



Global Environment Facility

GEF/C.23/Inf.19
May 17, 2004

GEF Council
May 19-21, 2004

SCIENTIFIC AND TECHNICAL ADVISORY PANEL (STAP) OF THE GLOBAL ENVIRONMENT FACILITY:

NON-COMBUSTION TECHNOLOGIES FOR THE DESTRUCTION OF POPS STOCKPILES

(Prepared by the Scientific and Technical Advisory Panel)

Scientific and Technical Advisory Panel
to the Global Environment Facility:
non-combustion technologies for the
destruction of POPs stockpiles

(Preface and Executive Summary only. The full report will be posted on
STAP's website shortly at www.unep.org/stapgef)

May 2004

Preface

Growing concern about the threats posed to human health and the global environment by the release of synthesised chemicals has triggered worldwide action for the destruction and elimination of at least one category of these substances, Persistent Organic Pollutants (POPs).

The Stockholm Convention and Basel Convention signal an international commitment to the identification and management of POPs wastes. The Global Environment Facility (GEF) has been designated, on an interim basis, as the financial mechanism of the Stockholm Convention. In response to this, the GEF prepared a draft of an Operational Programme for “*Reducing and Eliminating Releases of POPs into the Environment*” as a framework for its interventions. At the Second Global Environment Facility (GEF) Assembly, held in Beijing in October 2002, the GEF formally approved POPs as a new focal area.

The GEF is seeking to destroy obsolete stockpiles of POPs. Contaminated soils around stocks are also a challenge in many countries. Stockpiles are especially severe in Africa, in Central and Eastern Europe, and in the Newly Independent States, with 47,000 obsolete pesticide stockpiles identified in Africa alone.

One of GEF’s strategic priorities is the demonstration and replication of innovative and cost-effective technologies and practices, and the identification of potential opportunities for technology transfer, including non-combustion technologies. The GEF has developed an African Stockpile Programme. And the GEF is supporting a “Global Programme to Demonstrate the Viability and Removal of Barriers that Impede the Successful Implementation of Available, Non-Combustion Technologies for Destroying Persistent Organic Pollutants”, which has been developed by UNDP/UNIDO.

Scientific and Technical Advisory Panel (STAP) was asked by the GEF to provide strategic advice on emerging, innovative technologies for the destruction and decontamination of POPs. We therefore convened a technical workshop, 1-3 October,

2003, in Washington D.C. The workshop brought together a group of experts from developed and developing countries, academia, research, international and government agencies, and was attended by STAP Member Professor Xiao-bai Xu (Research Centre for Eco-Environmental Science at the Chinese Academy of Sciences in Beijing, China), representatives of the GEF Secretariat, the Implementing Agencies of the GEF (UNDP, UNEP and the World Bank), UNIDO, FAO, the interim Secretariat of Stockholm Convention, the Basel Convention Secretariat, and the STAP Secretariat.

Environmental and health concerns about emissions of POPs by-products from combustion have encouraged the development of alternative destruction technologies. Emerging technologies could play an important role in the final treatment and/or destruction of large numbers of stockpiles of obsolete POPs. In the case of developing countries, adequate destruction facilities are often lacking, and the costs associated with providing them very high. Most obsolete pesticides are therefore disposed of by shipping waste to developed countries for destruction, mostly by high temperature incineration.

Under the terms of the Stockholm Convention countries are asked to prepare National Implementation Plans, which provide for the identification and destruction of pesticide stockpiles, within a sustainable toxic waste management strategy. The Convention requires disposal techniques to be environmentally sound, and not to produce other POPs by-products. The workshop was an opportunity to assess experience so far, and to identify promising technologies.

STAP commissioned a review of alternative technologies which was conducted by the University of Auckland, New Zealand. The workshop made a thorough examination of the questions about the performance and applicability of various technologies. The review provides a state-of-the-art overview of existing and emerging, innovative and potentially cost-effective non-combustion and bio-remediation POPs destruction technologies. The review also examined the potential use of technologies, taking into account the conditions prevailing in developing countries and countries with economies in transition, as well as regional differences.

This report is timely, with the entry into force of Stockholm Convention on 17 May 2004. I hope the report and STAP's accompanying advice will be of assistance to the GEF as it goes about its work.

