

UNITED NATIONS DEVELOPMENT PROGRAMME
Project of the Government of UZBEKISTAN
PROJECT DOCUMENT

Number and Title: UZB/98/G31/A/1G/31 - Implementation of a National Programme for Recovery & Recycling of Refrigerants

Duration: 2 Years

ACC-UNDP Sector/Subsector: 200 Environment/201 Policies Planning & Legislation

National Implementation Agency: The State Committee for Nature Protection (SCNP)

Executing Agency: UN Office for Project Services (UNOPS)

Estimated Starting Date: 1 January 1999

UNDP Inputs: US \$ 1,327,980 (under the GEF)

Brief Description: The project is to implement a comprehensive National Programme for Recovery and Recycling of refrigerants in the refrigeration and air conditioning sectors as part of the Refrigerant Management Plan (RMP). Ten (10) training seminars for technicians performing repairs, maintenance and installation of refrigeration and air conditioning equipment will be held to familiarize all involved with the RMP and the Recovery & Recycling Programme. The seminars will include practical demonstration with the equipment that will include practical demonstrations with the equipment that will be supplied and will emphasize the necessary good practice and safety in the handling of refrigerants during the installation, servicing and dismantlement of refrigeration and air conditioning equipment. The project will provide recovery equipment and recovery bags to be distributed to the larger users as well as sets of recycling equipment strategically distributed around the country. These recycling machines will be used by the centers to be established where large quantities of CFC-12 would be collected.

Legal Context: This project document shall be the instrument referred to in Article 1 of the Standard Basic Agreement between the Government of Uzbekistan and the UNDP, signed by the parties on 10 June 1993 and shall be governed by normal UNDP practices regarding project revisions/monitoring/evaluation, and by special procurement arrangements applicable to the Montreal Protocol Programme. The project will be formally closed with a Hand-over Protocol to be signed by the Government and UNDP/UNOPS. This protocol will then be the final legally binding document.

On behalf of the Government:  Signature: *[Signature]* Name and Title: A. Sh. Khabibullaev, Chairman of the State Committee for Nature Protection Date: 3.11.99

UNDP Tashkent:  *[Signature]* P. KRA, PR 9/2/99

Executing Agency (UNOPS):  Authorization from UNOPS dated 15 January 1999 and signed by Mr. M. Bachman, Officer in Charge, Environmental Programmes

UNDP PROJECT BUDGETCountry: **UZBEKISTAN**Project Number: **UZB/98/G31/A/IG/31**Project Title: **Implementation of a National Programme for Recovery & Recycling of Refrigerants**

		Total		1999		2000	
		AOS	US\$	AOS	US\$	AOS	US\$
11.51	Consultants/Technology Transfer	2,000	25,000	1,200	15,000	800	10,000
16.01	Evaluation Mission	480	6,000	240	3,000	240	3,000
17.51	National Consultant	200	2,500	120	1,500	80	1,000
19	Personnel Component Total	2,680	33,500	1,560	19,500	1,120	14,000
33.01	Workshops	1,040	13,000	640	8,000	400	5,000
39	Training Component Total	1,040	13,000	640	8,000	400	5,000
45.02	Equipment	85,224	1,065,300	85,224	1,065,300	-	-
49	Equipment Component Total	85,224	1,065,300	85,224	1,065,300	-	-
53.02	Contingencies	8,522	106,530	8,522	106,530	-	0
53.04	Project Support Services	-	12,184	-	11,994	-	190
59	Miscellaneous Component Total	8,522	118,714	8,522	118,524	0	190
90	Project Total	97,466	1,230,514	95,946	1,211,324	1,520	19,190

PROJECT NUMBER: 3**COVER SHEET**

COUNTRY:	REPUBLIC OF UZBEKISTAN
PROJECT TITLE:	IMPLEMENTATION OF A NATIONAL PROGRAMME FOR RECOVERY & RECYCLING OF REFRIGERANTS
SECTOR COVERED:	REFRIGERATION
ODS USE IN SECTOR:	260.3 ODP TONNES IN 1996
PROJECT IMPACT:	91.48 ODP TONNES
PROJECT DURATION:	TWO (2) YEARS
PROPOSED GEF GRANT	1,327,980 US \$
COST EFFECTIVENESS:	13.32 US \$ / kg
COORDINATING NATIONAL BODY:	THE STATE COMMITTEE FOR NATURE PROTECTION OF THE REPUBLIC OF UZBEKISTAN
IMPLEMENTING AGENCY:	UNDP

