



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

19820

FINAL CONFIDENTIAL REPORT

ON

**TECHNO ECONOMIC ASSESSMENT OF THE FINANCIAL VIABILITY
OF THE COLLECTION AND SAFE DISPOSAL OF REFRIGERANT
GASES AND RELATED MATERIALS IN AFRICA**
(Project No. US/RAF/90/173)

VOLUME-IV: REGIONAL GUIDELINES & DATA BANK

FOR

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
VIENNA, AUSTRIA
(UNIDO CONTRACT No.91/212)**

M.92.629 N/210

AUGUST, 1992

MANTEC CONSULTANTS PVT. LTD., INDIA
(805, VISHAL BHAWAN, 95, NEHRU PLACE, NEW DELHI-110019 TEL: 6429295, FAX: 6447032, TLX: 31-75330)

in association with
S. B. BILLIMORIA & CO., INDIA

and experts from
INDIAN INSTITUTE OF TECHNOLOGY, NEW DELHI, INDIA
ACS, AUSTRALIA

SYNOPSIS

This report presents the background analysis that is intended to facilitate the UNIDO Secretariat to advise the Governments of Egypt, Kenya and Nigeria to enable them to launch an efficient system of collection/recovery and recycling of refrigerant gases and to develop regional guidelines for Africa as a whole.

The report is presented in four volumes, as described below :

VOLUME I : EGYPT COUNTRY STUDY
VOLUME II : KENYA COUNTRY STUDY
VOLUME III : NIGERIA COUNTRY STUDY
VOLUME IV : REGIONAL GUIDELINES & DATA BANK

Volumes I, II & III are structured similarly as under :

- The first part deals with a national economic audit on the pattern of import, demand and utilisation of CFCs in each of the countries based on an extensive primary survey. The audits, in turn, provide an assessment of the potential quantity of CFCs that can be recovered from various subsectors over the period allowed for complying with the Montreal Protocol.
- The second part looks at various feasible technical options and an analysis of the techno-economic viability of setting up nation-wide systems for recovery and recycling along with calculations of the net national economic benefits for each country for implementing such systems.
- The next part looks at the framework required for implementation, taking into account the technical, economic, socio-political and legislative environments in each of the countries.

Volume IV provides regional guidelines for Africa as a whole and the structure for a regional policy making oriented data bank. This volume reviews the analysis of the three countries on a comparative basis to evolve a generalised set of guidelines that could be used for implementing collection/recovery and recycling programmes throughout Africa to strengthen environmental and industrial policy and strategy in the region.

The findings of the study indicate that given adequate financial support from multilateral agencies and with appropriate legislation and institutional strengthening for implementation, viable programmes for collection/recovery and recycling of refrigerant gases can be set up in each of the project countries and policy guidelines can be established for Africa as a whole.

VOLUME IV - REGIONAL GUIDELINES & DATA BANK

TABLE OF CONTENTS

<u>CHAPTER NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
1.	INTRODUCTION	1 - 1
2.	COMPARISON OF THE COUNTRY CASE STUDIES	2 - 16
3.	REGIONAL POLICY GUIDELINES FOR AFRICA AS A WHOLE	17 - 25
	- INSTITUTIONAL GUIDELINES	17
	- LEGISLATIVE GUIDELINES	21
	- GUIDELINES FOR MARKET MEASURES	22
	- GUIDELINES FOR FINANCIAL SUPPORT	24
4.	REGIONAL DATA BANK	26 - 32
	- STRUCTURE OF REGIONAL DATA BANK	27
5.	CONCLUSIONS	33 - 34

LIST OF APPENDICES

- 3.1 ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING SUBSTANCES) NO. 1W.1B., VICTORIA, AUSTRALIA, 1990 PROVISIONS RELATING TO SALE OF CFCs
- 3.2 ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING SUBSTANCES) NO. 1W.1B., VICTORIA, AUSTRALIA, 1990 PROVISIONS RELATING TO ACCREDITATION OF USERS OF CFCs
- 3.3 ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING SUBSTANCES) NO. 1W.1B., VICTORIA, AUSTRALIA, 1990 PROVISIONS RELATING TO PURCHASE OF CFCs

- 3.4 ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING SUBSTANCES) NO. 1U.1B., VICTORIA, AUSTRALIA, 1990
- PROVISIONS RELATING TO ADOPTING PROPER PRACTICES IN USE OF CFCs
- 3.4(a) EXTRACTS OF RULES 1411 AND 1415 PERTAINING TO CFC RECOVERY, RECYCLING AND REDUCTION - SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, CALIFORNIA, 1991
- 3.5 PROVISIONS IN SWISS ORDINANCE ON ENVIRONMENTALLY HAZARDOUS SUBSTANCES
DISPOSAL OF EQUIPMENT CONTAINING CFCs
- 4.1 FORMAT FOR ENTERPRISE LEVEL DATA (LEVEL 1)
- 4.2 FORMAT FOR SUB-SECTOR LEVEL DATA (LEVEL 2)
- 4.3 FORMAT FOR SECTOR LEVEL DATA (LEVEL 3)
- 4.4 FORMAT FOR ECONOMIC DATA (LEVEL 4)
- 4.5 PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-EGYPT
- 4.6 PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-KENYA
- 4.7 PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-NIGERIA

CHAPTER - 1

INTRODUCTION

- 1.1 As a contribution to the efforts of the developing countries to meet the requirements of Montreal Protocol, UNIDO has embarked upon a project - US/RAF/90/173. The present study, which forms sub-programme 3 of the above project, has been entrusted to Mantec Consultants Pvt Ltd., India, by UNIDO vide letter dated 28th October, 1991 for carrying out a "Techno-Economic Assessment of the Financial Viability of the Collection and Safe Disposal of Refrigerant Gases and related materials in Africa".
- 1.2 One of the objectives in the terms of reference was to develop a set of policy guidelines and an outline of a policy-making oriented data bank for Africa region as a whole. This volume addresses itself to this task and aims at providing countries in Africa an appreciation of the tasks and policy aspects relating to introduction of a CFC recovery and recycling programme.

The volume is organised into the following chapters :

Chapter - 2 provides a comparative review of the three countries studied viz. Egypt, Kenya and Nigeria, in order to bring into focus the characteristics which are common as well as those that are distinctive to each country. This provides a basis for devising generalised regional policy guidelines as well as design inputs for a regional data bank.

Chapter - 3 sets out the guidelines in the following policy making areas

- institutional framework/organisation building
- legislation
- market measures
- financial support measures

Chapter - 4 provides an outline of a regional information system built up from enterprise level and aimed at providing inputs for policy making at national and regional levels.

Chapter - 5 summarises the key policy issues involved in formulating and implementing a CFC recovery and recycling programme in countries of the African Region.

CHAPTER - 2

COMPARISON OF THE COUNTRY CASE STUDIES

2.1 COMPARISON OF COUNTRY CASE STUDIES

In order to develop a generalised set of technical, economic and legislative guidelines for Africa as a whole it would be useful to first undertake a comparative review of the countries studied to bring into focus the characteristics that are common to these countries as well as those that are distinctive to each and which have an impact on the recommendations.

2.2 The per capita consumption of CFCs in the three project countries in 1991 was 33.7 gms, 4.15 gms and 8.5 gms in Egypt, Kenya and Nigeria respectively (population for 1991 estimated on the basis of 1989 figures & projected growth rate).

2.3 Table - 2.1 presents some economic indicators of the three project countries for the year 1989 (the latest year for which authenticated data for all three countries was available).

TABLE - 2.1

COMPARATIVE ECONOMIC INDICATORS (1989)

<u>PARAMETER</u>	<u>EGYPT</u>	<u>KENYA</u>	<u>NIGERIA</u>
- Area (Mn Sq.Km)	1.00	0.58	0.92
- Population (Mn)	54.76	23.20	109.00
- % Urban	44%	17.6%	15%
- % Rural	56%	82.4%	85%
- Population Growth %	2.6%	3.7%	2.6%
- GDP (Mn US\$)*	71,876	8,521	16,441
- Contribution* to GDP by Industry (%)	17%	11%	4%
- Per Capita* GDP US\$	1,403	368	157
- GDP Growth % * over previous yr.	5.3%	1.5%	4%
- Unemployment %	N.A.	N.A.	4.2%
- Balance of payments Trade Deficit (Mn US\$)	(-)4,851	(+) 67.2	N.A.
- Inflation Rate	13%	10.5%	9%

* Source : UN National Accounts Statistics, 1989

Of the three countries, Egypt ranks above the others in terms of per capita GDP and industrialisation. Significantly, it also has very large urban population. In absolute terms the level of industrial development in all countries is quite low (in comparison to developed countries).

In the last two years all these countries have been facing high inflation, slowdown in economic activity, an adverse balance of payments situation and erosion in their currency exchange rates. With the limited manufacturing infrastructure and dependence on imports there is a need in all the countries to conserve foreign exchange wherever feasible without affecting investment or industrial activity. This is a scenario, possibly common to all of the countries of Africa with the exception of, perhaps, South Africa.

Guidelines for extension of the system for recovery and recycling proposed in volumes I, II and III of this report for Egypt, Kenya and Nigeria, to other developing countries of Africa can be devised from the data collected and its analysis.

2.4 Table - 2.2 provides a comparative overview of the Refrigeration and Airconditioning sector in the three project countries.

TABLE - 2.2

COMPARATIVE OVERVIEW OF THE REFRIGERATION & A/C SECTOR
(All figures relate to 1991)

PARAMETERS	EGYPT	KENYA	NIGERIA
Production of equipment using CFCs (including imports, if any)			
* Domestic Refrigerators	300,000	20,000	115,000
* Units for Commercial & Industrial Refrigeration	9,160	15,260	23
* Domestic & Commercial Air Conditioners	20	Negligible	Negligible
* Mobile Air-Conditioners	10,000	1,500	34,000

Table - 2.2 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
Population and Projected Growth %			
- Domestic Refrigerators	6,686,000 (5%)	335,000 (3.5%)	1,646,000 (4.5%)
- Commercial Refrigeration	112,000 (4%)	176,600 (5%)	1,400 (1%)
- Domestic & Commercial Air conditioners	200 (5%)	Negligible -	30 -
- Mobile Air-conditioners	150,200 (4.5%)	9,500 (6%)	728,000 (3.5%)
Total CFC consumption (MT)	780	95.4	543
By sub-sector(MT)			
- Domestic Refrigerators	585	31.2	138.3
- Commercial Refrigeration	75	57.7	10.0
- Domestic & Commercial airconditioning	31	-	12
- Mobile Air-conditioners	89	6.5	382.7
Recharge requirement of CFCs	368	43.4	410
By sub-sector (MT)			
- Domestic Refrigerators	255	14.7	52.5
- Commercial Refrigeration	16	26.7	3.3
- Domestic & Commercial airconditioning	20	Negligible	12.0
- Mobile Air-conditioners	77	2.0	342.2

Table - 2.2 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
Recharging requirement (as % of total CFC consumption)	47%	45.5%	75.5%

The situation in Nigeria is somewhat different in comparison to the other project countries, mainly because of the very large proportion of airconditioned cars and low number of refrigerators. The large population of airconditioned cars are the result of the oil boom Nigeria had in the last decade. Most African countries are more likely to be somewhere in-between Egypt and Kenya in terms of development transition. The recharging demand for CFCs vis-a-vis total CFC consumption can therefore be expected to be around 45% to 50% as in the case of Egypt and Kenya rather than 75% as in the case of Nigeria (in Nigeria, if the impact of car airconditioners is not considered, this ratio comes to about 47 to 48% and this is more representative).

- 2.5 Table-2.3 presents a comparative study of the dimensions of the recovery and recycling programme envisaged for the three countries.

TABLE - 2.3

CFC RECOVERY AND RECYCLING - A COMPARATIVE ANALYSIS

PARAMETERS	EGYPT	KENYA	NIGERIA
CFC consumption by sub-sector cumulative for 1993-2010 (MT)			
- Domestic Fridges	5876.2	278.2	923
- Commercial & Industrial Refrigeration	309	490.8	79
- Commercial Air Conditioning	412	-	90
- Mobile Air-Conditioners	1102	60.7	2826.2

Table - 2.3 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
Total cumulative Consumption (MT)	1699.2	829.7	3918.2
Cumulative total recharging requirement from 1993 to 2010 (MT)	6131	727.4	3339
- as a % total consumption	79.6%	87.7%	85.2%
Max. CFC Recoverable by sub-sector from 1993 to 2010 (MT)			
- Domestic Fridges	3084	145	422.1
- Commercial & Industrial Refrigeration	133	233.5	23.4
- Commercial Air Conditioning	46	-	17.1
- Mobile Air-Conditioners	566	26	1005.7
Total	3829	404.5	1468.3
Practically recoverable quantity from 1993 to 2010 (MT)	1764	253	817
- as a % of total consumption	22.9%	30.4%	20.8%
- as a % of recharging requirement	28.8%	34.7%	24.4%
Type of service set up in each sub-sector			
- Domestic Fridges	Small repair agencies	Manufacturers' service deptt. plus small agencies	Manufacturers' service deptt. plus small agencies

Table - 2.3 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
- Commercial & Industrial refrigerators	Manufacturers service network	Manufacturers' service deptt.	Manufacturers' service deptt.
- Mobile Air-conditioners	Garages of various sizes	Big agencies	Garages of various sizes
<u>Costs: (in US\$)</u>			
- Project Cost			
* Recovery only	1352	1366	1352
* Recycling	3224	3244	3223
- Operational cost per kg			
* Recovery only	0.92	1.04	0.92
* Recycling	4.10	5.82	4.47
- Number of ventures proposed			
* Recovery only	100	40	150
* Recycling	12	5	10
Break-even quantity of CFC for enterprise			
Recovery	209 Kg	145 Kg	205 Kg
Recycling	1439 Kg	1013 Kg	1306 Kg
Total Project Investment(inUS\$)	173,888	70,860	235,030
Average annual value of CFC saved (in US\$)	215,606	35,159	100,889

The maximum quantity of CFC recoverable in the three project countries over the period 1993-2010 shows that Egypt has the largest quantity of over 3800 MT while Kenya has the lowest of approximately 426 MT.

In Egypt it is seen that the largest sub-sector i.e. domestic refrigerators and deep freezers is mainly serviced by a widely dispersed 'unorganised' sector of small repair workshops, whereas in Kenya and Nigeria these equipment are also serviced by the after sales service network of the manufacturers.

Commercial and industrial refrigeration equipment in all cases is invariably serviced by the manufacturer/supplier/user of equipment.

Mobile Airconditioning units i.e. car airconditioners are serviced by the large established automobile workshops of the importers/assemblers of foreign cars in Kenya. In Egypt and Nigeria, which are more industrialised, there are many smaller garages undertaking this activity.

A comparison of the project cost and operating costs of recovery and of recycling ventures in each of the countries shows project cost to be more or less equal (since the major component of this cost is equipment on which duty has been assumed to be waived). Operating costs are highest in Kenya followed by Nigeria and Egypt. However, the break even point for recovery and recycling ventures in Kenya is the lowest due to the high selling price of CFCs.

