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EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Forty-ninth Meeting  
Montreal, 10-14 July 2006

**PROJECT PROPOSALS: DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA**

This document consists of the comments and recommendations of the Fund Secretariat on the following project proposals:

Phase-out

- National CFC phase-out programme (NPP) (second tranche) UNEP/UNIDO
- Plan for terminal phase-out of CTC (fourth tranche) UNIDO

Process agent

- Supplementary plan for terminal CTC process agent phase-out UNIDO

Production

- Closure of ODS production plant: third tranche UNIDO

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**PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS  
DEMOCRATIC PEOPLE’S REPUBLIC OF KOREA**

**PROJECT TITLE****BILATERAL/IMPLEMENTING AGENCY**

|     |   |            |
|-----|---|------------|
| (a) | National CFC phase-out programme (second tranche) | UNEP/UNIDO |
|-----|---|------------|

**NATIONAL CO-ORDINATING AGENCY:**

National Coordinating Committee for Environment (NCCE)

**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT****A: ARTICLE-7 DATA (ODP TONNES, 2004, AS OF MAY 2006)**

|                 |           |  |  |
|-----------------|-----------|--|--|
| Annex A Group I | CFC: 7.31 |  |  |
|-----------------|-----------|--|--|

**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2004, AS OF DECEMBER 2005)**

| ODS    | Foam | Ref. Manuf. | Ref. Servicing | Aerosol | ODS | Solvents | Process agent | Fumigant |
|--------|------|-------------|----------------|---------|-----|----------|---------------|----------|
| CFC-11 |      | 30.68       | 14.40          |         |     |          |               |          |
| CFC-12 |      | 14.42       | 171.00         |         |     |          |               |          |

**CFC consumption remaining eligible for funding (ODP tonnes)**

0

**CURRENT YEAR BUSINESS PLAN: Total funding (UNEP) US \$185,000: total phase-out 0 ODP tonnes.**

| <b>PROJECT DATA</b>                          |  | 2005      | 2006           | 2007    | 2008   | 2009   | 2010 | Total     |
|--|--|-----------|----------------|---------|--------|--------|------|-----------|
| ODS Annex A Group I (ODP tonnes)             | Montreal Protocol limits               | 220.9     | <b>220.9</b>   | 66.3    | 66.3   | 66.3   | 0    |           |
|  | Annual consumption limit               | 177.0     | <b>120.0</b>   | 66.0    | 48.0   | 30.0   |      |           |
|  | Annual phase-out from ongoing projects | -         | -              | -       | -      | -      | -    | -         |
|  | Annual phase-out newly addressed       | 57.0+15.7 | 54.0           | 18.0    | 19.0   | 30.0   | 0    | 192.7     |
| Total ODS consumption to be phased out       |  | 57.0+15.7 | 54.0           | 18.0    | 19.0   | 30.0   | 0    | 192.7     |
| Project cost as originally submitted (US \$) |  | 938,980   | <b>481,900</b> | 155,000 | 20,000 | 10,000 |      | 1,605,880 |
| Final Project costs (US \$):                 |  |           |                |         |        |        |      |           |
| Funding for lead agency UNEP                 |  | 234,600   | <b>163,400</b> | 100,000 | 20,000 | 10,000 |      | 528,000   |
| Funding for UNIDO                            |  | 536,000   | <b>0</b>       | 0       | 0      | 0      |      | 536,000   |
| Total project funding                        |  | 770,600   | <b>163,400</b> | 100,000 | 20,000 | 10,000 |      | 1,064,000 |
| Final Support costs (US \$)                  |  |           |                |         |        |        |      |           |
| Support cost for lead agency UNEP            |  | 30,498    | <b>21,242</b>  | 13,000  | 2,600  | 1,300  |      | 68,640    |
| Support cost for UNIDO                       |  | 40,200    | <b>0</b>       | 0       | 0      | 0      |      | 40,200    |
| Total support costs                          |  | 70,698    | <b>21,242</b>  | 13,000  | 2,600  | 1,300  |      | 108,840   |
| Total cost to Multilateral Fund (US \$)      |  | 841,298   | <b>184,642</b> | 113,000 | 22,600 | 11,300 |      | 1,172,840 |
| Final project cost effectiveness (US \$/kg)  |  |           |                |         |        |        |      | 5.52      |

**FUNDING REQUEST: Approval in principle of total ODS phase-out, total project funding and total support costs, and approval of funding for second tranche (2006) as indicated above.**

**SECRETARIAT’S RECOMMENDATION**

Blanket approval at the costs indicated above

## PROJECT DESCRIPTION

1. On behalf of the Government of the Democratic People's Republic of Korea (D.P.R. Korea), UNEP has submitted a request amounting to US \$163,400 plus agency support costs of US \$21,242 for the second tranche of the national CFC phase-out programme (NPP) for D.P.R. Korea, for consideration by the Executive Committee at its 49<sup>th</sup> Meeting.

### Background

2. At its 47<sup>th</sup> Meeting, the Executive Committee approved in principle the NPP for D.P.R. Korea at the amount of US \$1,064,000 plus agency support costs of US \$68,640 for UNEP and US \$40,200 for UNIDO. The Executive Committee also approved an agreement specifying the agreed conditions for the implementation of the NPP, as well as funding for the first tranche of the NPP at the amount of US \$770,600 plus support costs for UNEP and UNIDO (decision 47/42).

### Progress report

3. Since the approval of the NPP by the Executive Committee, the Government of D.P.R. Korea has selected a consultant to conduct the verification of national CFC consumption. The project management unit (PMU) became operational in 2006, and an ODS import control enforcement centre has been established. Draft training programmes have identified 350 refrigeration technicians and 200 customs officers to be trained in 2006-2007, and 50 trainers for each group have already been trained. Specifications for equipment to be procured under the recovery and recycling programme have been agreed with the Government, and the refrigeration servicing workshops that will benefit from the programme have been identified. A strategy for a publicity and education programme is expected to be ready by the end of June 2006.

4. An enforcement centre for the control of ODS imports has been established under the Department of Pollution Control in order to: enhance the capacity of government officers to address ODS illegal trade issues; develop a database on illegal ODS trade activities; register imports of CFC and CFC-based equipment; develop guidelines for the investigation of suspect activities; and conduct training programmes for customs officers.

### 2006 Annual work programme

5. Work programme activities for 2006 include: implementation of the training programmes for refrigeration servicing technicians and customs officers; continued implementation of the refrigerant recovery and recycling scheme; development of enforcement measures for ODS regulations, and development of the public awareness strategy. The PMU will be transferred to the Ozone Unit and the Enforcement Centre for ODS Import and Export.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENTS

6. The Secretariat noted that the request for the second tranche of the NPP for D.P.R. Korea is in accordance with the agreement between the Government and the Executive Committee approved at the 47<sup>th</sup> Meeting. The Secretariat also noted that a number of phase-out activities included in the NPP were already under implementation notwithstanding the fact that the project was approved only in December 2005.

7. In 2004, the Government of D.P.R. Korea reported zero consumption of CFCs under Article 7 of the Montreal Protocol. D.P.R. Korea indicated that all CFCs used in 2004 were provided from stockpiles that had been produced before the end of 2003. Further reductions in CFC consumption were achieved in 2005 as the production of CFC-based compressors, domestic refrigerators and commercial refrigeration equipment ceased in the first quarter of 2005.

