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

Sixth Meeting
Montreal, 27-28 February 1992

REPORT FROM WORLD BANK ON MALAYSIA'S PROJECTS

PROJECT COVER SHEET

COUNTRY OR REGION : MALAYSIA

CALCULATED ODS CONSUMPTION : 0.23 Kg PER CAPITA (1990)

PROJECT TITLE : AUTOMOBILE AIR-CONDITIONING
CFC RECYCLING PROJECT

PROJECT DURATION : 2 YEARS

SECTOR COVERED : MOBILE AIR-CONDITIONING

PROJECTED ODS PHASE-OUT
FROM PROJECT PER ANNUM : 480-1200 METRIC TONNES
PER ANNUM

PROPOSED BUDGET : US\$1.07 MILLION

IMPLEMENTING AGENCY : WORLD BANK

NATIONAL COORDINATING AGENCY : DEPARTMENT OF ENVIRONMENT

PROJECT SUMMARY

1. The objective of the project is to reduce the consumption of CFC 12 in automobile air-conditioning (AAC) through leakage control and recycling. The project would have both technical assistance and investment components and be implemented in two phases. The first phase would consist of a demonstration project under which 35 recycling machines would be imported for providing training in AAC, leakage control, and recycling of CFC 12 to about 4000 technicians working in service workshops in Malaysia; funding would also be provided from the project funds for technical assistance to the Department of Environment (DOE) to improve its project implementation and monitoring capabilities and for a public awareness campaign. The second phase would involve provision of recycling equipment, financed from the Ozone Trust Fund Grant on incremental cost basis, over a period of two years, to about 165 authorized workshops around the country.

2. The major project issues relate to DOE's institutional capabilities to implement and monitor the project, the Government's interpretation of incremental costs, financial intermediaries' problems in appraising sub-projects' incremental costs, Government's disbursement procedures and retroactive financing of recycling equipment imported by AAC manufacturers for their dealers. These are summarized below.

(a) DOE's Montreal Protocol Unit is presently severely understaffed. Without immediate staff strengthening, which DOE thinks would take about one year due to Government's bureaucratic procedures, DOE would not be

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able to carry out technician training and other monitoring and regulatory functions under the project. To enable DOE to proceed immediately with implementation of the ODS phase-out program, EXCOM may consider funding for appointment of three local consultants on contract basis for one year on the condition that the Government undertake to appoint a Project Manager and three professionals on DOE's staff before the consultant contracts run out. The Multilateral Fund (MF) should also finance a short-term expert (and computer equipment) to assist DOE in drafting procedures and rules and establishing computerized data base for DOE's monitoring and regulatory activities.

(b) The Government's fundamental difference with the mission is on the interpretation of incremental costs. DOE is of the view that all expenses in connection with the reduction of CFC 12 consumption should be treated as incremental costs and paid for from MF. The mission considers that while technical assistance expenditure may be fully funded, incremental costs of investment expenditure should be calculated by deducting from the total capital costs the net present value of benefits during the economic life (in the case of recycling equipment, 5 years) of the project.

(c) The two financial intermediaries (FIs) authorized by the Government to appraise applications from service stations for recycling equipment would like some benchmarks to be established for calculating incremental costs of individual sub-projects to avoid allegations of discrimination from applicants, most of whom would be owners of small enterprises. A benchmark of 60% representing average incremental costs of AAC service stations other than AAC manufacturers' dealers and A/C specialty shops, which are highly profitable operations, was suggested; it appears to be reasonable.

(d) The Ministry of Finance (MOF) stated that the Bank's Special Account procedure would not be applicable in case of grant funds; a Trust Account would have to be opened, payments from which would be made by the Accountant General on DOE's authorization. This would delay payments to service stations and a simpler alternative needs to be found.

(e) DOE would like grant funds to finance retroactively a number of recycling equipments imported by AAC manufacturers some time ago to assist in reduction of CFC consumption. The method of procurement of these equipments is not known.

MALAYSIARECYCLING OF CFC 12 IN AUTOMOBILE AIR-CONDITIONINGBACKGROUND

1. According to information furnished by the Government, Malaysia's calculated consumption of controlled substances amounted to 3,741 metric tonnes in 1990 (down from 4,779 metric tonnes in 1989), representing 0.23 kg per capita. Refrigeration and automobile air-conditioning accounted for the largest share (48.5%) of total ODS consumed in 1989. The Government plans to phase out ODS consumption completely before 2000. In order to meet this target, it has prepared two projects, including this project, in the first instance, which it wants to implement on a priority basis.

2. Malaysia's Country Program states that there are about 5 million motor vehicles in Malaysia, of which about 1 million are air-conditioned. Each air-conditioned car uses an average of 2.4 Kg of CFC 12 per year, as compared to about 0.3 Kg in USA. Servicing of these cars is carried out by 200 dealers of the 5 manufacturers of AAC equipment in Malaysia, 500 specialty shops which perform only air-conditioning service and maintenance, and 2000 other general service shops. The high consumption of CFC 12 in Malaysia is due not only to venting it in the atmosphere at the time of "topping up" but also to leakage in the system which is not repaired due to expense consideration of the customer (high cost of repair and low cost of refrigerant) and/or ignorance of the technician attending to the car in the repair shop. Apart from the recovery and recycling of CFC 12, the problems of leakage control and public awareness also need to be addressed in the design of the project.

THE PROJECT

3. Objectives. The objective of the project is to reduce the consumption of CFC 12 in automobile air-conditioning (AAC) through leakage control, conservation and recycling, to increase public awareness of the environmental problems and to train service workshop technicians to perform these tasks in a professional manner.