Prepared by: Dr. Adham KHALIL, Eng.
UNDP Consultant

Reviewed by: Dr. L.J.M. KUJERS

PROJECT SUMMARY

The project is to implement a comprehensive National Programme for Recovery / Recycling of refrigerants in the refrigeration and air conditioning sub-sectors as part of the Refrigerant Management Plan (RMP). Ten (10) training seminars for technicians performing repairs, maintenance and installation of refrigeration and air conditioning equipment will be held to familiarize all involved with the RMP and the National Recovery & Recycling Programme. These seminars will explain the different methods and techniques for recovery and recycling of refrigerants. The seminars will include practical demonstrations with the equipment that will be supplied and will emphasize the necessary good practice and safety in the handling of refrigerants during the installation, servicing and dismantlement of refrigeration and air conditioning equipment as well as installations.

The project will provide 350 recovery equipment and 350 recovery bags to be distributed to the larger CFC-12 users as well as 350 sets recycling equipment strategically distributed around the country. The recycling machines will be used by the 350 centers to be established where large quantities of CFC-12 would be collected. It is to be noted that there are about 300,000 domestic refrigerators that are repaired annually and that there are about 200 CFC-12 based central air-conditioning systems that are also repaired/maintained annually. This is apart from over 5,000 commercial and industrial refrigeration systems that are repaired and/or maintained every year. It is also consequential to note that a large number of refrigerators are not presently operating as their owners cannot afford the cost of repairs. Hence, when the economical situation will improve in the country, there will be a larger demand for repair of that refrigeration equipment hence a

larger demand for CFC-12.

A system for monitoring the quantity and quality of the CFC recycled (with periodic evaluation) is planned, to ensure the success of the National Recovery & Recycling Programme.

PROJECT PROPOSAL
FOR THE
PROGRAMME FOR
RECOVERY AND RECYCLING OF REFRIGERANTS
ACCORDING TO THE NATIONAL REFRIGERANT MANAGEMENT PLAN

1. OBJECTIVE

The main objective of the project is to implement a comprehensive national programme for recovery and recycling of refrigerants in the refrigeration and air-conditioning sub-sectors according to the Refrigerant Management Plan (RMP).

2. SECTOR BACKGROUND

The Country Programme (CP) for the elimination of Ozone Depleting Substances (ODS) indicates that in 1996, 260.3 ODP Tonnes were used in the refrigeration sector. These chemicals were used for production, repair and maintenance of refrigeration and air-conditioning equipment.

This project is part of an overall strategy by the Government for the Refrigeration Sector. The Government's first priority is to stop the discharge of CFC into the atmosphere due to leaks and servicing emissions in the refrigeration and air-conditioning sub-sectors. In order to achieve this goal, the Government is considering a proposal to control the deliberate venting of CFC and train refrigeration technicians in proper techniques of repair and maintenance of refrigeration equipment. An introductory training programme on the Good Practices in Refrigeration will also be part of the present programme. It is to be noted that the full training session on Good Practices in Refrigeration is an independent project.

In accordance with the Copenhagen Amendment to the Montreal Protocol, CFC production has ceased at the end of 1995 in Article 2 Parties. Consequently, the availability and market price of CFC will be affected, which in turn, will affect consumers in this country. This is especially the case in the Refrigeration Sector. This country imports all its requirements of CFC and HCFC.

Indirectly, the implementation of the present project will allow the country to continue to use the existing refrigeration and air-conditioning installations for a further period of time without having to retrofit the equipment. This is due to the future availability of recovered and recycled CFC in the country.

A survey, completed by the State Committee for Nature Protection of the Republic of Uzbekistan in 1996, indicates that there are more than 900 refrigeration technicians in the country. The survey also indicates that there are over 700 major workshops in the country, and many smaller ones of different sizes. They carry out maintenance and repair of domestic, commercial and industrial refrigeration equipment; many also maintain air conditioning units.

With a population of about 24,000,000 in 1996, there were, about 5,000,000 domestic refrigerators, 51,000 commercial and industrial units, and 3,500 units used in transport systems in the country. One also finds some 200 central air-conditioning systems operating on CFC-12. A domestic refrigerator factory is located in Samarkand. Retrofitting of this factory is the subject of a separate project. Domestic refrigerators on the market are also imported.

