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

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Montreal, 26-28 July 1995

PROJECT PROPOSAL: PHILIPPINES

This document includes the Comments and Recommendations from the Fund Secretariat on the following project:

- Residual Phaseout of CFCs in the Manufacture of Flexible Polyurethane (Slabstock) at Mandaue Foam Industries Inc.

UNDP

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Philippines
PROJECT TITLE:	Mandaue Foam - Residual Phase-out of CFCs in the Manufacture of Flexible Polyurethane Foam (slabstock)
BUDGET:	Capital Costs: US \$405,000 Operating Costs: US \$ 41,000
INCREMENTAL COSTS:	US \$364,000 ¹
ODS PHASE-OUT:	228 MT
COST EFFECTIVENESS ² :	US \$0.22 per kg. ODP saved
PROJECT DURATION:	1.5 years
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	Department of Environment and Natural Resources, Environmental Management Bureau
TECHNICAL REVIEW COMPLETED:	YES <u> X </u> NO <u> </u>

SECRETARIAT'S COMMENTS

1. This project evaluation sheet covers the project proposal for the phase out of residual CFC-11 in the manufacture of flexible polyurethane foam (slabstock) in the Philippines (Mandaue Foam). During the initial evaluation, the Secretariat identified that the cost-effectiveness calculation was based mainly on the CFC-11 already phased out, i.e. 188 tonnes of the reported 228 tonnes. Based on the actual consumption (residual CFC-11) which was reported to be 40 tonnes, the cost-effectiveness would be US \$9.1/kg./year which exceeds the flexible foam sector threshold of US \$6.23/kg./year. Furthermore, the consumption reported in two projects submitted by UNDP for the flexible foam sector in Philippines (including the Mandaue project) were highly inconsistent with data as well as the use pattern of CFC-11 in the sector as reported in the approved country programme.

¹ Including contingency (15 per cent) and Financial Agent Fee (3 per cent)

² Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$/ODPk).
For CFC-11, ODS=ODP.

2. While providing the possible reasons for such inconsistencies, UNDP in its response also offered to request the Government of Philippines, if the Executive Committee so wishes, to update the country programme in order that the gap between consumption and importation can be accurately identified.

3. UNDP in its communication also attached a fax from Mandaue indicating that the consumption of the company was 80 tonnes and not 40 tonnes, as reported in the project document. When this revised consumption figure is taken into account, the project will meet the cost-effectiveness criterion.

4. Mandaue, which operates two plants, will phase out the residual CFC-11 through the use of methylene chloride. The capital cost of conversion is the cost of providing forced cooling systems for the maxfoam units and ventilation systems for the box foam and maxfoam units and curing room ventilation improvements. The project will generate incremental operating savings amounting to US \$220,140, based on the revised CFC-11 consumption.

5. The project costs will be as follows:

Total incremental capital costs: US \$405,000

Total incremental operating savings: US \$220,140

Total project cost: US \$184,860

ODS phase-out: 80 tonnes

Project cost-effectiveness: US \$2.31/kg./yr.

SECRETARIAT'S RECOMMENDATIONS

6. The Secretariat recommends as follows:

To approve the project in the sum of US \$184,860 (cost-effectiveness US \$2.31/kg./year) and US \$24,030 as support costs. Disbursement of funds to UNDP for this project should be made contingent on verification (by UNDP) of CFC consumption at Mandaue.