Julia Carabias
STAP Chair

30 April 2004
Washington, DC

Executive Summary

1. The most widely used approach for disposing of stockpiles of obsolete POPs in developing countries is to pack and ship them overseas for high temperature incineration in developed country facilities. These facilities have international standards for emissions of by-products produced. The current approach offers a safe, well-proven and practical solution: it is also relatively inexpensive because there is substantial overcapacity of well-equipped, modern high temperature incinerators in Western Europe.
2. But this approach may not be sustainable in the longer term for three reasons: (a) soils contaminated with POPs, which cannot be easily transported given their bulk, are a problem in developing countries, as well as stockpiles; (b) there is public pressure on environmental and health grounds about emissions of POPs by-products from incineration, despite the safety standards; and (c) new laws and regulations are being introduced to ban the importation of waste containing POPs for incineration. These factors are leading to interest in building capacity to dispose of POPs safely in developing countries.
3. As an alternative to incineration, there are a number of non-combustion and bioremediation technologies which might be suitable for use in developing countries. STAP was therefore asked: (a) to provide advice on existing and emerging, innovative and potentially cost-effective non-combustion and bioremediation technologies for the disposal and decontamination of soils containing POPs; (b) to examine the feasibility of using these technologies in developing countries; and (c) to analyse barriers to their use. STAP commissioned a technology review and convened a technical workshop in Washington D.C., 1-3 October 2003 to address these issues.

4. The review classified non-combustion technologies into a number of categories, ranging from existing commercial technologies¹ through those near or at the start of commercialisation, to those unlikely to be applicable.
5. The review also provided a comprehensive set of criteria against which to assess the suitability of a non-combustion technology. There are considerable difficulties in assessing suitability: developers are very reluctant to provide information, and much of the data comes from the companies themselves.
6. The evaluation and selection of a non-combustion technology is a complex matter: it requires careful consideration of many factors, often on the basis of incomplete information. There is no universally accepted view about what is an “acceptable” or “approved” technology. For example, the criterion for “dioxin-free” used by some companies is regarded as insufficient by the Stockholm and Basel Conventions. There is also a lack of agreement about cement kiln disposal, which is regarded as attractive by many developing countries, but is not widely regarded as acceptable elsewhere.
7. In view of this divergence of views, the technology review which underlies STAP’s conclusions and recommendations should be regarded as a working document that will need to be updated as new data become available.
8. STAP’s principal conclusions and recommendations are:

Disposing of obsolete stockpiles of POPs is not just about the choice of a particular technology. It is important to frame this in the broader context of waste management. Any intervention and clean-up decision should be risk-based, taking into account the impact on people and the environment. And in considering non-combustion technologies, it is important to recognise that there is very little

¹ There were six commercialised technologies with considerable experience i.e. with operating plants which are licensed to destroy high strength POPs stockpiles: Gas-Phase Chemical Reduction, Base Catalyzed Decomposition, Super-Critical Water Oxidation, Sodium Reduction, Plasma Arc and Pyrolysis/Gasifiers.

experience with new technologies, and there is often a lack of support systems essential to applying a particular technology successfully.

No disposal or management option not permitted in industrialised countries should be applied in developing countries. No dual standards are acceptable, and developing countries should not be testing grounds for new technologies.

Technology selection should be made on the basis of stringent criteria set by the international community and take into account the conditions the technology will operate in, and the needs of the country or region.

Only commercially proven non-combustion technologies should be considered by the GEF, with the exception of bioremediation technologies, which can offer cost-effective solutions for *in situ* soil decontamination.

Non-combustion technologies cannot compete against combustion technologies on a commercial basis. But the GEF alone cannot transform the market, and it should not attempt to bring down the cost of new technologies. It can cost up to \$100 million to produce a full-scale plant for a new innovative technology, and take 5 to 7 years to bring a near-commercial technology to market. The GEF should instead play a facilitating role through working in partnership with the private sector

Given the high initial investment costs involved in building safe and environmentally sound destruction facilities, and the high operational costs of non-incineration destruction facilities, cost-effective approaches need to be identified. This could mean setting up regional facilities, taking into consideration the potential problems associated with transporting waste.

In addition to the usual criteria for project selection, e.g. the need for demonstrated country-drivenness, sustainability and co-financing, the GEF should

establish criteria on the risks of disposal technologies, the enabling environment, and availability of partnerships as a basis for assessing its support for non-combustion technologies. It is likely that such criteria would be met in East and Central Europe, Mexico, the Philippines and China, where the market is sufficiently large, and capacity and finance are not major barriers.

Where these criteria are not met, as is the case for most countries in Africa, the GEF should support packing and shipping the stockpiles to facilities that meet internationally-agreed standards for destruction.

If the concentration of POPs is low, *in situ* soil remediation of contaminated sites using bioremediation technologies can be a cost-effective and appropriate way of decontaminating soils polluted with POPs. If the concentration is too high, the soil may first have to be mixed with uncontaminated soil.

There are relatively few successful full-scale bioremediation projects: more research and testing is needed. The GEF should support research, pilot testing and demonstration of bioremediation technologies.

The GEF should also establish a science programme using twinning and peer review for bioremediation technologies. Such a programme would also help the GEF avoid supporting the “wrong” technologies, and would help in the testing and evaluation of cost-effective and efficient technologies, with the information generated being publicly available.