3. PROJECT JUSTIFICATION

The Government has decided to develop a RMP which concludes that the optimum way to phase out ODS is to concentrate on retrofitting the local refrigerator manufacturing plant, training of trainers of refrigeration technicians, customs officers and introduce the present National Recovery and Recycling of Refrigerants Programme. The Government has also taken a policy decision to phase out the consumption of ODS by the year 2000. In order to repair and service existing equipment, there will be a demand for CFC beyond 2000. Part of the demand for CFC-12 to maintain refrigeration equipment will be met through recycled refrigerants. On the supply side, the imports of ODS will be according to the Country Programme schedule. It is therefore important that conservation of CFC through recovery and recycling be commenced early, enabling realization of the country's phase out schedule.

Three main ways of reducing the release of ODS will be from:

- i. Supplying major CFC users and service shops with recovery and recycling of refrigerant equipment to be used during service, conversion and disposal of equipment;
- ii. Improving the maintenance procedures for refrigeration and air-conditioning equipment through training and introducing up-to-date practices in CFC, HCFC and HFC charging as well as handling; and
- iii. Training in refrigerant containment.

The use of recycled CFC will provide an alternative source from imported virgin CFC. It is expected that by securing this volume of refrigerant, the country's demand for imports of CFC-12 will be reduced. The State Committee for Nature Protection of the Republic of Uzbekistan will monitor the recovery and recycling operations of this national programme.

The quantity of CFC-12 that will not have to be imported in the country, thanks to the recovery and recycling efforts of this programme, is of economical importance to the country. The quantity of CFC-12 that will have to be manufactured in the future will consequently also decrease, thus helping in protecting the Ozone Layer. This quantity is evaluated as following:

- 350 Recovery machines will recover an average of 1 kg of refrigerant per day per machine;
- Based on 270 working days a year;
- 90 % of the recovered material that can be recycled; and
- Plus the 350 Recovery bags to be used to recover some 85 grams of CFC-12 from domestic refrigerators also based on 270 working days and 80 percent recyclable,

The annual recycled CFC-12 would be 91.48 Tonnes

The following must be noted:

- The above amount does not include the amount of CFC-12 that might be recovered by technicians not included in the present programme but which will be accepted by the recycling centers created by the programme; and
- The amount that will be saved by improved servicing practices following the training workshops

included in the present programme and in other training workshops, is also not included in the above tonnage.

Placement of recovery machines and associated kits will be determined by evaluating the most effective locations with regards to their access to the largest and consistent volumes of CFC-12. With time, these locations may change. The requirements and the machines would then be relocated to facilities, which have greater needs. Although there are many locations where CFC-12 is being handled, it is not economically feasible for each location to have recovery systems on-site all the time. On the other hand, the users of small quantities of CFC-12 will have a number of recovery machines available. These will be located in the different districts. Therefore the number of recovery machines considered in this programme is less than the number of sites handling CFC-12.

3.1 Domestic, Commercial and Industrial Refrigeration

In view of the severe fluctuations in Voltage in the electricity supply during peak lighting hours, hermetically sealed domestic refrigeration equipment suffer premature winding failures. This is one of the main reasons for their breakdown. The present programme will also provide for refrigerant recovery bags for use to collect CFC-12 by the technicians who will be making house calls to repair and maintain domestic refrigerators.

The major source of CFC-12 will be during the repair and maintenance of CFC-12 based commercial and industrial refrigeration units as well as from domestic refrigeration units. It is expected that the commercial and industrial refrigeration units will be the larger source of CFC-12 as these units usually contain larger amounts of CFC-12 than that contained in domestic refrigeration equipment. The quantities of CFC-12 in domestic refrigerator units must not be neglected in this project, as the number of these units repaired per year is high.

If after a workshop receives a recovery machine and associated equipment it appears that it does not use the recovery equipment, then the Government will take that equipment from it and give it to another workshop that is willing to use it.

3.2 Mobile Air Conditioning (MAC) and Transport Refrigeration (TR)

Some workshops in the country repair and maintain MAC. Consequently, an introduction on proper maintenance and repair of MAC and TR will also be given. When distributing recovery equipment, special attention will be given to those workshops that have a record of repairing many MAC and TR, as such units contain large quantities of CFC-12. As in the case of domestic and commercial refrigeration above, before a workshop is given a unit, its senior technicians will have to be trained at first in the proper procedures of using recovery units.

