GLOBAL
ENVIRONMENT
FACILITY

17391

Russian Federation

Ozone Depleting Substance Consumption Phase-Out Project Second Tranche

Project Document
February 1998

THE WORLD BANK

GEF Documentation

The Global Environment Facility (GEF) assists developing countries to protect the global environment in four areas: global warming, pollution of international waters, destruction of biodiversity, and depletion of the ozone layer. The GEF is jointly implemented by the United Nations Development Programme, the United Nations Environment Programme, and the World Bank.

GEF Project Documents - identified by a green band - provide extended project-specific information. The implementing agency responsible for each project is identified by its logo on the cover of the document.

Global Environment Division
Environment Department
World Bank
1818 H Street, NW
Washington, DC 20433
Telephone: (202) 473-1816
Fax: (202) 522-3256

Report No. 17391-RU

Russian Federation

Ozone Depleting Substance Consumption Phase-Out Project

Second Tranche

Project Document
February 1998

Rural Development and Environment Department
Europe and Central Asia Region

CURRENCY EQUIVALENTS

Currency Unit	=	Ruble
December 1994 US$1	=	3,550
December 1995 US$1	=	4,640
December 1996 US$1	=	5,850

FISCAL YEAR

January 1 - December 31

WEIGHTS AND MEASURES

Metric System

ABBREVIATIONS AND ACRONYMS

CFC	-	Chlorofluorocarbons
CPPI	-	Center for Preparation and Implementation of International Projects on Technical Assistance
CTC	-	Carbon tetrachloride
EA	-	Environmental Assessment
EMP	-	Environmental Management Project
FSU	-	Former Soviet Union
GEF	-	Global Environmental Facility
GWP	-	Global Warming Potential
HAP	-	Hydrocarbon aerosol propellant
HCFC	-	Hydrochloroflourocarbon
HFC	-	Hydrofluorocarbon
ICB	-	International competitive bidding
IS	-	International Shopping
JSC	-	Joint Stock Company
MCF	-	Methyl Chloroform
MEPNR	-	Ministry of Environmental Protection and Natural Rresources
MP	-	Montreal Protocol
MPMF	-	Montreal Protocol Multi-lateral Fund
MT	-	Metric Ton
NCB	-	National Competitive Bidding
NS	-	National Shopping
ODP	-	Ozone Depleting Potential
ODS	-	Ozone depleting substance
ODS IPU	-	ODS Investment Project Unit
ODS CPU	-	ODS Country Program Unit
VOC	-	Volatile Organic Compound
SCEP	-	State Committee for Environmental Protection
TA	-	Technical Assistance

Vice President:	Johannes Linn, ECAVP
Director:	Kevin Cleaver, ECSRE
Sector Leader:	Michele de Nevers, ECSRE
Team Leader:	Roger Batstone, ECSRE

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
PROJECT PROGRESS AND SECOND TRANCHE APPRAISAL REPORT

TABLE OF CONTENTS

PART I: PROJECT SUMMARY

I. PROJECT PROGRESS REPORT 1
A Project Background 1
B. Project Implementation Arrangements 2
C. Institutional Developments 3
D. Implementation of the First Tranche 4
E. Second Tranche Preparation and Processing 5
F. Analysis of Current ODS Consumption and Production Trends 7
G. Proposed Third Trance Scope and Implementation Plan 12

II. HARMONIA 15
A. Background 15
B. Objectives 17
C. Sub-Project Description and Cost Estimates 17
D. Sub-Project Implementation 21
E. Enterprise Financial Evaluation and Sub-Project Financing 22
F. Environmental Analysis 25
G. Sustainability 26
H. Benefits 26
I. Risks 26
J. Conditionality 27
K. Recommendation 28

III. CHIMPROM 29
A. Background 29
B. Objectives 31
C. Sub-Project Description and Cost Estimates 31
D. Sub-Project Implementation 34
E. Enterprise Financial Evaluation and Sub-Project Financing 36
F. Environmental Analysis 39
G. Sustainability 40
H. Benefits 40
I. Risks 40
J. Conditionality 41
K. Recommendation 42

IV. SIBAR 43
A. Background 43
B. Objectives 45
C. Sub-Project Description and Cost Estimates 45
D. Sub-Project Implementation 48
E. Enterprise Financial Evaluation and Sub-Project Financing 50
F. Environmental Analysis 53
G. Sustainability 54
H. Benefits 54
I. Risks 54
J. Conditionality 55
K. Recommendation 57

V. MARIHOLODMASH 58
A. Background 58
B. Objectives 59
C. Sub-Project Description and Cost Estimates 59
D. Sub-Project Implementation 64
E. Enterprise Financial Evaluation and Sub-Project Financing 66
F. Environmental Analysis 69
G. Sustainability 69
H. Benefits 70
I. Risks 70
J. Conditionality 71
K. Recommendation 71

PART II: TECHNICAL ANNEXES

VI. ANNEXES 72

A. ESTIMATED DISBURSEMENTS AND PROCUREMENT SUMMARY 73

This report is based on the findings of a joint CPPI/World Bank appraisal mission conducted in Russia during July 1997. The mission comprised Vassily Tselikov (CPPI ODS Investment Unit Manager), Pavel A. Ivashin (CPPI Financial Specialist), Masha Filina (CPPI Procurement Specialist), Yuri Maximenko (NPAF, Manager, Environmental and Technology), Irina Gorkina (NPAF Environmental Specialist), R. J. Cooke (World Bank Team Leader), and Craig Leisher (Project Appraisal Specialist). Assistance was provided by COWI Consulting (Moscow) who prepared the pre-appraisal studies for the enterprises, Prospect (Moscow) who provided procurement advice, and Dewpoint Consultants (UK) who provided technical support.

PART I: Project Summary

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

SUMMARY

Grantee:	Russian Federation.
Implementing Agency:	Center for Project Preparation and Implementation under the State Committee for Environmental Protection and Natural Resources.
Beneficiaries:	Harmonia in Moscow, Chimprom in Volgograd, Sibiar in Novosibirsk, and Mariholodmash in Yoshkar-Ola. All are joint stock Russian enterprises and consumers of ozone depleting substances.
Amount:	US$25.4 million.
Terms:	Sub-Grants to the enterprises per Sub-Grant Agreements between the Grantee and the benificaries, subject to approval by the Bank.
Onlending Terms:	Not applicable.
Financing Plan:	The grants would finance eligible incremental investment costs up to a maximum amount determined by each enterprise's historical usage of ozone depleting substances. All other associated costs are financed by the companies.

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
PROJECT PROGRESS AND SECOND TRANCHE APPRAISAL REPORT

I. PROJECT PROGRESS REPORT

A. Project Background

1.1 The Russian Federation Ozone Depleting Substance Consumption Phase-out Project (Project) is being undertaken to assist Russia in the implementation of its overall Country Program for phase-out of ozone depleting substances (ODS). As adopted in 1995, this Program defines Russia's commitment to eliminate the production and new consumption of ODS by 2000 and has been agreed to by the Montreal Protocol Implementation Committee. Consistent with the Implementation Committee's call for favorable consideration of international assistance to Russia, the Project is being funded by the Global Environmental Facility (GEF) with the World Bank acting as implementing agency. Preparation was undertaken during 1995 and 1996 by the World Bank and Ministry of Environmental Protection and Natural Resources of the Russian Federation (MEPNR) utilizing a GEF project preparation advance. It was approved by the GEF in April 1996 as a framework project with an overall grant allocation of US$60.0 million. This is to be disbursed as sub-grants in three tranches to eligible phase-out investments in the high consumption aerosol and refrigeration sectors, and for institutional technical assistance related to upgrading of the national regulatory framework for ODS control. The first tranche was included in the appraisal and subsequent processing of the overall Project. The Project Document[1] published at the time of GEF approval provides a complete description of the Project, as originally structured. It also includes background on overall ODS production and consumption in Russia up to 1995, the status of Russia's international phase-out obligations and agreements with the Parties to the Montreal Protocol, and institutional initiatives related to ensuring compliance. Table 1.1 provides an overall summary of the Project as originally approved.

1.2 This document is intended as a progress report on the Project's implementation and to serve as support for the submission of as second tranche of sub-projects for endorsement by the GEF. This first section of the document provides a summary of the Project's status and overall phase-out progress in Russia including: a) a description of project implementation arrangements; b) institutional developments c) the results of the first tranche implementation to date; d) preparation and processing activities for the second tranche; e) summary data on overall ODS production and consumption in Russia; and d) the proposed scope and implementation plan for the third tranche. The subsequent sections provide detailed appraisal reports applicable to the four second tranche sub-projects presently being submitted to the GEF for approval.

---

[1] *Global Environmental Facility, Russian Federation Ozone Depleting Substances Phase-out Project, Project Document*, The World Bank, May 1996

TAB1-1.xls

TABLE 1.1

ORIGINALLY PROPOSED PROJECT SUMMARY

ENTERPRISE	SECTOR	PROPOSED SUB-PROJECT DESCRIPTION	ANNUAL ODP USE (MT/YR.)	INCREMENTAL INVESTMENT COST (US$)	INCREMENTAL OPERATING COST (SAVINGS) (US$)	TOTAL CAPITAL & OPERATING COST (US$)	PROPOSED GEF GRANT (US$)
JSC "Arnest" (Nevinnomysk)	Aerosol	CFC to HAP Propellant Conversion	2,456	15,786,000	(1,894,000)	13,892,000	5,650,000
JSC "KRP Birusa" (Krasnoyarsk)	Domestic Refrigeration	CFC-12 to Propane/Butane Refrigerant Conversion	117	4,505,000	2,211,000	6,716,000	1,976,000
Agency Fee						226,000	226,000
Technical Assistance	Institutional	Country Program Implementation				748,000	748,000
FIRST TRANCHE SUB-TOTALS			2,573	20,291,000	317,000	21,582,000	8,600,000
JSC "Sibar" (NDCP) Novosibirsk)	Aerosol	CFC to HAP Propellant Conversion	3,568	10,909,000	(2,421,000)	8,488,000	8,488,000
JSC "Halogen" (Perm)	Aerosol	CFC to HAP Propellant Conversion	1,435	2,826,000	(641,000)	2,185,000	1,976,000
JSC" Chimprom" (Volgagrad)	Aerosol	CFC to HAP Propellant Conversion	1,769	4,342,000	(616,000)	3,726,000	2,925,000
JSC "Novomoscowskbytchim" (Novomosowsk)	Aerosol	CFC to HAP Propellant Conversion	1,219	4,876,000	(664,000)	4,212,000	3,791,000
JSC "Bytchim" (Altaichimprom - Slavgorod)	Aerosol	CFC to Mechanical Pump Conversion	591	2,638,000	0	2,638,000	2,138,000
JSC "Harmonia" (Mosbytchim - Moscow)	Aerosol	CFC to HAP Propellant Conversion	2,083	5,678,000	(663,000)	5,012,000	4,015,000
JSC "KRP Birusa" (Kasnoyarsk)	Domestic Refrigeration	CFC-11 to Cyclopentane Foam Blowing Conversion	302	17,578,000	5,576,000	23,152,000	5,497,000
JSC "SEPO -Temp" (SEPO - Saratov)	Domestic Refrigeration	CFC-12 to HFC-134a Refrigerant Conversion plus Elimination of CFC-113	210	2,790,000	3,935,000	6,725,000	2,579,000
		CFC-11 to Cyclopentane Foam Blowing Conversion	228	1,579,000	6,634,000	8,413,000	1,522,000
ANOP "Marikholodmash (Yoshkar-Ola)	Commercial Refrigeration	CFC-12 to HFC-134a Refrigerant Conversion	15	1,251,000	203,000	1,454,000	356,000
		CFC-11 to Cyclopentane Foam Blowing Conversion	18	503,000	2,508,000	3,011,000	153,000
Agency Fee						1,004,000	1,004,000
Technical Assistance	Institutional	Country Program Implementation				526,000	526,000
SECOND TRANCHE SUB-TOTALS			11,438	54,970,000	3,945,000	70,546,000	35,000,000
JSC "Stinol" (Lipetsk)	Domestic Refrigeration	CFC-11 to Cyclopentane Foam Blowing Conversion	260	4,216,000	7,559,000	11,775,000	3,070,000
JSC "Ormez" (Orenburg - Orsk)	Domestic Refrigeration	CFC-12 to HFC-134a Refrigerant Conversion plus Elimination of CFC-113	202	8,792,000	2,598,000	11,390,000	4,772,000
		CFC-11 to Cyclopentane Foam Blowing Conversion	158	1,618,000	1,229,000	2,847,000	1,138,000
JSC "Polus" (Zlatoust)	Domestic Refrigeration	CFC-12 to HFC-134a Refrigerant Conversion plus Elimination of CFC-113	250	796,000	2,418,000	3,214,000	724,000
		CFC-11 to hfc-134a Foam Blowing Conversion	123	1,192,000	2,901,000	4,093,000	719,000
JSC "Pozis" (Zelenodolsk - Zavod)	Domestic Refrigeration	CFC-12 to HFC-134a Refrigerant Conversion plus Elimination of CFC-113	191	6,828,000	2,860,000	9,688,000	3,554,000
		CFC-11 to Cyclopentane Foam Blowing Conversion	159	1,947,000	4,215,000	6,162,000	1,289,000
Refrigeration Servicing	Refrigeration	Recovery Equipment Investments and Training		654,000		654,000	654,000
Agency Fee						480,000	480,000
THIRD TRANCHE SUB-TOTALS			1343	26,043,000	23,780,000	50,303,000	16,400,000
PROJECT TOTALS			15,354	101,304,000	28,042,000	142,431,000	60,000,000

B. Project Implementation Arrangements

1.3 The Project's counterpart implementing agency is the State Committee for Environmental Protection of the Russian Federation (SCEP, formally MEPNR), under the terms of a Global Environmental Facility Trust Fund Agreement[2] (Grant Agreement) between SCEP and the World Bank, signed on September 29, 1996. An amendment to the Grant Agreement was approved by the Bank in October 1997 to accommodate changes in procurement procedures. Within Russia, the Project is supervised by the Inter-Agency Commission for Ozone Layer Protection (Inter-Agency Commission) established under SCEP. It includes representatives of government and industrial stakeholders impacted by ODS phase-out and operates under the Chairmanship of the SCEP Chairman. In addition, final funding proposals for individual investment sub-projects are subject to the appraisal and review processes established by the National Pollution Abatement Facility (NPAF), including formal approval by the NPAF Supervisory Board, which is made up of representatives from the Ministry of Finance, Ministry of Economy, SCEP and a number of other agencies.

1.4 The functional implementation responsibility for the Project has been assigned to the Center for Preparation and Implementation of International Projects on Technical Assistance (CPPI) established within SCEP in association with the World Bank, Russian Federation Environmental Management Project (EMP). This assignment of responsibility has been formalized in a Project Implementation Agreement between SCEP and CPPI, dated January 28, 1997. Within CPPI, project management is assigned to two units, both of which are funded under the Project through the agency fee provided for in the Grant Agreement and in accordance with a work plan and budget approved by the NPAF Supervisory Board and World Bank. The ODS Investment Project Unit (ODS IPU) is responsible for the overall administration of the Project and for preparation, appraisal and implementation of investment sub-projects. This unit has a staff of five, covering the technical, procurement, financial and administrative expertise requirements of the Project. It is supported by staff from the NPAF, as well as local and foreign consultants as required. The ODS Country Program Unit with a staff of three is responsible for the institutional technical assistance components of the Project, provides support to SCEP in the overall implementation of the Country Program, acts as a secretariat to the Inter-Agency Commission, and assists in assembling information required in the fulfillment of Russia's reporting obligations under the Montreal Protocol.

---

2 *Global Environmental Facility Trust Fund Grant Agreement, GEF Trust Fund TF028314*, September 29, 1996, Amended, October 1997

C. Institutional Developments

1.5 The primary regulatory authority responsible for the ODS control is the SCEP and, within SCEP, the Department of State Environment Control and Safety. The legal basis for the control of ODS is provided by various resolutions of the government adopting the Country Program[3], and control measures over ODS production, imports and exports[4][5][6]. The mandate and organization of the Inter-Agency Commission[7] has also been strengthened to ensure coordination and cooperation of regulatory and investment activities among all stakeholders within the government. The major direct regulatory control initiatives that have been or are being implemented since initiation of the Project are:

a) Development of a system of ODS production quotas that provides for the progressive reduction in ODS production by producing enterprises such that complete phase-out can be achieved by 2000, while ensuring that supplies are available as consumption phase-out is being implemented. This system has been operational since 1996 with quotas and associated production reporting being effective for the years 1995 through 1997.

b) Development and implementation of a system of licensing applicable to the production and consumption of ODS.

c) In association with the Ministry for Foreign Economic Relations of the Russian Federation and the State Customs Committee of the Russian Federation, a system of import and export controls has been implemented that requires compliance with international obligations respecting ODS and ODS containing products. Specific provision for export allowances to other countries in the CIS have been provided for to ensure essential supplies while phase-out occurs in these countries. Full implementation and associated reporting capacity is anticipated by the end of 1997.

d) The delegation of enforcement authority for ODS control to regional Environment Committees has been initiated, to ensure that adequate capacity and coverage is achieved.

e) A formalized system of collecting and reporting information to the Montreal Protocol Secretariat, consistent with the countries obligations has been developed.

---

3 *Resolution on Priority Measures to Ensure Compliance with the Vienna Convention on Ozone Layer Protection and Montreal Protocol on Ozone Depleting Substances*, Resolution No. 526 of the Government of the Russian Federation, May 1995.

4 *On Control Over Imports to the Russian Federation and Exports from the Russian Federation of ODS and ODS Containing Products*, Resolution No. 563 of the Government of the Russian Federation, May 1996

5 *On Launching an Experiment to Develop a Mechanism to Control Imports of ODS Containing Products*, Order of the State Committee for Environmental Protection of the Russian Federation No. 48, February 1997.

6 *On Establishment of Quotas for Production of ODS in 1997*, Order of the State Committee for Environmental Protection of the Russian Federation, February 1997.

7 *On Inter-Agency Commission for Protection of the Ozone Layer*, Resolution No. 612 of the Government of the Russian Federation, May 1997.

f) Development of a formal Federal Program on ODS Phase-Out which is intended to mobilize state resources for phase-out activities. This has been drafted and is currently under review within the government under the coordination of the Inter-Agency Commission.

h) Establishment of working groups within the Inter-Agency Commission to address sectoral phase-out requirements related to refrigeration, halons, medical uses, solvent uses, chlorine containing feedstock production and ODS production.

D. Implementation Status of the First Tranche

1.6 The Project's first tranche, as originally approved, involved a total grant of US$8.6 million (Table 1.1). It was to include two investment sub-projects, one in each of the aerosol and domestic refrigeration sectors and technical assistance related to project processing and institutional strengthening. However, in the course of initiating implementation activities, it became apparent that new financial viability concerns had developed with one of the enterprises, JSC "KRP Birusa", located in Krasnoyarsk and which had been the largest producer of domestic refrigerators and compressors in Russia (750,000 units/year), had effectively stopped production in 1996 due to market problems. Production has dropped to approximately 16% of capacity and the enterprise was undergoing restructuring. As a consequence, it was decided to defer the sub-project until a new financial viability evaluation could be undertaken as part of the second tranche preparation. Therefore, first tranche implementation activities have been directed at the remaining sub-project in the aerosol sector (JSC "Arnest") and the technical assistance activities.

1.7 The sub-project under implementation is a hydrocarbon aerosol propellant conversion (HAP) at JSC "Arnest", which is one of the country's largest consumer aerosol producers and sustaining consumers of ODS. This conversion involves a total investment of US$15.8 million of which GEF grant funding is US$5.650 million. Project appraisal was based on a 1994 consumption level of 2,456 MT ODS. Expanding markets for its products have allowed the enterprise to progressively increase production up to the plant's rated capacity (40 million cans/year), although reductions in ODS consumption have been achieved by utilizing HAP/CFC blends as propellants. 1997 consumption is estimated to be 612 MT. Since Grant effectiveness in September, 1996, a Sub-Grant Agreement between the CPPI and JSC" Arnest" has been negotiated and signed (January 1997). The enterprise has proceeded with the completion of engineering and initiation of major procurement. The first tendering of equipment was completed in May, 1997 using International Competitive Bidding (ICB) procedures for the aerosol filling lines. A turn key contract valued at US$2.1 million for this equipment was signed in January, 1997 and the manufacturing of this equipment is in progress. These lines are scheduled to be delivered beginning in January 1998 and will be operational in June, 1998. Specifications and bidding documents for the other major procurement packages are being prepared. The major remaining grant funded component is the purchase of valve production equipment that is anticipated to require the remainder of the sub-grant resources. Tendering for this is in progress with contracting anticipated in January, 1998 and with commissioning of the equipment scheduled in December, 1998. It should be noted that the

enterprise has contracted for the purchase of valves suitable for HAP service and will effectively eliminate ODS consumption when the new filling lines are fully operational in the third quarter of 1998.

1.8 The technical assistance component of the first tranche is also under implementation with a primary emphasis on support of institutional strengthening related to regulatory control of ODS. In addition to the establishment of the Project implementation capacity in the ODS IPU and ODS CPU described above, a foreign consulting contract valued at US$150,000 has been awarded to provide support in regulatory framework development. The scope of this work covers a review of international regulatory practices for ODS phase-out, development of specific regulatory initiatives in Russia at the national and regional level and support in their implementation through training and operational assistance. Terms of Reference for a second contract covering assistance in upgrading monitoring and reporting has been prepared and is anticipated to be internationally tendered in early 1998, once the initial results of the regulatory work are available. Grant resources are also being directed at the provision of computer and communications equipment for SCEP and the Inter-Agency Commission to facilitate more effective data collection and reporting. ODS CPU is acting as the secretariat for the Inter-Agency Commission and is coordinating sectoral working groups, the development of the Federal Program on ODS Phase-Out, and the country's international reporting obligations. It has also undertaken a number of training and workshop initiatives for SCEP, regional environmental authorities and other stakeholders related to regulatory initiatives and international practices. The latter has included a study tour sponsored by the Government of the Netherlands on ODS monitoring systems. Development of a public information and awareness program on ODS phase-out has been initiated. To date, this has largely been directed toward industrial users of ODS, through workshops addressing such topics as the use of low global warming potential (GWP) refrigerants, solvent sector applications, halon phase-out opportunities, and consultation on various regulatory initiatives related to licensing, production quotas, and import/export controls. This program has recently been expanded to a more general audience in the public at large, with the occasion of the 10^{th} anniversary of the Montreal Protocol being used as a launching point with publications and media coverage.

E. Second Tranche Preparation and Processing

1.9 After grant effectiveness, the work necessary to complete preparation and processing through to appraisal of investment sub-projects for the second tranche was initiated. From the beginning, all enterprises originally identified for both the second and third tranches of the Project were regularly contacted and information on the enterprise's activities and sub-project preparation status was collected. This monitoring has indicated that significant declines in production have occurred in an number of the candidate enterprises. It was recognized that this could result in both reduced grants due to cost effectiveness threshold restrictions and uncertainty as to their eligibility on financial viability grounds. It also indicated that two candidate enterprises would not be eligible for other reasons. In one case, an enterprise in the domestic refrigeration sector (Stinol) had elected to proceed with phase-out investments in advance of the project and had contracted the major

equipment requirements slated for grant funding under the Project on a sole source basis, thereby making these expenditures ineligible. In another case, an aerosol producer (Halogen) who is also involved in ODS production indicated an unwillingness to undergo financial viability evaluation. Based on these initial monitoring results, it was apparent that the scope of the second tranche would likely be reduced, firstly through elimination of the two sub-projects that had become ineligible (Stinol and Halogen) and the potential failure of others to demonstrate sufficient consumption and/or financial viability. As a consequence, it was decided to initiate final preparation and processing of all remaining sub-projects in both the second and third tranches with the intention of including all that were eligible in the second tranche.

1.10 The formal pre-appraisal work necessary to complete preparation and processing for the second tranche was initiated in late 1996. A two stage pre-appraisal strategy was adopted for enterprise financial viability evaluations and sub-project updating. The first stage was directed at screening the subject enterprises and sub-projects, followed by detailed analysis and information collection on those judged to be potentially eligible for appraisal based on the first stage results. Using a combined local and foreign consulting team, the first stage of this work was completed in March 1997 and the second stage in June, 1997.

1.11 Table 1.2 provides a listing of all enterprises and sub-projects originally considered for the Project's second and third tranche, along with a summary of their production history and results of the pre-appraisal updating and financial viability evaluation, where applicable. In addition to the two sub-projects noted above that were dropped, it was apparent from the first stage screening that a number of the enterprises had suffered major reductions in capacity utilization and decline in financial viability. Based on these results, four domestic refrigeration enterprises (JSC "SEPO - Temp", JSC "Ormez", JSC "Polus" and JSC "Pozis") were not pursued further in the second stage. All were operating at very low levels of production and with the corresponding level of ODS consumption would not qualify for significant grant assistance. In addition, all had initially proposed sub-projects based on the refrigerant phase-out component utilizing HFC-134a refrigerant technology, which would be difficult to support based on the GEF Operational Strategy. Finally, all of these enterprises had serious financial viability constraints related to liquidity and would not unlikely be able to support the enterprise contribution requirements, although several have indicated that financial restructuring is underway. The more detailed second stage evaluation indicated that two additional enterprises were not viable for similar reasons. The earlier concerns relating to JSC "KRP Birusa" were verified in that its production was continuing to decline and no plan for rationalization of the operation and its restructuring had been implemented. Similarly, the aerosol manufacturer, JSC "Bytchim", is producing at such a low level that it has little prospect of continuing as a viable business and will almost certainly close once the parent company (JSC "Altaichimprom") discontinues ODS production which is anticipated in 1998. In addition, the aerosol plant at JSC "Novomoscowskbytchim", was found to have declining aerosol production and was operating at a loss, even though the enterprise itself was quite viable financially. During pre-appraisal, the enterprise indicated uncertainty respecting this plant's future and has since closed the facility permanently. The four remaining enterprises were judged ready for appraisal. These were three aerosol producers (JSC "Sibar", JSC "Harmonia" and JSC "Chimprom") and one commercial refrigeration equipment manufacturer (JSC "Marikholodmash").

TABLE 1-2

SECOND TRANCHE PRE-APPRAISAL SUMMARY

ENTERPRISE	SECTOR	PROPOSED SUB-PROJECT DESCRIPTION	PROPOSED GEF GRANT (US$)	PRODUCTION CAPACITY	REFERENCE ODP CONSUMPTION (MT)		% CAPACITY UTILIZATION/ODS CONSUMPTION (MT) SINCE PROJECT PREPARATION								PRE-APPRAISAL DECISION
					FULL CAPACITY	PROJECT DOCUMENT	1994		1995		1996		1997 (ESTIMATED)		
							% CAP.	ODP	% CAP.	ODP	% CAP.	ODP	% CAP.	ODP	
JSC "Sibiar" (NDCP)	Aerosol	CFC to HAP Propellant Conversion	8,488,000	30,000,000	5,550	3,568	66%	3,700	55%	3,272	31%	1,356	31%	1,356	Selected For Appraisal
Novosibirsk)				Cans											
JSC "Galogen"	Aerosol	CFC to HAP Propellant Conversion	1,976,000	22,500,000	1,831	1,435	68%	1,435	71%	1,560	<50%	<1,000	<50%	<1,000	Refused To Undertake Pre-Appraisal
(Perm)				Cans											Dropped from Project
JSC" Chimprom"	Aerosol	CFC to HAP Propellant Conversion	2,925,000	20,000,000	5,500	1,769	28%	1,558	20%	1,067	22%	1,196	14%	768	Selected For Appraisal
(Volgograd)				Cans											
JSC "Novomoscowskbytchim"	Aerosol	CFC to HAP Propellant Conversion	3,791,000	40,000,000	4,821	1,219	19%	926	22%	1,131	12%	516			Dropped from Project
(Novomosowsk)				Cans											Plant to be Shut Down
JSC "Bytchim"	Aerosol	CFC to Mechanical Pump Conversion	2,138,000	20,000,000	4,888	591	13%	620	6%	384	2%	132			Rejected on Viability Grounds
(Altaichimprom - Slavgorod)				Cans											
JSC "Harmonia"	Aerosol	CFC to HAP Propellant Conversion	4,015,000	20,000,000	4,012	2,083	64%	2,585	43%	2,083	17%	1,105	15%	1,000	Selected For Appraisal
(Mosbytchim - Moscow)				Cans											
JSC "KRP Birusa"	Domestic	CFC-12 to Propane/Butane Refigerant	1,976,000	750,000	135	117									
(Krasnoyarsk)	Refigeration	Conversion (Deferred fron 1st Tranche)		Units			100%	437	83%	475	16%	115			Rejected on Viability Grounds
		CFC-11 to Cyclopentane Foam Blowing	5,497,000		302	302									Requested Consideration after
		Conversion													Restructuring
JSC "SEPO -Temp)"	Domestic	CFC-12 to HFC-134a Refrigerant Conversion	1,552,000	650,000	235	228					20%	47			Rejected on Viability Grounds
(SEPO - Saratov)	Refigeration	plus Elimination of CFC-113		Units											Requested Consideration after
		CFC-11 to Cyclopentane Foam Blowing	2,579,000		217	210					20%	43			Restructuring
		Conversion													
JSC "Stinol"	Domestic	CFC-11 to Cyclopentane Foam Blowing	3,070,000	1,000,000	570	260	35%	200	45%	257	83%	400			Dropped from Project
(Lipetsk)	Refigeration	Conversion		Units											Completing Phaseout on Own(1998)
JSC "Ormez"	Domestic	CFC-12 to HFC-134a Refrigerant Conversion	1,138,000	500,000	215	158					3%	6			Rejected on Viability Grounds
(Orenburg - Orsk)	Refigeration	plus Elimination of CFC-113		Units											Requested Consideration after
		CFC-11 to Cyclopentane Foam Blowing	4,772,000		300	202					3%	9			Restructuring
		Conversion													
JSC "Polus"	Domestic	CFC-12 to HFC-134a Refrigerant Conversion	719,000	380,000	201	123					13%	26			
(Zlatoust)	Refigeration	plus Elimination of CFC-113		Units											Rejected on Viability Grounds
		CFC-11 to hfc-134a Foam Blowing	724,000		381	250					13%	50			
		Conversion													
JSC "Pozis"	Domestic	CFC-12 to HFC-134a Refrigerant Conversion	1,289,000	420,000	304	159	27%	82			5%	15			
(Zelendolsk - Zavod)	Refigeration	plus Elimination of CFC-113		Units											Rejected on Viability Grounds
		CFC-11 to Cyclopentane Foam Blowing	3,554,000		366	191	27%	99			5%	18			
		Conversion													
ANOP "Marikholodmash	Commercial	CFC-12 to HFC-134a Refrigerant Conversion	153,000	100,000		18		15		7		5			
(Yoshkar-Ola)	Refrigeration			Units	107		30%		23%		19%		19%		Selected For Appraisal
		CFC-11 to Cyclopentane Foam Blowing	356,000			15		18		15		13			
		Conversion													

1.12 The detailed appraisals on these four enterprises were undertaken in July 1997 and the results of each are documented in the following four sections of this report. All were judged to be eligible and recommended for GEF funding, subject to negotiation of an acceptable Sub-Grant Agreement and satisfaction of a number of sub-project specific conditions. The total grant funding recommended is US$25.4 million which will phase-out 14,139 MT ODP in consumption capacity, an appraised consumption[8] of 8,357 MT ODP and an estimated current (1997) consumption of 3,142 MT ODP.

F. Analysis of Current ODS Consumption and Production Trends

1.13 The results of the second tranche processing indicated that phase-out in the targeted high consumption aerosol and refrigeration sectors is rapidly occurring due to the combination of the GEF funded phase-out in the largest consumers, market driven rationalization of production capacity in these sectors, and enterprise initiated phase-out. Within the framework of the Project, this is being achieved with fewer grant resources than originally contemplated and the Project's basic objective of achieving phase-out in these two sectors will be substantially achieved without the resources originally allocated to the third tranche. This situation provides an opportunity to address other consumption sectors, as well as coordinate the Project's efforts with parallel efforts to phase-out ODS production in Russia. As a basis for developing the scope for the proposed re-allocation of Project grant resources, an overall analysis of the current situation and trends in each consumption sector as well as ODS production has been undertaken.

1.14 **Aerosol Sector.** In 1992, aerosol consumption in Russia was estimated to be 18,150 MT/Year[9], concentrated in eight producers of consumer and industrial products (17,850 MT ODP/year) and a smaller quantity for the production of medical aerosol (300 MT ODP/year). By 1994, this had fallen to 13,280 MT ODP in the major consumers, on the strength of the conversion of one large plant (Chiton) to HAP on its own initiative and the introduction of CFC/HAP blends at JSC "Arnest". The currently estimated sector consumption based on data collected during the project indicates that an estimated 8,382 MT ODP/year was consumed in 1996, of which JSC "Arnest" is the largest single consumer (3,050 MT ODP/year). In 1998, this demand will fall by an estimated 3,566 MT ODP as JSC "Arnest" completes phase-out and JSC "Novomoscowskbytchim" has closed. At the end of 1999 after implementation of the phase-out proposed in this sector for the second tranche, the only residual consumption of significance will be at JSC "Halogen". While no current consumption data is available from this plant, this could be as high as 1,560 MT ODP/year based on 1995 consumption. As such, it could remain a potential opportunity for the Project in the third tranche, should the enterprise choose to participate. However, given the regional nature of this plant's market, it is unlikely that it's sales are being sustained and will certainly be impacted with increasing introduction of lower cost HAP based products from both Russian and foreign producers. The limited information released by this enterprise confirms that production levels are low. In any event, the closure of the plant by regulatory action at the end of 1999 will be required due to the Country Program commitment.

