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

Fifteenth Meeting
Montreal, 12-16 December 1994

UNDP WORK PROGRAMME

This document includes:

- Comments and Recommendations from the Fund Secretariat
- 1994 Work Programme Amendments
- Indicative 1995 Work Programme

COMMENTS AND RECOMMENDATIONS FROM THE FUND SECRETARIAT

1. UNDP is requesting approval of the Executive Committee for amendments to its 1994 Work Programme. They include investment projects under US \$500,000, project preparation and technical assistance activities. The investment projects under US \$500,000 are being included as sub-projects to projects presented under the Agenda Item on Project Proposals related to each country. The rest of the activities are listed in Table 1 below, which shows the requested funding and recommended level of funding.

Table 1: 1994 UNDP Work Programme Amendments
Activities/Projects and Corresponding Funding Levels

Country	Activity	Amount (US \$)	
		Requested	Recommended
China	Project preparation assistance	100,000	100,000
Cuba	Implementation of a national programme for recovery and recycling of refrigerant	169,000	169,000
Indonesia	Project preparation assistance in solvent, halon and refrigeration sectors	100,000	100,000
Malaysia	Project preparation assistance	100,000	100,000
Philippines	Project preparation assistance	50,000	50,000
Thailand	Project preparation assistance in foam, halon and aerosol sectors	100,000	100,000
	Safety and technical assistance programme for manufacturers of aerosol products	127,000	127,000
Venezuela	Second phase of the CFC-12 recovery and recycling in MAC	220,000	220,000
	Total	966,000	966,000
	Project support cost	125,580	125,580
	Grand total	1,091,580	1,091,580

Specific Comments

2. The following comments relate to the activities listed in Table 1 above, where necessary.

Cuba: Implementation of a National Programme for Recovery and Recycling of Refrigerant

3. The objective of the project is to implement a comprehensive national programme for recovery and recycling of refrigerant in the refrigeration and air conditioning sectors.

4. About 49 tonnes of CFC will be recovered annually once the project is implemented.

5. Five training workshops for technicians performing repairs and maintenance on refrigeration and air conditioning equipment will be conducted.

6. The project will also provide 70 recovery machines and 6 recycling machines, as the basis for a nationwide collection and distribution of recovered CFC.

7. A system for monitoring the quantities of CFC recycled, with periodic evaluation, is planned to ensure the success of the programme.

8. The Secretariat recommends approval of the requested project costs of US \$169,000 and US \$28,600 as support costs.

Thailand: Safety and Technical Assistance Programme to Manufacturers of Aerosol Products

9. The project will conduct a survey of the aerosol plants to update the data on CFC users and to collect preliminary information on existing safety standards at the plants, that will facilitate elimination of CFC consumed in this sector.

10. Safety audits by an international aerosol expert and a local consultant will be conducted at about 20 large and medium-sized plants that have either converted to hydrocarbons (HAPs) or are considering switching to HAPs.

11. Recommendations to correct any deficiencies and to enhance safety at the plants will be provided.

12. This project has been identified as one of the priority aerosol projects by the Department of Industrial Works. The activities proposed under the project are very specific and results-oriented and do not overlap with the Global Aerosol Project.

13. The UNEP sectoral information and training material will be extensively used, together with other manuals and technical papers from leading aerosol manufacturers worldwide and other bilateral agencies.

14. The Secretariat recommends approval of the requested project costs of US \$127,000 and US \$16,510 as support costs.

Venezuela: Pilot Project on CFC-12 Recovery and Recycling in MAC (Phase II)

15. This project will avoid the release of 75 tonnes CFC-12 during the servicing of MAC units of automobiles and buses by the installation of recycling equipment at 40 service shops. This project is the second phase of a project approved at the Twelfth Meeting of the Executive Committee.

16. Lessons learned during Phase I will be taken into account when implementing Phase II. More emphasis will be put on maintenance and repair of the recovery and recycling units; servicing buses will be included; and detailed calculation will be made on the operational costs and savings resulting from the recovery operations which will be made available to the Executive Committee.

17. The project was prepared taking into account a technical assistance project in this sub-sector which is being submitted to this meeting by the Government of the United States as bilateral cooperation.

18. Equipment cost, including maintenance, repairs and technical assistance were based on the experience gained by UNDP during the implementation of Phase I of the project.

19. The Secretariat recommends approval of the requested project costs of US \$220,000 and US \$28,600 as support costs.

RECOMMENDATION

20. The Fund Secretariat recommends approval of the amount of US \$966,000 and US \$125,580 as support costs for the projects listed in Table 1 above as amendments to UNDP 1994 Work Programme.

PROJECT COVER SHEET

COUNTRY: CUBA

PROJECT TITLE: Implementation of a National Programme for Recovery and Recycling of Refrigerant.