If after a workshop receives a recovery machine and associated equipment it appears that the workshop does not use the recovery equipment, then the Government will take the recovery equipment from it and give it to another workshop that is willing to use it.

4. PROJECT MONITORING

In its capacity as co-ordinator of all activities related to the Montreal Protocol in the country, the

State Committee for Nature Protection of the Republic of Uzbekistan is the overall monitor of the project. This entity will keep records of the amounts of Ozone Depleting Substances recovered and presented for recycling by each service center. A computer database will be set up to monitor the information received from the service centers.

The State Committee for Nature Protection of the Republic of Uzbekistan will ensure that the operation for most effective use of the above equipment is attained. In particular monitoring will make sure that:

- The recovery machines are distributed according to criteria of maximum recovery of CFC;
- all the equipment is properly used, kept and maintained;
- proper records of the amounts of CFC recovered, recycled and reused are maintained.

It is to be noted that all the equipment supplied under this project is to be given to the end users on a grant basis. The title of ownership of the machines and equipment provided under the Global Environment Facility will be kept by the State Committee For Nature Protection Of The Republic Of Uzbekistan throughout the duration of the project and then transferred to the users. The transfer will be subject to final evaluation of the activities carried out by the individual users.

5. PROJECT ACTIVITIES AND COSTS

5.1 Objectives of the Training Programme

Training will be given to the most qualified technicians who will receive recovery and recycling equipment as well as some of the teaching staff of centers that already teach and train refrigeration. The successful philosophy of training the trainers, which ensures "self sustenance", will be behind the training activities related to the present project. This is an extremely important capacity building component for users. The on-the-job training will improve the operational discipline and encourage recycling.

A Train the Trainers Programme will be organized and run to complement the supply of recovery and recycling machines to ensure their effective use. Training is a crucial aspect of that programme especially as the field of refrigeration is constantly changing due to the implementation of the Montreal Protocol.

It is assumed that with training, many situations where venting is today considered to be normal, will be eliminated. This will result in lowering the demand for CFC. Also, a leak is often discovered after charging the system. This charge is then vented. In such situations recharge may be done more than once with the consequence of venting large quantities of CFC. Currently, some servicing shops flush the system with CFC-11 and CFC-12 and vent the flushed CFC prior to final charging. This practice is extremely wasteful and needs to be discontinued. With training in alternative technologies and maintenance techniques, these improper practices can be minimized and waste could be greatly reduced.

The training programmes given by the international consultant will benefit from previous training workshops held by UNDP in the context of, among others, the Montreal Protocol. UNDP has extensive information and expertise in the field of refrigeration. It is imperative that training is provided to all individuals who service and maintain refrigeration equipment. Otherwise it is unlikely that these technicians will learn about the Ozone issue and the many improved service

practices when handling CFC and their alternatives.

A series of training sessions will be held to enable technicians to learn proper repair procedures. Training must include hands-on practice with special focus on leak detection.

Training will be the responsibility of the State Committee for Nature Protection of the Republic of Uzbekistan in close co-operation with the existing teaching institutions. One (1) international expert on refrigeration system servicing, maintenance and CFC recovery and recycling will be fielded as soon as the Recovery and Recycling equipment will arrive in the country.

The main tasks of the experts will be to:

- carry out specific training in Recovery and Recycling;
- general training activities for refrigeration systems, maintenance, recovery and recycling of CFC;
- assist organizations and technicians in evaluating their systems and advice on possible retrofitting of existing equipment using non-ODS.

5.2 Training Programme

The ten (10) training sessions will be held in different parts of the country. Each one (1) day session / seminar will be held for (20 - 30) technicians. These sessions / seminars will include:

- The correlation between CFC emissions and depletion of the Ozone Layer;
- The consequences of Ozone Depletion;
- The production and supply trends of CFC refrigerants CFC-11, CFC-12 and R-502 as well as those of HCFC-22;
- Proper and safe handling of CFC;
- Recovery, Recycling and Reclaiming of ODS;
- General mistakes in maintenance leading to waste and release of CFC;
- Methods of installing recovery valves on existing equipment;
- Proper maintenance and housekeeping procedures, e.g., importance and methods of evacuation of systems before recharging, prevention and early detection of leaks, etc.; and
- Hands on training using the equipment supplied with emphasis on recovery and recycling and sound practice methodologies during service of the different systems.