The average value of CFC saved on an annual basis in relation to the total investment is highest in Egypt and lowest in Nigeria which is largely a reflection of the practical feasibility of recovering CFCs in these countries especially Nigeria with its poor infrastructure and wide dispersion of consumption points.

2.6 CONSIDERATIONS FOR IMPLEMENTATION

Table - 2.4 presents the major issues for consideration in implementation of a recovery and recycling programme in the three project countries.

TABLE - 2.4

MAJOR ISSUES FOR CONSIDERATION IN IMPLEMENTING A RECOVERY AND RECYCLING PROGRAMME

<u>PARAMETERS</u>	<u>EGYPT</u>	<u>KENYA</u>	<u>NIGERIA</u>
<u>TECHNICAL</u>			
Present practices for maintenance & servicing	No codes of practice. Maintenance in the larg-	No codes of practice. CFCs used for flush-	No codes of practice. CFCs used for flushing.

Table - 2.4 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
	est sector, i.e, domestic fridges is by small agencies. CFC used for flushing	ing in significant quantities	Maintenance very poor especially in mobile airconditioning
Availability of equipment for recovery/recycling	Would have to be imported	Would have to be imported	Would require to be imported
Technical capability for operating a recovery & recycling unit	General technical awareness high but training still required at operating level.	Technical capability exists in pockets which would take up the programme.	Moderate technical capability exists. Training inputs required.
Logistics of collection	Recycling agencies would have to take the initiative to collect plastic bags from small agencies since domestic fridges is the largest sub-sector	Consumption centres fairly localised; therefore logistics not a major impediment	Consumption centres highly dispersed. Poor infrastructure which will have an impact on collection from domestic fridges.
Impact of compliance with the Montreal Protocol	No impact on compliance although CFC demand reduces	Enables compliance between 2005 and 2007	Enables compliance in 2007
Impact of alternatives like substitutes	Even with change over assumed to start by 1993 in car airconditioners, 1995	Even with change over assumed to start by 1995 in cars and domestic	Even with change over assumed to start by 1995 in Domestic fridges and

Table - 2.4 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
	in Domestic fridges significant CFC-12 based population exists for recharging	fridges significant CFC-12 based population exists for recharging	cars significant CFC-12 based population exists for recharging
<u>ECONOMIC</u>			
Factors affecting venture viability	Quantities of CFCs that are actually collected in bags; subsidy for investment, CFC pricing	Quantity of CFC available per venture too small. Subsidy for investment, CFC pricing	Subsidy for investment, CFC pricing
<u>INSTITUTIONAL</u>			
Price support mechanisms	Legislation required to ensure that agencies recover CFCs and CFC suppliers buy back recovered CFC	Since quantities are very small the institutional constraints are not so critical	Legislation & Government interaction would have limited effectiveness, program would have to be market driven.
Organisation for Coordinating and implementing the total programme	Though EEAA exists, there is no dedicated organisation with staff adequately trained in this area to manage the programme.	NES' present scale of activities not significant in respect of CFCs with dedicated staff and training required	Though FEPA has a mandate to oversee all environmental activities including CFCs, it lacks separate trained staff for this programme

Table - 2.4 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
Infrastructure for monitoring & control	While systems for reporting do not exist, no major resistance, envisaged in implementation	While systems for reporting do not exist, no major resistance, envisaged in implementation	Past record of legislation enforcement not very encouraging

The technical considerations are almost identical for the countries despite differences in economic terms and levels of CFC consumption.

Maintenance practices are uniformly poor in all the countries, leading to lower equipment life and greater CFC consumption.

CFCs are invariably used for flushing and leak detection requirements which in many cases is more than the charge and is not recovered.

The awareness about recovery and recycling systems is virtually non-existent.

The equipment would require to be imported in all three countries. The total requirement would not be sufficient to warrant setting up manufacture within the country.

While technical capability exists to operate the proposed recovery and recycling equipment in many segments, there is a need for formal training inputs to be provided to persons in the trade. Logistics of collection would be largely an issue where CFC is to be collected from domestic refrigerators using plastic bags.

This would be felt particularly for a country like Nigeria where the population is spread out.

Another issue is the impact of alternatives like substitutes.

Since all countries rely on collaborators from developed countries for compressor design and manufacture, change over to non CFC based equipment could take place fairly soon. Even assuming an early change over, there would be a large population of CFC based equipment requiring servicing.

Economic viability of recovery and recycling ventures in all the three countries is contingent on

- a) the investment being subsidised
- b) quantity of CFCs practically recoverable

In Nigeria, particularly, the 'profitability' would have to be demonstrated for recovery and recycling ventures to take off. In terms of institutional mechanisms the key issues would be to ensure that the collection & recovery systems are actually used by the concerned agencies; that the purchase of collected CFC (in bags and from recovery units) takes place; and the purchase is at prices which would be equitable and represent an economic gain to each unit in the chain.

In all the countries the present institutional framework is not ready for implementing a CFC recycling programme. Therefore, institutional strengthening is an area which requires attention in all the countries.

In terms of a legislative framework the extent of environmental legislation and scope in the three countries is still very limited. The enforcement machinery does not seem to be particularly strong especially in Nigeria and Kenya.

Lastly, public awareness about the effects of CFCs on the ozone layer, the need to restrict their use, as well as the knowledge that recovery and recycling can be viable, is poor in all the three countries, perhaps Egypt having a higher level of awareness.

2.7 Table - 2.5 summarises some of the key recommendations made for the three countries in Volumes I, II & III respectively.

TABLE - 2.5

RECOMMENDATIONS MADE FOR SUCCESSFUL
IMPLEMENTATION OF A RECOVERY AND RECYCLING PROGRAMME
- A COMPARISON

<u>PARAMETERS</u>	<u>EGYPT</u>	<u>KENYA</u>	<u>NIGERIA</u>
<u>TECHNICAL</u>			
Priority for sub-sectors (on the basis of proportion of recoverable CFC available and	Collection from domestic fridges using plastic bags should be	Collection from domestic fridges and commercial refrigeration	Recovery from car air-conditioners using recovery equip-

Table - 2.5 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
ease and practicability of implementation)	accorded first priority among sub-sectors; followed by recovery from car air conditioners using portable recovery equipment	accorded equal priority	ment given maximum priority; followed by collection from domestic fridges using plastic bags.
<u>FINANCIAL</u>	Supply bags free of cost; eliminate duty on recovery and recycling equipment; increase duty on CFCs	Supply bags free of cost; eliminate duty on CFC related equipment; increase duty on CFCs	Supply bags free of cost; eliminate duty on CFC related equipment; increase duty on CFCs
<u>INSTITUTIONAL STRENGTHENING</u>	Have EEAA create a separate wing to actively initiate and monitor various aspects of CFC Recovery & Recycling programme with the help of manufacturers.	NES to constitute a separate section which would collaborate with manufacturers and associations to initiate and monitor various aspects of recycling programme.	FEPA to create a special department with sub-divisions at various locations in the country which would initiate and coordinate implementation as well as monitor the launch of the program across the country. This department would oversee various aspects with the help of man-
	This body would oversee various aspects including - creation of stan-	This section would oversee various aspects including - creation of stan-	

Table - 2.5 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
	<ul style="list-style-type: none"> - standards & specifications for CFCs and equipment - providing technical inputs through training personnel - certification and accreditation of persons/enterprises - organise demonstration centers at various points - publicity - intervention, if required, in enforcing legislation - overall programme monitoring through information collection and co-ordination 	<ul style="list-style-type: none"> - standards & specifications for CFCs and equipment - providing technical inputs through training personnel - certification and accreditation of persons/enterprises - organise demonstration centers at various points - publicity - intervention, if required, in enforcing legislation - Examining the timing and feasibility of setting up a CFC bank. - overall programme monitoring through information collection 	<ul style="list-style-type: none"> - manufacturers' association. These aspects would include : <ul style="list-style-type: none"> - creation of standards & specifications for CFCs and equipment - providing technical inputs through training personnel - certification and accreditation of persons/enterprises - organise demonstration centers at various points - publicity - intervention, if required, in enforcing legislation - overall programme monitoring through information collection and co-ordination

Table - 2.5 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
<u>LEGISLATIVE MEASURES</u>		tion and co-ordination	
	Enact Legislation on :	Enact Legislation on:	Enact Legislation on :
	- code of practices including obligation to install recovery equipment by accredited service agencies and major equipment manufacturers	- code of practices including obligation to install recovery equipment by accredited service agencies and major equipment manufacturers	- code of practices including obligation to install recycling equipment by accredited service agencies and major equipment manufacturers
	- Proper use of CFCs including obligation to collect/recover CFCs by service agencies and the same to be bought by CFC suppliers	- Proper use of CFCs including obligation to collect/recover CFCs by service agencies and the same to be bought by CFC suppliers	- Proper use of CFCs including obligation to collect/recover CFCs by service agencies and the same to be bought by CFC suppliers
	- Sale and purchase of CFC including maintaining proper record of sale and	- Sale and purchase of CFC including maintaining proper record of sale and	- Sale and purchase of CFC including maintaining proper record of sale and

Table - 2.5 (Contd.)

PARAMETERS	EGYPT	KENYA	NIGERIA
	purchase of CFCs : virgin and recovered.	purchase of CFCs : virgin and re- covered.	purchase of CFCs : virgin and recovered.

It may be seen from the above table that other than the choice of sub-sector in terms of priority for action, the steps proposed are almost identical for the three countries in the area of financial support, and creating an institutional & legislative framework.

CHAPTER - 3

REGIONAL POLICY GUIDELINES FOR AFRICA AS A WHOLE

- 3.1 This Chapter deals with the guidelines for successful introduction of a system for collection, recycling and/or safe disposal of refrigerant gases, refrigerant insulation and related CFC based products in Africa as a whole.

The main focus is on refrigerant gases as the viability of collection, recycling or disposal of other materials like insulation is still not established even for developed economies.

The guidelines are derived from the analysis of the three country case studies presented in Volumes I to III and by viewing the broad contours of countries in the African region.

It must be also mentioned at the outset that these guidelines are not intended to be a prescription for any country or set of countries. Rather the intention is to enable different countries to view at a glance the package of policy measures that would be relevant for them in the process of implementing a system for recovery and recycling of refrigerant gases.

- 3.2 The guidelines are discussed under the broad areas of Institutional, Legislative, Market Based & Financial measures.

3.2.1 Institutional Guidelines

The institutional area is a key aspect which encompasses the organisational and the institutional framework within a country for initiating, implementing and monitoring the CFC recovery and recycling programme in the country.

The requirements for successfully managing such a programme are :

- to have an identified agency for programme planning and implementation whose tasks would include :
 - * formulating the programme objectives
 - * identifying programme tasks, implementation schedules and milestones
 - * coordinating with various agencies within the government, in industry and the International agencies

- to have technical capability and resources for
 - * organising demonstration of recycling equipment
 - * coordinating technical awareness and training programmes
 - * advising on training and codes of practice
 - * providing other technical support

While a few African countries have established environmental ministries, some countries have enlarged the portfolio of existing ministries to include responsibility for environment. Further, some countries have created environmental advisory bodies placed under one of the sectoral ministries or the centre while other countries have environmental committees placed directly under central planning authorities. These agencies have in many cases been constituted quite recently and except in some cases, have not taken major initiatives in environmental issues.

Also, only a third of the countries have till date ratified the Montreal Protocol and thus in most countries there is still no institutional framework for taking steps for reducing CFC consumption, particularly through a national recycling system.

Given the above scenario, the institutional guidelines would include the following.

1. Identify or create a department within the environment ministry or any other relevant body to act as a 'nodal agency' for implementing the recovery/recycling programme on a national basis.

The activities of this CFC nodal agency would cover planning & policy making, technical and coordination aspects.

a. Planning & Policy Making

The following activities would be covered within this area -

- collection and compilation of data on CFC consumption, recovery and recycling as outlined in the regional data bank (chapter - 4).
- identification of sub-sectors for initiating national recovery and recycling activities and formulation of a programme for recovery and recycling.

- formulation of policies relating to legislative, market and financial support at the venture as well as industry level measures in order to successfully implement the national programme for recovery and recycling.

b. Technical Aspects

These would be cover inter alia the following :

- evaluation of current practices in use of CFCs & servicing of CFC equipment
- development of codes of practice for use of CFCs during assembly/manufacture and servicing of airconditioning & refrigeration equipment.
- training of manufacturing and servicing personnel in conservation, recovery and recycling methods/equipment.
- propagation/demonstration of CFC recovery & recycling methods and equipment
- certification/accreditation of trained service agencies/mechanics
- evaluation of equipment suitable for recovery and recycling and standardisation of the same
- technical appraisal of venture level projects for recovery and recycling
- interaction with industry on various issues and providing appropriate advice for technical improvement.

c. Co-ordination with other agencies :

To formulate programmes and liaise with other agencies for funding and implementation. Other agencies would include :

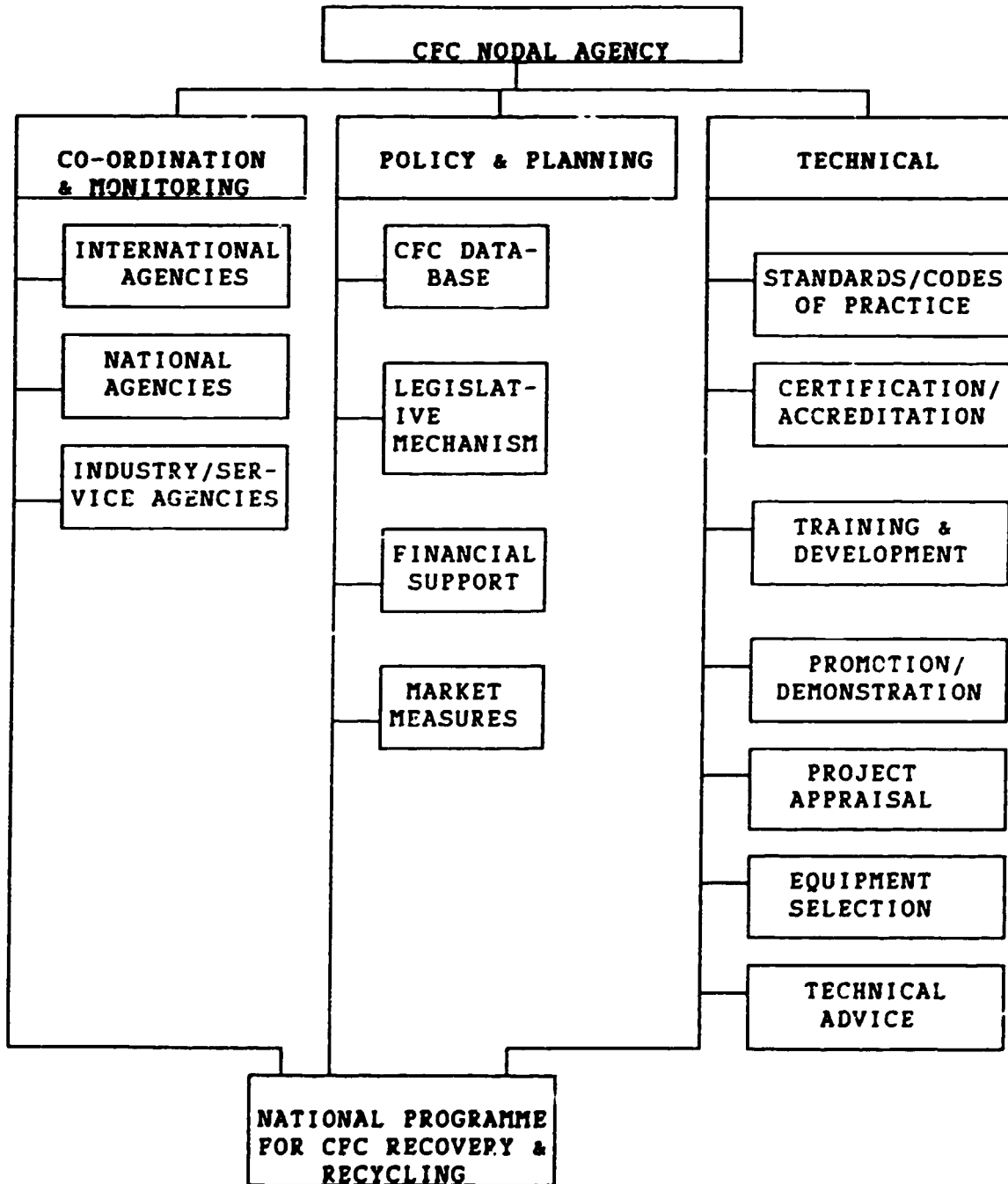
- other national agencies such as government departments/ministries and relevant national industry associations/bodies
- representatives of air conditioning & refrigeration industry/service agencies
- nodal CFC agencies of other African countries

- international agencies such as UN agencies, World Bank etc.

