GREENPEACE

Submission to
Environmental Affairs Panel, Legislative Council, HKSAR

The Decommissioning of Cheoy Lee Shipyard at Penny's Bay

11 March 2002

Background

The Civil Engineering Department (CED) of the HKSAR has prepared a Environmental Impact Assessment for the Decommissioning of Cheoy Lee Shipyard (CLS) at Penny's Bay (EIA – 072/2001). The decommissioning involves demolition and removal of all buildings and structures and decontamination of site areas. Major contaminants in soils found are metals (mainly barium, coppers, lead and zinc) and total petroleum hydrocarbons (TPH). Semivolatile organic compounds (SVOCs) and dioxins are also found in soil samples.

The total estimated volume of contaminated soil is 87,000 m^3, of which 30,000 m^3 is dioxin contaminated. The EIA report recommended Indirect Thermal Desorption (ITD) and incineration at Chemical Waste Treatment Centre (CWTC). The ITD plant will be put up at To Kau Wan in north Lantau where dioxin contaminated soil is treated off site. The highly contaminated residue generated will then be transported for incineration at CWTC in Tsing Yi.

Greenpeace Position

In May 2001, Governments of the world met in Stockholm to sign the Convention on Persistent Organic Pollutants (POPs). It is the first global agreement to eliminate the most insidious and damaging synthetic chemicals such as dioxin and furans, from the planet's biosphere.

In the project of decommissioning of CLS, the HKSAR faces several challenges: to decontaminate the site and destroy POPs stockpiles 100 percent; to identify other POPs sources, eliminate releases of dioxin and other by-product POPs.

Greenpeace supports and encourages the use of closed-loop non-incineration technologies to destroy POPs, such as dioxins and furans and other organochlorines, provided these technologies perform to strict operational criteria. The proposed decontamination works and remedial methods for dioxin contaminated soil at CLS should fully satisfy the fundamental performance criteria listed later in this submission paper.

Greenpeace has grave concern about destruction efficiency of combustion technology and opposes the use of incineration to treat highly contaminated residue at Chemical Waste Treatment Centre. With the development of relatively reliable methods for collecting and analyzing stack emissions, it was discovered that varying portions of the chemicals fed into the incinerators escaped destruction and were released in stack gases. The assessment of alternative technologies in the EIA did not assess non-incineration alternatives such as Ecologic and Base Catalyzed Dechlorination (BCD). Greenpeace considers this as major flaw and the CED should provide full explanation why this has not been done.

Lastly, Greenpeace believes it is only through an open, transparent public process that the current proposal will proceed without major opposition from local residents and other interested parties. The Government must be willing to provide sufficient documentation and operational and hazard information to fully support the proposal on an on-going basis, if the present remediation proposal is approved.

This submission aims to outline criteria for POPs destruction and information on toxicity of dioxins, particularly impacts on human health. A preliminary assessment of the proposed technologies (ITD and incineration) and brief information about decontamination works at North Homebush Bay, Australia. Further technical analyses are needed to assess destruction efficiency of the proposed technology and alternatives.

Dioxin

Dioxin is unintentionally formed and released from thermal processes involving organic matter and chlorine as a result of incomplete combustion or chemical reactions. It is one of the 12 short-listed POPs in Stockholm Convention, which are recognized as highly toxic at low concentrations.

Dioxin can be commonly detected in air, soil, sediments and food. Dioxin is transported primarily through the air and is deposited on the surfaces of soil, buildings and pavement, oceans, lakes, rivers, plants, animals and people. Dioxin can affect organisms in far-off locations. Like other POPs, they are transported for thousands of kilometres on air currents and have consequently become globally ubiquitous pollutants. It is thought that every man, woman and child on the planet now carries dioxins in their body tissues.

Dioxins are highly toxic and bioaccumulate in fatty tissues of animals and humans. Moreover, dioxin concentrate as they move up the food chain, so that animals at the topic, including humans, carry the highest levels. Dioxin, like other POPs, degrades slowly, often remaining in the environment and in human tissue for many years.

Human is exposed to dioxins primarily through food consumption. Meat, fish and dairy products are the most significant sources.

Dioxins exert a plethora of toxic effects because they act on a fundamental biochemical regulation system in the body, a system that is common to animals and humans. Dioxins exert their effects through binding to the “Ah receptor”, the outcome of which affects several genes (Webster and Commoner 1994). Their toxicological effects are summarized in table 1.