4. Relationship to Country Program. Malaysia has submitted to the Executive Committee of the Montreal Protocol (EXCOM) its Country Program (CP) which proposes elimination of ozone depleting substances completely well before the mandated schedule set in the Protocol i.e. year 2000. According to Government estimates, the total cost of the projects presently identified for this purpose amounts to US\$256.13 million, of which US\$254.35 million is for investment and pre-investment projects and US\$1.78 million for public awareness and training programs. The projects so far identified relate to ODS recovery, recycling etc., with a view to ultimate phase-out, in automotive air-conditioning, commercial and

residential system, aerosol system, solvent application, petroleum industry and fire extinguisher system. Of these, the Government has accorded the highest priority to implementation of two projects aimed at reducing the consumption of CFC 12 in AAC and of halon in fire extinguishers; it is now seeking EXCOM's approval for these projects and their funding from the Interim Multilateral Fund. Simultaneously with identification of ODS reduction projects, the Government has also initiated action to improve the framework for monitoring and regulating the import and use of controlled substances. DOE has confirmed that control on import of CFC 12 is already in force through the "Approved Permit" system and that proposals for tax increase on CFC and duty exemption on imports of recycling equipment are under consideration. Furthermore, drafting of regulations for banning aerosols and use of solvents in foam making is in an advanced stage.

5. Project Description. The project has both technical assistance and investment components and is proposed to be implemented in two phases. The technical assistance component, which would be implemented in the first phase, would consist of a demonstration project under which 35 recycling machines would be imported by the Department of Environment (DOE) for providing training in AAC, including leak detection, and recycling of CFC 12, to service workshop technicians in Malaysia. The investment component would be implemented in the second phase and would involve financing of recycling equipment, on incremental cost basis, over a period of two years, to about 165 authorized workshops around the country.

6. Technical Assistance Component. This component amounting to US\$410,550 would finance the following activities:

(a) Training of technicians. This program would be organized by DOE but actually carried out by the technicians of the five manufacturers of air-conditioning equipment in Malaysia. Initially, DOE would recruit a short-term consultant in automobile air-conditioning and CFC recycling from overseas, who would train 20 local trainers (four each from the five manufacturers of AAC equipment) in Malaysia. These local trainers would be able to train, depending on demand, up to 3870 technicians (two per shop) in different parts of the country in a period of 15-20 weeks, covering 77% of the service shops in Malaysia.

(b) Purchase of 35 sets of combined recycling and charge equipment, along with leak detection equipment, for training purposes. Since the equipment would be imported for the demonstration project, its full cost would be financed from the Multilateral Fund. After the training program is completed, most of the machines would be available for purchase by authorized shops on incremental cost basis, less depreciation.

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(c) Appointment of an expert for about 6 months in DOE to draft procedures and rules for technician training, their certification, approval of workshops for CFC recycling, and establishment of a computerized data base to enable DOE to monitor implementation of the project and carry out its regulatory functions. The TA component would also finance computer hardware and software.

(d) Appointment of three local consultants on contract basis for one year to assist the Montreal Protocol Unit in DOE, which is extremely short-staffed at present, to monitor implementation of the two projects. DOE is at present unable to appoint the necessary staff in its regular cadres for another year because of Government procedures. Recruitment of the local consultants would help early start of project implementation for reduction of ODS consumption.

(e) Public awareness program. DOE will draw up a comprehensive program, with the assistance of the consultant, to increase public awareness of the serious environmental damage resulting from emissions of ODS from AAC and appeal to citizens' sense of social responsibility to help in its containment and reduction.

7. Investment Component. The project's investment component of US\$1,072,325 would finance, on incremental cost basis, purchase of recycling equipment by approximately 165 licensed service shops. AAC manufacturers' dealers and most workshops specializing in AC service would possibly not qualify for financing under this component because their profits from CFC recovery over the useful life of the equipment (assumed to be 5 years) would far exceed the initial investment. Some AAC equipment manufacturers have recently imported the recycling equipment for their own and their dealers' shops. Only general service shops which service an average of 3 cars or less per day would qualify for assistance under this component. However, all approved shops employing trained and certified technicians would be eligible to apply for funding of incremental costs.

8. The two financial intermediaries (FIs), which are likely to be involved in appraising sub-projects under this component, the Malaysian Industrial Development Fund (MIDF) and the Bank of Industry (BIM), expressed concerns about the usefulness of calculating incremental costs based on the applicant's statement of average number of AC service performed per day, which they may find difficult to verify. Most applicants are likely to understate the number of AC clients serviced by them, and profits therefrom, in order to qualify for a higher amount of grant. At the same time, the FIs are likely to face allegations of favouritism from applicants who are appraised for smaller amounts of grants than some others. In order to avoid these situations, it would be appropriate to fix benchmarks to be applied to all applicants other than AAC manufacturers' dealers and A/C specialty shops, which are

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stated to be highly profitable operations and would not qualify for the grant. A calculation made on this basis indicates that a grant element of 60% of the cost of equipment would be appropriate for A/C service shops referred to above, the remaining amount to be provided by the enterprises out of their own resources or borrowed from FIs/banks on commercial terms. The two FIs would be able to meet any requests for financing on commercial terms the residual cost of equipments not met by grants.

9. Expected Outcome of Project. Enquiries made locally indicate that it should be possible to save as much as 40% or 0.48 Kg from each car coming to the service station for "topping up". With the installation of recycling equipment and DOE's proposal to restrict AAC operations and use of CFC 12 to approved workshops, it would be possible to reduce ODS consumption by 480 metric tonnes (480x1) per annum. However, with training of technicians in detection and repairing of leaks and effective enforcement of regulations, it should be possible to achieve reduction in CFC 12 consumption up to a maximum of 1,200 metric tonnes a year.