---

[8] Appraised consumption is the average of the three years prior to appraisal (1994, 1995, 1995) or the year prior to initiation of eligible phase-out investments.

1.15 Some residual consumption remains in the medical aerosol sector. In 1992 this was estimated to be 300 MT/year. However, preliminary data from the three identified enterprises in this sector[10] indicate that historical production levels are being maintained and the above consumption level is representative of current levels. This represents an additional opportunity for phase-out subject to the availability and acceptance of suitable technology.

1.16 The supply of suitable HAP is recognized as a potential constraint on assuring that ODS phase-out in this sector is achieved. It is estimated that up to 10,000 MT ODS/year of capacity will be required to fully service the sector, although current requirements are substantially less. At the present time, only two domestic suppliers of HAP is available. These are Minnebayoev GPZ at Almetievsk (Tatarstan), which has a preferential supply arrangement with Chiton but sells excess capacity on the open market, and Kirishi GPZ in the St. Petersberg region. Capacity is also under development at Neftekumsk GPZ in Stravropol (North Caucasas), and Nizhnevartovsky GPZ in Siberia. Furthermore, supplies are available from PO "Belarusneft" in the Gomel region of Belarus, Novouzensky GPZ in Kazakhstan, and can be readily imported from Western Europe. Pricing from the available facilities in the CIS is approximately US$0.40/kg compared to potentially higher quality material from Western Europe (US$0.70/kg). To take advantage of this price advantage, each sub-project within this Project includes HAP purification equipment in order to maximize the reliability and flexibility of supply. In summary, while the supply of HAP requires monitoring, particularly in the context of a potential rationalization of overall refining capacity in Russia, sufficient options are or can be made available to assure adequate supplies.

1.17 **Domestic Refrigeration Sector.** It is apparent that a major rationalization of the Russian domestic refrigeration sector has occurred over the past several years. In 1993, twelve manufacturers[11] were reported to produce 3,500,000 domestic refrigeration units/year. Four of these also produced compressors, along with four additional stand alone compressor manufacturers[12]. Direct ODS consumption (CFC-11, CFC-12, CFC-113) during manufacturing was estimated in 1992 to be 3,600 MT ODP[13]. In 1996, it is estimated that less than 1,187,000 units were manufactured and 834,700 were made by a single manufacturer (Stinol). Estimated direct ODS consumption in 1996 had fallen to 664 MT, with over half being associated with Stinol's CFC-11 consumption which will be phased-out in 1998. The residual consumption of approximately 300 MT ODP/year is distributed among the traditional manufacturers all of whom are in severe financial difficulty and most of whom can be expected to stop sustained production in

(..continued)

9 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

10 JSC"Oktiabr" (St. Petersburg), JSC "Moscchimfarmprepavaty" (Moscow), JSC "Altaivitaminy" (Bijsk, Altai Region)

11 Do. stic refrigerator manufacturers identified are KRP "Biryusa" (Krasnoyarsk), Saratov Electric Agregate Production (Saratov), Zavod (Zelenodolsk), Orsk Mechanical Plant (Orsk), Polus (Zaloust), NLMK "Stinol" (Lipetsk), Murom Machine Building Plant (Muron), Yuryuzan Mechanical Plant (Yuryuzan), ZIL (Moscow). JSC "Iceberg" (Smolensk), Ussuriysk Machine Building Plant, (Ussuriysk),and Leninetz (St. Petersburg)

12 Domestic manufacturers also producing compressors for internal and or sale are KRP "Biryusa" (Krasnoyarsk), Orsk Mechanical Plant (Orsk), Zil (Moscow), JSC "Iceburg" (Smolensk). Stand alone compressor manufacturers are Astzakhan Refrigeration Plant (Astzakhan), Tula Armory Plant (Tula), Omsk Compressor Plant (Omsk) and Kirov Plant "Avaitech" (Kirov).

13 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

the near future. The only two that appear to have any chance of survival are JSC "KRP Birusa" and JSC "SEPO-TEMP" who produced 250,000 units and consumed 205 MT ODP/year between them. Both are believed to be undergoing restructuring and as such could be considered in the third tranche. In summary, it can be concluded that effective phase-out in this sector is achievable by 2000.

1.18 **Commercial Refrigeration Sector.** In 1993, the Russian commercial refrigeration sector consisted of eleven producers of refrigeration equipment and compressors[14], although a substantial portion of the latter were imported from Ukraine. However, almost half of the actual production volume was concentrated in a single enterprise (Marikholodmash). Estimated consumption was 346 MT ODP, including HCFC-22. In 1996, the structure of the sector remains essentially the same but production has fallen and a substantial amount of conversion to HCFC-141b and additional conversion to HCFC-22 has occurred. Import of CFC-12 based compressors from Ukrainian has largely been discontinued and use of imported compressors from Western Europe has increased. Reliable estimates of current consumption are not available except for CFC-12 which was 73 MT ODP in 1996. While Marikholodmash remains the dominant producer in the sector, its consumption has fallen dramatically due to interim transitional substance conversion. The only other significant consumers appear to be Torgmash in Ekaterinburg, (15 MT CFC-12/year), Volgograd Tractor Works (12 MT CFC-12/year) and JSC "Kholodmash" in Yaroslavl (20 MT CFC-12/year). The latter has expressed interest in presenting a sub-project for the third tranche to complement a major reconstruction of the plant being undertaken with Western financing. The others could also be considered which would effectively achieve phase-out in the sector.

1.19 **Industrial Refrigeration Sector.** In 1993, six manufacturers[15] of industrial refrigeration machinery, including compressors were identified and a consumption level of 335 MT ODP (CFC-12 and HCFC-22) was attributed to the sector. Since that time, the sector appears to have largely disappeared, something that would be consistent with the decline in orders for domestic industrial equipment. One major enterprise in the sector (Kazan Compressor Plant) initially presented a sub-project during the Project's original preparation. However, this was not pursued but remains the only potential opportunity in this sector for the third tranche, provided the enterprise remains in the business.

1.20 **Refrigeration Servicing Sector.** Despite the dramatic decline in new production of new Russian refrigeration equipment, a substantial residual requirement for servicing existing equipment in the domestic, commercial and industrial sectors will remain, particularly as the useful life of older equipment is extended for economic reasons. In 1992, the overall consumption of CFC-12 in the servicing sector was estimated at 8,300 MT ODP, split between domestic (700 MT), commercial (4,500 MT), industrial (2,550 MT), and building air conditioning applications (650

---

[14] Commercial refrigeration equipment manufacturers identified are: ANPO "Marikholodmash" (Yoshkar-Ola): Torgmash (Ekaterinburg), Refrigeration Equipment Plant (Orenburg); JV. "Sovitalprodmash" (Volzhsk); Torhmash (Lubertzy); RPS "Initziativa" (Aleksandrov); JV "Interholod" (Moscow); JSC "Sneg" (Moscow); "Edelveys" (St. Petersburg), PO "Holodmash" (Yaroslavl); and Volgograd Tractor Plant (Volgograd).

[15] Industrial refrigeration producers identified are:- Kazan Compressor Plant (Kazan); Moscow "Iskra" (Moscow); Kasimov "Cholodmash"(Kasimov); Cita-Centre Machine Building Plant (Chita); Moscow Compressor (Moscow); and Cherkessk Refrigeration Plant (Cherkessk).

MT)[16]. While, no current estimate of annual consumption is available, it is apparent that even at half this level the servicing sector represents a large residual area of ODS demand in the country. It is also apparent that the commercial and industrial sectors represent the largest single area of consumption within the sector. This is clearly a priority area that should be addressed in any extension of the Project's scope in the third tranche, both because of the high potential phase-out impact, but also because of the social implications of not having recovered material to sustain existing infrastructure when new production stops.

1.21 **Non-Insulating Foam Sector.** In Russia, ODS, mainly CFC-11 and CFC-11/CFC-12 mixtures have traditionally been used to blow: a) flexible foams for bedding, carpet underlay and shoe soles, b) integral polyurethane foams for automotive components and c) rigid polyethylene foams for construction materials. In 1992, ODS consumption was estimated at 4,300 MT ODP. However, the introduction of CO_2 blowing techniques, along with the general economic slow down has reduced this to an estimated 830 MT ODP in 1995[17]. Initial identification work has identified seven consuming enterprises accounting for 600 MT ODP of this 1995 consumption. Of these, follow up review of current performance indicates that these consumption levels are being sustained and, in fact, are increasing in several cases, largely due to increasing automotive sector production. Five enterprises[18] accounting for an estimated 335 MT based on 1996 consumption were considered potentially sustainable enterprises and could be included as preparation candidates for the third tranche.

1.22 **Solvent Sector.** ODS solvents, specifically CFC-113, carbon tetrachloride (CTC) and methyl chloroform (MCF), are used in Russia for electronics and metal parts cleaning. No dry cleaning solvent applications have been identified. The Country Program preparation documents[19] estimated overall solvent consumption to be 5,035 MT ODP in 1992. In 1995, sector consumption[20] was estimated at 3,980 MT ODP (CFC-113 - 1,200 MT ODS, CTC - 2,500 MT ODS, MCF - 300 MT ODS). However, actual solvent production in 1996 based on regulatory reporting was 1,640 MT ODP (CFC-113 - 1,120 MT ODS, CTC - 676 MT ODS) which reflects a continued decline in consumption. Activity in the electronics sector has been low with the collapse of major military markets. Similarly, the largest traditional CFC-113 consumption applications appear to be in the manufacture of refrigeration compressors which, as noted above, is at a very low level. As a consequence, identification of specific users has been limited. Initially, eight enterprise specific sub-projects were identified, accounting for 216 MT ODP in current consumption. Of these, only three enterprises[21], consuming 38 MT ODP, were considered to be potentially eligible, with the others being excluded on the grounds of previous viability assessments or proposal of ineligible transitional substance technology. In summary, this sector appears to be

---

16 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

17 *Russia ODS Phase-Out Projects for the Solvent, Halons and Non-Insulating Foams Sector*, ICF Incorporated, January 1997.

18 JSC "GAZ" (Nizhny Novgorod), JSC "Moskvich" (Moscow), JSC "Nelidovo Plastik Plant" (Nelidovo), JSC "Plastik" (Syzran), JSC "Stroidetal" (Moscow)

19 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

20 *Russia ODS Phase-Out Projects for the Solvent, Halons and Non-Insulating Foams Sector, ICF Incorporated*, January 1997.

21 "Krasnaya Zarya" Enterprise, "Optimap" Enterprise (Moscow), SICA&I (Moscow)

difficult to comprehensively address, but, in fact, likely represents a relatively low residual consumption distributed among applications with poor conversion cost effectiveness.

1.23 **Fire Protection Sector.** Halon is widely used in both portable and stationary fire protection systems in Russia. Halon 2402 accounts for approximately 90% of usage, being used exclusively in domestically manufactured systems. The remaining halons in service are Halon 1211 and Halon 1301 which are characteristically contained in imported systems. The Country Program preparation documentation[22] indicated that new 1992 consumption was 900 MT ODS (5,450 MT ODP) made up of Halon 1211 (50 MT ODS), Halon 1301 (50 MT ODS), Halon 2402 (800 MT ODS). Of this 740 MT ODS was used for new equipment and 160 MT ODS was used for new equipment. The major applications were naval (22%), aviation and space (21%), pipelines (20%), and civilian marine and land transport (17%). Subsequent project identification studies[23] indicated that consumption had fallen to 400 MT ODS in 1995. It was also indicated that the total stock of halons in the country was between 12,000 and 15,000 MT ODS. Regulatory data on Halon 2402 production indicated that only 152 MT ODS was produced in 1996 which may in fact be a better reflection of actual current demand. The above referenced work identified a number of enterprise specific potential phase-out opportunities covering new consumption applications and a halon banking system. However, detailed screening of these indicated that most involved ineligible investments to develop new technology for large scale systems. Two were identified as suitable for further preparation. One was a dry powder conversion of portable extinguishers that would phase-out 202 MT ODP of new consumption. The second was a halon banking initiative with a national service organization. Based on historic amounts used in servicing this would phase out up to 970 MT ODP/year. Given the large stocks of halons in service and significant consumption in ODP terms, this area can be identified as a priority for potential third tranche funding.

1.24 **Consumption Summary.** Table 1.3 provides a summary of estimated domestic consumption for 1992/1993 and 1996 with a projection for 1998 and 1999 based on second tranche implementation but without any additional phase-out initiatives. The results indicated that overall consumption has declined from 40,966 MT ODS in the 1992/93 period to 16,245 MT ODS. It would be conservatively estimated at 12,070 MT ODS in 1998 and 8,620 MT ODS upon completion of the proposed second tranche sub-projects in 1999. It should be noted that actual consumption in 1998 and 1999 will likely be less since these estimates assume that 1996 or 1997 consumption will be sustained by remaining users, something that is unlikely given the trends for most of these. It is also apparent that the highest residual consumption that is likely sustainable is in the refrigeration servicing and halon sectors which account for an estimated 4,320 MT ODS.

1.25 **ODS Production Sector.** Russia has historically been one of the world's largest producers of ODS materials. Within eight producing facilities[24] including research facilities, a production capacity of 143,200 MT ODS theoretically exists which accounts for 47% of the capacity outside Western countries. Actual production, excluding CTC feedstocks, peaked in 1990 at 118,000 MT

---

22 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

23 *Russia ODS Phase-Out Projects for the Solvent, Halons and Non-Insulating Foams Sector*, ICF Incorporated, January 1997.

24 JSC "Altaichimprom" (Slavgorod),JSC "Chimprom", (Volgograd), JSC "Kaustik" (Volgograd), JSC "Halogen" (Perm), JSC "Tekhnoroz" (Redkino), JSC "Kirovo-Chepetsk Chemical Plant" (Kirovo-Chepetsk), RSC "Applied Chemistry" (St. Petersburg), JSC "Chapayevsk Chemical Plant" (Chapayevsk).

TABLE 1-3

SUMMARY OF ACTUAL AND FORECAST ODS CONSUMPTION BY SECTOR WITH SECOND TRANCHE IMPLEMENTATION

SECTOR	ODS MATERIAL	ODS CONSUMPTION (MT)			
		1992/93	1996	1998 ((FORECAST) Note 1	1999 (FORECAST) Note 1
Aerosol	CFC 11/12	17,850	8,382	4,816	1,692
Domestic Refrigeration	CFC-11, CFC-12, CFC-113, HCFC-22 HCFC-141b	3,600	664	332	332
Commercial Refrigeration	CFC-11, CFC-12, CFC-113, HCFC-22 HCFC-141b	346	73	40	40
Industrial Refrigeration	CFC-11, CFC-12, CFC-113, HCFC-22 HCFC-141b	335	-	-	-
Refrigeration Servicing	CFC-12, HCFC-22	8,300	4,150 Note 2	4,150	4,150
Non-Insulating Foam	CFC-11	4,300	830	830	830
Solvents	CFC-113, TCA, MCF	5,035	1,676 Note 3	1,676	1,676
Fire Protection (Halons)	Halon 2402, Halon 1301, Halon 1211	900	170 Note 4	170	170
TOTALS		40,666	15,945	12,014	8,890

NOTES:

1. Assumes that 1996 consumption not identified as phased out is sustained indefinitely
2. Assumes 50% of 1992 demand
3. Based on 1996 production less 120 MT ODS used in refrigeration sector.
4. Based on 1996 production.

ODS but declined to 66,515 MT ODS in 1992. Since that time, production has continued to decline with 1995 and 1996 production 44,865 MT ODS and 18,150 MT ODS respectively, based on the regulatory data illustrated in Table 1-4. This decline in production is generally consistent with the overall decline in domestic consumption described in Table 1.3. Comparison of domestic consumption estimates with production for 1996 indicate that the amount of material available for export which would be less than 2,000 MT ODS. Most of this material would be exported within the CIS, with Ukraine anticipated to account for the majority, based on current demand projections of approximately 1,480 MT ODP[25].

1.26 The phase-out of ODS production is being pursed both through the regulatory system within Russia and international assistance. Beginning in 1996, SCEP has established a system of annual quotas that set annual production limits for each producer which decline such that total phase-out will occur by the year 2000, consistent with the Country Program commitment. Table 1.4 provides the quota established by enterprise for 1996 and 1997, along with actual production for 1995 and 1996. International assistance has been provided to plan a production phase-out program under foreign technical assistance funded by the United States[26]. This assistance has continued in cooperation with the World Bank in the form of the Bank's Special Initiative for ODS Phase-out in the Russian Federation (Special Initiative)[27]. The Special Initiative contemplates a program of compensating producing enterprises for loss of revenue and costs associated with the closure and destruction of their production facilities before 2000. This compensation would be funded by a US$27.0 million facility assembled by the Bank from various donor countries. Bilateral commitments to this facility are approaching the required amount but a potential short fall may exist.

G. Proposed Third Tranche Scope and Implementation Plan

1.27 It is proposed that the remaining funding of US$26,950,000 available within the Project be allocated to the third tranche whose scope would be broaden to address other consumption sectors and as well as production phase-out. While overall phase-out in Russia is occurring rapidly, residual consumption exists in a number of sectors and recurrent demand for significant quantities of ODS could be sustained for some time, particularly for refrigeration and fire protection system servicing. Similarly, in the absence of ODS materials being available to these applications in the medium term, social hardship and public safety risks may develop. It is also recognized that a close linkage exists between the phase out of ODS consumption and production. The inclusion of ODS production phase-out within the Project's scope at this stage will facilitate the orderly completion of both aspects with the minimum of economic dislocation and provide additional assurance to the international community that the country's obligations are met.

---

25 *Draft Project Document: Ukraine GEF ODS Phaseout Project*, World Bank, September 1997

26 *Development of a Strategy to be Used by the CFC Production Industry in the Russian Federation to Confront the Phaseout of Ozone-Depleting Substances* ICF Incorporated,. April 1995.

27 *Project Prospectus: Special Initiative for ODS Production Phaseout in the Russian Federation*, World Bank, April 1997.

TABLE 1-4

ACTUAL PRODUCTION (1995 AND 1996) AND PRODUCTION QUOTAS (1996 AND 1997) BY PRODUCING ENTERPRISE

ODS MATERIAL	PRODUCING ENTERPRISE	1995 ODS PRODUCTION (MT)	1996 ODS QUOTAS (MT)	1996 ODS PRODUCTION (MT)	1997 ODS QUOTAS (MT)
CFC-11/12	JSC "Galogen"		15,000		7,000
	JSC "Kaustik"		8,000		4,000
	JSC "Chimprom"	Note 3	9,000	Note 3	5,000
	JSC "Altaichimprom"		2,000	Note 4	1,000
	Sub-Total	37,256	34,000	15,862	17,000
CFC-113	JSC "Chimprom"	Note 5	2,500	Note 5	800
	JSC "Kirovo-Chepetsk"		2,500		800
	Sub-Total	2,568	5,000	1,120	1,600
CFC-115	RSC "Applied Chemistry"	20	-	20	49
Halon 2402	JSC "Galogen"		200		1,800
	JSC "Kirovo-Chepetsk"		150		-
	Sub-Total	181	350	152	1,800
CFC-13	JSC "Tekhnoroz"	25	120	20	90
CTC	JSC "Chimprom"	2,486	880	676	660
MCF	JSC "Chapayevsk"	2,029	124	-	93
Recycled ODS	RSC "Applied Chemistry"	300	N/A	300	N/A
	TOTALS	44,865	40,474 (Note 1)	18,150	21,243 (Note 2)

NOTES:

1. Excludes 6,782 MT reserved for export and emergency domestic use under special SCEP permits.
2. Excludes 14,176 MT reserved for export and emergency domestic use under special SCEP permits.
3. CFC-11/12 production was 12,422 MT in 1995 and 5,134 MT in 1996.
4. CFC-11/12 production current limited supply of its own aerosol plant (132 MT - 1996)
5. CFC-113 production was1,213 MT in 1995 and 756 MT in 1996.

1.28 The scope of the proposed third tranche is summarized in Table 1.5 in comparison to the original Project scope, and is described by its various sectoral components in the following:

a) Residual Aerosol/Refrigeration (US$5.0 million). This would address the estimated 1,900 MT ODS/year of consumption potentially remaining in these sectors after implementation of the second tranche. The remaining consumer aerosol manufacturer (JSC"Halogen"), and the two domestic refrigeration manufacturers (JSC "KRP Birusa", JSC "SEPO-Temp") that have maintained some production and could potentially be viable upon restructuring would be most likely sub-project candidates. One or more commercial refrigeration enterprises will also be investigated. Up to 90% of the residual ODS consumption in these sectors could be eliminated.

b) Refrigeration Servicing (US$6.5 million). The largest remaining phase-out opportunity is in the refrigeration servicing sector where up to 4,150 MT ODS/year of recurrent consumption is estimated. A framework sub-project directed at the development of recovery and recycling capacity, primarily in the commercial and industrial sector will be developed. In addition, the development of retrofitting capacity for zero ODP refrigerants will be pursued. Based on the models developed or being developed in GEF phase-out projects in the Czech Republic, Belarus and Ukraine, it is anticipated that a number of regional operating enterprises in the servicing business will be identified as sub-grant beneficiaries.

c) Halon Banking (US$2.0 million. A large potential recurrent ODS consumer in terms of ODP is the servicing requirements for existing halon systems, particularly those in large infrastructure installations such as pipelines and power stations. It is estimated that approximately 100 MT ODS/year is required for this. It is proposed that a banking system be developed using an existing national service enterprise and/or major users as the sub-grant beneficiary. It is anticipated that material for such a system will be readily available to such a bank through access to decommission facilities, particularly in the military sector. Particular emphasis will be placed on the development of a business plan and security to ensure the sustainability of such a system.

d) Non-Insulating Foam (US$6.0 million). Previous project identification work has identified five potentially viable enterprises using CFC-11 in foam blowing applications, An estimated 332 MT ODS/year could be phased out, accounting for approximately 40% of the estimated residual consumption in the sector.

e) Fire Protection Equipment (US$0.5 million). A small allocation is proposed for the conversion of at least one manufacturer of fire protection equipment to non-ODS materials. This will phase-out approximately 20 MT/year of high ODP material which likely accounts for approximately 20% of identified consumption in the sector.

f) Medical Aerosols (US$1.0 million). It is proposed to prepare sub-projects with the three medical aerosol producers in the country. Phase-out potential is estimated to be 300 MT ODS/year and, subject to technology limitations, could eliminate consumption in this sector.

g) Solvents (US$1.0 million). An allocation of funds to up to four sub-projects in the solvent sector is proposed to cover applications in the aerospace, electronics, instrumentation, and machinery industries that may offer suitable phase-out opportunities.

h) Production Phase-out Support (US$5.0 million). It is proposed to allocate funding to production phase-out through the Bank's Special Initiative, should such supplementary funding be required after the assembly of bilateral commitments to the proposed facility. This will facilitate the coordination of the production and consumption phase-out timing.

1.29 Implementation of the third tranche will generally follow the same process employed to date. Final sub-project identification and confirmation of beneficiary interest will be completed by the end of 1997. The Inter-Agency Commission's membership and other representatives of consumption sectors have been notified that all remaining candidate sub-projects must put forward as soon as possible to allow consideration. Detailed preparation of sub-projects will begin, using resources from the first and second tranche technical assistance components. Three consulting assignments are envisioned for this. One will be directed to refrigeration servicing and any refrigeration manufacturing sub-projects that are accepted. A second will address the halon banking and fire protection sector sub-projects. Potential sub-projects in the remaining sectors will be covered by a third assignment. It is anticipated that project preparation and pre-appraisal enterprise financial viability evaluations will be completed by mid-1998 and appraisal will be done in the third quarter of 1998. This is anticipated to coincide with the projected appraisal schedule of the Special Initiative. Submission of the third tranche for GEF approval is scheduled for October 1998. While all third tranche sub-projects should begin disbursement in 1999, it is likely that phase-out investments will continue into 2000. Completion of the third tranche activities should occur by the end of that year.

1.30 The principal impact of the proposed third tranche is estimated to be the phase-out of up to 6,752 MT ODS (Table 1.5). This accounts for a substantial proportion of the conservatively estimated 8,630 MT ODS of consumption remaining after completion of the second tranche (Table 1.3). Furthermore, it is felt that much of the remaining consumption may not be sustainable in any event, given the trends in the sectors involved. As a consequence, the wider objective of the Project in phasing out substantive ODS consumption in Russia should largely be achieved by the year 2000, although it is probable that some phase-out activities under the Project will have to be maintained into the year 2000, beyond the Country Program phase-out date. This reality will have to accommodated within the GEF Operational Strategy and the compliance status of Russia in relation to the Montreal Protocol.

TAB1-5.XLS

TABLE 1-5

COMPARISON OF THE ORIGINAL AND REVISED PROJECT SCOPE

ORIGINAL PROJECT SCOPE				PROPOSED REVISED PROJECT SCOPE			
TRANCHE/SECTOR/ COMPONENTS	**NO. OF SUB-PROJECTS**	**GEF GRANT (US$X1000)**	**ESTIMATED ODS PHASEOUT (MT)**	**TRANCHE/SECTOR/ COMPONENTS**	**NO. OF SUB-PROJECTS**	**GEF GRANT (US$X1000)**	**ESTIMATED ODS PHASEOUT (MT)**
FIRST TRANCHE				**FIRST TRANCHE**			
Aerosol	1	5.650	2456	Aerosol	1	5.650	3050
Domestic Refrigeration	1	1.976	117				
Technical Assistance		0.748		Technical Assistance		0.748	
Agency Fee		0.226		Agency Fee (Note 1)		0.500	
Sub-Total	2	8.600	2573	Sub-Total	1	6.898	3050
SECOND TRANCHE				**SECOND TRANCHE**			
Aerosol	4	23.333	10665	Aerosol	3	24.319	6766
Domestic Refrigeration	2	9.628	740				
Commercial Refrigeration	1	0.509	33	Commercial Refrigeration	1	0.881	35
Technical Assistance		0.526		Technical Assistance		0.526	
Agency Fee		1.004		Agency Fee (Note:1)		0.426	
Sub-Total	7	35.000	11438	Sub-Total	4	26.152	6801
THIRD TRANCHE				**THIRD TRANCHE (Note 3)**			
Domestic Refrigeration	4	15.266	1343	Residual Aerosol/Refrigeration	3	5.000	1800
Refrigeration Servicing	1	0.654	-	Refrigeration Servicing	1	6.500	4150
				Halon Banking	1	2.000	100
				Non-Insulating Foam	5	6.000	332
				Fire Protection Equipment	2	0.500	20
				Medical Aerosols	3	1.000	75
				Solvents	4	1.000	50
				Production Phaseout Support	1	5.000	
Agency Fee		0.480		Agency Fee		0.850	
Sub-Total	5	16.400	1343	Sub-Total		26.950	6527
TOTALS	14	60.000	15354	TOTALS	20	60.000	16,378

NOTES:

1. First tranche agency fee is equal to the initial payment into the special account amade under the terms of the Grant Agreement Second trancge agency fee based on the reconcillation of first tranche over payment.

2. The proposed scope of the third tranche is indicative and funding allocations are subject to confirmation after further project preparation.

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

II. HARMONIA

A. Background

2.1 JSC " Harmonia" is a manufacturer of liquid soap, shampoo, hair spray, deodorant, anti-statics, air fresheners and other cosmetic products, located in Moscow. Aerosol packaging, involving CFC-11/12 mixtures are employed for the hair spray, deodorant, anti-statics, air fresheners. The enterprise was originally a part of a larger State household goods manufacturing organization which began developing aerosol production capability in 1979 and started operations in 1981. In 1985, it was separated as an independent aerosol goods producer under the name Mosbytchim, with a capacity of 40,000,000 cans/year. In 1989, it entered a joint venture with a leading international firm in the field (L'Oreal) and expanded its product lines into shampoo and other cosmetic products. This joint venture operated until 1994, at which time Mosbytchim withdrew its assets, including aerosol production capacity of 20,000,000 cans/year. In 1996, it changed its name to JSC "Harmonia" after being formally privatized. It is currently structured as an open joint stock company with the shares distributed between its employees (82%) and the Moscow Oblast Property Fund (18%). Harmonia has two subsidiaries: Harmonia Plus which undertakes product distribution, and Harmonia Plus Plus which is devoted to research and development. The company employ 356 people of which 78 work in aerosol production. These employment levels represent a decline from historical levels and further reductions are contemplated as the enterprise focuses on its principal business activities.

2.2 Harmonia currently has a production capacity of approximately 30,000,000 product units per year in all its product lines. In 1996, the proportion of sales among these was 57 % for aerosols, 28% for shampoo and liquid soap and 15% for other products. Historically, this distribution has shown a wide variation with the shampoo and soap production accounting for up to 40 % of sales during the joint venture period (1992/93) and dropping to 16% in 1995 immediately after its breakup. An overall decline in production has occurred through this period from 20,900,000 units of all products in 1994 to 10,800,000 in 1995 and 6,000,000 units in 1996. Overall production capacity utilization was estimated to be 20% in 1996. For the first half of 1997, sales and production have shown modest increases from 1996 levels, indicating a recovery trend from the extended dislocation associated with the termination of the joint venture. Aerosol production, which was almost 13,000,000 cans/year in 1994, declined to 3,440,000 cans/year in 1996. The relatively low production of aerosols in 1996 was largely attributable to a six month shut down while products were reformulated to use an ethanol substitute which does not attract an excise tax on consumer alcohol. Management has continued to limit aerosol production during the first half of 1997 as it concentrates on exploiting the higher demand for shampoo and soaps, and undertakes additional aerosol formulation work in preparation for ODS phase-out. Projected 1997 aerosol production is estimated to be 4,305,000 cans with significant recovery of aerosol production is not being anticipated until conversion to non-ODS propellant is completed

In 1996, the mix of aerosol products produced was: hair spray (75%), deodorant (3%), anti-statics (16%) and air-freshners (6%). This mix is expected to be generally sustained in the future, although some growth in the share of deodorants is expected with newly introduced product lines.

2.3 Harmonia's products generally lie in the middle to upper range of product quality in the domestic market. For aerosol products, the main competitors of a similar quality level are imported brands such as Taft, Wella and L'Oreal. Competition, also exists with lower quality Russian products (Arnest, Sibar) and imports from Turkey and Italy. Harmonia's pricing strategy is to maintain a 10-20% price differential with imported brands of similar quality, although this will be 30-40% above lower quality domestic and foreign competition. Within the particular aerosol market segment targeted, Harmonia estimates that it maintains a 20% market share. While Harmonia's products are marketed nationally, the principal market area is European Russia, primarily the Moscow and St. Petersburg regions. The enterprise does not export. Marketing is done through a series of distributors, large department stores, directly through a factory retail store, and, most recently, through its own mobile retail display units. The overall presentation and design of Harmonia's products is equivalent to Western retail standards and is markedly superior to that of other CIS producers.

2.4 The enterprise was originally established as a 40,000,000 can/year capacity facility, with four filling lines, a tin plate can making operation, valve manufacturing, can detail and packaging capability, and CFC propellant handling and storage infrastructure. The installed equipment dates from 1979, although its was not put into service until 1981. As such it is the most modern facility in the Russia aerosol sector prior to recent ODS phase-out initiatives. While no major new investment in aerosol production facilities has been made since it was originally built, the plant is well maintained and relatively efficient The actual capacity of the current operation has been reduced substantially from the original operation. The current filling line capacity is 20,000,000 cans/per year using two of the original two filling lines. One of the remaining filling lines was acquired by L'Oreal when the joint venture broke up. The other has been dismantled and is used for spares. The filling area originally housing one of these lines has been converted to shampoo production. The original can making facility is still operated but at reduced capacity. Imported cans are purchased for some product lines and imported preprinted shrink sleeve labeling is used. As a result, the can detailing operation is limited to locally produced cans and the excess lithography capacity is marketed externally. A mixture of manufactured and purchased valves is used with the latter being increasingly favored on the basis of cost and reliability. The current propellant and formulation storage facilities are located adjacent to the main production facility. The plant itself is located on a 6.63 hectare site with direct rail access.

2.5 Based on the design of the plant and the current operational capacity of 20,000,000 cans/year, the estimated maximum potential ODS consumption at this facility would be approximately 4,000 MT/year. However, the documented ODS consumption for the past four years was : 1993 - 1,965 MT, 1994 - 2,585 MT, 1995 - 2,083, 1996 - 1105. ODS Consumption in 1997 is projected to be 670 MT.