### RECOMMENDATION

8. The Fund Secretariat recommends blanket approval of the project with associated support costs at the funding level shown in the table below.

|     | Project Title                                     | Project Funding (US\$) | Support Cost (US\$) | Implementing Agency |
|-----|---|------------------------|---------------------|---------------------|
| (a) | National CFC phase-out programme (second tranche) | 163,400                | 21,242              | UNEP                |

**PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS  
DEMOCRATIC PEOPLE’S REPUBLIC OF KOREA**

|   |                                      |
|---|--------------------------------------|
| <b>PROJECT TITLE</b>                                    | <b>BILATERAL/IMPLEMENTING AGENCY</b> |
| (a) Plan for terminal phase-out of CTC (fourth tranche) | UNIDO                                |

|                                       |   |
|---------------------------------------|---|
| <b>NATIONAL CO-ORDINATING AGENCY:</b> | National Co-ordinating Committee for the Environment (NCCE) |
|---------------------------------------|---|

**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT**

**A: ARTICLE-7 DATA (ODP TONNES, 2004, AS OF MAY 2006)**

|                   |               |  |  |
|-------------------|---------------|--|--|
| Annex B, Group II | CTC: 2,198.90 |  |  |
|-------------------|---------------|--|--|

**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2005, AS OF MAY 2006)**

|      |      |      |         |     |          |               |          |
|------|------|------|---------|-----|----------|---------------|----------|
| ODS  | Foam | Ref. | Aerosol | ODS | Solvents | Process agent | Fumigant |
| CTC: |      |      |         |     | 203.5    | 545.6         | 86.9     |

|  |     |
|--|-----|
| <b>CFC consumption remaining eligible for funding (ODP tonnes)</b> | n/a |
|--|-----|

**CURRENT YEAR BUSINESS PLAN:** Total funding: US \$538,000 total phase-out 143.7 ODP tonnes.

| <b>PROJECT DATA</b>                            |  | 2003      | 2004      | 2005    | 2006    | 2007    | 2008    | 2009 | 2010 | Total     |
|--|--|-----------|-----------|---------|---------|---------|---------|------|------|-----------|
| <b>CTC</b><br>(ODP tonnes)                     | Montreal Protocol limits               |           |           | 192.8   | 192.8   | 92.8    | 92.8    | 92.8 | 0    |           |
|  | Annual consumption limit               | 2,200.0   | 2,200.0   | 192.8   | 92.8    | 77.8    | 37.8    | 0    | 0    |           |
|  | Annual phase-out from ongoing projects | 0         | 0         | 565.8   | 0       | 0       | 0       | 0    | 0    | 565.8     |
|  | Annual phase-out newly addressed       | 0         | 0         | 1,441.4 | 100.0   | 15.0    | 40.0    | 37.8 | 0    | 1,634.2   |
|  | Annual unfunded phase-out*             | 0         | 2,200.0   | 0       | 0       | 0       | 0       | 0    | 0    | 0         |
| <b>TOTAL ODS CONSUMPTION TO BE PHASED OUT</b>  |  | 0         | 0         | 2,007.2 | 100.00  | 15.0    | 40.0    | 37.8 | 0    | 2,200.0   |
| <b>Total project funding for UNIDO:</b>        |  | 3,500,000 | 1,000,000 | 300,000 | 500,000 | 284,844 | 100,000 | 0    | 0    | 5,684,844 |
| <b>Total support costs for UNIDO:</b>          |  | 262,500   | 75,000    | 22,500  | 37,500  | 21,363  | 7,500   |      |      | 426,363   |
| <b>TOTAL COST TO MULTILATERAL FUND (US \$)</b> |  | 3,762,500 | 1,075,000 | 322,500 | 537,500 | 306,207 | 107,500 |      |      | 6,111,207 |
| Project cost effectiveness (US \$/kg)          |  |           |           |         |         |         |         |      |      |           |

\* The unfunded phase-out includes phase-out from three applications not yet approved as process agent uses totalling 229.9 ODP tonnes for which additional funding will be requested.

**FUNDING REQUEST: Approval of funding for the fourth tranche (2006) as indicated above.**

|                                     |   |
|-------------------------------------|---|
| <b>SECRETARIAT’S RECOMMENDATION</b> | Blanket approval at the costs indicated above |
|-------------------------------------|---|

## PROJECT DESCRIPTION

9. On behalf of the Democratic People's Republic of Korea (D.P.R. Korea), UNIDO has submitted to the 49<sup>th</sup> Meeting a report on implementation activities under the second and third tranches of the phase-out plan, verification of the consumption of CTC in D.P.R. Korea in 2005, an implementation programme covering the remainder of the year 2006 and the year 2007 and a request for approval of the fourth tranche at a cost US \$500,000 plus support costs for UNIDO of US \$37,500.

### Background

10. At its 41<sup>st</sup> Meeting the Executive Committee approved in principle an agreement with the Government of D.P.R. Korea to phase-out the consumption of CTC at a total cost of US \$5,684,840 plus support costs of US \$426,363 for UNIDO. The Committee also approved funding of US \$3,500,000 plus support costs of US \$262,500 for the first tranche of the project. At the 46<sup>th</sup> Meeting the Committee approved additional funding totalling US \$1,300,000 plus support costs of US \$97,500 for UNIDO for the second and third tranches of the project.

11. The phase-out plan includes activities in the solvent cleaning, process agent and fumigation sectors. It is supplemented by individual projects in the solvent cleaning sector that were approved prior to preparation of the plan. The plan foreshadowed the submission of additional requests for funding for the phase-out of CTC applications that were not at the time classified as process agents by the Parties. The Agreement indicates the maximum level of remaining eligible consumption for these uses (146 ODP tonnes) and the maximum level of cost-effectiveness that could be requested, based on statistics for the process agent sector (US \$6.07/kg). These additional requests have been submitted to the present meeting as one separate project and are addressed elsewhere in this document.

### Report on implementation

12. UNIDO has indicated that the final project in the solvent cleaning sub-sector was satisfactorily completed during the year. CTC use in this sub-sector has now ceased. Completion of the four approved process agent projects, as indicated in the annual implementation plan (AIP), was delayed due to late delivery of equipment. However implementation is continuing and completion is now planned for mid-2006.

13. It is indicated that in the fumigation sector 79 metric tonnes of CTC were used in 2005. This quantity was supplied from the government stockpile accumulated in 2004. In addition a total of 27.5 tonnes of non-ODS substitute chemicals were used. The alternative chemicals were imported from China. The major proportion of the funds allocated to the fumigation sector for expenditure in 2006 and 2007 will be used to establish production of the alternative chemicals in D.P.R. Korea. The remainder of the funding will provide technical assistance to support the use of the alternative chemicals and for other technologies such as grafting. In this regard, UNIDO indicated that the purchase of computers and analytical equipment planned for 2005 had been delayed, with a resulting delay in some of the technical assistance activities for which the analytical equipment was needed.

14. By the end of 2005, out of total approved funds of US \$4,800,000 a total of US \$2,034,750 was disbursed with the obligation of an additional US \$2,761,291. The total disbursement forecast in the AIP for 2005-2006 was US \$4,510,933.

### **Verification report**

15. A report has been provided indicating the methodology used to verify 2005 consumption. The auditor who conducted the verification is a statistician from the D.P.R. Korea Academy of Agricultural Sciences. It is indicated that no quotas for import or export of CTC have been issued by the Government for many years and a letter to this effect was provided to UNIDO by the Government of D.P.R. Korea.

16. On the basis that there have been no imports or exports, consumption is equal to production. The auditor examined production logs, raw material records, flow-rate data and record keeping practices and found them satisfactory. Monthly production information was provided for the months of January and February, after which production ceased and the plant was dismantled. Verification of destruction has been provided separately as part of the report on the CTC closure project submitted separately to the 49<sup>th</sup> Meeting. The audit report was signed by the auditor and by a representative of UNIDO.

### **Annual implementation programme for 2005-2006**

17. UNIDO provided an annual implementation programme for the remainder of 2006 and 2007 indicating that the four approved process agent projects delayed from 2005 will be completed later in 2006, and providing details of the activities planned in the fumigation sector to support the phase-out now in place.

18. Consumption has already been reduced to zero, since there is no production and currently, no imports. However under the approved agreement D.P.R. Korea is still able to consume up to 92.8 ODP tonnes of CTC in 2006 and up to 77.8 ODP tonnes in 2007 and 2008. It is indicated that at the end of 2005 the CTC stockpile amounted to 409 metric tonnes, which is to be used solely for the newly approved process agent applications pending conversion under the supplementary project submitted to the 49<sup>th</sup> Meeting.