SECTOR COVERED: Refrigeration and Airconditioning Sectors

ODS USE IN SECTOR: 311 tons per year (as per figures for 1991).

PROJECT IMPACT: 49 tons/year of CFC 12

PROJECT DURATION: 1 years.
ECONOMIC LIFE: 5 years.

TOTAL COST: \$US 169,000
PROPOSED MLF GRANT: \$US 169,000

COST-BENEFIT RATIO OF PHASEOUT: 0.90 US\$/kg

COORDINATING NATIONAL BODY: Ministry of Science, Technology and Environment (OTOZ National Office).

IMPLEMENTING AGENCY: UNDP

PROJECT SUMMARY:

The project is to implement a comprehensive National Programme for Recovery/Recycling of refrigerant in the refrigeration and airconditioning sectors. Five training seminars for technicians performing repairs and maintenance on refrigeration and airconditioning equipment will be held to familiarize all involved with the recovery/recycling plan. Improved servicing techniques to avoid leaks of CFC will be an important part of the training provided during those seminars. The project will also provide recovery/recycling equipment, and a nationwide collection and distribution network of recovered CFC's will be established. A system for monitoring the quantities of CFC recycled (with periodic evaluation) is planned to ensure the success of the recovery/recycling programme. This task will be carried out by OTOZ and MINCIN.

PROJECT OF THE GOVERNMENT OF CUBA

IMPLEMENTATION OF A NATIONAL PROGRAMME FOR RECOVERY AND RECYCLING OF REFRIGERANT.

1. PROJECT OBJECTIVES.

The objective of the project is to implement a comprehensive National Programme for Recovery/Recycling of refrigerant in the refrigeration and airconditioning sectors.

2. SECTOR BACKGROUND

Cuba's Country Programme for the reduction of Ozone Depleting Substances (ODS) was approved in July 1993. It stipulates that 93.4 % of ODS is in the refrigeration and airconditioning sector (i.e. 311 tons of CFCs per year). These 311 tons are used for servicing of existing equipment in this sector. Losses of CFC charge in installations can be attributed to leaks and servicing activities.

Evolution in prices in the international market directly affects consumption in the country. In accordance with the provisions of the Copenhagen Amendment, CFC production will cease by the end of 1995 in the developed countries, which will affect its availability. In view of the fact that Cuba has to import all of its CFCs, and taking into account that the refrigeration service sector is the major consumer, the need has arisen to familiarize engineers and technicians in the sector with good maintenance practices and recovery/recycling technologies.

This project is part of an overall strategy by the Government for the refrigeration sector. The first priority is to stop the discharge of CFC's to the atmosphere due to leaks and servicing emissions in the refrigeration and airconditioning sectors. In order to achieve this, the Government decided to launch the comprehensive recovery/recycling programme presented herewith.

Indirectly this project will allow Cuba to continue to use its present refrigeration/airconditioning installations for a further period of time without conversion, as recovered CFC's will be available in the coming years. This should allow the country to face the most immediate consequences of possible future shortages of CFC's on the international markets.

3. PROJECT JUSTIFICATION.

One of the highest priorities in the phaseout of the use of CFC's in the refrigeration sector is to improve maintenance practices of technicians, repairing and servicing existing CFC-installations and the recovery and storage of the refrigerant present in the installation while conducting repairs and servicing to avoid unnecessary losses and venting of CFC's. This project will disseminate this type of information.

The recovery/recycling project constitutes of a National Programme which aims at phasing out CFC for the domestic and commercial refrigeration sectors, as well as the airconditioning sector, and will result in a phaseout of 49 tons of CFCs per year. To ensure its success, the Government will introduce a comprehensive monitoring system to check on a periodic basis how much CFC's are being recycled by each of the recovery equipments provided through this project.

The quantity of CFC 12 that will not have to be purchased anymore, thanks to the recovery/recycling efforts of this project is estimated as follows:

- 1) 70 recovery machines will recover an average of 3 kg of refrigerant per day.
 - 2) There are 260 working days per year.
 - 3) 90 % of the recovered material can be recycled
- =====
- Annual recycled CFC 12 would amount to 49 tons

It should be noted that this figure does not include the amounts of CFC's that one might expect to save during the repairing of leaks as a result of the availability of recovery equipment during servicing.

4. PROJECT ACTIVITIES AND PROJECT COSTS.

Activity 1: Demonstration Seminars on Recovery/Recycling Programmes and Good Maintenance Practices,

Five Demonstration Seminars will be held (two in Havana, three in other major cities). Each seminar will be of one day duration, and will include an explanation of the need for recovery/recycling, the presentation of recovery/recycling technologies, methodologies in different systems as well as good practice during services and maintenance.

It should also be noted that the seminars will utilize (among other materials) some of the existing training documentation and materials such as the ones prepared in previous seminars as well as other material prepared by UNEP. In view of the fact that UNEP and UNIDO are also actively involved in this sector, they will be invited to participate in the seminars.

