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Distr.
GENERAL

UNEP/OzL.Pro/ExCom/52/25
20 June 2007

CHINESE
ORIGINAL: ENGLISH

执行蒙特利尔议定书
多边基金执行委员会
第五十二次会议
2007 年 7 月 23 日至 27 日，蒙特利尔

对世界银行 2007 年工作计划的修正

基金秘书处的评论和建议

1. 世界银行请执行委员会核准 594,001 美元，用于修正其 2007 年工作计划修正案，外加 46,050 美元的机构支助费用。

2. 世界银行工作计划修正案提出的各项行动列于下表 1：

表 1：世界银行工作计划修正案

国家	活动/项目	申请供资额（美元）	建议供资额（美元）
A 节：建议一揽子核准的各项活动			
A1. 体制建设项目更新：			
约旦	体制建设更新：第七阶段	147,333	147,333
泰国	体制建设更新：第五阶段	346,668	346,668
体制建设项目小计：		494,001	494,001
A2. 区域技术援助项目：			
全球	评估氯碱行业四氯化碳淘汰情况	100,000	100,000
区域技术援助项目小计：		100,000	100,000
A 节和 B 节小计：		594,001	594,001
机构支助费用（7.5%用于项目编制、体制建设和超过 250,000 美元的其他活动，9%用于低于 250,000 美元的其他活动）：		46,050	46,050
共计：		640,051	640,051

建议一揽子核准的各项行动

A1. 更新体制建设项目

约旦：体制建设更新：（第七阶段）： 147,333 美元

泰国：体制建设更新： （第五阶段）： 346,668 美元

项目说明

3. 世界银行提交请求，要求更新约旦和泰国的体制建设项目。两国的体制建设项目说明载于本文件附件一。

基金秘书处的评论和建议

4. 基金秘书处建议按照表 1 所列供资数额一揽子核准约旦和泰国的体制建设更新请求。执行委员会谨建议向约旦和泰国政府表达本文件附件二所载评论。

A2. 区域技术援助项目

全球：氯碱行业的四氯化碳淘汰评估 ：100,000 美元

项目说明

5. 世界银行已提交一项研究供资要求，评估在氯碱行业作为加工剂的四氯化碳的淘汰情况。各项研究目标如下：

（a） 评估第 5 条国家和非第 5 条国家的氯生产过程中作为加工剂使用的四氯化碳的消费水平；以及

（b） 审查与氯生产过程中的四氯化碳淘汰有关的技术和/或生产过程，目的是确定符合成本效益的替代技术，改造第 5 条国家的氯碱行业。

6. 在开展研究时，本项目将着眼于全球氯碱行业的四氯化碳消费情况，审查该行业使用的无四氯化碳技术，审查第 5 条国家和非第 5 条国家的技术转换项目，并按照第 X/14 号决定审查各替代物，以最有利于环境、最符合成本效益的替代技术为基础，提供关于该行业技术转换的建议，并确保工人的安全。

7. 为比较不同的替代性备选方案，本提案建议最少由 5 个国家提供 5 个实例。本研究还将确保这 5 个实例体现第 5 条国家和非第 5 条国家经验之间的平衡。

8. 本研究将在 12 个月内完成，并于 2008 年向执行委员会最后一次会议提交最终报告。

基金秘书处的评论

9. 几乎没有确定与氟氯化碳具有相同的通用性和高效性的化学品，可用于替代氯碱行业使用的四氯化碳。许多第 5 条国家都生产氯，因此有必要审查各项备选方案，淘汰在该行业中作为加工剂使用的四氯化碳。

10. 世界银行提议的研究工作及其相关职权范围提供了一项氯碱行业替代物综合审查办法。列出了该办法的部分活动，描述了工作范围：应尽可能编写一份清单，列出有助于该行业的淘汰活动的化学品和方法，并允许第 5 条国家履行其对《蒙特利尔议定书》所做的承诺。

