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Montreal, 26-28 July 1995

1995 WORLD BANK WORK PROGRAMME AMENDMENTS

AMENDMENTS TO THE

1995 WORLD BANK WORK PROGRAMME

INSTITUTIONAL STRENGTHENING PROPOSAL
(Phase-2)

COUNTRY:	Hashemite Kingdom of Jordan
PROJECT TITLE:	Institutional Strengthening Support for the Department of Environment Air Protection Section, Project Implementation Unit (phase 2)
EXECUTING AGENCY:	Department of Environment
IMPLEMENTING AGENCY:	The World Bank
GNP PER CAPITA:	US$1,000
CONSUMPTION OF CONTROLLED SUBSTANCES:	900 tons/year ODP equivalent
CONSUMPTION OF CONTROLLED SUBSTANCES BY SECTOR:	Aerosol - 250 tons Refrigeration - 120 tons Foam - 260 tons Halon - 270 tons
PROPOSED OTF FINANCING:	US$100,000 (a first tranche of US$100,000 was approved in 1992)
PROJECT TYPE:	Institutional Strengthening

Background:

In June 1992 the Executive Committee approved US$100,000 for Institutional Strengthening (IS) activities in Jordan. The first phase of the IS project targeted agencies and institutions that are involved in the key management systems needed to ensure full phaseout. This proposal requests an additional US$100,000 to further support the Project Implementation Unit (PIU) so that the Country Program for ODS phaseout can continue to be implemented on a timely basis. This will bring the total budget for the PIU to US$200,000 for the three-year period 1994-1996.

Objectives:

1. To facilitate national efforts aimed at an accelerated phaseout of ODS in Jordan
2. To end the use of ODS in Jordan

Scope of the Project:

The activities of the project would be for the benefit of the entire country.

Justification:

1. The current infrastructure for dealing with issues related to the phaseout of ODS such as technology transfer, alternative substances etc. continues to require sustained support.

2. The public continues to be relatively unaware of the consequences of depleting the ozone layer.

3. There continues to be competing demands on limited government resources, resulting in less priority assigned to ODS reduction projects.

Beneficiaries of the Project and their Capabilities

Under the first IS project, the PIU was set up with an office, telephone and fax lines and other office equipment. The PIU team is now complete and has a fairly good knowledge of ozone related issue. The PIU also needs to recruit one last staff member and begin work on the database for various ODS sectors (aerosols, foams, halons and refrigeration).

The Lead agency (the Department of Environment Air Protection Section), in which the PIU is based, has many other responsibilities in addition to its responsibility to coordinate ODS issues. Most of its efforts are devoted to air pollution issues. Due to the difficult economic situation and limited resources, the Section will not be able to maintain a special ozone unit without assistance from the MF. Responsibility for MP coordination cannot be passed to non-governmental organizations or the industrial sector itself because neither have sufficient knowledge or capabilities to carry out ODS phaseout activities on their own.

Structure and Management

The Project Implementation Unit within the Department of Environment Air Protection Section is the body which requires additional institutional strengthening support. The Section has responsibilities for both air pollution issues and newly assigned MP issues. The relationship of the PIU to the Ministry is outlines below.

Ministry of Municipal Rural Affairs and the Environment

:

:

Department of Environment

Water Protection Section	Air Protection Section	Nature Protection Section	Land protection Section	Education and Awareness Section

The head of the Air Protection Section (also the head of the Project Implementation Unit) has the supervisory responsibility for the management of the unit. The Project Implementation Unit, established under the Air Protection Section is the national coordinating committee that oversees the implementation of the Montreal Protocol.

ACTIVITIES AND BUDGET:

Recurrent Expenditures	2-year period (In US$)
Personnel - Professional staff (3) - Technical (1) - Financial consultant (1) - Secretary - Data clerk	60,000.00
Operational Costs (data collection, domestic travel, symposiums, etc.)	30,000.00
Contingencies	10,000.00
TOTAL	100,000.00**

** The estimated budget is US$ 100,000 for the remaining two years 1995 and 1996 respectively.

The first allocation of US$100,000 is nearly completely disbursed, having covered the costs of infrastructure (office, etc...) and slightly over one year of operating costs. The total amount requested is slightly over the EC's guidelines for a country the size of Jordan. The main reason for this is the relatively high operating costs.

