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PROJECT PROPOSAL FOR THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL FINANCING

COUNTRY	: INDIA	
PROJECT TITLE	: Conversion of ODS Cleaning and Coating Processes from CFC- 113, to IPA and Xylene at Microraj Electronics Pvt. Ltd. and RCC (Sales) Pvt. Limited Hydrabad.	
SECTIONS COVERED	: Solvents	
ODS USE IN SECTOR	: 4876 MT (ODP-weighted) of ODS solvents in 1991.	
PROJECT IMPACT	: Phase out annual consumption of 5.13 MT of CFC-113 (4.1 ODP-weighted MT)	
PROJECT DURATION	: 18 Months	
PROJECT ECONOMIC LIFE	: 10 years	
TOTAL PROJECT COST	: Investment (Capital Cost)	US$ 159,250
	Incremental operating savings	US$ 10,228
	Total Project cost	US$ 149,022
OWNERSHIP STRUCTURE	: 100% Indian	
PROJECT MF FINANCING	: US$ 149,022	
UNIT ABATEMENT COST	: US$ 5.53 per ODP kg. Of phased out ODS	
CURRENCY CONVERSION	: US$ 1.00 = Indian Rs.40.00	
COUNTRYPART ENTERPRISE	: Microraj Electronics and RCC (Sales) Pvt.Ltd Hyderabad	
IMPLEMENTING AGENCY	: UNIDO	
NATIONAL CO-ORDINATING AGENCY	: Ministry of Environment and Forests	

PROJECT SUMMARY

The main requirement of this project is to phase out the use of CFC-113 at Microraj Electronics Pvt Ltd and RCC (Sales) Pvt Ltd, K. Nagar, Plot No 1, Phase IV, IDA, Jeedimetla, Hyderabad-500055. These solvents were used for the following applications :

1. Blade Edge Coating : heat cleaning the blades, the edges are coated before performing the actual application. This coating is done by the polymer composition called Vydax (brand name) in CFC-113.
2. Blade carrier and Accessories Cleaning : The accessories required for spray coating include Spray gun, Static charger, Blade Carrier, Mixing tank, and other fire preventive equipment. These accessories are also to be cleaned periodically. CFC-113 is used for cleaning these items.

CHAPTER - I

1. PROJECT OBJECTIVE

The basic objective of this project is to phase out the use of ODS (CFC-113) in the blade manufacturing process at Microraj Electronics Pvt. Ltd. and RCC (Sales) Pvt. Ltd. Hyderabad. In general, there are two process steps in blade manufacturing where ODS is utilised and is to be replaced with non ODS solvents. These two processes where ODSs are used are (I) blade edge cleaning and (ii) Polymer spray coating on the blade edges.

Microraj Electronics Pvt. Ltd. and RCC (Sales) Pvt. Ltd. Hyderabad (MEP & RCC), while setting up the unit selected ODS free cleaning technology since inception. However, the blade edge coating with poletetrafluoroethane in CFC –113 was the choice of process to achieve highest quality standards. Therefore, this project is formulated to phase out CFC-113 from the coating process with alternate environment friendly technology/material.

CHAPTER - II

SECTOR BACKGROUND

India became a signatory to Montreal Protocol in 1992 and as a part of subsequent exercise, a Country Programme document was prepared by the Government with the assistance of UNDP. This document has assessed the Ozone Depleting Substances (ODS) consumption in the country and on the basis of this, a National Programme for the Phase-out of ODSs has been prepared to ensure the Phase-out of ODSs according to the national development strategy, without undue burden to consumers and industry.

2.2 The solvents sector is the largest user of ozone depleting substances (ODS) in India. The size of consumption has been investigated in a number of studies. According to India Country Programme : August 1992, the total consumption of ODS in the country by 1991 was 10,370 tonnes equivalent to 13,111 tonnes ODP. Out of which, the solvent sector consumed 100 MT of CFC-12, 300 MT of CFC-113, 4,000 MT of carbontetrachloride and 550 MT of 1,1,1-trichloroethane (MCF), i.e. a total of 4,876 MT of ODP (ozone depletion potential)-weighted consumption, that is 36.6 per cent of total ODP-weighted consumption in India.