PROJECT COVER SHEET

COUNTRY: Philippines

PROJECT TITLE: MANDAUE FOAM-Residual Phaseout of CFCs in
Foam the Manufacture of Flexible Polyurethane
(Slabstock)

SECTOR COVERED: Foamed Plastics

ODS USE IN SECTOR: 1,180 t CFCs (1,180 t ODP) in 1991

PROJECT IMPACT: Completion of the Phaseout of 228 t CFC-
11/y (base 1993)

PROJECT DURATION: 18 months from approval

PROJECT ECONOMIC LIFE: Ten years

TOTAL PROJECT COST: USD 405,000 Incremental Capital Cost
USD 41,000 Incremental Operating Benefits

PROPOSED MLF GRANT: USD 364,000

COST EFFECTIVENESS: USD 0.22/kg/y Unit Abatement Costs
USD 1.60/kg/y Grant Effectiveness

COORDINATING
NATIONAL BODY Department of Environment and Natural
Resources, Environmental Management Bureau
(EMB-DENR)

IMPLEMENTING AGENCY: UNDP

APPRAISAL DATE: January/May, 1995

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PROJECT SUMMARY

Under this project, Mandaue Foam Industries Inc. will complete the phaseout of the use of the CFCs in the manufacture of flexible polyurethane foam (slabstock). The non-ODS technology of choice is methylene chloride supplemented by forced cooling and softening additives. Proper ventilation in the workplace, technical assistance and training on the safe handling of the new chemicals and process technologies is also included.

Prepared by: Jerry Pool/
Bert Veenendaal

Reviewed by: Hubert Creyf

PROJECT OF THE GOVERNMENT OF THE PHILIPPINES

MANDAUE FOAM - RESIDUAL PHASEOUT OF CFCs IN
THE MANUFACTURE OF FLEXIBLE POLYURETHANE FOAM (SLABSTOCK)

1. PROJECT OBJECTIVE

The objective of this project is (i) to complete the phaseout of the use of CFCs in the manufacture of flexible polyurethane foams, (ii) to re-establish acceptable foam quality and workplace conditions for production that has been already switched to non-CFC technologies at Mandaue Foam Industries Inc. ("Mandaue").

2. SECTOR BACKGROUND

The CFC consumption in the flexible foam sector in the Philippines was estimated--according to a CP survey-- to have reached about 25 t in 1991. This estimate has proven to be far too low, as it was based from insufficient import information and inadequate company interviews. Based on current information, the 1991 CFC-consumption in the foam sector has now more estimated to have been:

Category	CFC-11	CFC-12	TOTAL
Polyurethane Foams (PUF)			
Flexible PUF	715 t		715 t
Rigid PUF Appliances	285 t		285 t
General Insulation	90 t		90 t
			90 t
Extruded Polystyrene Foams		90 t	
TOTAL	1,090 T	90 T	1,180 T

The Government intends to eliminate the use of CFCs in this sector in or before 1998 through awareness programs, regulations and incentives. The sector, specifically in the flexible PU foams and in the polystyrene foams, have been very forthcoming in voluntary phaseout programs -- in polystyrene, supported by an active industry association -- and the actual use in 1994 has dropped to less than 150 t for flexible foams and 25 t for polystyrene foams. Safety has been sacrificed in these attempts, leading to unacceptable fire risks and workers exposure. A part of the UNDP program under the MLF in the Philippines is, to re-establish safe working conditions.

3. ENTERPRISE BACKGROUND

Mandaue Foam Industries Inc. is a fully Filipino, family owned enterprise, headquartered in Mandaue City, Cebu. The company was founded in 1971 and operates two (2) plants with a total of about 190 employees: Mandaue City (17,168 sqm, 104 employees) and Davao City (13,051 sqm, 85 employees). Annex-A provides more information on ownership and capital.

The company used in 1993 about 2,000 t chemicals, from which 40 t CFC-11 and 190 t methylene chloride. Each plant operates a continuous production line and a boxfoam unit.

The company has already undertaken efforts to replace CFCs in the recent years--after the Philippines signed the Montreal Protocol. Main reason was an intended ban in the Philippines on the use of CFCs in flexible foams. Although the introduction of methylene chloride (MC) was reasonable successful, there remains a significant residual use of CFCs in technically challenging qualities such as low density/low hardness flexible foams.

The foam quality has deteriorated somewhat through the appearance of scorching and a coarser cell structure, and not all customers were willing to accept this fact.