US\$

1 International Consultants/Lecturer (see note)	(see note)
Logistical Arrangements for Seminar	14,000
Duplication of Technical Literature	1,000
Total	15,000

Note: The consultant will also assist the counterpart in project implementation activities wherever needed. The cost of the consultant will be borne by a US\$ 30,000 fund approved at the 13th Executive Committee Meeting.

Activity 2: Recovering/Recycling Programme.

Creation of a National Recovery-Recycling Network.

There are 213 refrigeration/airconditioning workshops divided between 15 provinces. Based on the present needs of the country, the Government has decided to establish the network based on 6 recycling centers and 70 maintenance workshops. The six recycling centers would be at the following locations:

- Havana 1
- Havana 2
- Villa Clara
- Camagüey
- Holguín
- Santiago de Cuba

These six recycling centers will be supplied by sub-networks of maintenance workshops which will recover CFC's from domestic/commercial refrigerators as well as from airconditioners and chiller systems. Equipment needed for the network include the following items.

(see table on next page)

US\$

<u>CFC 12 Equipment to be used by 70 Workshops.</u>	
- 70 recovery machines (see note)	62,000
- 150 refrigerant recovery cylinders with two ports (see note)	9,000
<u>CFC 12 Equipment to be used at 6 recycling centers.</u>	
- one recycling machine with analyzing kit (see note)	40,000
- two 120 pounds cylinders, one that will contain incoming refrigerant and another one that contains recycled material (includes indicator on weight)	4,000
<u>Maintenance and Spares</u>	10,000
<u>Freight Costs</u>	15,000
<u>Contingencies (10 % of the above)</u>	14,000

Total: US\$ 154,000

Notes:

Each recovery machine includes a buffer tank and a scale, allowing to measure when a cylinder is full. These buffer tanks are necessary to increase the recovery rate or capacity of medium weight and therefore acceptably portable equipment.

Out of the 150 refrigerant recovery cylinders, 140 will be distributed among the 70 workshops, and 10 more will be kept in reserve to be used when a large system is serviced where several bottles are needed to contain the full charge. Each workshop needs two cylinders to allow one to be filled while the other is being recycled.

The analyzing kit is of utmost importance to define degree of contamination in the refrigerant and to avoid the attempted recycling of mixed refrigerants.

Samples will be taken of the recycled refrigerant and will be analyzed under the coordinating unit which is OTOZ.

Activity 3: Monitoring System.

A manual record-keeping system on the amounts of refrigerant being recovered and recycled will be performed at the 6 recycling centers. Initiation of this system, designing of a questionnaire, and overall coordination will be dealt with by the staff of the project of institutional strengthening, approved in 1993. The information received by the 6 recycling centers channeled through MINCIN to OTOZ, and presented at the tripartite meetings mentioned in the paragraph 8.

4. EXPECTED PROJECT RESULTS.

- Training of technicians in the refrigeration and airconditioning sector will be accomplished.
- A reduction of 49 tons/year of CFC purchased is expected.

5. TIMETABLE

TASK	TIME FOR COMPLETION					
	Q1	Q2	Q3	Q4	Q5	Q6
1. Preparation MLF Approval Procurement preparation Arrival of Equipment	xx xx	xxx				
2. Demonstration Seminars		x	xx			
3. Starting Recovery/Recycle Distribution equipment			xx	xxx		
4. Monitoring system				xxx		

6. COORDINATING NATIONAL BODY.

The Ozone Technical Office (OTOZ) under the Ministry of Science, Technology and Environment will coordinate the implementation of this project. The monitoring system will be managed by OTOZ and MINCIN (Ministry of Interior Trade). Technical inputs will also be provided by IRC-SIME (Instituto de Refrigeracion y Climatizacion - Sidero Mecanico).

7. PROJECT COSTS

All capital costs were spelled out in paragraph 5 and their total amount equals US\$ 169,000. The recurrent costs will balance out the recurrent savings. (i.e. savings for not having to purchase 49 tons of CFCs would balance out costs such as training needs of technicians, increased labor and internal travel costs, installation of the monitoring system, etc).

The unit abatement cost is calculated as follows:

a) Incremental Capital Cost	169,000 US\$
b) Project Economic Life Time	5 years
c) Incremental Recurrent Cost	nil
d) CFC Consumption	49 tons/yr
e) Capital Recovery Factor (5 years)	0.2638
Unit abatement cost (a * e + c) / d	0.90 US\$/kg

8. Project Review and Reporting.

The project will be the object of tripartite review (consisting of Representatives from the Government, the Executing Agency and the UNDP) for at least one time every 12 months. The national coordinator of the project or the official responsible for the execution of the project will prepare and submit for each of these tripartite review meetings a progress and evaluation report. During project implementation, other reports of this kind may be requested if needed.