OUTPUTS:

The expected output would be:

1. Reduced consumption of ODS (70% in the short term);
2. Enhanced capacity of the PIU to deal with ozone-related issues; and
3. Increased public awareness about protecting and improving the environment.

COUNTRY:	Kingdom of Thailand
PROJECT TITLE:	Safety and Technical Program to Assist Manufacturers Using Trichloroethylene as Substitutes for CFC-113 and 1,1,1-Trichloroethane in Solvent Cleaning Applications
SECTOR COVERED:	Solvent Cleaning
ODS USE IN SECTOR:	3,200 MT of CFC-113 in 1991 7,100 MT of 1,1,1-trichloroethane (TCA) in 1991 3,270 MT of Total ODP-weighted consumption
PROJECT IMPACT:	The project will not directly phase out any ODS. It will indirectly, however, ensure the sustained phase out of an undetermined quantity of ODS and the long-term safe and effective use of trichloroethylene as a substitute for ozone-depleting solvents.
PROJECT DURATION:	9 months
PROJECT ECONOMIC LIFE:	N/A
GRANT EFFECTIVENESS:	N/A
TOTAL PROJECT COST:	Total Project Costs: US$125,250
PROPOSED OTF FINANCING:	US$149,000 as a grant (including 15 percent contingency and 3 percent Financial Agent fee)
IMPLEMENTING ENTERPRISE:	Department of Industrial Works and East Asiatic (Thailand) Public Company Limited
COORDINATING MINISTRY:	Department of Industrial Works Ministry of Industry Kingdom of Thailand
IMPLEMENTING AGENCY:	The World Bank

PROJECT SUMMARY

This project will ensure the safe and effective use of trichloroethylene as an alternative to CFC-113 and 1,1,1-trichloroethane in solvent cleaning applications at manufacturing plants in Thailand. These facilities have already begun to shift from CFC-113 and 1,1,1-trichloroethane to trichloroethylene. Many solvent using companies are switching to trichloroethylene to eliminate their use of ozone-depleting substances (ODSs) because trichloroethylene is a virtual drop-in substitute. Most users will make no modifications to their existing vapor degreasing equipment when switching to trichloroethylene.

The issue of concern when using trichloroethylene in solvent cleaning applications is worker exposure. Trichloroethylene is a suspected human carcinogen and has therefore been assigned a relatively low worker exposure limit of 100 ppm by the U.S. Occupational Safety and Health Administration (OSHA). Despite this low recommended exposure limit, it is possible to safely use trichloroethylene in cleaning applications given the proper handling, equipment retrofits, and monitoring procedures.

While the project will not directly phase out the use of ODSs, it will ensure the sustained phase out of an unknown quantity of CFC-113 and 1,1,1-trichloroethane and that the companies use trichloroethylene in a safe and effective manner. At present, many facilities that have converted to trichloroethylene have inadequate emissions controls on their vapor degreasing equipment and insufficiently trained staff handling the chemical. In the long-run, improvements in manufacturing safety is key to protecting worker health and ensuring the long-term use of trichloroethylene as an alternative to ozone-depleting solvents. The proposed project will set up a safety and technical assistance program that will include plant safety audits, a training program, investments in safety equipment, and information awareness directed at companies not involved in the project.

TECHNICAL ASSESSMENT

This project was approved as proposed by the OORG reviewer, Mr. Bryan Baxter, on June 7, 1995. However, the review raised two important points. First, that the text could be clarified to indicate that, while trichloroethylene can be used as a replacement for both CFC-113 and 1,1,1-trichloroethane, it is more commonly used to replace 1,1,1-trichloroethane because of their similarly high solvency power. Second, that when the project is actually carried out, it would be useful to include in project materials some mention of the environmental risks associated with a trichloroethylene spill. This proposal has incorporated these points.

