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**THE HASHEMITE KINGDOM OF
JORDAN**

REFRIGERANT MANAGEMENT PLAN

**GENERAL CORPORATION FOR THE ENVIRONMENT
PROTECTION**

Amman, April 1999

EXECUTIVE SUMMARY

The Hashemite Kingdom of Jordan became a Party to the Vienna Convention and Montreal Protocol in May 1989. Jordan also ratified the London Amendment in 1993 and the Copenhagen Amendment in 1995. The Cabinet has agreed to ratify the Montreal Amendment of 1997 and the formalities will be completed in 1999.

Since Jordan operates as an Article 5 country under the Montreal Protocol, the Executive Committee of the Multilateral Fund approved the Country Programme in 1993. \$100,000 for the Institutional Strengthening Project was approved at the same Meeting of the Executive Committee, and an additional \$70,000 was approved for IS Phase II. Subsequently, \$30,000 was approved for preparation of the Refrigerant Management Plan. Several projects in various sectors have been approved for funding through the Multilateral Fund and have either been completed in 1998 or are expected to be completed in 1999. More investment projects are under preparation.

The Country Programme indicates that, in 1991, around 33% ODS consumption was in the Refrigeration and Air-Conditioning sector. This document presents the Refrigerant Management Plan for Jordan. The activities outlined in the Refrigerant Management Plan are designed to phase-out the use of refrigerants, particularly in the service sector, with minimum disruption. It should be noted that Chillers are not being considered in the RMP as Jordan has a separate bilateral project with France to develop a strategy for this sub-sector.

1993 - 1997 CONSUMPTION OF ODS (MT)

ODS	1993	1994	1995	1996	1997
CFC-11	160	150	150	260	440
CFC-12	400	350	360	350	400
CFC-113	-	-	-	3	3
CFC-114	20	20	25	15	15
CFC-115 (asR-502)	-	-	-	-	-
CFC-13	0,25	15	15		-
HCFC-22	60	70	75	70	60
HALON 1211	85	80	75	60	55
HALON 1301	-	-	-	3	3
CCL ₄	N/A	N.A.	N.A.	12	15
MCF	N/A	N.A.	N.A.	21	20
MeBr	30	333	300	300	275

Note: It has been found from discussions that Jordan has some consumption of R-502 and a small quantity of R-500. Department of Customs and Ministry of Industry (which issues Import Licenses) have not classified mixtures (R-500, R-502 etc.) as refrigerants, because of which importers have not sought to obtain clearance from NOU. The matter has been discussed and steps are being taken to rectify the situation.

Jordan has ODS consumption in the Aerosol, Foam, R&A/C, Solvent, Halon and Methyl Bromide sectors. In 1997, the reported tonnage by sector was:

Aerosol	305 MT	30.17%
Foam	380 MT	37.59%
R&A/C	233 MT	23.05%
Solvent	35 MT	3.46%
Halon	58 MT	5.73%

In addition Methyl Bromide consumption was 275 MT.

The consumption of CFC-12 by 4 domestic refrigerator manufacturers and 44 identified commercial refrigerator/freezer manufacturers was 144.376 MT for initial charge, while 158.500 MT was consumed for servicing purposes. In addition, 6.000 MT was consumed for MAC applications. It was seen that there were over 500 companies servicing domestic refrigerators with annual CFC-12 consumption ranging between 100 - 250 kg.

ESTIMATED CONSUMPTION OF REFRIGERANTS BY USE AND APPLICATION

Sector	Sub-Sector	ODS	Application	Consumption (MT)
Refrigeration and Air Conditioning	Domestic	CFC-12	Initial Charge	18.000
			Recharge	84.500
	Commercial	CFC-12	Initial Charge	126.376
			Recharge	74.000
	Mobile Air-Conditioning	CFC-12	Recharge	6.000
	Commercial	R-502	Recharge	5.000
	Specialised applications	CFC-113	Recharge	3.000
	Specialised applications	CFC-114	Recharge	15.000
Domestic/Commercial	HCFC-22	Initial Charge & Recharge	60.000	

Note: There is negligible use of CFC-11 as a flushing agent.

This corresponds to 330.812 ODP Tonnes consumption in the R&A/C sector.

In 1994 the Government banned setting up of new enterprises using ODS, and in 1999 enacted regulations to ban imports of used refrigerators, and equipment operating on ODS. In 1993 ODS was included in the list of items needing import licence, and export of ODS was banned. The Ozone Office, which issues the no objection certificate for import of ODS will put caps on imports, if required, to meet the freeze and subsequent phase-out requirements.

It is essential for the ODS users to be aware of the phase-out, and to be able to reduce and subsequently phase out their consumption in a coordinated, planned and cost effective manner. A combination of introduction of equipment using ozone friendly refrigerants including conversion of domestic and commercial refrigerator manufacturers to ozone friendly substances and retrofits, coupled with implementation of training in good maintenance practices and an effective recovery and recycling program is expected to ease the economic consequences of the accelerated phase-out. With several investment projects being completed in 1998 and 1999, and more under preparation, Jordan hopes to phase out the use of ODS well before 2010.

The following activities are being submitted for financial assistance from the Multilateral Fund:

Activity	Budget (US\$)
Technical assistance and support to develop regulations to implement the Environment Law of 1995	46,000
Phase I: Training of Trainers in good refrigerant management practices Phase II: National training program for training technicians in good refrigerant management practices	167,000
Training of Customs	57,000
National recovery and recycling project	618,000
TOTAL	888,000

On the basis of 1997 consumption of 330.812 ODP Tonnes of refrigerant in the R&A/C sector, the cost effectiveness amounts to \$2.68/ODP kg..

This Refrigerant Management Plan reflects the Government's commitment to comply with its obligations as a Party to the Montreal Protocol on Substances that Deplete the Ozone Layer.

REFRIGERANT MANAGEMENT PLAN

TO PHASE OUT THE USE OF OZONE DEPLETING SUBSTANCES IN THE R&A/C SECTOR IN JORDAN

1. CURRENT STATUS

1.1 Status of Jordan with regard to the Montreal Protocol

The Hashemite Kingdom of Jordan became a Party to the Vienna Convention and Montreal Protocol in May 1989. Jordan also ratified the London Amendment in 1993 and the Copenhagen Amendment in 1995. The Cabinet has agreed to ratify the Montreal Amendment of 1997 and the formalities will be completed in 1999.

1.2 Status of Country Programme

The Executive Committee of the Multilateral Fund approved the Country Programme in 1993. The Training projects mentioned in the CP form a part of this Refrigerant Management Plan.

The Action Plan, as given in the Country Programme is as follows:

“The objective of the Action Plan is to effectively, efficiently and as fairly as possible phase-out the consumption of ozone depleting substances in Jordan earlier than its obligations towards the Montreal Protocol.

The Action Plan comprises the investments, policies and implementation actions needed to ensure compliance. The principal agent is the Government of Jordan, which is responsible for the specific policies, referred to here as ‘National Ozone Policy’.

This Action Plan is consistent with the identified optimum phase-out timing and the principles for evaluating and financing net incremental cost for the ODS phase-out as detailed in the ‘Indicative List of Categories of Incremental Costs’ adopted by the Second Meeting of the Parties to the Montreal Protocol. In summary these are:

- cost-effective and efficient strategy;
- analysis which credits savings and avoids double accounting; and
- features early adoption of ozone protecting technologies.

The following section provides a summary of the Action Plan proposed for Jordan based on the optimum phase-out strategy. In this scenario, action is initiated in 1992 and phase-out is completed by 2010.

Recommended Government Actions and Responsibilities

The following is a summary of actions recommended for the various ministries and agencies with active roles in the implementation of an ODS phase-out in accordance with the Montreal Protocol. These actions and their proposed timings are summarised in Table 8.1.