This regional policy making framework has been schematically depicted in Figure - 3.1.

FIGURE - 3.1

REGIONAL POLICY MAKING FRAMEWORK



3.2.2 Legislative Guidelines

The area of legislative measures is of significance in the context of recovery and recycling because of the following reasons.

Majority of the African countries, like most other countries of the developing world, hardly have any environmental legislation.

Even among the project area countries, Egypt, which has a high degree of consciousness about the environmental issues relating to CFC, had only as recently as 1989 issued a Ministerial decree banning the use of CFCs in aerosols from 1991. While it is not known how successful the compliance with the ban has been, it highlights the second point that environmental legislation usually needs to work in conjunction with economic incentives which is one of the reasons why in many countries it has been possible to substitute CFCs by LPG in aerosols.

In the context of recovery and recycling of refrigerant gases, the country case studies have shown that substantial economic incentives are required for making recovery and recycling systems viable.

Thus any guidelines for legislation in other African countries must take this into account.

On the other hand, given that most African countries, including the project area countries, are wholly dependent on imports for CFC, the possible savings in foreign exchange would be positive factor in supporting legislative measures. Additionally with more and more countries being aware of environmental issues and ratifying the Montreal Protocol, the climate is moving to one where certain legislations could be made effective.

Lastly, the experiences of many developed countries in relation to legislations on CFC consumption and usages can be drawn upon, on a case to case basis, by the countries in the African region.

Guidelines in the area of legislation would suggest enactment of suitable laws in respect of the following :

a) Supply of CFCs

This would ensure that importers maintain and make available data on CFC imports and CFC sales

Further legislation could be enacted to ensure

- obligation to buy back recovered CFC for recycling
- installation of recycling equipment

b) Usage of CFCs

This would include

- defining standards for CFC handling in equipment manufacture and servicing
- accreditation of agencies based on their compliance with standards
- limiting use of CFCs to accredited users
- installation of recovery equipment

From the example of the project area countries it can be seen that large auto-garages servicing mobile airconditioners and manufacturers servicing refrigerators can be asked to install recovery machines.

Appendices - 3.1 to 3.5 of this report lists examples of legislation in other countries in this context.

It may be reiterated, however, that the above guidelines for legislation must be part of a total package encompassing all areas viz institutional, market and financial support.

3.2.3 Guidelines for Market Measures

These measures typically are interventions by the Government in pricing and in the distribution of virgin, recovered as well as recycled CFCs.

The three country case studies bring out some of the characteristics of CFC supply and usage which could well be mirrored to some extent by most African countries.

For a start, all the project area countries import their entire requirement of CFCs.

The manufacture of equipment in the project area countries in all sub-sectors, viz domestic refrigerators; commercial and industrial refrigeration; commercial airconditioning and mobile airconditioning is limited to assembly. The compressors are invariably imported.

We would expect the situation to be similar in most African countries with the exception perhaps of South Africa.

This has the following implications on the consumption of CFCs for refrigeration and airconditioning.

- a) With the change over by developed countries to equipment based on substitutes with zero or near zero ODP, these countries are also expected to change over to similar equipment with perhaps a lag of 2 to 3 years.

Thus the major consumption of CFCs is likely to be from the recharging requirement of existing CFC based equipment.

- b) The consumption pattern of CFCs by sub-sector is also likely to follow the trend in the project countries.

Domestic refrigeration would be predominant where urbanization and climatic conditions require refrigeration.

Commercial refrigeration is likely to account for substantial consumption in the countries where meat or other food processing is a major industry and, finally, mobile airconditioners would account for a sizeable proportion of consumption where the population of cars and the climatic conditions influence such use.

- c) The servicing activity in the countries in the African region is expected to correspond to what was observed in the project area countries. More industrialization and greater urbanization is likely to result in more service agencies in the unorganised private sector. The smaller countries with few urban centers are more likely to have greater proportion of servicing undertaken by manufacturers' service centers.

With these features in view the policy measures, that could be set out for the Region in this area, could comprise one or more of those listed below.

1. Intervene with legislation to raise prices of virgin CFCs by imposing higher import duties. This would have the effect of making it attractive to recover CFC as that would be remunerative.
2. Impose quotas on import of CFCs to curb the overall import and therefore consumption of CFCs. These

quotas could be in the form of tradeable permits sold to the present importers.

3. In some countries the governments may have to consider intervention to facilitate physical flow and trade of recovered CFCs by initiating a CFC exchange or bank. This could be done by setting up a central recycling centre.
4. Take initiative in active promotion of the benefits of recycling through dissemination of information that

- CFCs can be recovered, recycled and reused
- equipment/aids for recovery/recycling are available
- there are economic and environmental benefits of recovering and recycling CFCs

3.2.4 Guidelines for Financial Support

The country studies have clearly brought out that a viable project for recovery and/or recycling is contingent mainly on fiscal relief provided in terms of duty exemption on capital equipment, subsidies on collection aids (such as plastic bags) as well as on recovery/recycling projects at venture level.

The net national economic benefits worked out for the three project countries also demonstrate that there is a net cost to the country concerned which has to be met from external sources.

In most African countries the parameters which account for the above situation are not likely to be very different.

The project cost for setting up a recovery unit or recycling unit is unlikely to be very different.

The per capita as well as aggregate consumption of CFCs is also known to be very low in African Countries (less than 0.1 kg per capita).

In such an event the guidelines for other African countries in terms of financial support measures would be similar to those recommended for the project area countries.

These are :

- providing subsidies on projects for recovery and

recycling which could be between 30-50% of equipment costs.

- funding cost for training, development, promotion & demonstration.
- waiving import duties on all recovery and recycling equipment and their spares etc.
- completely subsidising collection aids such as plastic bags for refrigerant recovery
- drawing up an initial proposal for funding by multilateral agencies.

3.3 It has been seen from the country case studies that typically the break even quantities for recovery units and recycling units correspond to 200 kg and 1400 kg of CFCs per year.

The average practically recoverable quantities are around 20-30% of the total cumulative consumption taken till 2010.

Thus a rough estimate of the number of ventures can be arrived at, knowing the total consumption (imports) of CFCs in these countries.

The preliminary proposal for funding could consider meeting the equipment costs, costs of plastic bags and for training and promotion based on the number of ventures in a particular country.

3.4 While the above paragraphs have outlined the major policy guidelines suggested for countries in the African region intending to implement a recovery and recycling programme for CFC's it must be mentioned that these are only guidelines and country specific recommendations can only be evolved out of detailed country studies or data that can be available through a Regional Data Bank elaborated in the next chapter.

3.5 In volumes I, II and III of this report, a number of technical, legislative, financial and market based measures have been suggested, specific to Egypt, Kenya & Nigeria respectively. It is necessary to monitor the effectiveness of implementation of these measures in these countries and utilise that experience to formulate appropriate measures for extending the project to the other countries in the African region.

CHAPTER - 4

REGIONAL DATA BANK

4.1 Our study of the project countries has revealed that one of the essential inputs for policy making in the area of CFC phase out is organised information on CFC supply and utilisation.

4.2 Based on the experience of the project countries, it is felt that in all likelihood, most of the other African countries would also not have organised data on CFC supply and use.

It is therefore desirable, and probably necessary, as a prelude to any policy making in these countries to lay the groundwork for compilation and organisation of such information.

4.3 In the previous chapter we had advocated, as part of the regional guidelines, the need to set up a nodal agency in each country under the Ministry of Environment, or other similar authority, which would, among other things, compile information on CFC supply and usage.

Information on supply includes particulars of sources of imports, major importers, quantities of CFCs imported etc.

Information on utilisation would mean knowing the extent of usage in different sub-sectors and the variables influencing the usage which could be used to project future consumption.

Such information on CFC supply and utilisation is neither available at the enterprise level nor at the aggregate level with any of the national bodies including governmental agencies or departments.

In the present study the data on CFC supply and utilisation has been built up through an extensive primary survey of a sample of respondents from all sub-sectors.

It is this data (together with inputs on the socio-economic environment, as well as the existing institutional structure to manage a recycling programme) that has been the foundation for a prognosis on future demand and the formulation of a national system for recovery and recycling.

4.4 We have, therefore, designed a data bank which could be used to address the above need.

4.5 STRUCTURE OF THE REGIONAL DATA BANK

The proposed structure of the data bank will have four levels as indicated below :

Level 1 : Enterprise level

Level 2 : Sub-sector level

Level 3 : Sector level

Level 4 : National level

- 4.5.1 At Level - 1 the data bank will have data on individual enterprises. Such data will cover the activity of individual enterprises in each sub-sector such as a manufacturer or a service agency and the particulars of utilization of CFCs by the enterprise including norms of consumption, practices followed for reclaim, wastage etc.

It is largely modelled on the kind of data obtained by us in the project countries from respondents.

This enterprise level data will be the basic building block of the Data Bank.

The input proforma to be completed by the individual enterprise is shown at Appendix 4.1, which will be received by the nodal agency.

The data would then be transported to the computer in a suitable format depending on the software environment selected for the applications.

The data inputs sought from enterprises provide for cross checks in relation to CFC consumption as obtained through procurement figures and that computed from production data and unit consumption norm indicated.

Hence the level 1 data could be used to provide inter unit comparisons on norms and other useful information.

The pilot entries for the three countries for a Level - 1 input are shown in Appendices 4.5 to 4.7.

- 4.5.2 At level - 2 the data will be an aggregation of enterprise level data into sub-sectors as well as inputs of those elements of data that are sub-sector specific.

Level - 2 information, for which the format is shown at Appendix - 4.2, can be generated in the computer by simple aggregation of the data at Level - 1 e.g. item no. 4 of Appendix - 4.2, total capacity (By Product Types) in the

sub-sector is obtained by consolidation of Item 9.1.2 in Level - 1 for each enterprise, i.e. installed capacity for each product type for an enterprise in a particular sub-sector. Thus it may be seen that the data base structure can itself be used to generate information on CFC consumption, utilisation recovery price etc. at the level of sub-sector (Level- 2) with suitable software.

- 4.5.3 At level - 3 the data will be an aggregation of sub-sector data for each sector plus any 'sector specific' data.

The information structure of Level 3, shown at Appendix 4.3, can be generated similarly as in the case of Level-2 by further aggregation of subsectors (i.e. Level-2 data).

- 4.5.4 At level - 4 the data will be an aggregation of sector level data as well as country specific data.

The country level data will contain entries like population, GDP, growth rates, balance of payment position, CFC consumption per capita, per-capita GDP etc.

Hence, Level - 4 which is information at country level holds two kinds of information.

One kind of information is Economic Data which is required as input from external sources into the system. Other inputs which are required from external sources are inputs on supply of CFCs as also on policy measures and various other items specified in the input format at Appendix - 4.4. Such information will be monitored and collected by the Nodal Agency.

Other elements in this level result from an aggregation of sector level information and can be generated through the data base linkage itself.

- 4.5.5 The 'Data Bank' as above will form the heart of a system at country level to formulate policies for phase-out programme with projects for recovery and recycling.

The framework of such a system is depicted in Figure -4.1.

- 4.5.6 Each country will have a code number and the country level data base would provide inputs at a regional level to facilitate comparative analysis on the imports on CFC consumption and conservation under different policy regimes.

Figure - 4.2 shows the scheme of such a regional information system.