## **SECRETARIAT'S COMMENTS AND RECOMMENDATION**

### **COMMENTS**

19. The maximum CTC consumption limit for 2005 indicated in the Agreement is 192.8 ODP tonnes. The verification report indicates that a total amount of 191.4 ODP tonnes of CTC was produced in January and February 2005 after which the plant was closed (as per the separate verification report on plant closure). The report also advises that the auditor had checked the required production parameters such as production logs, raw material purchases and inventory changes and found them consistent with the reported production. Given that D.P.R. Korea has a closed economy regulated by the Government, the Government statement that no CTC has been imported in recent years can be taken as an indicator of compliance with the 2005 CTC consumption limit specified in the Agreement.

20. The data provided by D.P.R. Korea in its country programme implementation report, and indicated on the project evaluation sheet (page 2), shows total CTC consumption of 836 ODP tonnes. The information provided corresponds to the use of CTC in 2005, including use from the stockpile. 2005 consumption as defined under the Protocol is equal to the total production in 2005, namely 191.4 ODP tonnes, since imports were zero.

21. According to the Agreement, tranches become eligible for submission at the last meeting of the year. However the previous two tranches were approved simultaneously at the second meeting of 2005 (the 46<sup>th</sup> Meeting). Given that CTC production has ceased, and that D.P.R. Korea is attempting to avoid the need for imports through early completion of its conversion programme and judicious management of its remaining stockpile, advancement of the submission date appears warranted. The US \$4.8 million in funding approved so far has been fully committed.

22. In the schedule of NPP tranches noted by the Committee at its 48<sup>th</sup> Meeting (decision 48/15) this project was listed for submission to the second meeting of the year. Accordingly the Secretariat suggests that the Agreement for this project be amended (in Appendix 3-A) to reflect the change in submission of tranches. A revised agreement containing this amendment appears in Annex I of the present document. UNIDO has obtained the agreement of the Government of D.P.R. Korea to the amendment.

23. The Agreement also requires that the activities foreshadowed in the AIP be substantially completed. There has been a delay in implementation of the individual sub-projects in the process agent sub-sector, however UNIDO has advised that equipment procurement is now proceeding and that completion of the projects is anticipated in the second half of 2006. In regard to technical support activities in the fumigation sector UNIDO advised that equipment procurement will take place immediately after approval of the fourth tranche. The AIP for the balance of 2006 and 2007 provides a comprehensive list of specific activities proposed to take place in the fumigation sub- sector so that the production of substitutes for CTC in fumigation applications will be complete by the end of 2007.

24. There are no other issues related to the 2006-2007 annual implementation programme.



**RECOMMENDATIONS**

25. The Secretariat recommends:

- (a) Approval of an amended Agreement between the Government of the Democratic People's Republic of Korea and the Executive Committee to make provision for consideration of approval of funding at the second meeting of the year as contained in Annex I to the present document;
- (b) Blanket approval of the AIP for 2006-2007, together with funding for the fourth tranche of the plan for terminal phase-out of CTC in Democratic Peoples's Republic of Korea as indicated in the table below:

|     | <b>Project Title</b>                                | <b>Project Funding (US \$)</b> | <b>Support Cost (US \$)</b> | <b>Implementing Agency</b> |
|-----|---|--------------------------------|-----------------------------|----------------------------|
| (a) | Plan for terminal phase-out of CTC (fourth tranche) | 500,000                        | 37,500                      | UNIDO                      |

**PROJECT EVALUATION SHEET -- NON-MULTI-YEAR PROJECTS  
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA**

**PROJECT TITLES** **BILATERAL/IMPLEMENTING AGENCY**

|     |   |       |
|-----|---|-------|
| (a) | Supplementary plan for terminal CTC process agent phase-out | UNIDO |
|-----|---|-------|

|                                      |                                    |
|--------------------------------------|------------------------------------|
| <b>NATIONAL CO-ORDINATING AGENCY</b> | Ministry of Environment and Energy |
|--------------------------------------|------------------------------------|

**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT**

**A: ARTICLE-7 DATA (ODP TONNES, 2004, AS OF MARCH 2006)**

|                        |          |  |
|------------------------|----------|--|
| Annex B, Group II: CTC | 2,198.90 |  |
|------------------------|----------|--|

**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2005, AS OF MAY 2006)**

| ODS Name | Sub-sector/quantity | Sub-sector/quantity  | Sub-sector/quantity | Sub-sector/quantity. |
|----------|---------------------|----------------------|---------------------|----------------------|
| CTC      | Solvent: 203.5      | Process agent: 545.6 | Fumigant: 86.9      |                      |

|  |     |
|--|-----|
| <b>CFC consumption remaining eligible for funding (ODP tonnes)</b> | n/a |
|--|-----|

| CURRENT YEAR BUSINESS PLAN ALLOCATIONS |     | Funding US \$ | Phase-out ODP tonnes |
|--|-----|---------------|----------------------|
|  | (a) | 953,000       | 146.0                |

| PROJECT TITLE:   | (a)     |
|--|---------|
| <b>ODS use at enterprise (ODP tonnes):</b>                 | 229.9   |
| <b>ODS to be phased out (ODP tonnes):</b>                  | 229.9   |
| <b>ODS to be phased in (ODP tonnes):</b>                   |         |
| <b>Project duration (months):</b>                          | 18      |
| <b>Initial amount requested (US \$):</b>                   |         |
| <b>Final project cost:</b>                                 |         |
| Incremental Capital Cost (US \$)                           | 774,528 |
| Contingency (10%) (US \$)                                  | 109,871 |
| Incremental Operating Cost (US \$)                         |         |
| Total Project Cost (US \$)                                 | 884,399 |
| <b>Local ownership (%):</b>                                | 100     |
| <b>Export component (%):</b>                               | 0       |
| <b>Requested grant (US \$):</b>                            | 884,399 |
| <b>Cost-effectiveness (US \$/kg):</b>                      | 6.07    |
| <b>Implementing agency support cost (US \$):</b>           | 66,330  |
| <b>Total cost of project to Multilateral Fund (US \$):</b> | 884,399 |
| <b>Status of counterpart funding (Y/N):</b>                | Y       |
| <b>Project monitoring milestones included (Y/N):</b>       | Y       |

|                                     |   |
|-------------------------------------|---|
| <b>SECRETARIAT'S RECOMMENDATION</b> | Blanket approval at the costs indicated above |
|-------------------------------------|---|

## **PROJECT DESCRIPTION**

26. On behalf of the Democratic People's Republic of Korea (D.P.R. Korea), UNIDO has submitted to the 49<sup>th</sup> Meeting a supplementary plan for the phase out of CTC in the remaining, newly approved, process agent uses in D.P.R. Korea together with a request for approval of costs of US \$884,399 for implementation of the plan, plus support costs for UNIDO of US \$66,330.

### **Background**

27. At its 41<sup>st</sup> Meeting the Executive Committee approved in principle an Agreement with the Government of D.P.R. Korea for phasing out the consumption of CTC at a total cost of US \$5,684,840 plus support costs of US \$426,363 for UNIDO. The plan foreshadowed the submission of additional requests for funding for the phase-out of CTC applications that were not at the time classified as process agents by the Parties. The approved Agreement indicates the maximum level of remaining eligible consumption for these uses (145.7 ODP tonnes) and the maximum level of cost-effectiveness of compensation that could be requested, based on statistics for the process agent sector (US \$6.07/kg). This is equivalent to a maximum level of funding for the project of US \$884,399. These additional CTC applications were subsequently approved by the Parties as process agent uses at their 17<sup>th</sup> Meeting (decision XVII/7).

### **Description**

28. The supplementary plan consists of two conversion projects. The first conversion project will be implemented at the Hungnam Pharmaceutical Factory which manufactures the antibiotics ciprofloxacin and norfloxacin and the disinfectant sodium dichloroisocyanurate. The requested cost for conversion of these applications is US \$579,727, plus support costs of US \$43,480 for UNIDO. The second conversion project will be implemented at the Lanam Pharmaceutical Factory which manufactures vitamin-C. The requested cost is US \$304,672, plus support costs of US \$22,850 for UNIDO. The total requested cost is equal to the eligible level of funding of US \$884,399 as established in the approved CTC sector plan.