2.6 ODS phase-out opportunities at Harmonia (Mosbytchim) were originally identified during the development of the Russian Federation Country Program in 1994[1] which was undertaken with the support of the Danish Environmental Protection Agency. Subsequent technical preparation work in 1995 documented a defined phase-out sub-project to convert the facility to hydrocarbon aerosol propellant (HAP) through major investments in HAP storage and handling infrastructure and filling lines[2], while retaining can and valve making capacity. On this basis, the sub-project was included as a candidate sub-project within the second tranche of the overall Project[3] as approved by the GEF in April 1996. At that time, the total incremental investment cost was estimated to be US$5,678,000 with proposed GEF grant financing of US$4,015,000. In March 1997, an enterprise financial viability assessment and sub-project update was undertaken, with a follow-up pre-appraisal verification of additional information being completed in June, 1997[4]. In July 1997, a joint CPPI/World Bank appraisal mission visited the enterprise to complete sub-project processing. The results of this appraisal are documented as follows.

B. Objectives

2.7 The objective of the sub-project proposed by JSC "Harmonia" is to phase-out the use of ODS propellants through conversion of 20,000,000 cans/year aerosol production capacity to HAP technology.

2.8 The objective of this sub-project appraisal is to verify the eligibility of the sub-project for GEF funding. This specifically includes: a) confirmation of the sub-project's physical scope and technology selection; b) verification of current and historic ODS consumption information; c) verification of the estimated sub-project incremental investment and operating costs; d) determination of eligible costs and their allocation to the grant; e) documentation of sub-project procurement and implementation plans; f) verification of enterprise financial viability in the medium term, including the enterprise's capacity to support its contribution requirements; g) evaluation of the environmental implications of the sub-project; h) confirmation of the adequacy of proposed safety measures; and i) recommendation of appropriate conditions for the Sub-Grant Agreement.

C. Sub-Project Description and Cost Estimate

2.9 **Sub-Project Scope.** The overall scope of the appraised sub-project covers the complete conversion of Harmonia's aerosol products production from the use of CFC-11/12 mixtures to HAPs as propellants. Portions of the existing facilities have been judged as inadequate for HAP utilization in the following respects: a) present CFC storage and handling facilities do not meet Russian national or internationally recognized safety standards for flammable materials and are

---

1 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

2 *Assistance for Project Preparation: Aerosol and Refrigeration Sectors* , COWI, February 1996

3 *Global Environmental Facility, Russian Federation Ozone Depleting Substances Phase-out Project, Project Document*, The World Bank, May 1996

4 *Financial Viability Assessment, Marikholodmash, Yoshkar-Ola*, COWI, June 1997

not designed for the higher operating pressures required; b) the CFC delivery system and filling lines are not fire or explosion proof as is required for handling flammable materials; c) the general plant production infrastructure is not suitably designed for handling of flammable substances or equipped with suitable fire suppression equipment; d) present warehousing facilities for housing flammable finished products contravene Russian safety requirements and restrictions on quantity of material stored with each structure or isolated room; e) operational practice and training of staff is not appropriate for handling of flammable substances. The cans and valves produced with the existing manufacturing facilities are considered adequate for HAP service and will be retained, although increasingly the option of purchasing these components will likely be utilized.

2.10 The sub-project's appraisal verified that the following incremental investments are required for conversion to HAP and that this defines the detailed technical scope of the proposed sub-project:

a) HAP storage and handling facilities, including rail unloading facilities, underground storage tanks, piping and transfer equipment (pumps and compressors), and associated civil works and infrastructure (site preparation, sewer, water, controls and utilities), all to be located in the area adjacent to the current CFC storage facilities;

b) HAP purification system employing molecular sieve-type technology, in order to assure the necessary quality of HAP from potential domestic and foreign suppliers;

c) Dedicated HAP tank cars (4) to ensure the availability of rolling stock for reliable continuous delivery of HAP from suppliers in the mid-Volga region in Russia and Belarus;

d) Two 60 can/minute aerosol filling lines, each complete with unscrambling table, multiple head liquid filling unit, valve placer, vacuum crimping unit, gas house conveyer, modular filling room, gas filler, return conveyer, weight checking device, water bath, actuator placement device and cap installing unit, defective can destruction unit and air compressor;

e) Production area building upgrades including: HAP supply system, explosion proof electrical system installation, fire wall construction, and fire suppression systems;

d) Finished goods warehouse upgrading including: explosion proof lift trucks, fire suppression system installation, and electrical modifications;

e) Environmental monitoring and quality control instrumentation in the form of air monitoring devices and laboratory equipment related to detection and sampling of HAP releases;

f) Engineering and design necessary to support the development of technical specifications and construction drawings for the above equipment procurement, installation and associated works;

g) Project implementation support for environmental evaluation and permitting, procurement assistance in tendering and contracting the required goods, services and works, safety audits;

h) Training in the operation of new equipment, particularly related to safety procedures: and

i) Dismantling and destruction of CFC-based equipment, particularly operational and unused filling lines and CFC storage facilities.

2.11 **Technology Selection and Capacity Justification.** The selection of HAP propellant technology is approved as a zero ODP technology for the aerosol sector by the MPMF and is supported in the 1995 UNEP Technical Options Report on Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride. It offers an operating cost advantage due to the lower unit cost and overall volume required in comparison to CFC's. Harmonia is proposing the replacement of only half of its original 40,000,000 cans/year capacity, although this is in fact equivalent to the actual capacity of the plant at the time of appraisal. The appraisal mission concluded that replacement of 20,000,000 cans/year of capacity was eligible for grant funding consideration. However, it was noted that this remains well in excess of the facility's actual production levels in recent years and a lower capacity would likely be adequate in the near-term. Having said this, it was also concluded that any cost savings that could be obtained from reducing capacity would be small, given the need for at least two lines to support the variety of product lines produced by the enterprise and the common level of general infrastructure upgrading required for safety and fire protection reasons.

2.12 **Incremental Investment Costs.** Table 2.1 presents the detailed investment cost estimate for the proposed sub-project scope as defined above. This was finalized and agreed to at appraisal. This cost estimate is based on actual costs incurred to date, second quarter 1997 quotations for major equipment purchases, engineering services and works, and indicative estimates for minor works, and project implementation related support services. The total sub-project incremental investment cost is US$8,592,685 inclusive of applicable taxes (import duties and VAT) at current rates, and a 10% physical contingency. Of this, the enterprise has invested US$685,900 to date of appraisal in preparatory engineering and environmental activities, and works as noted above. Remaining incremental investment required is US$6,505,400, primarily in the purchase of major equipment and works needed for the filling operation and HAP storage and handling system. The appraisal mission concluded that all of these costs are consistent with the "Indicative List of Eligible Incremental Costs" adopted by the parties to the Montreal Protocol. The appraisal mission noted that the total incremental investment costs of the combined sub-project had increased by a factor of 1.51 since its original proposal to the GEF. This increase is attributable to the more comprehensive scope of the appraisal estimate, and the use of actual quotations for equipment and works, the latter of which reflects the high inflation rate applicable to local costs in 1995 and 1996.

2.13 **ODS Phase-Out Work Prior to Appraisal and Retroactive Financing.** The appraisal mission found that some preparatory work, directly supporting ODS phase-out, has been undertaken prior to appraisal, beginning in 1995. This included expenditures on engineering,

TAB2-1.xls25/11/97

TABLE 2.1

JSC "HARMONIA" HAP AEROSOL CONVERSION SUB-PROJECT
ESTIMATE OF INCREMENTAL COSTS AND FINANCING SUMMARY

ITEM NO.	COST COMPONENT	PRE-AUG./95 EXPENDITURES		'AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT COST	ENTERPRISE PRE-APPRAISAL	FINANCED POST-APPRAISAL	PROPOSED GEF FINANCED
						1997 (Aug.-Dec.)		'1998		'1999					
		LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN				
1.0	HAP Storage and Handling Facilities Equipment														
1.1	HAP Pumps (5)								54,560		13,640	68,200			68,200
1.2	LPG Compressors (2)								89,760		22,440	112,200			112,200
1.3	Storage Tanks								158,400		39,600	198,000			198,000
1.4	Safeguard HAP Purification System								149,600		37,400	187,000			187,000
2.0	HAP Tank Cars (4)								297,000			297,000			297,000
3.0	Aerosol Filling Lines Equipment														
3.1	Filling Line Equip. Packages (2)								2,222,000		555,500	2,777,500			2,777,500
3.2	Air Compressors (2)								44,000		11,000	55,000			55,000
3.3	Defective Can Destruction Unit							66,000				66,000		66,000	
4.0	Finished Goods Warehouse Equipment - Explosion Proof Lift Trucks (6)								121,000		121,000	242,000			242,000
5.0	Fire Suppression System (HAP Facilities,Warehouse,Filling Room)							247,500				247,500			247,500
6.0	HAP/Environmental Q/C Equipment								176,000		44,000	220,000			220,000
7.0	Civil Construction/Utilities/Equipment Installation														
7.1	Buildings/Civil Works	530,900						440,000		110,000		1,080,900	530,900		550,000
7.2	Electrical/Mechanical							792,000		198,000		990,000			990,000
7.3	Destruction of Existing Filling Lines/ CFC Storage/Handling Facilities			120,000						55,000		175,000	120,000	55,000	
8.0	Engineering			25,000			26,400		92,400		13,200	157,000	25,000		132,000
9.0	Environmental Documentation			10,000				55,000				65,000	10,000		55,000
10.0	Local Training							11,000		11,000		22,000		22,000	
11.0	Procurement Agent					13,200		46,200		6,600		66,000			66,000
12.0	Independant Safety Audit								25,000		30,000	55,000			55,000
13.0	Taxes					6,912		1,120,763		273,710		1,401,385			
14.0	Start Up Down Time									110,000		110,000		110,000	
	SUB-PROJECT TOTALS	530,900	-	155,000	-	20,112	26,400	2,778,463	3,429,720	764,310	887,780	8,592,685	685,900	253,000	6,252,400

FINANCING REQUIREMENTS

	PRE-AUG./95 EXPENDITURES		'AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT EXPENDITURES		
					1997 (Aug.-Dec.)		'1998		'1999				
	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	TOTAL
Enterprise Financing	530,900	-	155,000	-	6,912		1,197,763	-	449,710	-	2,340,285	-	2,340,285
GEF Grant					13,200	26,400	1,580,700	3,429,720	314,600	887,780	1,908,500	4,343,900	6,252,400

environmental permitting, and works associated with dismantling old equipment, building modifications and site preparation for the HAP storage facilities. Review of these investments indicates that while these are legitimate incremental costs, none would qualify for retroactive financing under the terms of the GEF Grant Agreement. The majority of these expenditures were made on preparatory building upgrading and civil works prior to August 1995, the earliest date for which retroactive financing would be possible under the Grant Agreement. The remainder involved procurement practices that would not meet the test of equivalency with World Bank competitive bidding procedures, since sole source selection of consultants and contractors was used.

2.14 **Safety Measures and Costs.** The investments required for conversion of aerosol production from CFC propellants to HAP are inherently driven by safety considerations due to the flammable nature of the material being substituted. For this reason, virtually all incremental costs are safety related. Those of specific note are : a) fire suppression and alarm systems; b) filling line enclosure and ventilation; c) defective can destruction equipment; d) explosion proof warehouse equipment; e) building construction and electrical service upgrading; f) safety training; and g) a safety audit. Safety training will be undertaken by the enterprise with the support of local consultants. It will also be included within the scope of training provided by suppliers of critical equipment such as the filling lines and HAP handling and storage systems in association with the commissioning support requirements under these contracts. The independent safety audit will be undertaken by an international consultant familiar with HAP installations in aerosol plants. This audit will occur in two parts. The first will occur during the detail design stage and will cover a review of the design and equipment specifications for the filling lines and HAP infrastructure, followed by a review of the technical proposals from the selected suppliers of this equipment, prior to commitment. The second stage will occur at commissioning and cover the facilities and equipment as installed, along with an evaluation of operating procedures and staff training. During operation, it was agreed that a trained safety team will be established. This will be made up of operational staff and technical specialists who will report to senior management (not production management) and have authority to shut down production in the event of dangerous situations developing.

2.15 **Incremental Operating Costs (Savings).** The conversion to HAP will result in both increases in quality control and maintenance costs, and in savings associated with use of lower quantities of less expensive propellant. The increased annual operating costs related to quality control were estimated to be US$22,500 attributable to the addition of six inspection and supervisory staff. The increased annual maintenance costs were estimated to be US$12,000 on the basis of additional staff and spares required to maintain leakage below 0.1%. Operating cost savings have been estimated on the basis of hair spray formulations which account for 75% of production. Utilizing current CFC-11/12 prices paid by the enterprise (US$0.96/kg) and market prices for HAPs sourced in the CIS (US$0.40/kg), an annual cost savings of US$539,381 was estimated based on average 1994/95/96 production levels. The resulting overall net annual operating cost savings estimate is US$504,881.

D. Sub-Project Implementation

2.16 **Sub-Project Schedule.** The implementation schedule (Figure 2.1) for completion of the ODS conversion will extend over a period of eighteen months. Assuming that GEF, and NPAF Supervisory Board approvals are obtained in the fourth quarter of 1997, major procurement activities and works construction will be undertaken in 1998, and the sub-project will be completed in April 1999 when full production with non-ODS technology will commence. It is noted that achievement of this schedule is dependent on procurement contracts being in place for the filling lines and HAP storage and handling equipment by April, 1998, and the works contracts for the HAP infrastructure by June, 1998. In order to meet these dates, detailed engineering and preparatory procurement activities will have to commence by October, 1997. As a consequence, it was agreed at appraisal that selection of engineering and procurement consultants would begin immediately. The early engagement of the independent safety audit consultant is also required to ensure availability prior to finalizing technical specifications, construction drawings and equipment supplier selection.

2.17 **Procurement Plan.** The overall procurement plan developed at appraisal is provided in Table 2.2 and summarized in Annex A. The enterprise has proposed that the GEF grant be allocated to: a) six IS packages ($4,156,900) covering foreign sourced equipment; b) one NS package (US$247,500) for fire suppression equipment that requires local certification; c) two NCB works packages (US$1,540,000) for civil construction and electrical/mechanical services plus equipment installation; and d) four consulting contracts (US$308,000) covering engineering, environmental evaluation, procurement services and the independent safety audit. This packaging is consistent with the Project Grant Agreement as amended[5]. It has been agreed that World Bank Procedures[6][7] and contract documents will be utilized. The remaining goods and services will be acquired by the enterprise as its contribution, using local commercial practice which in most cases will be equivalent to Bank procedures.

2.18 **Implementation Capacity.** Harmonia's capacity to manage the sub-project's implementation is judged to be good. The enterprise has undertaken the conceptual design and basic equipment identification necessary for development of the sub-project to the current stage, utilizing a contracted engineering firm. For the final design and technical project management of the sub-project, externally contracted capacity will continue to be required as provided for under the sub-project. Development of Terms of Reference for this work and the consultant selection process were initiated at appraisal and the ODS IPU will provide direct support in the administration this process in conformance with Bank procedures. The second area where assistance is felt to be required is in the administration of the World Bank procurement procedures, particularly as applied to the IS and NS contracting of the equipment packages, and

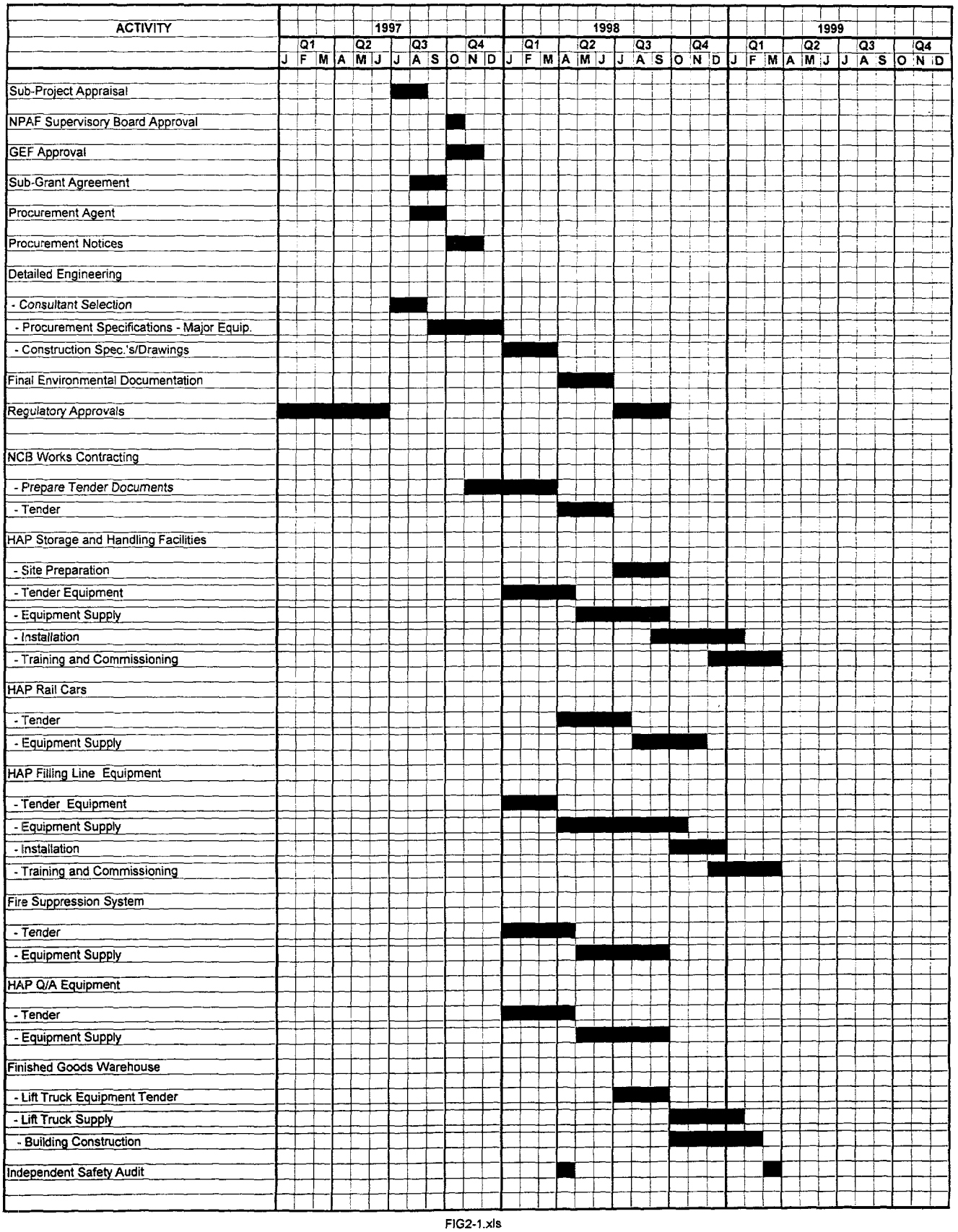
---

5 *Global Environmental Facility Trust Fund Grant Agreement, GEF Trust Fund TF028314*, September 29, 1996, Amended, ____, 1997

6 *Guidelines For Procurement Under IBRD Loans and IDA Credits*, World Bank, August 1996.

7 *Guidelines for the Selection of Consultants by World Bank Borrowers*, World Bank, January 1997.

FIGURE 2.1
JSC HARMONIA HAP AEROSOL CONVERSION SUB-PROJECT
SUB-PROJECT IMPLEMENTATION SCHEDULE



TAB2-2.xls25/11/97

TABLE 2.2

JSC "HARMONIA" HAP AEROSOL CONVERSION SUB-PROJECT
PROCUREMENT PLAN

DESCRIPTION OF GOODS, SERVICES, OR WORKS	NO. of PACKAGES	PACKAGE TYPE (Note 1)	ESTIMATED PACKAGE AMOUNT (US$)	FINANCING	PROCUREMENT METHOD (Note 2)	PROCUREMENT SCHEDULE		
						TENDER	AWARD	COMPLETE
HAP Storage and Handling Facilities Equipment Equipment - HAP Pumps (5) - LPG Compressors (2) - 25,000L. Storage Tanks (5) - 10,000L. Storage Tanks (2) - Safeguard HAP Purification System (1)	1	G	$565,400	GEF	IS	98/01/01	98/15/01	99/0401
HAP Tank Cars (4)	1	G	$297,000	GEF	IS	98/04/01	98/08/01	98/12/01
Aerosol Filling Lines (2) - Unscrambling Table - Liquid Filler Unit - Valve Placer - Vacuum Crimping Unit - Modular Filling Rooms w/Conveyers - Gas Filling Unit - Weighting Units - Water Test bath - Actuator and Cap Placing Device	1	G	$2,777,500	GEF	IS	98/01/01	98/04/01	99/04/01
Air Compressors (2)	1	G	$55,000	GEF	IS	98/01/01	98/04/01	98/11/01
Defective Can Destruction Unit	1	G	$66,000	Enterprise	LCP	N/A	98/06/01	98/12/01
Explosion Proof Lift Trucks (6)	1	G	$242,000	GEF	IS	98/06/01	98/10/01	99/02/01
Fire Suppression System (HAP Facilities,Warehouse,Filling Room)	1	G	$247,500	GEF	NS	98/01/01	98/05/01	98/10/01
HAP/Environmental Q/C Equipment	1	G	$220,000	GEF	IS	98/01/01	98/05/01	98/10/01
Civil Construction/Utilities/Equipment Installation								
- Buildings/Civil Works	1	CW	$550,000	GEF	NCB	98/04/01	98/07/01	99/04/01
- Electrical/Mechanical/Equipment Installation	1	CW	$990,000	GEF	NCB	98/04/01	98/07/01	99/04/01
- Destruction Existing Filling Lines/CFC Storage	1	CW	$55,000	Enterprise	LCP	N/A	98/12/01	99/04/01
Detail Design Engineering	1	CF	$132,000	GEF	SLF	97/09/01	97/10/01	99/04/01
Environmental Documentation	1	CF	$55,000	GEF	SLF	98/01/01	98/03/01	98/10/01
Local Training	1	TR	$22,000	Enterprise	SSF	N/A	98/10/01	99/04/01
Procurement Consultant	1	CF	$66,000	GEF	SLF	97/09/01	97/10/01	99/04/01
Independent Safety Audit	1	CF	$55,000	GEF	SLF	98/01/01	98/03/01	99/04/01
SUB-PROJECT TOTAL			$ 6,395,400					

Note 1: G - Goods, CW - Civil Works, S&I - Supply and Install, TK - Turnkey, CF - Consulting Firm, CI - Individual Consultant, TR - Training.

Note 2: ICB - International Competitive Bidding, LIB - Limited International Bidding, NCB - National Competitive Bidding, IS - International Shopping, NS - National Shopping, DC- Direct Contracting, FA - Force Account, MW - Minor Works, SLF - Short Listed Firm, SLI - Short Listed Individual Consultant, SSF - Sole Source Firm, SSI - Sole Sourve Individual, LCP - Local Commercial Practice.

the NCB contracting of works. The inclusion of a procurement consultant has been provided for under the sub-project. Jointly with the ODS IPU, Terms of Reference for this assignment are to be developed immediately after appraisal. The scope of this assignment will be to assist in the preparation of bidding documents, administering World Bank "No Objection" clearances, bid evaluation, and contract negotiations as required. Given the importance to the sub-project schedule of both the detailed design work and procurement support contracts being in place as soon as possible, the enterprise has agreed to make the necessary financial commitments for these services in advance of the Sub-Grant Agreement being signed and final approvals from the NPAF Supervisory Board and GEF. It was agreed that a condition of Sub-Grant Agreement signing will be that these contracts are in place and the work under them has been started. Subject to following Bank procedures and obtaining appropriate "No Objections" of Terms of Reference and consultant selection, expenses incurred will be reimbursed by the Bank after the signing of the Sub-Grant Agreement. It was also agreed that a condition of "No Objection" to selection of the filling line and HAP equipment suppliers, is the completion of a satisfactory review of the technical specifications and recommended supplier proposals by the consultant undertaking the independent safety audit. As a consequence, the selection of this consultant is also critical to the schedule and must be initiated prior to or immediately upon Sub-Grant Agreement signing.

E. Enterprise Financial Evaluation and Sub-Project Financing

2.19 **Pre-Appraisal Enterprise Financial Viability Evaluation.** A detailed enterprise financial viability evaluation was conducted on Harmonia[8] in March 1997 and documented in a confidential report made available to the ODS IPU and the World Bank. The scope of this evaluation covered: a) review of accounting and management information systems; b) development and analysis of Western-style income statements and balance sheets for the period 1992 through 1996; c) evaluation of the enterprise cost structure; d) analysis of enterprise financing capacity; e) identification of significant financial issues; and f) generation of financial projections involving several scenarios related to the enterprise's circumstances and prospects.

2.20 The results of the pre-appraisal enterprise financial viability evaluation are summarized as follows:

a) The overall financial performance of the joint venture between Harmonia (Mosbytchim) and L'Oreal for the years 1992 through 1994 was good, with expanding sales and revenues (US$29,382,000 in 1994), and after tax income consistently between US$2,500,000 and US$3,000,000;

b) Starting in 1995 and continuing through 1996, Harmonia has shown a decline in revenue, profitability and liquidity. At the end of 1996, the enterprise had assets of US$15,169,000 approximately half those shown in 1995 for the joint venture. Revenues were US$8,053, the operating profit margin had turned from a positive value of 17% in 1995 to -17%, and the enterprise was in a very tight cash flow position with minimal ability to sustain new investment;

---

8 *Financial Viability Assessment,Harmonia, Moscow*, COWI, June 1997

c) This decline in the enterprise's financial position is largely attributable to the impact of the joint venture's dissolution, which resulted in significant one time expenses being incurred, coincident with the major drop in sales associated with the loss of the joint venture brand names and loss of productive assets held by the joint venture;

d) In addition, the enterprise was faced with a significant excise tax expenditure associated with the use of ethanol-based hair spray formulations which caused a six month production shut down, with associated revenue losses, while a substitute was found to avoid this tax exposure;

e) Debt liabilities at the end of 1996, included non-interest bearing long-term debt to the former partner with repayment deferred to 2001, principal and interest payments for foreign equipment purchases (DM 500,000) acquired in 1995 and paid over a five year period, and short-term debt to Russian commercial banks (10.123 billion RBL);

f) A foreign currency line of credit (9.3 million FRF) was available, effective January 1997 to be paid in four tranches over the first six months of the year;

g) The enterprise operates adequate accounting and management systems suitable for its operations and sufficient to support external audit requirements which have been done since 1995;

h) Results for the first quarter of 1997, indicated that the enterprise was beginning to turn around with increased production and sales revenues and improved liquidity, as reflected by repayment of short term debt and operating income surplus; and

i) Projections of financial performance through 2000, indicated that the enterprise would be viable and able to sustain the enterprise contributions - provided that rental income is sustained, forecast 1997 and 1998 production levels are realized, and the predicted 1997 cash surplus is reserved to cover the short-fall anticipated in 1998.

2.21 **Appraisal Enterprise Financial Viability Verification.** At appraisal, the pre-appraisal financial viability evaluation was updated, with specific reference to the critical issues identified above. The following summarizes the information obtained and the results of the updated evaluation:

a) Trends respecting overall product sales had been sustained for the first six months of 1997, although management has emphasized the production of shampoo rather than aerosol products during this period;

b) A sales forecast for 1997 of 7, 305,000 units in 1997, increasing to 10,260,000 units in 1998 and held constant after that, were agreed upon as the basis for financial projections;

c) The enterprise's debt structure was verified with a repayment schedule of US$2,140,000 in 1997, US$1,587,000 in 1998, US$695,000 in 1999 and US$195,000 in 2000 being agreed, inclusive of utilization of the US$1,719,000 credit facility in 1997; and

d) Other income sources were verified and showed that the enterprise has long-term lease arrangements for 3,000 m^2 of vacant plant space and is actively marketing another 12,000 m^2. In addition, revenue is projected from the sale of lithography and transportation services and unused equipment (unrelated to ODS consumption). For purposes of financial projections, a conservatively estimated 1997 income of US$963,000 in 1997 and US$589,000 from these sources was agreed to.

2.22 **Maximum Allowable Grant:** Investment on ODS phase-out was initiated by the enterprise in 1995 with building renovation and upgrading in anticipation of HAP use and has continued with engineering and environmental work up to the time of appraisal. On this basis, it was determined that the annual ODS consumption for 1994 (2,585 MT ODP) could be used for purposes of establishing the maximum allowable grant as governed by the threshold cost effectiveness mandated by the Montreal Protocol Multi-lateral Fund (MPMF) (i.e. US$4.40/kg ODP). On this basis, the maximum grant allowable for eligible costs under the sub-project would be US$11,374,000. If calculated on the basis of the average of the most recent three full years (average consumption of 1994/95/96 is 1,924 MT ODP), the maximum grant would be US$8,467,067. In both cases, this exceeds the total sub-project cost and the maximum grant amount will be dictated by eligible incremental investment costs.

2.23 **Eligible Costs.** It was determined at appraisal that all incremental investment costs defined in Table 2.1, exclusive of taxes could theoretically be consider as eligible costs. However, eligibility will be largely limited by the procurement practices applied. This will exclude the pre-appraisal expenditures (US$685,900), startup/down time cost allowance (US$110,000) and some goods and services that the enterprise has elected to apply local commercial practice to in their acquisition (US$143,000). On this basis, the incremental investment costs judged eligible for grant funding equaled US$6,252,400.

2.24 **Proposed GEF Grant and Cost-Effectiveness.** The proposed grant based on that requested by the enterprise and the application of procurement practices allowing expenditures to qualify for grant funding is US$6,252,400. Using the 1994 consumption referenced above, the sub-project cost-effectiveness is $2.42/kg ODP. Using the most recent three year average consumption, the sub-project cost-effectiveness is $3.25/kg ODP. In both cases, this is within the MPMF cost effectiveness threshold for aerosol conversion of $4.40/kg ODP.

2.25 **Enterprise Viability and Financial Contribution Capacity.** The results of the appraisal financial projections are provided in Table 2.3. These indicated that the enterprise is sustainable through the year 2000 and maintains a reasonable operating margin of around 14% during this period. In terms of cash availability, cash surpluses are shown after the enterprise's obligations to the ODS sub-project are met in all years except 1998, where a short-fall of US$296,000 is indicated. Therefore, it will be necessary for the enterprise to reserve some of the 1997 surplus for distribution to the sub-project in 1998. This commitment should be formalized

TABLE 2.3

JSC "HARMONIA"

FINANCIAL PERFORMANCE PROJECTIONS. (US$ x1000)

MODEL INCOME Statement (USD'000)	**1997**	**1998**	**1999**	**2000**
NET SALES REVENUES	12 382	16 126	17 692	17 692
OPERATING EXPENSE	(9 079)	(13 258)	(14 417)	(14 417)
Net Cost savings ODS-project			505	507
NET OP. INC. BEFORE DEPR.	3 303	2 868	3 491	3 491
Depreciation	327	469	1 064	1 064
NET OP. INC. BEFORE INT	2 977	2 399	2 427	2 427
Net Interest on Bank Credits	276	161	60	15
NET OPERATING INCOME	2 700	2 238	2 266	2 367
Other Income(net)	(1 427)	92	92	92
Rental income from lease of property	444	589	589	589
Income from useless equipment sales	519	-	-	-
NET INCOME BEFORE TAX	2 236	2 919	2 947	3 048
Profit Tax	391	511	516	533
NET INCOME AFTER TAX	1 845	2 408	2 431	2 514
Add Back Depreciation	418	553	1 064	1 064
Net Cash Flow	2 262	2 961	3 495	3 579
Net change in operating accounts	(433)	(374)	(157)	-
Cash flow from operations	1 829	2 587	3 339	3 579
Financial inflows	132	(1 426)	(635)	(180)
Available for Investments and Distributions	1 962	1 160	2 704	3 398
Interest expenses out of profit	276	-	-	-
Social expenses	259	259	259	259
Enterprise investment	-	-	-	-
Enterprise ODS-investment	7	1 197	449	-
Free cash flow	1 420	(296)	1996	3 140
Memorandum Item: Net operational margin	22%	14%	13%	13%

in the Sub-grant Agreement. On this basis, it is concluded that the enterprise is viable and can sustain its contribution to the sub-project. However, it is noted that these projections are based on the assumption that sales are maintained as forecast, operating costs are as presented by the enterprise, no other investment is undertaken, residual liabilities have been fully disclosed, and other income at the above noted levels is maintained. Significant negative variation in these assumptions could lead to serious liquidity problems. For this reason close monitoring of the enterprise's financial performance will be required

2.26 **Financing Plan.** As defined in Table 2.1, the sub-project financing plan requires the financing of US$8,592,685 in post appraisal investment expenditures. The GEF Sub-Grant is proposed to provide US$6,252,400 of this requirement. Estimated disbursements are provided in Annex A. The enterprise post appraisal investment contributions of US$1,854,385 will be financed by free cash flow. A predicted short fall in enterprise cash flow in 1998 will require the reservation of surplus funds in 1997 to ensure capacity exists to maintain its contribution obligations.

