For discussion on
20 March 2002

Legislative Council Panel on Economic Services

**Financial Implication of the
Decommissioning of Cheoy Lee Shipyard at Penny's Bay**

This paper explains the financial implication of the decommissioning of Cheoy Lee Shipyard (CLS) at Penny's Bay, as requested by Members of the Panel.

Objective

2. The primary objective of the decommissioning project is to return the CLS site to a condition suitable for development and use by the community. Government is committed to taking all the steps necessary to rehabilitate the site and render it suitable for future use. All potentially harmful contaminants at CLS will be thoroughly removed, treated and disposed of in an environmentally acceptable manner.

Background

3. CLS was located on the north and eastern shores of Penny's Bay with a site area of about 19 hectares (location map at Annex A). It commenced operation in 1964 which included boat manufacture, repair and maintenance. The CLS site was returned to Government on voluntary surrender in April 2001 and is required for the construction of the necessary infrastructure (including the Penny's Bay Section of Chok Ko Wan Link Road and Road P2) in support of Hong Kong Disneyland.

Environmental Impact Assessment (EIA)

4. Under item 17, Part II of Schedule 2 of the EIA Ordinance, the decommissioning of a shipyard is a designated project requiring an environmental permit (EP) from the Director of Environmental Protection (DEP)[1]. Before an EP can be obtained, an EIA study has to be carried out and the EIA report approved by DEP. The EIA study for the decommissioning of CLS was completed by Civil Engineering Department in December 2001. The EIA report was submitted to DEP on 14 December 2001.

5. Considering that the EIA report has met the requirements of the prescribed EIA study brief and the Technical Memorandum on EIA Process, DEP decided on 9 February 2002 that the report was suitable for public inspection. The public inspection period which commenced on 21 February 2002 will last until 22 March 2002.

Land Contamination

6. The EIA study has fully analysed the conditions of the CLS site and examined all possible environmental impacts. The study has revealed the existence of hazardous substances in the soil at the site and has recommended a comprehensive and effective remediation and clean up plan which is in line with international practice.

7. A total of about 87,000 m^3 of soil has been found to contain different types of contaminants :

(a) About 48,000m^3 (55%) of the soil is contaminated with metals only. The soil will be excavated and solidified on-site using cement[2];

[1] As a thermal desorption plant is proposed at To Kau Wan (see paragraph 7(c) below), the decommissioning of CLS is also a designated project under item G4, Part I of Schedule 2 of the EIA Ordinance concerning waste disposal facility.

[2] Cement solidification is a process in which cement is added to the contaminated soil to immobilise the metal contaminants inside the soil matrix.

(b) Another 9,000 m^3 (10%) is contaminated with a combination of total petroleum hydrocarbons (TPH), semi-volatile organic compounds (SVOCs) and metals. The soil will be excavated and treated off-site at To Kau Wan (TKW) (please refer to Annex A for location of TKW) by biopiling[3], followed by cement solidification to immobilise the remaining metals in the soil;

(c) The remaining 30,000 m^3 (35%), found mainly in the south-eastern portion of the site, is contaminated predominantly with a combination of dioxins / metals / TPH / SVOCs. The soil will be excavated and treated off-site at a thermal desorption[4] plant to be set up at TKW. About 600 m^3 of organic oily residue will be generated from the thermal desorption process. They will be collected and despatched in batches for incineration at the Chemical Waste Treatment Centre (CWTC) in Tsing Yi. The soil after thermal desorption will be solidified by adding cement to immobilise the remaining metals in the soil.

8. A summary of the key findings and recommendations of the EIA report is at Annex B.

Financial Implication

9. The decommissioning project comprises mainly demolition and removal of all existing buildings and structures on the CLS site, excavation and treatment of contaminated soil and implementation of appropriate mitigation measures to avoid / minimise any adverse environmental impacts arising from the decommissioning. The estimated cost of the decommissioning project is $450 million in money-of-the-day prices. A breakdown of the estimated cost is as follows :

[3] Biopiling is a biodegradation process making use of micro-organisms to disintegrate TPH /SVOCs in the soil.

[4] Thermal desorption is an enclosed separation process in which indirect heat is applied to the contaminated soil. Upon indirect heating, the contaminants (including dioxins) will be evaporated into gaseous phase, trapped and subsequently condensed for further treatment.