Table 8.1 - Action Plan Summary

Item	1992 - 1993	1994 - 1995	1996 - 2010
MANAGEMENT AND MONITORING SYSTEM	<ul style="list-style-type: none"> Establish a Task Force to manage and monitor ODS phase-out projects. (MMRAE) Develop system to record ODS import and export consistent with GATT classification. (CD) Collect ODS import data (DOS) 	<p>Continued operation of the unit .(MMRAE)</p> <p>Continue data collection. (DOS)</p>	<p>Continued operation of the unit .(MMRAE)</p> <p>Continue data collection. (DOS)</p>
PUBLIC AWARENESS CAMPAIGN	<p>Enhance public awareness (MMRAE)</p> <ul style="list-style-type: none"> Direct media attention to ODS problems and potential recycling programs. 	<p>Continue to develop support for public awareness campaign.</p>	<p>Continue to develop support for public awareness campaign.</p>
POLICY	<p>Draft policy statement and necessary legislation. (MMRAE and MOP)</p> <ul style="list-style-type: none"> Formally announce phase-out timetable to enable industry to plan accordingly. 	<p>Enforcement</p>	<p>Enforcement</p>
LICENSING	<p>Incorporate ODS in existing licensing system. (MMRAE)</p> <p>One objective is to limit the use of ODS to trained personnel.</p>	<p>Maintain licensing system.</p>	<p>Maintain licensing system.</p>
LEVIES AND BAN	<p>Prepare legislation for levies and bans. (MMRAE)</p> <p>Establish levies on ODS. (CD)</p> <p>Introduce levy on CFC-11.</p> <p>Introduce levy on CFC-12.</p> <p>Introduce levy on CFC-113.</p> <p>Restrict use of Halons</p>	<p>If needed, increase levies on ODS.</p> <p>Ban on use of CFC in new central air-conditioning units.</p> <p>Ban on use of CFC for the manufacture of flexible polyurethane foams (excluding refrigerator foams).</p> <p>Increase restriction on use of Halon.</p>	<p>Ban use of CFC in electronic cleaning.</p> <p>Introduce second levy on CFC-11 and CFC-12.</p> <p>Ban on use of CFC in rigid foam comes into effect.</p> <p>Ban use of Halons in applications where alternatives are available.</p>
PROJECTS	<p>Initiate projects that will decrease the use of ODS.</p>	<p>Continue projects that will decrease the use of ODS.</p>	<p>Continue projects that will decrease the use of ODS.</p>

MMRAE : Ministry of Municipal, Rural Affairs and Environment
 DOS : Department of Statistics
 CD : Customs Department
 CDD : Civil Defense Department
 MOP : Ministry of Planning
 MOF : Ministry of Finance
 COI : Chambers of Industry”

1.3 Status of Institutional Project

\$100,000 for the Institutional Strengthening Project was approved in 1993. The National Ozone Office began operating from June, 1994. This unit is part of the General Corporation for the Environment Protection (GCEP). Funding was renewed for two years (1997 - 1999) and the NOU will be applying for a further two years funding.

The following activities have been undertaken by the NOU till date:

a) Public Awareness Program:

Every year since 1995, the NOU has been

- * Giving lectures at the University and schools on Ozone issues.
- * Holding technical workshops and awareness workshops for industry.
- * Conducting seminars on Ozone Day.
- * Taking out advertisements and encouraging media to report on ozone issues.

The NOU has prepared 4 films in Arabic on Ozone issues and they have a wide dissemination.

b) Legislation

- In 1993 it was decided that the General Corporation for Environment Protection would clear licenses for import of ODS. Earlier, the Ministry of Industry was doing this on a routine basis.
- In 1993 the Prime Minister handed down a decision that all equipment funded by the Multilateral Fund would be tax-free.
 - Imports of equipment not included in MP projects, which are environmentally friendly are considered on a case by case basis for tax-free status.
- In 1994 the Minister for MMRAE handed down a decision to ban any new enterprise using ODS equipment.
- An Environmental Law for Jordan was promulgated in 1995. Standards and regulations are under preparation to encourage use of ozone friendly substances.
 - Financial and technical assistance is being sought in this RMP to develop regulations for ozone depleting substances and equipment to implement the Law.
- In 1999 a ban was placed on imports of new and used ODS based equipment.
- A recommendation has been sent to the Prime Minister to remove taxes on ozone friendly substances and increase taxes on ODS. This is expected to be implemented by 2000.

c) Participation in Meetings/Workshops

- Jordan has participated in several meetings/workshops with assistance from UNEP and UNIDO, as well as with their own funds.

d) Projects approved and in preparation:

Name of Project	Sector	IA	Amount Approved	Status
Preparation of CP	All	WB		CP approved in 1993
Institutional Strengthening Project	All	WB	\$100,000	Completed 1997
I.S. Phase II	All	WB	\$ 70,000	To end in 1999
I.S. Phase III	All	WB	\$135,000	Being requested
Deodorisation of LPG at Jordan Petroleum Refinery Co.	Aerosol	WB	\$805,000	Project completed
Conversion of Aerosol Filler at Household & Toiletries Manufacturing Co.	Aerosol	WB	\$136,000	Project completed
- do - at M. Haddad & Sons Co.	Aerosol	WB	\$250,000	Project completed
- do - at Jordan Antiseptics & Detergents	Aerosol	WB	\$ 65,720	To be completed in 1999
- do - at Jordan Chemicals Production Co.	Aerosol	WB	\$203,328	Project completed
- do - at Jordan Industrial Petrochemical	Aerosol	WB	\$102,855	To be resubmitted
Reduction of CFC-11 in flexible foam at Kolaghassi Foam & Mattress Factory Co.	Foam	WB	\$152,000	Project completed
- do - at Arab Foam Factory	Foam	WB	\$125,600	Project completed
- do - at National Foam Factory	Foam	WB	\$118,400	To be completed in 1999
- do - at Jordan Plastics Co.	Foam	WB	\$129,600	To be completed in 1999
- do - at Abu Al-Hussein Establishment (Five Stars Foam Factory)	Foam	WB	\$66,000	Project completed
- do - at Baybars Foam Factory	Foam	WB	\$112,500	To be completed in 1999
Reduction of CFC-12 in extruded polystyrene at Al-Hussam Plastics Co.	Foam	WB	\$347,855	To be completed in 1999
Reduction of CFC-11 in rigid polystyrene foam at FAA group	Foam	WB	\$824,869	To be completed in 2000
Reduction in CFC-11 for foaming and CFC-12 for refrigeration at Household Appliances Manufacturing Co. Ltd.	R&A/C	UNIDO	\$777,602	To be completed in 1999
- do - at Middle East Industrial Complex PLC	R&A/C	UNIDO	\$883,153	To be completed in 1999
- do - at National Refrigeration Co.	R&A/C	UNIDO	\$813,887	To be completed in 1999
- do - at Abdeen Refrigeration Co.	R&A/C	UNIDO	\$116,000	Project completed
- do - at Ihsaan & Tahseer Baalbaki	R&A/C	UNIDO	\$545,033	To be completed in 1999
- do - at Maurice Al Deek	R&A/C	UNIDO	\$325,000	
- do - for umbrella project involving 6 commercial refrign. Companies (1 st Group)	R&A/C	UNIDO	\$340,000	
- do - for umbrella project 6 commercial refrign. Companies (2 nd Group)	R&A/C	UNIDO	\$338,670	To be submitted for July 1999
- do - for umbrella project 6 commercial refrign. Companies (3 rd Group)	R&A/C	UNIDO		To be submitted for November 1999
- do - for umbrella projects (17 commercial refrign. Companies	R&A/C	UNIDO		To be submitted in 2000
Demonstration Project for alternatives to Methyl Bromide	Methyl Bromide	UNIDO	\$435,050	To start May 1999
Demonstration Project for alternative to Methyl Bromide by solarisation	Methyl Bromide	Germany	\$267,327	To start May 1999
Technical assistance in air-conditioning (chillers)	R&A/C	France	\$42,000	To start July 1999

829 MT of ODS expected to be eliminated from the projects completed and approved till date.

1.4 Difficulties Encountered

- a) With a large number (over 500) R&A/C service companies in the country, most of which are very small setups which also do other mechanical and electrical repairs, it is impossible to determine their consumption. The NOU has completed a survey and has been able to prepare a list of most of these companies. Their annual consumption ranges from 100 kg. to 250 kg. each. Thus, this RMP is based on figures from organised companies, and the unorganised sector has been grouped together.
- b) Cross verification of NOU data with Customs Department data of imports is unreliable. Customs does record data as per 6 digit Harmonised Tariff Code but it depends whether the declaration has been made appropriately. Data on mixtures are difficult to capture. Currently, data is collected from GCEP/NOU database on import licenses approved. Export is banned.
- c) CFC-115 (as R-502) import data has not been maintained by the NOU. The data presented in the RMP is based on discussions with importers and consumers and may not be accurate.
- d) Customs Department does not have any training or equipment to recognise ODS and ODS using equipment. This makes it difficult to implement the ban on import of new and used ODS based equipment.
- e) While equipment operating on ozone friendly substances is already in use in the country, most of the maintenance technicians are not trained in the use of these substances. In addition, refrigeration equipment manufacturing companies which have been funded through the Multilateral Fund, and have completed implementation of the change-over to HFC-134a, are awaiting training through the RMP to service the new products. Cases have been reported of HFC-134a refrigerators being repaired and charged with CFC-12 since the technicians do not know how to handle the lubricants and refrigerant.