10. Procurement. DOE would follow standard Bank procedures for procurement of goods. Since the amount involved is small, competitive shopping would likely be the preferred procedure. Furthermore, since recycling equipment is of recent origin, it would be useful for DOE to import equipment for the training program from 2-3 suppliers and test its effectiveness during the training period. Regarding import of equipment for AAC service workshops, because the amounts involved would be small, bulk import of, say, 50 machines at a time through a local dealer, to obtain a discount for wholesale purchase, should also be the preferred alternative. Details would be worked out later with a view to obtaining the best value for money.

11. Disbursements. According to Malaysian Government procedures, grant funds received by the Government are placed in a Trust Account with the Accountant General, who makes disbursements only on receiving authorization from a Government department. While this procedure is likely to work satisfactorily in case of disbursements for programs for which Government departments are responsible, it could lead to frustrating delays in disbursement of small amounts to AAC service workshops, whose proposals for recycling equipment are appraised by the FIs. The Ministry of Finance has stated that the Bank's procedure of a Special Account to expedite disbursements locally can not be used for grant funds. There is need to develop a simpler procedure for disbursement of funds.

12. Project Implementation and Monitoring. The technical assistance (TA) component of the project would be implemented by DOE, which is responsible for formulation, implementation and oversight of Government's programs to protect environment. Under the project, it would: (a) organize the training program for AAC technicians; (b) recruit a foreign expert (for about 8-10 days) to impart training to 20 local trainers who would be drawn four each

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from the five local manufacturers of AAC equipment; (c) draw up a program for training of about 4,000 technicians throughout the country; (d) employ another short-term expert to draft rules and procedures for the various programs under the TA component and establish a data base for DOE's monitoring activities; (e) employ on a one year contract three local consultants to strengthen DOE's capabilities to carry out its responsibilities under the project; (f) arrange import of 35 recycling equipment with charging facilities and leak detection equipment; and (g) mount a country-wide campaign of public awareness of environment protection. The investment component would be implemented by the AAC enterprises themselves, although appraisal of their requirements and initial supervision would be carried out by the FI through which their sub-project was approved. Subsequent monitoring of their activities would be carried out by DOE. The project is likely to be implemented in about two years time.

13. Financial Intermediaries. The Malaysian Industrial Development Fund (MIDF) and the Bank Industry Malaysia (BIM) have been selected by the Government to carry out appraisal of proposals for grant financing submitted by AAC service shops. They have agreed, subject to approval of their boards, to carry out this role at a fee of 3% of the grant amount. These FIs are sound institutions; the Bank has used them in the past for financial intermediation in the industrial sector. As applications under this program would be for very small amounts, the FIs may also wish to use the services of their subsidiary finance companies, which deal with small-scale enterprises, in suitable cases. This procedure would be acceptable to the Bank so long as the FIs accept full responsibility for their subsidiaries. The FIs, directly or through their subsidiaries, would carry out appraisal of sub-projects only after receiving authorization from DOE who would be providing them with a technical evaluation of the project. Since appraisal would determine applicants' eligibility for grant and the amount thereof, the FIs would also be willing to consider the enterprises' applications for loan on commercial terms for the equipment cost not covered by the grant. After appraisal, the FIs would send the sub-projects to the Bank for approval. Only thereafter would the enterprise be able to obtain the grant.

13. Independent Technical Review. Annex I contains an independent technical review obtained by MF.

14. Implementation Schedule. An indicative implementation schedule covering various project activities over the two year period is attached as Annex II.

15. Budget and Disbursement Schedule. A detailed indicative budget showing all projected expenditures and schedule of disbursements and a detailed breakdown of training costs is attached as Annex III. The total cost of the project is US\$1.5 million, of which MF would provide US\$1.07 million and AAC workshops/financial institutions would provide US\$0.43 million.

ANNEX I

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Date: December 17, 1991

To: Mr. Valery Smirnov
Interim Multilateral Fund for the
Implementation of the Montreal Protocol

From: Adrian M. Rowan P.E. Consultant

Subject: MAC Recycling Project/Malaysia
Country Programme - Technical Review

Reference: "The conservation, leakage control and recycling of
CFC-12 and demonstration project in automobile air-
conditioning sector" Sept. 1991

As requested I have reviewed the reference project. The write up on this project does not contain a great detail however most of the important elements are either touched on or inferred. My comments on the project elements I feel are important follow:

1. Project Feasibility

The technology including equipment, know-how and personnel training material for mobile air conditioning (MAC) CFC-12 recovery and recycling is readily available and the project has the clear potential for reducing CFC-12 consumption and emissions in the near term and providing a source of supply of CFC-12 in the longer range when such supplies will become limited.

2. Equipment Selection

2.1 The proposal portion of this document should be expanded to recognize the type of equipment required for this project. There are a great many pieces of equipment available from a multiplicity of manufacturers throughout the world to address this demand. This project needs a machine capable of recovery (removing the remaining refrigerant in a MAC system); recycling (removing oil, air, water, acid and solid contaminants thru filtration, distillation or both) and recharging (returning the cleaned refrigerant plus any additional required to the MAC system). For safety and MAC performance reasons the machine must have the capability of weighing the refrigerant charge to insure the proper amount has been inserted.

2.2 Several standards have been developed that address the performance and safety of these machines as well as the condition of the recycled refrigerant that is suitable for recharging into the MAC systems. The Air-Conditioning & Refrigeration Institute (ARI) has promulgated Standard 740-91 entitled "Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment" which defines methods for determining the effectiveness of the machine in removing contaminants from the refrigerant. The Society of Automotive Engineers (SAE) has issued three standards that have relevance to this project. They are as follows:

SAE J1889 Recommended Service Procedure
for containment of R-12.

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substances.