29. The total cost for implementation of the two sub-projects exceeds the requested level of funding. The Government of D.P.R. Korea has undertaken to provide a counterpart contribution of US \$324,181 towards the incremental capital cost and to absorb the estimated one-year incremental operating cost of US \$54,409.

30. Included with the submission is a letter of transmittal from the Government of D.P.R. Korea to which the relevant commitments from each enterprise regarding implementation of the projects and phase-out of CTC use are attached.

31. The submission indicates that the supplementary plan has been integrated into the overall CTC phase-out plan for D.P.R. Korea, particularly concerning management and use of the remaining stockpile of CTC, to permit continued production at the two enterprises pending completion of conversion planned for mid-2007. While imports of CTC do not currently take place, a contingency plan in the event of any delay in implementation includes limited imports of CTC, up to the maximum levels of 92.8 ODP tonnes in 2006 and 77.8 ODP tonnes in 2007 as specified in the approved Agreement.

32. At the Hungnam Pharmaceutical Factory, the CTC used to manufacture a chemical intermediate product common to the manufacture of the two antibiotics ciprofloxacin and norfloxacin will be replaced by ethanol in a redesigned process. Implementation of this process requires the provision of new process and control equipment. CTC is currently used in the manufacture of the disinfectant sodium dichloroisocyanurate to remove an explosive chemical formed during the process. The need for CTC will be eliminated by implementing more precise control of the chemical reactions by means of a computerised control system. The requested incremental capital costs are for acquisition and installation of the required process and control equipment.

33. At the Lanam Pharmaceutical Factory, the current use of CTC to manufacture an intermediate chemical needed to produce vitamin-C will be eliminated by converting to a new process that uses fermentation of a bacterial culture to convert glucose into vitamin-C. Fermentation is the process now used by most manufacturers of vitamin-C. The new production method requires different processing equipment to that now in place, including a computerised operating system. Once again, the requested incremental capital costs are for acquisition and installation of the required process and control equipment.

34. Although fully integrated into the CTC sector plan, the supplementary plan has been submitted as a stand-alone project containing two sub-projects as outlined above. In view of the very short implementation period, full funding has been requested at the present meeting.

## **SECRETARIAT'S COMMENTS AND RECOMMENDATION**

### **COMMENTS**

35. The Secretariat sought clarification as to how the continued use of CTC could be accommodated pending conversion of the two enterprises, given that production and imports of CTC had ceased. UNIDO indicated that, as outlined in the CTC phase-out plan, consumption by all enterprises of newly produced CTC had ceased at the end of February 2005. The national stockpile of CTC stood at 450 ODP tonnes at the end of 2005. A detailed management plan had been developed by the Government to permit allocation of CTC to the enterprises pending conversion. Under the CTC phase-out plan agreement, D.P.R. Korea could consume up to 92.8 ODP tonnes of CTC in 2006 and up to 77.8 ODP tonnes in 2007. Thus imports might be used as a contingency should implementation be delayed.

36. Confirmation was sought that the technology choices proposed did not raise intellectual property issues, in particular regarding the fermentation process proposed for vitamin-C production. UNIDO confirmed in a revised project document that the fermentation process was mature and widespread and that intellectual property costs were not anticipated.

37. UNIDO included a detailed breakdown of component costs from a recognised supplier for the US \$100,000 total cost of production of the required bacterial culture. Given that the beneficiary enterprises are absorbing the incremental operating costs and that D.P.R. Korea has committed to counterpart funding for a proportion of incremental capital costs, there are no other cost issues associated with the project.

**RECOMMENDATION**

38. The Secretariat recommends blanket approval of the project at the cost indicated in the table below.

|     | <b>Project Title</b>  | <b>Project Funding (US \$)</b> | <b>Support Cost (US \$)</b> | <b>Implementing Agency</b> |
|-----|---|--------------------------------|-----------------------------|----------------------------|
| (a) | Supplementary plan for terminal CTC process agent phase-out | 884,399                        | 66,330                      | UNIDO                      |

**VERIFICATION OF COMPLETE CLOSURE OF CARBON TETRACHLORIDE (CTC)  
PRODUCTION FACILITY IN THE DEMOCRATIC PEOPLE'S REPUBLIC OF  
KOREA (DPRK)**

**Project Description**

39. UNIDO is submitting to the 49<sup>th</sup> Meeting, the verification of the complete closure of the CTC production facility and requests the release of the last tranche of US \$488,750 as well as the associated support cost of US \$24,438. The verification report is attached and a summary is presented below.

**Background**

40. At its 36<sup>th</sup> Meeting in 2002, the Executive Committee approved the amended agreement for the phase-out of the ODS production sector in the Democratic People's Republic of Korea (DPRK) at an agreed-in-principle funding level of US \$2,566,800. This would provide for the permanent closure of the production of CFC-11, CFC-12, CFC-113, carbon tetrachloride (CTC) and methyl chloroform (MCF), and the dismantling of the relevant production facilities. The agreed level of funding would be paid out according to the schedule in Table 1 below upon the submission of the independent verification report on the permanent closure of the relevant ODS production, the subsequent dismantling of the production facilities, and the Executive Committee's approval of such verification.

Table 1

**Schedule of closures and disbursement**

| <b>Processing facility</b> | <b>Time of closure</b> | <b>Time of verification</b> | <b>Level of disbursement</b> | <b>Time of disbursement</b>   |
|----------------------------|------------------------|-----------------------------|------------------------------|---|
| CFC-113                    | May 2001               | August 2001*                | 687,700                      | Upon satisfactory verification of permanent closure of the CFC-113 production and dismantling of the production facility.           |
| Methyl Chloroform          | May 2001               | August 2001*                | 656,650                      | Upon satisfactory verification of permanent closure of the methyl chloroform production and dismantling of the production facility. |
| CFC-11/12                  | 2003                   | 2003                        | 733,700                      | Upon satisfactory verification of permanent closure of the CFC-11/12 production and dismantling of the production facility.         |
| CTC                        | 2005                   | 2005                        | 488,750                      | Upon satisfactory verification of permanent closure of the CTC production and dismantling of the production facility.               |
| <b>Total</b>               |                        |                             | <b>2,566,800</b>             |   |

\* Verified by Wakim Consulting during the technical audit and to be confirmed by UNIDO.

41. Accordingly, UNIDO, the implementing agency of the project verified the permanent closure of the production and the dismantling of the related production facilities for CFC-113 and MCF in July 2002, and of CFC-11 and CFC-12 in December 2003 respectively and submitted reports on the findings of the missions to the 42<sup>nd</sup> meeting of the Executive Committee in 2004. Upon being satisfied with the results of the verification, the Executive Committee disbursed a total of US\$ 2,078,050 which corresponded to the closure of the relevant facilities.

#### Verification of the dismantling of the production facility of carbon tetrachloride

42. The verification of the CTC production closure was carried out in April 2006 by a consultant from the United Kingdom with background in chloro-fluorine production industry. The same consultant had carried out the verifications of the closure of the production of CFC-113, MCF and CFC-11/CFC-12. The report presents a brief update of the ODS production sector in the country as set out in Table 2. It also contains a short description of the process of CTC production, followed by the description of the site visit by the verification team and the way in which the verification was carried out.

Table 2

#### **Profile of ODS production facilities**

| <b>Plant</b>        | <b>ODS</b> | <b>Capacity (t/year)</b> | <b>Commissioning year</b> | <b>Remarks</b>     |
|---------------------|------------|--------------------------|---------------------------|--------------------|
| 2.8 Vinalon Complex | CFC-11     | 250                      | 1980                      | Dismantled in 2003 |
|                     | CFC-12     | 1,000                    | 1980                      | Dismantled in 2003 |
|                     | CFC-113    | 500                      | 1983                      | Dismantled in 2001 |
|                     | TCA        | 1,000                    | 1983                      | Dismantled in 2001 |
|                     | CTC        | 2,300                    | 1975                      | Dismantled in 2005 |
|                     | MBr        | 2,300                    |                           | Dismantled in 1995 |

43. Production of CTC had ceased on 30 October 2005. Dismantling of the CTC plant took place on 15 December 2005. Destruction of key items of equipment began on 15 December 2005 and was completed on 23 December 2005. The Ministry of Chemical Industry witnessed, and took photographs of the dismantling and destruction process in December 2005. These photographs are presented in Annex III of the verification report.