F. Environmental Analysis

2.27 The principal environmental effect of the sub-project will be positive through the permanent elimination of ODS usage within the enterprise. The evaluation of the sub-project itself indicates that potential negative environmental impacts may arise from fugitive emissions of hydrocarbon liquid petroleum gases, namely propane and butane that make up commercial HAP mixtures. While these have zero ODP and low GWP, they are volatile organic compounds (VOC's) and can contribute to ground level air contamination. This represents a small incremental impact in an urban area already suffering from poor air quality to which VOC's are a significant contributor. The processing of HAPs using the molecular sieve technology will also generate a small waste stream containing sulfur compounds that will require management as a hazardous waste. Furthermore, the HAP flammability risk could cause consequential atmospheric emissions in the event that it were to cause a fire in the facility. No direct releases of waste water are associated with the sub-project and a reduction in solid waste can be anticipated through reduced can rejects. In terms of energy consumption, the sub-project is viewed as conservation neutral, except in that positive gains may be obtained through the utilization of more modern and efficient electrical systems. Evaluation of these potential impacts at appraisal indicated that the sub-project has included appropriate measures in the form of fugitive emission containment, operational leakage detection, secure storage facility design and confined space ventilation to mitigate these impacts. It was the appraisal mission's conclusion that the sub-project falls within the scope of the World Bank Category B project for purposes of environmental evaluation.

2.28 The enterprise has completed the first part of the environmental regulatory approval process required under Russian legislation. The sub-project has been documented and presented to the local environmental authorities for purposes of performing the required environmental expertise. The major issue in this approval process related to the adequacy of the proposed location of the HAP storage and handling facilities. Given the location of the plant site within 300 meters of the nearest residential development, the option of having the primary HAP storage

facility located remotely from the plant site with only short-term storage being allowed at the plant was considered. However, this issue was resolved with appropriate design refinements and the basic approvals necessary to proceed with sub-project implementation were in place at appraisal. However, upon completion of final design and equipment selection, additional documentation is required to complete the approval process to allow commissioning and operation of the sub-project. The costs of completing this, along with additional monitoring facilities which are anticipated to be required, have been provided for in the sub-project cost estimate and are proposed for funding as part of the sub-grant.

G. Sustainability

2.29 The appraisal mission concluded that the proposed sub-project is sustainable, although this conclusion is qualified by the marginal nature of the enterprise's financial position. Harmonia has demonstrated the ability to survive a difficult corporate restructuring through a period of major economic dislocation in Russia. It is a well managed operation producing high quality products that should be in increasing demand as growth in the Russian economy occurs. In particular, the enterprise has benefited from exposure to Western consumer product development, marketing techniques and operational management. This, combined with its strategic location in the country's largest consumer market, indicates that it is well positioned to capitalize on these opportunities. The main sustainability concern respecting the sub-project is the fragile nature of the enterprise's financial situation. While current trends are positive, it has been weakened by the impact of the joint venture break up, and is dependent on the ability to manage its relatively large debt load, and maintain revenues from both its main production and external sources associated with property leases and sale of services.

H. Benefits

2.30 The major direct benefit of the sub-project is the phase-out of 2,585 MT/year of ODP consumption capacity, based on the current plant capacity and consumption upon initiating phase-out. Latent consumption potential based on full capacity utilization is approximately 4,000 MT/year ODP. The principal indirect benefit derived from successful implementation of the sub-project will be the continued operation of a competent and progressive manufacturer of consumer products. The nature of these products, their high quality, and the growing demand for them in Russia, offers significant import replacement potential.

I. Risks

2.31 The primary immediate risk associated with the sub-project's implementation is related to the enterprise's financial capacity over the next two years. More specifically, the enterprise is anticipated to be unable to generate enough free cash in 1998 to meet its enterprise contributions under the project. For this reason, it is critical that sufficient cash reserves be accumulated in 1997 and then dedicated to 1998 obligations. It should be noted that these enterprise obligations are primarily required to pay VAT and import duties. Failure to have capacity for the latter could

directly impact delivery of equipment and the planned realization of ODS phase-out in early 1999. The conditioning of the Sub-Grant Agreement with suitable undertakings respecting reservation of funds is recommended, along with monthly monitoring of the enterprise's financial position during this critical period.

2.32 The second area of risk relates to the implementation schedule and the importance of early commitment to detailed design and procurement activities. The enterprise has acknowledged this at appraisal and initiated the process of engineering and procurement consultant selection, with the support of the ODS IPU. Satisfactory progress in this preparatory work will be a condition of signing the Sub-Grant Agreement.

2.33 The technical and safety risks associated with the project appear to be well managed. The technology selection involves proven technology with an established record internationally. The enterprise has strong in-house technical operating capacity and access to external expertise that is capable of managing the sub-project. The safety risks are addressed through the use of suitably designed Western equipment, training and operational practices. As further assurance, the sub-project includes an independent safety audit.

J. Conditionality

2.34 The terms and conditions set out in the standard Sub-Grant Agreement form agreed between the Bank and ODS IPU for the Project would cover the general conditionality requirements applicable to this sub-project and were reviewed with the enterprise at appraisal. In addition, the following sub-project specific provisions are to be included in the Sub-Grant Agreement:

a) The enterprise will provide a binding undertaking to reserve US$1,500,000 in revenue in a separate account at the end of 1997or to present an alternative mechanism satisfactory to the Bank, such that capacity in meeting the projected 1998 enterprise contribution requirements is provided for;

b) The demonstration of the available capacity to meet the projected 1998 enterprise contributions shall be specified as a condition of Bank "No objection" to contracts for the HAP filling lines and HAP storage and handling equipment contracts;

c) Financial reporting conditions contained in the Sub-Grant Agreement shall specify monthly reporting of sales, production revenue and other income as well as quarterly submission of income statements - both on a comparative basis to those used in the above financial projections;

d) Contracts for design engineering and procurement consultants shall be in place and satisfactory progress in their implementation shall be demonstrated as a condition of Sub-Grant Agreement signing;

e) Safety audit results, covering the detailed design, equipment specifications and selected supplier technical proposals shall have been completed and the practices and procedures related to the implementation of safety measures undertaken for the sub-project shall be documented, as a condition of Bank "No objection" to contracts for the HAP filling lines and HAP storage and handling equipment contracts; and

f) Environmental evaluation and associated approval documentation, consistent with World Bank Category B requirements will be submitted for the Bank's review and "no objection" as a condition of disbursement.

g) The sub-Grant Agreement will contain a binding undertaking by the enterprise to destroy the two primary CFC filling lines, the inoperative filling line and CFC storage facilities. Satisfactory documentation demonstrating this has been accomplished will be submitted to SCEP and the Bank as a condition of the final disbursements against the contracts for the filling lines, HAP equipment, and works contracts.

K. Recommendation

2.35 This sub-project is recommended for grant funding from the Global Environmental Facility Trust Fund in the amount of US$6,252,000, subject to signing of a Sub-Grant Agreement with the Russian Federation State Committee for Environmental Protection, acceptable to the Bank.

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

III. CHIMPROM

A. Background

3.1 JSC "Chimprom" which is also known as JSC "Vocco" (Volgagrad Chemical Company) is among the largest companies in the Russian chemical sector. It's plant facilities are located in the southern part of Volgograd over a distance of 3 km along the Volga River. The enterprise was established in 1931. It was privatized in 1994, although the majority ownership remains with the State. Current ownership is held by the State Property Committee (51%), employees (36.2%), management (2.2%), and others (10.6%)). The State's interest is currently being offered for sale and a program of attracting international investors is being pursued. It produces approximately 140 different products, the principal ones, along with their proportion of sales revenue, are: caustic soda (15.8%), PVC resins (9.2%), calcium chloride (6.8%), CFC-11/12/113 (7.2%), trichlorethylene (5.3%), calcium hypochlorite (4.8%), aerosols (4.6%), plastic coatings (4.1%), methylene chloride (4.0%), and chloroform (3.9%). The enterprise is the dominant producer of caustic soda, calcium chloride, PVC resins, trichlorethylene, CFC-113, and chloroform in Russia. In addition, it accounts for approximately 40% of the country's CFC-11 and 12 production. It's major traditional exports, which account for 10% of sales, are methylene chloride, PVC resin and CFC's. Currently, market priorities are focusing the enterprise on high margin and demand products, namely caustic soda, calcium chloride, PVC resins and chloroform. CFC production capacity is 24,000 MT/year of CFC-11/12 and 18,000 MT/year of CFC-113. However, this has declined dramatically to 1996 5,134 MT of CFC-11/12 and 132 MT of CFC-113. All CFC production will be phased out, either by 2000 in accordance with the national Country Program, or sooner if funding from the World Bank Special Initiative[1] is realized. In this regard, the enterprise has signed a protocol with the Bank respecting its participation in the Special Initiative. Chimprom has also been a major military supplier, but these operations have largely been shut down and the production facilities dismantled. The enterprise currently employs 8,500 people which is a reduction of 10% from historical levels. Employment is predicated to drop by a further 1,500 in the medium-term.

3.2 The production of industrial aerosol products, primarily insecticides, lubricants and security gases began in 1972 as an integrated part of the enterprise's operation. In 1994, the domestic chemical plant business unit was separated as an independent operating entity. However, in 1996 it was re-integrated with the main corporate structure and currently operates as one of Chimprom's 24 technological product units. As such, it represents a relatively minor portion of the overall business, accounting for 4.6% of sales and employing 280 people. Current production is 85% insecticide, with one brand (Dichlofos) dominating, and 15% lubricants. These products are marketed directly to customers or major distributors. Sales are mainly

---

[1] *Project Prospectus: Special Initiative for ODS Production Phaseout in the Russian Federation*, World Bank, April 1997.

domestic, with approximately 10% exported to other CIS countries, mainly in Central Asia. Ukrainian markets, which were formerly significant, have effectively been closed by tariff barriers and unreliable payment history. No aerosol products are exported outside the CIS. The main domestic competitors are Arnest and Sibiar along with some imports from Western Europe and the Middle East. Chimprom's pricing policy is to maintain a discount relative to its main competitors, even though it is the dominant producer of insecticides in the market.

3.3 Chimprom is a fully integrated aerosol producer complete with formulation, filling, can and valve manufacturing, and packaging capability. The installed can making capacity is 25,000,000 cans/year, while the nominal filling capacity is estimated to be 20,000,000 cans/year, based on the installed capacity of the two original CFC-based lines. At present both lines are operational, but only one is utilized as the insecticide production facility. In addition, a small CFC-based line with a capacity of 1,000,000 cans/year is set up for filling of security gas containers for the military and Interior Ministry. At present, this is shut down and would only be activated if its conversion were financed by the customers. Finally, the enterprise has developed a 10,000,000 cans/year line based on CO_2 propellant for filling lubricant products, but this has only been operated on a trial basis. Aerosol production reached 18,000,000 cans/year in 1990. However, this declined to 9,073,000 cans/year in 1993, 5,995,000 cans/year in 1994, and 3,900,000 cans/year in 1995, In 1996, production increased to 4,305,000 cans/year and in 1997 production is projected to be 3,000,000 cans/year. Within a given year, the seasonal nature of insecticide sales produces significant variation in capacity utilization during the year. Typically, 70% of production is in the second and third quarters.

3.4 Based on the design of the plant and the current operational capacity of 20,000,000 cans/year, the estimated maximum potential ODS consumption at this facility would be approximately 5,500 MT/year, noting that this is proportionally higher than other facilities with similar filling capacity due to the larger cans used for insecticides as opposed to consumer products. However, the documented ODS consumption for the past four years was : 1993 - 2,495 MT, 1994 - 1,506 MT, 1995 - 1,091 MT, 1996 - 1,212 MT ODS. Consumption in 1997 is projected to be 768 MT.

3.5 ODS phase-out opportunities at Chimprom were originally identified during the development of the Russian Federation Country Program in 1994[2] which was undertaken with the support of the Danish Environmental Protection Agency. Subsequent technical preparation work in 1995 documented a defined phase-out sub-project to convert the facility to hydrocarbon aerosol propellant (HAP) through major investments in HAP storage and handling infrastructure and filling lines[3], while retaining can making capacity and purchasing valves. On this basis, the sub-project was included as a candidate sub-project within the second tranche of the overall Project[4] as approved by the GEF in April 1996. At that time, the total incremental investment cost was estimated to be US$5,678,000 with proposed GEF grant financing of US$4,015,000. In March 1997, an enterprise financial viability assessment and sub-project update was undertaken,

---

2 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

3 *Assistance for Project Preparation: Aerosol and Refrigeration Sectors* , COWI, February 1996

4 *Global Environmental Facility, Russian Federation Ozone Depleting Substances Phase-out Project, Project Document*, The World Bank, May 1996

with a follow-up pre-appraisal verification of additional information being completed in June, 1997[5]. In July 1997, a joint CPPI/World Bank appraisal mission visited the enterprise to complete sub-project processing. The results of this appraisal are documented as follows.

B. Objectives

3.6 The objective of the sub-project proposed by JSC "Chimprom" is to phase-out the use of ODS propellants through conversion of 20,000,000 cans/year aerosol production capacity to HAP technology.

3.7 The objective of this sub-project appraisal is to verify the eligibility of the sub-project for GEF funding. This specifically includes: a) confirmation of the sub-project's physical scope and technology selection; b) verification of current and historic ODS consumption information; c) verification of the estimated sub-project incremental investment and operating costs; d) determination of eligible costs and their allocation to the grant; e) documentation of sub-project procurement and implementation plans; f) verification of enterprise financial viability in the medium term, including the enterprise's capacity to support its contribution requirements; g) evaluation of the environmental implications of the sub-project; h) confirmation of the adequacy of proposed safety measures; and i) recommendation of appropriate conditions for the Sub-Grant Agreement.

C. Sub-Project Description and Cost Estimates

3.8 **Sub-Project Scope.** The overall scope of the appraised sub-project covers the complete conversion of Chimprom's primary aerosol products production from the use of CFC-11/12 mixtures to HAPs as propellants, along with the conversion of some product lines to CO_2 propellant. Portions of the existing facilities have been judged as inadequate for HAP utilization in the following respects: a) present CFC storage and handling facilities do not meet Russian national or internationally recognized safety standards for flammable materials and are not designed for the higher operating pressures required; b) the CFC delivery system and filling lines are not fire or explosion proof as is required for handling flammable materials; c) the main plant production areas where the primary filling operations are located not suitably designed or located for handling of flammable substances or equipped with suitable fire suppression equipment; d) present warehousing facilities for housing finished products contravene Russian safety requirements and restrictions on quantity of material stored with each structure or isolated room and are unsuitable for upgrading to these standards; e) operational practice and training of staff is not appropriate for handling of flammable substances. As a consequence, the development of new HAP handling and storage infrastructure, the relocation of primary filling and warehouse operations, and installation of new primary filling lines are required. The aluminum cans produced with the existing manufacturing facilities are considered adequate for HAP service and will be retained. The present valve manufacturing will not produce components suitable for HAP, but will be shut down in favor of using purchased valves.

---

5 *Financial Viability Assessment, Chimprom, Volgograd*, COWI, June 1997

3.9 The sub-project's appraisal verified that the following incremental investments are required for conversion to HAP and that this defines the detailed technical scope of the proposed sub-project:

a) HAP storage and handling facilities, including rail unloading facilities, underground storage tanks, piping and transfer equipment (pumps and compressors), fire protection system, and associated civil works and infrastructure (site preparation, sewer, water, controls and utilities), all to be located in an area to be prepared adjacent to the proposed new location of the filling operation and finished goods warehouse;

b) HAP purification system employing molecular sieve-type technology, in order to assure the necessary quality of HAP from potential domestic and foreign suppliers;

c) Dedicated 55,000 liter HAP tank cars (4) to ensure the availability of rolling stock for reliable continuous delivery of HAP from suppliers in the mid-Volga and North Caucasus regions in Russia;

d) Two 60 can/minute aerosol filling lines, each complete with unscrambling table, multiple head liquid filling unit, valve placer, vacuum crimping unit, gas house conveyer, modular filling room, gas filler, return conveyer, weight checking device, water bath, actuator placement device and cap installing unit, defective can destruction unit and air compressor;

e) Renovation of an existing building to house the new filling lines and finished product storage including installation of : HAP supply system, explosion proof electrical system installation, fire wall construction, and fire suppression systems;

f) Explosion proof lift trucks for the finished goods storage facility;

g) Conversion of the existing security gas filling operation to HAP, complete with modification of equipment and necessary building upgrading;

h) Environmental monitoring and quality control instrumentation in the form of air monitoring devices and laboratory equipment related to detection and sampling of HAP releases;

i) Engineering and design necessary to support the development of technical specifications and construction drawings for the above equipment procurement, installation and associated works;

j) Project implementation support for environmental evaluation and permitting, procurement assistance in tendering and contracting the required goods, services and works, safety audits;

k) Training in the operation of new equipment, particularly related to safety procedures: and

l) Dismantling and destruction of CFC-based equipment, particularly operational and unused filling lines and CFC storage facilities.

3.10 **Technology Selection and Capacity Justification.** The selection of HAP propellant technology as the primary ODS phase-out approach is approved as a zero ODP technology for the aerosol sector by the MPMF and is supported in the 1995 UNEP Technical Options Report on Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride. It offers an operating cost advantage due to the lower unit cost and overall volume required in comparison to CFC's. Chimprom is proposing the replacement of its entire capacity, including its original primary filling capacity of 20,000,000 cans/year. It will undertake a HAP conversion of the existing 1,000,000 cans/year filling line used for production of security gases. It is also developing 10,000,000 cans/year of alternative capacity for filling with CO_2 in certain product lines. The appraisal mission concluded that replacement of 20,000,000 cans/year of capacity was eligible for grant funding consideration. While this is in excess of current utilization, the seasonal nature of the enterprise's product sales requires more than single line capacity in its primary filling operation to maintain an efficient operation. Any cost savings associated with reduction in line sizing would be marginal given the need for at least two lines to support the variety of product lines produced by the enterprise and the common level of general infrastructure upgrading required for safety and fire protection reasons.

3.11 **Incremental Investment Costs.** Table 3.1 presents the detailed investment cost estimate for the proposed sub-project scope as defined above. This was finalized and agreed to at appraisal. This cost estimate is based on actual costs incurred to date, second quarter 1997 quotations for major equipment purchases, engineering services and works, and indicative estimates for minor works, and project implementation related support services. The total sub-project incremental investment cost is US$8,044,316 inclusive of applicable taxes (import duties and VAT) at current rates, and a 10% physical contingency. Of this, the enterprise has invested US$249,000 to date of appraisal in alternative propellant filling capacity, preparatory engineering activities, and works as noted above. Remaining incremental investment required is US$7,795,316, primarily for the purchase of major equipment and works needed for the filling operation and HAP storage and handling system. The appraisal mission concluded that all of these costs are consistent with the "Indicative List of Eligible Incremental Costs" adopted by the parties to the Montreal Protocol. The appraisal mission noted that the total incremental investment costs of the combined sub-project had increased by a factor of 1.65 since its original proposal to the GEF. This increase is attributable to the more comprehensive scope of the appraisal estimate, and the use of actual quotations for equipment and works, the latter of which reflects the high inflation rate applicable to local costs in 1995 and 1996.

3.12 **ODS Phase-Out Work Prior to Appraisal and Retroactive Financing.** The appraisal mission found that some preparatory work, directly supporting ODS phase-out, has been undertaken prior to appraisal, beginning in 1995, but primarily undertaken in 1996 and in the first half of 1997. This included in-house expenditures on development of the pilot CO_2 propellant filling line, preliminary engineering, and works associated with preparation of the conversion of existing buildings to house the new filling lines and finished goods warehouse. Review of these investments indicates that, while they are legitimate incremental expenditures, none would qualify for retroactive financing under the terms of the GEF Grant Agreement. Even though they

tab3-1.xls25/11/97

TABLE 3.1

JSC "CHIMPROM" HAP AEROSOL CONVERSION SUB-PROJECT

ESTIMATE OF INCREMENTAL COSTS AND FINANCING SUMMARY

ITEM NO.	COST COMPONENT	'AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT COST	ENTERPRISE PRE-APPRAISAL	FINANCED POST-APPRAISAL	GEF GRANT FINANCED
				1997 (Aug.-Dec.)		'1998		'1999					
		LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN				
1.0	HAP Storage and Handling Facilities Equipment						412,267		412,267	824,534			824,534
1.1	HAP Pumps (5)												
1.2	LPG Compressors (2)												
1.3	Storage Tanks w/Fittings												
1.4	HAP Purification System												
2.0	HAP 55,000 L. Tank Cars (4)								194,040	194,040			194,040
3.0	Aerosol Filling Lines Equipment												
3.1	Filling Line Equip. Packages (2)						1,430,880		357,720	1,788,600			1,788,600
3.2	Air Compressors (2)								55,440	55,440			55,440
3.3	Defective Can Destruction Unit							13,200		13,200		13,200	
3.4	Development of CO2 Filling Line	83,000								83,000	83,000		
4.0	Finished Goods Warehouse Equipment - Explosion Proof Lift Trucks (4)								237,600	237,600			237,600
5.0	HAP/Environmental Q/C Equipment								171,600	171,600			171,600
6.0	Civil Construction/Utilities/Equipment Installation												
6.1	Preliminary Construction - Finished Goods Warehouse and Plant Infrastructure	141,000								141,000	141,000		
6.1	Preparation HAP Storage Area			440,000						440,000		440,000	
6.3	Tank Farm w/Fire Protection System					396,000		594,000		990,000			990,000
6.4	Filling Pant/Finished Goods W/H w/Fire Protection System					131,500		523,000		654,500			654,500
6.5	Destruction of Existing Filling Lines/ CFC Storage/Handling Facilities							55,000		55,000		55,000	
6.6	Conversion of Police Product Line							385,000		385,000		385,000	
7.0	Engineering	25,000		112,200		112,200				249,400	25,000	224,400	
8.0	Environmental Documentation			22,000		55,000				77,000		22,000	55,000
9.0	Local Training							11,000		11,000		11,000	
10.0	Procurement Agent			13,200		39,600		13,200		66,000			66,000
11.0	Independent Safety Audit						25,000		30,000	55,000			55,000
11.0	Taxes			105,516		612,295		834,591		1,552,402		1,552,402	
	SUB-PROJECT TOTALS	249,000	-	692,916	-	1,346,595	1,868,147	2,428,991	1,458,667	8,044,316	249,000	2,703,002	5,092,314

FINANCING REQUIREMENTS	AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT EXPENDITURES		
			1997 (Aug.-Dec.)		'1998		'1999				
	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	TOTAL
Enterprise Financing	249,000	-	679,716	-	725,395	-	1,297,891	-	2,952,002	-	2,952,002
GEF Grant	-	-	13,200	-	621,200	1,868,147	1,131,100	1,458,667	1,765,500	3,326,814	5,092,314

were made after August 1995, they would be classified as force account expenditures and could not be financed under the World Bank's competitive bidding procedures.

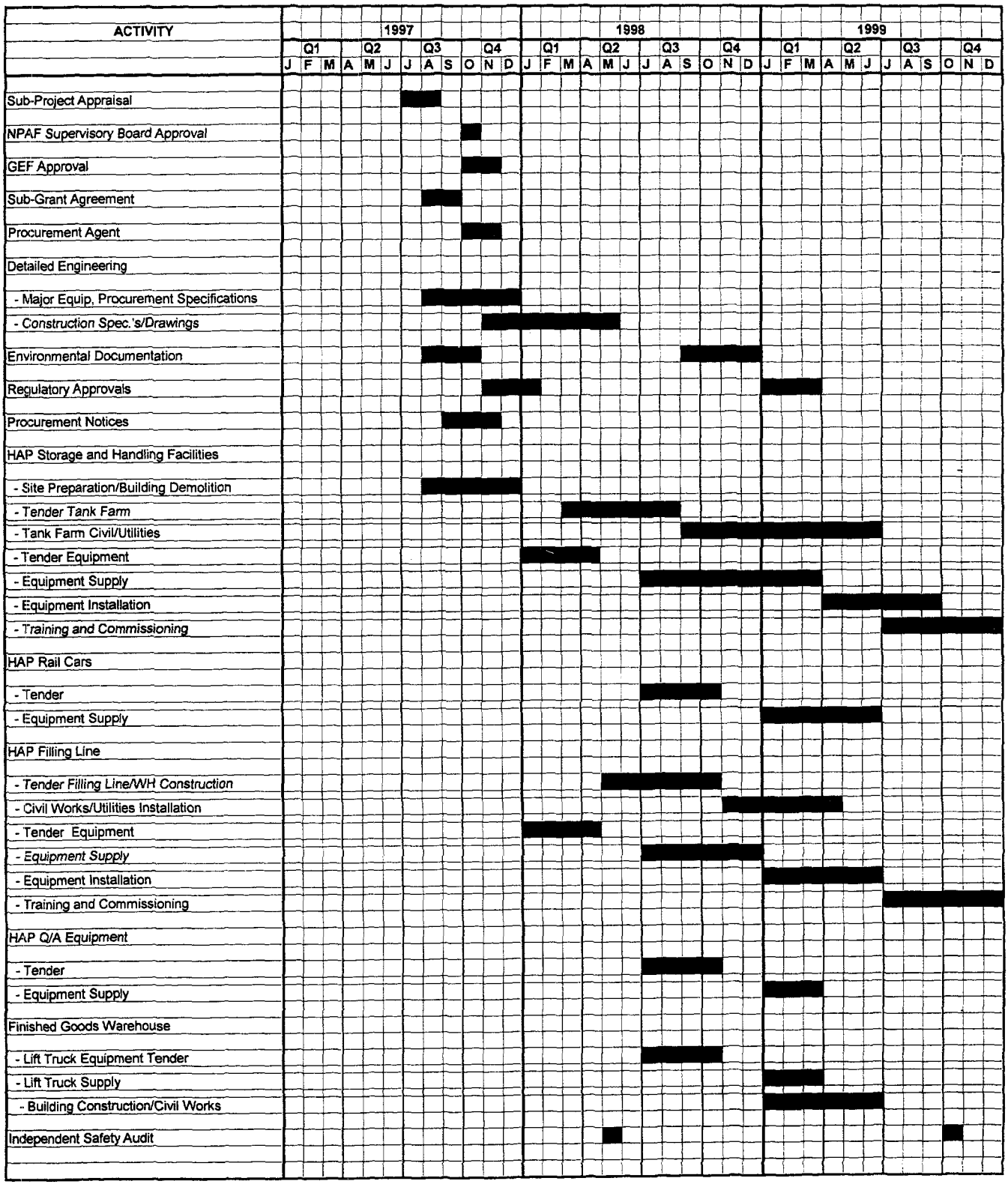
3.13 **Safety Measures and Costs.** The investments required for conversion of aerosol production from CFC propellants to HAPs are inherently driven by safety considerations due to the flammable nature of the material being substituted. For this reason, virtually all incremental costs are safety related. Those of specific note are : a) fire suppression and alarm systems; b) filling line enclosure and ventilation; c) defective can destruction equipment; d) explosion proof warehouse equipment; e) building construction and electrical service upgrading; f) safety training; and g) a safety audit. Safety training will be undertaken by the enterprise with the support of local consultants. It will also be included within the scope of training provided by suppliers of critical equipment such as the filling lines and HAP handling and storage systems in association with the commissioning support requirements under these contracts. The independent safety audit will be undertaken by an international consultant familiar with HAP installations in aerosol plants. This audit will occur in two parts. The first will occur during the detail design stage and will cover a review of the design and equipment specifications for the filling lines and HAP infrastructure, followed by a review of the technical proposals from the selected suppliers of this equipment, prior to commitment. The second stage will occur at commissioning and cover the facilities and equipment as installed, along with an evaluation of operating procedures and staff training. During operation, it was agreed that a trained safety team will be established. This will be made up of operational staff and technical specialists who will report to senior management (not production management) and have authority to shut down production in the event of dangerous situations developing.

3.14 **Incremental Operating Costs (Savings).** The conversion to HAP will result in increases in both quality control and maintenance costs, and in materials costs due to more expensive purchased valves and increased wastage due to rejects. Savings will be associated with the use of lower quantities of less expensive propellant. The increased annual operating costs related to quality control were estimated to be US$30,000 attributable to the addition of inspection staff. The increased annual maintenance and wastage costs were estimated to be US$25,000. Operating cost savings have been estimated on the basis of the main insecticide formulation which accounts for 85% of production. Utilizing current CFC-11/12 transfer prices paid by the enterprise (US$0.96/kg), market prices for HAPs sourced in the CIS (US$0.40/kg) and a US$0.012/per can valve price differential, an annual cost savings of US$276,640 was estimated based on average 1994/95/96 production levels. The resulting overall net annual operating cost savings estimate is US$221,640.

D. Sub-Project implementation

3.15 **Sub-Project Schedule.** The implementation schedule (Figure 3.1) for completion of the ODS conversion will extend over a period of twenty-eight months. Assuming that GEF, and NPAF Supervisory Board approvals are obtained in the fourth quarter of 1997, major procurement activities and works construction will be undertaken in 1998, and the sub-project will be completed in the fourth quarter of 1999 when full production with non-ODS technology will commence. The critical preparatory implementation activity is the completion of site

FIGURE 3.1
JSC "CHIMPROM" HAP AEROSOL CONVERSION SUB-PROJECT
SUB-PROJECT IMPLEMENTATION SCHEDULE



preparation for the HAP storage and handling facilities which the enterprise had agreed to initiate at its own expense in the fourth quarter of 1997. It is also noted that achievement of this schedule is dependent on procurement contracts being in place for the filling lines and HAP storage and handling equipment by June 1998, and the works contracts for the HAP infrastructure by September 1998. In order to meet these dates, detailed engineering and preparatory procurement activities will have to commence by September, 1997. As a consequence, it was agreed at appraisal that initiation of this work on a direct contract basis, at enterprise expense, would begin immediately. Similarly, the procurement consultant needs to be in place in the fourth quarter of 1997 to support the equipment tendering process. The early engagement of the independent safety audit consultant is also required to ensure availability prior to finalizing technical specifications, construction drawings and equipment supplier selection.

3.16 **Procurement Plan.** The overall procurement plan developed at appraisal is provided in Table 3.2 and summarized in Annex A. The enterprise has proposed that the GEF grant be allocated to: a) five IS packages ($3,271,814) covering foreign sourced equipment; b) two NCB works packages (US$1,644,500) for construction of the tank farm, and the electrical/mechanical services plus equipment installation in the relocated filling plant and finished goods warehouse; and c) three consulting contracts (US$175,000) covering environmental evaluation, procurement services and the independent safety audit. This packaging is consistent with the Project Grant Agreement as amended[6]. It has been agreed that World Bank Procedures[7][8] and contract documents will be utilized. The remaining goods and services will be acquired by the enterprise as its contribution, using locally accepted direct contracting and force account practices.

3.17 **Implementation Capacity.** Chimprom's overall capacity to manage the sub-project's implementation is judged to be good. The enterprise has undertaken the conceptual design and basic equipment identification necessary for development of the sub-project to the current stage using in-house resources. It's practice is to direct contract engineering, project management and construction services to one or more specialist enterprises that are approved for operation within its facility and are specifically licensed to undertake work involving flammable substances. The enterprise's own construction division will supervise this work. The enterprise agreed that it will initiate direct contracting of both detailed design services and preparation of the HAP storage site immediately after appraisal. The latter involves the removal of four unused buildings, excavation of storage bunkers formally used for military chemicals, and removal of an unused waste incineration facility. The enterprise also agreed to initiate environmental permitting immediately, inclusive of a site assessment of the building that the plant is to be relocated in and the HAP storage site. It was also agreed at appraisal that assistance will be required in the administration of the World Bank procurement procedures, particularly as applied to the IS equipment packages, and the NCB contracting of works. The inclusion of a procurement consultant has been provided for under the sub-project. Jointly with the ODS IPU, Terms of Reference for this assignment are to be developed immediately after appraisal. The scope of this assignment will be to assist in the

---

6 *Global Environmental Facility Trust Fund Grant Agreement, GEF Trust Fund TF028314*, September 29, 1996, Amended,October, 1997

7 *Guidelines For Procurement Under IBRD Loans and IDA Credits*, World Bank, August 1996.

8 *Guidelines for the Selection of Consultants by World Bank Borrowers*, World Bank, January 1997.