7. Project Schedule.

The write up suggests that the 200 machines will arrive at the same time after which a training program would take place consisting of four (4) consecutive days wherein 50 different technicians would be trained each day. It would be much more efficient to set up a timed phase in program that would start off with the arrival of 25 to 50 machines to be followed by a hands on training program for local operator trainers conducted by expert consultants. This would be followed by training of operating technicians in numbers to match the available machines and then after a month or two of field experience that would provide valuable feedback information to the local trainers and program monitors, another group of 50 machines would be delivered followed by the appropriate operator technician training as so on until the 200 machines were in place over approximately a six-months period.

8. Cost Effectiveness.

8.1 Cost effectiveness is not dealt with in the proposal. As indicated in the write up, by far the largest cause of MAC servicing is leaks in the system. Depending on the elapsed time between when the car operator notices a deterioration in the air conditioner performance and when he delivers the car to the service center there may well be a very small quantity of refrigerant remaining in the system and available for recovery. Assuming that the average charge remaining in vehicles presented for service is 30% of the original charge of 1.2 kgs of CFC-12 or .36 kgs and the recovery efficiency is 95% and the recharge efficiency is also 95% then the amount of CFC that would be vented if a recovery machine were not used would be .32 kgs per vehicle serviced.

8.2 The number of vehicles that each recovery machine can service in one day is limited not by the machine capacity but by the logistics of delivering cars for servicing to the machines and integrating the recovery / recycle element into the total time taken by the technician for the entire servicing procedure.

8.3 A scenario that would maximize recovery machine utilization would be one where each of the 200 machines would service 6 cars per day for each of 300 working days per year. Assuming that every service shop would work six days per week with a few holidays taken out. Under this scenario .32 kgs of CFC-12 would be salvaged from each of 360,000 cars resulting in recovery of 115.2 tonnes of refrigerant per year. It appears then that anticipated saving of 394 tonnes in the first year of operation (paragraph 8) is overstated. The cost saving however is still substantial. If one kg of CFC-12 costs \$U.S.3.00 then the 115 tonnes recovered would result in a financial saving of \$U.S.345,000 per year. Then providing the Interim Multilateral Fund would cover the capital costs of the machines, this monetary saving would more than offset the service centers operating costs and if government action is initiated to increase the price of new CFC-12 then the recovery activity would become quite profitable and lead to maximum use of the equipment.

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6.4 The cost of recovery machines shown in Table III is adequate to obtain the proper type of equipment and the necessary spares providing the government forgoes any import duties or related taxes on this equipment as part of their National Ozone Policy.

Conclusions:

Table II "Implementation Schedule of the Project" shows time frames for three activities i.e. A-Project Identification B-Project Preparation and C-Project Funding. The document I have reviewed is the project identification portion of this schedule. It may be the intent to amplify the project description content including the areas I have suggested in the Project Preparation phase.

In any case a MAC recovery / recycling project in Malaysia can be both efficient and effective and can serve as an excellent introduction to a country programme aimed at the timely phase out of ozone depleting substances.



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ANNEX 11MALAYSIAAUTOMOBILE AIR-CONDITIONING CFC RECYCLING PROJECT
INDICATIVE IMPLEMENTATION SCHEDULE

PHASE	1992	1993	1994
<u>First Phase - Demonstration Project</u>			
(a) Assistance to DOE-Consultant in Systems and Procedures	September '92 - February '93		
(b) 3 Local Consultants	September '92 - August '93		
(c) Training of Local Trainers by foreign experts		February	
(d) Training of Technicians		March - June	
(e) Public Awareness Program	September '92 - December '94		
<u>Second Phase - Investment</u>			
Purchase of Recycling Equipment by service shops		April '93 - September '94	

ANNEX III

MALAYSIA

AUTOMOBILE AIR-CONDITIONING CFC RECYCLING PROJECT

INDICATIVE BUDGET

BUDGET ITEMS	PROJECTED EXPENDITURE	DISBURSEMENT SCHEDULE		
		(US\$'000)		
		Calendar Year		
		1992	1993	1994
<u>Phase One - Demonstration Project</u>				
I) Employment of Expert In DOE for procedures, regulations and data base (1)	12	8	4	
II) Employment of 3 consultants (2)	36	12	24	
III) Computer and software	4	4		
IV) Training of local trainers (3)	43	43		
V) Training of technicians (3)	94	26	68	
VI) Import of recycling and leak detection equipment for demonstration project (4)	201	201		
VII) Public awareness campaign	20	5	10	5
<u>Phase Two - Investment</u>				
I) Financing of recycling and lead detection equipment by enterprises (5)	643	39	389	215
<u>Financial Intermediaries Fee (6)</u>	19	1	12	6
	1,072	339	507	226

(1) @ US\$24,000 p.a.

(2) @ M\$36,000 US\$14,400

M\$30,000 US\$12,000

M\$24,000 US\$ 9,600

(3) See Attachment 1

(4) @ US\$5,750

(5) Average financing of 165 A/C Recycling equipment @ 3893 prt equipment

(6) @ 3% of grant for recycling equipment

ATTACHMENT 1MALAYSIAMONTREAL PROTOCOL - ODS PHASE-OUT
AUTOMOBILE AIR CONDITIONING CFC 12 RECYCLING PROJECTPHASE 1 - DEMONSTRATION PROJECT - TECHNICAL TRAININGPart 1 5 Days Training of 20 Local Mobile
A/Cond Trainers by Consultant Expert