44. During the verification exercise in 2002 of the CFC-113 and MCF production facilities, the verification team made a brief photographic record of the CTC plant which was located in the same complex and set up the baseline for the verification of the 2005 CTC plant closure. This record was included in Annex II of the 2002 verification report for the closure of the CFC-113 and MCF plants and was reproduced for this report, together with photographs of storage tanks and products, reactors and distillation towers and the control room. These pre- and after-dismantling photographs provided the basis for the confirmation of the dismantling of the production facilities.

45. The verification has confirmed that all of the key components had been destroyed and there was no realistic possibility that the CTC facility could return to operation. It also identified a stockpile from the production allowance for 2005 under the terms of the Montreal Protocol of 192.8 ODP tonnes of CTC which would support continuing operations at two pharmaceutical

factories, Hungnam and Lanam in 2006. Phase out projects for these two plants have yet to be approved.

46. There are 4 annexes to the report consisting of: Annex I—list of equipment destroyed, and a certificate of destruction from the Ministry of Chemical Industry; Annex II—photographs of CTC plant site before dismantling; Annex III—photographs of CTC plant site during dismantling and destruction, 15-23 December 2005; Annex IV—photographs of former CTC plant site during visit of UNIDO inspection team, 27 April 2006. The report and its Annex I are attached. Annexes II-IV to the report could however be made available upon request.

## **SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**

### **COMMENTS**

47. The verification report submitted by UNIDO follows the guidelines and standard format for verification of ODS production phase-out approved at the 32<sup>nd</sup> Meeting of the Executive Committee and provides evidence that DPR Korea has permanently closed the production of CTC and dismantled the related production facility to an extent that there is no realistic possibility that the facilities could return to an operational status.

48. With the closure of the CTC production plant, DPR Korea has completed the phase out in its ODS production sector.

### **RECOMMENDATIONS**

49. The Secretariat recommends that the Executive Committee:

- (a) Takes note of the verification report submitted by UNIDO;
- (b) Commends the work of the Government of DPR Korea and UNIDO in completing the ODS production phase-out;
- (c) Releases the last tranche of funding of US \$488,750 for the implementation of the ODS production closure Agreement in DPR Korea, and US \$24,438 as support cost to UNIDO;
- (d) Requests:
  - (i) UNIDO and the Government of DPR Korea to continue monitoring the production at the plant 2.8 Vinalon Complex to ensure the sustainability of the ODS production phase-out; and
  - (ii) UNIDO to submit a verification report to the last meeting in 2007 and 2008.



## Annex I

### **DRAFT AGREEMENT BETWEEN THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE PHASE-OUT OF THE OZONE-DEPLETING SUBSTANCE CARBON TETRACHLORIDE (CTC)**

1. This Agreement represents the understanding of Democratic People's Republic of Korea (the "Country") and the Executive Committee with respect to the complete phase-out of controlled use of the ozone-depleting substance CTC (the "Substance") prior to 1 January 2010 in compliance with Protocol schedules.
2. The Country agrees to phase out the controlled use of the Substance in the solvent sector in accordance with the annual phase-out targets set out in row 1 of Appendix 2-A (the "Targets") and this Agreement. The annual phase-out targets will, at a minimum, correspond to the reduction schedules mandated by the Montreal Protocol, except to the extent that the performance targets conform to the response by the Meeting of the Parties to Decision 37/20(a) of the Executive Committee. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to the Substance.
3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees in principle to provide the funding set out in row 5 of Appendix 2-A (the "Funding") to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A (the "Funding Approval Schedule").
4. The Country will meet the consumption limits for the Substance as indicated in row 1 in Appendix 2-A. It will also accept independent verification by the relevant Implementing Agency of achievement of these consumption limits as described in paragraph 8 of this Agreement.
5. The Executive Committee will not provide the Funding in accordance with the Funding Disbursement Schedule unless the Country satisfies the following conditions at least 30 days prior to the applicable Executive Committee meeting set out in the Funding Disbursement Schedule:
  - (a) That the Country has met the Target for the applicable year;
  - (b) That the meeting of these Targets has been independently verified as described in paragraph 8;
  - (c) That the Country has substantially completed all actions set out in the last Annual Implementation Programme; and

- (d) That the Country has submitted and received endorsement from the Executive Committee for an annual implementation programme in the form of Appendix 4-A (the “Annual Implementation Programmes”) in respect of the year for which funding is being requested.
6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A (the “Monitoring”) will monitor and report on that monitoring in accordance with the roles and responsibilities set out in Appendix 5-A. This monitoring will also be subject to independent verification as described in paragraph 8.
7. While the Funding was determined on the basis of estimates of the needs of the Country to carry out its obligations under this Agreement, the Executive Committee agrees that the Country may have the flexibility to reallocate the approved funds, or part of the funds according to the evolving circumstances to achieve the goals prescribed under this Agreement. Reallocations, which are considered as major changes should be accounted for in the verification report and reviewed by the Executive Committee.
8. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNIDO (the “Lead IA”) has agreed to be the lead implementing agency in respect of the Country’s activities under this Agreement. The Lead IA will be responsible for carrying out the activities listed in Appendix 6-A, including but not limited to independent verification. The Country also agrees to periodic evaluations, which will be carried out under the monitoring and evaluation work programmes of the Multilateral Fund. The Executive Committee agrees, in principle, to provide the Lead IA with the fees set out in row 6 of Appendix 2-A.
9. Should the Country, for any reason, not meet the Targets for the elimination of the Substance or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Disbursement Schedule. At the discretion of the Executive Committee, Funding will be reinstated according to a revised Funding Disbursement Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next instalment of Funding under the Funding Disbursement Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amounts set out in Appendix 7-A in respect of each ODP tonne of reductions in consumption not achieved in any one year.
10. The Funding components of this Agreement will not be modified on the basis of any future Executive Committee decision that may affect the Funding of any other consumption/production sector projects or any other related activities in the Country.
11. The Country will comply with any reasonable request of the Executive Committee and the Lead IA to facilitate implementation of this Agreement. In particular, it will provide access by the Lead IA to information necessary to verify compliance with this Agreement.
12. All of the agreements set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Protocol unless otherwise defined herein.

**Appendices**

**Appendix 1-A: The Substances**

|          |          |     |
|----------|----------|-----|
| Annex B: | Group II | CTC |
|----------|----------|-----|

**Appendix 2-A: The Targets and Funding**

| Year   | 2003      | 2004      | 2005<br>CTC-<br>85% | 2006    | 2007    | 2008    | 2009 | 2010 |
|--|-----------|-----------|---------------------|---------|---------|---------|------|------|
| Montreal Protocol reduction schedules                            |           |           | 192.8               | 192.8   | 92.8    | 92.8    | 92.8 | 0    |
| 1. Max allowable total consumption of Annex B Group II substance | 2,200     | 2,200     | 192.8               | 92.8    | 77.8    | 37.8    | 0    | 0    |
| 2. Reduction from ongoing projects                               | 0         | 0         | 565.8               | 0       | 0       | 0       | 0    | 0    |
| 3. New reduction under the present plan                          | 0         | 0         | 1,441.4             | 100.0   | 15      | 40      | 37.8 | 0    |
| 4. Total annual reduction of Annex B Group II substance          | 0         | 0         | 2,007.2             | 100.0   | 15      | 40      | 37.8 | 0    |
| 5. Lead IA agreed funding (US\$)                                 | 3,500,000 | 1,000,000 | 300,000             | 500,000 | 284,844 | 100,000 |      |      |
| 6. Lead IA support cost (US\$)                                   | 262,500   | 75,000    | 22,500              | 37,500  | 21,363  | 7,500   |      |      |
| 7. Total agreed funding (US\$)                                   | 3,762,500 | 1,075,000 | 322,500             | 537,500 | 306,207 | 107,500 |      |      |