FIGURE - 4.1

SYSTEM FRAMEWORK AT COUNTRY LEVEL
FOR REGIONAL POLICY ANALYSIS

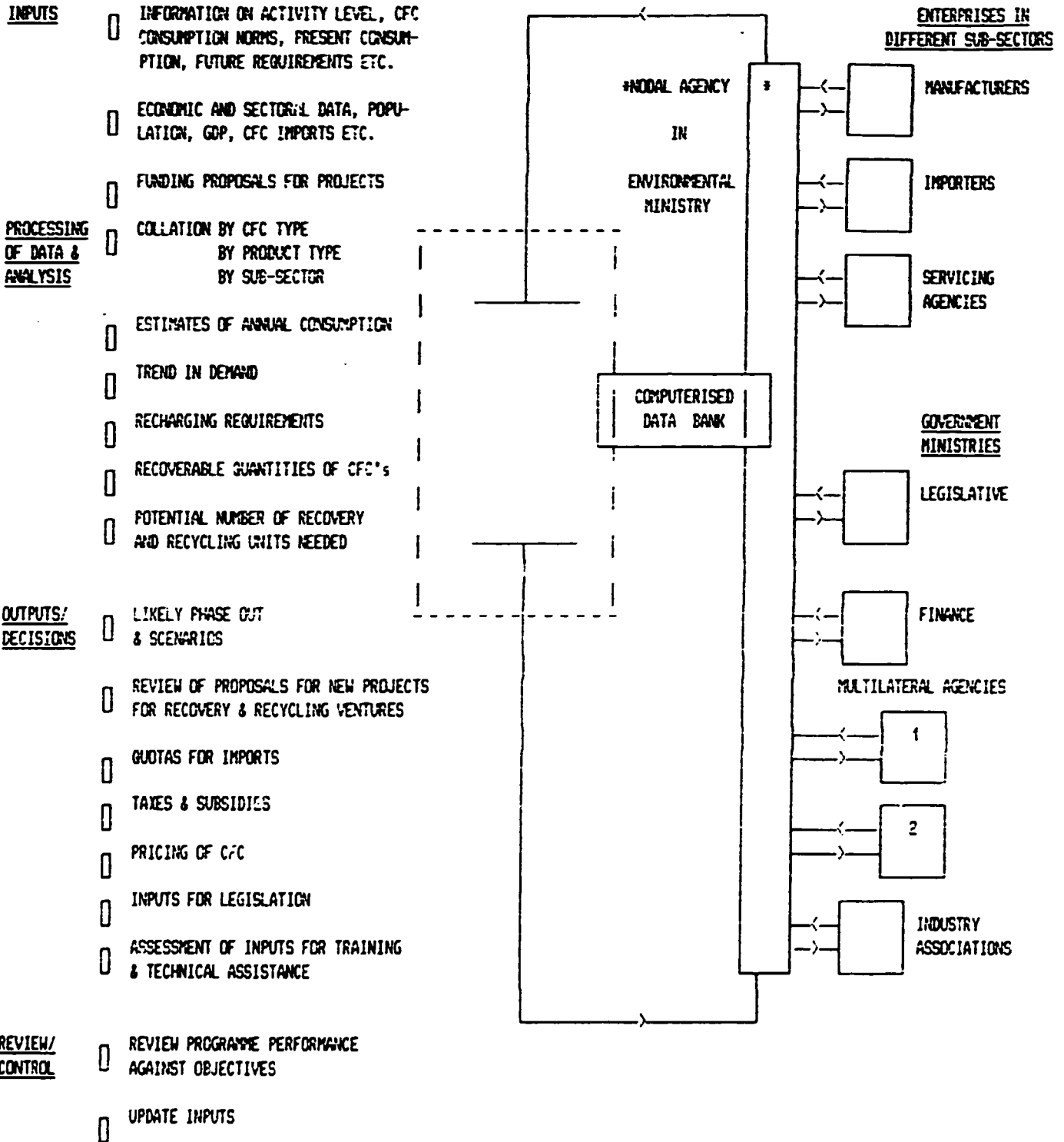


FIGURE - 4.2

SYSTEM OUTLINE AT REGIONAL LEVEL

INPUTS

- ECONOMIC PARAMETERS, POPULATION, GDP, GROWTH RATE
- POPULATION AND PRODUCTION OF EQUIPMENT USING CFC'S, GROWTH
- CFC CONSUMPTION FOR NEW EQUIPMENT, FOR RECHARGING
- NO. OF RECOVERY & RECHARGING INSTALLATIONS, ACTIVITY LEVEL
- EXISTING POLICY MEASURES, QUOTAS, DUTIES, SUBSIDY ON EQUIPMENT, INCREASED TAXES

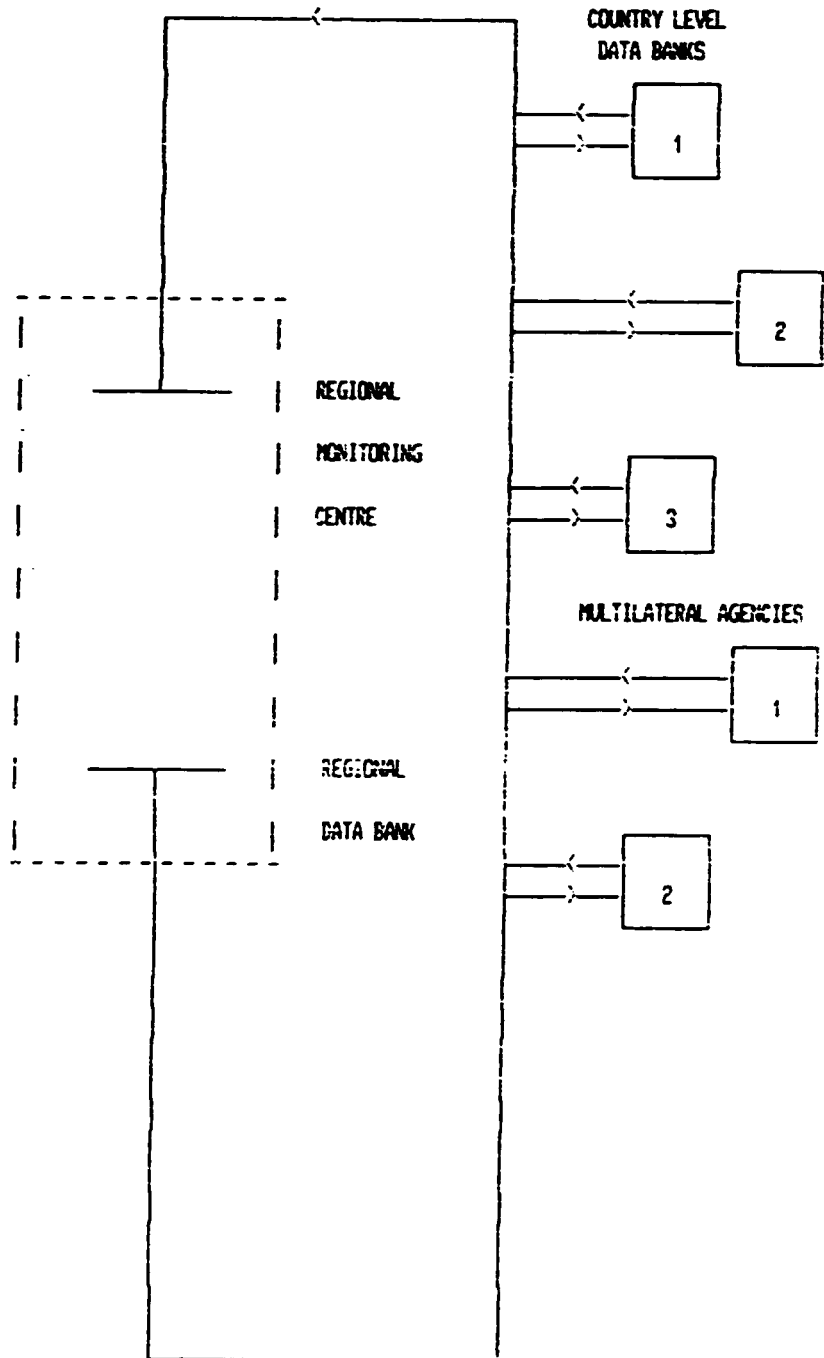
- EXTERNAL FUNDING

ANALYSIS

- REDUCTION IN CFC CONSUMPTION BY SUB-SECTORS-TREND BY COUNTRY
- CFC QUANTITY RECOVERED & RECYCLED IN EACH COUNTRY
 - AS % OF CONSUMPTION
 - AS % OF INVESTMENT

OUTPUT/DECISIONS

- ADVICE TO COUNTRIES ON POLICY MEASURES
- RECOMMENDATIONS FOR FUNDING PRIORITIES
- REVIEW OF REGIONAL CFC CONTAINMENT OBJECTIVES



The Regional Data Bank will be a collation of country wise data which would be available from the country level Data Bank.

Thus level - 4 at the country level mentioned earlier would correspond to the country level data in the Regional Data Bank.

- 4.6 The comparative analysis of different countries which may adopt different policy regimes would be the major output of the Regional Analysis which could provide useful inputs for policy shifts within countries or for feedback to multilateral agencies for redefining priorities in matters of funding etc. The policy regimes could be defined in terms of different parameters.

These could be

- Pricing of CFC's
- Extent of subsidy on recovery equipment
- Incentives for change over to substitutes
- Legislation to limit use of CFC's by accredited/certified agencies

The format of such an analysis would be similar to that adopted in the chapter-2 of this Volume, though the focus would be different.

- 4.7 The above outline is not intended to be a systems specification document which is not under the scope of this exercise.

It would, however, provide sufficient material to develop and construct an application system for a suitable computerised environment.

- 4.8 It may be mentioned that the present data bank outline does not cover the data on CFC utilisation at the enterprise level for other sectors e.g. Foams (excluding refrigerators), Aerosols or Cleaning as these are not related to recovery and recycling of CFCs from refrigeration and airconditioning equipment.

However the overall structure would allow integration of data on other sectors/sub-sectors also at a later point in time. This detailed outline of the data bank would serve as the basis for a future development of the software to generate specific outputs needed in the policy making process.

We have earlier recommended that this is one of the tasks to be overseen by the agencies coordinating the CFC recovery and recycling programme in each country.

- 4.9 From the experience of the project country studies it may be said that a one time comprehensive audit in various African countries can provide sufficient data at the enterprise, sub-sector and sectoral levels for assistance in framing required policy measures.

This data bank would then be updated each year by incorporating the information received through a system for annual reporting by individual enterprises, industry association, concerned govt. bodies etc.

- 4.10 As it is recognised that most of the countries in the African region will require some time for compilation of the information, the Regional Data Bank can be started based on the data available for the three countries - Egypt, Kenya & Nigeria. The data on other countries can be added on, as and when it become available.

CHAPTER - 5

CONCLUSIONS

- 5.1 This chapter summarises the key policy issues involved in formulating and implementing a CFC recovery and recycling programme in countries of the African Region.

With the development of low cost and compact aids as well as equipment for CFC recovery as well as recycling, it is now technically feasible to introduce CFC recovery and recycling technology in even low consumption countries. However, it is necessary to build up an institutional and policy making framework in most African countries in order to successfully plan and implement a national level programme for recovery and recycling.

The key policy issues are in the areas of :

- institutional building & framework
- legislation
- market measures
- financial support

An analysis of the three country case studies indicates that a strong organisational framework is a prerequisite for introducing any national scheme. Therefore, we have suggested that a nodal agency for CFCs should be created under the aegis of the environmental ministry (or equivalent department) in each country in order to plan, co-ordinate, frame policies, provide technical inputs and monitor the programme.

A mix of legislative, market and financial measures appears to be necessary in order to achieve effective implementation. While each country would have to formulate these measures unique to its requirement, a set of generalised guidelines drawn from the experience of project countries is helpful in formulating specific policies to illustrate :

- legislation to cover the following areas :
 - * import of CFCs
 - * installation of CFC recovery & recycling equipment
 - * buy-back of recovered CFCs

- * standards for CFC handling and use during manufacture as well as servicing
 - * accreditation and certification of servicing agencies
- market measures may have to be initiated to support the price of recovered/recycled CFCs by imposing taxes on virgin CFCs and imposing import quotas on the same. The physical flow of recovered & recycled CFCs may also have to be created by building CFC exchanges/banks through centralised recycling centres. In addition active promotion and dissemination of information on CFC recovery/recycling may also have to be carried out.
- financial support measures may include the following :
- * subsidies on equipment and collaboration aids and waiver of import duty on the same
 - * funding of training, development, promotion and demonstration costs at government level

Since data on CFC consumption is likely to be insufficient in most countries, it is suggested that a policy oriented data bank be set up in the region comprising of the following levels of information :

Level 1 : Enterprise level

Level 2 : Sector level

Level 3 : Country level

Level 4 : Regional level

This data bank will provide useful information for the region as whole to effectively devise strategies as well as monitor the impact of policy adopted by different countries in the Africa as a whole.

APPENDIX 3.1

ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE
MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING
SUBSTANCES) NO. 1U.1B

PROVISIONS RELATING TO SALE OF CFCs

1. Any distributor or wholesaler selling chlorofluorocarbons or halons must keep written records of sales.
2. Any distributor or wholesaler of chlorofluorocarbons must-
 - a) accept, wherever practicable, all reclaimed chlorofluorocarbons returned for reprocessing.
 - b) Keep written records of quantities of chlorofluorocarbon returned for reprocessing.
3. Accurate information on chlorofluorocarbon and halon consumption will be achieved as follows :
 - a) All records must include the name and address of the purchaser, the end use category, the quantity of ozone-depleting substances supplied and the quantity of ozone-depleting substances returned. The end use categories which must be recorded are -
 - foam production
 - solvents use
 - dry cleaning
 - vehicle air conditioning
 - commercial/industrial airconditioning and refrigeration
 - domestic refrigeration
 - domestic air conditioning
 - portable fire extinguishers
 - halon fire suppression systems
 - miscellaneous (if none of the above, specify the application or activity)
 - b) Written records must be sent to the authority no later than 14 days after each of the quarters ending 31 March, 30 June, 30 September and 31 December and must be available for inspection at any time by an authorised officer upon request.

APPENDIX 3.2

ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE
MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING
SUBSTANCES) NO. 1W.1B

PROVISIONS RELATING TO ACCREDITATION OF USERS OF CFCs

1. On and from 1 January 1991 any person who uses any ozone-depleting substance for or with respect to any industry or activity listed in Schedule C must be accredited by -
 - 1) an appropriate Industry Board : or
 - 2) by the Authority :
 - a) where there is no appropriate Industry Board; or
 - b) following a successful application for accreditation made under clause 26.
2. Accreditation shall be granted where the appropriate Industry Board or the Authority, as the case requires, is satisfied that the applicant has -
 - 1) an adequate appreciation of -
 - a) the role of ozone-depleting substances in depleting stratospheric ozone; and
 - b) the consequences of the depletion of stratospheric ozone; and
 - 2) a proven ability to take effective measures to minimise emissions of any ozone-depleting substances.
3. Where the appropriate Industry Board receives an application for accreditation, the appropriate Industry Board must not later than 60 days after receiving the application -
 - 1) refuse to grant accreditation; or
 - 2) grant accreditation subject to such conditions, if any, as the appropriate Industry Board considers appropriate.
4. A person who has been refused accreditation by the Industry Board may apply to the Authority for accreditation.
5. Where the Authority receives an application for accreditation, the Authority must, not later than 60 days after receiving the application -
 - 1) refuse to grant accreditation; or
 - 2) grant accreditation subject to such conditions, if any, as the authority considers appropriate

APPENDIX 3.2 (Contd..)

6. On and from 1 January 1991, any person who purchases any ozone-depleting substance for or with respect to any industry or activity listed in Schedule C must be registered by -

- 1) an appropriate Industry Board; or
- 2) by the Authority :

- a) where there is no appropriate Industry Board; or
- b) following a successful application for registration made under Clause 4.

7. Registration shall only be granted where the appropriate Industry Board or the Authority, as the case requires, is satisfied that -

- 1) any ozone-depleting substance purchased will only be supplied for use by an accredited person; and
- 2) the person applying for registration has access to the necessary equipment to minimise the emissions of any ozone-depleting substance.

ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE
MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING
SUBSTANCES) NO. 1U.1B

PROVISIONS RELATING TO PURCHASE OF CFCs

1. Any person who purchases any ozone-depleting substance must maintain, in respect of each purchase, written records which must -
 - 1) contain the following details :
 - a) the quantity of the ozone-depleting substance;
 - b) the name of the ozone-depleting substance; and
 - c) the name and address of the person from whom the ozone-depleting substance was purchased.
 - 2) be made available for inspection upon request at any time by an authorised officer.