1.	Accommodation	\$US
	- @ US\$60 x 15 persons x 5 days	4,500
	- @ US\$60 x 4 persons x 5 days (Government Officer - G.O)	1,200
2.	Daily Allowance	
	(per team) - @ US\$25 x 15 persons x 5	1,875
	- @ US\$25 x 4 (G.O) x 5	500
3.	Air travel - @ US\$100 x 15 persons	1,500
4.	Committee/Secretariat Staff	
	- Allowance @ US\$80 x 12 persons	960
	- Meeting @ US\$50 x 3 times	150
	- Others	100
5.	Facilities/Equipments	
5.1	Hotel (Conference Room, Equipments, services, secretariat room, stationery, backdrop logo	
	@ US\$1,500 x 3 days	4,500
5.2	Mobile A/Cond Training Centre	
	@ US\$100 x 2 days	200
6.	Meal	
6.1	Refreshment (Opening Ceremony)	
	@ US\$10 x 50 guests inclusive of participants	500

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6.2	Working lunches and tea breaks @ US\$20 x 40 persons x 5 days	4,000
7.	Preparation of Instruction Materials	
7.1	Development of Materials (Stationery/ paper/bag)	
	- @ US\$25 x 40 persons	1,000
7.2	Translation Services	
	@ US\$100 x 4 persons	400
7.3	Printing Document	
	- Document/teaching materials @US\$0.3 x 150 pages x 40	1,800
	- Photostate machine (rent) @ US\$30 x 5 days	150
	- Video tape/cassette/film @US\$10 x 30 pcs	300
8.	Transportation Services (Bus)	
	@US\$50 x 3 days trip	150
9.	Paper Presentation by Local Resource Persons (Private/Government)	
	@US\$100 x 5 persons	500
10.	Consultant Expert	
10.1	Air Travel @ US\$4,000	4,000
10.2	Accommodation @ US\$200 x 8 days	1,600
10.3	Food @ US\$50 x 8 days	400
10.4	Fee @ US\$800 x 10 days	8,000
11.	Miscellaneous	500
	TOTAL	US\$38,785
12.	Contingency (10%)	3,878
	GRAND TOTAL	US\$42,663

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Part II 10 Hours Retraining For Technician

1. Cost for Trainer and Government Officers (G.O)
Coordinator

1.1	Hotel @ US\$60 x 5 persons x 3 times x 4 days	3,600
1.2	Daily Allowance (Per team) @ US\$50 x 20 persons x 10 weeks x 4 days	40,000
	@ US\$50 x 2 persons (G.O) x 10 times x 2 days	2,000

2. Travel Expense

2.1	Air travel @ US\$100 x 20 persons x 2 times	4,000
	@ US\$100 x 2 persons (G.O) x 2 times	400
2.2	Car @ US\$50 x 20 persons x 8 times	8,000
	@ US\$50 x 2 persons (G.O) x 2 times	200

3. Document and Material Facility Cost

3.1	Stationery/bag @ US\$5 x 4,000 technicians	20,000
3.2	Printing documents @ US\$0.3 x 4,000	1,200
3.3	Certificate/mailling @ US\$1.5 x 4,000	6,000

4. Paper Presentation by Government Official

	@ US\$100 x 2 persons (G.O)	200
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5. Miscellaneous

400

T O T A L

US\$86,000

6. Contingency

8,600

US\$94,600

Part I

42,663

Total cost

US\$137,263

Bay

US\$137,300

PROJECT COVER SHEET

COUNTRY OR REGION: MALAYSIA

CALCULATED ODS CONSUMPTION: 3741 TONS (.23 Kg per capita) in 1990

PROJECT TITLE: HALON CONTROL, RECOVERY AND RECYCLING PROJECT

PROJECT DURATION: 2 Yrs. 6 Mths.

SECTORS COVERED: FIRE PROTECTION

PROJECTED ODS PHASE-OUT FROM PROJECT: 450-600 TONS PER YEAR

PROPOSED BUDGET: US\$ 772,500

IMPLEMENTING AGENCY: WORLD BANK

NATIONAL COORDINATING AGENCY: DEPARTMENT OF ENVIRONMENT/FIRE
SERVICE DEPARTMENT

PROJECT SUMMARY

The project aims at reducing drastically Halon 1211 through the installation of recovery/recycling units and gradual substitution of portable Halon fire extinguishers with other non-ODS media (CO₂, chemical powders, etc.). The Project also aims at the controlling and initial phasing down of 1301 Halon use. The installation of a recycling unit to supply the needs of essential users will require previous steps in identifying users and registering existing installations and stocks.

The Project will be implemented by the Fire Service Department. General supervision on environmental aspects and regulations will be the responsibility of the Department of the Environment which is seriously understaffed. This issue is being addressed to by a separate project being presented to the ExCom simultaneously with this one.

There are no outstanding policy issues in this Project.

PROJECT REPORT

MALAYSIA - HALON CONTROL, RECOVERY AND RECYCLING PROJECT

I. BACKGROUND

1.01 The Government of Malaysia ratified the Montreal Protocol on Substances that Deplete the Ozone Layer (MP) in November 1989 and a study on a National Program to Reduce and Eliminate the Consumption and Emissions of Ozone Depleting Substances was produced in December 1991.

1.02 Total consumption of ozone depleting substances (ODS) increased, in terms of their ozone depletion potential (ODP), from 1,689 tons in 1985 to 4,779 tons in 1989 and dropped to 3741 tons in 1990 after a Customs regulation controlling ODS imports was issued in November 1989. As shown in table 1 shown below consumption of Halons also increased rapidly between 1985 and 1986, and then gradually decreased through 1988 and dropped abruptly in 1990.

Table 1. Halon Consumption in Malaysia

<u>By Weight (tons)</u>				<u>By ODP in Equiv tons</u>			
	<u>Halon 1211</u>	<u>Halon 1301</u>	<u>Total</u>		<u>Halon 1211</u>	<u>Halon 1301</u>	<u>Total</u>
1985	71	56	127		213	560	773
1986	150	120	270		450	1,200	1,650
1987	198	101	299		594	1,010	1,604
1988	270	38	308		810	380	1,190
1989	246	60	306		738	600	1,338
1990	70	13	86a		211	133	356a

a Including a small volume of Halon 2402 which has an ODP of 6.