4. PROJECT DESCRIPTION

This project has two main elements:

1. The re-establishment of acceptable foam quality and safe workplace conditions in production areas where the use of CFCs has already been eliminated, but with no complete satisfactory results.
2. The elimination of the residual use of CFC-11 in areas where elimination has not yet progressed.

The technology of choice is the expansion of the use of methylene chloride (MC) to the extent possible. The production of foam qualities that cannot be successfully made with MC alone will be concentrated on one foaming unit. Forced cooling will be introduced to alleviate scorching, softening additives to reduce the use of MC and the related deteriorating influence on the foam quality when used in large amounts. On all foaming units, improved ventilation, reducing workers exposure to acceptable levels, will be installed.

The project also includes technical assistance for reformulation, trial supervision and for process/safety training as well as the material costs related to the trials.

5. TECHNOLOGY

There are numerous technologies to replace the use of CFCs in flexible foams.

Available replacements fall into the following categories:

- o Alternative blowing agents
- o Alternative chemistry
- o Alternative manufacturing technologies

Methylene chloride has been chosen as alternative blowing agent for box- and slabstock foam, supported by forced cooling to alleviate scorching and softening additive in low density supersoft formulations.

6. PROJECT COSTS

6.1 INCREMENTAL CAPITAL COSTS

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

QUANTITY	DESCRIPTION	TOTAL (USD)
2	Ventilation Hoods for Boxfoam Units	24,000
2	Curing Room ventilation Improvements	24,000
2	Ventilation Extensions for Maxfoam Units	40,000
1	Forced Cooling Unit for Maxfoam	250,000
--	Trials	20,000
--	Technical Assistance	10,000
--	Contingency	37,000
TOTAL INCREMENTAL CAPITAL COSTS		405,000

Remarks: o Ventilation equipment costs and costs for a forced cooling unit originate from design calculations from other recent projects.
o Trial costs have been standardized on USD 5,000/production unit.

6.2 OPERATING COSTS

The conversion provides incremental operating benefits to the company. Following MLF standard templet, an NPV of around USD 41,000 have been calculated and deducted from the project costs. Annex-B provides a detailed calculation.

6.3 COST EFFECTIVENESS

a) Capital cost	USD 405,000
b) Capital recovery factor	0.16275
c) Incremental recurrent costs/y	USD (15,900)
d) NPV of incremental recurrent costs.....	USD (41,000)
e) ODP phased out/y	228,000 kg

UNIT ABATEMENT COSTS $[(a(b)+c)/e]$ USD/kg/y 0.22

GRANT EFFECTIVENESS $[(a+d)/e]$ USD/kg/y 1.60

7. FINANCING PLAN

The company requests a grant covering the project costs calculated under 6.1 and 6.2 to the amount of

USD 364,000.

8. PROJECT IMPLEMENTATION

8.1 MANAGEMENT

UNDP will oversee the implementation of this project and provide technical assistance.

8.2 SCHEDULE

TASK	Q1	Q2	Q3	Q4	Q5	Q6
Procurement preparations						
o Project management	x					
o Design, specifications short listing bidders	x	x				
o Tenders, selection of contractors		x				
o Purchase orders			x			
Installation, Start-up						
o Arrival equipment				x		
o Installation					x	
o Trials, Training					xx	
Commissioning, Handover protocol						xx

9. PROJECT IMPACT

This project will complete the elimination of at least 228 t CFC-11 (base: 1993). The projects employ commercially and environmentally acceptable technology.

