 te	0.333 te

Note :- Both figures are at the high end of the normal industry range, reflecting the drop in conversion efficiency associated with frequent production " swings " (12 in the year).

Plant Operating Pattern (days)

CFC 11 / 12	171
HCFC 22	172

Records Examined :

AHF purchase orders and receipts
Carbon tetrachloride and chloroform transfers from own production on adjacent site
Carbon tetrachloride and chloroform orders and receipts (duty rebate on exported product)
Daily plant logbooks and QC records for both CFC and HCFC production
Product stock movements to Packaging / Despatch
Cylinder and Bulk filling , and sales despatch, records
Weekly and monthly collated figures.

Comments :

Spot-sample cross checks were made between feedstock order and use data, crude and pure product tonnages , and bulk and packaged product records. We were given sufficient access to data on HCFC 22 production to be reassured on AHF consumption and plant utilisation.

Monthly production figures are given in the Table on Page 11.

Chemplast Personnel (principals , many assistants were also present) :-

A Janakiraman	President – Chlorochemicals
S D Sankaralingam	Executive Vice-President
V Ramachandran	Vice-President
M R Somayaji	Asst. General Manager
S Suresh	Manager – Sales

Auditors :- Mukund M Chitale Brian D Joyner

CFC Plant - Production / Closure Verification

Verification for Production Year **1999**

Date Visited **1 April 2000**

A: Plant Identification :

S R F Limited - Fluorochemicals Division

SRI Report Ref.	SRIC Project 7866		December 1998
Date of MoEF Quota Regulation			December 1999
CFC 11 / 12 Quota		Base level	6,644 te.
		Traded	- 373 te.
		Total	**6,271 te.**
Address	A – 16, Aruna Asaf Ali Marg , Qutab Institutional Area New Delhi – 110 067 , India.		
Contact	Rajdeep Anand	Sr. Vice President	
	Tel. No.	00-91-11-685-7231	
	Fax. No.	- 4260	

B : Plant Activities

Production Capacity	**Nominal**	**Eligible**
CFC 11 / 12	25,000 te.	25,000 te.

Other Activities : AHF , Chloromethanes
HCFC 22
Halons 1211 and 1301

C : Plant Dismantling Verification :

Plant dismantled	No
Status of dismantling	N / A
Can plant resume production	N / A
Has documentation of destruction of key components been verified by EPB	N / A

Production Verification

Production	CFC 11		CFC 12
	1,790 te.		4,477 te.
Total		**6,267 te.**	
Raw Materials Usage	C T C		A H F
	8,093 te.		1,927 te.
Use per tonne of CFC 11 / 12	1.291 te		0.307 te

Note :- These are within the expected industry range.

Plant Operating Pattern (days)

CFC 11 / 12	115
HCFC 22	177

Records Examined
AHF plant production / transfer to 11 / 12 / 22 plant
CTC and CFM production / transfer to 11 / 12 / 22 plant
CTC and CFM purchase orders (duty rebate on exported products)
Daily production and QC logbooks for both CFCs and HCFC campaigns
Movements of product stock to Packaging / Despatch
Filling and despatch records
Weekly and monthly collated figures

Comments :
Spot checks were made on purchase orders against receipts , inter-plant transfers, bulk stock against packaged goods, daily figures against weekly / monthly aggregations, etc. Adequate data on HCFC raw materials and production allowed cross-checking of AHF use and plant utilisation.

Monthly production figures are in the Table on Page 11.