TAB3-2.xls25/11/97

TABLE 3.2

JSC "CHIMPROM" HAP AEROSOL CONVERSION SUB-PROJECT
PROCUREMENT PLAN

DESCRIPTION OF GOODS, SERVICES, OR WORKS	NO. of PACKAGES	PACKAGE TYPE (Note 1)	ESTIMATED PACKAGE AMOUNT (US$)	FINANCING	PROCUREMENT METHOD (Note 2)	PROCUREMENT SCHEDULE		
						TENDER	AWARD	COMPLETE
HAP Storage and Handling Facilities Equipment Equipment - HAP Pumps (5) - LPG Compressors (2) - 25,000L. Storage Tanks (5) - 10,000L. Storage Tanks (2) - Tank Farm Fittings, Valves,Piers, Unloading Dock - Safeguard HAP Purification System (1)	1	G	$824,534	GEF	IS	98/01/01	98/07/01	98/07/01
55,000 L. HAP Tank Cars (4)	1	G	$194,040	GEF	IS	98/07/01	98/12/01	99/07/01
Aerosol Filling Lines - 60 Can/Min. (2) - Unscrambling Table - Liquid Filler Unit - Valve Placer - Vacuum Crimping Unit - Modular Filling Rooms w/Conveyers - Gas Filling Unit - Weighting Units - Water Test bath - Actuator and Cap Placing Device - Air Compressors (2)	1	G	$1,845,040	GEF	IS	98/01/01	98/07/01	99/10/01
Defective Can Destruction Unit	1	G	$13,200	Enterprise	LCP	98/09/01	98/11/01	99/03/01
Explosion Proof Lift Trucks (4)	1	G	$237,600	GEF	IS	98/07/01	98/12/01	99/04/01
HAP/Environmental Q/C Equipment	1	G	$171,600	GEF	IS	98/07/01	98/12/01	99/04/01
Civil Construction/Utilities/Equipment Installation								
- Preparation HAP Storage Area	1	CW	$440,000	Enterprise	DC	N/A	N/A	98/01/01
- Tank Farm w/Fire Protection System	1	CW	$990,000	GEF	NCB	98/01/01	98/09/01	99/12/31
- Filling Plant/Finished Goods Warehouse w/ Fire Protection Systems	1	CW	$654,500	GEF	NCB	98/05/01	98/11/01	99/12/31
- Destruction of Existing Filling Lines/CFC Storage	1	CW	$55,000	Enterprise	FA	N/A	N/A	99/11/30
- Conversion of Police Product Line	1	CW	$385,000	Enterprise	FA	N/A	N/A	99/11/30
Detail Design Engineering	1	CF	$224,000	Enterprise	DC	N/A	97/09/01	99./07/01
Environmental Documentation	1	CF	$55,000	GEF	SLF	98/04/01	98/07/01	99/01/01
Local Training	1	TR	$11,000	Enterprise	SSF	N/A	99/01/01	99/12/31
Procurement Consultant	1	CF	$66,000	GEF	SLF	97/10/01	97/12/01	99/11/01
Independent Safety Audit	1	CF	$55,000	GEF	SLF	98/01/10	98/03/01	99/11/01
SUB-PROJECT TOTAL			$ 6,221,514					

Note 1: G - Goods, CW - Civil Works, S&I - Supply and Install, TK - Turnkey, CF - Consulting Firm, CI - Individual Consultant, TR - Training.

Note 2: ICB - International Competitive Bidding, LIB - Limited International Bidding, NCB - National Competitive Bidding, IS - International Shopping, NS - National Shopping, DC- Direct Contracting, FA - Force Account, MW - Minor Works, SLF - Short Listed Firm, SLI - Short Listed Individual Consultant, SSF - Sole Source Firm, SSI - Sole Sourve Individual, LCP - Local Commercial Practice.

preparation of bidding documents, administering World Bank "No Objection" clearances, bid evaluation, and contract negotiations as required. Given the importance to the sub-project schedule of the detailed design work, site preparation and environmental work, the substantive progress in these tasks will be a condition of Sub-Grant Agreement signing. Similarly, the contracting of a procurement consultant will be a condition of Sub-Grant Agreement signing. It was also agreed that a condition of "No Objection" to selection of the filling line and HAP equipment suppliers, is the completion of a satisfactory review of the technical specifications and recommended supplier proposals by the consultant undertaking the independent safety audit. As a consequence, the selection of this consultant is also critical to the schedule and must be initiated prior to or immediately upon Sub-Grant Agreement signing.

E. Enterprise Financial Evaluation and Sub-Project Financing

3.18 **Pre-Appraisal Enterprise Financial Viability Evaluation.** A detailed enterprise financial viability evaluation was conducted on Chimprom[9] in March 1997 and documented in a confidential report made available to the ODS IPU and the World Bank. The scope of this evaluation covered: a) review of accounting and management information systems; b) development and analysis of Western-style income statements and balance sheets for the period 1992 through 1996; c) evaluation of the enterprise cost structure; d) analysis of enterprise financing capacity; e) identification of significant financial issues; and f) generation of financial projections involving several scenarios related to the enterprise's circumstances and prospects.

3.19 The results of the pre-appraisal enterprise financial evaluation are summarized as follows:

a) Chimprom's balance sheet showed that total fixed assets at the end of 1996 were US$365,000, a significant increase over previous years due to revaluation. However, current assets were US$34,444,000, about the same as 1995, and not significantly higher than previous years. US$19,492,000 of these assets were in inventories which is a marked increase over previous years;

b) The enterprise's income statement indicates net sales revenues of US$146,979,000 in 1996, a moderate increase from 1995. However, operating income and net after tax income dropped significantly such that the operating margins fell from 15% in 1995 to 5% in 1996 and the enterprise moved from a position of reasonable profitability to a break even position. This change was a direct result of significant increases in energy prices which were not compensated by product pricing adjustments, a large write down of assets associated with the shut down of military production, and an increase in short-term debt repayments;

c) The enterprise's long term debt has decline from US$483,000 in 1995 to US$162,000 in 1996, and had been eliminated in the first quarter of 1997. However, high interest rate (45%) short-term debt liabilities remained high (US$2,526,000) at the end of the first quarter of 1997.

---

9 *Financial Viability Assessment, Chimprom, Volgagrad*, COWI, June 1997

d) In addition to ODS consumption phase-out, other near-term investment programs committed to include three federally co-financed projects (conversion of ODS production to substitute products, development of aspartam production and waste water treatment plant sludge treatment), and three internal initiatives (titanium oxide production, aluminumoxidechloride production and Chloroparafine 1100 production. Total enterprise obligations for these investments were US$6,395,000 in 1997 and US$5,746,000 in 1998;

e) The enterprise operates a manual management information system capable of giving profitability and cash flow analysis on a monthly basis at individual product and consolidated levels. An external audit has been undertaken for the 1996 year; and

f) Financial projections based on a range of sales forecast and operating cost assumptions indicated that the enterprise will remain viable in the medium term under reasonable circumstances and will have the capacity to maintain its projected sub-project contribution obligations. In the long-term, the enterprise faces a major viability risk associated with escalating energy prices which are the dominate cost component in production of several of its main products (calcium chloride and caustic soda).

3.20 **Appraisal Enterprise Financial Viability Verification.** At appraisal, the pre-appraisal financial viability evaluation was updated, with specific reference to the critical issues identified above. The following summarizes the information obtained and the results of the updated evaluation:

a) Effective July 1, 1997, the enterprise has obtained a 30% industrial discount on electricity rates, originally set at US$0.04 per kilowatt hour, and while no long-term certainty in rate reductions has been obtained, they believe that this can be renewed annually in the medium-term;

b) Sales forecasts for 1997 are being met but little real growth in overall revenue is anticipated as the enterprise optimizes its product lines;

c) Special Initiative funding was assumed to be available in late 1998 and shut down of CFC production would occur in the second quarter of 1999, allowing revenue from CFC sales to be assumed until that time;

d) The co-financing for investment projects anticipated from federal programs has not been realized in 1997, and the expenditure obligations for these have been deferred one year, although further deferments in federal financing are anticipated and the enterprise will focus its resources on internal investments directed at new product development and cost reduction, including energy conservation; and

e) Review of the completed 1996 external audit and statements up to appraisal verified the assumptions respecting operating costs and liabilities made in the pre-appraisal projections.

TABLE 3.3

JSC "CHIMPROM"

FINANCIAL PERFORMANCE PROJECTIONS (US$ x 1000)

(ASSUMING CONTINUED ENERGY COST DISCOUNTS)

MODEL INCOME Statement (USD'000)	1997	1998	1999	2000
NET SALES REVENUES	167 492	167 492	167 492	159 311
OPERATING EXPENSES	(141 011)	(131 324)	(131 324)	(124 686)
Raw materials and half-products	31%	31%	31%	31%
Fuel and Energy	39%	39%	39%	39%
Salaries and Social Costs	15%	15%	15%	15%
Services				
Other	15%	15%	15%	15%
NET OP. INC. BEFORE DEPR.	26 481	36 168	36 168	34 626
Total depreciation	13 772	13 772	13 772	13 772
NET OP. INC. BEFORE INT	12 709	22 396	22 396	20 853
Net Interest on Bank Credits	1 117	1 117	1 117	1 117
NET OPERATING INCOME	11 592	21 279	21 279	19 736
Other Income(net)	(2 961)	(2 961)	(2 961)	(2 961)
NET INCOME BEFORE TAX	8 631	18 318	18 318	16 775
Profit Tax (35%)	3 021	6 411	6 411	5 871
NET INCOME AFTER TAX	5 610	11 907	11 907	10 904
Add Back Depreciation	17 402	17 402	17 402	17 402
Net Cash Flow	23 012	29 308	29 308	28 305
Net change in operating accounts	(1 026)	-	-	409
Cash flow from operations	21 986	29 308	29 308	28 715
Change in financial liabilities	(2 526)	-	-	-
Available for Investments and Distributions	19 460	29 308	29 308	28 715
After tax social obligations	-	-	-	-
Non-ODS investment programmes	6 149	11 502	12 192	12 192
of which normal maintenance	4 132	4 132	4 132	4 132
of which new programmes	2 017	7 371	8 060	8 060
Available for ODS investment and other distributions	13 311	17 806	17 116	16 522
Enterprise financing for ODS project	680	725	1 299	-
Free cash flow	12 631	17 081	15 817	16 522
Memorandum Item:				
Operational Margin	16%	22%	22%	22%

TABLE 3.4

JSC "CHIMPROM"

FINANCIAL PERFORMANCE PROJECTIONS (US$x1000)

(ASSUMING NO ENERGY COST DISCOUNTS)

MODEL INCOME Statement (USD'000)	**1997**	**1998**	**1999**	**2000**
NET SALES REVENUES	163 415	163 415	163 415	155 234
OPERATING EXPENSES	(137 216)	(146 667)	(146 667)	(139 149)
Raw materials and half-products	31%	31%	31%	31%
Fuel and Energy	39%	39%	39%	39%
Salaries and Social Costs	15%	15%	15%	15%
Services				
Other	15%	15%	15%	15%
NET OP. INC. BEFORE DEPR.	26 199	16 748	16 748	16 085
Total depreciation	13 772	13 772	13 772	13 772
NET OP. INC. BEFORE INT	12 427	2 976	2 976	2 313
Net Interest on Bank Credits	1 117	1 117	1 117	1 117
NET OPERATING INCOME	11 310	1 859	1 859	1 195
Other Income(net)	(2 961)	(2 961)	(2 961)	(2 961)
NET INCOME BEFORE TAX	8 349	(1 102)	(1 102)	(1 765)
Profit Tax (35%)	2 922	-	-	-
NET INCOME AFTER TAX	5 427	(1 102)	(1 102)	(1 765)
Add Back Depreciation	17 402	17 402	17 402	17 402
Net Cash Flow	22 828	16 299	16 299	15 636
Net change in operating accounts	(822)	-	-	409
Cash flow from operations	22 007	16 299	16 299	16 045
Change in financial liabilities	(2 526)	-	-	-
Available for Investments and Distributions	19 481	16 299	16 299	16 045
After tax social obligations	-	-	-	-
Non-O investment programmes	6 149	11 502	12 192	12 192
of which normal maintenance	4 132	4 132	4 132	4 132
of which new programmes	2 017	7 371	8 060	8 060
Available for ODS investment and other distributions	13 332	4 797	4 107	3 853
Enterprise financing for ODS project	680	725	1 299	-
Free cash flow	12 652	4 072	2 809	3 853
Memorandum Item:				
Operational Margin	16%	10%	10%	10%

3.21 **Maximum Allowable Grant:** Substantive investment on ODS phase-out was initiated by the enterprise in 1996 with preparation of the buildings for the relocated facilities and development of alternative capacity to fill lubricant products with CO_2. On this basis, it was determined that the average annual ODS consumption for 1993, 1994 and 1995 (1,769 MT ODP) could be used for purposes of establishing the maximum allowable grant as governed by the threshold cost-effectiveness mandated by the Montreal Protocol Multi-lateral Fund (MPMF) (i.e. US$4.40/kg ODP). On this basis, the maximum grant allowable for eligible costs under the sub-project would be US$7,783,600.

3.22 **Eligible Costs.** It was determined at appraisal that all incremental investment costs defined in Table 3.1, exclusive of taxes could theoretically be consider as eligible costs. However, eligibility will be largely limited by the procurement practices applied. This will exclude the pre-appraisal expenditures (US$249,000), and some goods and services that the enterprise has elected to directly contract or supply using its internal resources (US$1,150,600). On this basis, the incremental investment costs judged eligible for grant funding equaled US$5,092,314.

3.23 **Proposed GEF Grant and Cost-Effectiveness.** The proposed grant based on that requested by the enterprise and the application of procurement practices allowing expenditures to qualify for grant funding is US$5,092,314. Using the three-year average consumption referenced above (1,769 MT) sub-project cost-effectiveness is $2.88/kg ODP. Using the most recent three year average consumption (1,274 MT/year), the sub-project cost-effectiveness is $4.00/kg ODP. In both cases, this is within the MPMF cost-effectiveness threshold for aerosol conversion of $4.40/kg ODP.

3.24 **Enterprise Viability and Financial Contribution Capacity.** The results of the appraisal financial projections are provided in Tables 3.3 and 3.4. Table 3.3 represents the anticipated circumstances of the enterprise, namely modest sales growth in 1997 and but constant thereafter, and energy prices rising with inflation and continuation of the current energy discount arrangement. Table 3.4 represents a less optimistic situation in which first quarter 1997 sales are held constant, and the current energy discount does not apply in 1998 and later. In both instances, the enterprise remains profitable through the year 2000 and has a reasonable cash surplus after accounting for investment obligations, including those to the sub-project. On this basis, it is concluded that the enterprise is viable and can sustain its contribution to the sub-project. However, it is noted that these projections are based on the assumption that sales are maintained as forecast, operating costs are as presented by the enterprise, no other investment is undertaken, and residual liabilities have been fully disclosed. For this reason, monitoring of the enterprise's financial performance will be required.

3.25 **Financing Plan.** As defined in Table 3.1, the sub-project financing plan requires the financing of US$7,795,316 in post appraisal investment expenditures. The GEF Sub-Grant is proposed to provide US$5,092,314 of this requirement. Estimated disbursements are summarized in Annex A. The enterprise post appraisal investment contributions of US$2,703,002 will be financed by free cash flow.

F. Environmental Analysis

3.26 The principal environmental effect of the sub-project will be positive through the permanent elimination of ODS usage within the enterprise. The evaluation of the sub-project itself indicates that potential negative environmental impacts may arise from fugitive emissions of hydrocarbon liquid petroleum gases, namely propane and butane that make up commercial HAP mixtures. While these have zero ODP and low GWP, they are volatile organic compounds (VOC's) and can contribute to ground level air contamination. This represents a small incremental impact in an urban area already suffering from poor air quality to which VOC's are a significant contributor. The processing of HAPs using the molecular sieve technology will also generate a small waste stream containing sulfur compounds that will require management as a hazardous waste. Furthermore, the HAP flammability risk could cause consequential atmospheric emissions in the event that it were to cause a fire in the facility. No direct releases of wastewater are associated with the sub-project. An increase in solid waste may occur as a result of higher rejection rates when higher integrity standards for HAPs are applied to the present can manufacturing operation. In terms of energy consumption, the sub-project is viewed as conservation neutral, except in that positive gains may be obtained through the utilization of more modern and efficient electrical systems. Evaluation of these potential impacts at appraisal indicated that the sub-project has included appropriate measures in the form of fugitive emission containment, operational leakage detection, secure storage facility design and confined space ventilation to mitigate these impacts. It was the appraisal mission's conclusion that the sub-project falls within the scope of the World Bank Category B project for purposes of environmental evaluation.

3.27 At appraisal, the enterprise had not initiated any formal environmental approvals for the sub-project with the local authorities. Under Russian legislation, this requires the documentation of the development proposed and its submission to the Volgograd City Environmental Committee for an formal environmental expertise. It would be anticipated that the major issues will not relate to the sub-project itself, but rather to the location that is proposed for development of the filling plant, finished goods warehouse and HAP storage and handling facilities. An assessment of the site's condition, recognizing the nature of the military production formally utilizing this area will be required to provide assurance that it is acceptable for the proposed use. The enterprise undertook to initiate this process immediately after appraisal. The completion of this work should be a condition of signing the Sub-Grant Agreement and the receipt of regulatory clearance for implementation will be a condition of disbursement. Upon completion of final design and equipment selection, additional documentation is required to complete the approval process to allow commissioning and operation of the sub-project. The costs of completing this, along with additional monitoring facilities which are anticipated to be required, have been provided for in the sub-project cost estimate and are proposed for funding as part of the sub-grant.

G. Sustainability

3.28 The appraisal mission concluded that the proposed sub-project is sustainable. The enterprise has the demonstrated technical capacity to undertake the sub-project, being a major operator of complex process and production facilities. It has adequate financial resources to sustain its contribution requirements and appears to be viable in the medium-term, although it remains vulnerable to energy pricing, the overall evolution of technology in the chemical production sector, and ability to maintain competitiveness in a global market. At appraisal, the enterprise stated its commitment to proceed with phase-out and supported this with undertakings to initiate the required preparatory work at its own expense in advance of finalizing the commitment of GEF sub-grant. Fulfillment of these undertakings will be the immediate test of the enterprises commitment.

H. Benefits

3.29 The major direct benefit of the sub-project is the phase-out of 1,769 MT/year of ODP consumption capacity, based on the current plant capacity and the appraised consumption based on the average of the three years prior to first phase-out investment. Latent consumption potential based on full capacity utilization is approximately 5,500 MT/year ODP. Phase-out at this enterprise has broader significance in that it is being undertaken by one of the principal ODS producers in the country. As such, its realization provides added credibility to the commitment of the country and its industry to meeting the Country Program objectives. More specific to Chimprom, the sub-project offers an opportunity to further its restructuring away from military production and to the production of commercial products.

I. Risks

3.30 The primary financial risk associated with the project relates to the enterprise's long term viability. While it is a major integrated chemical producer operating world scale facilities, these are aging and at some point will not be competitive in the global market. As a consequence, the dominant position of its primary product lines in the Russian market could be threatened by imports. It would seem imperative that the enterprise attract external investment. In this regard, attempts to attract foreign investment have been unsuccessful to date. A similar risk to long term viability is presented by potential increases in energy prices.

3.31 The sustainability of the enterprise's commitment to the sub-project represents a risk. While undertakings to proceed have been provided, it was also apparent at appraisal that Chimprom's management were not convinced that GEF funding would actually be realized. A risk exists that the enterprise will hold back on its commitment until it has such assurance. This is in conflict with the imperative of the enterprise proceeding with preparatory work at its own expense in advance of confirming the GEF commitment. A similar skeptism applies to the Special Initiative and the credibility of the ODS consumption and production phase-out

initiatives at Chimprom are inter-linked in this respect. For this reason, it is important that the ODS IPU maintain close liaison with the enterprise on the processing of the sub-project and that the Special Initiative's activities be pursued and coordinated with this sub-project.

3.32 Sub-project implementation risks are largely associated with the schedule and specifically the completion of preparatory site preparation, initial environmental approvals, and detailed engineering work, which is, in turn, critical to major procurement activities associated with the supply of major equipment and construction services. Substantive progress in these areas is necessary in the fourth quarter of 1997, requiring significant enterprise effort and expense. Realization of such progress should be a condition of Sub-Grant Agreement signing, both as evidence of enterprise commitment and as a demonstration that the sub-project is in a position to proceed with disbursement for the major elements required for phase-out realization.

3.33 The technical and safety risks associated with the project appear to be well managed. The technology selection involves proven technology with an established record internationally. The enterprise has strong in-house technical operating capacity and access to external expertise that is capable of managing the sub-project. The safety risks are addressed through the use of suitably designed Western equipment, training and operational practices. As further assurance, the sub-project includes an independent safety audit.

3.34 The final area of risk is environmental. The selection of an area, formally used for military production, for relocation of the filling plant, finished goods warehouse and HAP storage and handling facilities, raises concerns about residual contamination and its suitability for the new service. While it is understood that decontamination has been undertaken under international supervision, this will have to be verified in the environmental approval process and the demonstration of site acceptability is recommended as a condition of disbursement.

J. Conditionality

3.35 The terms and conditions set out in the standard Sub-Grant Agreement form agreed between the Bank and ODS IPU for the Project would cover the general conditionality requirements applicable to this sub-project and were reviewed with the enterprise at appraisal. In addition, the following sub-project specific provisions are to be included in the Sub-Grant Agreement:

a) The demonstration of the available capacity to meet the projected 1998 enterprise contributions shall be specified as a condition of Bank "No objection" to contracts for the HAP filling lines and HAP storage and handling equipment contracts;

b) Financial reporting conditions contained in the Sub-Grant Agreement shall specify quarterly reporting of sales, production revenue, current energy pricing arrangements, as well as submission of income statements, on a basis comparable to those used in the above financial projections;

c) Substantive progress, acceptable to the Bank and SCEP, in detailed design and in the preparation of the proposed site for the HAP storage and handling facilities shall be demonstrated as a condition of Sub-Grant Agreement signing;

d) Contracting of the procurement consultant will be a condition of Sub-Grant Agreement signing;

e) Safety audit results, covering the detailed design, equipment specifications and selected supplier technical proposals shall have been completed and the practices and procedures related to the implementation of safety measures undertaken for the sub-project shall be documented, as a condition of Bank "No objection" to contracts for the HAP filling lines and HAP storage and handling equipment contracts;

f) Environmental evaluation and associated approval documentation, consistent with World Bank Category B requirements will be submitted for the Bank's review and "no objection" as a condition of disbursement. This will include a satisfactory demonstration of the site's acceptability for the sub-project development; and

g) The Sub-Grant Agreement will contain a binding undertaking by the enterprise to destroy the two primary CFC filling lines, and CFC storage facilities, and to convert or destroy the CFC-based security gas filling line. Satisfactory documentation demonstrating that this has been accomplished will be submitted to SCEP and the Bank as a condition of the final disbursements against the contracts for the filling lines, HAP equipment, and works contracts.

K. Recommendation

3.36 This sub-project is recommended for grant funding from the Global Environmental Facility Trust Fund in the amount of US$5,092,314, subject to signing of a Sub-Grant Agreement with the Russian Federation State Committee for Environmental Protection, acceptable to the Bank.

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

IV. SIBIAR

A. Background

4.1 JSC "Novosibirsky Zavod Bytovoy Chimii, Sibiar" (Sibiar) is a household chemical products enterprise located in Novsibirsk, in South Central Siberia. It started operations in 1975 and was privatized in 1992. Its ownership is widely held with the following distribution of shares: employees -18%, management - 30%, private individuals - 23%, Regional State Property Committee - 10%, various financial institutions and holding companies - 19%. Almost all of the enterprise's business is related to the production consumer products using aerosol containers. In 1996, the main product lines in proportion of production were: hair spray - 34%, insecticides - 28%, anti-statics - 17%, air fresheners - 10%, stove cleaners - 8%, and other products (engine cleaners, after shaving lotions, deodorants) - 3%. In addition, Sibiar produce shampoo, hair-dye, perfume and custom polyethylene packaging, and operate tool production and transportation services units. The enterprise employs 2,000 people of which 580 are directly involved in aerosol production.

4.2 Sibiar has historically accounted for approximately 12% of the Russian aerosol market with a major focus in Siberia and the Eastern regions, as well as Central Asia. It continues to be the dominant domestic supplier (60% market share) in the main market areas where competition has significant transportation cost penalties. However, markets in the Urals and European Russia have declined significantly to a current market share of 5%. Similarly, markets in other CIS countries have declined or disappeared. In Ukraine, this is related to the competitive disadvantage associated with distance, as well as competition from imports and local tariff barriers. In 1996, the enterprise stopped exports of ODS-containing products to CIS countries in Central Asia, not signatory to the Montreal Protocol. However, exports to Kazakhstan of up to 50,000 cans/month are being maintained using the enterprise's limited HAP filling capacity and arrangements to do the same in Kyrgystan are under negotiation. No exports are made outside the CIS. The enterprise's pricing policy has varied considerably in recent years. Pricing policies are based on maintaining parity with domestic competitors in the Urals and farther west while offering a 20% differential against competitors in Siberia and the Far East. The enterprise's main competitors are Harmonia, Chilton, Arnest, and Galogen for cosmetic aerosols and Chimprom for insecticides. Foreign competition comes from Western European, North American, Asian and Middle Eastern manufacturers.

4.3 The enterprise's original installed aerosol production capacity was 40,000,000 cans/year. However, this is now rated at 30,000,000 cans/year, a level that was typically approached up until 1992. Production utilization since 1992 was as follows: 1992 - 29,740,000 cans, 1993 - 19,140,000 cans, 1994 - 20,000,000 cans, 1995 - 16,360,000 cans, 1996 - 9,414,000 cans. The significant drop in 1996 production is attributable to a number of factors including: a) continued depressed economic conditions in its market area; b) loss of markets resulting from increases in

prices; c) production stoppages associated with product reformulation and operating problems. In 1997, production is projected to be 11,420,000 cans.

4.4 Sibiar is a fully integrated aerosol producer. Plant facilities consist of: a) two can production lines for producing three piece tin plate cans dating from 1975 and having a combined installed capacity of 360 cans per minute (now down-rated to 320 cans/minute); b) two filling lines of Western manufacture, dating from 1975 and having a combined installed capacity of 500 cans/minute (now down-rated to 300 cans/minute); c) CFC storage, handling and distribution infrastructure; d) valve manufacturing line; and e) packaging and shipping operations. While the main production operation remains primarily based on CFC propellants, the enterprise has developed some limited HAP filling capacity. This includes: a) basic HAP tank farm and handling facilities, b) a new 120 can/minute aerosol filling machine of Western manufacture, suitable for HAP service; c) a fire-proof filling line room adjacent to one operating CFC-based filling line, allowing dual propellant operation; d) redesigned cap fitting and valves for HAP service; e) limited product re-formulations; and f) four 55,000 L. HAP tank cars.

4.5 Based on the design of the plant and the current operational capacity of 30,000,000 cans/year, the estimated maximum potential ODS consumption at this facility would be approximately 4,520 MT/year. The documented ODS consumption for the past five years was : 1992 - 4,482 MT, 1993 - 3,732 MT, 1994 - 3,700 MT, 1995 - 3.272 MT, 1996 - 1,356 MT. ODS. Consumption for aerosol production in 1997 is projected to be 1,360 MT. In addition, the enterprise uses CFC-113 in the formulation of stove cleaners. In, 1996, 27 MT of CFC-113 was used, although this is being replaced with an alternative zero-ODS solvent.

4.6 ODS phase-out opportunities at Sibiar were originally identified during the development of the Russian Federation Country Program in 1994[1] which was undertaken with the support of the Danish Environmental Protection Agency. Subsequent technical preparation work in 1995 documented a defined phase-out sub-project to convert the facility to hydrocarbon aerosol propellant (HAP) through major investments in HAP storage and handling infrastructure and filling lines[2], can production facilities and upgrading of valve production. On this basis, the sub-project was included as a candidate sub-project within the second tranche of the overall Project[3] as approved by the GEF in April 1996. At that time, the total incremental investment cost was estimated to be US$10,909,000 with proposed GEF grant financing of US$8,488,000. In March 1997, an enterprise financial viability assessment and sub-project update was undertaken, with a follow-up pre-appraisal verification of additional information being completed in June, 1997[4]. In July 1997, a joint CPPI/World Bank appraisal mission visited the enterprise to complete sub-project processing. The results of this appraisal are documented as follows.

---

1 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

2 *Assistance for Project Preparation: Aerosol and Refrigeration Sectors* , COWI, February 1996

3 *Global Environmental Facility, Russian Federation Ozone Depleting Substances Phase-out Project, Project Document*, The World Bank, May 1996

4 *Financial Viability Assessment, Sibiar, Novsibirsk*, COWI, June 1997

B. Objectives

4.7 The objective of the sub-project proposed by JSC "Sibiar" is to phase-out the use of ODS propellants through conversion of 30,000,000 cans/year aerosol production capacity to HAP technology.

4.8 The objective of this sub-project appraisal is to verify the eligibility of the sub-project for GEF funding. This specifically includes: a) confirmation of the sub-project's physical scope and technology selection; b) verification of current and historic ODS consumption information; c) verification of the estimated sub-project incremental investment and operating costs; d) determination of eligible costs and their allocation to the grant; e) documentation of sub-project procurement and implementation plans; f) verification of enterprise financial viability in the medium term, including the enterprise's capacity to support its contribution requirements; g) evaluation of the environmental implications of the sub-project; h) confirmation of the adequacy of proposed safety measures; and i) recommendation of appropriate conditions for the Sub-Grant Agreement.

C. Sub-Project Description and Cost Estimates

4.9 **Sub-Project Scope.** The overall scope of the appraised sub-project covers the complete conversion of Sibiar's aerosol products production from the use of CFC-11/12 mixtures to HAPs as propellants. Portions of the existing facilities have been judged as inadequate for HAP utilization in the following respects: a) present CFC storage and handling facilities do not meet Russian national or internationally recognized safety standards for flammable materials and are not designed for the higher operating pressures required; b) the CFC delivery system and filling lines are not fire or explosion proof as is required for handling flammable materials; c) the plant production areas, housing the primary filling operations, are not suitably designed or located for handling of flammable substances or equipped with suitable fire suppression equipment; d) present warehousing facilities for housing finished products contravene Russian safety requirements and restrictions on the quantity of flammable material stored with each structure or isolated room and are unsuitable for upgrading to these standards; e) the can production facilities have a leakage rate of 3%, far in excess of the level deemed acceptable for a flammable propellant; f) existing valve production facilities are not adequate to make the design and quality of valves required for HAP propellant; g) operational practice and training of staff is not appropriate for handling of flammable substances.

4.10 The sub-project's appraisal verified that the following incremental investments are required for the complete conversion to HAP and that this defines the detailed technical scope of the proposed sub-project:

a) HAP storage and handling facilities, including upgraded rail unloading facilities, additional storage tanks, piping and transfer equipment (pumps and compressors), fire protection system, and associated civil works, all to be located in the present tank farm area;

b) HAP purification system employing molecular sieve-type technology, in order to assure the necessary quality of HAP from potential domestic and foreign suppliers;

c) Dedicated 55,000 liter HAP tank cars (4) to ensure the availability of rolling stock for reliable continuous delivery of HAP from suppliers in the mid-Volga and North Caucasus regions in Russia;

d) Two 120 can/minute aerosol filling lines, each complete with unscrambling table, multiple head liquid filling unit, valve placer, vacuum crimping unit, gas house conveyer, modular filling room, gas filler, return conveyer, weight checking device, water bath, actuator placement device and cap installing unit, defective can destruction unit and air compressor;

e) Renovation of existing buildings housing the present filling lines and finished product storage including installation of : HAP supply system, explosion proof electrical system installation, fire wall construction, and fire suppression systems;

f) Explosion proof lift trucks for the finished goods storage facility;

g) Installation of a new 250 can/minute can production facility in place of the existing facility;

h) Upgrading of existing valve manufacturing production facility with a valve assembly unit and new molds;

i) Environmental monitoring and quality control instrumentation in the form of air monitoring devices and laboratory equipment related to detection and sampling of HAP releases;

j) Engineering and design necessary to support the development of technical specifications and construction drawings for the above equipment procurement, installation and associated works;

k) Project implementation support for environmental evaluation and permitting, procurement assistance in tendering and contracting the required goods, services and works, safety audits;

k) Training in the operation of new equipment, particularly related to safety procedures: and

l) Dismantling and destruction of CFC-based equipment, including filling lines, can production units, and CFC storage facilities..

4.11 **Technology Selection and Capacity Justification.** The selection of HAP propellant technology as the primary ODS phase-out approach is approved as a zero ODP technology for the aerosol sector by the MPMF and is supported in the 1995 UNEP Technical Options Report on Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride. It offers an operating cost advantage due to the lower unit cost and overall volume required in comparison to CFC's. Sibiar is proposing the replacement of its current effective filling capacity of 30,000,000 cans/year. The appraisal mission concluded that replacement of 30,000,000 cans/year of capacity was eligible

for grant funding consideration. While this is in excess of current utilization, the enterprise has a recent historical usage approaching this level. Furthermore, it's wide range of products require multiple filling lines. Any cost savings associated with reduction in individual line capacity sizing would be marginal given the need for at least two lines to support the variety of product lines produced by the enterprise and the common level of general infrastructure upgrading required for safety and fire protection reasons.