1.5 Current Consumption

The table below, comparing 1993 - 1997 consumption figures for all ODS provides a picture of the current situation in Jordan.

1993 - 1997 CONSUMPTION OF ODS (MT)

ODS	1993	1994	1995	1996	1997
CFC-11	160	150	150	260	440
CFC-12	400	350	360	350	400
CFC-113	-	-	-	3	3
CFC-114	20	20	25	15	15
CFC-115 (asR-502)	-	-	-	-	2.560
CFC-13	0.25	15	15		-
HCFC-22	60	70	75	70	60
HALON 1211	85	80	75	60	55
HALON 1301	-	-	-	3	3
CCl ₄	N/A	N.A.	N.A.	12	15
MCF	N/A	N.A.	N.A.	21	20
MeBr	30	333	300	300	275

2. JUSTIFICATION FOR REFRIGERANT MANAGEMENT PLAN

The Country Programme for Jordan identifies 1991 consumption in the R&A/C sector as 205 MT of CFCs. For 1997, the corresponding reported figures are 233 MT. This consumption includes the MAC sub sector. It should be noted here, that the Country Programme did not identify consumption of CFC-115 (as R-502), of which there is on going consumption. In addition, Chillers are not being considered in the RMP since Jordan has a separate bilateral project with France to develop a strategy for this sub-sector.

1997 ESTIMATED CONSUMPTION IN THE R&A/C SECTOR (ODP Tonnes)

CFC-12	CFC-113	CFC-114	CFC-115 (as R-502)	HCFC-22
308.876	2.400	15.000	1.536	3.000

ESTIMATED CONSUMPTION OF REFRIGERANTS BY USE AND APPLICATION

Sector	Sub-Sector	ODS	Application	Consumption (MT)
Refrigeration and Air Conditioning	Domestic	CFC-12	Initial Charge	18.000
			Recharge	84.500
	Commercial	CFC-12	Initial Charge	126.376
			Recharge	74.000
	Mobile Air-Conditioning	CFC-12	Recharge	6.000
	Commercial	R-502	Recharge	5.000
Domestic/Commercial	HCFC-22	Initial Charge & Recharge	60.000	

The R&A/C equipment in use in the country are in the domestic, commercial, and MAC (car and bus a/c) sectors. Jordan's economy is growing and this has led to an increase in "consumer" goods and personal comforts. In addition, several perishable commodities are imported, and refrigerated storage and transportation facilities are essential.

Jordan has had several projects approved in the Aerosol, Foam and R&A/C sector approved by the Multilateral Fund Executive Committee. Most of these project have been completed in 1998 or are expected to be completed in 1999. Some more projects in the commercial refrigeration sector are under preparation for submissions at later dates.

The Government remains concerned about the consequences of non-availability of refrigerants, particularly for the service sector. It will encourage recovery and recycling, particularly from commercial units during servicing, and certainly during decommissioning, to ensure a stock of CFC-12 for the domestic and commercial refrigeration service sector, beyond 2010.

The Government is committed to meeting its obligations as a Party to the Montreal Protocol. It realises that regulatory instruments have to be enacted and implemented to ensure that ODS friendly technology is available and implemented at an early stage. The Multilateral Fund continues to support Jordan's efforts to eliminate the use of ODS in the manufacturing sector. It is expected that once the projects are fully implemented Jordan's ODS consumption will drop sharply, leaving the R&A/C service sector as the only consumer of ODS. The Government is confident that phase-out will be achieved earlier than 2010.

It is essential for ODS users to understand the implications of the country's obligations under the Montreal Protocol and be able to reduce and subsequently phase out their consumption in a coordinated, planned and cost effective manner. A combination of conversion projects, introduction of equipment using ozone friendly refrigerants, coupled with implementation of training in good maintenance practices, and an effective recovery and recycling program is expected to ease the economic consequences of the phase out. The 1999 Regulation banning import of ODS using equipment will limit the consumption to a finite service tail.

The RMP reflects the Government's commitment to comply with its obligations as a Party to the Montreal Protocol on Substances that Deplete the Ozone Layer. It also provides the catalyst to the R&A/C service sector in particular, to allow them to meet the conditions of the Montreal Protocol. It provides the necessary tools to the Jordan Department of Customs to implement the recent ban.

2.1 Sector Analysis

Jordan is divided into 12 Governorates. The major cities are Amman, Zarka, Irbid, and Aqaba. The bulk of refrigerant consumption occurs in areas in and close to the above cities. Most imports come through Aqaba port. Goods coming from and going to neighbouring countries (Lebanon, Syria, Iraq, Saudi Arabia and Palestine) are transported by road through customs checkpoints at the borders.

a) Manpower

It is estimated that Jordan has over 1,000 technicians working in the Refrigeration and Air - Conditioning sector. The skill level of service technicians in the country varies considerably. The industrial users and manufacturing cum service organisations have reasonably well trained in-house technicians while there are a large number (over 500) of small service workshops with semiskilled or untrained technicians, who service household refrigerators.

Jordan has a Vocational Training Corporation, an independent organisation under the Ministry of Labour, which has training facilities for technicians and mechanics in 33 locations within the country. 10 locations teach Refrigeration & Air Conditioning as part of the Mechanical Technicians course. R&A/C training is also provided at Technical Schools.

b) Domestic Refrigerators and Freezers

It is estimated that there are at least 1 million refrigerators and freezers in Jordan. The average life is 20 years.

Jordan has four facilities manufacturing domestic refrigerators with imported compressors. In addition they are imported from Western Europe, Korea, Japan and USA. Substantial quantities of used refrigerators were also being imported from Korea and Japan. Discussions with manufacturers and service companies indicate that most refrigerators and freezers have their compressor changed at least twice during their lifetime, with an additional recharge due to leakage. This means about 150,000 refrigerators are being serviced each year, leading to an estimated use of 75 MT of CFC-12 per annum. (The practice is to use CFC-12 for flushing and pressure test before charging leading to an estimated consumption of 0.5 kg. per refrigerator serviced.) CFC-11 is not used for flushing.

Approximately 5% of refrigerators/freezers in use are scrapped annually. If even 50% of them still contain refrigerant, there is a potential to recover around 5 MT of refrigerant.

HFC-134a based refrigeration systems are now being manufactured in Jordan, and have started being imported into the country. R-600 (Hydrocarbon) based units are reported to have just started appearing in the country also. The 1999 Regulation bans import of ODS using equipment with immediate effect and this will limit the service tail to equipment imported prior to 1999.

c) Commercial Refrigeration

44 commercial refrigerator manufacturers have been identified till date in Jordan. They manufacture commercial refrigerators, deep freezers, cold shelves, display cabinets, bottle coolers, water coolers, and cold rooms of different sizes. Nearly all of them are CFC-12 based with very few being R-502 based. Negligible use of HCFC-22 was found in this sub-sector. Some R-404 based units are now being seen in Jordan. Negligible quantity of CFC-11 is used for flushing.

Smaller Commercial Units (Initial charge less than 10 kg.)

The average life of smaller commercial units (commercial refrigerators, deep freezers, self contained display cabinets, bottle coolers etc.) is around 10 years because of the heavy usage. During this period at least one compressor replacement and two recharges are done. It is estimated that there are over 100,000 such units in operation in Jordan.

Large Commercial Units (Initial charge 10 kg. or more)

These units have leakage due to bends and joints in pipelines. It is estimated over 750 units are in operation in Jordan.

Cold Rooms

Cold rooms have at least 10 compressors with 10 kg. initial charge per compressor. Here too, leakage is due to bends and joints in pipelines. It is estimated that there are over 200 cold rooms in Jordan.

Very few new systems based on HCFC-22 and HFC-134a are being imported although most Imported equipment from Europe is still CFC-12 based. Once the commercial sector investment projects are completed, CFC-12 based units will not be manufactured.