The final outcome of this training may reveal that one of the largest reductions in venting was accomplished by merely providing the know-how and that with conservation measures the industry will realize substantial savings.

The trained technicians will train others after the departure of the UNDP international expert. This way continuity is guaranteed.

6. ANALYSIS OF THE PROPOSED APPROACH

A few approaches have been considered to implement the recovery, recycling and reclaiming portion of the County Programme. The present programme proposal has the following characteristics:

- Rapid overall implementation;

- Low cost for both up-front and continuing operations;
- Technicians will have the opportunity to reuse the CFC that has been recovered and recycled;
- Availability of long term support through the technical centers;
- The State Committee for Nature Protection of the Republic of Uzbekistan will be responsible for monitoring the use of the equipment and the logbooks of the technicians. This should lead to a better understanding of the programme impact; and
- Since Government maintains ownership of the units during the life of the programme, it is possible to redistribute the units to locations that have a greater need.

7. SPECIAL ARRANGEMENTS (AWARENESS)

Providing information and stimulating motivation are probably the least expensive and most effective way to reduce the amount of CFC released into the atmosphere. Part of the State Committee for Nature Protection of the Republic of Uzbekistan's mandate is to increase awareness on issues relating to Ozone layer protection.

8. RETAILER LICENSE SCHEME

This scheme, when adopted, will make it mandatory for organizations to possess a retailer's license in order to purchase CFC from wholesalers/importers. A pre-requisite for issuing such licenses will be that at least one technician of the organization has undergone training. Necessary precautions will have to be taken to avoid creating a black-market, once this scheme is implemented.

9. INSTITUTIONAL ARRANGEMENT

The State Committee for Nature Protection of the Republic of Uzbekistan will co-ordinate the implementation of this programme. Some of the training sessions in the programme will be conducted at the technical centers.

10. INPUTS

10.1 Equipment

The following criteria were used for the selection of the equipment :

- Fifty percent of the (700) workshops would receive a recovery unit and associated equipment, according to its needs; and
- In order to reasonably recycle the amounts of CFC-12 recovered from the workshops having recovery machines, 30 mobile recycling centers would be established.

Based on the above, the following equipment will be provided to the State Committee for Nature Protection of the Republic of Uzbekistan.

10.2 Equipment Needed for the Recovery of CFC-12 Refrigerant

- The recovery machines will be portable and will incorporate an over fill protection (OFP) device. Each machine will include as part of its equipment a 30 lb. DOT refrigerant recovery cylinder and appropriate hoses and tap valves;

- Recovery bags for use with domestic refrigerators;
- 30 lb. CFC-12 recovery cylinders with two ports and OFP;
- CFC-12 recovery equipment kits. Each kit will include; 1 gauge manifold with hoses, 1 electronic leak detector, 2 service couplings, 1 piercing pliers, 2 pairs of goggles, 2 pairs of gloves, 1 thermometer, 1 set of service hoses, as well as an electronic weighing scale; and
- Maintenance and spare parts for the above.

10.3 Equipment Needed for the Recycling of CFC-12 Refrigerant

- Mobile single cycle CFC-12 recycling machines incorporating an OFP device and with capacity to fill automatically, in one single pass and continuous process a 120-lb. cylinder. Each machine will incorporate an oil separator, 2 independent filters, (one for acid one for moisture and particles), automatic purging of non condensable gases, appropriate refrigerant gauge, hoses and a weighing scale;
- CFC-12 refrigerant identification kits to identify mixed refrigerants and assure that only the machines recycle CFC-12;
- 100 lb. CFC-12 refrigerant cylinders with dual port and OFP device;
- 1000 lb. CFC-12 refrigerant cylinders with dual port and relief valve;
- Vacuum pumps to empty the cylinders;
- Leak detectors; and
- Maintenance and spare parts for the above.

11. DISTRIBUTION AND SITING OF THE RECOVERY AND RECYCLING EQUIPMENT

11.1 Distribution of Recovery Equipment

The recovery machines and equipment kits will be made available, under the supervision of the State Committee for Nature Protection of the Republic of Uzbekistan to refrigeration service workshops and firms maintaining their own installations.