A final project report will be prepared to be considered at the final tripartite meeting of the project. A draft of this final report will be prepared in advance so that all parties may examine its contents before the final tripartite meeting. The final draft will be obtained after this meeting, to incorporate final observations (technical and others).

PROJECT COVER SHEET

COUNTRY: Thailand

PROJECT TITLE: Safety and Technical Assistance Programme to Manufacturers of Aerosol Products

SECTOR COVERED: Aerosols

ODS USE IN SECTOR: 500 MT

PROJECT IMPACT: Reduced fire risks from use of flammable hydrocarbon propellant substitutes

PROJECT DURATION: 12 months

PROJECT ECONOMIC LIFE: 10 years

TOTAL PROJECT COSTS: US\$ 127,000

PROPOSED MLF GRANT: US\$ 127,000

COST EFFECTIVENESS: N/A

COORDINATING NATIONAL AGENCY: Department of Industrial Works

IMPLEMENTING AGENCY: UNDP

APPRAISAL DATES: November 1993, October 1994

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PROJECT SUMMARY

High quality hydrocarbon aerosol propellants (HAPs) are not yet widely available in Thailand; as a result, CFCs are still being used by many aerosol product manufacturers in many applications. Under this project, a survey of the aerosol plants will be conducted to update the data on CFC users and to facilitate CFC phaseout in this sector. It will include preliminary information on existing safety standards at the plants. In addition, safety audits by an international aerosol expert and a local consultant will be conducted at about 20 large and medium-sized plants that have either converted to HAPs or are considering switching to HAPs. The consultants will make appropriate recommendations to correct any deficiencies and to enhance safety at the plants. A workshop will be organized to disseminate information on aerosol technology and related safety issues. A safety manual will also be compiled and distributed to aerosol product manufacturers.

PREPARED BY: Mr. Geno Nardini/Ms. L. Reno
REVIEWED BY: Mr. Erik Pedersen, UNDP Halon and Safety Expert

PROJECT OF THE GOVERNMENT OF THAILAND
SAFETY AND TECHNICAL ASSISTANCE PROGRAMME TO
MANUFACTURERS OF AEROSOL PRODUCTS IN THAILAND

1. PROJECT OBJECTIVE

The objective of this project is to ensure the safe and effective use of hydrocarbon aerosol propellants (HCs) at aerosol product manufacturing plants in Thailand.

2. SECTOR BACKGROUND

It is estimated that the CFC usage in the aerosol sector in Thailand is higher than previously established in the Country Programme. Visits to four plants alone placed this figure between 400-500 MT. Most of the larger companies producing paints or insecticides have either never used CFCs or have already converted to HCs. In total, Thailand's aerosol industry produces about 45-70 million cans per year, primarily for consumption in the domestic market. CFCs are still being used in some cosmetic and personal care products and other aerosol applications. At this time, CFCs are being used by about 20-50 companies that make up possibly 50% of Thailand's aerosol industry. It is therefore necessary to identify the remaining CFC users and to develop plans to assist them in phasing out CFC use.

The visits to four aerosol manufacturers revealed that there are serious safety problems involved with filling hydrocarbons. This is being performed without proper safety precautions. In two of the four companies visited, plant safety conditions and standards are appalling. Since many companies have already, or are switching to non-CFCs, an unfortunate accident now can cause irreparable damage to the programme to convert the remaining fillers, as well as having an extremely high social cost.

3. ENTERPRISE BACKGROUND

It is estimated that about 20 companies have either partially or totally shifted away from CFCs, however, access to these companies proved to be extremely difficult and more information will be required. These companies will receive technical assistance from an aerosol expert; safety audits will be performed and technical advice on safety improvement and hydrocarbon handling will be provided. Follow-up visits, where required, will be part of this technical assistance to ensure the safe and effective use of HAPs.

4. PROJECT DESCRIPTION

The focus of this project is to bring improved knowledge on safety issues to those aerosol companies which are in various stages of technology conversion, or which are considering embarking on the process of switching away from CFCs to hydrocarbons (HCs). The goal is to help them minimize the risks associated with using flammable propellants. This will be accomplished through provision of safety training, raising awareness of safety hazards and mitigation strategies, and technical assistance in the form of safety audits at the various sites. The follow-up to this set of activities will be to develop individual programmes and schedules for correction of any deficiencies identified, and to put in place basic safety elements before finalizing the conversion process. The safety and technical assistance programme will consist of six main components.