The new Regulation bans import of ODS using equipment from 1999 and this will limit the service tail to equipment imported prior to 1999.

d) Industrial Refrigeration/Chillers

Some chemical, pharmaceutical, petrochemical and food industries in Jordan use refrigeration/chilling in their process. CFC-12 based chillers and some Ammonia systems are in use. This sub-sector has not been surveyed as yet, and is a bilateral project with France.

e) Air-Conditioning

Central air-conditioning systems are generally HCFC-22 based. One manufacturer has been identified so far in Jordan. The total consumption of HCFC-22 for initial charge and recharge is approximately 60 MT per year.

g) Mobile Air-conditioning and Refrigeration

Cars and Buses:

Jordan does not manufacture or assemble cars. In 1997 there were 170,000 cars registered in Jordan (excluding taxis). The majority of cars are imported from Europe, Japan, Korea, and USA. Cars up to 5 years old are permitted to be imported. The new models (from 1995) are HFC-134a based, except those manufactured in Korea. It is believed that from 1999 model onwards, the a/cs in these cars will be HFC-134a based.

The estimated consumption for MAC servicing is 3.500 MT/year, mostly done by car dealerships.

In 1997, there were 500 private busses, all of which are air-conditioned. Assuming an average of 5 kg. per year topping up and repairs, the estimated consumption is 2.500 MT/year.

Refrigerated Trucks:

It is estimated that there are over 5,000 refrigerated trucks in Jordan moving perishable goods within the country and to and from neighbouring countries. These refrigerated trucks are serviced by commercial manufacture and service companies and their consumption figures include this application.

Total consumption in the MAC sector can be estimated as 6.000 MT. The new Regulation banning import of ODS using equipment can also be applied to mobile cooling and air-conditioning devices, refrigerated transport, and mobile a/c units, including units installed in vehicles, aircraft and vessels. This decision has not been taken as yet. However, since cars up to 5 years old can be imported, the imports of all except Korean makes from 2000 will be HFC-134a based.

2.2 Current Prices

Retail prices for various refrigerants, in April 1999 averaged as follows:

CFC-11	\$ 6.00 per kg..
CFC-12	\$ 3.00 per kg..
CFC-13	\$120.00 per kg..
CFC-113	\$200.00 per kg..
CFC-114	\$ 85.00 per kg..
R-500	\$ 90.00 per kg..
R-502	\$ 60.00 per kg..
HCFC-22	\$ 5.00 per kg..
HFC-134a	\$ 15.00 per kg..
R-404a	\$ 22.00 per kg..

3. ASSISTANCE RECEIVED

At the 25th Meeting of the Executive Committee of the Multilateral Fund, \$30,000 was approved for the preparation of the Refrigerant Management Plan for Jordan. The Government has received technical assistance from UNIDO. Various Government authorities and relevant stakeholders and importers and consumers of ODS were consulted in the preparation of the RMP.

4. COMPONENTS OF PHASE OUT STRATEGY AND ACTION PLAN

The critical components of the phase out strategy being considered in the RMP are given below.

4.1 Policy Framework

The GCEP/NOU of Jordan will monitor implementation and control measures such as:

- Ban on new installations and equipment using ODS.
- Monitor imports of ODS to ensure freeze and phase-out conditions are being met. Implement and enforcing caps or quotas if necessary.
- Study the possibility of import concessions and tax incentives to promote use of substitutes and alternative technologies. (A recommendation will be sent shortly to the Prime Minister to reduce taxes on ozone friendly substances and increase taxes on ODS. Approval is expected in 1999 and implementation from 2000)

4.2 Emission Reduction

- Implement a national recovery and recycling project.
- Encourage industrial and commercial consumers to evaluate retrofitting of existing equipment to operate on ozone friendly refrigerants, and recover/recycle ODS from decommissioned equipment.

4.3 Training

- Training of refrigeration technicians in good refrigerant management practices.
- Training for Customs, aimed at Custom enforcement officers to better implement the licensing system, the ban on new and used ODS based equipment, increased taxation on ODS (as and when approved and put into effect) as well as identify imports of ODS and ODS containing equipment and products for accurate recording for the database..

The GCEP/NOU will be the main link with the users of ODS. The reporting of consumption as obliged under the Montreal Protocol, ensuring that freeze and eventual phase-out dates of use of the ODSs within the projected timetable is done by the GCEP/NOU. Continuation of Public Awareness programs, data collection of import/export and analysis of the same, monitoring of the recovery/recycling program (as and when implemented), and ensuring training programs reach the intended recipients will be a critical on-going task of the GCEP/NOU for the next 3 years at least.

5. TIMETABLE

The timetable below identifies the activities under the Action Plan of the Country Programme and this RMP, and estimates time to implement.

Activity	1999		2000				2001			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Public information program in association with industry and NGOs.	X	X	X	X	X	X	X	X	X	X
Monitoring of ban on import of ODS using equipment..	X	X	X	X	X	X	X	X	X	X
Monitoring of imports of ODS	X	X	X	X	X	X	X	X	X	X
Develop and implement regulations/economic instruments		X	X							
Training of Trainers in Good Refrigerant Management Practices.		X								
Training of technicians.			X	X	X	X	X	X	X	X
Training of Customs Trainers.		X								
Training of Customs staff				X	X	X	X	X		
National Recovery and Recycling Project.					X	X	X	X	X	X

6. INSTITUTIONAL FRAMEWORK

The Government and national stakeholders of Jordan are committed to the freeze and phase out requirements of the Montreal Protocol. Early decisions will be taken to finalise and implement some or all of the action items that have been presented in the Refrigerant Management Plan. The GCEP/NOU will be responsible for the monitoring, coordination and successful implementation of the phase-out activities proposed in the RMP. The different Government bodies and other organisations will also be involved.

7. PROJECTS, COSTS AND FINANCIAL ASSISTANCE NEEDED

The following activities are being submitted for financial assistance from the Multilateral Fund:

Activity	Budget (US\$)
Technical assistance and support to develop regulations for ODS to implement the Environment Law of 1995	46,000
Phase I: Training of Trainers in good refrigerant management practices Phase II: National training program for training technicians in good refrigerant management practices	167,000
Training of Customs	57,000
National recovery and recycling project	618,000
TOTAL	888,000

On the basis of 1997 consumption of 330.812 ODP Tonnes of refrigerant in the R&A/C sector, the cost effectiveness amounts to \$2.68/ODP kg..

More details of each project are provided in Annexes 1 - 4 attached.

8. IMPACT

The successful implementation of the various components of the RMP (training, implementation and monitoring of 1999 regulation, and implementation of the National Recovery and Recycling Project) will lead to the effective phase out of ODS well within the requirements of the Montreal Protocol.

Component	Expected Impact
Institutional Strengthening and National Awareness Program (if extended beyond July 1999)	<ul style="list-style-type: none"> • Effective monitoring and coordination of all phase-out activities. • National Awareness of relevant regulations. • National awareness on Ozone issues, leading to increased demand for ozone friendly equipment.
Implementation of ban	<ul style="list-style-type: none"> • Ban on imports of ODS and ODS using equipment
Legislation for ODS to implement Environment Law	<ul style="list-style-type: none"> • Ensure Montreal Protocol freeze and phase-out conditions are met. • Ensure phase-out earlier than 2010.
Training of Trainers in Good Refrigerant Management Practices, followed by national training of technicians project	<ul style="list-style-type: none"> • Control of CFC-11 for flushing from 2000 - 2001. • Reduce CFC-12 from 2000 - 2001 (by preventing unnecessary emissions) • Make technicians familiar with drop in substitutes, retrofitting, and the different ozone friendly refrigerants
Training of Customs	<ul style="list-style-type: none"> • Effective implementation of ODS import/export licensing system and data collection. • Enforce ban on import of ODS using equipment. • Enforce economic incentives/disincentives.
National Recovery and Recycling Project	<ul style="list-style-type: none"> • Termination of imports of refrigerants at the earliest possible , and easing the consequences of non availability, through use of recovered and recycled refrigerants, particularly for domestic and commercial equipment until end of their economic life.

Annex 1

PROJECT COVER SHEET

Country	:	THE HASHEMITE KINGDOM OF JORDAN
Name of Project	:	Technical assistance and support to develop regulations for ODS to implement the Environment Law of 1995
Sectors Covered	:	All
ODS Consumption	:	1,073.9 ODP Tonnes (1997)
Duration of Project	:	2 years
Total Project Cost	:	\$46,000
Amount to be Contributed by Government of Jordan	:	\$1,000
Amount Requested from Multilateral Fund	:	\$45,000
National Coordinating Body	:	National Ozone Unit/GCEP.
Implementing Agency	:	UNIDO

1.1 Background

While Jordan has its Environmental Act of 1995, the regulations needed to implement the Act are not in place. The Government believes it is necessary to develop and implement regulations related to ODS and ODS using equipment urgently to ensure that Jordan meets the freeze and phase-out requirements.