1.03 In Malaysia, Halon 1211 is used mainly in portable fire extinguishers and Halon 1301 in fixed installations. It has been estimated that there are between 600,000 and 800,000 portable extinguishers containing about 2000 tons of Halon. Complete information on the number and contents of all fixed installations is not known - many units are imported as a package or as parts of joint venture projects - but "banked" Halon 1301 is thought to lie in the range of 12,000 - 20,000 tons. There is no production of Halons in Malaysia: they are imported mainly from the UK and the USA. Most of the

demand for portable extinguishers is met by eight local fire equipment manufacturers who sell their products through dealers who also offer maintenance service to the users. Fixed fire fighting systems are generally installed by independent contractors or by foreign suppliers of large plants.

II THE PROJECT

Objective of the Project

- 2.01 The objective of the project is to eliminate the need for further imports of halons and to reduce drastically their use and their discharge into the atmosphere from existing installations. The project relates to the overall ODS phase out considered in the proposed country Program presented by Malaysia to the MP Ex Com, which aims to eliminate the use of ODS.

2.02 Institutional Aspects

The institutions participating directly or indirectly in the Project are: DOE, the Fire Service Department, under the Ministry for Housing and Local Government, the Malaysian Standards Board and the more than 100 fire equipment manufacturers and installation and service contractors who are members of the Fire Protection Association, which has as one of its aims to encourage technical education and training for its members' employees. The Association is also one of the participants in the FSD Consultative Committee.

- 2.03 The Fire Service Department (FSD) was established more than 35 years ago and has a long tradition as a well managed public service organisation. It supervises the operations of 131 fire stations and the Central Fire Training School (CFTS). Another 30 stations will start operating before the end of the year and 20-30 more are planned for entering into service in the next three years. The main Kuala Lumpur fire station has a staff of 150, major stations have 100 (capable to turn out at least 4 fire engines simultaneously) and other stations can turn out 3 engines. The FSD responds to an average of 15,000 fire calls per year.

- 2.04 CFTS, located at Kuala Kubu Baru (57 Km by excellent road from Kuala Lumpur), has a campus of 20 acres and appropriate installations for the training courses but additional facilities are being planned at a cost of US\$ 17 million to meet expected growth of needs. The school is providing training courses not only to FSD personnel but also to staff from other Government agencies, port installations and petroleum companies. The Training Division of FSD has a staff of 150.

2.05 The Construction permits for all buildings are issued by local authorities subject to prior review of plans and specifications by the local FSD authority (or the FSD headquarters in the case of large installations) and after the building is completed the fire safety installations are checked. All portable fire extinguishers require an annual visual check up by the appropriate local fire station. If cylinders are dented or otherwise damaged or the fire extinguisher have lost weight, the equipment does not receive an inspection sticker and is retired from service.

Project Description

The Project will be consist of four components as described below.

A. Institutional Strengthening

2.06 The FSD is a well organized institution and it has capable staff but it will require strengthening to meet the additional work demanded by the preparation, implementation and monitoring of Halon control and phase out activities. It will be indispensable to provide the initial capabilities required through the contracting of a well qualified local senior engineer to fill the position of fixed - term Project Manager on halon phase out activities and the engaging of consulting services for specific design tasks. An Administrative Assistant will also be required on a fixed term contract for the efficient implementation of the project. The FSD capacity to carry out its functions in the preparatin, implementatin and supervision of Halon control and phase out actions will be enhanced by the installation of computing and photocopying facilities that have also been included in the project scope.

B. Demonstration Training Component for Halon 1211

2.07 This component will include:

- a) The establishment of recovery/recycling centers in 7 major fire stations located in different areas of the country; this will permit verifying the suitability of the details of the selected design parameters and obtaining practical experience on their operations
- b) Technical assistance (TA) to be provided by two international level experts who will assist in the preparation and training of 12 FSD officers on halon recovery and recycling as well as on updated fire safety and alternative firefighting technolo-

gies. They would also assist in the start up and the running in of the 7 demonstration centre.

C. Full Implementation Stage of Halon 1211 Component

2.08 This component will comprise the installation of up to 48 recovery/recycling centres, 33 of which will be located at major fire stations throughout the country and the balance at government, port and petroleum installations. (During project implementation, the FSD may shift the installation of a given centre from a fire station to a suitable existing maintenance shop, if it finds it advisable to do so.) This component will include training courses for each group of recovery/recycling centers being implemented and technical assistance to be provided by a qualified senior engineer. A central recycling / halon storage unit will also be set up at this stage.

D. Halon 1301 Control, Recovery and Recycling Component

2.09 In the present project, the setting up of the regulatory system, the establishment of a qualified maintenance and service network and the training of qualified personnel will be first undertaken. A specialized laboratory for rapid analysis of used Halon 1301 has also been considered at this stage. The establishment of a recycling unit at CFTS has been included in a second stage because of the need to determine first the type of systems that will be installed in substitution of existing ones, to identify essential uses of Halon 1301 which cannot be shortly eliminated and to define the appropriate design for the Halon 1301 recycling plant. These actions should be nevertheless immediately undertaken because prompt phase out of this ozone depleting substance is of the greatest urgency. Disbursement for the recycling plant will be subject to the satisfactory completion of those previous steps.

III COST AND EXPECTED OUTCOME OF THE PROJECT

3.01 The total cost of the Project is US\$ 771,500 as shown in the attached cost estimate (Annex 1), summarized below US\$ 86,000 will be used for institutional strengthening, US\$ 97,335 for a demonstration/training component and the balance for the implementation of Halon 1211 and 1301 investment projects

3.02 The expected reduction of Halon 1211 discharged into the atmosphere resulting from the implementation of the project is estimated at 150-200 tons per year (450-600 tons in terms of their ODP), in addition to the savings resulting from the stoppage of consumption by new users. The Project will also strengthen the capabilities of the agencies, institutions and private enterprises to deal correctly with the country's ODS phase out programs and to create conditions which may facilitate exports of equipment appropriate for use in other countries.