2.3 ODS consumption in the solvents industry is split between electronics, metal cleaning and other processes such as textiles, pharmaceuticals, pesticides, chlorinated rubber, etc. Cleaning processes used in the electronics industry consumed in 1991, 150 MT CFC-113, 75 MT CTC and 30 MT of MFC and included flux removal (printed circuit cards and hybrid circuits), semi-conductor manufacturing, microelectronics component cleaning, metal and plastic part cleaning and photoresist development and stripping. The use of ODSs in electronics cleaning in India has been increasing as a result of the development of the electronics industry.

2.4 ODS consumption in India : As per the India Country Programme, the ODS & ODP figures for the year 1991 and unconstrained scenario by 2010 is given in the following Table-1, Exhibit-1

Table-1

1991 Consumption

Types of ODS	All Sectors			Solvents		
	Actual MT	ODP MT	Weighted %	Actual MT	ODP MT	Weighted %
CFC-11	900	1900	14.4	0	0	0.0
CFC-12	2850	2850	21.6	100	100	2.1
CFC-113	320	342	2.6	300	321	6.6
Sub-total	5070	5092	38. 6	400	421	9.7
Halon-1211	550	1650	12.5	0	0	0.0
Halon-1301	200	2000	15.1	0	0	0.0
Sub-total	750	3650	27.6	0	0	0.0
CTC	4000	4400	33.3	4000	4400	90.2
MCF	550	66	0.5	550	55	1.1
TOTAL	10370	13208	100.0	4950	876	100.0

]Sectoral Distribution

Aerosols	1100	1100	8.3
Forams	1580	1580	12.0
Refrigeration	1990	1990	15.1
Solvents	4950	4876	36.9
Halons	750	3662	27.7
TOTAL	10370	13208	100.0

The total ODS consumption as solvent in India in 1991 is given at Table-2

Table-2

ODS Consumption in Solvent Sector

Sub-Sector	ODS	Qty.	ODP
Electronics	CFC-113	150	120
	CTC	80	8 8
	MCF	30	3
Textile Cleaning	CTC	600	660
Pharmaceuticals	CTC	1060	1160
Pesticides	CTC	800	880
Rubber industry	CTC	320	352
Chemicals & Laboratory	CTC	70	77
	MCF	50	5
Sterlization	CFC-113	10	8
	CFC-12	100	100
Metal & precision cleaning	CFC-113	130	104
	MCF	40	4
Miscellaneous uses	CFC-113	10	8
	CTC	1070	1177
	MCF	430	43
Sub total	CFC-12	100	100
	CFC-113	300	240
	CTC	4000	4400
	MCF	550	55

CHAPTER III

ENTERPRISE BACKGROUND :

3.1 Microraj Electronics Pvt. Ltd. and RCC (Sales) Pvt. Ltd. Hyderabad (MEP & RCC) belongs to the Malhotra Group of Companies. These units are the sister concern of the major blade manufacturing company M/s Vidyut Metallics Company, Thane, Mumbai. Microraj Electronics Pvt. Ltd. was established in the year 1986 whereas RCC (Sales) Pvt. Ltd. was established way back in 1978 in the vicinity of Jeedimetla, Hyderabad

3.2 Microraj Electronics Pvt. Ltd. and RCC (Sales) Pvt. Ltd. have started their manufacturing with the conventional type double edge safety razor blades. The technology and equipment design and specifications were provided by their parent company M/S Vidyut Metallics Ltd Thane, Mumbai. The company paralllely started backward integration by adding manufacturing facilities for rolling of steels for razor blade applications, a step towards self sustenance.

3.3 These companies started their production with conventional double edge blades and currently have been manufacturing a diverse range of products such as safety razors, disposable , twin blades and so on. During the initial stages of incorporation, the manufacturing activity was very slow due to some technical snags. However, the dedicated group of engineers in the Malhotra Group of Companies such as Vidyut Metallics who have achieved high level of excellence in the blade manufacturing and backward integration, stepped forward along with the experts from abroad, for trouble shooting and over come all the difficulties faced. Today the product manufactured by these companies is no way inferior to the product available in the international market as far as the quality is concerned. This has been possible by establishing advanced manufacturing facility for razor blades and twin track shaving system. The fast moving item include : Zorrik, Vidyut, Topaz etc.

3.4 The company has achieved multiple growth in production and sale during the last five years which is evident from the details given below with regard to the production and sale during the last five years.