- a full survey of all the aerosol factories in Thailand. This will include making a preliminary assessment of the existing production facilities and classify them in a logical way that will allow easy follow-up later on;
- safety audits at about 20 factories. This will include making appropriate recommendations to factories to bring their operations up to acceptable safety standards and personnel training relating to safe aerosol-filling operations and practices;
- safety workshop;
- preparation of a safety manual for translation into Thai language for distribution to aerosol product manufacturers;
- follow-up visits to selected aerosol factories for inspection of safety practices adopted;

At the end of the planned project activities, the international consultant will prepare a final project report and make recommendations on follow-up actions required for ODS phaseout in the aerosol sector. Wherever justified, the consultant will prepare preliminary project proposals for those companies interested in switching away from CFCs and may be eligible for funding from MLF.

a) Survey

To phaseout CFCs in the aerosol sector, it is necessary to conduct a light survey of the industry and identify the remaining CFC users. Relevant information on the users will be collected which will allow easy future follow-up actions such as conversion project. An international consultant will be recruited to guide the project activities and provide substantive technical inputs. One or two local experts will be hired to assist in the initial survey work, safety audits and the follow-up visits to selected plants. They will be trained by the international consultant and will work closely with the latter.

b) Plant Safety Audit

The team will visit approximately 20 companies which have started conversion to HCs, or are currently using flammable propellant gases, identify fire hazards and/or potential safety enhancements, and make appropriate recommendations both in terms of additional safety measures and personnel training needs. Their safety audit report will include estimates of the costs and benefits (e.g. prevention of accidents) associated with the recommended changes, an explanation of the risks likely to be eliminated with such changes, and a schedule for these changes to be completed.

c) Safety Workshop

Representatives of the 20 companies will be invited to participate in a safety workshop. It will address the special circumstances of each company and focus on the recommendations of the safety audit. If LPG storage tanks and cylinders are to be used, local fire fighting personnel will also be invited to receive additional training in handling LPG fires. The consultant(s) will help companies develop a schedule for implementing the recommendations and will schedule plant visits to ensure that such recommendations are being implemented.

The workshop will target those smaller companies which have not yet embarked on a programme to replace CFCs. They will be exposed to alternative technologies, safety considerations and requirements for a conversion, and the options available for phasing out - including the option of contract filling, will be explained. At the workshop, a list of companies interested in phasing out the use of CFCs will be developed, including the preferred technology.

d) Safety Manual

The international consultant will be responsible for compiling a safety manual for distribution to interested aerosol product manufacturers in Thailand. This manual will be translated into Thai language by the local expert(s) under supervision of the international consultant.

e) Follow-up Visits

One or two follow-up visits will be made to each plant. the team will review the established individual safety programme recommended and correct any remaining problem areas. The second visit, if required, will generally be made by the local expert to follow through the additional recommendations made by the international expert and agreed upon by the plant during the first follow-up visit.

5. TECHNOLOGY

Hydrocarbons (HCs) are the most commonly used substitutes for CFCs in aerosol propellants. They account for 80% of worldwide conversions from CFCs and about 90% of current aerosol propellant used in the United States. Advantages of HCs include their widespread availability, low cost, non-toxicity, and good dispersion characteristics.

While hydrocarbons provide a cost-effective propellant alternative, these gasses are, unfortunately, hydrocarbon gases and are very flammable. Because their flash points are extremely low, any fire or spark can ignite hydrocarbons at ambient temperatures. In order to prevent fire or explosion, the concentration of hydrocarbons in the air must be below the lower explosive limit and all possible sources of ignition must be eliminated.

The intrinsic flammability of these gases requires special care and safety design in the following areas:

- (a) propellant receiving and storage;
- (b) propellant filling in containers (gassing);
- (c) in-plant storage of filled aerosol products;
- (d) disposal of defective, filled test units;
- (e) laboratory operations.

6. PROJECT COSTS

The total cost is
follows:

and is broken down as

. Survey	\$ 25,000
. Safety audit (approx. 20 plants)	30,000
. Safety workshop	30,000
. Follow-up visits	25,000
. Safety manual	5,000
. Contingency @ 10%	12,000
TOTAL:	<u>\$127,000</u>

Since there is not operational cost, ODS savings, or non-ODS investment cost in this project, the total cost is also the incremental cost.

7. FINANCING PLAN

The proposed MLF grant for this project is US\$ 127,000.

8. IMPLEMENTATION SCHEDULE

As shown in the following table, this project can be implemented over 4 quarters:

TASKS	Q1	Q2	Q3	Q4
Project document sign.	XX			
Consultants recruitment	XX			
Survey	XX	XX		
Safety audit		XX XX		
Safety training			XX	
Safety manual		XX XX XX	XX XX	
Follow-up visits			XX XX	XX
Final report				XX

9. PROJECT MANAGEMENT

The Department of Industrial Works will be the overall coordinating agency and UNDP/OPS will be responsible for the implementation of this project.

10. PROJECT IMPACT

This project will not directly eliminate any ODS. However, it will ensure the sustained phaseout of CFCs in the aerosol sector and continue to maintain its momentum, and is not resisted by an industry that has begun to become hesitant. Additionally, aerosol filling plants in Thailand will receive significant improvement in manufacturing safety and in worker safety.