ILLUSTRATIVE PROVISIONS OF THE INDUSTRIAL WASTE
MANAGEMENT POLICY (CONTROL OF OZONE DEPLETING
SUBSTANCES) NO. 1U.1B

PROVISIONS RELATING TO ADOPTING PROPER PRACTICES IN USE OF CFCs

Domestic Refrigeration

1. From the date of declaration of this policy, any person who designs or services domestic refrigeration units must comply with the "Code of Practice for the Design and Service of Domestic Refrigeration Units" endorsed by the Authority.

Motor Vehicle Air Conditioning

2. To reduce the emission of chlorofluorocarbons from motor vehicle air conditioning units -
 - 1) on and from the date of declaration of this policy, any person who designs or services motor vehicle air conditioning units must comply with the "Code of Practice for the Design and Service of Motor Vehicle Air Conditioning Units" endorsed by the Authority; and
 - 2) on and from 1 January 1991, services or maintains motor vehicle air conditioning units must reclaim chlorofluorocarbons whenever units are being serviced and maintained; and
 - 3) any chlorofluorocarbons reclaimed must be returned to the distributor or wholesaler for reprocessing, or recycled on-site or securely stores pending destruction.

Industrial/Commercial Air Conditioning and Refrigeration

3. To reduce the emission of chlorofluorocarbons from industrial and commercial air conditioning and refrigeration units -
 - 1) on and from the date of declaration of this policy, any person who designs or services industrial and commercial air conditioning and refrigeration units must comply with the Code of Practice for the Design and Service of Industrial and Commercial Air Conditioning and Refrigeration Units" endorsed by the Authority.

APPENDIX 3.4 (Contd..)

- 2) on and from 1 January 1991, any person who services or maintains industrial and commercial air conditioning and refrigeration units must reclaim chlorofluorocarbons whenever units are being serviced, maintained and decommissioned; and
- 3) Any chlorofluorocarbon that is reclaimed must be returned to the distributor or wholesaler for reprocessing, or recycled on-site or securely stores pending destruction.
4. On and from the date of declaration of this policy refrigeration and air conditioning units containing chlorofluorocarbons must be labelled in such a manner that the refrigerant can be identified by service personnel at all times.

Domestic Air Conditioning

5. To reduce the emission of chlorofluorocarbons from domestic air conditioners -
 - 1) on and from the date of declaration of this policy, any person who services or maintains domestic air conditioners must reclaim chlorofluorocarbons whenever units are being serviced and maintained at a central service premises; and
 - 2) any chlorofluorocarbon that is reclaimed must be returned to the distributor or wholesaler for reprocessing or recycled on-site or securely stored pending destruction.

APPENDIX - 3.4 A

South Coast Air Quality Management District, California, has introduced the following rules which are indicative of the requirements in the USA.

a) Rule 1411: Recovery or Recycling of Refrigerants from Motor Vehicle Air-conditioners

This rule prohibits, w.e.f. 1/1/92, release or disposal of refrigerants used in Motor Vehicle .PA Air-conditioners and prohibits the sale of refrigerant in containers carrying less than 20 pounds of refrigerant. This rule is applicable to any person engaged in installation, replacement and servicing of Motor Vehicle Air-conditioners or any other vehicle repairs that could cause release of refrigerants. This rule also applies to refrigerant retailers.

Certified recovery/recycling equipment is required to be installed and the technicians operating the machines required certification from competent authorities regarding adequate training for proper use of the equipment.

The Mobile Air Conditioning Society (MACS) have devised a program to impart proper training to technicians for proper use of equipment, understanding of the recovery process, equipment servicing requirements. A written test is administered (at a nominal cost of \$ 20 per person) and certificate issued to successful technicians.

b) Rule 1415 : Reduction CFC Emission from Stationary Refrigeration and Airconditioning Systems

The purpose of this rule is to reduce CFC emission from Stationary Emission and Air-conditioning Systems by requiring the owners or operators of such systems to reclaim recover and/or recycle the refrigerants and minimize leakages. This is also applicable to any persons who replace, service or relocate a refrigerant system.

On or after 1st January, 1992, persons covered under this rule are required to recover or recycle the refrigerant using approved equipment and employ specified procedures for the use of equipment. All installations of refrigerant systems require an inspection by a certified auditor to determine that the system is operating as per specifications and there are no refrigeration leakages. Such an inspection is required every 12 months.

The full text of the rules are available with us and the above is an extract to indicate the nature and coverage of the legislation in force regarding the recovery and recycling of refrigerants.

APPENDIX 3.5

PROVISIONS IN SWISS ORDINANCE ON ENVIRONMENTALLY
HAZARDOUS SUBSTANCES

DISPOSAL OF EQUIPMENT CONTAINING CFCs

1. The regulation inter alia contains special provisions for disposal, which means e.g. that refrigerants must be removed from discarded refrigerators and properly disposed of. On January 1st 1992, a concept for the elimination of used refrigerators and deep freezers, elaborated by the concerned industry, has become operational nationwide. According to this scheme, the consumer will give his old refrigerator back to the supplier, against a unit fee. The supplier will then pass on the refrigerator to a specialised elimination unit, that recovers the CFC from the refrigeration circuit and the insulating material.

Source : Ordinance of 9 June, 1986 relating to
Environmentally Hazardous Substances (Ordinance on
Substances; Rs 814.013).

LEVEL - 1

ENTERPRISE LEVEL DATA

<u>SL.NO. DATA ELEMENT</u>	<u>DATE OF UPDATE</u>	/ /
01. SERIAL NO.		
02. NAME AND ADDRESS OF ENTERPRISE :		
03. YEAR OF INCEPTION :		
04. NAME OF PROMOTER :		
05. NAME OF CONTACT PERSON :		
06. SUB-SECTOR APPLICABLE		
6.1 DOMESTIC FRIDGES & : DEEP FREEZERS (INCLUDING FOAMS)		
6.2 COMMERCIAL AND : INDUSTRIAL REFRIGERATION		
6.3 COMMERCIAL : AIRCONDITIONING		
6.4 MOBILE : AIRCONDITIONING		
* If enterprise is in more than one sub-sector then a record will exist for each sub-sector.		
07. TYPE OF ENTERPRISE :	a) Manufacturer b) Importer/Assembler c) Installation Contractor d) Repairer/Service Agency	
7.1 NO. OF EMPLOYEES :		
7.2 BREAK UP OF : EMPLOYEES BY ACTIVITY		
- MANUFACTURE		
- SERVICE*		
- OTHERS		
* Sales and distribution including service		

APPENDIX - 4.1 (Contd.)

08. TECHNICAL TIE-UPS :
- 8.1 NAMES OF TECHNO- :
LOGY SUPPLIER/
COLLABORATOR
 - 8.2 NATURE OF :
COLLABORATION
 - 8.2.1 DESIGN & DRAWINGS:
 - 8.2.2 EQUIPMENT SUPPLY :
 - 8.2.3 ANY OTHER :

INFORMATION ON ACTIVITY AND LEVELS

09. 9.1 MANUFACTURE/ASSEMBLY (FOR EACH SUB-SECTOR)
- 9.1.1 PRODUCT TYPES & :
MODELS UNDER
EACH PRODUCT
TYPE
 - 9.1.2 INSTALLED CAPA- :
CITY(NOS/ANNUM)
[BY MODEL OR
BY PRODUCT TYPE)
 - 9.1.3 ACTUAL PRODUC- :
TION
 - 9.1.4 ANNUAL GROWTH :
IN DEMAND
(PROJECTED)
 - 9.1.5 PRESENT INSTA- :
LLED BASE
[POPULATION]
AS OF YEAR END
[BY PROD.TYPE]
 - 9.1.6 SALES QTY (BY :
PRODUCT TYPE)
 - 9.1.7 PRESENT MARKET :
SHARE [BY
PRODUCT TYPE]
 - 9.1.8 ANNUAL CFC QUA- :
NTITY CONSUMED
 - CFC-12 :
 - CFC-11 :
 - OTHER CFCs :
(if any)
 - TOTAL :

APPENDIX - 4.1 (Contd.)

- 9.1.9 CFC CONSUMPTION:
NORM PER UNIT
- FOR FRESH
CHARGE BY
MODEL
- FOR FRESH
CHARGE BY
PRODUCT TYPE
BASED ON
WEIGHTED AVG.
- 9.1.10 CFC CONSUMPTION:
NORM
- FOR FOAM
BLOWING BY
MODEL
- FOR FOAM
BLOWING BY
PRODUCT TYPE
BASED ON
WEIGHTED AVG.
- 9.1.11 ESTIMATED LIFE :
OF PRODUCTS
BEFORE SCRA-
PPING(BY PRO-
DUCT TYPE)
IN YEARS
- 9.1.12 WARRANTY PERIOD:
BY PRODUCT TYPE
- 9.1.13 % AGE OF SALES :
AS RETURNS IN
WARRANTY PERIOD
BY PRODUCT
TYPE REQUIRING
RECHARGING
- 9.1.14 CFC QUANTITY :
USED FOR REC-
HARGE (BY
PRODUCT TYPE
OR MODEL)
- CFC QUANTITY :
USED BY RECHARGE
(BY PRODUCT TYPE
BASED ON WEI-
GHTED AVERAGE)

APPENDIX - 4.1 (Contd.)

- 9.1.15 FOAM INSULATION:
USED BY MODEL
(IN KGS)
- FOAM INSULATION:
USED BY PRODUCT
TYPE BASED ON
WEIGHTED AVE-
RAGE (IN KGS)
- 9.2 REPAIR/SERVICING (FOR EACH SUBSECTOR)
- 9.2.1 TYPES OF PRO- :
DUCTS SERVICED
- 9.2.2 NUMBER OF :
PRODUCTS SERVI-
CED PER YEAR
- 9.2.3 PRODUCTS SERVI-:
CED AT SITE
(BY PROD. TYPE)
- 9.2.4 PRODUCTS SERVI-:
CED INHOUSE(BY
PROD. TYPE)
AT OWN CENTRES
- 9.2.5 CONSUMPTION :
NORM OF CFC(BY
TYPE) FOR
PRODUCT TYPE
(KG/UNIT)
- 9.2.5.1 AVERAGE CFC (BY:
TYPE) RECOVE-
RABLE FOR PROD.
TYPE AS % OF
ORIGINAL
CHARGE)
- 9.2.6 CFC CONSUMPTION:
BY TYPE (QUAN-
TITY)
- 9.2.7 CFC CONSUMPTION:
BY TYPE VALUE

APPENDIX - 4.1 (Contd.)

9.3 INFRASTRUCTURAL FACILITIES

9.3.1 FACILITIES AVAILABLE FOR CHARGING AND HANDLING OF CFCs

9.3.1.1 STORAGE :

9.3.1.2 MEASUREMENT OF CHARGE :

9.3.1.3 LEAK DETECTION

9.3.1.4 FLUSHING

9.3.1.5 ESTIMATE OF CFC WASTAGE PER ANNUM (BY TYPE OF CFC) QTY/BY CAUSE PAST 1 YR) :

9.3.1.6 WHETHER ANY FACILITY EXISTS :

- FOR RECOVERY :
(YES/NO),
NUMBER OF

- FOR RECYCLING:
(YES/NO),
NUMBER OF

- COST OF EQUIPMENT :

9.3.1.7 QUANTITY OF CFC: (BY TYPE)

- RECOVERED/YR :
- %AGE OF TOTAL: USAGE
- RECYCLED YR :
- % OF TOTAL : USAGE

9.3.1.8 IF PLASTIC BAGS: USED FOR RECOVERY (Y/N)

- NUMBER OF BAGS USED :

- COST PER BAG :

APPENDIX - 4.1 (Contd.)

9.3.1.9 FOR RECOVERY, :
USING MACHINE

- TYPE OF UNIT :
- CIF PRICE :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

9.3.1.10 FOR RECYCLING :
USING MACHINE

- TYPE OF UNIT :
- PRICE CIF :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

10. CFC CONSUMPTION

10.1 SOURCES OF :
SUPPLY

10.2 BREAK-UP OF CFC:
PROCURED BY
DIRECT IMPORT
BY TYPE,

- QTY :
- BASIC PRICE :
- TAXES AND :
DUTIES
- FREIGHT :

10.3 SIZE OF CONTAIN:
ERS PROCURED IN

10.4 % QUANTITY PR- :
OCURED BY SIZE
OF CONTAINER

10.5 PROCUREMENT :
PRICE BY CFC
TYPE & CONTAI-
NER SIZE

APPENDIX - 4.1 (Contd.)

- 10.6 IF CFC RECOVERED, :
CONSUMED OR SOLD
- 10.7 IF SOLD, MODE OF :
SALE (CYLINDERS,
PLASTIC BAGS)
- 10.8 PRICE OBTAINED FOR :
RECOVERED CFC
 - IN BAGS
 - IN CYLINDERS
- 10.9 IF CFC RECYCLED :
AND SOLD (Y/N)
- 10.10 PRICE OBTAINED :
FOR SALE OF
RECYCLED CFC
- 11. ORGANISATION RELATED
 - 11.1 NO.OF EMPLOYEES:
 - 11.2 AVERAGE YEARLY :
WAGE RATE (AVG.
FOR ALL
EMPLOYEES)
 - FOR :
SUPERVISORS
 - FOR :
TECHNICIANS
 - 11.3 TOTAL INVEST- :
MENT IN PLANT
& EQUIPMENT
- 12. GENERAL
 - 12.1 STEPS TAKEN
TO REDUCE CON-
SUMPTION OF CFCs
 - 12.1.1 BY TECHNICAL
IMPROVEMENTS
 - 12.1.2 BETTER HANDLING:
PRACTICES
 - 12.1.3 BY SUBSTITUTION:

APPENDIX - 4.1 (Contd.)

12.1.4 BY RECOVERY & :
RECYCLING TYPE
OF EQUIPMENT
USED

12.2 APPROXIMATE % :
OF REDUCTION
ACHIEVED IN CFC
CONSUMPTION/
UNIT OF PRODUCT
BY PRODUCT TYPE)

12.3 PLANS OF COLLA-:
BORATOR TO
SWITCH OVER TO
SUBSTITUTES
(PRODUCT TYPE
AND SUBSTITUTE
PLANNED)

Note : 1. The data for previous years may please be
provided as available.
2. Records be kept so as to provide data for
multiple years in future.

LEVEL - 2SUB-SECTOR LEVEL DATA

<u>SL.NO.</u>	<u>DATA ELEMENT</u>	<u>LINKAGE REFERENCE</u> <u>[(LEVEL) SL.NO.]</u>
01.	SUB-SECTOR IDENTITY :	
	- DOMESTIC FRIDGES & DEEP FREEZERS (INCLUDING FOAMS) :	
	- COMMERCIAL & INDUSTRIAL REFRIGERATORS :	
	- COMMERCIAL AIRCONDITIONERS :	
	- MOBILE AIRCONDITIONERS :	
02.	NO. OF ENTERPRISES IN SUB-SECTOR (BY TYPE) :	
	- MANUFACTURER :	
	- ASSEMBLER/IMPORTER :	
	- INSTALLATION CONTRACTOR :	
	- REPAIRER/SERVICE AGENT :	
	- OTHERS :	
03.	PHYSICAL DISTRIBUTION OF ENTERPRISES (LOCATION & ENTERPRISE TYPE) :	
04.*	TOTAL CAPACITY (BY PRODUCT TYPES) :	(1) 9.1.2
05.*	ACTUAL PRODUCTION (BY PRODUCT TYPES) :	(1) 9.1.3
06.	ACTUAL SALES (BY PRODUCT TYPE) :	(1) 9.1.6
07.*	INSTALLED BASE (BY PRODUCT TYPE) :	(1) 9.1.5

APPENDIX - 4.2 (Contd.)