1.2 Project Objectives

To develop and implement regulations related to ODS and ODS using equipment to implement the Environmental Law of 1995.

1.3 Expected Outcome

Some or all of the following will be implemented following study and deliberation by the various stakeholders.

- Regulations to have reducing caps on imports of ODS.
- Regulations to ban venting of ODS and make recovery and recycling mandatory.
- Regulations to certify technicians and require sale of ODS to certified technicians only.
- Regulations to recover refrigerants from scrapped ODS using equipment before disposal.
- Regulations to recover refrigerants from equipment being retrofitted.
- Any other regulations related to ODS use and the subsequent phase-out thereof.

1.4 Target Audience

All stakeholders in government, industry and service sector will be involved in the deliberations.

1.5 Project Activity

- Collect all Acts, Regulations, Standards in Jordan which can be modified to include ODS.
- Collect regulations from Article 2 and Article 5 countries on ODS phase-out.
- List all decisions taken by the Parties to the Montreal Protocol and by the MF ExCom.
- Organise a committee from Ministries of Finance, Planning, Industry, Customs Department, Legal Affairs, GCEP/NOU, Royal Scientific Society, NGOs, University of Jordan, Chamber of Industry, and ODS using industries to finalise the Regulations by consensus.
- Hold a workshop for the Committee with presentations from Ozone Secretariat, Implementing Agencies and Multilateral Fund (if possible) explaining the Vienna Convention, Montreal Protocol and Amendments, Decisions of the Meetings of the Parties and the Multilateral Fund Executive Committee. Explain the role of the Ozone Office.
- Draft set of regulations to ensure phase-out of ODS in a coordinated and least cost manner.
- Organise a workshop to discuss draft regulations with all stakeholders and finalise them.
- Presentation to the Environment Protection Council (EPC) of the recommendations and the reasons for them, seeking the EPC's approval.
- Forward EPC approval to Prime Minister for approval.
- Following Prime Minister's approval, advertise in Gazette and newspapers.

1.6 Time Frame

If supported by the Multilateral Fund the whole exercise can be completed in 6 months, with regulations in place 6 months thereafter.

1.7 Organisers

The NOU will play the lead and coordinating role in all the activities described above.

1.8 Support and Follow Up Actions

- Support from UNEP IE is particularly important to put together a compendium of regulations in Article 2 and Article 5 countries.

1.9 Budget

Item	Budget
International Expert (Travel, DSA and fees)	5,000
First workshop	2,000
Local Consultants (for 6 months)	5,000
Costs for committee meeting(s), local workshop, publication of regulations, media exposure	20,000
Substantive assessment & coordination of technical and policy related issues.	10,000
Contingency (10%)	4,000
TOTAL	46,000
Amount to be contributed by Jordan Government	1,000
Amount requested from Multilateral Fund	45,000

Annex 2

PROJECT COVER SHEET

Country	:	THE HASHEMITE KINGDOM OF JORDAN
Name of Project	:	Phase I - Training of Trainers in Good Refrigerant Management Practices Phase II - National Technicians Training Project
Sectors Covered	:	Refrigeration and Air Conditioning
ODS Consumption	:	330.812 ODP Tonnes
Duration of Project	:	2 years
Total Project Cost	:	\$167,000
Amount to be Contributed by Government of Jordan	:	\$2,000
Amount Requested from Multilateral Fund	:	\$165,000
National Coordinating Body	:	National Ozone Unit/GCEP.
Implementing Agency	:	UNIDO

2.1 Background

a) Manpower Resources

It is estimated that Jordan has over 1,000 mechanics/technicians working in the Refrigeration and Air Conditioning sector. The Vocational Training Corporation (VTC) has training programs in the R&A/C sector, which are tabulated below:

Program	Description	Duration	Training Level	Certificate	Educational Requirements
Domestic R&A/C Mechanic	Long term training	2 years school + 6-12 months experience	Skilled	Apprenticeship Certificate with skilled level	10 years school
Refrigeration Mechanic	Mid term training	1 year school	Limited skilled	1 year training certificate with limited skilled level	9 years school
Domestic refrigerator maintenance (new entrants)	Short term	150 hours	Unskilled	150 hours training certificate	Know reading & writing
A/C maintenance (skill upgrading)	Short term	150 hours	Unskilled	150 hours training certificate	Know reading & writing

These programs are offered at 10 out of 33 VTC locations. They are:

- Sahab Trade Training Centre - Amman
- Hashimieh Trade Training Centre - Zarqa
- Ramtha Trade Training Centre - Irbid
- Mashara Trade Training Centre - Irbid
- Ein-El-Basha Trade Training Centre - Balqa
- Middle Ghoor Trade Training Centre - Balqa
- Ghor Al-Safi Trade Training Centre - Karak
- Al-Tafilieh Trade Training Centre - Tafilieh
- Ma'an Trade Training Centre - Ma'an
- Aqaba Trade Training Centre - Aqaba

In addition, technical schools under the Ministry of Education also provide training in R&A/C.

b) Refrigerant Consumption

1997 estimates of CFC consumption in the R&A/C sector is as follows:

1997 ESTIMATED CONSUMPTION IN THE R&A/C SECTOR

	CFC-12	CFC-113	CFC-114	CFC-115 (as R-502)	HCFC-22
Metric Tonnes	308.876	3.000	15.000	2.560	60.000
ODP Tonnes	308.876	2.400	15.000	1.536	3.000

ESTIMATED CONSUMPTION OF REFRIGERANTS BY USE AND APPLICATION

Sector	Sub-Sector	ODS	Application	Consumption (MT)
Refrigeration and Air Conditioning	Domestic	CFC-12	Initial Charge	18.000
			Recharge	84.500
	Commercial	CFC-12	Initial Charge	126.376
			Recharge	74.000
	Mobile Air-Conditioning	CFC-12	Recharge	6.000
	Commercial	R-502	Recharge	5.000
Specialised applications	CFC-113	Recharge	3.000	
	Specialised applications	CFC-114	Recharge	15.000
	Domestic/Commercial	HCFC-22	Initial Charge & Recharge	60.000

Note: There is negligible use of CFC-11 as a flushing agent.

c) Presence of ODS Friendly Technology

Imports of R&A/C equipment to Jordan come from Europe, USA, Japan and Korea. The 1999 Regulation, which bans import of equipment operating on Annex A, Group I substances, will ensure new imports are with ozone friendly substances. Discussions with several service companies and large consumers indicate that there is awareness of alternatives to CFCs. The service companies are seeing refrigerators and commercial refrigeration equipment operating on HFC-134a. Some refrigerators operating on R-600 (Hydrocarbon blends) are also reported operating in Jordan. Those companies which service R&A/C equipment were the first to encounter HFC-134a and were initially not aware of the differences between the refrigerants and their respective lubricants. The wholesalers of refrigeration spares and components have received information and some training on alternatives and their differences with traditional CFC based equipment and try to advise the service technicians who are their customers on how to deal with the changing technology.

It was noted that there were substantial imports of used CFC-12 based domestic refrigerators/freezers. With the implementation of the Regulation this will stop with immediate effect. There are some reports of HFC-134a systems being charged with CFC-12 but details are not known.

In the commercial sector single and multi-compressor systems for supermarkets are being designed and assembled in Jordan using CFC-12. Projects have been/are being developed to assist these 44 companies switch over to ozone friendly substances. Most imports are from Europe and are CFC-12 based, while very few units based on ozone friendly substances are also being imported.

In the industrial sector, R&A/C equipment operating on Ammonia, and CFC-12, and some R-502 have been observed. Users of such equipment are extremely concerned about the availability of CFC-12 and R-502 to keep their equipment operational till the end of the economic life.

In the MAC sector, it is noted that new cars, (European and Japanese and American) are all based on HFC-134a. The premier line of cars come “fully loaded” with a/c. However most of the cars are not air-conditioned. Used cars are imported, and the law prohibits import of cars older than five years.

In addition there are several air-conditioned busses operating in Jordan. All of them are CFC-12 based.

Over 5,000 refrigerated trucks operate in Jordan.

All package and split type air-conditioning units are HCFC-22 based. There is one manufacturer identified so far in Jordan, and large numbers are also imported.