4.12 **Incremental Investment Costs.** Table 4.1 presents the detailed investment cost estimate for the proposed sub-project scope as defined above. This was finalized and agreed to at appraisal. This cost estimate is based on actual costs incurred to date for civil works, the filling unit and tank cars, second quarter 1997 quotations for the filling lines and can production lines, recent reference prices for the additional tank car and HAP storage tanks, updated past quotations for valve equipment, and in-house engineering estimates for works, engineering services and project implementation related support services. The total sub-project incremental investment cost is US$18,562,994, inclusive of applicable taxes (import duties and VAT) at current rates, and a 10% physical contingency. Of this, the enterprise has invested US$942,000 to date of appraisal in initial development of HAP storage and handling infrastructure, the purchase of tank cars and a filling unit, construction of a filling room, and preparatory engineering and environmental activities. Remaining incremental investment required is US$17,620,994, primarily for the purchase of major equipment and works needed for the filling operation, can production facility, valve line upgrading, and HAP storage and handling system. The appraisal mission concluded that all of these costs are consistent with the "Indicative List of Eligible Incremental Costs" adopted by the Parties to the Montreal Protocol. The appraisal mission noted that the total incremental investment costs of the combined sub-project had increased by a factor of 1.70 since its original proposal to the GEF. This increase is attributable to the more comprehensive scope of the appraisal estimate, and the use of actual quotations for equipment and works, the latter of which reflects the high inflation rate applicable to local costs in 1995 and 1996.

4.13 **ODS Phase-Out Work Prior to Appraisal and Retroactive Financing.** The appraisal mission found that some preparatory work, directly supporting ODS phase-out, has been undertaken prior to appraisal, beginning in 1994, but primarily undertaken in 1995, 1996 and the first half of 1997. This included the purchase of the new filling unit in 1995, the construction of the explosion proof filling room and development of basic HAP storage capacity in 1996, and the purchase of tank cars in 1997. Review of these investments indicates that all are legitimate incremental expenditures made after August 1995 and therefore potentially eligible for grant funding. However, only the purchase of the tank cars would qualify for retroactive financing under the terms of the GEF Grant Agreement, based on the procurement procedures used. The other expenditures were made using force account or direct contracting procedures.

4.14 **Safety Measures and Costs.** The investments required for conversion of aerosol production from CFC propellants to HAPs are inherently driven by safety considerations due to the flammable nature of the material being substituted. For this reason, virtually all incremental costs are safety related. Those of specific note are : a) fire suppression and alarm systems; b) filling line enclosure and ventilation; c) defective can destruction equipment; d) explosion proof warehouse equipment; e) building construction and electrical service upgrading; f) safety training; and g) a safety audit. Safety training will be undertaken by the enterprise with the

TAB4.1.xls25/11/97

TABLE 4.1

JSC SIBIAR HAP AEROSOL CONVERSION SUB-PROJECT
ESTIMATE OF INCREMENTAL COST AND FINANCING SUMMARY

ITEM NO.	COST COMPONENT	PRE-AUG./95 EXPENDITURES		AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT COST	ENTERPRISE PRE-APPRAISAL	FINANCED POST-APPRAISAL	GEF GRANT FINANCED
						1997 (Aug.-Dec.)		'1998		'1999					
		LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN				
1.0	HAP Storage and Handling Facilities Equipment								944,053			944,053			944,053
1.1	HAP Pumps (5)														
1.2	LPG Compressors(2)														
1.3	Storage Tanks														
1.4	HAP Purification System														
2.0	HAP 55,000 L. Tank Cars (5)			228,000					60,500			288,500			288,500
3.0	Aerosol Filling Lines Equipment														
3.1	Filling Line Component (Now Installed)				285,000							285,000	285,000		
3.1	New Filling Line Equip. Packages (2)								2,200,000		550,000	2,750,000			2,750,000
3.2	Air Compressors								66,000			66,000			66,000
3.3	Defective Can Destruction Unit							11,000				11,000		11,000	
4.0	Finished Goods Warehouse Equipment - Explosion Proof Lift Trucks (6)								290,000		73,000	363,000			363,000
5.0	Valve Production Upgrading Equipment								220,000		55,000	275,000			275,000
5.1	Molds														
5.2	Valve Assembly Unit														
6.0	Can Production Equipment								1,590,500		6,362,617	7,953,117			7,953,117
6.1	250 cpm Production Line														
6.2	Can Transport/Flange/Seamer Units														
6.3	Installation Supervision/Commissioning/ Training														
7.0	HAP/Environmental Q/C Equipment								171,600			171,600			171,600
8.0	Civil Construction/Utilities/Equipment Installation														
8.1	Initial Construction - HAP Storage/ Handling	100,000		131,000								231,000	231,000		
8.2	Initial Construction - Filling Line			326,000								326,000	326,000		
8.3	HAP Storage Handling							237,600				237,600		237,600	
8.4	Filling Plant							275,000				275,000		275,000	
8.5	Finished Goods Warehouse							209,000				209,000		209,000	
8.6	Can Production Installation									310,200		310,200		310,200	
8.7	Destruction of Existing Filling Lines/ CFC Storage/Handling Facilities									84,700		84,700		84,700	
9.0	Engineering	25,000		25,000			60,000		50,000			160,000	50,000		110,000
10.0	Environmental Documentation			50,000				99,000				149,000	50,000		99,000
11.0	Local Training							81,510				81,510		81,510	
12.0	Procurement Agent					13,200		39,600		13,200		66,000			66,000
13.0	Independent Safety Audit								25,000		30,000	55,000			55,000
14.0	Taxes					14,376		1,426,038		1,830,300		3,270,714		3,270,714	
	SUB-PROJECT TOTALS	125,000	-	760,000	285,000	27,576	60,000	2,378,748	5,617,653	2,238,400	7,070,617	18,562,994	942,000	4,479,724	13,141,270

FINANCING REQUIREMENTS	PRE-AUG./95 EXPENDITURES		AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT EXPENDITURES		
					1997 (Aug.-Dec.)		'1998		'1999				
	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	TOTAL
Enterprise Financing	125,000	-	532,000	285,000	14,376	-	2,240,148	-	2,225,200	-	5,136,724	285,000	5,421,724
GEF Grant	-	-	228,000	-	13,200	60,000	138,600	5,617,653	13,200	7,070,617	393,000	12,748,270	13,141,270

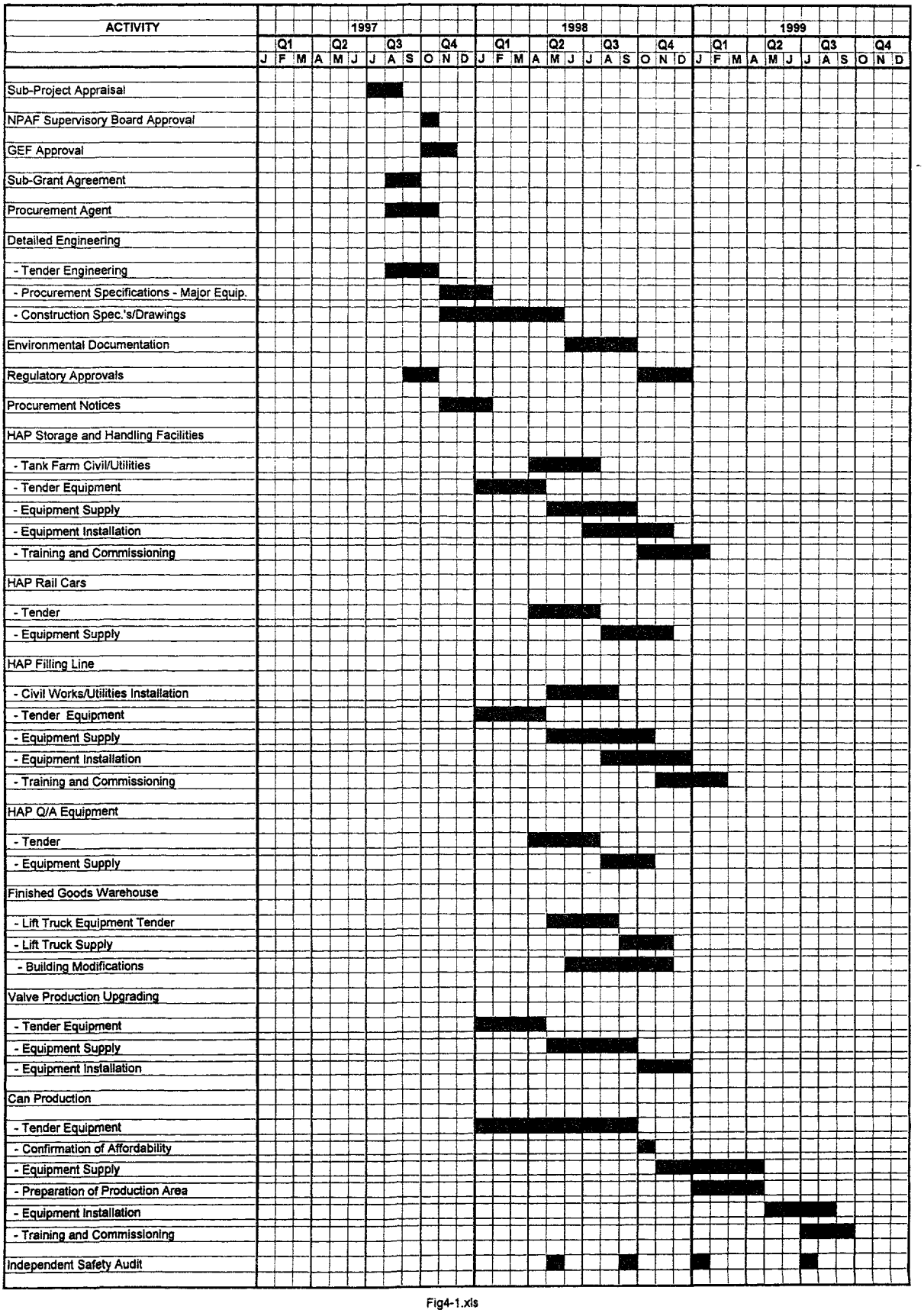
support of local consultants. It will also be included within the scope of training provided by suppliers of critical equipment such as the filling lines and HAP handling and storage systems in association with the commissioning support requirements under these contracts. The independent safety audit will be undertaken by an international consultant familiar with HAP installations in aerosol plants. This audit will occur in several parts. The first will occur during the detail design stage and will cover a review of the design and equipment specifications for the filling lines and HAP infrastructure, followed by a review of the technical proposals from the selected suppliers of this equipment, prior to commitment. Subsequent, parts will occur at commissioning of the filling lines and the can line. These on-site audits will cover the facilities and equipment as installed, along with an evaluation of operating procedures and staff training. During operation, it was agreed that a trained safety team will be established. This will be made up of operational staff and technical specialists who will report to senior management (not production management) and have authority to shut down production in the event of dangerous situations developing

4.15 **Incremental Operating Costs (Savings).** The conversion to HAP will result in cost increases related to: a) quality control effort associated with can making and filling operations to ensure a leakage rate below 0.1%; b) maintenance and down time costs associated with the need for line shut down and adjustment when leakage rate exceeds that allowable; and c) increased rejection rate of tin plate materials to ensure required can quality. Savings will be associated with: a) the use of lower quantities of less expensive propellant; and b) reduced scrap and returns from increased finished can and valve quality. The increased annual operating costs related were estimated to be US$222,500/year. Operating cost savings have been estimated on the basis of a weighted composite per can saving rate for the three main product lines (hair sprays, air fresheners, insecticides) based on average 1994, 1995 and 1196 production levels. Utilizing current discounted CFC-11/12 prices negotiated with suppliers (US$0.79/kg) and prices for HAPs negotiated with a local refinery (US$0.55/kg), an annual cost savings of US$935,554 was estimated based on average 1994/95/96 production levels. The resulting overall net annual operating cost savings estimate is US$713,054.

D. Sub-Project Implementation

4.16 **Sub-Project Schedule.** The implementation schedule (Figure 4.1) for completion of the ODS conversion will extend over a period of twenty-eight months. Assuming that GEF, and NPAF Supervisory Board approvals are obtained in the fourth quarter of 1997, major procurement activities and works construction will be undertaken in 1998, and the sub-project will be completed in the fourth quarter of 1999. However, full production with non-ODS technology will commence in the first quarter of 1999, when the filling lines are commissioned. Recognizing the longer procurement times associated with the ICB procurement of the can making equipment, effective phase-out of ODS can be achieved in advance of sub-project completion by purchasing cans for a period of up to nine months in 1999. It is also noted that achievement of this schedule is dependent on procurement contracts being in place for the filling lines and HAP storage and handling equipment by May 1998, and the can production equipment by November 1998. In order to meet these dates, tendering of detailed engineering and other preparatory procurement activities will have to commence by September, 1997. As a consequence, it was agreed at appraisal that the enterprise would engage the engineering design

FIGURE 4.1
JSC "SIBIAR" HAP AEROSOL CONVERSION SUB-PROJECT
SUB-PROJECT IMPLEMENTATION SCHEDULE



consultant immediately and in advance of having the Sub-Grant Agreement in place. Costs incurred prior to sub-grant effectiveness would be paid after disbursement conditions are met and subject to consistency with procurement rules. Similarly, the procurement consultant needs to be in place in the fourth quarter of 1997 to support the equipment tendering process. The early engagement of the independent safety audit consultant is also required to ensure availability prior to finalizing technical specifications, construction drawings and equipment supplier selection.

4.17 **Procurement Plan.** The overall procurement plan developed at appraisal is provided in Table 4.2 and summarized in Annex A. The enterprise has proposed that the GEF grant be allocated to: a) one ICB package ($7,953,117) for the can line, b) six IS packages ($4,584,163) covering foreign sourced equipment; and c) four consulting contracts (US$330,000) covering detailed design, environmental evaluation, procurement services and the independent safety audit. In addition, the procurement of four HAP tank cars will be retroactively financed, subject to presentation of documentation to the Bank supporting the equivalency of the procurement practices used with IS procedures. This packaging is consistent with the Project Grant Agreement as amended[5]. It has been agreed that World Bank Procedures[6][7] and contract documents will be utilized. The remaining goods and services will be acquired by the enterprise as its contribution, using locally accepted direct contracting and force account practices.

4.18 **Implementation Capacity.** Sibiar's overall technical capacity to manage the sub-project's implementation is judged to be good, although support in project management activities will be required. The enterprise has undertaken the conceptual design and basic equipment identification necessary for development of the sub-project to the current stage, using its own resources and those of contracted technical service organizations. For the final design and technical project management of the sub-project, externally contracted capacity will be required as provided for under the sub-project. Development of Terms of Reference for this work and the consultant selection process were initiated at appraisal and the ODS IPU will provide direct support in the administration of this process in conformance with Bank procedures. The second area where assistance is felt to be required is in the administration of the World Bank procurement procedures, particularly as applied to the IS and ICB contracting of the equipment packages. The inclusion of a procurement consultant has been provided for under the sub-project. Jointly with the ODS IPU, Terms of Reference for this assignment are to be developed immediately after appraisal. The scope of this assignment will be to assist in the preparation of bidding documents, administering World Bank "No Objection" clearances, bid evaluation, and contract negotiations as required. Given the importance to the sub-project schedule of both the detailed design work and procurement support contracts being in place as soon as possible, the enterprise has agreed to make the necessary financial commitments for these services in advance of the Sub-Grant Agreement being signed and final approvals from the NPAF Supervisory Board and GEF. It was agreed that a condition of Sub-Grant Agreement signing will be that these contracts are in place and the work under them has been started. Subject to following Bank

---

5 *Global Environmental Facility Trust Fund Grant Agreement, GEF Trust Fund TF028314*, September 29, 1996, Amended, October, 1997

6 *Guidelines For Procurement Under IBRD Loans and IDA Credits*, World Bank, August 1996.

7 *Guidelines for the Selection of Consultants by World Bank Borrowers*, World Bank, January 1997.

TABLE 4.2

JSC "SIBIAR" HAP AEROSOL CONVERSION SUB-PROJECT PROCUREMENT PLAN

DESCRIPTION OF GOODS, SERVICES, OR WORKS	NO. of PACKAGES	PACKAGE TYPE (Note 1)	ESTIMATED PACKAGE AMOUNT (US$)	FINANCING	PROCUREMENT METHOD (Note 2)	PROCUREMENT SCHEDULE		
						TENDER	AWARD	COMPLETE
HAP Storage and Handling Facilities Equipment Equipment - HAP Pumps (5) - LPG Compressors (2) - 25,000L. Storage Tanks (6) - 50,000L. Storage Tanks (1) - Tank Farm Fittings, Valves,Piers, Unloading Dock - Safeguard HAP Purification System (1)	1	G	$944,063	GEF	IS	98/01/01	98/05/01	99/02/01
Pre-Purchased 55,000 L. HAP Tank Cars (4)	1	G	$228,000	GEF	IS - Equivalent (Note 3)	N/A	N/A	N/A
55,000 L. HAP Tank Cars (1)	1	G	$60,500	GEF	IS	98/04/01	98/07/01	98/12/01
Aerosol Filling Lines - 120 Can/Min. (2) - Unscrambling Table - Liquid Filler Unit (only One Required) - Valve Placer - Vacuum Crimping Unit - Modular Filling Rooms w/Conveyers - Gas Filling Unit - Weighting Units - Water Test bath - Actuator and Cap Placing Device - Air Compressors (2) - Installation/Supervision/Training	1	G	$2,750,000	GEF	IS	98/01/01	98/05/01	99/01/01
Defective Can Destruction Unit	1	G	$11,000	Enterprise	DC			
Explosion Proof Lift Trucks (4)	1	G	$363,000	GEF	IS	98/05/01	98/07/01	98/11/01
Valve Production Upgrade Equipment - Molds - Valve assembly Unit	1	G	$275,000	GEF	IS	98/01/01	98/05/01	98/10/01
Can Production Equipment - 250 Can/Min. Production Line - Can Transport/Flange/Seamer Units - Installation/Supervision/Training	1	G	$7,953,117	GEF	ICB	98/01/01	98/10/01	99/09/01
HAP/Environmental Q/C Equipment	1	G	$171,600	GEF	IS	98/01/01	98/05/01	98/11/01
Civil Construction/Utilities/Equipment Installation								
- HAP Storage/Handling Area Additions/Fire Protection System	1	CW	$237,000	Enterprise	DC			
- Filling Plant/ Modifications w/ Fire Protection Systems	1	CW	$275,000	Enterprise	DC			
- Finished Goods Warehouse w/Fire Protection Systems	1	CW	$209,000	Enterprise	DC			
- Can Production Installation	1	CW	$310,200	Enterprise	DC			
- Destruction of Existing Filling Lines/CFC Storage	1	CW	$84,700	Enterprise	DC			
Detail Design Engineering	1	CF	$110,000	GEF	SLF	97/09/01	97/11/01	98/10/01
Environmental Documentation	1	CF	$99,000	GEF	SLF	97/09/01	97/11/01	98/02/01
Local Training	1	TR	$11,000	Enterprise	SSF			
Procurement Consultant	1	CF	$66,000	GEF	SLF	97/09/01	97/11/01	99/07/01
Independent Safety Audit	1	CF	$55,000	GEF	SLF	98/01/01	98/03/01	99/08/01
SUB-PROJECT TOTAL			$ 14,213,180					

Note 1: G - Goods, CW - Civil Works, S&I - Supply and Install, TK - Turnkey, CF - Consulting Firm, CI - Individual Consultant, TR - Training.

Note 2: ICB - International Competitive Bidding, LIB - Limited International Bidding, NCB - National Competitive Bidding, IS - International Shopping, NS - National Shopping, DC- Direct Contracting, FA - Force Account, MW - Minor Works, SLF - Short Listed Firm, SLI - Short Listed Individual Consultant, SSF - Sole Source Firm, SSI - Sole Sourve Individual, LCP - Local Commercial Practice.

Note 3 : Four HAP tank cars purchased in 1997 in anticipation of project and to provide interim capacity using procurement practice equivalent to IS Procedures Eligibility subject to audit of procurement documentation.

procedures and obtaining appropriate "No Objections" `of Terms of Reference and consultant selection, expenses incurred will be reimbursed by the Bank after the signing of the Sub-Grant Agreement. It was also agreed that a condition of "No Objection" to selection of the filling line and HAP equipment suppliers, is the completion of a satisfactory review of the technical specifications and recommended supplier proposals by the consultant undertaking the independent safety audit. As a consequence, the selection of this consultant is also critical to the schedule and must be initiated prior to, or immediately upon, Sub-Grant Agreement signing.

E. Enterprise Financial Viability Evaluation and Sub-Project Financing

4.19 **Pre-Appraisal Enterprise Financial Viability Evaluation.** A detailed enterprise financial viability evaluation was conducted on Sibiar[8] in March 1997 and documented in a confidential report made available to the ODS IPU and the World Bank. The scope of this evaluation covered: a) review of accounting and management information systems; b) development and analysis of Western-style income statements and balance sheets for the period 1992 through 1996; c) evaluation of the enterprise cost structure; d) analysis of enterprise financing capacity; e) identification of significant financial issues; and f) generation of financial projections involving several scenarios related to the enterprise's circumstances and prospects.

4.20 The results of the pre-appraisal enterprise financial viability evaluation are summarized as follows:

a) Financial performance has been satisfactory between 1992 and 1996, although a deterioration occurred in 1996 as a result of increasing operating costs, followed by increased pricing which resulted in lower production and sales as market share was lost;

b) The balance sheet analysis showed total fixed assets at the end of 1996 of US$15,000,000, down from US$22,000,000 in 1995, as a result of changes in valuation methods. However, an increase in current assets from US$3,500,000 to $US4,200,000 was recorded, with a decline in inventories, but increase in receivables;

c) The income sheet analysis indicated that sales revenues have steadily increased since 1992, reaching US$11,000,000 in 1996, even though sales volume in units sold has declined. However, operating expenditure increases have been generally larger than the growth in sales revenues with operating margins declining from 53% in 1994 to 16% in 1996;

d) Cash flow has been generally good over the period of analysis with the enterprise being able to meet its obligations and show a surplus that has been available for distribution primarily to new investment, the principal one being ODS phase-out;

e) The enterprise's long-term debt obligations are minimal and short term-debt was recorded as US$280,000 in 1996. Total current liabilities were US$3,350,000 of which US$2,038,000 was payables;

---

[8] *Financial Viability Assessment, Sibiar, Novosibirsk*, COWI, June 1997

f) While the enterprise has prudently protected its liquidity position by responding to higher operating costs with increased prices in 1996, it is now attempting to reduce operating costs and regain market share so that the relatively optimistic sales projections put forward by management can be realized. A 10% operating cost reduction is projected in early 1997, largely through the combination of negotiating lower raw material prices and using cheaper materials;

g) The enterprise operates a manual management information system capable of giving profitability and cash flow analysis. An external audit has been undertaken for the 1996 year; and

h) Financial projections based on several scenarios related to sales forecasts indicate that the enterprise would be able to meet its obligations under the sub-project and remain viable in the medium term. However, these conclusions, remain conditional on a significant growth in sales from 1996 levels, and the ability to raise US$1,500,000 through a planned share issue or long-term debt.

4.21 **Appraisal Enterprise Financial Viability Verification**: At appraisal, the pre-appraisal financial viability evaluation was updated. The following summarizes the information obtained:

a) The enterprise sales and production forecast for 1997 appears to be reasonably accurate based on performance in the first six months. This supports the enterprise's ability to regain lost markets with price reductions. Projected production for 1997 is 11,420,000 cans. Management is projecting subsequent sales as follows: 1998 - 20,000,000 cans, 1999 - 22,030,000 cans, 2000 - 25,000,000 cans. These levels are seen as very optimistic and represent a significant viability risk factor; and

b) The ability of the existing can making operation to sustain these higher production levels, even in the near term was identified as a major viability issue, and it was agreed that provision for contingency purchasing of cans should be built into the cost structure, at least for the period between commissioning of HAP filling lines and completion of the new can line, and potentially for a long period beginning in 1998, should the existing operation not be able to sustain production levels.

4.22 **Maximum Allowable Grant:** Substantive investment on ODS phase-out was initiated by the enterprise in 1995 with the purchase of a new filling unit and development of an interim HAP storage and handling capability. On this basis, it was determined that the average annual ODS consumption for 1992, 1993, and 1994 (3,971 MT ODP) could be used for purposes of establishing the maximum allowable grant as governed by the threshold cost-effectiveness mandated by the Montreal Protocol Multi-lateral Fund (MPMF) (i.e. US$4.40/kg ODP). On this basis, the maximum grant allowable for eligible costs under the sub-project would be US$17,473,867. Utilizing the average consumption of 2,776 MT ODP for 1994, 1995 and 1996, the maximum allowable grant would be US$12,214,000.

4.23 **Eligible Costs.** It was determined at appraisal that all incremental investment costs defined in Table 4.1, exclusive of taxes could theoretically be considered as eligible costs.

However, eligibility will be largely limited by the procurement practices applied. This will exclude the pre-appraisal expenditures on the purchase of the new filling unit and the initial works associated with HAP and filling line infrastructure (US$817,000), and some goods and services that the enterprise has elected to directly contract or supply using its internal resources (US$4,479,724). The pre-appraisal purchase of four tank cars (US$228,000) appears to qualify for retroactive financing on the basis of the equivalency to IS procurement procedures. Subject to verification of this, the incremental investment costs judged eligible for grant funding equaled US$13,141,270.

4.24 **Proposed GEF Grant and Cost-Effectiveness.** The proposed grant based on that requested by the enterprise and the application of procurement practices allowing expenditures to qualify for grant funding is US$13,141,270, conditioned on verification of the eligibility of the tank car purchase for retroactive financing. Using the three-year average consumption referenced above (3,971 MT) sub-project cost-effectiveness is $3.31/kg ODP. This is within the MPMF cost-effectiveness threshold for aerosol conversion of $4.40/kg ODP. Using the 1994/1995/1996 average consumption (2,776 MT/year), the sub-project cost-effectiveness is $4.73/kg ODP which exceeds the MPMF threshold cost-effectiveness.

4.25 **Enterprise Viability and Financial Contribution Capacity.** The results of the appraisal financial projections, applicable to the whole sub-project as proposed, are provided in Tables 4.3, and 4.4. Each assumes realization of the sales and production recovery noted above in 1998, and that the enterprise raises US$1,500,000 through a share issue or long-term debt in 1998. Table 4.3 represents the base case scenario where the enterprise proceeds with HAP conversion by the end of 1998, the existing can line can sustain demand until CFC usage is discontinued, and purchased cans are utilized until the can line comes on stream at the beginning of the fourth quarter of 1999. In this case, the enterprise is viable in the medium term and can meet its contribution obligations except in 1999 (US$227,000). However, this can be covered by allocation of a portion of the 1998 surplus to cover these obligations. Table 4.4 represents the case where the existing can making capability can not sustain the enterprise's requirements, after the end of the second quarter. At this point, purchased cans are required until the fourth quarter of 1999 when new can making capability is available. In this case, the enterprise remains viable in the medium-term but short-falls in availability of resources to cover its contribution obligations occur in 1998 (US$414,000) and again in 1999 (US$227,000). This would have to made up by allocation of 1997 free cash flow to cover these commitments or external financing from increased share issues or long-term borrowing. It is apparent from these projections that the enterprise's ability to sustain the sub-project is marginal and dependent on the ability to raise additional equity or long term debt financing in 1998, the realization of optimistic sales forecasts, and the technical capacity of aging can making equipment to produce at historical levels to meet forecast demand. Failure of any of these assumptions would place the sub-project at risk, likely with the enterprise being unable to pay import duties and other taxes required for equipment delivery or the installation costs associated with this equipment.

4.26 The major investment that could both precipitate this situation and be most affected by it would be that made in the new can making installation. Therefore, it is recommended that the commitment of the portion of the grant to be directed to this equipment be specifically conditioned with a test of affordability at the end of the third quarter of 1998, prior to issuing "no objection" for the procurement contract applicable to it. In the event that the enterprise cannot

TABLE 4.3

JSC "SIBIAR"

FINANCIAL PERFORMANCE PROJECTIONS (US$ x 1000)

(ASSUMING 9 MONTHS OF CAN PURCHASE IN 1999)

MODEL INCOME Statement (USD'000)	**1997**	**1998**	**1999**	**2000**
NET SALES REVENUES (Aerosol)	11 131	18 789	20 896	23 713
OPERATING EXPENSE (Aerosol)	(8 037)	(15 643)	(19 417)	(19 829)
Net Cost savings (ODS-project)		200	713	713
NET OP. INC. BEFORE DEPR.	3 094	3 146	2 828	5 445
Total depreciation	328	328	328	328
NET OP. INC. BEFORE INT(Aerosol)	2 767	2 818	2 500	5 117
NET OP. INC. BEFORE INT(non-Aerosol)	211	211	211	211
TOTAL NET OP. INC. BEFORE INT	2 978	3 030	2 712	5 329
Net Interest on Bank Credits	(225)	(59)	-	-
NET OPERATING INCOME	2 753	2 970	2 712	5 329
Other Income(net)	(431)	(431)	(431)	(431)
NET INCOME BEFORE TAX	2 322	2 539	2 281	4 898
Profit Tax (17.5%)	406	444	399	857
NET INCOME AFTER TAX	1 916	2 095	1 882	4 041
Add Back Depreciation	328	328	328	328
Net Cash Flow	2 244	2 423	2 209	4 368
Change in working capital	(154)	(766)	(211)	(282)
Cash flow from operations	2 089	1 657	1 999	4 087
Principal Payments on Loans	(256)	(340)	-	-
Proceeds from sale of shares	-	1 500	-	-
Available for Investments and Distributions	1 834	2 816	1 999	4 087
Enterprise Investment (own financing)	14	2 240	2 225	-
Free cash flow	1 819	576	(227)	4 087
Memorandum Item: Operational Margin	28%	17%	14%	23%

TABLE 4.4

JSC "SIBIAR"

FINANCIAL PERFORMANCE PROJECTIONS (US$ x 1000)

(ASSUMING CAN PURCHASE FROM QUARTER 3 1998 TO QUARTER 4 1999)

MODEL INCOME Statement (USD'000)	1997	1998	1999	2000
NET SALES REVENUES (Aerosol)	11 131	18 789	20 896	23 713
OPERATING EXPENSE (Aerosol)	(8 037)	(16 843)	(19 417)	(19 829)
Net Cost savings (ODS-project)		200	713	713
NET OP. INC. BEFORE DEPR.	3 094	1 946	2 828	5 445
Total depreciation	328	328	328	328
NET OP. INC. BEFORE INT(Aerosol)	2 767	1 618	2 500	5 117
NET OP. INC. BEFORE INT(non-Aerosol)	211	211	211	211
TOTAL NET OP. INC. BEFORE INT	2 978	1 830	2 712	5 329
Net Interest on Bank Credits	(225)	(59)	-	-
NET OPERATING INCOME	2 753	1 770	2 712	5 329
Other Income(net)	(431)	(431)	(431)	(431)
NET INCOME BEFORE TAX	2 322	1 339	2 281	4 898
Profit Tax (17.5%)	406	234	399	857
NET INCOME AFTER TAX	1 916	1 105	1 882	4 041
Add Back Depreciation	328	328	328	328
Net Cash Flow	2 244	1 433	2 209	4 368
Change in working capital	(154)	(766)	(211)	(282)
Cash flow from operations	2 089	667	1 999	4 087
Principal Payments on Loans	(256)	(340)	-	-
Proceeds from sale of shares	-	1 500	-	-
Available for Investments and Distributions	1 834	1 826	1 999	4 087
Enterprise Investment (own financing)	14	2 240	2 225	-
Free cash flow	1 819	(414)	(227)	4 087
Memorandum Item: Operational Margin	28%	10%	14%	23%

demonstrate the ability to sustain its obligations, the sub-project could proceed with the HAP infrastructure and filling line development to meet the ODS phase-out objective with the use of purchased cans indefinitely into the future. Table 4.5 provides a financial performance projection of this situation using the same base line assumptions used previously. The enterprise still shows a small cash flow deficiency in 1998 (US$414,000) but this would easily be covered by reserves. In the medium-term, the enterprises remains viable but at a lower operating margin due to the higher operating costs associated with can purchase.. The overall project is reduced to a total incremental costs of US$8,316,398 and the proposed GEF grant would be US$5,178,133.

4.27 **Financing Plan.** As defined in Table 4.1, the sub-project financing plan requires the financing of US$17,620,994 in post appraisal investment expenditures. The GEF Sub-Grant is proposed to provide US$13,141,270 of this requirement. Estimated disbursements are summarized in Annex A. The enterprise post-appraisal investment contributions of US$4,429,724 will be financed by free cash flow, new equity and potentially long-term debt. In the event, that the enterprise is unable to demonstrate its ability to meet these obligations prior to committing to the can making equipment, an alternative financing plan would be developed based on a reduced sub-project scope. This would involve US$7,374,398 in post-appraisal expenditures, a GEF grant of US$5,178,133 and enterprise contributions of US$2,196,265 which could be financed primarily from free cash flow and less ambitious levels of external financing.

F. Environmental Analysis

4.28 The principal environmental effect of the sub-project will be positive through the permanent elimination of ODS usage within the enterprise. The evaluation of the sub-project itself indicates that potential negative environmental impacts may arise from fugitive emissions of hydrocarbon liquid petroleum gases, namely propane and butane that make up commercial HAP mixtures. While these have zero ODP and low GWP, they are volatile organic compounds (VOC's) and can contribute to ground level air contamination. This represents a small incremental impact on urban air quality. The processing of HAPs using the molecular sieve technology will also generate a small waste stream containing sulfur compounds that will require management as a hazardous waste. Furthermore, the HAP flammability risk could cause consequential atmospheric emissions in the event that it were to cause a fire in the facility. No direct releases of wastewater are associated with the sub-project. An increase in solid waste may occur as a result of higher rejection rates when higher integrity standards for HAPs are applied to the present can manufacturing operation. In terms of energy consumption, the sub-project is viewed as conservation neutral, except in that positive gains may be obtained through the utilization of more modern and efficient electrical systems. Evaluation of these potential impacts at appraisal indicated that the sub-project has included appropriate measures in the form of fugitive emission containment, operational leakage detection, secure storage facility design and confined space ventilation to mitigate these impacts. It was the appraisal mission's conclusion that the sub-project falls within the scope of the World Bank Category B project for purposes of environmental evaluation.