基金秘书处的建议

11. 基金秘书处建议按照上表 1 所示供资数额一揽子核准提案，开展与氯碱行业的四氯化碳淘汰有关的研究。

附件一

体制建设项目提案

约旦：体制建设更新

项目摘要和国情简介	
执行机构：	世界银行
以往核准的体制建设供资额（美元）：	
第一阶段：1992 年 6 月，1995 年 7 月	170,000
第二阶段：1997 年 5 月	113,333
第三阶段：1999 年 7 月	113,333
第四阶段：2001 年 7 月	143,333
第五阶段：2003 年 7 月	147,333
第六阶段：2005 年 7 月	147,320
共计	804,652
申请用于更新的供资额（第七阶段）（美元）：	147,333
建议用于核准第七阶段的供资额（美元）：	147,333
机构支助费用（美元）：	11,050
体制建设第七阶段向多边基金申请的费用总额（美元）：	158,383
按每公斤 12.1 美元计算的因体制建设第七阶段而淘汰的氟氯化碳等量（ODP 吨）	暂缺
国家计划核准日期：	1993 年 6 月
国家计划报告的消耗臭氧层物质消费量（1991 年）（ODP 吨）：	905.0
最新报告的消耗臭氧层物质消费量（2006 年）（ODP 吨）：	117.5
受管制物质基准消费量（ODP 吨）：	
(a) 附件 A 第一组（各类氟氯化碳）（1995 至 1997 年平均值）	673.3
(b) 附件 A 第二组（哈龙库）（1995 至 1997 年平均值）	210.0
(c) 附件 B 第二组（四氯化碳）（ 1998 至 2000 年平均值）	40.3
(d) 附件 B 第三组 (甲基氯仿) （1998 至 2000 年平均值）	18.2
(e) 附件 E （甲基溴）（1995 至 1998 年平均值）	176.3
受管制物质最新消费量（2006 年）（ODP 吨）：	
(a) 附件 A 第一组（各类氟氯化碳）	21.8
(b) 附件 A 第二组（哈龙库）	36.0
(c) 附件 B 第二组（四氯化碳）	1.1
(d) 附件 B 第三组(甲基氯仿)	2.2
(e) 附件 E （甲基溴）	42.6
(f) 附件 C 第一组（氟氯烃化合物）	13.8
核准项目供资额（美元）：	19,879,185
拨付额（截至 2007 年 3 月）（美元）：	17,308,970
将淘汰的消耗臭氧层物质（ODP 吨）：	1,916.8
已淘汰的消耗臭氧层物质（截至 2007 年 3 月）（ODP 吨）：	1,695.3

1. 各项活动摘要及执行秘书处核准的供资：

各项活动摘要		核准供资（美元）
(a)	投资项目：	17,936,274
(b)	体制建设：	870,951
(c)	项目编制、技术援助、培训和其他非投资项目：	1,071,960
	共计：	19,879,185

进展报告

2. 约旦的体制建设项目第五阶段已成功实施。约旦国家臭氧机构继续负责牵头协调该国的各种淘汰项目，并在第五阶段取得了多项成绩。最突出的成绩是，按照商定的约旦氟氯化碳淘汰计划，减少了氟氯化碳消费。还减少了约 25 吨甲基溴的使用。在体制建设项目的当前阶段，完成了对军队的培训和对教师的技术培训。在本阶段，国家臭氧机构还采取了多种举措，制订并实施提高认识的各项活动，并制作了“海关官员的消耗臭氧层物质快速甄别工具”海报，分发给所有海关官员和办公室。此外还制作并分发了公共海报，特别针对学校和以青年人为目标群体的其他类似场所。

行动计划

3. 在体制建设项目的下一个阶段，国家臭氧机构将与世界银行和工发组织密切协商，继续协调国家氟氯化碳淘汰计划。约旦政府还将批准《北京修正》作为一项优先事项，尤其是在体制建设项目新阶段的第一年。在新阶段，约旦还将继续努力，全面实施许可证制度，并可能对该制度进行审查，进一步加强同海关部门的合作，打击非法贸易。在本阶段，预计各项甲基溴活动将淘汰该国 80%的甲基溴消费。将继续进行提高认识的活动，重点是纪念《蒙特利尔议定书》签署二十周年和庆祝国际臭氧日。