Production in Million Pieces
Turn over and Export in Rs. Millions

Year	1990-91	1992-93	1994-95	1996-97
Production	16.58	95.86	502.78	912.15
Turn Over	2.65	15.34	60.33	82.09
Export	---	---	---	----

3.5 Microraj Electronics Pvt Ltd. has invested about Rs. 119 millions in fixed assets whereas the investment made by RCC Sales Pvt. Ltd. was Rs. 160 Millions during the last five years. The expansion programme in both these units is in the advanced stage and soon the production and output could be doubled.

Blade Cleaning Process :

3.6 In razor blade process, cleaning is very much essential after edge sharpening and polishing operation. During sharpening and polishing operation, the dirt or the polishing compound or any other foreign particles which are stuck on the blade edge should be cleaned thoroughly without damaging the blade edge before sending it for further process of polymer coating. This point was considered seriously while setting up the unit and selecting a best suitable technology. Heat cleaning was preferred for these units and the process was built around heat cleaning technology and related equipment i.e. heat cleaning furnace. To achieve higher rate of production micro processor based continuous automatic system is preferred, but for want of finances this is held up and conventional heat cleaning furnaces ,manually operated systems are in use at present. Therefore, no cleaning solvent like cholorofluorcarbons are used for cleaning operations.

3.7 A very small quantity of CFC-113 however is used for cleaning the accessories, blade chargers and moulds for regular maintenance purposes. The annual consumption of CFC-113 for this application was 200 Kgs..

2.5 Subsequently to the finalisation of India Country Programme for ozone depleting phase out under Montreal Protocol .rtment of Electronics (DoE) / Electronics Technology Development & Trade (ET&T) has formulated a programme under which a few solvent phase out proposals can be worked out. ET&T is a commercial venture by DoE and involved in the manufacturing of electronics components & products and has got expertise and infrastructure to carry out such programmes in an efficient manner. and taking into consideration the structure and distribution of Indian Electronics Industry and lack of awareness, UNIDO in co-operation with Department of Electronics/ Centre for Materials for Electronics Technology formulated a programme under which 04 OD solvent phase out projects were worked out which have been approved by multilateral Fund for financial assistance. As a follow up to this programme, UNIDO in co-operation with Department of Electronics / Electronics Trade & Technology Development (ET&T) are currently working on the preparation of five projects for ODS phase out by Industry under the guidance of UNIDO.

Blade Edge Coating Process :

3.8 Microraj and RCC Sales set up the blade edge coating process based on Vydax-1000 polymer which was being supplied by Dupont, USA. The polymer content in Vydax-1000 is polytetrafluoroethane (PTFE). Vydax-1000 is available with 7.5% solid content of PTFE in CFC-113. For coating the razor blade edges with this polymer, the concentrate is diluted in required ratio to get a fine uniform suspension containing around 1-2% of the solute. For this purpose, Vydax-1000 & CFC-113 were mixed in 1: 9 proportion in a mixer (mixing tank with integral pump, stirrer mechanism) and later it is homogenized in a homogeniser at a pressure of 8000 lbs/sq.inch. In this process the polymer particle size is uniformly reduced from 30 microns to 1 micron, which results uniform and fine spray during spray operation. This fine solution is sprayed through electrostatic spray gun. The complete operation is done in spray booth where blade carriers are moving horizontally on conveyor. Spray gun is activated by Limit switches for proper timing and position. The total annual consumption of Vydax-1000 during 1994-95 was 452 kgs. (90 gms per 100,000 blades) To make a dilute spray of the suspension for razor blade edge coating application, the corresponding CFC-113 consumption was 4.53 tons per annum (900 gms per 100,000 blades)

3.9 The year wise break up of ODS substances in the production at Microraj and RCC Hyderabad was as under:

(Figures in Tonnes)

Solvent	1992-93	1994-95	1995-96	1996-97
Vydax - 1000	0.086	0.452		----
CFC-113	0.862	4.530		
Vydax -2000				0.435
IPA				4.350
CFC-113 for cleaning	0.200	0.600	0.600	--

3.10 The list of equipment used for ODS based cleaning and coating at Microraj & RCC (Sales) along with broad specifications and purchase price are indicated below.