11. ANNEXES

Annex 1: Technical Review

TECHNICAL REVIEW

PREPARED BY: Mr. Erik Pedersen
UNDP Halon and Safety Expert

Erik Pedersen
New York 22/10 94

DATE: 20 October 1994

The Thai project on Safety and Technical Assistance Programme to Manufacturers of Aerosol Product has been reviewed by me on the basis of draft project document. The comments reflect my observations as a Safety Engineer and my experience with HC aerosol projects in other countries.

1. **COUNTRY:** Thailand
2. **PROJECT TITLE:** Safety and Technical Assistance Programme to Manufacturers of Aerosol Products
3. **(SUB) SECTOR:** Aerosol
4. **CP RELATIONSHIP:** Conversion of the aerosol sector is addressed in the C.P, so is the use of HC as propellant for aerosols cans. The safety issue has been raised based on experience from projects in other developed and developing countries and information obtained during site inspection and implementation of HC aerosol projects.
5. **TECHNOLOGY:**

Technical soundness
The project is relevant and justified. A major accident caused by lack of prevention and protection will put similar projects on hold, thereby delaying the sector phaseout plan.

Safety
A major accident will have a severe impact on the safety of the workers and the surroundings. As national requirements do not seem to be in place or enforced, the project is well justified.
6. **ENVIRONMENTAL IMPACT:** Not relevant for this type of project.

7. PROJECT COST:

The cost of safety audit depends greatly on the number of companies to be covered. Since they will only be identified as part of the project activities, it is difficult to foresee the actual audit cost. However, the cost per facility should not exceed one day per company by the expert. Taking into account the travel and reporting time, the budget for 20 audits seems high and clarifications are needed.

Otherwise, the overall project budget seems reasonable and justified.

8. IMPLEMENTATION:

The project implementation schedule seems feasible.

The following additional activities/points are recommended to enhance the effectiveness of the project:

- a) The project should include the education of a national safety expert, who can carry out safety audit as part of the project and who can undertake the continuous safety audit as required.
- b) The safety manual should be prepared before any safety inspection and audit is carried out. Such manuals are available internationally and should be applied for all project covered by the Multilateral Fund (irrespective of countries concerned).
- c) The safety manual should also set standards and requirements for equipment and installations used in accordance with international recognised standards. It should provide clear guidelines for installations and lay out of aerosol plants regarding receiving and storage areas, filling area and equipment, in-plant storage of filled aerosol products, disposal of defective filled units and laboratory operations. It should give guidelines for the placing of storage tanks and protection of such.

9. RECOMMENDATIONS:

The project is sound and needed and it is recommended for approval.

PROJECT COVER SHEET

COUNTRY:	REPUBLIC OF VENEZUELA
PROJECT TITLE:	Pilot Project for Recovery-Recycling of CFC 12 in the Mobile Airconditioning Sector (PHASE 2)
SECTOR COVERED:	Mobile Airconditioning
ODS USE IN SECTOR:	1486 tons of CFC-12 per year (figures for 1993).
PROJECT IMPACT:	75 Tons of CFC-12 per annum
TOTAL COST:	\$US 220,000
UNIT ABATEMENT COST:	0.48 US\$/kg-yr
PROJECT DURATION:	Eight Months
IMPLEMENTING AGENCY:	UNDP
COORDINATING NATIONAL BODY:	FONDOIN

1. Project Background.

The first phase Pilot Project of the Recovery-Recycling of CFC 12 in the Mobile Airconditioning Sector was developed and implemented by FONDOIN and USEPA with the cooperation of UNDP. The project has been designed to have four phases, one preparatory phase and three implementation phases. The first implementation phase will end at the end of 1994, and the terms of reference of the second phase, which should start in January 1995, are described herewith.

The preparatory phase which took place between October 1992 and April 1994 included following activities:

- conduct a study on the MAC sector in Venezuela
- identify a first sample of 40 mechanical workshops
- draft guidelines and terms of reference on:
 - criteria for the selection of 20 mechanical workshops
 - organization of the demonstration and training workshop
 - writing specifications for the requisition of recovery and recycling equipment.
 - preparation of legal documentation.

In May 1994, the first implementation phase started which included the following activities:

- to hold the above-described demonstration workshop.
- signature of contracts between FONDOIN and the mechanical workshops and delivery of the recovery-recycling machines.
- Continuous follow-up on
 - filling out monthly questionnaires by the mechanical workshops, recollection and revision of the data.
 - preparation of monthly progress reports by FONDOIN
 - technical assistance by FONDOIN to the mechanical workshops.
 - mid-term evaluation by FONDOIN and the US-EPA.
 - final evaluation in December 1994.