3.03 Copies of independent technical reviews are attached as Annex 2.

IV INFORMATION ON NATIONAL AGENCIES RESPONSIBLE FOR THE PROJECT

4.01 The project will be implemented by FSD in accordance with DOE guidelines and regulations. For this purpose, qualified professionals will be engaged by FSD under fixed term contracts to assist in the adaptation and strengthening of the FSD to carry out its new responsibilities. The descriptive information of FSD and its training facilities has been given in paras 2.03 7 2.04 above. The Project is scheduled to be implemented in 30 months (Annex 3). Procurement of equipment and consultancy services will be made following Bank guidelines.

4.02 The World Bank will make to proceeds of the Ozone Trust Fund (OTF) grant available to the Government of Malaysia and provide as needed for the implementation of the project by FSD, following procedures to be agreed upon by the Government and the Bank. Disbursements will be made in parallel to progress in execution of the Project as shown in Annex 3.

4.03 The project will be monitored by the FSD in all the aspects related to fire safety and protection and to the enforcement of regulations pertaining to those activities while DOE will be in charge of the environmental aspects and of the fulfilment of all the obligations derived from the environment protection laws and regulations. Reporting requirement will be agreed upon by the Bank and DOE.

4.04 DOE is understaffed and will have to face a continual increasing load because of the country's rapid economic growth and the expanding concern about the protection of the environment. No assistance to strengthen DOE has been included in the Halon Control, Recovery and Recycling Project because such assistance is being considered in another project being submitted to the Ex Com in parallel to this one.

MALAYSIA
HALON CONTROL, RECOVERY AND RECYCLING PROJECT

PROJECT COSTS

Exchange rate used: 1 US \$ equal 2.50 M\$

	In Local Currency US\$	In Foreign Currency US\$	Total US\$
PART A : INSTITUTIONAL STRENGTHENING			
1 Senior engineer			
30 month, 3.000 M\$/month	36,000		
1 Administrative assistance			
30 month, 1.800 M\$/month	21,600		
Travel expenses etc	10,000		
1 Photocopying machine	6,400		
Computer			
- 2 PC, printer, modern	10,000	10,000	
Software, etc			
	-----	-----	-----
Totals	84,000	10,000	94,000
PART B: Halon 1211: Demonstration and Training			
Training, 12 officers			
15 days, M\$ 30/day	2,160		
7 demonstration centers			
7 units, each US\$ 5,050		35,350	
Set up and install.		700	
Technical assistance.			
1 instructor,			
30 days, 500 US\$/day		15,000	
1 senior engineer			
3X7 days, 500 US\$/day		10,500	
Travel cost		16,000	
Allowance, 45 days,		9,625	
125 US\$/d			
Local Consultancy Fees	6,000		
Miscellaneous		2,000	
	-----	-----	-----
Total	8,160	89,175	97,335

	In Local Currency US\$	In Foreign Currency US\$	Total US\$
PART C : HALON 1211: IMPLEMENTATION COMPONENT			
Training Courses for each group of 10 centers 5 days, 30 person, 4 groups 30 M\$ per day pr person	7,200		
Textbooks etc 120 person, each 100 M\$	4,800		
Trainers, 5 days, 8 hours - 4 groups, M\$ 50 pr hour	3,200		
Running in of equipment - 10 hours, M\$ 50 pr hour	8,000		
Travel etc, M\$ 400 pr center	6,400		
Establishment of 48 centers each 5,050 US\$/center		242,400	
Technical assistance - 1 instructor, 10 days 10 days, 500 US\$/days		5,000	
- Travel cost		4,000	
- Allowance, 10 days		1,250	
Central recycling unit		6,000	
Central storage facility		-	
Total Part C	29,600	258,650	288,250

	In Local Currency US\$	In Foreign Currency US\$	Total US\$
PART D: HALON 1301 PREPARATION RECOVERY AND RECYCLING			
Set up of regulation by DOE	-	-	-
Quality control system	-	-	-
Cost of registration of halon 1301 extinguishing system	4,000		
Training and demonstration facility	30,000		
Technical assistance			
- 1 senior engineer			
10 days, 500 US\$/day		5,000	
- Travel cost		4,000	
- Allowance (Subsistence)		1,250	
Consultancy Services	4,000	10,000	
Education and Training			
100 person, 5 days,			
30 M\$/day	6,000		
teachers,			
5 days, 6 courses, 50 M\$/h	4,800		
Text books, 30 M\$/person	1,200		
Lab equipment,			
- Gaschromatograph,		25,000	
Cylinders for circulation	8,000		
Recycling unit for halon 1301		150,000	
Storage facilities	8,000	15,000	173,000
Total PART D	66,000	210,250	276,250

	In Local Currency US\$	In Foreign Currency US\$	Total US\$
SUMMARY			
Component A, Institutional Strengthening	84,000	10,000	94,000
Component B, Demonstration/ Training for Halon 1211	8,160	89,175	97,335
Component C, Implementation Stage for Halon 1211	29,600	258,650	288,250
Component D, Halon 1301 Control, Recovery and Recycling	66,000	210,250	276,250
Sub totals	187,760	568,075	755,835
Physical Contingencies and Unforeseen Price Changers a]	4,865	11,800	16,665
Totals	192,625	579,875	772,500

a] Estimated at about 5% for local currency costs and 2.5% for foreign exchange costs of implementation components.