(a)	Demolition of buildings and structures[5]	$10M
(b)	Decontamination works (i) Excavation and on-site treatment of soil contaminated with metals only and associated cost (ii) Excavation and off-site treatment at TKW of soil contaminated with TPH, SVOCs and metals and associated cost (iii) Excavation and off-site treatment at thermal desorption plant at TKW for soil contaminated with dioxins / metals / TPH / SVOCs and associated cost	 $66M $22 352
	Total	$450M

The above works will form part of our submission to Finance Committee, seeking funding approval for "Infrastructure for Penny's Bay Development, Package 3" in May/June 2002.

10. As shown in the above table, a very substantial portion ($352 million or 78%) of the decommissioning cost is attributed to the treatment of dioxin-contaminated soil. Treatment of dioxin-contaminated materials is very expensive as it involves various operations and procedures. These include excavation and transportation of the dioxin-contaminated soil, site preparation at TKW, setting up of a thermal desorption plant at TKW, operation of the thermal desorption plant, storage facilities, cement solidification for soil after thermal desorption, incineration of residue at CWTC and implementation of monitoring and safety control measures. As dioxins are extremely persistent compounds and are not broken down easily, the dioxin treatment technologies which have a proven record of performance and have been used internationally are thermal treatment technologies which are energy intensive and hence incur higher operating costs.

[5] Demolition works also include removal of asbestos in the roofing of the shipyard buildings. We have already sought Finance Committee's funding approval for the asbestos removal works under "Infrastructure for Penny's Bay Development, Package 2" in June 2001. The cost of the removal works is $17 million.

Previous Estimate in November 1999

11. While the original estimated cost of decontaminating the CLS site was roughly assessed to be $22 million in November 1999[6], this estimate was worked out before the EIA study and with reference to the decommissioning of Kai Tak Airport and the then available information relating to the land uses and operation of CLS (e.g. on-site observation, interview with some shipyard personnel, etc.).

12. The substantial rise in the decommissioning cost is mainly attributed to the presence of dioxins in the soil, effective and thorough treatment of which is very expensive. The likely cause of dioxins in CLS is open burning of plastic materials[7] on site. Whilst metals, TPH and SVOCs are commonly found in shipyards during the decommissioning process, we have not encountered dioxins in previous shipyard decommissioning projects. The limited contamination assessments carried out in February 2000[8] and December 2000[9] also did not reveal the extent of the contamination problem in CLS.

13. A more accurate estimate became available only when the actual level of contamination and types of contaminants existing in CLS could be assessed during the detailed site investigation[10] carried out after April 2001 when the site had been returned to Government. Now that we have thoroughly assessed the level of contamination at CLS, we are committed to taking all the steps necessary to

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[6] We sought Finance Committee's in principle approval for the overall infrastructure package of the HKD project on 26 November 1999. $22 million was earmarked for the decommissioning of CLS.

[7] Dioxins are mainly generated in trace quantities as by-products from various burning, combustion and chemical processes, including incineration of chlorinated organic substances and chlorinated waste.

[8] During the Northshore Lantau Development Feasibility Study (NLDFS) EIA study, a limited soil sampling and analysis was conducted along a stream bed discharging from the southeastern boundary of the CLS site in early February 2000. While the results of the analysis indicated that there were low levels of TPH and metals, no concentration of SVOCs was detected. Based on this analysis, the EIA report on NLDFS considered that the contamination at CLS should be limited in extent.

[9] Upon repeated requests by the Administration, limited site access for an advanced site investigation was permitted by the CLS operator in December 2000. Soil and groundwater samples were collected at 13 boreholes. Testing results indicated that soil contamination by heavy metals or TPH occurred at some sampling locations at surface level only. TPH and heavy metals were detected in groundwater samples but none exceeded established levels.

[10] A total of 440 boreholes were excavated to collect soil samples. Another 56 groundwater monitoring wells were installed to test the groundwater. A total of 17,220 laboratory tests on the soil and groundwater samples were carried out.

rehabilitate the site, excavate and treat the hazardous substances to render the site suitable for future use. In this connection, the EIA report has recommended a comprehensive and effective remediation and clean up plan for the site. The decontamination methods and control measures recommended in the report are technically advanced and internationally accepted. The proposed thermal desorption process in particular is in line with international practice and the best practical method to treat the dioxin-contaminated soil in the CLS case.

Conclusion

14. The nature of this decommissioning project is primarily of environmental improvement. Contaminated materials will be thoroughly excavated and removed from the site once and for all. The contaminated soil will be treated in accordance with stringent international standards. The soil after treatment will become clean inert materials suitable for use as public fill. The site will also be returned to a condition suitable for development and use by the community.