4.29 At appraisal, the enterprise was in the process of obtaining preliminary environmental approvals for the sub-project with the local authorities on its own initiative. Under Russian

TABLE 4.5

JSC "SIBIAR"

FINANCIAL PERFORMANCE PROJECTIONS (US$ x 1000)

(ASSUMING CAN PURCHASE INDEFINITELYAFTER FROM QUARTER 13 1998 AND NO CAN LINE INVESTMENT)

MODEL INCOME Statement (USD'000)	1997	1998	1999	2000
NET SALES REVENUES (Aerosol)	11 131	18 789	20 896	23 713
OPERATING EXPENSE (Aerosol)	(8 037)	(16 843)	(19 417)	(19 829)
Net Cost savings (ODS-project)		200	713	713
NET OP. INC. BEFORE DEPR.	3 094	1 946	2 828	5 445
Total depreciation	328	328	328	328
NET OP. INC. BEFORE INT(Aerosol)	2 767	1 618	2 500	5 117
NET OP. INC. BEFORE INT(non-Aerosol)	211	211	211	211
TOTAL NET OP. INC. BEFORE INT	2 978	1 830	2 712	5 329
Net Interest on Bank Credits	(225)	(59)	-	-
NET OPERATING INCOME	2 753	1 770	2 712	5 329
Other Income(net)	(431)	(431)	(431)	(431)
NET INCOME BEFORE TAX	2 322	1 339	2 281	4 898
Profit Tax (17.5%)	406	234	399	857
NET INCOME AFTER TAX	1 916	1 105	1 882	4 041
Add Back Depreciation	328	328	328	328
Net Cash Flow	2 244	1 433	2 209	4 368
Change in working capital	(154)	(766)	(211)	(282)
Cash flow from operations	2 089	667	1 999	4 087
Principal Payments on Loans	(256)	(340)	-	-
Proceeds from sale of shares	-	1 500	-	-
Available for Investments and Distributions	1 834	1 826	1 999	4 087
Enterprise Investment (own financing)	14	2 240	500	-
Free cash flow	1 819	(414)	1 499)	4 087
Memorandum Item: Operational Margin	28%	10%	14%	23%

legislation, this requires the documentation of the development proposed and its submission to the Novosibirsk City Environmental Committee for an formal environmental expertise. The completion of this work should be a condition of signing the Sub-Grant Agreement and the receipt of regulatory clearance for implementation will be a condition of disbursement. Upon completion of final design and equipment selection, additional documentation is required to complete the approval process and allow commissioning and operation of the sub-project. The costs of completing this, along with additional monitoring facilities which are anticipated to be required, have been provided for in the sub-project cost estimate and are proposed for funding as part of the sub-grant.

G. Sustainability

4.30 The appraisal mission concluded that the proposed project was sustainable, subject to realization of a number of key assumptions. The enterprise has an established track record within its market area and has demonstrated an ability to respond to market and corporate financial conditions in its marketing policies. Given its position in the Siberian and Far Eastern markets in Russia and its proximity to emerging markets in Central Asia, the enterprise's medium-term prospects are good, particularly noting that it targets lower priced products, rather than high quality products more characteristic of imports and some other domestic suppliers. Technically, it offers strong operational capability as demonstrated by its ability to maintain aging equipment and facilities at relatively high levels of productivity. This capability should be able to capitalize on the plant modernization as contemplated under the sub-project. The major limitations on sub-project sustainability are identified as the financial capacity of the enterprise to support the level of investment involved and, to some degree, the enterprise's financial management capacity through a period where careful coordination of investment, pricing and external financing activities are required.

H. Benefits

4.31 The major direct benefit of the sub-project is the phase-out of 3,971 MT/year of ODP consumption capacity, based on the current plant capacity and the appraised consumption utilizing the average of the three years prior to first phase-out investment. Latent consumption potential based on full capacity utilization is approximately 4,520 MT/year ODP. Phase-out at Sibiar has broader significance in that it represents one of the largest traditional consumers of ODS in the country. Furthermore, it is the aerosol consumer with the least economic motivation to undertake phase-out. Its location reduces the inherent economic advantages of using HAP, particularly in light of its being targeting by at least one ODS producer providing price discounts which approach the unit price of HAP. For the region, the long-term survival of this enterprise adds to the diversification of a regional economy, traditionally heavily dependent on military production and resource extraction.

I. Risks

4.32 The primary financial risk associated with the sub-project is associated with its affordability and dependence on realization of a combination of key assumptions. These include the ability to achieve significant recovery in sales and markets, the sustainability of operating cost reductions, the attraction of additional financing through a major share issue, and the ability to maintain high levels of production from aging equipment while the sub-project is being implemented. Failure to achieve any or all of these will result in a significant decrease in the enterprise's ability to meet its contribution obligations, putting the achievement of phase-out objectives at risk. The sub-project has been structured to allow mitigation of these risks by providing an opportunity to reduce its scope during implementation to a level more affordable to the enterprise. This will require a strict conditioning regime along with financial performance monitoring and specific demonstration of financial capacity prior to making the sub-project's largest capital commitment.

4.33 The sustainability of the enterprise's commitment to the sub-project represents a risk in that it is apparent that the main motivation for pursing GEF funding is for modernization of production facilities, particularly the can making operation which is at the end of its useful life. In isolation, this investment component does not contribute directly to phase-out and would be equally useful using ODS. As noted earlier, the location and current marketing strategy of at least one major ODS producer make continued use of ODS propellants more competitive with HAPs, than is the case with most such plants. For this reason, it is fundamental that initial investment be directed at the conversion of filling capacity and removal of residual capability to revert to HAP. Careful conditioning of the Sub-Grant agreement with associated monitoring will be required to ensure this occurs.

4.34 Sub-project implementation risks are largely associated with the schedule and, specifically, the completion of detailed engineering work, which is, in turn, critical to major procurement activities associated with the supply of major equipment. Substantive progress in this is necessary in the fourth quarter of 1997. The enterprise has acknowledged this at appraisal and initiated the process of engineering and procurement consultant selection, with the support of the ODS IPU. Realization of such progress should be a condition of Sub-Grant Agreement signing, as a demonstration that the sub-project is in a position to proceed with disbursement for the major elements required for phase-out realization.

4.35 The technical and safety risks associated with the project appear to be well managed. The technology selection involves proven technology with an established record internationally. The enterprise has strong in-house technical operating capacity and access to external expertise that is capable of managing the sub-project. The safety risks are addressed through the use of suitably designed Western equipment, training and operational practices. As further assurance, the sub-project includes an independent safety audit

J. Conditionality

4.36 The terms and conditions set out in the standard Sub-Grant Agreement form agreed between the Bank and ODS IPU for the Project would cover the general conditionality requirements applicable to this sub-project and were reviewed with the enterprise at appraisal. In addition, the following sub-project specific provisions are to be included in the Sub-Grant

Agreement:

a) The demonstration of the available capacity to meet the projected 1998 enterprise contributions shall be specified as a condition of Bank "No objection" to contracts for the HAP filling lines, and HAP storage and handling equipment contracts. This will specifically include the results of the planned share issue in early 1998;

b) The demonstration of the enterprise's ability to meet its obligations respecting the purchase of the can production equipment, based on the availability of additional equity and/or debt financing and confirmation of sales forecasts shall be specified as a condition of Bank 'no objection" to contracts for the can production equipment. In addition, disbursement of more than 50% of the value of the contract for this equipment shall be conditional on satisfactory demonstration that CFC-based filling equipment and CFC storage and handling infrastructure has been dismantled and destroyed;

c) Financial reporting conditions contained in the Sub-Grant Agreement shall specify monthly reporting of sales, can production levels, sales revenue, and operating costs. In addition, submission of quarterly income statements shall be prepared on a basis comparable to those used in the above financial projections, and submitted;

d) Substantive progress, acceptable to the Bank and SCEP, in detailed design and in the preparation of the proposed site for the HAP storage and handling facilities shall be demonstrated as a condition of Sub-Grant Agreement signing;

e) Contracting of the procurement consultant will be a condition of Sub-Grant Agreement signing;

f) Safety audit results, covering the detailed design, equipment specifications and selected supplier technical proposal shall have been completed and the practices and procedures related to the implementation of safety measures undertaken for the sub-project shall be documented, as a condition of Bank "No objection" to contracts for the HAP filling lines, HAP storage and handling equipment, and can production equipment contracts;

g) Environmental evaluation and associated approval documentation, consistent with World Bank Category B requirements will be submitted for the Bank's review and "no objection" as a condition of disbursement. This will include a satisfactory demonstration of the site's acceptability for the sub-project development; and

h) The Sub-Grant Agreement will contain a binding undertaking by the enterprise to destroy the two primary CFC filling lines, and CFC storage facilities, and to convert or destroy the CFC-based security gas filling line. Satisfactory documentation demonstrating that this has been accomplished will be submitted to SCEP and the Bank as a condition of the final disbursements against the contracts for the filling lines and HAP equipment.

K. Recommendation

4.37 This sub-project is recommended for grant funding from the Global Environmental Facility Trust Fund in the amount of US$13,141,270, subject to signing of a Sub-Grant Agreement with the Russian Federation State Committee for Environmental Protection, acceptable to the Bank

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

V. MARIHOLODMASH

A. Background

5.1 Mariholodmash is a commercial refrigeration equipment manufacturer located in Yoshkar-Ola, the principal city of the Mari-El Republic in the Central Volga Region of the Russian Federation. The main plant was originally established in 1941, based on a munitions facility moved from Kiev. The manufacture of commercial refrigeration equipment began in 1972 and was developed to a capacity of 100,000 units per year by 1990. In 1992, the enterprise became a privatized open joint stock company. The current ownership is 100% Russian, with stock held primarily by employees and former employees (80%). The remaining minority interest (20%) is held by JSC "Antey". The enterprise currently operates two manufacturing facilities: the main plant in Yoshkar-Ola; and a smaller plant located approximately 50 km. from the city. In addition, it has its own design and research center along with subsidiaries devoted to sales, distribution and servicing. It also has an extensive dealer/service network involving 160 representative firms,primarily in Russia, but also in Ukraine, Estonia, Latvia, Lithuania, Belarus, Moldova, Uzbekistan, and Kazakstan.

5.2 ODS phase-out opportunities at Mariholodmash were originally identified during the development of the Russian Federation Country Program in 1994[1] which was undertaken with the support of the Danish Environmental Protection Agency. Technical preparation was first documented as two separate sub-projects, one each for conversion of CFC-11 to cyclopentane, and CFC-12 to HFC-134a in 1996[2]. On this basis, they were included as candidate sub-projects within the second tranche of the overall Project[3] as approved by the GEF in April 1996. At that time, the total incremental investment costs were estimated to be US$1,579,000 and US$503,000 with GEF grant financing of US$356,000 and US$153,000 being proposed for the CFC-11 and CFC-12 phase-out sub-projects respectively. In March 1997, an enterprise financial viability assessment and sub-project update was undertaken, with a follow-up pre-appraisal verification of additional information being completed in June, 1997[4]. In July 1997, a joint CPPI/World Bank appraisal mission visited the enterprise to complete sub-project processing. During appraisal, it was decided to combine the two sub-projects into a single one. The results of this appraisal are documented in the following.

5.3 The enterprise manufactures four general classes of commercial refrigeration equipment (refrigerated cabinets, display counters and show cases, ice cream conservators and cold rooms), along with a range of other products, the most important of which is furniture and commercial

---

1 *Phaseout of Ozone Depleting Substances in Russia*, COWI, August 1994

2 *Assistance for Project Preparation: Aerosol and Refrigeration Sectors* , COWI, February 1996

3 *Global Environmental Facility, Russian Federation Ozone Depleting Substances Phase-out Project, Project Document*, The World Bank, May 1996

4 *Financial Viability Assessment, Marikholodmash, Yoshkar-Ola*, COWI, June 1997

counter assemblies. Historically, some military production was also undertaken but this has largely been discontinued. Commercial refrigeration equipment production peaked in the early 1990's when the plant's full capacity of 100,000 units per year was utilized. This declined after 1992 to the current level of approximately 20,000 units per year, although this production level has been stable since 1995. This period has also seen a shift on emphasis to refrigerated counters and display cases and away from cabinets and cold rooms. Table 5.1 provides a summary of production levels from 1993 to the present. 90% of sales are made on the basis of barter arrangements, mainly through the dealer network that arranges supply of raw materials. Most of the production is sold in European Russia (72%) with smaller markets in the Urals (10%) and Siberia (10%). Exports (2%) are limited to other countries of the FSU.

5.4 Traditionally, the enterprise's main competition were manufacturers within the FSU. However, other Russian manufacturers are operating at low production levels and imports from other CIS countries are limited. Mariholodmash appears to be the last remaining viable manufacturer in Russia for counters, display cases and ice cream conservators. Its main competitors for these products are Polish, Italian and Spanish manufacturers, all of whom sell at higher prices. Sovitalpromash is the main domestic competitor for refrigerated cabinets and cold rooms, although their production levels are low, reflecting a poor market for these products generally. The enterprise's product lines are of good quality but dated in design. This is being addressed by the introduction of redesigned counter and show case lines that now make up approximately 20% of these line's production. Overall, the enterprise appears to have a competitive product with reasonable growth potential in the domestic market.

5.5 The enterprise's product lines were originally based on the use of CFC-11 to blow insulating foam and CFC-12 to charge refrigeration circuits employing domestically manufactured CFC-12 compressors. A decision was made in 1994 to phase-out ODS for foam blowing and refrigerants, initially by using transitional substances (HCFC-141b and HCFC-22), and eventually with full conversion to non-ODS alternatives (cyclopentane, HFC-134a, and HFC-404a). HCFC-141b blowing agents were introduced in 1993, along with some substitution of polystyrene slabs that are manufactured by the enterprise using non-ODS blowing agents. From 100% CFC-11 use in 1992 (14.0 MT), this has declined to about 30% of blowing agent use in 1996 (4.6 MT). While limited amounts of HCFC-22 refrigerant have been used for many years, significant amounts began to be substituted in 1994 and limited use of HFC-404a began in 1995. Consumption of CFC-12 has dropped from 22.4 MT to 13.2 MT between 1992 and 1996 with HCFC-22 being used in all larger capacity units, except for HFC-404a use in limited production runs of certain cold room units. A variety of imported compressors from Belarus, Bulgaria and France are now used, in addition to compressors from Yaroslaval Holodmash in Russia. Table 5.1 provides a profile of blowing agent and refrigerant consumption by product type over this period including projected 1997 data, as well as summary ODS consumption data since 1992.

5.6 Substantive investment in the ultimate phase-out of ODS began in 1995. Since that time, construction of a new building suitable for a consolidated production facility using flammable substances has been completed. In addition, a modern foaming machine of Western European manufacture and suitable for conversion to cyclopentane was purchased in 1995, and a number of Western refrigerant charging machines with associated pumps and service tools were purchased

TABLE 5.1
ANPO Marikholodmash
Historical Refrigerant and Blowing Agent Consumption

PRODUCT/ YEAR	PRODUCTION UNITS	CFC-12 (kg)		HCFC-22 (kg)		CFC-11 (kg)		HCFC-141b (kg)		R-404a (kg)	
		PER UNIT	AGGREGATE	PER UNIT	AGGREGATE	PER UNIT	AGGREGATE	PER UNIT	AGGREGATE	PER UNIT	AGGREGATE
1993											
Cabinet	17,168	0.90	10,250	1.00	0	0.23	7,440				
Ice Cream	14,871	0.70	7,012	0.80	1,000	0.20	3,850				
Conservator											
Display Cases	2,114	0.80	1,138	1.00	0	0.19	920				
Coldrooms	5,989	0.00	0	1.80	2,200	0.86	5,190				
Sub-Total	40,142		18,400		3,200		17,400				
1994											
Cabinet	5,121	0.90	3,050	1.00	0	0.23	1,300	0.23	450		
Ice Cream	8,749	0.70	4,100	0.80	1,943	0.20	2,450	0.20	400		
Conservator											
Display Cases	10,427	0.80	7,250	1.00	3,250	0.19	2,850	0.19	427		
Coldrooms	2,886	0.00	0	1.80	5,190	0.86	2,500	0.86	950		
Sub-Total	27,183		14,400		10,383		9,100		2,227		
1995											
Cabinet	4,900	0.90	4,400	1.00	2,100	0.23	1,300	0.20	500		
Ice Cream	9,989	0.70	7,000	0.80	1,000	0.20	1,660	0.20	750		
Conservator											
Display Cases	6,101	0.80	3,600	1.00	2,850	0.19	1,430	0.19	600		
Coldrooms	2,194	0.00	0	1.80	3,900	0.86	2,410	0.86	524	1.00	50
Sub-Total	23,184		15,000		9,850		6,800		2,374		50
1996											
Cabinet	3,877	0.9	3,500	1	2,740	0.23	892	0.23	495		
Ice Cream	7,313	0.7	4,920	0.8	2,910	0.2	1,460	0.2	515		
Conservator											
Display Cases	6,994	0.8	4,780	1	2,751	0.19	1,262	0.19	510		
Coldrooms	1,147	0	0	1.8	2,065	0.86	986	0.86	980	0.13	150
Sub-Total	19,331		13,200		10,466		4,600		2,500		150
1997 (First Half Yr.)											
Cabinet	2,123	0.9	1,910	1	6,790	0.23	600	0.23	280		
Ice Cream	3,228	0.7	2,415	0.8	2,582	0.2	589	0.2	300		
Conservator	3,796	0.8	2,843	1	3,796	0.19	721	0.19	340		
Coldrooms	826	0	0	1.8	1,487	0.86	710	0.86	710	0.13	150
Sub-Total	9,973		7,168		14,655		2,620		1,630		150
Pro-Rated for Whole Year	19,946		14,336		29,310		5,240		3,260		300

YEAR	CFC-12 (MT)		HCFC-22 (MT)		CFC-11 (MT)		HCFC-141b (MT)		TOTAL (MT)	
	ODS	ODP	ODS	ODP	ODS	ODP	ODS	ODP	ODS	ODP
1992	22.40	22.40	1.25	0.06	14.00	14.00	-	-	37.65	36.46
1993	18.40	18.40	3.20	0.18	17.40	17.40	40.14	4.42	79.14	40.40
1994	14.40	14.40	10.38	0.57	9.10	9.10	27.18	2.99	61.06	26.62
1995	15.00	15.00	9.85	0.54	6.80	6.80	23.18	2.55	54.83	24.89
1996	13.20	13.20	10.47	0.56	4.60	4.60	19.33	2.13	47.60	20.49
1997 (Estimated)	14.34	14.34	29.31	1.61	3.26	3.26	19.95	2.19	66.86	21.41

in 1995 and 1996 in preparation for the higher demands of HFC refrigerants and polyol ester lubricants.

5.7 The current production facilities consist of three main refrigerant equipment assembly lines plus an experimental product line and a line for producing solid (non-insulating) polyurethane details for both refrigeration equipment and commercial catering furniture in the Yoshkar-Ola plant. Cold room panels are manufactured at the second plant site outside of the city. Existing foaming equipment consists of: a) five dated high pressure foam injection machines (three in the main plant and two at the remote plant) manufactured in East Germany (Truisioma) and which are unsuitable for cyclopentane conversion; b) one new Italian foam injection machine (SAIP) suitable for cyclopentane conversion; and c) associated jigs and molds for the various product lines based on ODS and transitional substance blowing agents. Existing refrigeration equipment consists of : a) range of locally and in-house manufactured production line charging machines and vacuum pumps, b) eight new western portable charging units, six of which are used in the plant assembly operations and two of which are used by the company's own service teams; and c) twenty new universal electronic leak detectors.

B. Objectives

5.8 The objective of the sub-project proposed by Marikholodmash is to complete the phase-out of ODS in the manufacture of commercial refrigeration equipment through conversion of foam blowing technology to cyclopentane and refrigerant charging to HFC-134a. In addition, the servicing capacity to recover and recharge existing ODS containing equipment and to maintain new equipment using non-ODS refrigerants is to be provided.

5.9 The objective of this sub-project appraisal is to verify the eligibility of the sub-project for GEF funding. This specifically includes: a) confirmation of the sub-project's physical and technology selection; b) verification of current and historic ODS consumption information; c) verification of the estimated sub-project incremental investment and operating costs; d) determination of eligible costs and their allocation to the grant; e) documentation of sub-project procurement and implementation plans; f) verification of enterprise financial viability in the medium term, including the enterprise's capacity to support its contribution requirements; g) evaluation the environmental implications of the sub-project; h) confirmation of the adequacy of proposed safety measures; and i) recommendation of appropriate conditions for the Sub-Grant Agreement.

C. Sub-Project Description and Cost Estimates

5.10 **Sub-Project Scope.** The overall scope of the appraised sub-project covers the complete conversion of all manufacturing operations from the use of ODS to non-ODS substances and addition of appropriate servicing capacity to support the non-ODS refrigerants as well as to recover and recycle CFC-11 where practical. Its principal components are: a) the conversion of present CFC-11 and HCFC-141b based foam blowing operations to cyclopentane; b) replacement of refrigerant charging and servicing equipment to allow use of HFC-134a and HFC-404a

refrigerants in the near term and c) consolidation of production at the new plant facility in Yoshkar-Ola designed for the non-ODS blowing agents and refrigerants. Secondary incremental investment components are: a) engineering and development work associated with infrastructure design and product modification, b) environmental assessment and approvals; c) training; dismantling and destruction of equipment and facilities utilizing ODS; and d) undertaking appropriate safety measures for the use of flammable substances.

5.11 **Incremental Investment Costs.** Table 5.2 provides the detailed investment cost estimate developed at appraisal for the complete sub-project. This lists the specific investments items included within the overall sub-project scope defined above. It is based on actual costs incurred to date, second quarter 1997 quotations for remaining major equipment purchases and works remaining, and indicative estimates for minor works, in-house design and project management and consulting support services. The total sub-project incremental investment cost is US$4,281,858 inclusive of applicable taxes and 10% physical contingency. Of this, the enterprise has invested US$2,135,083 to date of appraisal on implementation of interim phase-out measures and preparation for full phase-out as noted above. Remaining incremental investment required is US$2,146,775, primarily in conversion to cyclopentane, completing modernization of the production refrigerant charging equipment and completing the new production facility. The appraisal mission noted that the total incremental investment costs of the combined sub-project had increased by a factor of 2.35 since its original proposal to the GEF. This increase is attributable to the more comprehensive scope of the appraisal estimate and to the high inflation rate applicable to local costs in 1995 and 1996 which were not reflected in the original estimates.

5.12 **Foam Blowing Conversion.** The remaining investment in the cyclopentane conversion consists of the following:

a) Two new foam injection machines suitable for cyclopentane use, complete with installation and commissioning support, and training;

b) Modification of the previously purchased Western foam injection machine for cyclopentane;

c) Ventilated enclosures for all foam injection machines;

d) Central cyclopentane and polyol storage facilities complete with distribution piping to the mixing equipment;

e) Cylcopentane/polyol blending facilities and day tank servicing all three foaming machines;

f) Nitrogen and gas detection systems;

g) Installation of new equipment and relocation of existing equipment to the new production facility;

TAB5-2.xls25/11/97

TABLE 5.2

ANPO "MARIKHOLODMASH" COMMERCIAL REFRIGERATION FOAM AND REFRIGERANT CONVERSION SUB-PROJECT
ESTIMATE OF INCREMENTAL COSTS AND FINANCING SUMMARY

ITEM NO.	COST COMPONENT	PRE-AUG./95 EXPENDITURES		AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB=PROJECT COST	ENTERPRISE PRE-APPRAISAL	FINANCED POST-APPRAISAL	PROPOSED GEF FINANCED	SAFETY COSTS
						1997 (Aug.-Dec.)		'1998		'1999						
		LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN					
1.0	Cyclopentane Foam Blowing Equip.															
1.1	Polyol Storage Tanks (4)								29,920		7,480	37,400			37,400	
1.2	Polyol Intermediate Tank Storage (1)								74,800		18,700	93,500			93,500	93,500
1.3	Pentane Storage Tank (4)								42,240		10,560	52,800			52,800	52,800
1.4	Pentane Feed System to Blending Unit (1)								19,404		4,851	24,255			24,255	
1.5	Polyol/Cyclopentane Blending Unit (1)								101,640		25,410	127,050			127,050	
1.6	Polyol/Cyclopentane Mixture Tank (1)								8,800		2,200	11,000			11,000	
1.7	Polyol/Cyclopentane Recycle System (2)								14,080		3,520	17,600			17,600	
1.8	MSH Miscellaneous (1)								22,000		5,500	27,500			27,500	20,000
1.9	High Pressure Dispensing Machines (2)								247,368		61,842	309,210			309,210	103,069
1.10	Nitrogen Devices (2)								2,728		682	3,410			3,410	3,410
1.1	Portable Gas Detection Kit (1)								1,716		429	2,145			2,145	2,145
1.1	Spare Parts								23,672		5,918	29,590			29,590	
1.1	Documentation								16,368		4,092	20,460			20,460	
1.1	Transportation/Agent's Fees								26,070		6,518	32,588			32,588	
1.2	Installation/Commissioning Support and Training -New Equipment								30,710		7,677	38,387			38,387	
1.2	High Pressure Dispensing Machine (Pre-Appraisal Purchase)				100,000							100,000	100,000			
1.2	Head Modification - Recently Purchased High Pressure Dispensing Machine								44,000			44,000		44,000		44,000
2.0	Refrigerant Conversion Equipment															
2.1	Stationary Evacuation Units (8)								28,098			28,098		28,098		
2.2	Portable Evacuation Units (3)								3,977			3,977		3,977		
2.3	Leak Detectors H25 HFC (4)								37,706			37,706		37,706		
2.4	Leak Detectors L-790 (28)			6,320					3,263			9,583	6,320	3,263		
2.5	Plant Charging/Weighting Units-Large(2)								42,374			42,374		42,374		
2.6	Plant Charging/Weighting Units-Small (2)								15,862			15,862		15,862		
2.7	Portable Weighting/Charging Units (14)			12,216					10,381			22,597	12,216	10,381		
2.8	Recovery and Recycling Units (3)			5,452					5,949			11,401	5,452	5,949		
2.9	Service Repair/Diagnostics Package (5)								28,212			28,212		28,212		
2.10	Service Tools (6)			33,300								33,300	33,300			
2.1	Air Drying Units (2)								49,852			49,852		49,852		
2.1	Moisture Analyzers (4)								27,192			27,192		27,192		
2.1	Liquid Refrigerant Pump (1)								7,535			7,535		7,535		
2.1	Vacuum Pump (5)			5,105								5,105	5,105			
3.0	Construction and Installation															
3.1	Plant Upgrade for Cyclopentane Conversion															
3.1.1	Civil Works/Building Upgrading	200,000		1,698,040								1,898,040	1,898,040			
3.1.2	Electrical/Mechanical/HVAC/Piping			5,510				73,367				78,877	5,510	73,367		28,019
3.1.3	Fire Fighting and Nitrogen Feed System							37,931				37,931		37,931		37,931
3.1.4	Explosion Proof Grounding			1,140				17,712				18,852	1,140	17,712		18,966
3.1.5	Explosion Proof Electrical/Alarms							70,331				70,331		70,331		70,331
3.1.6	Equipment Installation							70,000		15,345		85,345		85,345		64,009
3.2	Refrigerant Conversion															
3.2.1	Initial Plant Modifications			17,000								17,000	17,000			
3.2.2	Dismantling/Destruction Old Equipment									5,500		5,500		5,500		
3.2.3	New equipment Installation							15,400				15,400		15,400		
3.2.4	Power Supply Installation							4,950				4,950		4,950		
3.2.5	Ventilation System							4,950				4,950		4,950		

TAB5-2.xls25/11/97

TABLE 5.2

ANPO "MARIKHOLODMASH" COMMERCIAL REFRIGERATION FOAM AND REFRIGERANT CONVERSION SUB-PROJECT
ESTIMATE OF INCREMENTAL COSTS AND FINANCING SUMMARY

PAGE 2

ITEM NO.	COST COMPONENT	PRE-AUG./95 EXPENDITURES		AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB=PROJECT COST	ENTERPRISE PRE-APPRAISAL	FINANCED POST-APPRAISAL	PROPOSED GEF FINANCED
						1997 (Aug.-Dec.)		'1998		'1999					
		LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN				
4.0	Engineering/Development Costs														
4.1	Cyclopentane Works Design					70,000		19,137				89,137		89,137	
4.2	Cyclopentane Development Costs							93,500				93,500		93,500	
4.3	Pre-Appraisal Development Costs			31,000								31,000	31,000		
4.4	Refrigerant Conversion Development Costs							60,500				60,500		60,500	
5.0	Environmental Documentation														
5.1	Initial Approvals			20,000								20,000	20,000		
5.2	Final Approvals					33,000						33,000		33,000	
6.0	Local Training														
6.1	Training For Cyclopentane Use							4,400		4,400		8,800		8,800	
6.2	Refrigerant Conversion Training							6,710				6,710		6,710	
7.0	Independent Safety Audit								25,000		30,000	55,000			55,000
8.0	Taxes														
8.1	Import Duties							56,492				56,492		112,984	
8.2	VAT					5,940		284,123		6,792		296,855		593,710	
	SUB-PROJECT TOTALS	200,000	-	1,835,083	100,000	108,940	-	819,503	990,917	32,037	195,379	4,281,859	2,135,083	1,618,228	881,895

FINANCING SUMMARY

	PRE-AUG./95 EXPENDITURES		'AUG./95 - JULY 97 EXPENDITURES		POST APPRAISAL EXPENDITURES						TOTAL SUB-PROJECT EXPENDITURES			
					1997 (Aug.-Dec.)		'1998		'1999					
	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN		LOCAL	FOREIGN	TOTAL
ENTERPRISE FINANCING	200,000	-	1,835,083	100,000	108,940	-	819,503	304,401	32,037	-		2,995,563	404,401	3,399,964
PROPOSED GEF GRANT	-	-	-	-	-	-	-	686,515	-	195,379		-	881,894	881,894

h) Installation of a fixed foam extinguishing system, automatic alarm system, explosion proof lighting and electrical distribution system in the new production facility;

i) Dismantling and destruction of old foaming machines and ODS storage and handling infrastructure; and

x) Modification of product design to accommodate the lower insulating properties of cyclopentane.

5.13 The appraisal team judged all of the above investments to be required technically to complete phase-out of ODS used for foam blowing. The selection of cyclopentane technology is consistent with current practice throughout the world in moving to zero ODP alternative, as well as offering low Global Warming Potential (GWP), consistent with the GEF Operational Strategy. The enterprise is proposing to purchase the two new foaming machines, cyclopentane and polyol storage, blending and mixing equipment, portable gas detection equipment and nitrogen system as a complete package (Table 5.2, Items 1.1 to 1.15 inclusive). The supplier of this package will be named as the sub-project's primary technological partner, once identified. Equipment necessary for modifications of the existing foam dispensing machine will be sourced from the original supplier of this equipment (Table 5.2, Item 1.17). Installation of ventilation, electrical, fixed alarm and fire protection systems, equipment installation, and destruction of existing ODS based infrastructure and equipment will be provided within the scope of finishing the new production facility (Table 5.2, Item 3.1). Product design modifications will be done by the enterprise's own forces (Table 5.2, Item 4.1 and 4.2).

5.14 **Refrigerant Conversion.** The remaining investment in refrigerant conversion consists of the following:

a) Programmable charging/weighting units for production;

b) Stationary evacuation units for production;

c) Production line leak detectors:

d Liquid refrigerant pump;

e) Air drying and moisture analyzing equipment;

f) Additional portable evacuation, charging/weighting and leak detection equipment for servicing;

g) Recovery and recycling units for servicing;

h) Service repair/diagnostic packages and tools;

i) Re-design of product range for HFC-134a and HFC-404a use;

k) Installation of new equipment, ventilation systems and power supply; and

l) Dismantling and destruction of old equipment.

5.15 The appraisal team judged all of the above investments as being necessary technically for the conversion to non-ODS refrigerants in the near term. Programmable charging equipment, air drying equipment and moisture analyzers are required for adequate moisture level control when using HFC refrigerants. The additional servicing equipment is required to adequately support the products using the HFC refrigerants and to provide capacity to recover and recycle ODS refrigerants. The selection of HFC-based refrigerant technology as the zero ODP alternative is considered the best practical choice available to the enterprise at this point. It is recognized that zero ODP refrigerants such as isobutane and hydrocarbon blends could be selected. This would offer lower GWP and are therefore more consistent with the GEF Operational Strategy. However, to date the application of this refrigerant technology has generally been restricted to small hermetically contained refrigerant charges, such as used in domestic refrigeration applications. The higher charges in commercial equipment, the historically higher leakage rates in this type of equipment, and restrictions on its placement in areas of public access have limited the development of this technology in commercial applications. As a consequence, a robust Western technology base does not yet exist to support Marikholodmash in pursuing this option at this time. Waiting until the technology is sufficiently mature would prolong ODS usage beyond the target phase-out dates. However, the enterprise is following these developments and is endeavoring to select equipment that could also be used for potential future conversion to hydrocarbon-based refrigerants.