SRF Personnel :-	Rajdeep Anand	Sr. Vice President
	W Samuel	Sr. General Manager
	N K Singhania	Dep. General Manager (Materials)
	V K Trehan	Dep. General Manager (Works)
	N Ram Mohan	Chief Manager (Planning and TQM)
	Rabinder Kaul	Chief Manager (International Trade)
	Rajiv K Chaudary	Manager - GI
Observers :-	Dr. Sukumar Devotta	Deputy Director , N C L, Pune
	Dr. S Satapathy	MoEF Ozone Cell – Deputy Director
Auditors :-	Mukund M Chitale ,	Brian D Joyner

INDIA - Monthly CFC Production (tonnes) - 1999

	CSL CFC 11	CSL CFC 12	GFL CFC 11	GFL CFC 12	NFI CFC 11	NFI CFC 12	SRF CFC 11	SRF CFC 12	Total
Open Stk	84	97	250	508	177	432	#	431	1979
Jan	6	76	11	58	290	491	65	205	1202
Feb	5	23	489	810	175	315	147	475	2439
Mar	59	204	147	523	342	527	30	143	1975
Apr	27	92	165	349	109	325	149	612	1828
May	23	71	99	710	190	522	185	563	2363
June	35	143	16	43	286	732	108	259	1622
July	57	169	240	523	147	473	170	448	2227
Aug	13	41	207	550	84	628	142	440	2105
Sep	46	159	166	770	207	506	54	162	2070
Oct	17	48	127	395	105	357	253	501	1803
Nov	46	124	141	877	144	290	279	287	2188
Dec	0	0	0	0	0	0	208	381	589
Clos. Stk	9	4	4	65	11	50	#	517	660
Prod'n Total	335	1150	1808	5607	2078	5166	1790	4477	22411

Note :- All figures rounded to nearest tonne

:- Stock figures are CFC 11 and 12 combined

PROJECT EVALUATION SHEET
INDIA

SECTOR: Refrigeration ODS use in sector (1999): 2,202 ODP tonnes

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

Project Titles:

(a) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Aarkay Industries
(b) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Saikrupa Industries
(c) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sarkar Refrigeration Industries
(d) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sidwal Refrigeration Industries P. Ltd.

Project Data	**Commercial**			
	Aarkay	**Saikrupa**	**Sarkar**	**Sidwal**
Enterprise consumption (ODP tonnes)	19.8	14.8	12.0	11.7
Project impact (ODP tonnes)	19.8	14.8	12.0	11.7
Project duration (months)	18	18	18	18
Grant already approved for incremental capital cost and incremental operating cost without IOC for compressors (a)	135,798	125,618	119,860	169,744
Incremental operating cost for compressors (b)	24,012	16,704	6,960	8,213
Total project cost (a) + (b) :	159,810	149,630	133,780	177,957
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	24,012	16,704	6,960	8,213
Cost effectiveness (US $/kg.)	8.08	10.11	11.15	15.21
National coordinating agency	Ministry of Environment and Forests			
Implementing agency	IBRD			
Combined amount requested	70,156			
Implementing agency support cost (US$)	9,120			
Total cost to Multilateral fund (US$)	79,276			

Secretariat's Recommendations				
Amount recommended (US $)	15,128	10,524	4,385	5,174
Project impact (ODP tonnes)				
Cost effectiveness (US $/kg)	7.62	9.20	10.35	14.95
Implementing agency support cost (US $)	1,967	1,368	570	673
Total cost to Multilateral Fund (US $)	17,095	11,892	4,955	5,852

PROJECT EVALUATION SHEET
INDIA

SECTOR: Refrigeration ODS use in sector (1999): 2,202 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US $ 15.21/kg ODP
Domestic US $ 13.76/kg ODP

Project Titles:

(e) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration equipment at Fedders Lloyd Corporation Ltd.

Project Data	**Commercial/Domestic**
	Fedders
Enterprise consumption (ODP tonnes)	22.40
Project impact (ODP tonnes)	21.19
Project duration (months)	36
Initial amount requested (US $)	258,457
Final project cost (US $):	
Incremental capital cost (a)	98,500
Contingency cost (b)	9,850
Incremental operating cost (c)	169,958
Total project cost (a+b+c)	278,308
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US $)	257,428
Cost effectiveness (US $/kg.)	12.15
Counterpart funding confirmed?	Yes
National coordinating agency	Ministry of Environment and Forests
Implementing agency	UNDP

Secretariat's Recommendations	
Amount recommended (US $)	257,428
Project impact (ODP tonnes)	21.19
Cost effectiveness (US $/kg)	12.15
Implementing agency support cost (US $)	33,466
Total cost to Multilateral Fund (US $)	292,056