Annex-A: Shareholder's Information
Annex-B: Incremental Operating Costs
Annex-C: Technical Assessment

ANNEX B

MANDAUE-INCREMENTAL OPERATING COSTS/BENEFITS

ASSUMPTIONS

ITEM	PRICE (USD/t)	CONSUMPTION (t/y)		INFORMATION SOURCE
		BEFORE	AFTER	
CFC-11	2,500	40		--
Standard				
ADDITIVE	7,500	--		4 Standard
MC	900	--		18 Standard
TIN	8,000	3		3.75
Standard				
ENERGY (/KWH)	0.10		60,000	Power Cy.
PRODUCTION	2,000	2,000	2,000	Recipient

INVESTMENT IN EQUIPMENT : USD 338,000
 CFC/MC RATIO : 1.00/0.90
 YIELD LOSS : 3/2/1/0%/y on 15% of production
 MAINTENANCE : 5% of equipment investment

IOC CALCULATION (000 USD)

COST ITEM	1995	1996	1997	1998	TOTAL
BASELINE					
CFC-11	100	100	100	100	
TIN	24	24	24	24	
TOTAL	124	124	124	124	
POST-PROJECT					
MC	16.2	16.2	16.2	16.2	
ADDITIVE	30	30	30	30	
TIN	30	30	30	30	
INCR. YIELD LOSS	18	12	6	0	
INCR. ENERGY	6	6	6	6	
INCR. MAINTENANCE	16.9	16.9	16.9	16.9	
TOTAL	117.1	111.1	105.1	99.1	
IOC	(6.9)	(12.9)	(18.9)	(24.9)	
DISCOUNT FACTOR	0.91	0.83	0.75	0.68	
NPV					
	(6.3)	(10.7)	(14.2)	(16.9)	(48.1)

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TECHNICAL REVIEW

1. Country:

Philippines.

2. Project Title:

Conversion to CFC-free technology in the Manufacture of Flexible Slabs, rock PUF at Mandau Foam Company.

3. (Sub)Sector:

Foamed Plastics.

4. CP Relationship:

The Philippines CP for the phase-out of ODS was approved at the 10th Meeting of the Executive Committee of the MLF in 1993. The World Bank is the Implementing Agency. The National Coordinating Body is the Energy Management Bureau, Department of Environmental and Natural Resources.

The government intends to eliminate the use of CFCs in this sector in 1998 through awareness programs, regulations and incentives.

5. Technology:

Mandau has already partly substituted CFC 11 in a number of their formulations with methylenechloride (MC).

It now wants to abandon all CFC 11, by reformulating the remaining foam qualities to MC. It is standard proven technology and can be used when the allowed concentration in the workplace and the applicable emission legislation are met.

The project clearly describes additional precautions to maintain the MC levels in the working area. It is however not understood why these precautions are not yet in place, since the company has run on MC formulations already. The only explanation the reviewer can think of, is that now more MC will be used in the formulation. In this case however, it would have been better to explain the problem, and to illustrate it with concentration measurements.

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6. Environmental Impact:

As said under 5., the actual and future Philippine legislation must be looked up in order to check whether the MC solution can be used for some time.

MC has no influence on the ozone layer, but may contribute to a small extent to atmospheric ozone formation.

7. Project Costs:

It is felt that more justification is needed for some costs items like:

- aluminium framed glass windows
- fans for transition conveyor hoods
- modify saw take away conveyor
- drum transfer pumps for MC
- PVC strips
- close openings in curing room
- add fans to curing room

It is unclear whether these items are meant as retrofitting or whether the old installation did not fit.

Incremental operating costs are not requested by the company.

In the supposition that all cost elements can be justified, the cost for elimination of 1 kg of ODS would be: USD (170,000 / 40,000) or USD 4.25.

8. Implementation:

Management, procurement and schedule can be accepted as proposed.

9. Recommendation:

It is recommended to approve the project, after a more detailed justification is given for cost items mentioned under 7.

Dissemination of information to the public is not required

Date: 06/13/95.



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Addendum to Mandaue Technical Review, dated 060595.

On June 10 1995 the reviewer has noted that MANDAUE also wants to include forced cooling technology.

Costs have been revised and discussed with Mr B. Vannendaal, Foam Sector Expert and agreed.

Other remarks made in the Technical Review of 060595, were discussed and agreed.

It is hence recommended to accept the total incremental capital costs of USD 405,000 as requested in the project.

Hubert Gray, UNDP Foam Sector Reviewer

Date 061195

H. Gray