Tourism Commission
Economic Services Bureau
March 2002

Title

附件 甲
Annex A

位置圖
LOCATION PLAN

Annex B

Decommissioning of Cheoy Lee Shipyard at Penny's Bay
Environmental Impact Assessment

Introduction

The former Cheoy Lee Shipyard (CLS) is located on the north and eastern shores of Penny's Bay with a site area of about 19 hectares. CLS had been in operation since 1964. The site reverted to Government in April 2001 and is required for the construction of the necessary infrastructure in support of HKD (including the Penny's Bay Section of Chok Ko Wan Link Road and Road P2).

2. The decommissioning of CLS involves two designated projects, one for the decommissioning of the shipyard under item 17, Part II of Schedule 2 of the EIA Ordinance and the other for the waste disposal facility under item G4, Part I of Schedule 2 of the Ordinance. An EIA study has been carried out by the Civil Engineering Department. The study revealed the existence of hazardous substances in the soil at the site and recommended a comprehensive remediation and clean up plan which is in line with international practice.

Project Description

3. The decommissioning project comprises mainly demolition and removal of all buildings and structures, remediation of the site area, excavation and treatment of contaminated soil and implementation of appropriate mitigation measures to avoid or minimise any adverse environmental impacts arising from the decommissioning works.

Key Findings

4. The EIA Report has fully analysed the conditions of the CLS site and examined all possible environmental impacts. The Report has recommended a remediation and clean up plan for the site which is in line with international practice and is very comprehensive and effective. Key findings of the EIA Report are summarised below.

Land Contamination

- A total of about 87,000 m^3 of soil have been found to contain different types of contaminants.
- About 65% of the 87,000 m^3 of contaminated soil (about 57,000m^3) is contaminated with metals, total petroleum hydrocarbons (TPH) and semi-volatile organic compounds (SVOCs).
- The remaining 30,000 m^3, found mainly in the southeastern portion of the site, is contaminated with a combination of metals and dioxins.
- Risk assessment results indicated that the impact of land contamination on groundwater is insignificant.

Remediation Plan

- A combination of remediation methods is recommended for treating different groups of contaminants. All these remediation methods are technically advanced and in line with

international practice.

- For *soil contaminated with metals only*, it will be excavated and solidified on-site by adding cement to the contaminated soil to immobilise the metal constituents in the soil (i.e. cement solidification).
- For *soil contaminated with TPH/SVOCs*, it will be excavated and treated off-site at To Kau Wan (TKW) by biopiling (a biodegradation process making use of micro-organisms to disintegrate the TPH/SVOCs). If the soil is also contaminated with metals, cement solidification will be carried out after biopiling.
- For *soil contaminated with a combination of dioxins and metals/TPH/SVOCs*, it will be excavated and first treated off-site at TKW by thermal desorption, followed by cement solidification. The residue arising from the thermal desorption process will be collected and incinerated at the Tsing Yi Chemical Waste Treatment Centre.
- A thermal desorption plant will be set up at TKW. Thermal desorption is a separation process in which heat is used to evaporate the contaminants from the soil to gaseous phase, which are subsequently condensed and collected for disposal. A diagram on the thermal desorption process is at Annex. This method is in line with international practice for treating soil contaminated with dioxins.
- To avoid any adverse impact on nearby water and fish culture zones, the contaminated soil to be treated at TKW will be transported from CLS to TKW via dedicated road access. The residue arising from the thermal desorption process will also be transported by land to the Chemical Waste Treatment Centre in Tsing Yi.
- Confirmation sampling and testing will be conducted to ensure that the contaminated soil has been completely removed from CLS and treated to attain the respective cleanup standards. The soil after treatment will be clean inert material suitable for use as public fill.
- With the implementation of the comprehensive control measures including engineering controls, personal protection and air monitoring recommended in the EIA report, the health risks to the workers associated with the project would be negligible.

Air Quality

- Air modelling test concluded that the impact of dust is very low. Mitigation measures including spraying of water mist and covering the stockpiles will be implemented.
- The impact of air emissions from the treatment facilities at TKW will comply with established standards.

Waste Management

- The Construction and Demolition (C&D) material generated by this project will be reused and recycled on site as far as practicable to minimise the amount of C&D material to be disposed of at public filling areas.
- The soil after treatment will be clean inert material suitable for use as public fill.

Water Quality

- With the implementation of best site practices and the recommended mitigation measures, no adverse water quality impact is envisaged for the decommissioning and decontamination works.