The recovery cylinders, (2 each), and recovery bags will be distributed among the recovery centers. The recovery bags will be given to those centers that mainly maintain domestic refrigerators. The remaining will be given to the recycling centers, along with the 100 lb. and 1000 lb. cylinders, for use when large refrigeration and air conditioning systems are serviced.

11.2 Siting of the Recycling Centers

The recycling centers will be situated within the installations of entities with refrigerant handling experience such as the principle refrigerant distributors, who will also be responsible for the operation of the centers. The final location of the centers will be determined before the equipment arrives in the country.

11.2.1 Conditions for the Siting of the Recycling Centers

Each of the refrigerant suppliers and the technical institutes will be invited to submit its proposal and qualifications to the State Committee for Nature Protection of the Republic of Uzbekistan who will have the responsibility for deciding the correct site for the recycling centers.

The recycling centers will need protected but properly ventilated areas for the siting of the recycling equipment and for the storage of the recovered and recycled refrigerant. The chosen operator will have to possess adequate equipment for the storage of the unrecyclable refrigerant (i.e. CFC mixtures) until means are found for their reclaim or destruction.

The technicians responsible for the operation of the recovery center must have certified experience in handling refrigerants.

12. REDUCTION IN CONSUMPTION

Based on the number of recovery machines and refrigerant recovery bags that will be operating, the quantity of CFC-12 that will not have to be imported in the country, and thus manufactured in the future, thanks to the recovery / recycling efforts in this programme, is estimated as **91.48 Tonnes per year.**

13. OPERATIONAL, QUALITY AND PRICING CONTROLS

13.1 Operational Control

The State Committee for Nature Protection of the Republic of Uzbekistan will have responsibility for implementing and overseeing the recovery and recycling programme. The duties of the State Committee for Nature Protection of the Republic of Uzbekistan will include distributing the recovery equipment, siting the recycling centers, monitoring the amount of CFC recycled and redistributing the equipment, when necessary.

13.2 Quality Control

Samples of recycled refrigerant will be analyzed for cleanliness under the supervision of the State Committee for Nature Protection of the Republic of Uzbekistan.

13.3 Pricing of Recycled Refrigerant

The recycled refrigerant will be returned, as such, to the recovery network at a price that shall not be more than that which is reasonable to cover the operational costs of the recycling centers including; collection of recovered refrigerant, operating space, storage areas, man hours and redistribution of the recycled refrigerant. This price will be agreed upon under the supervision of the State Committee for Nature Protection of the Republic of Uzbekistan.

14. EXPECTED PROGRAMME RESULTS

The following are results expected from this programme:

- improved training of technicians in the refrigeration and air conditioning sector thereby reducing leaks and emissions during servicing and maintenance;
- the recovery of refrigerant before retrofitting or dismantling and scrapping operations;
- creation of the necessary infrastructure within the country for the collection, recycling and distribution of all CFC recovered by whatever means;
- encouragement to service workshops and companies to maintain their own systems and/or

- equipment, whether directly included in this programme or not, to recover CFC-12 during servicing; and
- Expected reduction of a minimum of 91.48 Tonnes / year of CFC-12 purchased.

15. TIMETABLE

TASK / PERIOD	TIME FOR COMPLETION							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1. PREPARATION								
GEF Approval	XX							
Procurement preparation	XX							
Arrival of equipment		XXX						
2. DEMONSTRATION SEMINARS			XX					
3. STARTING RECOVERY / RECYCLING Distribution of equipment			XX	XXX				
4. MONITORING Setting up Monitoring System			XX	XXX	XXX	XXX	XXX	XXX

16. CO-ORDINATING NATIONAL BODY

The State Committee for Nature Protection of the Republic of Uzbekistan (Ozone Focal Point) will be the coordinating body for this project.

17. PROGRAMME COSTS**17.1 Demonstration Seminars**

Days	Item	Total
10	One International Consultant: fees, travel, DSA and other expenses	\$25,000
10	National Consultant	\$2,500
10	logistical arrangements for seminars including interpreters	\$10,000
3	Duplication of Technical Literature	\$3,000
	SUB-TOTAL	\$40,500