泰国：体制建设更新

项目摘要和国情简介	
执行机构：	世界银行
以往核准的体制建设供资额（美元） 第一阶段：1993 年 7 月 第二阶段：1998 年 7 月 第三阶段：2003 年 7 月 第四阶段：2005 年 7 月 共计	 400,000 266,667 346,667 346,668 1,360,002
申请用于更新的供资额（第五阶段）（美元）：	346,668
建议用于核准第五阶段的供资额（美元）：	346,668
机构支助费用（美元）：	26,000
体制建设第五阶段向多边基金申请的费用总额（美元）：	372,668
按每公斤 12.1 美元计算的因体制建设第五阶段而淘汰的氟氯化碳等量（ODP 吨）：	暂缺

国家计划核准日期：	1993 年 11 月
国家计划报告的消耗臭氧层物质消费量（1991 年）（ODP 吨）：	8,820.7
最新报告的消耗臭氧层物质消费量（2005 年）（ODP 吨）：	2,317.3
受管制物质基准消费量（ODP 吨）： (a) 附件 A 第一组（各类氟氯化碳）（1995 至 1997 年平均值） (b) 附件 A 第二组（哈龙库）（1995 至 1997 年平均值） (c) 附件 B 第二组（四氯化碳）（ 1998 至 2000 年平均值） (d) 附件 B 第三组 (甲基氯仿) （1998 至 2000 年平均值） (e) 附件 E （甲基溴）（1995 至 1998 年平均值）	 6,082.1 271.7 7.5 54.6 183.0
受管制物质最新消费量（2005 年）（ODP 吨）： (a) 附件 A 第一组（各类氟氯化碳） (b) 附件 A 第二组（哈龙库） (c) 附件 B 第二组（四氯化碳） (d) 附件 B 第三组(甲基氯仿) (e) 附件 E （甲基溴） (f) 附件 C 第一组（氟氯烃化合物）	 1,259.9 10.9 0.0 0.0 146.0 900.5
核准项目供资额（美元）：	55,557,205
拨付额（截至 2007 年 3 月）（美元）：	40,864,015
将淘汰的消耗臭氧层物质（ODP 吨）：	6,744.7
已淘汰的消耗臭氧层物质（截至 2007 年 3 月）（ODP 吨）：	5,585.9

4. 各项活动摘要及执行秘书处核准的供资：

各项活动摘要		**核准供资（美元）**
(a)	投资项目：	51,098,637
(b)	体制建设：	1,498,669
(c)	项目编制、技术援助、培训和其他非投资项目：	2,959,899
	共计：	55,557,205

进展报告

5. 泰国国家臭氧机构正与国家氟氯化碳淘汰计划项目管理机构密切合作，确保统一各项活动，最大限度地减少工作重叠，并实现到 2010 年淘汰各类氟氯化碳的目标。泰国体制建设项目第五阶段要确保全面实施许可证制度，并落实消耗臭氧层物质的进出口配额。本阶段还将颁布新的法规，禁止在商用制冷制造中使用各类氟氯化碳。泰国还将在本阶段批准《北京修正》。国家臭氧机构将继续在国家一级制订并实施提高认识的活动。这些活动包括国家臭氧机构网页更新、举办纪念《蒙特利尔议定书》二十周年的学生智力竞赛、发行海报和宣传册以及发展广播站。泰国还将在本阶段开展关于氟氯烃化合物的调查，并举办讲习班，讨论调查结果。

行动计划

6. 在体制建设项目的下一阶段，国家臭氧机构将继续同世界银行密切磋商，协调国家氟氯化碳淘汰计划，同时执行国家甲基溴淘汰计划。泰国政府还将特别重视家用和汽车空调行业的制冷维修行业，确保不会出现反弹。海关部门将密切监督许可证制度的全面实施情况。泰国还将最终完成消耗臭氧层物质数据库的制订工作，实现消耗臭氧层物质相关数据的一致性。在本阶段还将继续开展提高认识活动。