2.2 Project Objectives

The goal of this training is to reduce ODS usage in the refrigeration & air-conditioning sector. The immediate objectives will include (but not be limited to):

- Increasing participant awareness.
- Providing information on the new Regulations.
- Introduction and demonstration of procedures that eliminate refrigerant emissions during preventive and unscheduled maintenance.
- Stimulate development of a network for information sharing throughout the sector.

2.3 Expected Outcome

- In Phase I, approximately 40 National Trainers trained for ongoing training of existing technicians.
- In Phase II, most or all technicians in the country (over 1,000) trained in good refrigerant management practices.
- Elimination of the use of CFC-11 for flushing by 2000 - 2001.
- Substantial reduction in CFC-12 consumption from 2000 - 2001, after technicians are trained in preventing leaks through good maintenance practices.

2.4 Target Audience

Phase I:

The first phase in training technicians is the Train the Trainers Program. The National Trainers will be drawn from the faculty of Vocational Training Corporation, Technical Schools and senior engineers/technicians from the domestic and commercial manufacturing facilities.

Two Train the Trainer courses are planned to cover all the National Trainers. The courses will be held at Amman, the capital. Each training course will have a maximum of 40 participants.

It should be noted, that the investment projects for conversion of domestic and commercial refrigeration facilities does not include training. The training is to be provided through the RMP.

Phase II:

The NOU has decided that the local training program will be provided through the 10 VTC training centres, which teach R&A/C. Following the Train the Trainers Program, the Trainers will develop a common national training program to take it to the mechanics/technicians. At this point of time it is envisaged that 50 training courses, each with 20 mechanics/technicians will be held. Out of necessity, and to ensure maximum participation, the courses will be held over a week or more in the evening hours. This will allow the mechanics/technicians to earn their living during the day and upgrade their skills in the evening.

2.5 Project Activity

Phase I:

As indicated above, two 5 day "Train the Trainers" workshop will be held in Amman. The workshops will consist of classroom presentations, practical demonstrations, and hands-on training. The emphasis of the workshops will be on Training of Trainers who will be involved in the delivery of the hands-on training programs for the service technicians in the country, both in service and subsequently coming into the sector every year. The course development for these training programs will be done by the VTC and coordinated by the National Consultant. This Training of the Trainers Program is an important self-sustaining capacity building tool and is considered very important by the Government. It will assure continuity in training and introduction of current methodology and techniques to future technicians also.

The agenda will include, but not be limited to:

- Background to Ozone Layer, Destruction of the Ozone Layer, the Vienna Convention, the Montreal Protocol and its amendments, the freeze and phase out requirements, and the Government's response as a Party to the Montreal Protocol.
- Discussion on the new Regulation and its implications.
- Why the refrigeration sector is important
- Installation of equipment
- System operation and maintenance
- Preventive inspection and maintenance
- Properties of different refrigerants and lubricants
- Handling and storage of refrigerants
- Safety requirements
- Retrofitting, redesign and alternatives
- Safety requirements
- Recovery, recycling and reclamation
- Discussion on developing a national code of good practice
- Discussion on certification
- Equipment demonstration and hands on training in the proper use of equipment and recovery and recycling machines.

One set of basic equipment, a recovery machine and a recycling machine, along with spares, consumables and adequate number of refrigerant storage cylinders will be provided to each of the 10 VTC training centres. These equipment will be used as training tools in the on going curriculum of the institutions as well as for the short training courses for the technicians. The Recycling machines at 6 training institutions will also be used for commercial recycling, to ensure effective capacity utilisation.

Following the Training of the Trainers in Phase I, the National Consultant will coordinate the development of the training curriculum, which will be suitable for the target audience.

Phase II:

The format of delivery of the training program will be finalised after completion of the Train the Trainers Program. The NOU and a National Consultant will be closely involved in the curriculum development. As soon as the curriculum for the mechanics/technicians is ready, the NOU will finalise dates and locations for the training programs in consultation with the VTC. The NOU, through its public information program, will ensure that the information, along with the need to participate, is widely disseminated. It is expected that if the training programs are held in the evenings, and at no cost to the technicians, there will be very good participation.

By the time the curriculum for the technicians is ready, it is expected that the Government will come to a decision about certification of technicians. If it is decided to do so, then this information will also be widely disseminated to the general public as well as the technicians.

Given the number of technicians estimated (around 1,000) it is expected that at least 50 training programs of 20 participants will need to be conducted. The cost for these is reflected in the budget.

2.6 Time Frame

The tentative timing for the Train the Trainers program is the fourth quarter of 1999. However, in view of the need to procure equipment as part of the training activity, the workshops may be delayed to 2000.

2.7 Organisers

The GCEP/NOU will coordinate the local organisation of the workshops, including local invitations for participation. This will be done in conjunction with the VTC, technical schools and the R&A/C equipment manufacturers. UNIDO will arrange for the expert and for the equipment to be supplied. The equipment should be the same as equipment to be supplied under the Recovery and Recycling project.

2.8 Support and Follow Up Actions

Pre Workshop:

- GCEP/NOU to ensure waiver of any applicable duties and taxes, and speedy clearance of training equipment.

Post Workshop:

- Development of curriculum by the Trainers for local training of mechanics/technicians. – within 3 months or earlier.
- Appropriate dissemination of information about training program for mechanics/technicians by the NOU within 3 months.
- On going follow up by the NOU of delivery of the Program.
- Follow up with service companies by NOU on discontinuation of use of CFC-11 for purging.

2.9 Budget

A detailed budget is provided below. Cost for the equipment is included in the R&R Project at Annex 4.

Item	Budget (US\$)
Phase I:	
International Expert (Travel, DSA and fees)	10,000
National Consultant	2,500
Translator (\$150 per day x 10 days)	1,500
Travel and per diem for outstation participants (50 persons x 5 days @\$100 per day)	25,000
Local Organisation (2 x 40 persons for 5 days each)	15,000
Training material	3,000
Sub Total for Phase I	57,000
Phase II:	
1,000 sets training material	10,000
Logistical Organisation for 50 training programs @\$1,500 per session	75,000
Sub Total for Phase II	85,000
Substantive assessment and coordination of technical and policy related issues	10,000
Contingency (10%)	15,000
TOTAL	167,000
Contribution by Jordan Government	2,000
Amount Requested from Multilateral Fund	165,000

Annex 3

PROJECT COVER SHEET

Country	:	THE HASHEMITE KINGDOM OF JORDAN
Name of Project	:	Customs Training
Sectors Covered	:	All
ODS Consumption	:	1,073.9 ODP Tonnes in 1997 (all sectors)
Duration of Project	:	2 years
Total Project Cost	:	\$ 57,000
Amount to be Contributed by Government of Jordan	:	\$ 1,000
Amount Requested from Multilateral Fund	:	\$ 56,000
National Coordinating Body	:	National Ozone Unit/GCEP
Implementing Agency	:	UNIDO

3.1 Background

An essential source of information for monitoring and control of ODS and ODS using equipment is the Customs Division, since all ODS and ODS using equipment are imported to Jordan. Currently, Customs statistics are unreliable for several reasons, such as:

- a) Current Harmonised Tariff Codes do not identify some specific ODS or ODS using equipment
- b) Custom inspectors are not trained to recognise ODS and ODS using equipment. Jordan has an import/export licensing policy in place for some time. The new Regulation came into force in March 1999 which bans import of ODS using equipment.

3.2 Project Objectives

Jordan has 8 Centres for Declaration (Amman, Zarka Free Zone, Aqaba, Queen Alia Airport, Jaber, Hussain Industrial City (Sahab), and Jordan Valley. Goods from non-Arab countries enter through the Aqaba port, while goods from neighbouring countries can enter by road from over 28 entry points.

Customs requires training in recognition of ODS and ODS containing using equipment to control and ensure acceptable products are entering the country. The objective of this training is primarily to ensure the proper enforcement of the 1999 Regulation and any subsequent regulations in Jordan. This training program will also be developed around the Train the Trainers principle, for on going training and refresher programs of the Customs Department.

CFC detection equipment will also be provided for all Centres for Declaration in the country.

3.3 *Expected Outcome*

- Appropriate vigilance on entry of ODS and ODS using equipment into the country
- Database of ODS importers/exporters, and accurate data on imports and exports, which will assist in meeting reporting requirements.
- Continuity in Training of all Customs officers in Jordan, including new entrants.

3.4 *Target Audience*

The participants at the workshops will number approximately 40. They will be drawn from the 8 Customs Centres for Declaration, Amman Headquarters, Amman and Aqaba Laboratories, the training department, and other enforcement agencies and government.