17.2 Recovery and Recycling Equipment

Units	Recovery and Recycling Equipment	Total Cost
	CFC-12 EQUIPMENT TO BE USED BY THE WORKSHOPS	
350	Recovery Machines	\$350,000
350	Recovery Bags	\$14,000
350	Refrigerant Recovery Cylinders with two ports	\$29,750
350	Refrigerant Recovery Cylinders with two ports and OFP	\$38,500
350	Recovery Equipment Kits Including Leak Detectors	\$227,500
	CFC-12 EQUIPMENT TO BE USED AT THE RECYCLING CENTERS	
30	Recycling Equipment	\$150,000
30	Refrigerant Identification Kits	\$19,500

30	Vacuum pumps to empty the cylinders	\$10,500
90	100 lb. refrigeration Cylinders with two ports and OFP	\$18,000
30	1000 lb. Refrigerant Cylinders with two ports	\$30,000
	Sub-total	\$887,750
	MAINTENANCE AND SPARES	\$88,775
	FREIGHT COSTS	\$88,775
	CONTINGENCIES (10 % OF EQUIPMENT+MAINTENANCE+SPARES+FREIGH)	\$106,530
	SUB-TOTAL	\$1,171,830

17.3 Incremental Operating Costs

All operating costs including; transportation of cylinders to and from the recycling centers, maintenance of the equipment that will be supplied under the present programme shall be included in the sale price of the recycled refrigerant.

As part of its responsibilities, the State Committee for Nature Protection of the Republic of Uzbekistan (Ozone Focal Point), shall monitor the programme and ensure that the sale price of the recycled refrigerant is balanced in such a manner that neither financial loss nor profit shall be incurred by the operators of the recycling centers.

17.4 Evaluation Mission

Cost of Evaluation Mission

Two Days including travel etc.	\$6,000
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17.5 Monitoring System Costs

The activities under this heading will be part of the funds approved for monitoring the Refrigerant Management Plan.

17.6 Project Support Services

Project support services costs for the local office \$12,183

17.7 Executing Agency Fees

8 % OF (All the Project costs MINUS Project support costs)	\$97,466
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17.8 Project Costs

17.2 DEMONSTRATION SEMINARS	\$40,500
17.3 Recovery and Recycling Equipment	\$1,171,830
17.4 Evaluation Mission	\$6,000
17.5 Project Support Services by Local Office	\$12,183
17.6 Executing Agency Fee	\$97,466

98.07.23

TOTAL PROJECT COST (INCREMENTAL COST)	\$1,327,980
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18. COST EFFECTIVENESS

Project Cost (incremental Cost)	\$1,327,980
Minus Project Support	\$109,650
Applicable Grant for CE-Calculation	\$1,218,330
Reduction inCFC-12 consumption in kg / year	91,476
THEREFORE	
COST EFFECTIVENESS FOR ONE YEAR IN US \$ PER KG	13.32

19. PROGRAMME REVIEW AND REPORTING

The programme will be the object of tripartite review consisting of representatives from the Government, the State Committee for Nature Protection of the Republic of Uzbekistan, as the Executing Agency, and UNDP. This review will be done at least twice during the life of the programme. The national co-ordinator for the programme or the official responsible for the execution of the programme will prepare and submit for each of the reviewing parties' progress and evaluation reports. During the implementation of the programme, other similar reports that may be requested shall be prepared.

A final programme report will be prepared to be considered at the final review committee meeting of the programme. A draft of that final report will be prepared in advance so that all parties may examine its contents before the final meeting. The final draft will be obtained within two weeks after this final meeting. It will incorporate all the agreed final observations, technical and otherwise.

Country: **Uzbekia**
Co-ordinator: **State Committee for Nature Protection**
Type: **Recovery and Recycling of ODS; Training of Service Technicians**
Date: **August 1998**

RTU-UNWB-LK-980346-dl

Scope

The project under review covers the recovery and recycling of CFC-12 from serviced equipment as well as a training course for good practice and hands on training of the R&R equipment.

1. Project Description; Sector Background and Justification

The project proposal describes the sector background in Uzbekistan and the project justification quite well. It is logical that the government would like to start efforts in recovery and recycling at short notice given the production and import situation of CFCs; the situation seems manageable given the fact that there are 700 workshops (260 ODP tonnes consumption mainly in servicing). It is an appropriate decision to give recovery and also the recycling machines to only the larger users and to check their operations during the first year. Training of technicians is directly related to proper handling of refrigerants and proper use of the R&R machines. It is several times stated in the proposal that this will contribute to an extra saving (but where it can be assumed that this saving can, in a next step not be realised via recovery and recycling, the CFC material is simply not used).