08.	GROWTH RATE OF EQUIP- MENT POPULATION (BY PRODUCT TYPE)	:	(2)	7
09.*	TOTAL CFC CONSUMPTION BY TYPE OF CFC QTY BY PRODUCT TYPE (MT)	:	(1)	
	9.1	NEW REFRIGERSNT: CHARGE	(1)	9.1.9
	9.2	FOR FOAMS	:	(1) 9.1.10
	9.3	FOR RECHARGING	:	(1) 9.1.14
10.	ESTIMATE OF WASTAGE OF CFC BY TYPE (BY CAUSE)	:	(1)	9.3.1.5
11.	NO. OF RECOVERY/RECY- CLING UNITS IN SUB- SECTOR	:	(1)	9.3.1.6
	WITH PLASTIC BAGS	:	(1)	9.3.1.8
	WITH RECOVERY MACHINE	:	(1)	9.3.1.9
	WITH RECYCLING MACHINE	:	(1)	9.3.1.10
11.1	INVESTMENT IN RECOVERY/ RECYCLING UNITS			
	11.1.1	RECOVERY UNITS :		
		- TOTAL COST	:	(1) 9.3.1.9
		- SUBSIDY		
	11.1.2	RECYCLING UNITS:		
		- TOTAL COST	:	(1) 9.3.1.10
		- SUBSIDY		
12.	CFC BY TYPE RECOVERED PER YEAR	:	(1)	9.3.1.7
	CFC BY TYPE RECYCLED PER YEAR	:		
12.1	RECOVERED CFC SOLD PER YEAR IN BAGS	:	(1)	10.8
	AVERAGE PRICE	:		

APPENDIX - 4.2

12.2 RECOVERED CFC SOLD PER : (1) 10.9
YEAR IN CYLINDERS

AVERAGE PRICE

12.3 RECYCLED CFC SOLD : (1) 10.11

AVERAGE PRICE

GENERAL

13 * TOTAL EMPLOYMENT IN : (1) 11.1
SUB-SECTOR

14 * TOTAL INVESTMENT IN : (1) 11.3
SUB-SECTOR

* To be aggregated from individual enterprise data

Note : 1. The data for previous years may please be provided as available.
2. Records be kept so as to provide data for multiple years in future.

LEVEL - 3SECTOR LEVEL DATA

<u>SL.NO.</u>	<u>DATA ELEMENT</u>	<u>LINKAGE REFERENCE</u> <u>[(LEVEL) SL.NO.]</u>
01.	SECTOR IDENTITY :	
	1.1 REFRIGERATION AND AIRCONDITIONING :	
	1.2 AEROSOLS :	
	1.3 PLASTIC FOAMS (EXCLUDING REFRIGERATOR FOAMS) :	
	1.4 SOLVENTS :	
02.	SUB-SECTORS WITHIN SECTOR (E.G. FOR 1.1) :	
	- DOMESTIC FRIDGES AND FREEZERS :	
	- COMMERCIAL AND INDUSTRIAL REFRIGERATION EQUIPMENT :	
	- COMMERCIAL AIRCONDITIONING :	
	- MOBILE AIRCONDITIONING :	
03.*	CONSUMPTION OF CFC BY SUB-SECTOR :	(2) 9
04.	GROWTH IN DEMAND OF CFC CONSUMPTION BY TYPE [BY SUB-SECTOR]) :	(3) 03
05.	CFC QUANTITY RECOVERABLE BY TYPE (LAST 3 YRS [BY SUB-SECTOR]) :	(2) 9.4

APPENDIX - 4.3 (Contd.)

06.* CFC CONSUMPTION (BY : (2) 13
TYPE) BY SOURCE OF
SUPPLY

SOURCE	CFC TYPE	YEAR	QTY	VALUE

07.* ESTIMATE OF WASTAGE OF : (2) 10
CFC (BY TYPE)

08.* TOTAL SECTORAL EMPLOY- : (2) 15
MENT

09.* TOTAL SECTORAL INVEST- : (2) 16
MENT IN PLANT &
EQUIPMENT

10. NUMBER OF VENTURES :
EXISTING FOR RECOVERY
AND FOR RECYCLING
- WITH PLASTIC BAGS : (2) 11
- WITH RECOVERY UNIT :
ONLY
- WITH RECYCLING UNIT :
- PRESENT YEAR
- YEAR-1

11. QUANTITY OF CFC (BY : (2) 12
TYPE) ACTUALLY RECOVERED
AND RECYCLED
- PRESENT YEAR
- YEAR-1

12. PRICES FOR CFC

12.1 COLLECTED : (2) 12.1
THROUGH BAGS

12.2 RECOVERED IN :
CYLINDERS
- PRESENT : (2) 12.2
YEAR
- YEAR-1 : (2) 12.2

12.3 RECYCLED : (2) 12.3

APPENDIX - 4.3 (Contd.)

13. INVESTMENT IN VENTURES :
FOR RECOVERY AND
RECYCLING

13.1	RECOVERY ONLY :		
	- TOTAL COST :	(2)	11.11
	SUBSIDY		
13.2	RECYCLING ONLY :		
	- TOTAL COST :	(2)	11.1.2
	SUBSIDY		

- Note : 1. The data for previous years may please be provided as available.
2. Records be kept so as to provide data for multiple years in future.

APPENDIX - 4.4 (Contd.)

12. TOTAL IMPORTS OF CFCs :
BY TYPE)

TYPE :	(ODP) :	YEAR :	QTY :	:	:	:
:	:	:	IN EQUIV:	:	:	:
:	:	:	ODP TONS:	CIF :	DUTY :	TOTAL
:	:	:	:	:	:	:
:	:	:	:	:	:	:
:	:	:	:	:	:	:

12.1 PRICE OF RECOVERED/
RECYCLED CFC'S :

-	RECOVERED IN BAGS	:	(3)	12.1
-	RECOVERED IN CYLINDERS	:	(3)	12.2
-	RECYCLED	:	(3)	12.3

13. CFC CONSUMPTION :
PER CAPITA (ODP GMS)

14. CFC CONSUMPTION PER :
GNP (ODP TONS)

USE OF CFCs

15. CONSUMPTION OF CFCs BY : (3) 3
SECTOR (BY CFC TYPE)

CFC CONSUMPTION QUANTITY

SECTOR :	CFC-11:	CFC-12 :	CFC-113:	CFC-114 :	CFC-115
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
TOTAL :	:	:	:	:	:

16. GROWTH IN DEMAND OF :
CFCs BY SECTOR (BY
CFC TYPE)

SECTOR :	GROWTH RATE %
:	:
:	:
:	:

APPENDIX - 4.4 (Contd.)

17. CFC RECOVERED AND RECYCLED (LAST 2 YRS) (BY CFC TYPE) : (3) 5
18. TOTAL CFC INVENTORY (LAST 2 YEARS) (BY CFC TYPE) : (3) 7
19. CFC LOST IN SCRAP & RECHARGING, EMISSION : (3) 8

CFC LOST

SECTOR	PRESENT YEAR			PREVIOUS YEAR			PRESENT YEAR-2		
	SCRAP	RECYCLING	EMISSION	SCRAP	RECYCLING	EMISSION	SCRAP	RECYCLING	EMISSION

20. TOTAL NUMBER OF VENTURES EXISTING FOR RECOVERY AND RECYCLING :
- WITH PLASTIC BAGS
 - WITH RECOVERY UNIT ONLY : (3) 10
 - WITH RECYCLING UNIT
 - PRESENT YEAR
 - YEAR - 1
21. TOTAL INVESTMENT IN RECOVERY AND RECYCLING VENTURES :
- WITH RECOVERY UNIT ONLY : (3) 13.1
 - WITH RECYCLING UNIT : (3) 13.2
22. TOTAL SUBSIDY GIVEN FOR RECOVERY/RECYCLING UNITS : (3) 13.1, 13.2

APPENDIX - 4.4 (Contd.)

23. FUNDING FROM MULTILATERAL SOURCES FOR EQUIPMENT :

POLICY MEASURES ADOPTED FOR CFC REDUCTION

24. IMPORT QUOTAS (Y/N) :
REDUCTION PLANNED OVER NEXT 3 YEARS AS PERCENTAGE OF 1991 CONSUMPTION

25. ARE QUOTAS TRADEABLE (Y/N) :

26. MARKET PREMIUM ON QUOTAS :

27. SUBSIDY ON EQUIPMENT USING SUBSTITUTES IF ANY (Y/N) :

EXTENT OF SUBSIDY

28. INCREASED TAXES ON CFC BASED EQUIPMENT, IF ANY (Y/N) :

EXTENT OF TAX INCREASE

29. TOTAL EXPENDITURE ON TRAINING & PROMOTION :

AMOUNT SPENT

NUMBER OF PERSONS TRAINED :

AMOUNT OF SUBSIDY FROM EXTERNAL SOURCES :

- Note : 1. The data for previous years may please be provided as available.
2. Records be kept so as to provide data for multiple years in future.

LEVEL - 1

PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-EGYPT

<u>SL.NO.</u>	<u>DATA ELEMENT</u>	<u>DATE OF UPDATE</u>	<u>/-----\</u> <u> / / </u> <u>\-----/</u>
01.	SERIAL NO.		
02.	NAME AND ADDRESS OF ENTERPRISE	:	KIRIAZI REFRIGERATOR MANUFACTURING CO. 10TH OF RAMADAN CITY, AREA B2 P.O. BOX 90, EGYPT
03.	YEAR OF INCEPTION	:	1985
04.	NAME OF PROMOTER	:	MR RAYMOND STEPHO KIRIAZI
05.	NAME OF CONTACT PERSON	:	MR KAHAL WADIE DOWOUD
06.	SUB-SECTOR APPLICABLE		
	6.1 DOMESTIC FRIDGES & DEEP FREEZERS (INCLUDING FOAMS)	:	_/
	6.2 COMMERCIAL AND INDUSTRIAL REFRIGERATION	:	X
	6.3 COMMERCIAL AIRCONDITIONING	:	X
	6.4 MOBILE AIRCONDITIONING	:	X
	* If enterprise is in more than one sub-sector then a record will exist for each sub-sector.		
07.	TYPE OF ENTERPRISE	:	a) Manufacturer _/ b) Importer/Assembler c) Installation Contractor d) Repairer/Service Agency _/
7.1	NO. OF EMPLOYEES	:	150
7.2	BREAK UP OF EMPLOYEES BY ACTIVITY	:	
	- MANUFACTURE		100
	- SERVICE		40
	- OTHERS		10

			150

APPENDIX - 4.5 (Contd.)

08. TECHNICAL TIE-UPS :
- 8.1 NAMES OF TECHNO- : ZEROWATT, ITALY
 LOGY SUPPLIER/
 COLLABORATOR
- 8.2 NATURE OF : Technological and other
 COLLABORATION support
- 8.2.1 DESIGN & DRAWINGS: YES
- 8.2.2 EQUIPMENT SUPPLY : NO
- 8.2.3 ANY OTHER : N.A.

INFORMATION ON ACTIVITY AND LEVELS

09. 9.1 MANUFACTURE/ASSEMBLY (FOR EACH SUB-SECTOR)
- 9.1.1 PRODUCT TYPES &: Domestic Refrigerators & Deep
 MODELS UNDER Freezers
 EACH PRODUCT
 TYPE
- A. DOMESTIC REFRIGERATORS
- | MODEL NO. | CAPACITY (LTRS) |
|-----------|-----------------|
| ----- | ----- |
| K 220 | 220 |
| K 330 | 330 |
| K 440 | 440 |
- B. DEEP FREEZERS
- | MODEL NO. | CAPACITY (LTRS) |
|-----------|-----------------|
| ----- | ----- |
| KCF 140 | 140 |
| KCF 180 | 180 |
| KCF 220 | 220 |
- 9.1.2 INSTALLED CAPA-: 1,00,000 per annum for
 CITY(NOS/ANNUM) refrigerators and deep
 (BY MODEL OR freezers
 BY PRODUCT TYPE)
- 9.1.3 ACTUAL PRODUC- : 50,000 (1991) of refrigerators
 TION and deep freezers
- 9.1.4 ANNUAL GROWTH : 10%
 IN DEMAND
 (PROJECTED)

APPENDIX - 4.5 (Contd.)

9.1.5	PRESENT INSTALLED BASE [POPULATION] AS OF YEAR END [BY PROD. TYPE]	MODEL NO. ----- K 220 K 330 K 440 KCF 140 KCF 180 KCF 220 ----- 200000 -----	NO. ---- 34000 11400 24000 12000 10000 60000 ----- 200000 -----
9.1.6	SALES QTY (BY PRODUCT TYPE)	MODEL NO. -----	NO (1991) -----
		A. Refrigerators :	
		K 220 K 330 K 440	2500 25000 10000
		B. Deep Freezers :	
		KCF 140 KCF 180 KCF 220	5000 5000 2500 ----- 50000 -----
9.1.7	PRESENT MARKET SHARE [BY PRODUCT TYPE]	17%	
9.1.8	ANNUAL CFC QUANTITY CONSUMED	QTY. -----	VALUE -----
	- CFC-12 :	14 MT	LE 160000 (Est.)
	- CFC-11 :	44 MT	Using blended polyol
	- OTHER CFCs (IF ANY) :	-	-
	- TOTAL :	58 MT -----	
9.1.9	CFC CONSUMPTION: NORM PER UNIT - FOR FRESH CHARGE BY MODEL	MODEL ----- K 220 K 330 K 440 KCF 140 KCF 100 KCF 220	NORM/UNIT FOR CFC-12 (GMS) ----- 190 235 220 175 100 185

APPENDIX - 4.5 (Contd.)

- FOR FRESH CHARGE BY PRODUCT TYPE BASED ON WEIGHTED AVG.	WTD AVG. EXCLUDING LOSSES(GMS)	AVG. LOSSES/ UNIT (GMS)	INCL. LOSSES (GMS)
	-----	-----	-----
	210	20 (@ 10%)	230
 9.1.10 CFC CONSUMPTION: NORM	MODEL	NORM FOR CFC-11/ UNIT (GMS)	
- FOR FOAM BLOWING BY MODEL	-----	-----	
	K 220	715	
	K 330	825	
	K 440	950	
	KCF 140	580	
	KCF 180	670	
	KCF 220	770	
 - FOR FOAM BLOWING BY PRODUCT TYPE BASED ON WEIGHTED AVG.	WTD AVG. EXCLUDING LOSSES(GMS)	LOSSES (GMS)	WTD AVG. INCL. LOSSES (GMS)
	-----	-----	-----
	805	80	885
 9.1.11 ESTIMATED LIFE OF PRODUCTS BEFORE SCRAPPING(BY PRODUCT TYPE) IN YEARS	20 years (estimate)		
 9.1.12 WARRANTY PERIOD: BY PRODUCT TYPE	3 years		
 9.1.13 % AGE OF SALES AS RETURNS IN WARRANTY PERIOD BY PRODUCT TYPE REQUIRING RECHARGING	1-2% per year		
 9.1.14 CFC QUANTITY USED FOR RECHARGE (BY PRODUCT TYPE OR MODEL)	AVERAGE 210 GMS/UNIT		

(Nitrogen/dry compressed air used for flushing/leak detection).