O.D.S. Equipments at Vidyut Metallics Ltd.,

Blade Edge coating, Spray system - 2 sets **Rs. 7.5 Lacs**

The system consisting of Spray guns with fixtures,. Blade carrier, Blade carrier motor drive system with limit switches and voltage regulator, 1/2 HP Solution circulating pump, Solution container with stirrer with speed control and Exhaust system for Vydax fumes

The capacity of the system is 1750 million blades per year
1 charge = 3000 blades
30 charge per hour = 90,000 blades/ Hour./ system

Ancillary equipment - 1 set **Rs. 4.5 Lacs**
Consisting of Controlled environmental chamber with Thermostat control and humidity, Homogeniser for Vydax, Polymer mixing pump,. Motor with required pipe lines and Electrical fittings and Hot chamber with temperature control.

Capacity : Matching to the above coating system

CHAPTER - IV

PROJECT DESCRIPTION:

Sector wise approach :

4.1 As explained earlier the technology in use at Microraj as also at RCC Sales was supplied by their principal company M/s Vidyut Metallics Ltd, Thane. The technology does not require the use of CFC for cleaning operations as the technology is based on heat cleaning. The heat cleaning furnace is having high electrical power consumption but the advantage of the process is that this does not require Ozone Depleting Solvents. This process is a proven technology throughout the world and can yield the best quality product of international standards. The only area where Ozone Depleting Substances (CFC-113) are used is blade edge coating. The CFC-113 is basically used for diluting the Vydax coating concentrate to make a fine mist of the polymer suspension.

Technological Selection, Equipment Selection for Coating System :

4.2 Microraj and RCC (Sales) Pvt. Ltd. with the help of Vidyut Metallics have tried for suitable ODS free process to change over from presently used ODS system to non-ODS system in blade edge coating process.. It was found that an alternate coating material i.e Vydax-2000 could be suitably used incorporating isopropyle alcohol as a solvent in place of CFC-113. However, this require installation of a suitable coating system and process standardisation to replace CFC-113 to IPA system.

ALTERNATIVE PROCESS OF BLADE COATING :

4.3 The alternative technology which has now been adopted by major razor blade manufactures is to use Vydax -2000/IPA which is a 20 percent dispersion of fluorotelometer solids in ISO-propyl alcohol (IPA), which is then diluted to the required coating concentrations with IPA. However, a low quality wet IPA can not be used for coating because it can cause rusting of the blades during coating. Therefore, dried IPA can be utilised for a substitution technology.

4.4 The existing blade coating system was designed for Freon and tertiary butyl alcohol. The new blade coating system should have the following mechanism and ancillary equipment i.e. a complete razor blade coating system having a fully automatic spray facility consisting of spray booth equipment, transport conveyor all power fitting and disconnects. This also includes a homogenizer which break the suspension particle size from 30 microns to 01 micron at a high pressure of about 8000 PSI. Microraj and RCC (Sales) has conducted trial studies in their R&D laboratory for an alternate coating process. The new technology incorporate the change of Freon by IPA. The drying chamber is also attached to vaporize IPA before the sintering process. Presently the retrofits are used on experimental basis in smaller batches. It is now proposed to go in for a new coating system. The cost of new coating system would be around (US$ 150,000). The new coating material used would be Vydax-2000 which has 20% dispersion of Fluorotelometer solids in IPA.

4.5 The replacement of ODS in the blade manufacture require alternative processes with extensive engineering know how to carryout tasks such as reliability testing, materials compatibility testing, quality consistency & process development, technology selection for cleaning and coating system, site preparation, installation of machinery and staff training, etc. This was carefully studied by Microraj & RCC (Sales) and the company selected a suitable process as an alternate to the existing ODS technology.

4.6 Since Vydax -2000/IPA has a 20 percent dispersion of fluorotelometer solids (half as much Vydax-1000 which has 7.5 per cent), the amount of Vydax-2000/IPA will be needed approximately half as much under a new substitution. The annual consumption of Vydax 2000/IPA is 435 kg. & IPA is 4.35 MT as shown in Annexure –II

Estimated Consumption of Non-ODS Solvents (Dried IPA)

Description	Unit	Unit Cost US$	Qty/year	Cost/year US$
Dried IPA	Lit	2.2	4,350	9,750

4.7 Ancillary new fire proof equipment with the main system is also required as under:

a.	Homogeniser	1 No.
b.	Mixing Tank	1 No.
c.	Krytox shaker	1 No.
d.	Fire proof exhaust fan	1 No.
e.	Automatic fire extinguishing system	1 No.