Ecological Impact

- The potential impact on the restricted/protected plants around CLS and the Rice Fish habitats at Mong Tung Hang Stream (MTHS) will be minimized through controlling construction practices and implementing mitigation measures.
- Restricted/protected plants will be fenced off and preserved in situ. Plants directly affected by the works will be transplanted to a suitable receptor site at Tai Tam Country Park.
- The habitat of the Rice Fish will be recreated at MTHS. Environmentally friendly design will be incorporated in the future drainage channel to encourage recolonisation of the lower stream fauna.

Cultural Heritage

- Some artifacts of different periods have been identified by the Antiquities and Monuments Office (AMO) during its survey at CLS from August to November 2001.
- Preservation measures and rescue works will be carried out before commencement of the decommissioning works to minimize the potential impact on archaeological resources.

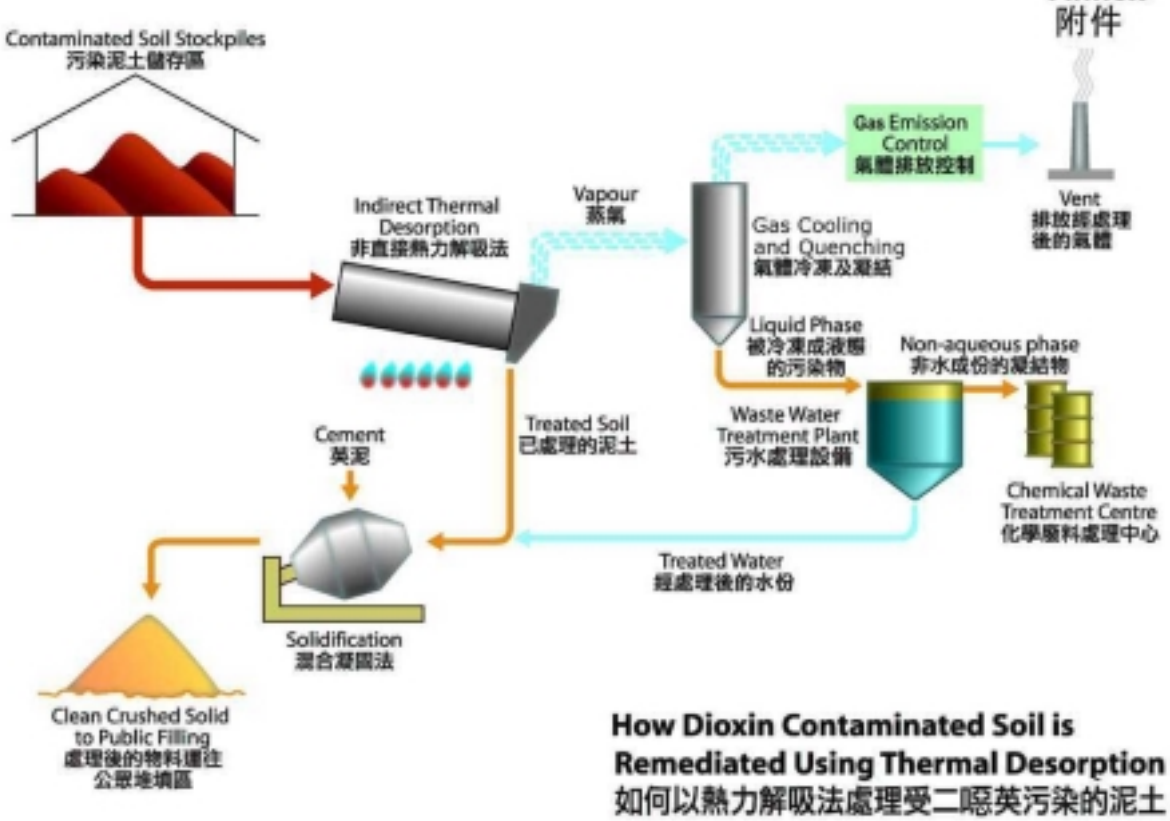
Environmental Monitoring and Audit (EM&A)

- All the recommended mitigation measures will be incorporated into an EM&A programme for implementation.

Conclusion

5. The primary objective of the decommissioning exercise is to return the CLS site to a condition suitable for use by the community. All potentially harmful contaminants at CLS will be thoroughly removed, treated and disposed of in an environmentally acceptable manner. After treatment, the soil will be suitable for use as public fill. With the implementation of the precautionary and mitigation measures recommended in the EIA report, the decommissioning project will comply with all environmental standards and legislation.

Annex
附件



How Dioxin Contaminated Soil is Remediated Using Thermal Desorption
如何以熱力解吸法處理受二噁英污染的泥土