PROJECT OBJECTIVE

The objective of this project is to ensure the safe and effective use of trichloroethylene as a solvent cleaner at various manufacturing plants in Thailand.

SECTOR BACKGROUND

Solvent cleaning processes represent the largest use of ozone depleting substances (ODS) in Thailand. In 1991, the solvent cleaning sector consumed 3,200 MT of CFC-113 and more than 7,100 MT of 1,1,1 trichloroethane (TCA). On an ozone depletion potential (ODP) weighted basis, the 1991 Thai consumption in the solvent sector amounted to 3,270 MT, approximately 40 percent of total ODP-weighted consumption in the country. The rapid increase in the use of ODS in Thailand is a result of an expansion of the electronics industry, particularly through investment in joint ventures or captive Thai-owned companies, by Japanese, European, and American firms.

ODS consumption in the solvents industry is split almost equally between electronics and metal cleaning processes. Electronic cleaning processes include circuit-card and electronic part cleaning. Metal part cleaning includes most gross cleaning processes of large or heavily soiled parts such as sheet metal cleaning, cleaning prior to painting or surface finishing, and cleaning to remove machine oils from manufactured parts. The cleaning of high-reliability precision parts, such as instrumental aircraft gyroscopes, is not a significant contributor to Thai cleaning operations.

It is estimated that consumption of trichloroethylene in solvent cleaning in Thailand increased from approximately 800 MT in 1992 to approximately 6000 MT in 1994. This increase can be attributed in large part to the elimination of 1,1,1-trichloroethane in metal and textile cleaning applications and to the fact that the current cost of trichloroethylene in Thailand is about half that of 1,1,1-trichloroethane. It is believed that approximately 10% of the companies using trichloroethylene as a solvent cleaner are considered large users (>50 drums per month), 20-30% are considered medium users, and 60-70% are considered small users.

ENTERPRISE BACKGROUND

Fifteen companies that have partially or totally substituted trichloroethylene for CFC-113 and/or 1,1,1-trichloroethane will receive assistance through this proposed project. All will receive safety audits, safety training, and packages of safety equipment. In addition, other current and potential users of trichloroethylene will benefit from the educational materials to be developed as part of this project.

The East Asiatic (Thailand) Public Company Limited will provide assistance in carrying out this project. East Asiatic is the largest supplier of trichloroethylene in Thailand and currently holds approximately 45% of the local market.

PROJECT DESCRIPTION

The focus of this project is to provide the necessary safety and technical assistance to facilities conducting solvent cleaning in Thailand that have already shifted their cleaning process from CFC-113 or 1,1,1-trichloroethane to trichloroethylene.

While trichloroethylene is a very effective cleaner, it has associated with its use substantial health risks to workers that must be evaluated and considered before implementing its use. Worker exposure to trichloroethylene vapors is of great concern and must be minimized. Trichloroethylene is a suspected human carcinogen and has therefore been assigned a relatively low worker exposure limit of 100 ppm by the U.S. Occupational Safety and Health Administration (OSHA).[1]

Despite this low recommended exposure limit, it is possible to safely use trichloroethylene in cleaning applications if a number of precautions are taken, such as ensuring proper handling, retrofitting existing equipment or purchasing new equipment, and monitoring levels of trichloroethylene vapor in the air around the cleaning equipment.

To raise awareness of safety hazards and mitigation strategies, the safety and technical assistance program proposed by this project will consist of five main components: (1) company survey, (2) plant safety audit, (3) safety training program, (4) provisions of safety equipment, (5) safety audit follow-up, and (6) information awareness program.

Company Survey

Approximately fifteen companies (one plant per company) will be selected which have already partially or completely converted their solvent cleaning processes from an ozone-depleting solvent to trichloroethylene. To the maximum extent possible, these companies will be 100% Thai-owned or will have a high percentage of Thai ownership. Companies will be identified through a survey of known users of trichloroethylene. Local consultants with expertise in solvent cleaning, with input from an international consultant with solvent cleaning expertise, will prepare and conduct the survey. The survey will be conducted entirely in Thai and the results will be evaluated to select the fifteen companies that will be invited to participate in this project.