4.8 Due to availability of IPA the ODS free coating solutions is flammable and thus the personal and the coating equipment should be properly protected against fire hazard. This can be achieved through installation of an automatic fine water mist fire protection system which allows to extinguish fires at much lower application rates than a conventional water sprinkler system. This choice is based on such characteristics of the system as low occupant risk, suitability for use on energised electrical equipment, high reliability and effectiveness and relatively low cost of installation and maintenance. This equipment is yet to be installed in Microraj and RCC (Sales) Pvt. Ltd. The cost of the equipment is around US $ 12,000.

Environmental aspects :

4.9 Microraj and RCC Sales Pvt. Ltd. has adopted applying heat cleaning and IPA based coating process, which is technologically accepted world wide. Since the coating process involves the use of Isopropyle alcohol as the diluent, no adverse implication to environment are there during coating process. With regard to the condensed waste, all the contaminants can be easily removed and economically disposed off. No additional cost is needed since the factory normally burns all the wastes.

Site preparation and installation of machinery :

4.10. The project includes funding to prepare the sites for the equipment installation. This is for electrical supply and plumbing to ensure safe installation of the equipment. Technical staff of the equipment supplier or their agents in India would help the installation work.

Staff Training :

4.11 Since Microraj and RCC (Sales) Pvt. Ltd. have developed in-house process with the help of their principal for heat cleaning and coating. The existing Engineers, operators and maintenance personnel have to be trained in operating the new systems. The replacement of ODSs in the razor blades industry applications with IPA processes and heat cleaning technologies will require extensive engineering know-how to carry out to tasks such as :

- Reliability testing
- Material compatibility testing and process development
- Technology selection
- Equipment selection/modification of existing equipment
- Purchase of aqueous cleaning machine and systems
- Site preparation
- Installation of machinery
- Operator training

4.12 Therefore, the overall programme conceived for implementation here includes awareness of the industry towards phasing out of these chemicals and taking up activities with the help of industry, R&D institutions to develop substitutes for the actual usage, as well as taking up demonstration projects with the help of experts in the field and translating the knowledge and experience gained to the other sectors.

Project Costs :

4.13 The project costs refers to all costs including incremental recurring costs. The cost of utilities and solvents may differ between project to project in the country. Annexure-I indicates the total project cost of US$ 159,250. The total project incremental cost of US $ 149,022 was calculated as the investment capital cost US $ 159,250 minus the net incremental operating savings of US$ 10,228 for 04 years discounted at 10%.

Capital Investment Cost :

4.14 As given in Annexure-I, the total investment cost is US $ 159,250. The major components of this cost include the purchase, installation of heat cleaning system and retrofitting of Blade Coating Systems with necessary ancillary equipment.

Incremental Operating Costs/Savings :

4.15 If the project was not undertaken, the annual operating cost could have been US $ 50,968. Once the project is implemented, the annual operating cost is US $ 47,740 resulting in annual operating saving of US $ 3,228. Given an equipment lifetime of 10 years and discount rate of 10% , the net value of the first 04 years of incremental operating savings is US $ 10,228. The details are provided in Annexure II.

Revenues :

4.16 This project provide to Microraj and RCC Sales Pvt. Ltd. with US$ 3,228 as annual incremental saving.

Local Ownership ratio.

4.17 Since the total project incremental cost should be multiplied by the fraction of local ownership i.e 100% to determine the proposed grant amount, so the total proposed multilateral fund financing is equal to total project incremental cost i.e. US $ 149,022

Contingencies :

4.18 The calculations are based on budgetary quotations and, therefore, suitable amount has been provided as contingencies to meet the unforeseen expenditure.

Unit Abatement Cost (UAC) :

4.19 As in Annexure III, the UAC is US $ 5.53 per ODP weighted kilogram of ODS phased out per year. This number is derived from an annualised incremental cost of capital US $ 159,250 and first year incremental annual operating savings of US $ 3,228 and phasing out of 5.13 MT of CFC-113 (4.1 ODP tons) ODS per year .

Proposed MF Grant :

4.20 The proposed MF grant for this project was US $. 149,022 calculated below :

The total investment cost of US $ 159,250 was deducted with the net present value of the incremental operating savings over the first 04 years of the project, which is US $ 10,228. The sum was then multiplied by the 100% Indian ownership ratio of, Microraj and RCC Sales yield the resultant grant of US $ 149,022.