The mid-term evaluation report illustrates the success of the programme. It shows that three months, 1.6 tons of CFCs were recovered, which corresponds to an average of 0.7 kg per vehicle serviced, and which represents 58.3% of the initial charge in each vehicle. This good result shows that the mechanics used the recovery machines in an appropriate way, and even developed non-conventional uses of them such as

- recovering of CFC's independantly of whether a repair is carried out or not
- complete evacuation of cylinders of new refrigerant
- recovery of gas while testing leaks
- recovery of gas for repairs that necessitate dismantling the airconditioning, eventhough nothing is wrong with the airconditioning per se.

These and other experiences gained during phase 1, will allow a more defined orientation on the implementation of phase 2, which is proposed herewith.

2. Project Description.

The objective of the second phase of the project is to apply the results of phase 1 to a larger extent, both from a numeric and geographical point of view, as fourty new mechanical workshops, fifteen of which are located in Caracas, will become involved in the MAC programme.

The activities will be similar to the ones undertaken during phase 1 of the project. Lessons learned during the first phase will of course be taken into account when carrying out phase 2. For instance, more emphasis will be put on maintenance and repair of the recovery and recycling units during the demonstration

workshops. Servicing companies for busses will be involved as well, which will result in larger quantities of CFC's to be recovered per vehicle for those cases. This also means that recovery units for those service workshops will have to have a larger capacity. During this second phase, a detailed calculation will be made on the operational costs and savings resulting from the recovery operations (see paragraph 4).

FONDOIN will continue to be responsible to collect and process data, and will produce bi-monthly reports as well as mid-term and final evaluation reports.

It should be noted that US-EPA is also presenting a bilateral project proposal that will complement the activities and inputs listed below. The activities proposed by US-EPA are listed in the two-page annex attached herewith.

3. Project Impact.

According to the findings of phase 1, and taking into account that the recovery units considered for phase 2 will be in places which have a hotter climate than Caracas, it is estimated that each service station will repair an average of 8 car airconditioning systems, and that an average of 0.75 kg of CFC 12 will be recovered for each repair. The total amount of CFC's will thus be

$0.75 \text{ kg-CFC/repair} \times 8 \text{ repairs/day} \times 250 \text{ workdays/yr} \times 36 \text{ units} = 54 \text{ tons/yr}$

For autobusses this calculation amounts to

$7 \text{ kg-CFC/repair} \times 3 \text{ repairs/day} \times 250 \text{ workdays/yr} \times 4 \text{ units} = 21 \text{ tons/yr}$

The total amount of 75 tons/yr will be in addition to the 30 tons per year already being saved as a result of phase 1 of the project.

The results obtained during this phase of the project will lead to the third and last phase contemplated in this programme.

4. Project Costs.

4.1. Capital Costs.

US\$

Five one-day demonstration workshops in Caracas (Note 1)	30,000
36 Recovery Units - Service Workshops for Cars (Note 2)	108,000
4 Recovery Units - Service Workshops for Busses	32,000
Monitoring System/Technical Assistance (Note 3)	30,500
Contingencies (10%)	19,500

Total Capital Cost	220,000
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Note 1: It should be noted that the international consultants will be recruited through a parallel project which will be implemented by US-EPA. There is therefore no overlap between these two projects.

Note 2: Prices were taken based on the experience by UNDP-OPS during phase 1. The amount also provides for scales and cylinders.

Note 3: During this second phase, a detailed calculation will be made on the operational costs and savings resulting from the recovery operations (see next paragraph). It might be possible to avoid this expense for monitoring/technical assistance in phase 3, if findings during phase 2 determine that savings are higher than costs. However, as no such funds are available at this time for such activities, it is necessary to include this budget item for phase 2, in order to ensure the success of this crucial step in the programme.

4.2. Operational Costs.

There will be operational savings which will result from the fact that recycled CFC's will replace CFC's which would otherwise have to be purchased. On the other hand, there will be operational costs related to the

- additional labour cost needed to recover the gases
- longer time needed to service one vehicle will often cause loss of revenues as less cars per day can be serviced compared to the past.
- additional costs related to the handling/transportation of recovered refrigerant.

It is estimated that the savings will be equal to the costs, so that no operational costs/savings are included in the project.

4.3. Unit Abatement Cost.

a. Capital Investment Cost (US\$)	220,000
b. Capital Recovery Factor (10% p.a.)	0.16275
c. Incremental Operating Costs/Benefits	0
d. ODS Reduction (ODP Kgs July 93 - June 94)	75
e. Unit Abatement Cost (US\$/Kg)	0.48
[(a x b) + c] /d	

THE PROJECT UNIT ABATEMENT COST IS 0.36 US\$/Kg

PROVISIONAL 1995 UNDP WORK PROGRAMME UNDER THE MONTREAL PROTOCOL

1. **DURING 1991-1993**, UNDP's cumulative work programme under the Montreal Protocol was \$23 million, of which \$13.46 million (58%) has already been disbursed. In preparing the 3-year work programme for 1994-96, the initial UNDP forecast (Oct. 1993) was around \$90 million. Many considered this highly unrealistic given the low level of approved UNDP projects at that time and the paucity of acceptable project proposals. UNDP, accordingly, lowered its expectation by half, projecting a moderate 1994-96 work programme of around \$47 million in investment projects plus around \$13 million in technical assistance, institutional strengthening and other activities, for a total of around \$60 million over the period 1994-96.