**Appendix 3-A: Funding Approval Schedule**

13. Funding will be considered for approval at the second meeting of the year.

**Appendix 4-A: Format of Annual Implementation Programme**

1. **Data**

|  |       |
|--|-------|
| Country                                      | _____ |
| Year of plan                                 | _____ |
| # of years completed                         | _____ |
| # of years remaining under the plan          | _____ |
| Target ODS consumption of the preceding year | _____ |
| Target ODS consumption of the year of plan   | _____ |
| Level of funding requested                   | _____ |
| Lead implementing agency                     | _____ |

**2. Targets**

| Indicators    |                  | Preceding year | Year of plan | Reduction |
|---------------|------------------|----------------|--------------|-----------|
| Supply of ODS | Import           |                |              |           |
|               | <b>Total (1)</b> |                |              |           |
| Demand of ODS | Manufacturing    |                |              |           |
|               | Servicing        |                |              |           |
|               | Stockpiling      |                |              |           |
|               | <b>Total (2)</b> |                |              |           |

**3. Industry Action**

| Sector               | Consumption preceding year (1) | Consumption year of plan (2) | Reduction within year of plan (1)-(2) | Number of projects completed | Number of servicing related activities | ODS phase-out (in ODP tonnes) |
|----------------------|--------------------------------|------------------------------|---------------------------------------|------------------------------|--|-------------------------------|
| <b>Manufacturing</b> |                                |                              |                                       |                              |  |                               |
| Aerosol              |                                |                              |                                       |                              |  |                               |
| Foam                 |                                |                              |                                       |                              |  |                               |
| Refrigeration        |                                |                              |                                       |                              |  |                               |
| Solvents             |                                |                              |                                       |                              |  |                               |
| Other                |                                |                              |                                       |                              |  |                               |
| Total                |                                |                              |                                       |                              |  |                               |
| <b>Servicing</b>     |                                |                              |                                       |                              |  |                               |
| Refrigeration        |                                |                              |                                       |                              |  |                               |
| Total                |                                |                              |                                       |                              |  |                               |
| Grand total          |                                |                              |                                       |                              |  |                               |

**4. Technical Assistance**

Proposed Activity: \_\_\_\_\_  
 Objective: \_\_\_\_\_  
 Target Group: \_\_\_\_\_  
 Impact: \_\_\_\_\_

**5. Government Action**

| Policy/Activity Planned                              | Schedule of Implementation |
|--|----------------------------|
| Type of policy control on ODS import: servicing, etc |                            |
| Public awareness                                     |                            |
| Others   |                            |

**6. Annual Budget**

| Activity | Planned Expenditures (US \$) |
|----------|------------------------------|
| Total    |                              |

**7. Administrative Fees**

## Appendix 5-A: Monitoring Institutions and Roles

14. As developed in Section 5 of the Plan: The Terminal CTC Phase-out Plan will be managed by a dedicated Policy and Management Committee, consisting of a co-ordinator to be designated by the Government and supported by representatives and experts from the Lead IA and the necessary support infrastructure. The Policy and Management Support component of the Phase-out Plan will include the following activities for the duration of the Plan:

- (a) Management and co-ordination of the Plan implementation with the various Government policy actions pertaining to the Fumigant, Process Agent and Solvent Sectors;
- (b) Establishment of a policy development and enforcement programme, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations;
- (c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations;
- (d) Awareness creation of the Phase-out Plan and the Government initiatives in the Sectors among consumers and public, through workshops, media publicity and other information dissemination measures;
- (e) Development of a programme and procedures, if needed, to address the impact of CTC phase-out on the certain number of small scale enterprises in the Country re-using spent CTC, in view of the hardship that CTC elimination will cause them;
- (f) Preparation of implementation plan including determining the sequence of enterprise participation in planned sub-projects;
- (g) Verification and certification of CTC phase-out in completed projects within the Plan through plant visits and performance auditing;
- (h) Establishment and operation of a reporting system for use of CTC substitutes by enterprises; and
- (i) Establishment and operation of a decentralised mechanism for monitoring and evaluation of Plan outputs, in association with provincial regulatory environmental bodies to ensure sustainability.

**Appendix 6-A: Role of the Lead IA**

15. UNIDO will be responsible for a range of activities specified in the project document as follows:

- (a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's phase-out plan;
- (b) Providing verification to the Executive Committee that the Targets have been met and associated annual activities have been completed as indicated in the annual implementation programme
- (c) Assisting the Country in preparation of the Annual Implementation Programme;
- (d) Ensuring that achievements in previous Annual Implementation Programmes are reflected in future Annual Implementation Programmes;
- (e) Reporting on the implementation of the Annual Implementation Programme commencing with the Annual Implementation Programme for the year 2004 to be prepared and submitted in 2005;
- (f) Ensuring that technical reviews undertaken by the lead IA are carried out by appropriate independent technical experts;
- (g) Carrying out required supervision missions;
- (h) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Annual Implementation Programme and accurate data reporting;
- (i) Verification for the Executive Committee that consumption of the Substance has been eliminated in accordance with the Targets;
- (j) Ensuring that disbursements made to the Country are based on the use of the Indicators; and
- (k) Providing assistance with policy, management and technical support when required.

**Appendix 7-A: Reductions in Funding for Failure to Comply**

16. In accordance with paragraph 9 of the Agreement, the amount of funding provided may be reduced by US \$5,600 per ODP tonne of reductions in consumption not achieved in the year.

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**PROJECT COVER SHEET**

**COUNTRY:**  
DPR of KOREA

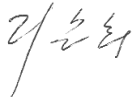
**VERIFYING AGENCY:**  
UNIDO

**Verification of complete closure of all Carbon Tetrachloride (CTC)  
production facilities in the DPRK**

**UNIDO  
2006**

On behalf of the Government of DPRK

Ri Sun Hui, Ministry of Chemical Industry



On behalf of UNIDO

Victor Shatrauka

Mr. John Place, Consultant to

UNIDO



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## 1. BACKGROUND

### Government and Industry Structure

NCCE is the leading body coordinating ozone issues at the national level. All environment issues and draft policies including those on ozone issues are discussed and reviewed in the NCCE first. Thereafter, the NCCE makes recommendation to the Cabinet regarding environment issues.

The Ministry of Chemical Industry is responsible for the management of production and consumption of ODS and for monitoring the production of ODS.

The State Planning Committee formulates the plan of ODS production.

### ODS Production, Import and Consumption

The 2003 Country Programme Update (CPU) was presented to the 41<sup>st</sup> Meeting of the Executive Committee of the Multilateral Fund for approval. The 2003 CPU draft represents the most up-to-date survey of the situation regarding ODS in DPRK and has been a major source of background information for this document.