APPENDIX - 4.5 (Contd.)

CFC QUANTITY : Nil as repair is undertaken at
 USED BY RECHARGE service centre
 (BY PRODUCT TYPE
 BASED ON WEI-
 GHTED AVERAGE)

9.1.15 FOAM INSULATION: USED BY MODEL (IN KGS)	MODEL	KGS OF FOAM USED (POLYOL MIX)
	-----	-----
	K 220	4.7
	K 330	5.6
	K 440	6.4
	K 140	3.9
	K 180	4.5
	K 220	5.2

FOAM INSULATION: 5.0 KG
 USED BY PRODUCT
 TYPE BASED ON
 WEIGHTED AVE-
 RAGE (IN KGS)

9.2 REPAIR/SERVICING (FOR EACH SUBSECTOR)

- | | | |
|---------|--|--|
| 9.2.1 | TYPES OF PRO- :
DUCTS SERVICED | ALL MODELS |
| 9.2.2 | NUMBER OF :
PRODUCTS SERVI-
CED PER YEAR | 9000 |
| 9.2.3 | PRODUCTS SERVI- :
CED AT SITE
(BY PROD. TYPE) | < 10% |
| 9.2.4 | PRODUCTS SERVI- :
CED INHOUSE(BY
PROD. TYPE)
AT OWN CENTRES | > 90% |
| 9.2.5 | CONSUMPTION :
NORM OF CFC(BY
TYPE) FOR
PRODUCT TYPE
(KG/UNIT) | Average 210 gms

(Nitrogen/dry compressed air
used for flushing/leak detec-
tion). |
| 9.2.5.1 | AVERAGE CFC (BY:
TYPE) RECOVE-
RABLE FOR PROD.
TYPE AS % OF
ORIGINAL CHARGE) | 80% for Compressor failure
cases |

APPENDIX - 4.5 (Contd.)

- 9.2.6 CFC CONSUMPTION: 2 MT CFC-12
BY TYPE (QUANTITY)
- 9.2.7 CFC CONSUMPTION: LE 23000 (Estimated)
BY TYPE VALUE
- 9.3 INFRASTRUCTURAL FACILITIES
- 9.3.1 FACILITIES AVAILABLE FOR CHARGING AND HANDLING OF CFCs
- 9.3.1.1 STORAGE : Cylinders for CFC-12 & Drums for blended polyol
- 9.3.1.2 MEASUREMENT OF CHARGE : Pressure Gauge at Mobile Trucks & Charging Station at Service Centre.
- 9.3.1.3 LEAK DETECTION : Electronic Leak Detector
- 9.3.1.4 FLUSHING : Nitrogen/Dry Compressed air
- 9.3.1.5 ESTIMATE OF CFC WASTAGE PER ANNUM (BY TYPE OF CFC) QTY/BY CAUSE PAST 1 YR : 10% of total consumption for CFC-12 and 10% of CFC-11.
- 9.3.1.6 WHETHER ANY FACILITY EXISTS :
- FOR RECOVERY : No
(YES/NO)
NUMBER OF : N.A.
 - FOR RECYCLING: No
(YES/NO)
NUMBER OF : N.A.
 - COST OF EQUIPMENT : N.A.
- 9.3.1.7 QUANTITY OF CFC: (BY TYPE)
- RECOVERED/YR : Nil
 - %AGE OF TOTAL USAGE : N.A.
 - RECYCLED YR : N.A.
 - % OF TOTAL USAGE : N.A.

APPENDIX - 4.5 (Contd.)

10.4	% QUANTITY PROCURED BY SIZE OF CONTAINER	:	CFC-11 ----- 100%	CFC-12 ----- 1 MT Containers - 85% 30 kg Cylinders - 15%
10.5	PROCUREMENT PRICE BY CFC TYPE & CONTAINER SIZE	:	CFC-11 ----- Use blended Polyols	CFC-12 ----- 1 MT containers Avg. LE 11.50/kg
10.6	IF CFC RECOVERED, CONSUMED OR SOLD	:	No	
10.7	IF SOLD, MODE OF SALE (CYLINDERS, PLASTIC BAGS)	:	N.A.	
10.8	PRICE OBTAINED FOR RECOVERED CFC	:	N.A.	
	- IN BAGS			
	- IN CYLINDERS			
10.9	IF CFC RECYCLED AND SOLD (Y/N)	:	No	
10.10	PRICE OBTAINED FOR SALE OF RECYCLED CFC	:	N.A.	

11. ORGANISATION RELATED

11.1	NO. OF EMPLOYEES:	:	150	
11.2	AVERAGE YEARLY WAGE RATE (AVG. FOR ALL EMPLOYEES)	:	LE 600	
	- FOR SUPERVISORS	:	N.A	
	- FOR TECHNICIANS	:	N.A	
11.3	TOTAL INVESTMENT IN PLANT & EQUIPMENT	:	Total capital in 1990 was LE 12.5 Mn	

APPENDIX - 4.5 (Contd.)

12. GENERAL

- 12.1 STEPS TAKEN TO REDUCE CONSUMPTION OF CFCs : Started using Nitrogen for flushing and cleaning
- 12.1.1 BY TECHNICAL IMPROVEMENTS : None
- 12.1.2 BETTER HANDLING: PRACTICES : Use of Electronic test detector
- 12.1.3 BY SUBSTITUTION: : None
- 12.1.4 BY RECOVERY & RECYCLING TYPE OF EQUIPMENT USED : None, has planned to installed recovery & recycling plant for demonstration purposes
- 12.2 APPROXIMATE % OF REDUCTION ACHIEVED IN CFC CONSUMPTION/ UNIT OF PRODUCT BY PRODUCT TYPE) : Nil
- 12.3 PLANS OF COLLABORATOR TO SWITCH OVER TO SUBSTITUTES (PRODUCT TYPE AND SUBSTITUTE PLANNED) : HCFC-134a for compressors by 1994-95. 50% less CFC based blended polyols based on its availability expected by '93.

- Note : 1. The data for previous years may please be provided as available.
2. Records be kept so as to provide data for multiple years in future.

LEVEL - 1

PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-KENYA

<u>SL.NO.</u>	<u>DATA ELEMENT</u>	<u>DATE OF UPDATE</u>	<u>/-----\</u> <u> / / </u> <u>\-----/</u>
---------------	---------------------	-----------------------	--

01. SERIAL NO.

02. NAME AND ADDRESS OF ENTERPRISE : TOYOTA KENYA LTD
P.O.BOX 45912
UHURU HIGHWAY, NAIROBI

03. YEAR OF INCEPTION : AIRCONDITIONED CAR WAS
INTRODUCTION IN 1990.

04. NAME OF PROMOTER : TOYOTA MOTOR CO., JAPAN

05. NAME OF CONTACT PERSON : MR B M GACHOKA
LOCAL CONTENT MANAGER

06. SUB-SECTOR APPLICABLE

6.1 DOMESTIC FRIDGES & :
DEEP FREEZERS
(INCLUDING FOAMS)

6.2 COMMERCIAL AND :
INDUSTRIAL
REFRIGERATION

6.3 COMMERCIAL :
AIRCONDITIONING

6.4 MOBILE : _/
AIRCONDITIONING

* If enterprise is in more than one sub-sector then a record will exist for each sub-sector.

07. TYPE OF ENTERPRISE : a) Manufacturer
b) Importer/Assembler _/
c) Installation Contractor
d) Repairer/Service _/
Agency

7.1 NO. OF EMPLOYEES : 4 (involved in airconditioning jobs)

7.2 BREAK UP OF :
EMPLOYEES BY
ACTIVITY

- MANUFACTURE :) 3
- SERVICE :)
- OTHERS (Admn.) : 1

APPENDIX - 4.6 (Contd.)

08. TECHNICAL TIE-UPS :
- 8.1 NAMES OF TECHNO- : TOYOTA MOTOR CO., JAPAN
 LOGY SUPPLIER/
 COLLABORATOR
- 8.2 NATURE OF
 COLLABORATION
- 8.2.1 DESIGN & DRAWINGS: _/
 8.2.2 EQUIPMENT SUPPLY : --
 8.2.3 ANY OTHER : Supply of CKD/SKD Kits

INFORMATION ON ACTIVITY AND LEVELS

09. 9.1 MANUFACTURE/ASSEMBLY (FOR EACH SUB-SECTOR)
- 9.1.1 PRODUCT TYPES & : Airconditioned Passengre cars
 MODELS UNDER : Corolla 1600 CC (only one model
 EACH PRODUCT : is airconditioned)
 TYPE
- 9.1.2 INSTALLED CAPA-: N.A.
 CITY(NOS/ANNUM)
 [BY MODEL OR
 BY PRODUCT TYPE)
- 9.1.3 ACTUAL PRODUC- : 180 (in 1991)
 TION
- 9.1.4 ANNUAL GROWTH : about 5%
 IN DEMAND
 (PROJECTED)
- 9.1.5 PRESENT INSTA- : 220
 LLED BASE
 [POPULATION]
 AS OF YEAR END
 [BY PROD.TYPE]
- 9.1.6 SALES QUANTITY : 180 (IN 1991)
 (BY PRODUCT
 TYPE)
- 9.1.7 PRESENT MARKET : 18%
 SHARE [BY
 PRODUCT TYPE]
- 9.1.8 ANNUAL CFC QUA-: QTY. VALUE
 NTITY CONSUMED : ----
 - CFC-12 : 500 Kg KSH 110,000
 - CFC-11 : NIL -
 - OFHTER CFCs :
 (if any)
- TOTAL :

APPENDIX - 4.6 (Contd.)

- 9.1.9 CFC CONSUMPTION:
NORM PER UNIT
- FOR FRESH : Corolla 1600 CC : 2.8 kg
CHARGE BY (including losses etc.)
MODEL
 - FOR FRESH : Same as above (only one model)
CHARGE BY
PRODUCT TYPE
BASED ON
WEIGHTED AVG.
(INCLUDING
LOSSES ETC.)
- 9.1.10 CFC CONSUMPTION:
NORM
- FOR FOAM : N.A
BLOWING BY
MODEL
 - FOR FOAM : N.A
BLOWING BY
PRODUCT TYPE
BASED ON
WEIGHTED AVG.
- 9.1.11 ESTIMATED LIFE : 20 years (estimate)
OF PRODUCTS
BEFORE SCRA-
PPING(BY PRO-
DUCT TYPE)
IN YEARS
- 9.1.12 WARRANTY PERIOD: NIL
BY PRODUCT TYPE
- 9.1.13 % OF SALES AS : NEGLIGIBLE
RTURNS IN WARR-
ANTY PERIOD BY
PRODUCT TYPE
REQUIRING RE-
CHARGE
(LAST 5 YRS)
- 9.1.14 CFC QUANTITY : Corolla 1600 CC : 3 kg
USED FOR REC-
HARGE (BY
PRODUCT TYPE
OR MODEL)

APPENDIX - 4.6 (Contd.)

	CFC QUANTITY : USED BY RECHARGE (BY PRODUCT TYPE BASED ON WEI- GHTED AVERAGE)	Same as above
9.1.15	FOAM INSULATION: USED BY MODEL (IN KGS)	N.A
	FOAM INSULATION: USED BY PRODUCT TYPE BASED ON WEIGHTED AVE- RAGE (IN KGS)	N.A
9.2	<u>REPAIR/SERVICING</u>	(FOR EACH SUBSECTOR)
9.2.1	TYPES OF PRO- : DUCTS SERVICED	Airconditioned Passenger Cars (Toyota make)
9.2.2	NUMBER OF : PRODUCTS SERVI- CED PER YEAR	About 75-100
9.2.3	PRODUCTS SERVI- : CED AT SITE (BY PROD. TYPE)	NIL
9.2.4	PRODUCTS SERVI- : CED INHOUSE(BY PROD. TYPE) AT OWN CENTRES	100%
9.2.5	CONSUMPTION : NORM OF CFC(BY TYPE) FOR PRODUCT TYPE (KG/UNIT)	CFC-12 : 3 kg/unit
9.2.5.1	AVERAGE CFC (BY: TYPE) RECOVE- RABLE FOR PROD. TYPE AS % OF ORIGINAL CHARGE)	80-90% if there is no leakage (only compressor failure)
9.2.6	CFC CONSUMPTION: BY TYPE (QUAN- TITY)	3 kg/unit

APPENDIX - 4.6 (Contd.)

9.3.1.8 IF PLASTIC BAGS: No
USED FOR
RECOVERY (Y/N)

- NUMBER OF : N.A.
BAGS USED

- COST PER BAG : N.A.

9.3.1.9 FOR RECOVERY, : N.A.
USING MACHINE

- TYPE OF UNIT :
- CIF PRICE :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

9.3.1.10 FOR RECYCLING : N.A.
USING MACHINE

- TYPE OF UNIT :
- PRICE CIF :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

10. CFC CONSUMPTION

10.1 SOURCES OF : REFRIGERATION CONTRACTORS LTD,
SUPPLY NAIROBI
(Imported from GALCO LTD,
BELGIUM)

10.2 BREAK-UP OF CFC:
PROCURED BY
DIRECT IMPORT
BY TYPE,

- QTY : NIL

- BASIC PRICE : N.A

- TAXES AND : N.A
DUTIES

- FREIGHT : N.A

APPENDIX - 4.6 (Contd.)

- | | | |
|-------|---|---|
| 10.3 | SIZE OF CONTAINERS PROCURED IN | : Disposable Cylinders (13.6 kg) |
| 10.4 | % QUANTITY PROCURED BY SIZE OF CONTAINER | : 100% in 13.6 kg cylinders |
| 10.5 | PROCUREMENT OF PRICE BY CFC TYPE & CONTAINER SIZE | : KSH 3000 per Cylinder(13.6 Kg) |
| 10.6 | IF CFC RECOVERED, CONSUMED OR SOLD | : No |
| 10.7 | IF SOLD, MODE OF SALE (CYLINDERS, PLASTIC BAGS) | : N.A. |
| 10.8 | PRICE OBTAINED FOR RECOVERED CFC | : N.A. |
| | - IN BAGS | |
| | - IN CYLINDERS | |
| 10.9 | IF CFC RECYCLED AND SOLD (Y/N) | : No |
| 10.10 | PRICE OBTAINED FOR SALE OF RECYCLED CFC | : N.A. |
| 11. | ORGANISATION RELATED | |
| 11.1 | NO.OF EMPLOYEES: | 4 (involved in airconditioning jobs) |
| 11.2 | AVERAGE YEARLY WAGE RATE (AVG. FOR ALL EMPLOYEES) | |
| | - FOR SUPERVISORS | :) |
| | - FOR TECHNICIANS | :) |
| | |) KSH 4,000 to 8,000 per month |
| 11.3 | TOTAL INVESTMENT IN PLANT & EQUIPMENT | : KSH 60,000 for charging station & electronics leak detector (Rest of infrastructure common for general servicing of cars) |

APPENDIX - 4.6 (Contd.)