2. **DURING 1994**, there was a tremendous surge in the number of requests for investment project preparation assistance received by UNDP. While several of these requests came from countries where UNDP already had ongoing work programmes (e.g. China, Egypt, Malaysia, Philippines, Uruguay), new requests came from Latin America (e.g. Argentina, Colombia, Mexico, Peru) and Asia (e.g. India, Thailand) where UNDP had previously little involvement in investment project formulation. As a result, UNDP project approvals in 1994 could reach the \$58 million range comprising:

a)	UNDP project approvals in March 1994	:	\$ 16.3 million
b)	" " " " July "	:	15.5 "
c)	" " " " Sept. "	:	1.4 "
d)	" " " " Dec. " (est.)	:	<u>24.5</u> "
	Estimated 1994 UNDP approved work programme	:	57.7 "

3. In addition, \$14 million in projects originally submitted for the 15th ExCom Meeting have been deferred to the 16th ExCom Meeting.

4. UNDP's overall 1994 work programme which, following 15th ExCom approvals, could reach \$57.7 million demonstrates the seriousness with which Article 5, para 1 Parties now view ozone layer depletion and their urgent need to phaseout ODS as per the schedules proposed in their respective approved country programmes. Following 15th ExCom approval, the UNDP project portfolio will phaseout 8,564 ODS tonnes, of which 427 tonnes have already been phased-out. UNDP is surprised and somewhat embarrassed to have, in the space of one year, presented and received approval for a volume of investment project proposals that it had initially assumed would arrive over the full 1994-96 period. To respond to this accelerated demand, UNDP has been strengthening its operations and is now quite able to process and implement annual programme approvals in the \$60 million range.

5. **FOR 1995**, UNDP is proposing a work programme of \$61.5 million which includes the \$14 million in projects deferred at the 15th ExCom Meeting. This is half of what UNDP had been requested to include in its work programme by its client countries. UNDP is confident that its projected \$61.5 million project volume in 1995, roughly the same level as what will be approved in 1994, is well within its expanded capabilities. The sectoral disaggregation for our 1995 work programme is: aerosols (3%), foams (44%), refrigeration (36%), solvents (9%), halons (7%) and miscellaneous (1%).

6. The attached table specifies the expected country disaggregation of the sectoral components of UNDP's provisional 1995 work programme.

PROVISIONAL 1995 UNDP WORK PROGRAMME UNDER THE MONTREAL PROTOCOL (In \$ Millions)

COUNTRY	AEROSOL	FOAM	REFRIG	SOLVENT	HALON	OTHER	TOTAL
ARGENTINA		2.0			0.5		2.5
BANGLADESH	0.5		0.5				1.0
BRAZIL		3.0	1.0	0.5	0.5	0.1	5.1
CHINA		10.0	10.0	1.0	0.5		21.5
COLOMBIA			1.0			0.1	1.1
CUBA			0.4		0.2		0.6
EGYPT		0.5			0.5	0.05	1.05
GHANA			0.3				0.3
GUATEMALA			0.3				0.3
INDIA		2.5					2.5
INDONESIA			1.0	1.0	0.5		2.5
JAMAICA			0.5				0.5
KENYA			0.4			0.05	0.45
MALAYSIA	1.0	3.0	2.0	1.0	0.5		7.5
MEXICO		1.0	1.0	1.0	0.5		3.5
PAKISTAN						0.05	0.05
PANAMA		0.4	0.4				0.8
PERU		0.7	0.3				1.0
PHILIPPINES		1.0	0.5	1.0			2.5
SRI LANKA		0.2	0.5				0.7
THAILAND	0.5	2.0	1.0		0.4		3.9
TRINIDAD/TOBAGO		0.4					0.4
URUGUAY		0.3			0.2		0.5
VENEZUELA			1.0				1.0
VIETNAM				0.25			0.25
T O T A L	2.0	27.0	22.1	5.75	4.3	0.35	61.5*

Second Draft - 14 November 1994

NOTE: 1/ The \$61.5 million provisional 1995 UNDP work programme above includes a carryover of \$14 million in projects for China initially submitted to the 15th ExCom Meeting but then deferred. Thus "new" 1995 project submissions would total \$61.5 - 14.0 = \$47.5 million.

2/ The OTHER category includes mainly project preparation assistance.

(MP95WP2.TAB)