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	12,036.0	ODP tonnes
- Baseline consumption* of Annex A Group I substances (CFCs)	6,681.0	ODP tonnes
- 1998 consumption of Annex A Group I substances	Not available	ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,770.0	ODP tonnes
- 1998 consumption of CFCs in refrigeration sector	Not available	
- 1999 consumption of CFCs in refrigeration sector	2,202.00	ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 1999	US $16,924,000	
- Quantity of CFC to be phased out in refrigeration sector as of July 1999 (28th Meeting)	2,092.0	ODP tonnes

*Baseline consumption of Annex A controlled substances refers to average of the consumption for the years 1995-1997 inclusive.

1. The domestic refrigeration sub-sector in India is comprised of seven major original equipment manufacturers which have joint venture/license agreements with international groups such as Whirlpool, General Electric, Matsushita, Electrolux and others. All the seven domestic refrigeration enterprises have received assistance from the Multilateral Fund to phase out a consumption of 1,766 ODP tonnes. The commercial refrigeration sub-sector consists of about 300 small- and medium-sized enterprises. The Multilateral Fund has assisted 25 of these enterprises to phase out 350 ODP tonnes. The Multilateral Fund has also funded the conversion of three out of six compressor manufacturers.

2. According to the information from the Government of India, 1999 consumption in the refrigeration sector (2,202 ODP tonnes) is sub-divided into consumption in manufacturing of new refrigeration equipment (662 ODP tonnes) and consumption for servicing (1,540 ODP tonnes). The Multilateral Fund has also funded the conversion of three compressor manufacturers. The complete phase-out of ODS in the refrigeration and air-conditioning sector is targeted for the year 2003.

(a) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Aarkay Industries

(b) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Saikrupa Industries

(c) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sarkar Refrigeration Industries

(d) Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sidwal Refrigeration Industries P. Ltd.

(e) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration equipment at Fedders Lloyd Corporation Ltd.

3. Four commercial refrigeration projects previously approved at the 23rd Executive Committee Meeting for India did not receive funding for incremental operating costs (IOC) associated with the use of HCFC-134a compressors, pending a decision on the methodology for calculation of eligible costs for HFC-134a compressors. Decision 26/36 on IOC for compressors, taken by the Executive Committee at its 26th Meeting, has provided the methodology. This methodology has been already used for calculation of IOC for compressors in five domestic refrigeration projects in India, which have been approved at the 28th Meeting.

4. The World Bank has submitted a combined proposal requesting IOC for compressors for these four commercial refrigeration companies (listed in a – d above) whose projects are under implementation.

5. The IOC for compressors for individual enterprises have been calculated using unit cost and duration as requested in the project proposals and by applying the calculated discounting factor.

6. The enterprise (Fedders Lloyd) presently manufactures a small range of domestic and commercial refrigeration appliances, packaged air conditioners, mild and vegetable chilling units, air conditioners for defence applications and rail coach air conditioning units. The total production was 16,400 units in 1999. The enterprise also used about 5.9 ODP tonnes of CFC-11 in production of rigid foam insulating panels. The enterprise's baseline foam equipment includes one high-pressure foam dispenser and assorted jigs and fixtures. The baseline refrigeration equipment includes two automatic charging units, thirteen vacuum pumps and two refrigerant leak detectors.

7. This project will phase out 16 OPD tonnes of CFC-11 and 6.4 ODP tonnes of CFC-12 consumption annually. This will be achieved by converting foam operation to HCFC-141b and refrigeration operations to HFC-134a. The project will include incremental capital costs covering dispenser retrofitting (US $15,000), new refrigerant charging units (US $40,000), cost of two new and retrofitting of the remaining 11 vacuum pumps (US $11,500), re-design, testing, trials (US $10,00), technical assistance (US $20,000) and training (US $10,000). The total incremental operating costs amount to US $186,229 reflecting higher cost of chemicals and components, including IOC for compressors. Savings on account of more efficient handling of chemicals (5%) due to the introduction of new high pressure dispensers to the existing low pressure dispensers have been subtracted from incremental operating costs. Cost-effectiveness threshold established in domestic refrigeration, commercial refrigeration and rigid foam sectors were used in determining the level of eligible grant.