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F.12NEX



ICF INCORPORATED

November 7, 1991

TO : Mr. Donald Brown
FROM : Sudhakar Kesavan *SK*
SUBJECT : Review of Malaysia's Country Programme and Two Ozone Projects

Attached is our review of the material on Malaysia you sent us. Please call Laura Tialye at (202) 646-6085 or me at (202) 646-6070 if you have any questions.

Attachments

Project No. 2: 'Servicing, Maintenance and Recovery Charging Kit for Portable Extinguisher (Halon 1211) and Training Project in Halon Sectors'

The Government of Malaysia proposed the above project consisting of US\$1.5 million for 50 recovery/recycling machines, US\$0.8 million for a central recycling plant, and US\$0.2 million for demonstration and training. All of these components apply to Halon 1211. This review focuses on three key areas: (1) the price and assumed number of recycling machines; (2) the justification for a central recycling plant; and, (3) the implementation arrangements.

Price and Number of Halon 1211 Recycling Machines

The document estimates that each Halon 1211 recycling machine will cost approximately US\$29,830. Average costs of existing machines in the United States are more in the range of the US\$10,000 to US\$15,000. Even if transportation, insurance, and installation costs are included, the proposed price appears to be an overestimate.

The document states that 50 machines are needed to achieve the estimated 300 tons of halon emissions reduction by the year 2000. Clarification on how this figure was derived will be instructive.

Justification for a Central Recycling Plant

The document indicates the need for a central recycling plant to recover and recycle Halon 1211 from extinguishers that are not serviceable. The type and capacity of recycling equipment for the central plant is not described. Furthermore, it is not clear why a central recycling plant is needed in view of the fact that 50 recovery/recycling machines are being procured. There is no comparative evaluation of a central plant vis-a-vis recovery/recycling machines.

A National Halon Bank to capture the reusable stock of halon is also proposed. The reusable stock would presumably be recycled at the central plant. A National Halon Bank may not be necessary since residual Halon extracted and recycled from defective extinguishers could be used to refill empty extinguishers.

Implementation Arrangements

The document proposes to locate the service and recovery centers at fire stations. As stated in the document, most portable 1211 extinguishers are serviced by private companies or individuals. Usually these private companies inspect extinguishers on-site and replace those that may require repair with new ones. Repair takes place at the companies' repair shops. The project proposed requires the portable extinguishers to be taken to fire stations for maintenance and recovery of the halon. This may be impractical as fire stations do not typically engage in such activities. Another option to be considered is to equip existing service companies and contractors with such recycling equipment. Additional questions on implementation arrangements include:

- Are the Fire Services Department and DOE the "joint-owners" of the equipment?
- Would there be regulations mandating procedures to service portable fire extinguishers?
- Which Institution would perform the monitoring function?
- How will the fire stations staff the recycling centers?
- Which technicians would receive training? Will the fire stations' depute their staff?

Finally, the document mentions the use of Halon 1301 in paragraph 8; however, the equipment characteristics for both the recycling machines and the central recycling plants are directed to portable Halon 1211 extinguishers. Recycling equipment for recycling Halon 1301 is commercially available. The project does not discuss the possibility of recycling Halon 1301.

ANNEX 3

MALAYSIA - HALON CONTROL RECOVERY AND RECYCLING PROJECTPROJECT DISBURSEMENT SCHEDULEA. Institutional Strengthening

Organization Work, Contracting....
 Consultants and Preparation of Regulations July 1992 - Dec 1992

B. Demonstration / Training Component
for Halon 1211

Training..... Aug 1992 - Sep 1992
 Evaluation..... Jan 1993 - Feb 1993
 Installation of seven Demonstration
 Recovery / Recycling Centers..... Oct 1992 - Mar 1993

C. Implementation of the Halon
1211 Recovery / Recycling Component

Training..... Apr 1993 - Mar 1994
 Installation of Recovery / Recycling
 Centers..... Mar 1993 - Jun 1994
 Central Recycling / Storage Facility Mar 1993 - May 1993

D. Halon 1301 Preparation, Recovery
and Recycling Component

Establishment of DOE Regulations
 and Quality Controls..... Aug 1992 - Dec 1992
 Inventorying and Registration of
 Halon 1301 Systems..... Oct 1992 - Sep 1993
 Training..... Feb 1993 - Jun 1994
 Licensing..... Sep 1993 - Sep 1994
 Central Recycling / Storage Facility Mar 1994 - Dec 1994

MALAYSIA - HALON CONTROL RECOVERY AND RECYCLINGPROJECT DISBURSEMENT SCHEDULE
(US\$)

	<u>1993</u>	<u>1994</u>
A. <u>Institutional Strengthening</u>		
Organization Work, Contracting....	-	-
Consultants and Preparation of Regulations	-	-
B. <u>Demonstration / Training Component</u>		
<u>for Halon 1211</u>		
Training.....	3,000	-
Evaluation.....	-	-
Installation of seven Demonstration	46,000	46,175
Recovery / Recycling Centers.....	-	-
C. <u>Implementation of the Halon</u>		
<u>1211 Recovery / Recycling Component</u>		
Training..... ⁴³	22,200	7,400
Installation of Recovery / Recycling Centers	157,900	94,750
Central Recycling Facility	6,000	-
D. <u>Halon 1301 Preparation, Recovery</u>		
<u>and Recycling Component</u>		
Establishment of DOE Regulations		
and Quality Control.....	\$ 3,000	\$ -
Inventorying and Registration of	\$ 37,000	\$ 12,000
Halon 1301 Systems.....	\$ 28,000	\$ 7,000
Training.....	-	173,000
Licensing.....	-	-
Central Recycling / Storage Facility	-	-
Contingencies and Unforeseen Price	\$ 303,100	\$ 340,325
Charges	\$ 6,675	\$ 7,515
Totals	\$ 309,775	\$ 347,840