DPR Korea's production of ODS in 2002 was 2,326 ODP tons, and consumption in the same year is 2,326 ODP tons. ODS consumption was largely concentrated in the CTC (solvents, fumigation and process agent) and refrigeration sectors. The ODS production and consumption profiles, based on the MP classification for Annex A, Group I and Annex B, Group II, for 1995-2002 is given in Tables 1 and 2:

**Table 1: ODS Production (MT)**

| ODS              | Production Capacity (MT) | Actual Production (MT) |             |             |             |             |             |             |             |
|------------------|--------------------------|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                  |                          | 1995                   | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002        |
| CFC-11           | 250                      | 185                    | 60          | 50          | 45          | 40          | 23          | 54          | 64          |
| CFC-12           | 1000                     | 500                    | 150         | 125         | 40          | 50          | 42          | 208         | 235         |
| CFC-113          | 500                      | 100                    | 40          | 35          | 35          | 20          | 15          | 36          |             |
| Halon 1211       | -                        | 0                      | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Halon 1301       | -                        | 0                      | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| CTC              | 2300                     | 1060                   | 1822        | 1893        | 2022        | 1985        | 1594        | 1889        | 1843        |
| TCA              | 1000                     | 100                    | 100         | 100         | 100         | 90          | 51          | 70          |             |
| MBr              | 200                      | 200                    | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| <b>Total ODS</b> |                          | <b>2145</b>            | <b>2172</b> | <b>2203</b> | <b>2242</b> | <b>2185</b> | <b>1725</b> | <b>2247</b> | <b>2142</b> |
| <b>Total ODP</b> |                          | <b>2061</b>            | <b>2256</b> | <b>2267</b> | <b>2347</b> | <b>2299</b> | <b>1836</b> | <b>2376</b> | <b>2326</b> |
| CTC as Feedstock |                          | 956                    | 330         | 270         | 125         | 130         | 93          | 361         | 402         |

**Table 2: ODS Import (MT)**

| ODS                | Import in year |           |           |          |          |          |           |          |
|--------------------|----------------|-----------|-----------|----------|----------|----------|-----------|----------|
|                    | 1995           | 1996      | 1997      | 1998     | 1999     | 2000     | 2001      | 2002     |
| CFC-11             | 40             | 10        | 20        | 0        | 0        | 0        | 0         | 0        |
| CFC-12             | 20             | 15        | 10        | 0        | 0        | 0        | 30        | 0        |
| CFC-113            | 0              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| Halon-1211         | 0              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| Halon-1301         | 1              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| CTC                | 0              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| TCA                | 0              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| MBr                | 0              | 0         | 0         | 0        | 0        | 0        | 0         | 0        |
| <b>Total (ODP)</b> | <b>70</b>      | <b>25</b> | <b>30</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>30</b> | <b>0</b> |

### Production Phase-Out

The Multilateral Fund for the Implementation of the Montreal Protocol (MLF) engaged Wakim Consulting (Wakim) in 2001 to conduct a Technoeconomic Audit of Production of Ozone Depleting Substances (ODS) in the Democratic People's Republic of Korea (DPRK). The Final Report was submitted in September 2001 and issued on 8 November 2001.

*49th Meeting of the Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol*  
 DPRK and ExCom agreed at the 36<sup>th</sup> Meeting of ExCom on the terms of timing and compensation for the complete closure of all ODS production facilities.

The Government of DPR Korea dismantled the production facility of methyl bromide in 1995 at its own cost to honor its commitment of the ozone layer protection. The government also dismantled the production facilities of CFC-113 and methyl chloroform in May 2001.

Wakim (p. 2) reported that the DPRK shut down both the Methyl Chloroform (TCA) and CFC-113 production facilities in May 2001 and dismantled them. The CFC-11/CF-12 facilities were closed in December 2003 and the CTC facility was closed at the end of 2005. Wakim reported that these are the only ODS production plants in the DPRK and that they are located in the February 8<sup>th</sup> Vinalon Complex.

### **ODS Production Sector**

DPR Korea is one of four Article 5 countries producing ODSs in the South Asia region. There is only one plant producing ODSs in DPR Korea in 2002, Feb.8th Vinalon Complex (former name was Sinhung Chemical Complex) in Hamhung. This plant produces CFC-11, CFC-12 and CTC. The country is self sufficient in the availability of the critical raw materials. The annual production capacity of the plant is 2,300 t/y of CTC. The CFC-11/-12 units were built in 1980 and the CTC production facility was built in 1975. There was also a 500t/yr CFC-113 unit and a 1,000 t/y methyl chloroform unit built in 1983. Table 3 summarizes the plant profile.

MLF approved in 2002 a production closure project of DPR Korea with the grant of US\$ 1,350,000. Under this project implementation plan, the CFC-113 and TCA production facilities had been already destroyed in May 2001 in compliance with the DPR Korea's obligations under the MP. In accordance with the phase out schedule specified in the Agreement between ExCom and DPR Korea, the other ODS production facilities were to be dismantled by the end of 2005.

Feb. 8th Vinalon Complex also operated a 2,300t/yr methyl bromide unit. The unit was shut down and dismantled at its own cost in 1995. DPR Korea suspended production of Halon 1211 and Halon-1301 before 1993. DPR Korea also phased out consumption of Halon 1211 in January 1995 and Halon 1301 in January 1996. No Halon-1211 has been imported since 1996, and only small quantities, 1 or 2 tons of Halon-1301 were imported from 1993 to 1995 annually.

DPR Korea does not export ODSs, and all the ODSs produced are consumed in the domestic market.

**Table 3: Profile of ODS production facilities**

| <b>Plant</b>        | <b>ODS</b> | <b>Capacity (t/year)</b> | <b>Commissioning year</b> | <b>Remarks</b>     |
|---------------------|------------|--------------------------|---------------------------|--------------------|
| 2.8 Vinalon Complex | CFC-11     | 250                      | 1980                      | Dismantled in 2003 |
|                     | CFC-12     | 1,000                    | 1980                      | Dismantled in 2003 |
|                     | CFC-113    | 500                      | 1983                      | Dismantled in 2001 |
|                     | TCA        | 1,000                    | 1983                      | Dismantled in 2001 |
|                     | CTC        | 2,300                    | 1975                      | Dismantled in 2005 |
|                     | MBr        | 2,300                    |                           | Dismantled in 1995 |

## 2. DPRK PRODUCTION SECTOR COMPLETE CLOSURE PROJECT FOR CTC

### A. Plant identification

Name of Enterprise : 8<sup>th</sup> February Vinalon Complex

Plant Ref. Number : n.a.

Address of the Plant : Huinsil-dong, Hungnam City, South Hamgyong Province, DPRK

Contact persons and Functional Title : Jang Myong Hak, General Director, February 8<sup>th</sup> Vinalon Complex, Hong Song Bok, Chief Engineer for Technological Development

Telephone Number : (+)850 2 381 5908

Fax Number : (+)850 2 381 5809

e-mail address : not available

### B. Verification

Team Composition : 2

**Leader** :

Name : V. Shatrauka

Functional Title : Project Manager, UNIDO

**Member(s)** : 1

Name : J. Place

Functional Title : Consultant, UNIDO

Date of Plant Visit : April 27, 2006

Duration of Visit : 1 day

### C. Plant History

Table 4 summarises the plant history.

**Table 4**

| Date of construction: | 1975         |                                  |                      |                |                |
|-----------------------|--------------|----------------------------------|----------------------|----------------|----------------|
| ODS Products          | No. of Lines | Capacity in Baseline Year*, 2000 | Production           |                |                |
|                       |              |                                  | Baseline Year*, 2000 | Year 1**, 2001 | Year 2**, 2002 |
| CTC                   | 2            | 2,300                            | 1,594                | 1,889          | 1,843          |

\* The year from which data are used for approving the ODS production phase out project

\*\* Till the year of verification

The figures for production and stocks in ODS MT for 2005 at the CTC plant are shown in Table 5.

Table 5 Production and stocks in ODS MT for 2005

|     | Stock<br>1 Jan. | J    | F    | M | A | M | J | J | A | S | O | N | D | Stock*<br>31 Dec. |
|-----|-----------------|------|------|---|---|---|---|---|---|---|---|---|---|-------------------|
| CTC | 0               | 96.4 | 77.6 |   |   |   |   |   |   |   |   |   |   | 0                 |

\* All the stocks are hold at user factories

#### D. Plant Activity in the Year Verified

##### Plants for Complete Closure (CTC)

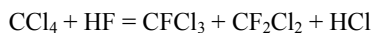
|   |   |
|---|---|
| No. of CTC lines closed   | : 1/1   |
| Date CTC production ceased  | : February 28, 2005   |
| Date of dismantling completed   | : Started December 15, 2005; completed December 15, 2005          |
| Destruction started and completed                                       | : Started December 15, 2005; completed December 23, 2005          |
| Verification of destruction of key components by UNIDO                  | : National Coordinating Committee for the Environment,            |
| Reactor tanks dismantled and destroyed                                  | : Yes   |
| Control and monitoring equipment dismantled and destroyed               | : Yes   |
| Pipes dismantled and destroyed  | : Dismantled; some were destroyed, some were used in other plants |
| Utilities dismantled and destroyed                                      | : Yes   |
| Evidence of destruction   | : Photographs   |
| Chance of resuming production   | : No  |
| Assessment by the Verification Team Included in the Verification Report | : Yes   |

### 3. MANUFACTURING PROCESSES FOR CTC

#### The process for manufacture of CTC

The inventory of the equipment in the CTC plant is given in Annex I.

