Attachment 3
IPAC Submission to UNFCCC

IPCC Third Assessment Report - Climate Change 2001: Mitigation

[*Excerpt from Appendix III of the Report***]**

A3.5 Aerosol Products

A3.5.1 *Medical Applications*

Metered dose inhalers (MDIs) form a reliable and effective therapy for asthma and chronic obstructive pulmonary disease (COPD).

There are estimated to be 300 million patients with asthma and COPD worldwide. Approximately 450-500 million MDIs are used annually worldwide with asthma prevalence increasing as urbanization of developing countries continues. It is estimated that 10,000 metric tons (tonnes) of CFC and 1000 tonnes of HFCs were used in MDIs worldwide in 1998 (UNEP, 1998b, 1999b). HFC-based MDIs are essential for the near-term CFC phaseout, because other available options, including dry powder inhalers (DPIs) (single or multi-dose), nebulizers (hand held or stationary), orally administered drugs (tablets, capsules, or oral liquids), and injectable drugs, which are alternatives for not using CFCs or HFCs, cannot currently replace CFC products for all patients (UNEP, 1999b). The transition to HFC MDIs began in 1995, and approximately 5% in 1998 and 10% in 1999 contain HFC (UNEP, 1999b). HFC-based MDIs and DPIs are expected to help minimize the use of CFCs by 2005 in developed countries, while providing essential medication for patients. Important factors in the conversion to DPIs will include their acceptance by doctors, patients, insurance companies, and medical authorities.

Assuming the complete phase-out of CFC MDIs and a continued growth rate in demand for asthma and COPD treatment of 1.5%–3.0%/yr, it is estimated that HFC consumption and emissions will be 7,500 to 9,000t/yr – about 3–3.6MtCeq in 2010 (UNEP, 1999b).

DPIs have been formulated successfully for many anti-asthma drugs. Dry powder inhalers are an immediately available alternative free of CFCs and HFCs; however, they are not a satisfactory alternative to the pressurized MDIs for some patients with very low inspiratory flow (e.g., some small children and elderly people, patients) with acute asthma attacks or with severe respiratory diseases, and emergency-room patients. Use is likely to accelerate, particularly as they may be more suitable for young children than the older DPIs (UNEP, 1999b). In Scandinavian countries, government policies have led to greater use of DPIs than of MDIs (IPCC/TEAP, 1999; UNEP, 1999b; March, 1998).

The abatement cost estimates to reduce future HFC emissions by replacing MDIs with DPIs depend on the price of DPIs. The cost per equivalent dose varies between products and countries, with some CFC-free MDIs being more expensive than CFC-based MDIs and some DPIs more expensive than both CFC- and HFC-based MDIs (ARCF, 2000). In Europe, prices are less as

much as US$4 higher for a DPI than for a comparable MDI (Harnisch and Hendriks, 2000). It is estimated that, by 2010, the EU can reduce HFC emissions by 30% at a cost of about US$460/tCeq and 50% at about US$490/tCeq (March, 1998), which translates to a differential cost of US$4 over MDIs; for one country in Europe there is no differential cost (Harnisch and Hendriks, 2000). It is not currently medically feasible to replace MDIs by DPIs completely because approximately 25% of MDI use is for patients who require medication be forced into their respiratory system (Öko-Recherche, 1999).

A3.5.2 Cosmetic, Convenience, and Technical Aerosol Propellants
Global 1998 consumption and emissions of HFCs in non-medical aerosol products was less than 15,000 tonnes (UNEP, 1998d) with two-thirds HFC-134a and one-third HFC-152a – less than 4MtCeq. Emissions of HFCs are projected to not exceed 20,000 tonnes in 2010 (IPCC/TEAP, 1999) or about 5MtCeq (calculated assuming equal emissions of HFC-134a and HFC-152a). HFCs have replaced only about 2% of the aerosol product market that would have used CFCs had there not been the Montreal Protocol (McFarland, 1999). Hydrocarbon, dimethyl ether (DME), carbon dioxide, nitrogen propellants, and not-in-kind alternative products have replaced the remaining 98% of projected demand.

HFCs are used in aerosol products primarily to comply with technical requirements or environmental regulations. HFC-134a is the propellant of choice for products that must be completely non-flammable. An example of HFC use based on a technical requirement is non-flammable, far-reaching insecticide products used on high-voltage power lines and transformers where workers cannot escape from wasps and hornets. HFC-152a is the propellant of choice to replace hydrocarbon aerosol propellants restricted in Southern California and in some applications where hydrocarbons and dimethyl ether are too flammable but the flammability of HFC-152a is acceptable. HFC-134a and HFC-152a are the propellants of choice for laboratory, analytical, and experimental uses where chemical properties are important and flammability may be a concern.

One source estimates that about 45% of HFC emissions from cosmetic and convenience applications where flammability is an issue could be eliminated at a cost of US$70/tCeq and about 70% could be eliminated at a cost of about US$130/tCeq (March, 1998).

The aerosol product industry has every incentive to minimize HFC use. HFCs cost more than other propellants and unnecessary HFC use has the potential to re-ignite consumer boycotts like the CFC boycotts in the early 1970s that led to national bans on certain cosmetic products. Boycotts could threaten sales of all aerosol products because consumers may not be able to distinguish targetted HFC products from acceptable hydrocarbon products (UNEP, 1999b).

A “self-chilling beverage can” was designed to achieve refrigeration through the physics of expanding and emitting approximately 35–75g of HFC-134a directly to the atmosphere for every beverage can chilled. The inventing company pledged not to manufacture or license the technology and to discourage its use, the US government banned the use of HFCs in self-chilling beverage cans (US Federal Register, 1999), and a number of HFC producers have stated publicly

that they will not supply such an application. However, self-chilling cans using HFC-134a are marketed in at least one country and it is estimated that even a small market penetration could substantially increase emissions of greenhouse gases (US Federal Register, 1999).

The UNEP/TEAP HFC and PFC Task Force (UNEP, 1999b) developed principles to guide the use of HFCs for aerosol products:

recommend HFCs be used only in applications where they provide technical, safety, energy, or environmental advantage that are not achieved by not-in-kind alternatives; and

select the HFC compound with the smallest GWP that still meets the application requirements.
Application of these principles justifies the use of HFCs for some products in some circumstances but these "responsible use" criteria are not satisfied when not-in-kind alternatives are technically and economically suitable. The above-mentioned study (UNEP, 1999b) includes detailed evaluation of alternatives and substitutes for aerosol safety products (insecticides, boat horns, noise-makers), cosmetic products (deodorants, hair sprays, shaving creams), convenience products (room fresheners, dust blowers, tyre inflators, foam caulk, and insulation), and novelty products (foam party streamers, pneumatic pellet and bait guns).