附件二

执行委员会对于更新提交第五十二次会议的体制建设项目的意见

约旦

1. 执行委员已审查随约旦体制建设项目更新请求一同呈交的报告，并赞赏地注意到，约旦向臭氧秘书处报告的数据表明，约旦提前实现了 85%的 2007 年氟氯化碳淘汰目标。执行委员会还注意到，在体制建设项目框架内，约旦已采取重大步骤淘汰其他领域的消耗臭氧层物质消费，例如哈龙库和甲基溴领域。具体说来，协调国家氟氯化碳、哈龙和甲基溴淘汰计划的执行情况；完成对海关官员的培训讲习班，并实施进口管制制度；继续开展提高认识活动，确保利益攸关方做出关于淘汰消耗臭氧层物质的承诺；以及制订甲基溴战略。执行委员会还注意到为防止非法进口各类氟氯化碳而在本计划的这一关键阶段采取的各项措施。执行委员会大力支持约旦在减少消耗臭氧层物质消费方面开展的各项工作。因此，执行委员会希望，在今后两年内，约旦继续在国家消耗臭氧层物质淘汰计划项下执行其国家计划和行动，在减少当前的消耗臭氧层物质消费水平方面取得突出成绩，到 2010 年实现全部淘汰。

泰国

2. 执行委员会已审查随泰国体制建设项目更新请求一同呈交的报告，并赞赏地注意到，泰国向臭氧秘书处报告的 2006 年数据表明，泰国正在制订氟氯化碳消费淘汰时间表。泰国已批准《蒙特利尔议定书北京修正》，执行委员对此表示赞赏。此外，执行委员会还祝贺泰国颁布法规，自 2005 年起禁止在制冷行业使用氟氯化碳，并祝贺泰国在防止消耗臭氧层物质非法交易方面不断做出的努力。因此，执行委员会希望，在今后两年内，泰国继续实施其国家计划和有关活动，并取得突出成绩，进一步降低氟氯化碳消费水平。

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2007 WORK PROGRAM AMENDMENT

Presented to the 52nd Meeting of the Executive Committee

WORLD BANK
MONTREAL PROTOCOL OPERATIONS

28 May 2007

The World Bank 2007 – 2009 Business Plan was submitted for the consideration of the Executive Committee (ExCom) of the Multilateral Fund for Implementation of the Montreal Protocol at its 51st Meeting in March 2007 in Montreal, Canada. Except activities related to HCFCs and disposal of unwanted ODS, all activities proposed for the period 2007 – 2009 were approved by the ExCom as per Dec. 51/10. In addition, the ExCom also requested the World Bank to investigate the possibility of undertaking projects for the accelerated phase-out of production of CFC and CTC, and to report back to the Executive Committee on any issues it encountered.

In accordance with Dec. 51/10, there are five non-investment activities to be submitted for the consideration of the ExCom in 2007. These include four institutional strengthening renewal requests from Ecuador, Jordan, Thailand, and Turkey, and one technical assistance activity – Assessment of Phaseout of CTC in Chlo-alkali Sector. This technical assistance activity is included in the Bank's Business Plan as per the recommendation made by the ExCom in 2006.

At the 51st Meeting of the ExCom, the Bank submitted its 2007 Work Program for the ExCom's consideration. The 2007 Work Program contained a proposal for renewal of Ecuador's Institutional Strengthening Project. The request for renewal of Ecuador's Institutional Strengthening Project was approved by the ExCom for a period of one year only, instead of two years (Dec. 51/26). This is due to Ecuador's apparent non-compliance with Annex E of the Montreal Protocol. Ecuador is working with its methyl bromide industry to develop a plan of action to return to compliance. The plan of action will be submitted to the Ozone Secretariat for the consideration of the Implementation Committee in September 2007.

This proposed work program amendment includes two institutional strengthening renewal requests from Jordan and Thailand, and the funding request for undertaking the assessment of phaseout of CTC in the chlo-alkali sector. The plans of action and terminal reports for Jordan and Thailand are included as Attachments 1 and 2.

Regarding the accelerated phase-out of CFC and CTC production, the Bank has been working closely with the Government of India to investigate this possibility. Meetings have already been organized to explore this possibility with the CFC producers and with relevant agencies undertaking CFC consumption phaseout activities in India.

Country	Request (US $)	Duration	Description
Jordan	147,333	July 2007 – June 2009	Institutional Strengthening Renewal
Thailand	346,668	July 2007 – June 2009	Institutional Strengthening Renewal
Global	100,000	July 2007 – December 2008*	Assessment of CTC Phaseout in the Chlo-alkali Sector
Sub-total	594,001		
Support Cost	46,050**		
Total	640,051		

*The assessment report will be submitted to the ExCom at its last meeting in 2008. To meet this submission deadline, the report will be submitted to the Secretariat by end of September 2008. Therefore, the actual time for preparation of this document is about 12 months after the preparation funds are made available to the Bank.