3.5 *Project Activity*

One “Train the Trainers” workshop, will be held for training enforcement officers in the requirements of the Regulations; ODS import/export licensing system, and in recognising ODS and ODS containing equipment to control and ensure acceptable products are entering the country. 3 CFC detection equipment for each of the 8 Customs Centre for Declaration will also be provided.

3.6 *Time Frame*

The training program is tentatively scheduled for last quarter of 1999. The timing is governed by when the project will be approved by the Multilateral Fund Executive Committee, and contracts with the implementing agency finalised.

3.7 *Organisers*

The GCEP/NOU will organise the workshop in collaboration with the Department of Customs and other government offices. UNIDO will arrange for expert and supply of CFC detection equipment..

3.8 *Support and Follow Up Actions*

- Follow up by GCEP/NOU with Customs on implementation of Regulation and Import/Export Licensing system.
- Ongoing training of local Customs officials within 6 months of workshop.

3.9 *Budget*

Item	Budget
International Expert (Travel, DSA and fees)	10,000
Translator (\$150 per day x 5 days)	750
Travel and per diem for outstation participants (30 persons x 5 days @\$100 per day)	15,000
Local Organisation (35-40 persons for 5 days)	5,000
24 ODS Identification kits @ \$650 each	15,600
Substantive assessment and coordn. of technical and policy related issues	10,000
Contingency (10%)	5,650
TOTAL	57,000
Amount to be contributed by Jordan Government	1,000
Amount requested from Multilateral Fund	56,000

Annex 4

PROJECT COVER SHEET

Country	:	THE HASHEMITE KINGDOM OF JORDAN
Name of Project	:	National Recovery and Recycling Project
Sectors Covered	:	Refrigeration and Air Conditioning
ODS Consumption	:	330.812 ODP Tonnes
Duration of Project	:	2 years
Total Project Cost	:	\$ 759,000
Amount to be Contributed by Government of Jordan	:	NIL
Amount Requested from Multilateral Fund	:	\$ 759,000
National Coordinating Body	:	National Ozone Unit/General Corporation for the Environment Protection.
Implementing Agency	:	UNIDO

4.1 Background

The information needed to prepare this project was supported by a survey conducted by a local consultant and the GCEP/NOU. An international consultant of UNIDO, accompanied by the Ozone Officer met several consumers and importers to understand current practices and discussed the concept of recovery and recycling with them. The concept was well received by all consumers and repair shops, which have not yet implemented recovery and recycling practices due to the high cost of equipment.

The survey disclosed that commercial equipment manufacturers serviced most commercial equipment. There are 44 identified commercial equipment manufacturers and all of them have CFC-12 consumption for service, in addition to initial charge consumption. The 4 domestic refrigerator manufacturers have some consumption for servicing, but most of it is during the warranty period. There are over 500 small service companies, which have been identified, which work primarily in the domestic sub-sector.

The survey indicates the following use for 1997:

1997 ESTIMATED CONSUMPTION IN THE R&A/C SECTOR (ODP Tonnes)

CFC-12	CFC-113	CFC-114	CFC-115 (as R-502)	HCFC-22
308.876	2.400	15.000	1.536	3.000

ESTIMATED CONSUMPTION OF REFRIGERANTS BY USE AND APPLICATION

Sector	Sub-Sector	ODS	Application	Consumption (MT)
Refrigeration and Air Conditioning	Domestic	CFC-12	Initial Charge	18.000
			Recharge	84.500
	Commercial	CFC-12	Initial Charge	126.376
			Recharge	74.000
	Mobile Air-Conditioning	CFC-12	Recharge	6.000
	Commercial	R-502	Recharge	5.000
	Specialised applications	CFC-113	Recharge	3.000
Specialised applications	CFC-114	Recharge	15.000	
	Domestic/Commercial	HCFC-22	Initial Charge & Recharge	60.000

Note: There is negligible use of CFC-11 as a flushing agent.

Jordan has 4 domestic refrigerator manufacturing units and 44 identified commercial equipment manufacturing units. The consumption of refrigerants attributed to replacement after leaks, venting during service activities, and replacement of burnt out compressor motors (all servicing activities) was ?? MT. At present, none of the refrigerant is recovered or recycled.

In addition, the dismantling of old equipment and retrofitting to non-CFC equipment will lead to venting of large quantities of refrigerant. It is expected that this project will be able to capture these refrigerants also.

4.2 Project Objectives

The objectives of this project are to implement a National Recovery and Recycling project in the R&A/C sector. Implementation of this project will lead to capture of refrigerants currently being vented, both from repair and maintenance activities and from decommissioning and retrofitting of CFC based equipment. The recovered and recycled refrigerant will lead to reduced dependency on imports and provide for a stock to meet the requirement of the service tail of CFC-12 based equipment continuing in service till the end of their economic life. The Government would like to ensure availability of CFC-12 for refrigeration servicing as long as necessary and practical.

4.3 Expected Outcome

The minimum quantity of CFC-12 that will not need to be imported after successful implementation of the Recovery and Recycling project is estimated as follows:

- 72 refrigerant bags will recover an average of 0.1 kg. of CF-12 per day per bag.
- 80 recovery machines will recover and average 1kg. of CFC-12 per day per machine.
- 15 MAC systems will recover and recycle minimum 0.5 kg. per day per machine
- The basis is 250 working days per year.
- 80% of recovered gas can be recycled.

Thus annual quantity of recycled CFC-12 would be 19.315 MT.

4.4 Target Beneficiaries

The survey indicates that service divisions of commercial refrigerator manufacturing units, consume over 500 kg. of CFC-12 per annum for servicing purposes. These will receive recovery machines and associated equipment. Service companies, which have 1.6 to 3.0 MT consumption, will be provided with two recovery machines and associated equipment; 3.1 to 5.0 MT three sets, 5.1 to 7.0MT four sets and more than 7.0 MT five sets.

The domestic unit manufacturers also have consumption in excess of 1.00 MT. Their service organisation is set up around mobile service teams and workshops.

NRC	3 mobile + 2 workshops
MEC	5 mobile + 5 workshops
HAMCO	5 mobile + 1 workshop
NORD	5 mobile + 2 workshops

Recovery bags and associated equipment will be provided for the mobile units, and one recovery unit with associated equipment for each workshop will be provided.

The smaller consumers are primarily involved with domestic refrigeration. All the service companies have consumption ranging from 100 to 250 kg. per year and will not receive any equipment. They will benefit from the training program.

The 10 VTC centres, which teach R&A/C, will take the lead role in the training program for the technicians will each receive a set of recovery machines and associated equipment. The equipment will be used primarily for training and, when not being used for that purpose, be available to those technicians who have not benefited from the distribution of equipment. Six of the centres will be designated as recycling centres in Jordan and will receive recycling machines also, which when not being used for training, will be available for on site jobs, when large volumes of refrigerant have to be handled.

4.5 Project Activity

4.5.1 Demonstration Seminars:

Four 1.5-day demonstration seminars will be held at Amman, Zarqa, Irbid, and Aqaba. Representatives of firms and organisations owning and maintaining their own R&A/C installations, technicians from maintenance and service workshops and independent refrigeration technicians will be invited to attend these demonstration seminars which will be conducted prior to distribution of equipment.

An international consultant/representative of equipment supplier will introduce and explain the recovery program and the recycling infrastructure. The seminars will include a background to the Montreal Protocol, an explanation of the effects of Ozone Layer Depletion, and the resultant need for recovery and recycling of CFC refrigerants, presentation on the appropriate regulations, the presentation of recovery and recycling technologies and methodologies in different R&A/C systems, and a hands on demonstration of the equipment to be supplied through the project.

4.5.2 Formation of Recycling Centres:

Based on the survey (Annex 4), 80 recovery machines and associated equipment to commercial service companies, and domestic manufacturing companies for their service centres.

As mentioned above six recycling centres will be set up at six VTC Training Centres. They are Sahab Trade Training Centre (Amman), Hashimieh Trade Training Centre (Zarqa), Ramtha Trade Training Centre (East Irbid), Mashara Trade Training Centre (West Irbid), Ma'an Trade Training Centre (Ma'an) and Aqaba Trade Training Centre (Aqaba). Recycling centres at these cities will provide coverage for most of the country since they are situated in industrial areas.

4.5.3 MAC Applications:

Jordan has 15 major cities. The NOU would like to have a MAC centre in each city to encourage car and bus operators to use them and as demonstration centres. 15 MAC recovery/recycling/recharge equipment are proposed in this project. Each centre will receive one 100 lb. cylinder to store recycled gas and one 100 lb.. cylinder to store non-recyclable gas.