Where it concerns the servicing of domestic refrigerators, the proposal mentions the use of plastic bags which seems to be adequate. It is appropriate to give training to the most "qualified" technicians first; the principle of licensed technicians is OK, if the licensing determines whether or not one will receive the recovery equipment.

It is proposed that in the period after the first training (by a UNDP consultant to the best technicians) the training will be given following "the train the trainer approach". It should be safeguarded that the State Committee or one training institute will act as the focal point and as a demonstration centre during the entire project, in co-operation with the National Ozone Unit or Ozone Coordinator, or the State Committee.

The way of distributing the recovery equipment and the siting of the recycling centres is supported, as well as the conditions for the siting of the Recycling Centres.

2. Technology

As far as the recover and recycle technology introduced, no comments (the proposal mentions erroneously 350 recycling machines in the summary).

The only important questions one may ask is whether the assumption that 350 machines will recover 1 kg per day, and whether the recycling efficiency is 90%, which would yield a saving of 85 tonnes. It is furthermore just an assumption to state that one service technician with a bag recovers 85 grams a day, and a total -country-wise- of 6.5 tonnes. The figure seems to be somewhat random, and is at least not related to the repair operations. Very much will depend on how many systems are repaired, how many have leaked and what the leakage percentages are; the recycling efficiency may well be lower.

One should at this stage refer to the RMP that mentions the tonnages that are used in the repairs of the different types of equipment. With some assumptions for the influence of better practices, and an assumption which percentage of the systems will be serviced by technicians with equipment, it may all be possible to recycle 91.5 tonnes compared to the 1996 national consumption of 260 tonnes. Although it is stated that domestic refrigerator repairs are important, it is only 6% in the total (in a first instance good practices and adequate repairs will reduce the consumption substantially).

The proposal mentions 700 workshops and 900 technicians, and that next to the 700, there are many smaller ones of different sizes (as far as can be observed most of the workshops identified are small, one person only ??).

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However, an assumption that about 30% of the total consumption can be reused seems reasonable, given the fact that only half the workshops are equipped with recovery units, it may even be a bit too high, but it is an appropriate number to base the efficiency of the project upon.

It is correct to have the project monitoring done as part of the national RMP.

The training course is proposed for one day (10 courses, 20-30 participants). One may consider at least two days if not three, if it includes hands on training in small groups. Next to the UNDP experience, material developed by UNEP could/should be used (difficulty is here; which languages can be used since the material is not available in Russian); maybe UNDP or Uzbekistan could develop some material from material available in the English language. The training could also contain some information on new refrigerants, i.e. isobutane (flammables) in domestic appliances (since the domestic appliance factory may consider conversion to isobutane in the near future) and the use of HFCs in new equipment and for retrofits. As mentioned, the certificate proposed is an important element in setting up a good national framework.

3. Environmental impact

The project contributes to a decrease of emissions of CFCs and therefore has positive environmental aspects.

4. Project costs

There are no major comments to the incremental investment costs mentioned. Costs would somewhat increase if one would extend the duration of the seminars, but this would be in the order of USD 15-20,000 which keeps the cost effectiveness still below the threshold level.

5. Implementation time frame

Demonstration seminars could go during a longer period than only 1-2 months (within one quarter).

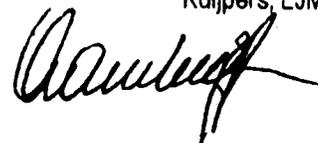
6. Recommendations

The R&R and training project as proposed for Uzbekistan for 350 recovery and 30 recycling centres is supported.

A derivation of the amount to be expected to be recycled should be calculated more accurately in a second way, particularly since the information is available from the RMP (make reference to the RMP). One may further consider extension of the duration of seminars and some changes in the monitoring.

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The RMP May 1998 mentions tonnages that are involved in repair; can it be true that out of 265 industrial units 165 units are repaired per year which is the larger portion of the recovery. Or has this to do with certain practices which could easily be changed (e.g. a prescribed emptying of the system before the wintertime) and which would seriously affect the recovery recycling efficiency.

Apart from some questions in 4.1.3 of the RMP, section 5 of the RMP has some inconsistencies. Line 2 is not supposed to reduce consumption, lines 4 and 4b contain two different numbers for R&R, where only 51.53 tonnes are used in the reduction as a total. I think this needs to be once more properly looked at, also at the sequence of actions.