**7.5% support cost is applied to funding related to the two IS projects, and 9% is applied to the proposed CTC study.

TERMS OF REFERENCE

EVALUATION OF ALTERNATIVES FOR THE PHASEOUT OF CARBON TETRACHLORIDE AS PROCESS AGENT IN THE PRODUCTION OF CHLORINE

1. BACKGROUND

Liquid chlorine is produced by electrolysis of sodium chloride brine. Even after undergoing purification, the natural rock salt used as raw material in the preparation of the brine contains impurities, leaving traces of ammonium and nitrogen in the electrolyte solution. These impurities are entrained by the chlorine gas after the electrolysis process is completed. As chlorine gas is liquefied it may react with these impurities, and the result is Nitrogen Trichloride (NCl_3). NCl_3 is a highly explosive compound when present in concentrations over three percent (3%), and it must therefore be periodically removed from the chlorine production process.

The chlor-alkali industry around the world traditionally used Carbon Tetrachloride (CTC), CCl_4, to extract NCl_3 from liquid chlorine. The chemical properties of CTC are ideal for this process, since it is both soluble in chlorine and a solvent for NCl_3, and it therefore mixes well with the two compounds. Moreover, the boiling point of CTC is 77°C, which is significantly higher than that of chlorine (-34°C) and similar to that of NCl_3 (71°C). It is therefore possible to keep NCl_3 in solution with CTC, at a range of temperatures where liquid chlorine is no longer present. CTC is inert, non-corrosive, and it is stable in a relatively wide range of temperatures[1].

CTC is controlled by the Montreal Protocol on Substances that Deplete the Ozone Level[2]. It has been recognized as a controlled substance used as process agent[3] by the Meeting of the Parties to the Montreal Protocol (Decision XV/6) when used to eliminate NCl_3 in the production of chlorine. Therefore, as countries phase out their consumption of Ozone Depleting Substances (ODS) in accordance to their commitments to the Montreal Protocol, the use of CTC by the global chlor-alkali sector has decreased, particularly in non-Article 5 countries (UNEP PATF, 1997). The overall consumption of CTC as a process agent in Article 5 countries is not, at present clearly known, but is expected to be relatively small. A report prepared by the Technology & Economic Assessment Panel (TEAP) is expected to be released in June 2007 and will provide insight on this matter.

A few chemicals have been identified that can be used as substitutes for CTC in the production of chlorine for the removal of NCl_3, but none is as versatile or as efficient. Therefore, in spite of having relatively low levels of CTC consumption, in absence of suitable alternatives, Article 5 countries that produce chlorine risk being out of compliance to their Montreal Protocol obligations before 2010. In an effort to identify potential countries that may need additional assistance to meet their target ODS reductions, the Executive Committee of the Montreal Protocol has requested the World Bank to carry out an assessment of the global chlor-alkali sector and to identify technically and economically viable alternatives to the use of CTC in the production of chlorine in Article 5 countries.

[1] UNEP, 2001. Report of the Process Agents Task Force (PATF), Case Study #1.

[2] CTC is an Annex B – Group II substance. Non-Article 5 countries phased out their baseline 1989 consumption of CTC in 1996, while Article 5 countries reduced their baseline 1998-2000 baseline consumption by 85% in 1995 and have committed to phase out 100% of their consumption by 2010 (with possible essential use exemptions).

[3] Process Agent is defined as a controlled substance, that because of its unique chemical and/or physical properties, facilitates an intended chemical reaction and/or inhibits and unintended chemical reaction (UNEP PATF, 1997).

2. PROJECT OBJECTIVE

The main objectives of this project are to:

- Assess consumption levels of CTC used as process agent in the production of chlorine both in Article 5 and non-Article 5 countries
- Examine technologies and/or production processes relevant to the phaseout of CTC in the production of chlorine, with a view to identifying cost-effective alternatives for the conversion of the chlor-alkali sector in Article 5 countries.