5.16 **Costs Eligible for Retroactive Financing.** Review of the investments already undertaken by the enterprise, indicates that while these are legitimate incremental costs, none would qualify for retroactive financing under the terms of the GEF Grant Agreement. Some of these expenditures were made prior to August 1995, the earliest date for which retroactive financing would be possible under the Grant Agreement. The remainder involved procurement practices that would not meet the test of equivalency with World Bank competitive bidding procedures, since most were made on the basis of barter arrangements with pre-selected suppliers.

5.17 **Safety Costs.** Due to the introduction of a highly flammable substance, the sub-project provides for a number of safety measures in the form of specific investments and implementation of specific operational and audit practices. These are:

a) Design enhancements of the new cyclopentane foam blowing equipment for flammable service;

b) Modifications to the existing foaming machine to accommodate cyclopentane;

c) Ventilated enclosures around foaming machines to ensure any leakage or fugitive emissions are exhausted to atmosphere;

d) Installation of an audible alarm system set at 10% of the lower explosion limit for cyclopentane in air (2%) and devices to disconnect electrical supply at 20% of this limit;

e) Nitrogen supply system allowing cyclopentane to be flushed from molds after each forming process;

f) Grounding of all equipment and installation of a lightning conductor;

h) Explosion proof lighting and electrical supply system;

i) Fixed foam fire protection system;

j) Safety training for operators and technical staff in safe operating practices and emergency procedures;

k) Establishment of a trained safety team made up of operators and technical specialists, reporting to senior management (not production management), who have authority to shut down production in the event of dangerous situations developing; and

l) Undertaking a safety audit by an independent specialist and monitoring the new operation through visits during equipment installation and its commissioning.

Analysis of the sub-project cost estimates indicates that the total safety cost included within the sub-project is US$601,980. The specific items and associated costs are identified in Table 5.2.

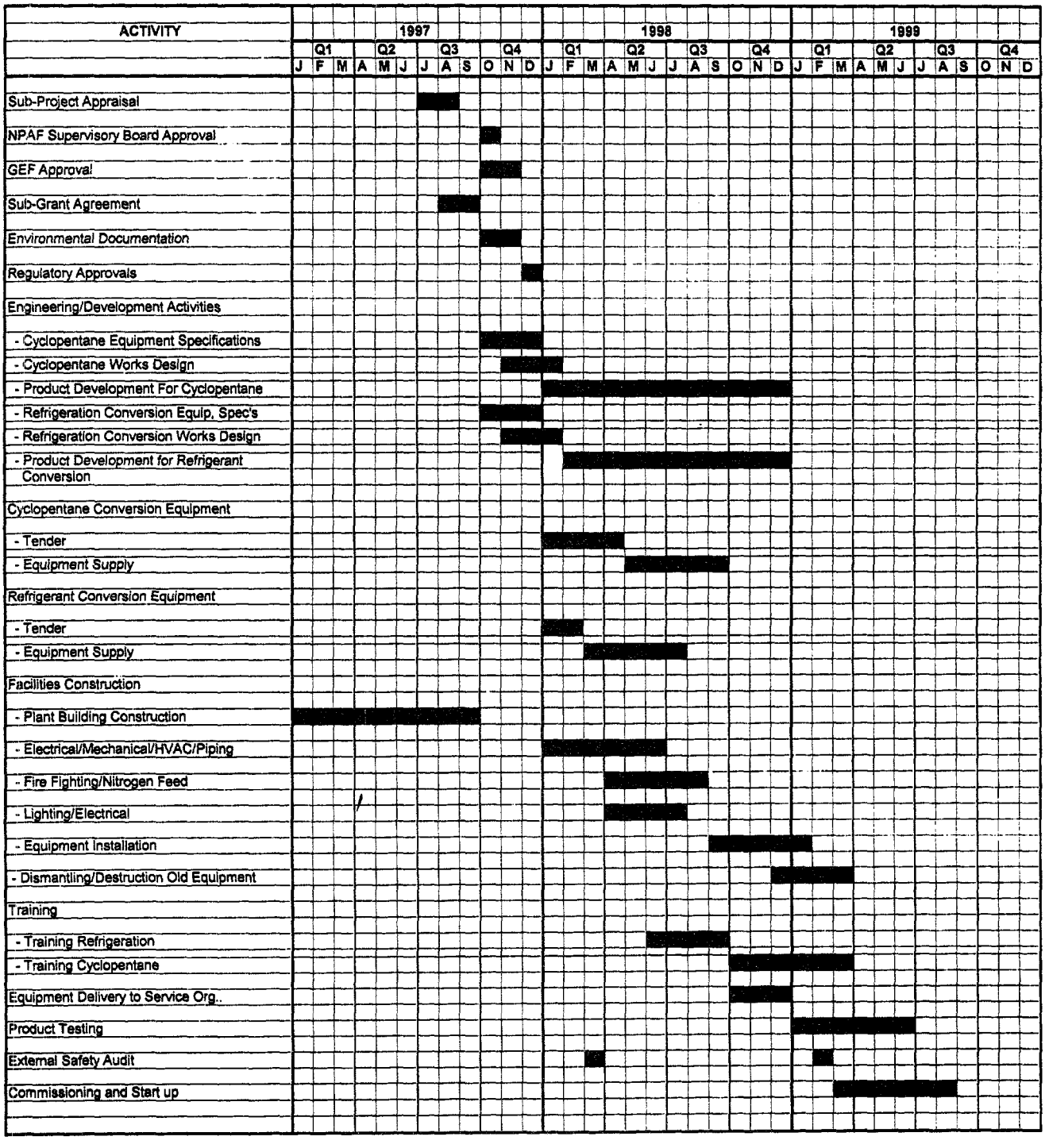
5.18 **Incremental Operating Costs.** The conversion to cyclopentane and HFC refrigerants involves an increase in operating costs. For the foaming conversion component, the estimated cost of cyclopentane is higher that CFC-11 (US$5.10/kg versus US$2.60/kg) but the cost per unit is marginally lower due to the lower per unit consumption rate of cyclopentane relative to CFC-11. However, the use of cyclopentane results in increases in polyol and isocynate consumption, thus an increase in costs. Labor, energy and other inputs remain unchanged. For the refrigerant conversion, the estimated cost of HFC-134a is higher than CFC-12 (US$4.96/kg versus US$2.61/kg) and approximately the same per unit consumption is involved. In addition, increased operating costs are associated with purchasing HFC-134a compressors, thermostatic valves and filter/dryers for production units. Other inputs remain unchanged. The net annual increase in operating cost based on average production and product mix for the years 1994 through 1996 is US$77,700 for the foam conversion and US$168,629 for the refrigerant conversion, for a total annual incremental operating cost increase of US$246,329.

D. Sub-Project Implementation

5.19 **Sub-Project Schedule.** The implementation schedule for completion of the ODS conversion will extend over a period of two years. Assuming that GEF, NPAF Supervisory Board, and outstanding regulatory approvals are obtained in the fourth quarter of 1997, major

FIGURE 5.1

ANPO "MARIKHOLODMASH" FOAM AND REFRIGERANT CONVERSION SUB-PROJECT
t SUB-PROJECT IMPLEMENTATION SCHEDULE



procurement activities and works construction will be undertaken in 1998, and the sub-project will be completed in September 1999 when full production with non-ODS technology will commence. This schedule is presented in Figure 5.1.

5.20 **Procurement Plan.** The overall procurement plan developed at appraisal is provided in Table 5.3 and summarized in Annex A. The enterprise has proposed that the GEF grant be allocated to the purchase of the cyclopentane foam blowing equipment which constitutes the major foreign expenditure remaining to complete conversion. This will be procured in accordance with World Bank Procedures[5] and the Project Grant Agreement as amended[6]. A single contract package procured competitively using IS procedures and valued at US$826,894 will be involved. In addition, it was agreed at appraisal that GEF funding would also apply to the independent safety audit to be undertaken by a western expert consultant in two stages during sub-project implementation. This contract, valued at US$55,000 will be governed by the World Bank Consultant Guidelines.[7] The remaining goods and services will be acquired by the enterprise as its contribution. It is their intention to acquire most goods, services and works for which they will have payment obligations, using their normal commercial practice that allows the use of barter arrangements. Such arrangements have been made and documented with the contractor currently undertaking the finishing of the new building facility to complete the remaining works (US$299,179). Engineering, project management and local training will be supplied by the enterprise's own forces. Remaining expenditures involve: a) the purchase of equipment for conversion of the existing high pressure foam dispensing unit to cyclopentane (US$44,000) on a sole source basis; b) purchase of foreign refrigerant conversion and servicing equipment (US$210,597) acquired using competitive commercial practice; iii) purchase of locally manufactured drying equipment (US$45,000) by a barter arrangement, and c) local consulting services associated with environmental approvals (US$33,000) to be selected on a sole source basis.

5.21 **Implementation Capacity.** Marikholodmash's capacity to manage the sub-project's implementation is judged to be good. The significant amount of conversion work undertaken at the enterprise's own initiative is evidence of this. Detailed plans for the completion of the work have been prepared by the enterprise and a high level of technical and project management capacity is readily available within the organization. The only area where assistance is felt to be required is in the administration of the World Bank procurement procedures as applied to the IS contracting of the cyclopentane foam blowing equipment and consultant contracting for the safety audit. For the IS package, it has been agreed at appraisal that the enterprise will provide a detailed technical specification and the ODS IPU will assist in the preparation of bidding documents, administering World Bank "No Objection", bid evaluation, and contract negotiations as required. It was also agreed that a condition of "No Objection" to selection of the foam blowing supplier equipment supplier is the completion of a satisfactory review of the technical specifications and recommended supplier proposals by the consultant undertaking the

---

5 *Guidelines For Procurement Under IBRD Loans and IDA Credits*, World Bank, August 1996.

6 *Global Environmental Facility Trust Fund Grant Agreement, GEF Trust Fund TF028314*, September 29, 1996, Amended, October, 1997

7 *Guidelines for the Selection of Consultants by World Bank Borrowers*, World Bank, January 1997.

TAB5-3.xls25/11/97

TABLE 5.3

ANPO "MARIHOLODMASH" FOAM AND REFRIGERANT CONVERSION SUB-PROJECT PROCUREMENT PLAN

DESCRIPTION OF GOODS, SERVICES, OR WORKS	NO. of PACKAGES	PACKAGE TYPE (Note 1)	ESTIMATED PACKAGE AMOUNT (US$)	FINANCING	PROCUREMENT METHOD (Note 2)	PROCUREMENT SCHEDULE		
						TENDER	AWARD	COMPLETE
Cyclopentane Foam Blowing Equip. Consisting of: - Polyol Storage Tanks (4) - Polyol Intermediate Storage Tank(1) - Pentane Storage Tanks(4) - Pentane Feed System (1) - Polyol/Cyclopentane Blending Unit(1) - Polyol/Cyclopentane Mixture Tank(1) - Polyol/Cyclopentane Recycle System(1) - High Pressure Dispensing Machines(2) - Nitrogen Devices (2) - Portable Gas Detection Kit(1) - Spare Parts(1 lot) - Documentation - Installation/Commissioning/Training Support	1	G	$826,894	GEF	IS	98/01/01	98/05/01	99/03/01
Head Modification - Recently Purchased High Pressure Dispensing Machine	1	G	$44,000	Enterprise	DC	N/A	98/01/01	98/05/01
Refrigerant Conversion Equipment Consisting of - Stationary Evacuation Units(8) - Portable Evacuation Units(3) - Leak Detectors H25 HFC(4) - Leak Detectors L-790(9) - Large Plant Charging/Weighting Units(2) - Small Plant Charging/Weighting Units (2) - Portable Charging/Weighting Units (1) - Recovery and Recycling Units (2) - Service Repair/Diagnostics Packages (6) - Moisture Analyzers (4) - Liquid Refrigerant Pump (1)	1	G	$210,597	Enterprise	IS	98/01/01	98/05/01	99/03/01
Air Drying Units (2)	1	G	$45,000	Enterprise	NS	98/04/01	98/06/01	98/09/01
Plant Upgrade for Cyclopentane/Refrgerant ConversionConsisting of: - Electrical/Mechanical/HVAC/Piping - Fire Fighting and Nitrogen Feed System - Explosion Proof Grounding - Explosion Proof Electrical/Alarms - Equipment Installation - Dismantling/Destruction Old Equipment - New equipment Installation - Power Supply Installation - Refrigerant Ventilation System	1	CW	$299,179	Enterprise	DC	N/A	98/01/01	99/04/01
Engineering/Development Consisting of: i) Cyclopentane Works Design ii) Cyclopentane Product Development iii) Refrigerant Product Development	1	N/A	$243,137	Enterprise	FA	N/A	N/A	99/01/01
Environmental Documentation	1	CF	$33,000	Enterprise	SSF	N/A	97/09/01	98/01/01
Local Training	1	CF	$15,510	Enterprise	SSF	N/A	98/07/01	99/04/01
Independent Safety Audit	1	CF	$55,000	GEF	SLF	97/12/01	98/03/01	99/03/01
SUB-PROJECT TOTAL			$ 1,772,317					

Note 1: G - Goods, CW - Civil Works, S&I - Supply and Install, TK - Turnkey, CF - Consulting Firm, CI - Individual Consultant, TR - Training.

Note 2: ICB - International Competitive Bidding, LIB - Limited International Bidding, NCB - National Competitive Bidding, IS - International Shopping, NS - National Shopping, DC- Direct Contracting, FA - Force Account, MW - Minor Works, SLF - Short Listed Firm, SLI - Short Listed Individual Consultant, SSF - Sole Source Firm, SSI - Sole Sourve Individual, LCP - Local Commercial Practice.

Note 3 : Four HAP tank cars purchased in 1997 in anticipation of project and to provide interim capacity using procurement practice equivalent to IS Procedures Eligibility subject to audit of procurement documentation.

independent safety audit. As a consequence, the selection of this consultant is critical to the schedule and must be initiated prior to or immediately upon Sub-Grant Agreement signing.

E. Enterprise Financial Evaluation and Sub-Project Financing

5.22 **Pre-Appraisal Enterprise Financial Viability Evaluation.** A detailed enterprise financial viability evaluation was conducted on Mariholodmash[8] in March 1997 and documented in a confidential report made available to the ODS IPU and the World Bank. The scope of this evaluation covered: a) review of accounting and management information systems; b) development and analysis of western-style income statements and balance sheets for the period 1992 through 1996; c) evaluation of the enterprise cost structure; d) analysis of enterprise financing capacity; e) identification of significant financial issues; and f) generation of financial projections involving several scenarios related to the enterprises circumstances and prospects.

5.23 The results of the pre-appraisal enterprise financial viability evaluation are summarized as follows:

a) The enterprise has remained profitable through the period evaluated despite the difficult economic conditions in the country and significant decline in sales volumes;

b) In 1996, the enterprise had US$44,130,000 in assets. Revenues were US$26,651,000 and an after tax income of US$2,418,000 was recorded. Profit margins were consistently above 20% up to 1996 when they fell to 11%. This was attributable to significant increases in raw material prices that were not reflected in selling prices and increased revenues until late in the year;

c) The enterprise has shown the capacity to make ongoing capital investments including initial investments in ODS phase-out and in developing new products;

d) The enterprise operates adequate accounting and management systems suitable for its operations and sufficient to support external audit requirements which have been done since 1995;

e) The enterprise's sales and revenue projections are considered conservative and realistic in the absence of any increase in marketing efforts beyond the areas in which they are established;

f) The enterprise operates almost completely on a barter basis with only 10% of its sales being cash transactions. This limits the enterprise's ability to pay taxes and purchase foreign equipment, both of which will be required for sub-project implementation;

g) Major liabilities at the end of 1996 are a short term debt to a local bank of US$414,000 and an outstanding federal tax debt of US$1,900,000;

---

[8] *Financial Viability Assessment, Marikholodmash, Yoshkar-Ola*, COWI, June 1997

h) The only near-term major capital investment plans or obligations in addition to the ODS conversion investments were commitments to contribute to federal programs associated with strategic development of the refrigeration sector (Program Xolod) and a regional environmental program (Volga River Program). Subject to federal funds being available these commitments involve US$8,865,441 between 1997 and 2000 inclusive;

i) The ability to settle short-term debt, tax arrears and pay for a significant portion of the required ODS phase-out investment by barter arrangements were identified as the most significant financial issue in the enterprise being able to fulfill its commitments to the sub-project; and

j) The initial financial projections made for the years 1997 through 2000 indicated that, under all variations of sales projections (base case, pessimistic case and optimistic case), a cash flow short fall will exist in the first year of sub-project implementation that would have to be filled by external borrowing. However, the medium-term prospects for the enterprise to remain viable beyond this are positive.

5.24 **Appraisal Enterprise Financial Viability Verification.** At appraisal, the above financial viability evaluation was updated, with specific reference to the issues identified above. The following summarizes the information obtained and results of the updated evaluation:

a) Mariholodmash presented documentation regarding the settlement of both short-term debt obligations and tax arrears using barter arrangements, both of which have been completed in the first half of 1997;

b) Contractual arrangements have been established with a local construction contractor to complete the required works under the sub-project with a barter arrangement, similar to that utilized for earlier work;

c) Analysis of Mariholodmash's financial results from the first five months of 1997 shows significant and sustainable growth in net profits, which when projected to the whole year gives a net profit of US$3,190,000;

d) Analysis of sales for the first five months of 1997 confirms management predictions respecting volume and margins; and

e) The enterprise presented a letter of credit from a local bank indicating a borrowing capacity in the amount of US$400,000.

5.25 **Maximum Allowable Grant.** Evaluation of documentation covering expenditures to date by the appraisal team indicated that investment on ODS phase-out was initiated by the enterprise in 1995 with the purchase of the foam blowing machine to be converted to cyclopentane, and of refrigeration charging equipment suitable for use with HFC-404a. On this basis, it was determined that the average annual ODS consumption for the years 1992 through 1994 could be used for purposes of establishing the maximum allowable grant as governed by the

threshold cost effectiveness mandated by the Montreal Protocol Multi-lateral Fund (MPMF) (15.21). This consumption was determined to be 32.0 MT (Table 5.1). The maximum grant allowable for eligible costs under the sub-project would be US$486,720. However, this is a small contribution in relation to the total incremental investment cost (US$4,281,858) and the remaining investment cost (US$2,135,083). Given the similarity in the major investments in this case to those in domestic refrigeration conversions, it is proposed that an allowance of the eligible safety costs (US$601,980) as is permitted by the MPMF for domestic refrigeration cyclopentane conversions also be applied in this case. This would provide a maximum eligible grant of $1,088,700.

5.26 **Eligible Costs.** It was determined at appraisal that, while all incremental investment costs defined above could theoretically be consider as eligible costs, eligibility will be largely limited by the procurement practices applied. The enterprise's historical dependence on barter arrangements and use of sole sourcing eliminates all expenditures to date from eligibility. Similarly, the use of barter and its own forces for local works, design and project management disqualify these costs. Of the remaining costs, the enterprise has only requested the grant to cover the equipment costs associated with the cyclopentane foam blowing conversion and the independent safety audit. The enterprise has agreed to purchase imported refrigerant conversion and servicing equipment as part of its contribution using competitive commercial practice or potentially barter arrangements as it has done in the past for such equipment.

5.27 **Proposed GEF Grant and Cost Effectiveness.** The proposed grant based on that requested by the enterprise and the application of procurement practices allowing expenditures to qualify for grant funding is US$881,895. On this basis and including safety costs, the sub-project cost effectiveness is $8.74/kg ODP which is below the MPML cost effectiveness threshold for commercial refrigeration investments.

5.28 **Enterprise Viability and Contribution Capacity.** The above information along with the cost estimates developed at appraisal and requested grant allocation based on eligible costs within the cost effectiveness threshold were utilized to prepare an updated financial projection for the period 1997 through 2000. This is based on the following assumptions: a) June 1997 exchange rates; b) fixed real sales prices as of June 1997; c) absorption of operating cost increases from the second half of 1999; and d) sales projections based on 5% annual growth from a base of actual first half 1997 sales projected to the full year. The results of these projections are presented in Table 5.4. Based on this, it is concluded the enterprise has the internal capacity to sustain its contribution to the sub-project on the basis of internally generated revenue, with in excess of US$2,000,000 in free cash flow over and above that required to support the sub-project and other investment obligations.. Similarly, the enterprise appears sustainable financially in the medium term after undertaking the required investment. However, it is also recognized that the nature of the enterprise's business practices and reliance on barter remains a constraint. As a consequence, external borrowing may be required to meet cash obligations, particularly in regards to foreign equipment purchases and import duties associated with them.

5.29 **Financing Plan.** The sub-project financing plan requires the financing of US$2,146,776 in post appraisal investment expenditures. The GEF Sub-Grant is proposed to provide

TABLE 5.4

ANPO "MARIHOLODMASH

FINANCIAL PERFORMANCE PROJECTIONS (US$x1000)

	1997	1998	1999	2000
NET SALES REVENUES	27 767	29 155	30 613	32 143
OPERATING EXPENSE	(21 633)	(22 715)	(23 851)	(25 043)
Incremental savings (ODS project)			-	-
Incremental costs (ODS project)			(185)	(246)
NET OP. INC. BEFORE DEPR.	6 134	6 440	6 577	6 854
Total depreciation	1 220	1 220	1 220	1 220
NET OP. INC. BEFORE INT (D)	4 913	5 220	5 357	5 634
				-
Net Interest on Bank Credits	173	-	-	-
NET OPERATING INCOME	4 741	5 220	5 357	5 634
Other Income(net)	(259)	(259)	(259)	(259)
NET INCOME BEFORE TAX	4 481	4 961	5 098	5 375
Profit Tax (17,5%)	784	868	892	941
NET INCOME AFTER TAX	3 697	4 093	4 206	4 434
Add Back Depreciation	1 220	1 220	1 220	1 220
Net Cash Flow	4 917	5 313	5 426	5 654
Cash flow from operations	4 917	6 339	6 504	6 786
Principal Payments on Loans	370	-	-	-
Payment of debt to budget (taxes)	1 940			
Available for Investments and Distributions	2 606	5 313	5 426	5 654
After tax budget payments	12	12	12	12
Social payments	857	857	857	857
Enterprise's share of ODS Investment	109	1 124	32	
Enterprise non-ODS Investments (HOLOD+Volga)	886	1 248	2 214	1 979
Free cash flow	742	2 072	2 311	2 805
Memorandum Item:				
Operational Margin	22%	22%	21%	21%

US$881,895 of this requirement. Estimated disbursements are provided in Annex A. The enterprise post appraisal investment contribution contributions of US$1,264,881 will be financed by a combination of barter arrangements, free cash flow and short term borrowing. In addition, the enterprise will finance an estimated annual increase in operating costs of US$246,329 associated with the conversion from ODS. This will be absorbed within the enterprise's present pricing structure of its various products.

F. Environmental Analysis

5.30 The principal environmental effect of the sub-project will be positive through the permanent elimination of ODS usage within the enterprise. The evaluation of the sub-project itself indicates that any negative environmental impacts would be associated with fugitive emissions of both cyclopentane and HFC-134a. Furthermore, cyclopentane's risk of flammability could cause consequential air emission in the event of it causing a fire in the facility. Evaluation of these potential impacts at appraisal indicated that the sub-project has included appropriate measures in the form of fugitive emission containment, operational leakage detection, secure storage facility design and confined space ventilation to mitigate these impacts. It was the appraisal mission's conclusion that the sub-project falls within the scope of the World Bank Category B project for purposes of environmental evaluation.

5.31 The enterprise has completed the first part of the environmental regulatory approval process required under Russian legislation. The sub-project has been documented and presented to the local environmental authorities for purposes of performing the required environmental expertise. The results of this expertise were positive and have been documented in a letter from the Ministry of Environment and Nature Protection, Republic of Mari El, dated July 23, 1997. This is sufficient approval for the enterprise to proceed with implementation. However, upon completion of final design and equipment selection, additional documentation is required to complete the approval process to allow commissioning and operation of the sub-project. The costs of completing this, along with additional monitoring facilities which are anticipated to be required, have been provided for in the sub-project cost estimate as part of the enterprise's contribution.

G. Sustainability

5.32 The appraisal mission concluded that the proposed sub-project is sustainable. Mariholodmash is a viable enterprise servicing a stable and potentially expanded market. The enterprise has survived a period of major economic dislocation in Russia and maintained a profitable operation. During this period, it has undertaken significant investments in ODS phase-out on its own initiative, as well as developing new product lines. It has shown the necessary flexibility to change product mix to respond to evolving market conditions, and has developed innovative commercial practices in response to the realities of local conditions in the transition to a market-based economy. This demonstrates that the enterprise has the technical and management capacity for continued operations in this business into the future, with significant potential for growth.

H. Benefits

5.33 The major direct benefits of the sub-project is the phase-out of 32 MT/year of ODP consumption capacity based on the current plant utilization and average consumption upon initiating phase-out. Latent consumption potential based on full capacity utilization is approximately 160 MT/year ODP. Taking into consideration the significant conversion to non-ODS and transitional substances, the actual phase-out benefits based on projected 1997 production will be 21.6 MT/year ODP.

5.34 The sub-project will support the operation of Russia's last major manufacturer of commercial refrigeration equipment during a period where the availability of this equipment is important to maintaining and modernizing the country's food distribution system. Historically the lack of such equipment has been a contributing factor in high losses of perishable foods during distribution. This has worsened in recent years as existing equipment reaches the end of its service life but is not replaced. The support for Mariholodmash provides a basis for provision of modern and affordable equipment in the market place.

5.35 The completion of ODS phase-out at Mariholodmash provides an opportunity for future introduction of emerging non-ODS technologies into this sector based on the strong technical capacity of this enterprise. In addition, the enterprise also represents a potential partner in future phase-out opportunities in the servicing sector where its extensive service network offers a possible vehicle for establishment of ODS recovery and recycling, as well as retrofit of existing equipment.

I. Risks

5.36 The major technical risks associated with the sub-project are associated with the enterprise's capacity to maintain it's contribution requirements. It can be anticipated that the enterprise will rely primarily on barter arrangements for this and has demonstrated that the necessary arrangements to accomplish this have been made for the acquisition of locally sourced goods and services. However, direct cash payment will be required for at least import duty obligations (US$56,492), potentially VAT (US$296,855), and likely the purchase of foreign-sourced equipment (US$254,597). The availability of US$400,000 in credit from a local bank to cover such obligations has been established, if internally generated cash flow is unable to cover this. However, the enterprise's management of these obligations requires monitoring during implementation and the Sub-grant Agreement should be conditioned to link grant funding to demonstration of enterprise contribution capacity, specifically that related to payment of import duties and VAT which will be required for the delivery of grant-funded equipment.

5.37 Other risks relate to the continued overall financial viability of the enterprise and schedule risks. The enterprise's financial viability is largely dependent on maintenance of sales and profit margins. These will require monitoring during implementation and should be explicitly provided for in the Sub-Grant Agreement as part of the financial reporting requirements. Schedule risks are largely associated with the timely receipt of approvals from the GEF, NPAF Supervisory Board and local environmental authorities, as well as negotiation of the

Sub-Grant Agreement. Other implementation or technical risks are considered minor and within the enterprise's direct control.

J. Conditionality

5.38 The terms and conditions set out in the standard Sub-Grant Agreement form agreed between the Bank and ODS IPU for the Project would cover the general conditionality requirements applicable to this sub-project and were reviewed with the enterprise at appraisal. In addition, the following sub-project specific provisions are to be included in the Sub-Grant Agreement:

a) The Sub-Grant Agreement provisions related to financial reporting shall include quarterly reporting of sales and prices on a comparative basis to those used in the above financial projections;

b) As a condition of "no objection" for the foam blowing equipment contract package, the enterprise shall demonstrate the availability and dedication of sufficient cash resources to pay for any import duty obligation;

c) Safety audit results, covering the detailed design, equipment specifications and selected supplier technical proposals shall have been completed and the practices and procedures related to the implementation of safety measures undertaken for the sub-project shall be documented, as a condition of Bank "No objection" to contracts for the foam blowing equipment ;

d) Environmental evaluation and associated approval documentation, consistent with World Bank Category B requirements will be submitted for the Bank's review and "no objection" as a condition of disbursement; and

g) The sub-Grant Agreement will contain a binding undertaking by the enterprise to destroy CFC-based foam blowing and refrigerant charging equipment. Satisfactory documentation demonstrating this has been accomplished will be submitted to SCEP and the Bank as a condition of the final disbursements against the contract for the cyclopentane foam blowing equipment.

K. Recommendation

5.39 This sub-project is recommended for grant funding from the Global Environmental Facility Trust Fund in the amount of US$881,895, subject to signing of a Sub-Grant Agreement with the Russian Federation State Committee for Environmental Protection., acceptable to the Bank.

PART II: Technical Annexes

RUSSIAN FEDERATION
OZONE DEPLETING SUBSTANCE CONSUMPTION PHASE-OUT PROJECT
SECOND TRANCHE APPRAISAL

ANNEX A-1

A. ESTIMATED GEF GRANT DISBURSEMENTS AND PROCUREMENT SUMMARY

Table A1: Estimated GEF Grant Disbursements
(US$ million)

Period	*SemesterDisbursements*	*Cumulative Disbursements*
Harmonia		
7/97-12/97	39,800	39,800
1/98-6/98	1,525,860	1,565,660
7/98-12/98	3,384,260	4,949,920
1/99-6/99	1,302,480	6,252,400
7/99-12/99	0	6,252,400
Total	6,252,400	
Chimprom		
7/97-12/97	13,200	13,200
1/98-6/98	1,021,373	1,034,593
7/98-12/98	1,468,874	2,503,447
1/99-6/99	1,193,293	3,696,740
7/99-12/99	1,395,574	5,092,314
Total	5,092,314	
Sibiar		
7/97-12/97	361,200	361,200
1/98-6/98	1,217,979	1,579.179
7/98-12/98	4,219,759	5,798.938
1/99-6/99	4,158,021	9,956,959
7.99-12/99	3,184,311	13,141,270
Total	13,141,270	
Mariholodmash		
7/97-12/97	0	0
1/98-6/98	355,758	355,758
7/98-12/98	330,758	686,516
1/99-6/99	195,379	881,895
7/99-12/99	0	881,895
Total	881,895	
Combined		
7/97-12/97	414,200	414,200
1/98-6/98	4,120,970	4,535,170
7/98-12/98	9,403,651	13,938,821
1/99-6/99	6,849,173	20,787,994
7/99-12/99	4,579,885	25,367,879
Total	25,367,879	

ANNEX A-2

RUSSIAN FEDERATION ODS PHASEOUT PROJECT

SUMMARY OF PROCUREMENT ARRANGEMENTS - SECOND TRANCHE
(US$ million equivalent)

Project	Procurement Methods			Total Cost
	ICB	Other	Nor Financed by GEF	
1.0 Works				
1.1 Installation/Infrastructure				
Harmonia	-	1.5 (1.4)	0.1	1.5 (1.4)
Chimprom		2.5(1.8)	0.7	2.5(1.8)
Sibiar		1.1(0.0)	1.1	1.1(0.0)
Marikiholodmash		0.3(0.0)	0.3	0.3(0.0)
Sub-Total		5.4(3.2)	2.2	5.4(3.2)
2.0 Goods				
2.1 Equipment/Machinery				
Harmonia		4.4(4.4)	0.0	4.4(4.4)
Chimprom		3.3(3.3)	0.0	3.3(3.3)
Sibiar	8.0(8.0)	4.5(4.5)	0.0	12.5(12.5)
Marikiholodmash	-	1.0(0.9)	0.1	1.0(0.9)
Sub-Total	8.0(8.0)	13.2(13.1)	0.1	21.2(21.1)
3.0 Consultancies				
3.1 Design/Environment/Procurement/ Safety/Training				
Harmonia		0.3(0.3)	0.0	0.3(0.3)
Chimprom		0.5(0.2)	0.3	0.5(0.2)
Sibiar		0.4(0.3)	0.1	0.4(0.3)
Marikiholodmash		0.4(0.1)	0.3	0.4(0.1)
Sub-Total		1.6(0.9)	0.7	1.6(0.9)
Totals	8.0(8.0)	20.2(17.2)	3.1	28.2(25.2)

Note: Figures in parenthesis are respective amounts financed by GEF

Others Includes:	
US$13.4 (13.1) million	International Shopping
US$3.2 (3.1) million	National Competitive Bidding
US$50.0 (0.0) thousand	National Shopping
US$2.5 (0.0) million	Direct Contracting
US$48.0 (0.0) thousand	Force Account
US$910.0 (910.0) thousand	Short Listed Firm
US$100.0 (0.0) thousand	Sole Source Firm