Table 1

Carcinogenesis	IARC class 1 carcinogen (carcinogenic to humans)
Immune system effects	Suppression of cell-mediated and humoral immunity Increased susceptibility to infectious challenge; anto-immune response
Male reproductive toxicity	Reduced sperm count, testicular atrophy Abnormal testis structure; reduced size of genital organs Feminized hormonal responses; feminized behavioral responses
Female reproductive toxicity	Decreased fertility Inability to maintain pregnancy Ovariandysfunction Endometriosis

Developmental impacts	Birth defects, foetal death; Impaired neurological development and subsequent cognitive deficits; altered sexual development
Modulation of hormones, receptors, and growth factors	Steroid hormones and receptors (androgens, estrogens and glucocorticoids); thyroid hormones; insulin; melatonin; vitamin A; EGF and receptor; TGF-a and TGF-b; TNF-a, IL-1b, c-Ras, c-ErbA
Other effects	Organ toxicity (liver, spleen, thymus, skin) Diabetes, weight loss, wasting syndrome, Altered fat and glucose metabolism

Source: Adapted from USEPA 1994 and Birnbaum 1994

POPs Destruction technology – Fundamental Performance Criteria

POPs stockpiles, in this case 30,000 m^3 dioxin contaminated soil and associated contamination imposes enormous environmental, public health and economic burdens. In all circumstances, destruction of POPs stockpiles and decontamination of associated material must be accomplished in a manner that safeguards both nearby and distant human and wildlife populations as well as workers against further toxic exposure via direct pathways (e.g. inhalation) and indirect pathways (e.g. through the food chain). To achieve this destruction technologies must meet certain stringent criteria and they must be expertly applied and regulated.

Greenpeace has concluded that to afford adequate protection of both local and distant populations of humans and wildlife, the technologies used for destroying stockpiles of persistent organic pollutants (POPs) must meet the following fundamental performance criteria:

1. Destruction efficiencies of effectively 100 percent for the chemicals of concern. The determination of 100 percent destruction efficiency is necessarily based on findings of no detectable concentrations of the chemicals of concern in any and all residues, using the most sensitive analytical techniques available worldwide. Analyses of the unmodified residues must be carried out sufficiently frequently to ensure compliance with this criterion during startups, shutdowns and routine operations.

2. Complete containment of all residues for screening and, if necessary, reprocessing to ensure that no residues contain detectable levels of chemicals of concern or other harmful constituents, such as newly formed persistent organic pollutants or other hazardous substances.

3. No uncontrolled releases.

Treatment Technologies

- **Indirect Thermal Desorption**

Indirect Thermal Desorption (ITD) removes organic and organochlorine chemicals from soil and waste by indirectly heating the contaminated soil, causing the contaminants to evaporate from the soil so they can be collected for later treatment.

It is claimed that this technology can treat a wide range of organic contaminants in soils such as organochlorine pesticides, dioxins and furans and polycyclic aromatic hydrocarbons (PAHs).

The US EPA says that in general, thermal desorption is effective at separating organics from refining wastes, coal tar wastes, waste from wood treatment, and paint wastes. It can separate solvents, pesticides, PCBs, dioxins and fuel oils from contaminated soil.

- **Incineration (CWTC)**

The second stage of decontamination involves off site treatment of incineration. “The oily concentrated waste containing dioxins and other contaminants will be transported off site by roll-off trucks for incineration at the local chemical waste incinerator.” (par 4.262, EIA)

Combustion technologies that have historically been used to attempt the destruction of POPs stocks and POPs-contaminated materials have failed to meet these criteria. Indeed, combustion technologies themselves are identified as major sources from which POPs and other hazardous substances are released to the environment.

Modern incinerators are commonly described as destroying POPs and similar chemicals very efficiently. However, recent tests suggest that incinerators achieve destruction efficiencies that are considerably lower than those achieved by certain non-combustion technologies. In addition, some incinerators burning POPs and other wastes are associated with the spread of undestroyed and newly formed POPs into the surrounding environment, contaminating air, soil, vegetation, wildlife and human populations.

Greenpeace is highly skeptical of the proposal using incineration at CWTC to destroy highly contaminated oily condensate stream formed after ITD. The assessment of alternative technologies in the EIA did not assess non-incineration alternatives such as Ecologic and Base Catalyzed Dechlorination (BCD). Greenpeace demands CED to further explore alternative methods and provide full assessment on the efficiency of such technologies.

- **Example of North Homebush Bay – use of ITD and BCD**

The Sydney 2000 Olympic site remediation project needed to treat 400 contaminated wastes at Homebush Bay. The 400 tonnes of contaminated soil include chemicals such as pesticides, polycyclic aromatic hydrocarbons (PAHs), dioxins and furans. Indirect Thermal Desorption (ITD) and modified Base Catalysed Decomposition (BCD) are used to treat the scheduled chemical waste. The ITD process is used first to concentrate the chlorinated benzenes and dioxins/furans. The BCD process is then used to destroy the chlorinated compounds. The BCD process is a non-incineration process that results in the destruction of organochlorine compounds. It primarily treats organochlorine compounds in a liquid. The treated soil, recovered waste water and other residues from both processes are held and tested before release or disposal.

Greenpeace believes this remediation project provides useful model for the decommissioning of CLS and the decontamination works. The reporting and monitoring requirements of the Homebush project are also recommended as a good reference for the decommissioning of CLS project.