Plant Safety Audit

Each of the fifteen plants participating in the project will receive the benefits of a consultant's safety audit. The local consultants, in conjunction with the international consultant, will develop a checklist of items to be investigated during the audit. The local consultant will then visit each of the plants and prepare a report with recommendations on ways to enhance safety measures relating to the cleaning processes using trichloroethylene. The report will include estimates of the costs and the benefits (e.g., preservation of worker

[1] OSHA has assigned worker exposure limits of 1000 ppm and 350 ppm to CFC-113 and 1,1,1-trichloroethane, respectively.

health) associated with the recommended changes in equipment and facilities and an explanation of the risks likely to be eliminated by implementing such changes. It will also include recommendations of training that should be provided to facility employees to ensure the safe use of trichloroethylene. These reports will then be reviewed by the international consultant and modified as necessary.

Safety Training Program

Representatives from the fifteen companies will be invited to participate in a training program. The training program will be conducted to address the special circumstances of each company and will focus on the recommendations of the safety audits. In addition to addressing the health and safety issues associated with trichloroethylene use, the safety training program will discuss the need for proper handling to avoid spills of the solvent, as well as the environmental impacts that such a spill may have were it to occur. The local consultants will work with the international consultant to develop and organize the training program. They will contact speakers, prepare training materials, and coordinate all of the logistics of the program. All training materials will be translated into Thai and the training program will be conducted primarily in Thai. If desired, additional companies that are using or plan to use trichloroethylene, but are not a part of this project, may be invited to attend the training program.

Provisions of Safety Equipment

As part of the technical assistance program, each of the fifteen companies participating in the project will be eligible to receive immediate provisions of safety equipment, provided they do not already have the equipment in their facility. This package of safety equipment will consist of air monitors, gloves, and masks. The air monitors will be useful for measuring the concentration of trichloroethylene vapors in the immediate vicinity of the vapor degreasing equipment, and will allow plant managers to shut down operations if the concentration moves above safe levels. Masks and gloves will protect those workers who are performing the loading and unloading of parts in the cleaning equipment. In addition, the project allocates US$3,000 per facility for retrofits to the existing cleaning equipment in which trichloroethylene is being used. These funds may be used for the addition of a cover, to fix leaks, to increase cooling coil efficiency, or for any other retrofits that will contribute to a reduction in trichloroethylene vapor emissions.

Audit Follow-Up

One follow-up visit will be made to each facility by the local consultants. In each case, the visit will take place after implementation of the process changes recommended during the initial visit and during the training program, and the consultants will spend a half-day at each of the fifteen facilities. During the visit, the consultants will review the use of trichloroethylene and make additional recommendations for necessary changes to the facility's operations.

Information Awareness Program

Companies that have converted or are considering converting from CFC-113 or 1,1,1-trichloroethane to trichloroethylene, but that are not participating in this project, will still benefit from this project through the receipt of technical and safety information. The local consultants, in conjunction with the international consultant, will prepare a trichloroethylene information package that would be mailed to all companies requesting such information. The package will consist of technical information concerning the use of trichloroethylene, information on the risks associated with trichloroethylene use, and information on how to ensure the safe use of trichloroethylene. While some of this information will be gathered from existing sources, additional items will be written by the local and international consultants as necessary.

JUSTIFICATION FOR SELECTION OF ALTERNATIVE TECHNOLOGY

There are many feasible alternatives to the use of CFC-113 and 1,1,1-trichloroethane in solvent cleaning applications in Thailand. Some of the more common alternatives include aqueous cleaning, semi-aqueous cleaning, and the use of organic solvents such as alcohols and petroleum distillates. However, the nonozone-depleting chlorinated solvents, most often trichloroethylene, are also popular alternatives, primarily because of the ease with which they can be implemented. In terms of technical performance, trichloroethylene is a drop-in replacement for 1,1,1-trichloroethane in most applications. A facility need only remove the existing solvent from its vapor degreaser, refill the equipment with trichloroethylene, and resume production. It is also possible to utilize trichloroethylene as a drop-in replacement for CFC-113, although this will only be feasible in limited applications due to the fact that the trichloroethylene has a solvency power significantly higher than that of CFC-113. This ease of substitution, coupled with the comparatively low cost of the solvent (about half that of 1,1,1-trichloroethane), have resulted in many companies of varying sizes switching to trichloroethylene as a cleaning solvent in Thailand. The switch to trichloroethylene in existing equipment is undoubtedly the least expensive option for eliminating the use of ozone-depleting solvents.