Carbon disulphide, chlorine and catalyst are fed from their storage tanks to the reactor, where a gaseous CTC is produced with hydrogen chloride as by-product.



The mix of CTC and HCl is fed to an absorption tower where water dissolves and removes the hydrogen chloride. The aqueous hydrochloric acid goes to the neutralisation tower where it is reacted with NaOH to form a salt solution for disposal.

The gaseous crude mix of CTC is fed to a dehydration tower to be dried. The dry gas is stored and then compressed to feed for the low boiling separation tower.

CTC is further distilled in rectification columns to give the purified product, ready for storage and shipment.

A schematic of the process is presented in Annex II. A detailed drawing is to be found in the Wakim Report (Appendix D-1).

#### **4. SITE VISIT**

UNIDO accepted the responsibility for administering the dismantling of the ODS processing units. The Verification Team (J. Place, consultant, UNIDO) visited the 8<sup>th</sup> February Vinalon Complex on April 27 2006 in order to verify the destruction of the CTC production facilities.

The Terms of Reference and the Questionnaire Template are located in Attachment A.

Officials of the Complex, of the Ministry of Chemical Industry and of the National Ozone Unit accompanied the Verification Team to the site of the former production facilities.

Production had ceased on October 30, 2005. The Verification Team of 2002 made a brief photographic record of the CTC plant in order to prepare the baseline for the 2005 CTC phase-out. This record, as described to the 2002 Verification Team, is to be found in Annex II of the 2002 Verification Report for the closure of the CFC-113 and TCA plants. Specifically, that report includes:

Annex II-1        “Storage tanks and products”  
                      “Reactors (below), distillation towers (above)”  
Annex II-2        “Control room”

Dismantling of the CTC plant took place on December 15, 2005. Destruction of key items of equipment started on December 15, 2005 and was completed on December 23, 2005. The photographic record of this stage is presented in Annex III.

All of the key components have been destroyed.

#### **5. REPLACEMENTS FOR CTC**

According to the Agreement on ODS production phase out between the ExCom and DPR Korea, ExCom does not provide any financial support to DPR Korea in the development and/or production of ODS alternatives.

#### **6. NATIONAL ACTION PLAN TO PHASE OUT ODS**

Phase-out of production and consumption of CTC is a significant part of the National Action Plan.

The action plan will be supported by continued strengthening of ODS import controls. NCCE will be actively involved through technical support programs to ensure full compliance with the regulations and policies.

#### **7. PHOTOGRAPHIC RECORD OF THE CTC PLANT**

##### **7.1 Record made in 2002**

The Verification Team of 2002 made a brief photographic record of the CTC plant in order to prepare the baseline for the 2005 phase-out programme. This record, as described to the 2002 Verification Team, is to be found in Annex II of the 2002 Verification Report for the closure of the CFC-113 and TCA plants.

Annex II-1        “Storage tanks and products”  
                      “Reactors (below), distillation towers (above)”  
Annex II-2        “Control room”

##### **7.2 Record of dismantling and destruction**

The Ministry of Chemical Industry recorded the dismantling and destruction process of December 2005. The photographs are presented in

Annex II - Photographs of CTC plant site during dismantling, December 15-23, 2005.

##### **7.3 Visit of Verification Team**

The 2006 Verification Team confirmed the destruction of the CTC and inspected the site during the visit of April 2006. The photographs are presented in

Annex III - Photographs of CTC plant site after destruction, April 27, 2006.

## **8. SOLVENT SECTOR**

No CTC has been consumed by the Solvent Sector in 2005. Enterprises have used stockpiled CTC to continue operations until installation of the alternative technologies. The small production allowance for 2005 under the terms of the Montreal Protocol (maximum 192.8 ODP MT) was used to supply continuing operations at two pharmaceutical factories, Hungnam and Lanam, whose projects have yet to be approved. These two factories will rely on stockpiled CTC to continue operations into 2006.

## **9. CONCLUSIONS AND ASSESSMENT BY THE VERIFICATION TEAM**

The CTC facilities have been dismantled and substantially destroyed in accordance with the terms of the Agreement between the Executive Committee and DPRK at its 36<sup>th</sup> Meeting. The key components have been destroyed and there is no realistic possibility that the facilities can be returned to operational status.

UNIDO will pay the Third Tranche of US\$ 488,750 upon acceptance of the Verification Report by ExCom.

## **10. REQUEST FOR THE RELEASE OF 2005 FUNDING**

In accordance with the terms of the Agreement reached between the Executive Committee and the DPRK at the 36<sup>th</sup> Meeting, UNIDO and DPRK request the Executive Committee to release the Third Tranche in the amount of US\$ 488,750 together with the 5% fee.

## ANNEX I

## LIST OF EQUIPMENT DESTROYED

|           | <b>Equipment</b>                                      | <b>Factory inventory numbers</b> |
|-----------|---|----------------------------------|
| <b>1</b>  | 1 CS <sub>2</sub> storage vessel reflux condenser     | S-15-1                           |
| <b>2</b>  | 1 catalyst storage vessel                             | S-28-2                           |
| <b>3</b>  | 1 chlorination reactor                                | S-15-3                           |
| <b>4</b>  | 1 chlorination reactor reflux condenser               | S-15-4                           |
| <b>5</b>  | 1 distillation column                                 | S-15-5                           |
| <b>6</b>  | 1 distillation column condenser                       | S-15-6                           |
| <b>7</b>  | 1 distillation mass vessel                            | S-28-7                           |
| <b>8</b>  | 1 distillation mass vessel condenser                  | S-15-8                           |
| <b>9</b>  | 1 decomposition reactor                               | S-15-9                           |
| <b>10</b> | 1 crude product reflux condenser                      | S-15-10                          |
| <b>11</b> | 1 crude product storage vessel                        | S-28-11                          |
| <b>12</b> | 1 redistillation column                               | S-28-12                          |
| <b>13</b> | 1 redistillation column condenser                     | S-25-13                          |
| <b>14</b> | 1 CCl <sub>4</sub> cooler                             | S-15-14                          |
| <b>15</b> | 1 first low bpt. mass storage vessel                  | S-28-15                          |
| <b>16</b> | 1 first low bpt. mass storage vessel reflux condenser | S-15-16                          |
| <b>17</b> | 2 CCl <sub>4</sub> storage vessel                     | S-15-17                          |
| <b>18</b> | 1 CCl <sub>4</sub> storage vessel, reflux condenser   | S-15-18                          |
| <b>19</b> | 1 NaOH measuring vessel                               | S-28-19                          |
| <b>20</b> | 2 CS <sub>2</sub> storage vessel                      | S-28-20                          |
| <b>21</b> | 1 CS <sub>2</sub> pressure tank                       | S-28-21                          |
| <b>22</b> | 1 waste gas absorption column                         | S-28-22                          |
| <b>24</b> | 2 NaOH storage vessel                                 | S-28-23                          |

### CERTIFICATE OF DESTRUCTION

This is to certify that the 2.8 Vinalon Complex has destroyed the installations for production of Carbon Tetrachloride (CTC), described in the Techno-Economic Audit of the Production of Ozone-Depleting Substances (ODS) in the Democratic People's Republic of Korea (Wakim Consulting, 8 November 2001). The installations have been dismantled and scrapped or destroyed or otherwise rendered unusable.

Signed: 

Date: 28<sup>th</sup> April 2006

Name: Ri Sun Hui, Director of Ministry of Chemical Industry,  
DPR of Korea



Title:

Address: Sinri Dong, Dongdaewon District, Pyongyang, DPR of Korea