Justification for the use of HCFC's

8. The enterprise has selected HCFC-141b technology to replace CFC-11 in foam blowing operations. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with Executive Committee decision 27/13 and is attached to this evaluation together with the justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The eligible IOCs associated with compressors for the enterprises listed in (a – d) above have been calculated according to the methodology based on Decision 26/36. The calculation has produced a discounting factor of 0.63, which has been used in calculating IOC in the present proposals and can be applied to any future projects requesting IOC for compressors with capacity higher than 250 watt in India.

2. The Secretariat has discussed with UNDP eligibility and cost of chemicals and components used in the calculation of incremental operating costs in the proposal listed in "e" above. The Secretariat has advised UNDP that the relevant discounting factor which is calculated in accordance with Decision 26/36 should be applied in calculating IOC for compressors. The incremental operating costs have been adjusted accordingly.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the refrigeration projects from the World Bank and UNDP with the funding levels and associated support costs as indicated below.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Aarkay Industries	15,128	1,967	IBRD
(b)	Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Saikrupa Industries	10,524	1,368	IBRD
(c)	Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sarkar Refrigeration Industries	4,385	570	IBRD
(d)	Incremental operating cost for compressor: Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sidwal Refrigeration Industries P. Ltd.	5,174	673	IBRD
(e)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration equipment at Fedders Lloyd Corporation Ltd.	257,428	33,466	UNDP

ANNEX I

Additional Justification for Use of HCFC Technology

The implementing agency expert appraised the prospective recipient enterprise, Fedders Lloyd Corporation Ltd., prior to the preparation of this project document, during August 1999 and February 2000 and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.

2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by Fedders Lloyd Corporation Ltd..

3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.

4. It was emphasized to Fedders Lloyd Corporation Ltd., that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.

5. It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by Fedders Lloyd Corporation Ltd.

Fedders Lloyd Corporation Ltd. preferred selection of HCFC-141b based technology, in their manufacture of domestic and commercial refrigeration equipment offering the following reasons:

a) The fire, explosion and security hazard involved in the implementation of hydrocarbon technology (pentanes) requires extensive and stringent safety precautions & investments and compliance with local safety regulations, in view of their flammability. The present manufacturing facilities of the enterprise are unsuitable for ensuring safe operation with hydrocarbon-based technology.

b) Fedders Lloyd Corporation Ltd. has reservations regarding the availability and convenience of procurement of the required grades of pentanes at acceptable prices.

c) Fedders Lloyd Corporation Ltd. have selected HCFC-141b based systems as the conversion technology, as this technology would ensure phase-out of substantial ODP cost-effectively, with no safety hazard, while maintaining the product and processing characteristics at acceptable levels.

भारत सरकार
पर्यावरण एवं वन मन्त्रालय
ओज़ोन सैल
Government of India
Ministry of Environment and Forests
Ozone Cell

Atul Bagai
Director (O)

F.No. 5/1/99-OC
May 31, 2000

Ref: **Your fax of 30th May, 2000 regarding letter of justification for use of HCFCs for M/s Fedders Lloyd Corporation.**

Dear Frank

Reference Commercial Refrigeration Projects of India submitted for consideration of the 31st Executive Committee Meeting in July, 2000. It is stated in accordance with the Decision 27/13 of the Executive Committee that the specific situations involved with the Commercial Refrigeration project of M/s Fedders Lloyd Corporation and HCFC commitments under Article-2F, has been reviewed and determined that, at the present time M/s Fedders Lloyd Corporation needs to use HCFCs for an interim period. This company is aware that no funding would be available for the future conversion for their projects.

Taking into account the above statements the Commercial Refrigeration projects of M/s Fedders Lloyd Corporation submitted, may kindly be considered for approval in the 31st Meeting of the Executive Committee meeting in July, 2000.