While this substitution poses no problems from a technical standpoint, it is cause for concern in terms of worker health. The use of trichloroethylene in old vapor degreasing equipment with no retrofits is likely to result in high levels of emissions of trichloroethylene vapor. These high levels of emissions are of great concern when one considers that trichloroethylene is a suspected human carcinogen. Therefore, in order to protect worker health, it is necessary to educate plant managers in the safe use of trichloroethylene and the handling and equipment changes that make this safe use possible. Failure to do so may result in either serious worker health impacts or the conversion of some facilities back to the use of an ozone-depleting solvent.

PROJECT COSTS

As detailed in Annex A, the total project cost is US$125,250. Because there are no operating costs, ODS savings, or non-ODS investment costs associated with this project, the

total cost is also the incremental cost. This project will not provide any of the companies with any incremental revenues.

Other Costs. A 15% contingency (US$19,000) was also included to ensure adequate funding of project costs following project appraisal. An additional US$4,000 (3%) was added to the grant request to cover the fee for services of the financial institution (FI) that will appraise the projects and oversee procurement, disbursement and audits.

Requested Funding. The proposed OTF grant for this project is US$149,000 and was calculated as follows: the total project cost was increased by a 15 percent contingency to yield the grant amount. Finally, this figure was increased by 3 percent to account for the financial institution's fee.

PROJECT IMPLEMENTATION

Management

DIW will oversee the implementation of this project.

Schedule

As shown in the following table, this project can be implemented over three quarters.

TASK	Q1	Q2	Q3
Company Survey	XX		
Safety Audit	X	X	
Safety Training Program		X	
Safety Investments		X	
Audit Follow-Up			X
Information Awareness Program			XX

Note: Each "X" represents one month.

RESULTS

Project Impacts

This project will not directly eliminate any ODS. It will, however, ensure the sustained elimination of an unknown amount of ODS used in solvent cleaning operations. Moreover, it will ensure the long-term safe and effective use of trichloroethylene instead of ODSs in the Thai

solvent cleaning sector. Manufacturing facilities using trichloroethylene in Thailand will receive significant improvements in worker safety through implementation of this project.

ANNEX A
Investment Costs (US$)

The project costs are as follows:

Company Survey, Safety Audits, Training Seminar, and Follow Up Visit

1.	Company Survey		
	a)	Develop survey	$1,000
	b)	Conduct survey	$1,000
	c)	Analyze survey results	$5,000
2.	Plant safety audit		
	a)	Conduct audits (15 plants - 1/2 day each)	$3,000
	b)	Draft audit reports	$1,500
	c)	Review audit reports	$1,000
3.	Safety training program		
	a)	Develop program materials and logistical planning	$9,600
	b)	Conduct training program (2 days)	$2,000
4.	Audit follow-up visits (15 plants - 1/2 day each)		$3,000
5.	Air travel and per diem for international solvents consultant		$6,000
5.	15 days for interpreter, translation of training materials, and printing of materials in Thai		$1,500
6.	Miscellaneous expenses (secretarial, courier, telephone etc.)		$5,000
Sub-total			$39,600

Information awareness

1.	Develop information package for current and future users of trichloroethylene		$14,400

Safety Investments

1.	1 each air monitor	$ 1,000
2.	2 each worker masks	$ 500
3.	2 each worker gloves	$ 250
4.	1 each retrofits to existing cleaning equipment	$ 3,000
	Sub total per plant = $4,750 Number of plants = 15	
Sub-total		$71,250
TOTAL COSTS		**$125,250**