3. PROJECT ACTIVITIES

Activities to be conducted under this project are as follows:

Task 1: Global CTC consumption by chlor-alkali sector

The first activity under this project consists of establishing the current global context of CTC consumption as process agent for chlorine production. The consultants will determine remaining CTC consumption as a process agent for NCl_3 removal by the chlor-alkali sector in both Article 5 and non-Article 5 countries. Data shall be presented in a disaggregated manner, by country and by production facility.

Task 2: Review of CTC-free technologies for the chlor-alkali sector

Consultants will provide a detailed review of currently existing technologies or processes for the production of chlorine, which do not use CTC as a process agent for the removal of NCl_3. Consultants will specify if and how NCl_3 is removed from the final chlorine stream and whether any ODS are produced as byproducts (*e.g.* conversion of chloroform into CTC).

Task 3: Review of conversion projects

Consultants will review conversion projects that have been carried out over the past 10-15 years, through which chlor-alkali facilities have phased out the use of CTC as process agent in the production of chlorine. The review will include information on conversion projects in both Article 5 and non-Article 5 countries. The evaluation should include, but not be limited to, the following:

i. Overall plant characteristics (*e.g.* age of relevant equipment at the time of conversion, type of electrolytic cell, compressor types) and pre-conversion production procedures
ii. Annual level of production of chlorine (pre and post-conversion) and consumption of CTC (pre and post-conversion)
iii. Detailed description of methodology or technology used to achieve the phaseout of CTC and of new production processes
iv. Operational considerations associated with phaseout (*e.g.* down time of plant, required training of personnel, maintenance, safety issues)
v. Percent of NCl_3 in final chlorine product and related safety considerations
vi. Duration and cost of conversion project
vii. Post conversion issues and solutions

A minimum of five examples describing different conversion alternatives shall be provided. Consultants shall also provide contact details of technical personnel who can be approached for additional information at each of the facilities described.

Task 4: Review of containment alternatives

In its Decision X/14 of 1998, the Meeting of the Parties to the Montreal Protocol noted that process agent used in non-Article 5 countries should not be taken into account in the calculation

of a country's consumption or production, if the emissions of controlled substances had been reduced to "insignificant" levels as defined in the text of the Decision, through operating processes and containment technologies.

Consultants will review current CTC emission levels in a sample of non-Article 5 chlor-alkali plants where containment approaches have led to acceptable losses of CTC, as per Decision X/14. Consultants will estimate the cost effectiveness of containment alternatives and will make recommendations on the feasibility of adopting them in Article 5 production facilities.

Task 5: Analysis and recommendations

Based on their evaluation of the chlor-alkali sector, of the existing types of production facilities and of the alternatives for NCl_3 removal in the production of chlorine, consultants will propose possible scenarios for CTC phaseout in Article 5 countries (*e.g.* most suitable types of technical and procedural alternatives depending on the various types of production facilities). Recommendations should be made on the basis of the most environmentally sound and cost effective alternatives for conversion or containment, which at the same time ensure the safety of the workers at the production plant and of the chlorine costumers (*e.g.* level of NCl_3 in final product). Consultants will specify expected cost-effectiveness ranges of each alternative proposed.

4. MANAGEMENT AND IMPLEMENTATION ARRANGEMENTS

The World Bank will be the implementing agency for this proposed project. The Montreal Protocol Unit in the Environment Department will directly oversee the work of the consultants.

5. TIMELINE AND DELIVERABLES

Consultants are expected to spend a maximum of four (4) months completing their assignment. Based on the objectives and activities stated, deliverables from the project are as follows:

i. Progress report to be submitted two months after signature of the contract
ii. Final report to be submitted two weeks before the end of the contract

The progress report will be reviewed by the World Bank and comments will be provided within a week. Final reports must be cleared by the World Bank before final payment is made to consultants.

6. CONSULTANT'S QUALIFICATIONS

The firm selected to carry out this project must meet the following requirements:

- Consulting firm with a minimum of ten years of experience working with the chemical industry, with specific experience in the chlor-alkali sector
- Demonstrated technical capacity to carry-out the analysis in question
- Knowledge of the Montreal Protocol and of policies governing Multilateral Fund financing of operations in developing countries

7. BUDGET

The total budget for this project will be in the order of US$100,000.