Regards

Yours sincerely

(Atul Bagai)
Director (O)

Mr. Frank Pinto
Technical Adviser and Chief,
Montreal Protocol Unit,
UNDP, New York,
Fax: 001-212-906-6947
E-mail: frank.pinto@undp.org

जोन चार बी, द्वितीय मंजिल, इंडिया हैबिटाट सैंटर, लोधी रोड, नई दिल्ली- ११० ००३
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PHONE : 4642174, 4602401, 4601533 FAX : 91-11-4642175 E-mail : ozone@del3.vsnl.net.in

PROJECT EVALUATION SHEET
INDIA

SECTOR: Solvent ODS use in sector (1998): 5,500 ODP tonnes

Sub-sector cost-effectiveness thresholds: - US $/kg

Project Titles:

(a) Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Blue Star Ltd., Thane

Project Data	**CTC**
	Blue Star
Enterprise consumption (ODP tonnes)	6.60
Project impact (ODP tonnes)	6.60
Project duration (months)	18
Initial amount requested (US $)	181,269
Final project cost (US $):	
Incremental capital cost (a)	79,000
Contingency cost (b)	7,900
Incremental operating cost (c)	-10,873
Total project cost (a+b+c)	76,027
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US $)	76,027
Cost effectiveness (US $/kg.)	11.52
Counterpart funding confirmed?	
National coordinating agency	Ministry of Environment and Forests
Implementing agency	UNIDO

Secretariat's Recommendations	
Amount recommended (US $)	76,027
Project impact (ODP tonnes)	6.60
Cost effectiveness (US $/kg)	11.52
Implementing agency support cost (US $)	9,884
Total cost to Multilateral Fund (US $)	85,911

PROJECT DESCRIPTION

Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Blue Star Ltd., Thane

2. In the period 1996 to 1999, Blue Star Ltd consumed an average of 6.6 ODP tonnes of carbon tetrachloride (CTC) annually in metal cleaning operations associated with the manufacture of compressors for central air-conditioning units (chillers).

3. The phaseout in metal cleaning is proposed to be accomplished by replacing the current manual CTC-based cleaning with trichloroethylene (TCE) vapour degreasing technology. The technology is commercially available.

4. The major cost item proposed is US$ 150,000 for a closed degreaser suitable for use with TCE. Other costs include a portable analysis kit (US$ 2,000), safety equipment (US$ 2,300), installation costs (US$ 5,000), training and trials (US$ 5,000). Incremental operating costs for a period of four years are US $539.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

5. The sector description and consumption figures in the project document are all based on the original 1991 country programme information which now is of limited relevance. The agency was advised that sector consumption tables in such projects should include figures for the latest year for which information is available.

6. Blue Star received a technical assistance grant of US $567,000 in 1993 through the World Bank to build and test HCFC-123 chiller compressors under licence from York International. Additionally, Blue Star received a grant of US $224,000 in 1995, also through the World Bank to phase out CFC-11 use in the manufacture of foam insulation panels. UNIDO advised that this cleaning application was not included in the initial projects.

7. Although CTC is a hazardous substance, the baseline cleaning process at Blue Star is manual and no safeguards for the occupational health and safety of the workers are apparent. The process consists of spraying and hand wiping of the compressor body with CTC and dipping of the smaller components in two 5-litre tubs of cold CTC. The substitute solvent, TCE, is also hazardous and the equipment proposed in the project is needed solely to provide adequate health safeguards, none of which exist in the baseline.

8. Because of the absence of baseline equipment, and consistent with Executive Committee decisions on technical upgrade, it was agreed that 50 percent of the estimated cost of the proposed new closed cleaning machine was eligible for funding and that this should include the cost of installation. Personal safety equipment is required in the baseline and is thus the responsibility of the enterprise. The allowance for testing was agreed as US $2,000.

9. Incremental operating costs were adjusted to take account of manpower savings from provision of the cleaning machine.

RECOMMENDATION

10. The Secretariat recommends blanket approval of the project with the level of funding and associated support cost indicated below:

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Blue Star Ltd., Thane	76,027	9,884	UNIDO