4.21 MF Grant Calculation :

Total investment cost US $	: 159,250
Incremental Operating costs over the first four years US $	: 10,228
Proposed MF grant US $	: 149,022

Financing Plan :

4.22 MF funding is a grant and is limited to the capital and incremental savings as calculated above.

4.23 The project will be carried out at Microraj and RCC Sales in co-operation with Ozone Cell, Ministry of Environment and Forests, Government of India. UNIDO will also provide technical assistance to the project during its implementation.

Required Regulatory Action :

4.24 No regulatory action, other than routine permitting are required to implement this project.

Direct Project Impacts :

4.25 The project will eliminated annually 5.13 MT of ODS (4.1 MT ODP weighted) at Microraj and RCC (Sales) Pvt. Ltd., Hyderabad.

Annexure - I

Breakdown of total investment (capital) cost

Sl. No	Description of cost item	Unit	Unit cost US $	Qty.	Total cost US$
1.	**Training**				
	Material compatibility, process Development, preparation of Technological documentation, Reliability testing for new Cleaning & coating processes	week	200	25	5,000
2.	**Equipment Cost**				
	A. New blade edge coating system includes spray guns & high voltage controls.	ea	96,000	01	96,000
	B. Spray booth & fire proof Exhaust system	ea	6,000	01	6,000
	C. Conveyor for, indexing Carrier for Spray & rotary Table	set	16,500	01	16,500
3.	**Ancillary Equipment**				
	A. Homogeniser	Nos.	15,000	01	available
	B. Mixing tank & shaker	set	3,750	01	3,750
	C. Dust free air Circulation System	ea	17,000	01	17,000
4.	**Others**				
	A. Installation and Commissioning of all Above equipment	set	5,000	01	5,000
	B. Transportation, shipping & insurance	set	5,000	01	5,000
	C. Contingency				5,000
	Total				**159,250**

Annexure II

Breakdown of incremental cost/ savings

Description of	Unit	Unit cost US $	Qty. per year	Pre-project Total cost US$	Post Project Total cost US$
A. Solvent cost					
1. Vydax - 1000	Kgs.	30.0	452	13,560	--
2. CFC-113	Kgs.	4.0	5,130	20,520	
3 Vydax –(2000)/IPA	Kgs	30.5	435	--	13,270
4. IPA	Kgs.	2.2	4,350	--	9,570
5. Chlorinated solvent/ xylene for cleaning	Kgs	3.0	600	--	1,800
Sub Total				**34,080**	**24,640**
B. Energy Consumption					
1. Spray Unit	Kwh	0.1	128,800	12,888	
2. New Spray(IPA)	Kwh	0.1	85,000	--	8,500
3. Exhaust system for IPA coating	Kwh	0.1	126,000	---	12,600
Sub-Total				**12,888**	**21,100**
C. Labour costs					
C.1 Labour costs (4 machine in three shifts, 12 operators/shifts)	w/m	100	40	4,000	--
C.2 New Labour cost	w/m	100	20	-	2,000
Furnace, spray &					
Conveyer system 6					
Per shifts					
Sub-Total				**4,000**	**2,000**
TOTAL PRE-PROJECT COST/YEAR				50,968	47,740
TOTAL POST-PROJECT SAVINGS/YEAR					-(3,228)

Calculation of Unit-Abatement cost

A.	**ODS Phase out**		
A.1	Annual Consumption of		
	• CFC-113	mt	5.13
A.2	*ODP of*		
	• CFC-113		0.8
A.3	ODP		
	• CFC-113	mt	4.10
B.	**Annualised Capital Cost**		
B.1	Total Investment cost from Annexure I	US$	159,250
B.2	Equipment Life	years	10
B.3	Discount rate	%	10
B.4	Annualised Capital cost B.1* 0.1627	US%	25,910
C.	**Annual Incremental Operating Cost/Savings**	US$	3,228
D.	**Unit abatement cost**		
D.1	Annualised Capital Cost per kg. ODS phased out (B.4/A.3 * 1000)	US$/Kg.	6.32
D.2	Annual incremental operating savings per kg. phased out (C/A 3 * 1000)	US$/Kg	0.79
D.3	Unit Abatement Cost (D_1 - D_2)	US$/Kg	5.53