12. GENERAL

- 12.1 STEPS TAKEN :
TO REDUCE CON-
SUMPTION OF CFCs
- 12.1.1 BY TECHNICAL : NO
IMPROVEMENTS
- 12.1.2 BETTER HANDLING: Use of Electronic Leak
PRACTICES Detector
- 12.1.3 BY SUBSTITUTION: NO, Received technical
literature from parent company
about HFC 134a based car air-
conditioning units. Awaiting
further guidelines about
commercialisation of the same.
- 12.1.4 BY RECOVERY & : NO
RECYCLING TYPE
OF EQUIPMENT
USED
- 12.2 APPROXIMATE % : N.A
OF REDUCTION
ACHIEVED IN CFC
CONSUMPTION/
UNIT OF PRODUCT
(BY PRODUCT TYPE)
- 12.3 PLANS OF COLLA-: See item 12.1.3 above.
BORATOR TO
SWITCH OVER TO
SUBSTITUTES
(PRODUCT TYPE
AND SUBSTITUTE
PLANNED)

- Note : 1. The data for previous years may please be
provided as available.
2. Records be kept so as to provide data for
multiple years in future.

LEVEL - 1

PILOT ENTRIES AT ENTERPRISE LEVEL FOR DATA BANK-NIGERIA

<u>SL.NO.</u>	<u>DATA ELEMENT</u>	<u>DATE OF UPDATE</u>	(-----\ / / \-----)
01.	SERIAL NO.		
02.	NAME AND ADDRESS OF ENTERPRISE	:	THERMOCOOL ENGINEERING CO.PLC PLANNING OFFICE WAY, ILUPEJU LAGOS.
03.	YEAR OF INCEPTION	:	1971
04.	NAME OF PROMOTER	:	PATERSON ZOCHONIS PLC MANCHESTER, UK
05.	NAME OF CONTACT PERSON	:	MR R M RAYNER
06.	SUB-SECTOR APPLICABLE		
	6.1 DOMESTIC FRIDGES & DEEP FREEZERS (INCLUDING FOAMS)	:	_/
	6.2 COMMERCIAL AND INDUSTRIAL REFRIGERATION	:	x
	6.3 COMMERCIAL AIRCONDITIONING	:	x
	6.4 MOBILE AIRCONDITIONING	:	x
	* If enterprise is in more than one sub-sector then a record will exist for each sub-sector.		
07.	TYPE OF ENTERPRISE	:	a) Manufacturer _/ b) Importer/Assembler c) Installation Contractor d) Repairer/Service Agency _/
	7.1 NO. OF EMPLOYEES	:	714
	7.2 BREAK UP OF EMPLOYEES BY ACTIVITY		
	- MANUFACTURE	:	586
	- SERVICE*	:	77
	- OTHERS	:	51

			714

* Sales & Distribution including serv

APPENDIX - 4.7(Contd..)

08. TECHNICAL TIE-UPS

- 8.1 NAMES OF TECHNO- : Paterson Zochonis Plc, Manch-
LOGY SUPPLIER/ ester, UK
COLLABORATOR
- 8.2 NATURE OF : Technological and other
COLLABORATION support
- 8.2.1 DESIGN & DRAWINGS: Yes
- 8.2.2 EQUIPMENT SUPPLY : N.A.
- 8.2.3 ANY OTHER : N.A.

INFORMATION ON ACTIVITY AND LEVELS

09. 9.1 MANUFACTURE/ASSEMBLY (FOR EACH SUB-SECTOR)

- 9.1.1 PRODUCT TYPES & : Domestic Refrigerators & Deep
MODELS UNDER Freezers
EACH PRODUCT
TYPE

A. DOMESTIC REFRIGERATORS

MODEL NO. CAPACITY (LTRS)

T 150 140
T 200 180
T 250 230
T 300 270
T 400 310

B. DEEP FREEZERS

MODEL NO. CAPACITY (LTRS)

F 251 250
F 381 380

- 9.1.2 INSTALLED CAPA- : 2,50,000 os per annum for
CITY(NOS/ANNUM) refrigerators and deep
[BY MODEL OR freezers
BY PRODUCT TYPE)
- 9.1.3 ACTUAL PRODUC- : 32,000 (1991) of refrigerators
TION and deep freezers
- 9.1.4 ANNUAL GROWTH : 10%
IN DEMAND
(PROJECTED)

APPENDIX - 4.7(Contd..)

9.1.5 PRESENT INSTALLED BASE : 500,000 (estimated)
 [POPULATION]
 AS OF YEAR END
 [BY PROD.TYPE]

9.1.6 SALES BY PRODUCT TYPE : SPLIT AS FOLLOWS (AVERAGE)
MODEL NO. %

T 150	10
T 200	45
T 250	10
T 300	5
T 400	12
F 251	10
F 381	8

	100

9.1.7 PRESENT MARKET SHARE : 28%
 [BY PRODUCT TYPE]

9.1.8 ANNUAL CFC QUANTITY CONSUMED

	Qty.	Vale
- CFC-12 :	7 MT	Naira 1,75,000 (est)
- CFC-11 :	22 MT	Naira 3,90,000 (est)
- OTHER CFCs (if any) :	-	-
- TOTAL :	29 MT	Naira 5,65,000 (est)

9.1.9 CFC CONSUMPTION: NORM PER UNIT

- FOR FRESH CHARGE BY MODEL

MODEL	NORM/UNIT FOR CFC-12 (GMS)
-----	-----
T 150	100
T 200	130
T 250	165
T 400	283
F 251	165
F 381	283

- FOR FRESH CHARGE BY PRODUCT TYPE BASED ON WEIGHTED AVG. (INCLUDING LOSSES ETC.)

WTD AVG. EXCLUDING LOSSES(GMS)	AVG.LOSSES/ UNIT (GMS)	INCL. LOSSES (GMS)
-----	-----	-----
167	50 (@ 30%)	217

APPENDIX - 4.7(Contd..)

9.1.10	CFC CONSUMPTION: NORM	MODEL	NORM FOR CFC-11/ UNIT (GMS)	
		-----	-----	
	- FOR FOAM	T 150	325	
	BLOWING BY	T 200	388	
	MODEL	T 250	516	
		T 300	611	
		T 400	868	
		F 251	824	
		F 381	1067	

	- FOR FOAM	WTD AVG.	LOSSES	WTD AVG.
	BLOWING BY	EXCLUDING	(GMS)	INCL LOSSES
	PRODUCT TYPE	LOSSES(GMS)		(GMS)
	BASED ON	-----	-----	
	WEIGHTED AVG.	561	112	673
			(20%)	

9.1.11 ESTIMATED LIFE : 10 Years
OF PRODUCTS
BEFORE SCRA-
PPING(BY PRO-
DUCT TYPE)
IN YEARS

9.1.12	CFC QUANTITY : USED FOR REC- HARGE (BY PRODUCT TYPE OR MODEL)	MODEL	NORM/UNIT FOR CFC-12 (GMS)
		-----	-----
		T 150	100
		T 200	130
		T 250	165
		T 400	283
		F 251	165
		F 381	283

(Nitrogen/dry compressed air
used for flushing/leak detec-
tion).

CFC QUANTITY : USED BY RECHARGE (BY PRODUCT TYPE BASED ON WEI- GHTED AVERAGE)	WTD AVG. EXCLUDING LOSSES(GMS)	AVG.LOSSES/ UNIT (GMS)	INCL. LOSSES (GMS)
	-----	-----	-----
	167	50	217
		(@ 30%)	

9.1.13 WARRANTY PERIOD: 12 Months
BY PRODUCT TYPE

APPENDIX - 4.7(Contd..)

9.1.14 % AGE OF SALES : 1.5% (warranty)
AS RETURNS IN
WARRANTY PERIOD
BY PRODUCT
TYPE REQUIRING
RECHARGING
- LAST 5 YRS

9.1.15	FOAM INSULATION: USED BY MODEL (IN KGS)	MODEL -----	KGS OF FOAM USED -----
		T 150	2.46
		T 200	2.94
		T 250	3.91
		T 300	4.63
		T 400	6.58
		F 251	6.24
		F 381	8.08

FOAM INSULATION:
USED BY PRODUCT
TYPE BASED ON
WEIGHTED AVE-
RAGE (IN KGS) 4.25

9.2 REPAIR/SERVICING (FOR EACH SUBSECTOR)

9.2.1 TYPES OF PRO- : ALL MODELS
DUCTS SERVICED

9.2.2 NUMBER OF : 30,000
PRODUCTS SERVI-
CED PER YEAR

9.2.3 PRODUCTS SERVI- : < 10%
CED AT SITE
(BY PROD. TYPE)

9.2.4 PRODUCTS SERVI- : > 90%
CED INHOUSE(BY
PROD. TYPE)
AT OWN CENTRES

9.2.5	CONSUMPTION : NORM OF CFC(BY TYPE) FOR PRODUCT TYPE (KG/UNIT)	MODEL -----	NORM/UNIT FOR CFC-12 (GMS) -----
		T 150	100
		T 200	130
		T 250	165
		T 400	283
		F 251	165
		F 381	283

(Nitrogen/dry compressed air used
for flushing/leak detection).

APPENDIX - 4.7(Contd..)

- 9.2.5.1 AVERAGE CFC (BY: 80% for Compressor failure
TYPE) RECOVERABLE FOR PROD. cases.
TYPE AS % OF
ORIGINAL
CHARGE)
- 9.2.6 CFC CONSUMPTION: 6.5 MT
BY TYPE (QUANTITY)
- 9.2.7 CFC CONSUMPTION: 2,70,000
BY TYPE VALUE
- 9.3 INFRASTRUCTURAL FACILITIES
- 9.3.1 FACILITIES AVAILABLE FOR CHARGING AND HANDLING OF CFCs
- 9.3.1.1 STORAGE : Tanks for CFC-12 & Drums for R-11
- 9.3.1.2 MEASUREMENT OF : Through charging station
CHARGE (semi-automatic station with setting)
- 9.3.1.3 LEAK DETECTION : Electronic
- 9.3.1.4 FLUSHING : Nitrogen/Dry Compressed air
- 9.3.1.5 ESTIMATE OF : 30% of total consumption for
CFC WASTAGE PER ANNUM (BY TYPE OF CFC) QTY/BY CAUSE PAST 1 YR) CFC-12 and 20% of CFC-11.
- 9.3.1.6 WHETHER ANY :
FACILITY EXISTS
- FOR RECOVERY : No
(YES/NO)
NUMBER OF N.A.
 - FOR RECYCLING: No
(YES/NO)
NUMBER OF N.A.
 - COST OF : N.A.
EQUIPMENT

APPENDIX - 4.7(Contd..)

9.3.1.7 QUANTITY OF CFC:
(BY TYPE)

- RECOVERED/YR : Nil
- %AGE OF TOTAL : N.A.
USAGE
- RECYCLED YR : N.A.
- % OF TOTAL : N.A.
USAGE

9.3.1.8 IF PLASTIC BAGS: No
USED FOR
RECOVERY (Y/N)

- NUMBER OF : N.A.
BAGS USED
- COST PER BAG : N.A.

9.3.1.9 FOR RECOVERY, : N.A.
USING MACHINE

- TYPE OF UNIT :
- CIF PRICE :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

9.3.1.10 FOR RECYCLING : N.A.
USING MACHINE

- TYPE OF UNIT :
- PRICE CIF :
- DUTY (%) :
- INSTALLED :
COST
- SUBSIDY REC- :
EIVED, IF ANY

10. CFC CONSUMPTION

10.1 SOURCES OF : CAPL, Lagos
SUPPLY ICI, Manchester

10.2 BREAK-UP OF CFC: N.A.
PROCURED BY

APPENDIX - 4.7(Contd..)

DIRECT IMPORT
BY TYPE,

- QTY :
- BASIC PRICE :
- TAXES AND DUTIES :
- FREIGHT :

10.3	SIZE OF CONTAINERS PROCURED IN	CFC-11 ----- 295 Kg Drums	CFC-12 ----- 1 MT containers for factory 13.5/64 Kg cylinders for servicing
10.4	% QUANTITY PROCURED BY SIZE OF CONTAINER	CFC-11 ----- 100%	CFC-12 ----- 1 MT containers-52% 13.5 Kg/64 Kg cylinders - 48%
10.5	PROCUREMENT PRICE BY CFC TYPE & CONTAINER SIZE	CFC-11 Avg. Naira 17.7/kg	CFC-12 Av. Naira 25/Kg
10.6	IF CFC RECOVERED, CONSUMED OR SOLD	:	No
10.7	IF SOLD, MODE OF SALE (CYLINDERS, PLASTIC BAGS)	:	N.A.
10.8	PRICE OBTAINED FOR RECOVERED CFC	:	N.A.
	- IN BAGS		
	- IN CYLINDERS		
10.9	IF CFC RECYCLED AND SOLD (Y/N)	:	No
10.10	PRICE OBTAINED FOR SALE OF RECYCLED CFC	:	N.A.

11. ORGANISATION RELATED

11.1 NO.OF EMPLOYEES: 714

APPENDIX - 4.7(Contd..)

11.2	AVERAGE YEARLY : WAGE RATE (AVG. FOR ALL EMPLOYEES)	Naira 8,800
	- FOR : SUPERVISORS	N.A.
	- FOR : TECHNICIANS	N.A.
11.3	TOTAL INVEST- : MENT IN PLANT & EQUIPMENT	N.A. (Value of total fixed assets in 1991 was Naira 69.89 million).
12.	GENERAL	
12.1	STEPS TAKEN : TO REDUCE CON- SUMPTION OF CFCs	None
12.1.1	BY TECHNICAL : IMPROVEMENTS	None
12.1.2	BETTER HANDLING: PRACTICES	None
12.1.3	BY SUBSTITUTION:	None
12.1.4	BY RECOVERY & : RECYCLING TYPE OF EQUIPMENT USED	None
12.2	APPROXIMATE % : OF REDUCTION ACHIEVED IN CFC CONSUMPTION/ UNIT OF PRODUCT BY PRODUCT TYPE)	Nil
12.3	PLANS OF COLLA- : BORATOR TO SWITCH OVER TO SUBSTITUTES (PRODUCT TYPE AND SUBSTITUTE PLANNED)	HCFC-134a for compressors by 1994-95. Water blowing in foam by mid-1992.

- Notes :
1. The data for previous years may please be provided as available.
 2. Records be kept so as to provide data for multiple years in future.