INTERMEDIATE EVALUATION OF THE CFC PRODUCTION PHASE-OUT AGREEMENTS

COUNTRY EVALUATION REPORT ON DPR KOREA

By Oscar Gonzalez and David Sherry,

Consultants

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List of Acronyms and Abbreviations

CFC	ChloroFluoroCarbon
CTC	Carbon Tetrachloride
HCFC	HydroChloroFluoroCarbon
HFC	HydroFluoroCarbon
ktpa	Thousand (metric) ton per year (generally used for annual capacity of chemical plants)
mt, ton	Metric ton (1000 kilogram)
NCCE	National Coordinating Committee for the Environment (in DPR Korea)
NOU	National Ozone Unit
ODP	Ozone Depletion Potential
ODS	Ozone Depleting Substances
TA	Technical Assistance
TCA	Trichloroethane (Methyl chloroform or T111)
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WB	World Bank

1 Purpose and Scope of the Evaluation

1. The terms of reference, methodology and scope of the evaluation and the proceedings of the mission are described in the synthesis report submitted to the 42nd meeting of the Executive Committee (Doc. 42/).

2 CFC production sector phase-out achieved

2. In DPR Korea the phase-out was based on the closure of production of the sole producer. Plant occupancy of the CFC-113 plant was very small and production did not exceed 36 tons in any year since 1996. Plant occupancy of the CFC-11/12 plant was hardly more and production did not exceed 300 tons in the period 1996-2002, although in 2003, the year of closure, the output is recorded as just under 600 ton, probably for stockpiling purposes.

Table 1: Overview of the CFC Production Sector Agreement with China

Chemical	Year	Phase-Out as per Agreement (ODP Tonnes)[1]	Verified Actual Gross Prod. (Metric Tonnes)	Production in Excess of Agreement (Metric Tonnes)	Verified Actual Prod. (ODP Tonnes)	Actual Production (ODP Tonnes)[2]	Annual Funding Tranches as per Agreement (US$)	Approved Funds (US$)	Funds Disbursed (US$)[3]
CFC-113	2001	400.0				28.8	687,700	687,700	687,700
TCA	2001	100.0				7.0	656,650	656,650	656,650
CFC-11/12	2003	1,250.0				587.4	733,700		
CTC	2005	2,530.0				2,027.3	488,750		
Total		**4,280.0**				**2,650.5**	**2,566,800**	**1,344,350**	**1,344,350**

[1] These figures do not come from the agreement which does not contain any but from UNIDO's business plans.
[2] Data from CP; for CFC-11/12 and CTC data for 2002.
[3] According to 2002 Progress Report.

3. Because in DPR Korea there is no free market mechanism to determine sales values and profits per ton, the compensation was calculated and approved on the basis of plant replacement cost. On the basis of 1250 tpa CFC-11/12 plant capacity and an agreed amount of US$ 733,700 for its closure, this amounts to US$ 587/ton of capacity. According to UNIDO, some definitional uncertainty meant that a number of process chemical applications for CTC were wrongly assumed to be chemical intermediate applications and the funding calculated for the phase-out was consequently underestimated.

4. The techno-economic audit conducted in 2001 (dated November 2001) reviewed the specific production of CFC-11 and 12 and CTC, but did not refer to internal CTC use within the factory for the process solvent applications. This may not have been part of the TOR of the audit but a fuller review of the CTC trail is suggested.

5. The unit ratio of CTC to CFC-11 (1.6:1.0) used by the Vinalon 2.8 factory is an anomaly, which has not been clarified by the techno-economic audit (2001) and a subsequent discussion with the consultant, nor the company itself during the visit. However, this ratio is history since the CFC plant is closed and had no substantive impact on the funding amount.

6. With its policy of industrial self-sufficiency, DPR Korea has been both a producer and consumer of ODS. At the time of signature of the MP in 1995, it was producing CFC-11/12 and 113,TCA (T111), CTC and methyl bromide. Halon 1211 and 1301 production units had been closed down at the beginning of 1995. The 200 tpa methyl bromide unit was closed in 1995 without funding from the MLF. DPR Korea met the required freeze commitments of the Montreal Protocol in 1999. CFC-113 and TCA (T111) plants were closed in 2001, with the consequence that CTC replaced the withdrawn products as a cleaning solvent.