Monitoring System:

The GCEP/NOU will design a program to follow up and monitor the recovery and recycling activities. It will keep records of the amounts recovered, the quantities of recycled refrigerant stored at the recycling centres and monitor the quality of recycled gas as well as the price structure.

4.6 Time Frame

The National Recovery and Recycling project implementation will begin around the third quarter of 2000. By that time regulations will be in place to control consumption of ODS and it is expected that the Prime Minister will approve the recommendation to increase taxes on ODS, thereby making it economically viable to recover and recycle. For regulations to be effective, support has to be provided to the technicians by way of equipment to encourage recovery and recycle of refrigerant.

4.7 Equipment Specification

4.7.1 For Recovery of Refrigerant

- Portable CFC-12 recovery machines with over fill protection (OFP) device. Each machine will include one 30lb.. DOT refrigerant recovery cylinder and appropriate hoses with tap valves.
- 30 lb.. (ERC) DOT refrigerant recovery cylinders with OFP device and two ports.
- Recovery Equipment Kit consisting of:
 - 1 gauge manifold with hoses
 - 1 electronic weighing scale
 - 1 electronic hand held leak detector
 - 2 service couplings
 - 1 piercing pliers
 - 2 pairs of goggles and 2 pairs of gloves
 - 1 thermometer
 - 1 set of service hoses
- Refrigerant recovery bags and appropriate hoses incorporating a tap valve and sight glass.
- 30 lb.. DOT refrigerant recovery cylinders with OFP device and two ports.
- Vacuum pumps
- Spare parts and consumables for the above.

Note: All equipment to operate at 220V AC 50 c/s and meet European Standards.

4.7.2 For Recycling of Recovered Refrigerant

- One pass recycling machines incorporating an OFP device with capacity to process a 120 lb. cylinder and fill automatically in a single pass. Each machine will incorporate at a minimum an oil separator, acid, moisture and particulate filters, automatic purging of non-condensable gasses, along with appropriate gauges and hoses.
- Refrigerant identification kit to identify mixed refrigerants and assure only CFC-12 is recycled.
- Vacuum pump
- 100 lb.. Refrigerant cylinder with OFP and dual ports.
- 1,000 lb.. Refrigerant cylinder with OFP and dual ports.
- Spare parts and consumables for the above.

Note: All equipment to operate at 220V AC 50 c/s and meet European Standards.

4.7.3 For Recovery/Recycle/Recharge of Refrigerants in MAC Applications

- Standard Recovery/Recycle/Recharge equipment
- One 100 lb.. cylinder to store recycled CFC-12
- One 100 lb.. cylinder to store non-recyclable refrigerants.

Note: All equipment to operate at 220V AC 50 c/s and meet European Standards.

4.8 Number of Equipment Required

Equipment	Domestic Eqpt. Service	Comm./ Ind. Eqpt. Service	MAC Centres	Trng. Centres cum Recycling Centres	Spare	TOTAL
Recovery m/c, spares and consumables	10	70		10	6	96
30 lb.. ERC Recovery Cylinder	20	140		20	30	210
Vacuum Pump	10	70		10	6	96
Equipment Kit, spares and consumables	28	70		10	6	114
Recovery Bags	72			72		144
30 lb.. DOT Recovery Cylinder (for use with recovery bags)	18			18		36
Recycling machine, spares and consumables				6		6
Refrigerant Identification Kit				6		6
Vacuum pump				6		6
100 lb.. Refrigerant Cylinders			30	24		54
1,000 lb.. Refrigerant Cylinders				24		24
Recovery/Recycle/Recharge equipment for MAC			15			15

Note 1: Each recovery machine set will consist of 1 recovery machine, 2 ERC Recovery cylinders, 1 vacuum pump and 1 equipment kit.

Note 2: Each domestic service set will consist of 4 recovery bags, 1 equipment kit and 1 DOT recovery cylinder.

Note 3: The 6 Recycling centres will each have one recycling machine, one refrigerant identification kit, one vacuum pump, four 100 lb. and three 1,000 lb. recovery cylinders for use when large systems are serviced and for storing recycled CFC-12. An additional 1,000 lb. cylinder will be earmarked at each location, for storage of unrecyclable (mixed) refrigerants for disposal at a later date.

Note 4: Each recycling centre will have 12 recovery bags and associated equipment, one recovery machine sets in reserve, to be made available for recovery operations by workshops and firms not included in the recovery network and for replacement during repair of equipment. In addition, each centre will also have three ERC recovery cylinders in reserve.

Note 5: Each MAC centre will have one recovery/recycling recharge equipment and one 100 lb.. cylinder to store recycled CFC-12. An additional 100 lb.. cylinder will be provided to store non-recyclable gas for subsequent disposal.

ANNEX 5

1997 CFC-12 CONSUMPTION

	Company	Sub-Sector %		Initial Charge		Service	
		Dom	Com/Ind	MT	MT	MT	MT
				Dom	Com/Ind	Dom	Com/Ind
<i>Domestic Refrigerator Manufacturers</i>							
1	NRC	100		3.000		1.000	
2	MEC	100		5.000		3.500	
3	HAMCO	100		4.000		1.000	
4	NORD	100		6.000		2.000	
<i>Large Commercial Refrigerator Manufacturers</i>							
1	Maurice Al-Deek		100		10.405		2.000
2	Ihsan & Tahseer Baalbaki	2	98		28.560	2.000	8.500
3	Abdeen Refrigeration Co.		100		4.625		3.600
<i>Medium & Small Scale Commercial Refrigerator Manufacturers</i>							
1	Naim Dahdal & Sons		100		1.807		1.500
2	Burhan Al-Awatani		100		1.842		1.500
3	Eissa Hedjawi Co.		100		1.585		1.400
4	Gulf Workshop		100		1.240		1.100
5	Al-Amer Workshop		100		1.727		1.500
6	Malak Est.		100		1.263		1.200
7	Jamal Yussef Workshop		100		1.869		1.500
8	Baraka Workshop		100		2.525		1.800
9	Emad Hedjawi Workshop		100		0.906		0.800
10	Al-Besani Workshop		100		1.505		1.400
11	Aqaba Al-Eslah Workshop		100		1.171		0.900
12	Lebanon Workshop		100		1.662		1.400
13	Thabbah Establishment Co.		100		2.191		1.800
14	Dahbour Factory for Refrigerator & Water Cooler		100		2.037		1.800
15	Riad Hedjawi Workshop		100		2.016		1.800
16	Aqaba Works for Manuf. of Ind. Refrigerators		100		1.742		1.500
17	Yazouz Refrigerator Factory		100		1.604		1.400
18	Industrial and Commercial Refrigerator Manuf. Co.		100		1.432		1.300
19	Al-Amal Refrign. Industries		100		4.257		3.500
20	Shanableh Workshop		100		3.565		2.500
21	United Works for Commercial Refrigeration		100		6.190		4.500
22	Industrial Refrign. Workshop		100		1.500		1.300
23	Petra Co.		100		15.000		3.500
24	Marka Workshop		100		1.500		1.300
25	Yarmok Workshop		100		1.000		0.800
26	International Ind. Refrign. Co.		100		1.800		1.500
27	Babsult Modern Factory of Refrigerators		100		1.700		1.500
28	Zarka New Factory		100		1.600		1.400
29	Nattanyal Comm. Refrign. Factory		100		1.200		1.000
30	Abu Fadi Workshop		100		1.200		1.000

	Company	Sub-Sector %		Initial Charge		Service	
		Dom	Com/Ind	MT	MT	MT	MT
				Dom	Com/Ind	Dom	Com/Ind
31	Naji Geriea for Refrigerators		100		1.300		1.200
32	Liakam A-Hafi Workshop		100		1.350		1.200
33	Hassan Abdelkader for Refrigeration		100		1.500		1.300
34	Al-Said for Refrigeration		100		1.000		0.800
35	Al-Shaek for Refrigeration		100		1.000		0.800
36	Batreack Factory		100		1.000		0.800
37	Al-Shark Workshop		100		1.000		0.800
38	Al-Susi Workshop		100		1.000		0.800
39	Al-Omari Workshop		100		1.000		0.800
40	Al-Rousan Workshop		100		1.000		0.800
41	Kanash Workshop		100		1.000		0.800
Small Scale Service Companies							
	Over 500 companies	100				75.000	
	TOTAL CONSUMPTION			18.000	112.676	84.500	74.000