3 Policy instruments and institutions involved

7. The NCCE (National Coordinating Committee for the Environment) is an inter-ministerial committee, which oversees the NOU. It cooperates with the UN system to manage the national ozone activities in a structured way.

8. The line ministry responsible for chemical production is the Ministry of Chemical Industry. With the support of UNIDO, NCCE is supervising the implementation of the phase-out agreement.

9. Information on the phase-out and on potential alternatives has been provided to ODS consumers. Laws banning the use of CFCs (except recycled or under special provisions) will be enacted by 2005.

4 Mechanisms to audit and verify production

10. In DPR Korea, CFC-113 manufacture in a 500-tpa plant was discontinued in 2001. The plant dismantling was verified and a disbursement of US $687,700 received. A TCA plant with a capacity of 1,000 tpa was closed at the same time and its closure compensated with US $ 656,650. Manufacture of CFC-11 and CFC-12 on plant with a capacity of 1,250 tpa was discontinued in December 2003 and the dismantling of the plant has taken place, been verified and the verification report issued by UNIDO. The agreed compensation is US$ 733,700 and is requested for approval by the 42nd meeting of the EXCOM.

11. The sales records showed movements of CTC in exact 4 and 5-ton quantities. Since a standard 200-liter drum of CTC contains 316.8 kg, exact weights rounded to ton quantities are difficult to achieve. This aspect should be followed by the verifiers engaged by UNIDO to review the CTC consuming sectors.

12. So far as we could establish, the documentation shown during the evaluation mission was the same that was made available to previous auditors and verifiers.

13. No information was obtained by the evaluators on illegal production in DPR Korea, which, in any case, would be very unlikely to happen.

5 Sustainability

14. The phase-out is sustainable since the plant has been verified as having been dismantled and this evaluation confirmed it. The lack of non-ODS domestic alternatives means:

(a) Continuation of use of CTC whilst stocks remain.

(b) Importing substitutes which is difficult due to scarcity of foreign exchange.

(c) Possible acceleration of the 'Moran Programme'.

6 Evolution of prices for CFCs

15. Calculation of prices by production costs or market mechanisms is not applicable. The Vinalon 2.8 factory produced CFCs (and presumably CTC) at the request of the various Ministries responsible for the industrial sectors. These include Ministry of Electronics Production, Ministry of Metallurgy and Machinery Industry (metal and electronic parts cleaning), Ministry of Electronics Industry (refrigerator manufacture) and General Bureau of External Service (refrigerator servicing). These call off the chemicals required according to production budgets and the Vinalon 2.8 factory is then instructed to produce and deliver those chemicals.

16. In 2003, the phase-out year for CFCs, production of CFCs was quite high permitting stock build up in the consuming plants but by contrast reducing the amount of CTC available for consumption. In 2004 CTC, which will not be required for CFCs, will still be produced at close to maximum capacity to enable stock piling in anticipation of CTC closure.

7 Foreign Trade with CFCs

17. Legislation on controlling imports of ODS is in place. There seem to be no exports.

8 Substitutes

18. In DPR Korea, stated plans to manufacture methylene chloride (for foam-blowing) and trichloroethylene (as metal-cleaning solvent) will probably not be viable due to the large plant sizes required for economic production, the technology acquisition cost involved, as well as the volume of co-products which are inevitably co-manufactured (including CTC in the case of methylene chloride). There is no substitute for the CFCs (and in the longer term, from 2005, CTC) except imported products, which DPR Korea has been seeking to avoid. CTC in its own right has of course been used as a substitute in recent years, for the discontinued products methyl bromide, CFC-113, and TCA (methyl chloroform or T111), all of which are much more benign both in terms of ODP and toxicity than the CTC that replaced them.

19. HFC-134a has been selected as the product suitable for replacing CFC-12 in refrigeration applications. A new refrigerant, said to be derived from propylene and with the code-name "Moran", has been referred to in a number of previous verification and update reports but no more is known about the technology or its status.

20. There have been projects tabled to review methylene chloride production for foam-blowing use, and trichloroethylene production as a feedstock to HFC134a. The economics of such plants were reviewed during the visit and it was noted that methylene chloride production would entail the necessary co-production of chloroform and CTC. Building such plants at an economic scale would necessitate capacities far in excess of domestic market demand.

9 Technical assistance

21. No Technical Assistance was provided for the closure of the CFC plants. UNIDO is implementing the assistance provided for the phase-out in ODS consuming sectors, which are beyond the scope of this evaluation.
