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## 14 LAND CONTAMINATION PREVENTION

### 14.1 INTRODUCTION

This Section identifies potential sources of land contamination during the operation of the proposed LNG Terminal and associated facilities at South Soko Island and assesses potential environmental impacts. Recommendations have been made for operational practices, control measures and waste management for prevention of site contamination.

### 14.2 LEGISLATION REQUIREMENT AND EVALUATION CRITERIA

Assessments of land contamination are guided by the EPD's guidance document *Professional Persons Environmental Consultative Committee Practice Note 3/94 - Contaminated Land Assessment and Remediation (ProPECC PN 3/94)*, the *Technical Memorandum on Environmental Impact Assessment Process (EIAOTM)*, and EPD's 1999 *Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations; Boatyards; and Car Repair/ Dismantling Workshops (Guidance Notes)*.

*ProPECC PN 3/94* advises that measures for land contamination problems are relatively simple, mainly relying on good engineering practice, well developed waste management strategies and established industrial guidelines.

*Annex 19 of the EIAOTM: Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts*, and the 1999 *Guidance Notes*, provides guidance on the assessment of potentially contaminated land, including petrol filling stations, shipyards, car repair/ dismantling workshops and docking facilities.

Discharge of potentially contaminated surface and groundwater will also be compared against *Standards for Effluent Discharged into the Marine Water of Southern and North Western Water Control Zone* prescribed in the EPD's *Technical Memorandum on Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Water* issued under the *Water Pollution Control Ordinance (WPCO)*.

The following legislation, documents and guidelines may also cover or have some bearing upon contamination and the handling, treatment and disposal of contaminated materials in Hong Kong:

- *Waste Disposal Ordinance (Cap 354)*;
- *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)*; and
- *Code of Practice on the Packaging, Labeling and Storage of Chemical Wastes*, Environmental Protection Department (1992).

## 14.3

**POTENTIAL SOURCES OF LAND CONTAMINATION DURING THE OPERATIONAL PHASE**

Potential sources of land contamination during the operation phase of the project were identified as follows:

- Fuel (diesel) loading/unloading and storage facilities for power generation, vehicle tanking, emergency fire water pumps, maintenance areas, workshops, paint shops, washing down facilities, waste and dangerous/hazardous material stores; and
- Process water in SCV back up facility.

Potential contaminants include total petroleum hydrocarbons (TPH), volatile and semi-volatile organic compound (VOCs/SVOCs), heavy metals, other organic hydrocarbons and inorganic pollutants. It is noted that accidental spills of LNG are not considered to cause contamination as the LNG will vaporize quickly leaving behind no contaminating residue. The impacts associated with accidental spills of LNG are discussed in *Section 13 – Quantitative Risk Assessment* of this EIA Report.

As discussed in detail in *Annex 13A1*, the terminal is designed and would have operation systems and procedures which will reduce the potential for accidental spills or leakages, including:

- The tank design will be full containment, with all tank connections made through the roof to maximize mechanical strength and integrity.
- The double wall construction of tanks will comprise an inner wall of low temperature steel and an outer wall of pre-stressed concrete. The outer concrete wall will include a reinforced concrete bottom slab and roof and it will contain any leak from the inner tank
- Alarm and shutdown devices will be incorporated in the design to ensure safe tank operation.
- Fire water systems will be provided to protect the LNG Terminal and berth.
- Security will be designed to ensure the safety and integrity of the facilities.
- During cargo discharge the vapour pressure in the LNG Carrier cargo tanks will be maintained by returning vapour from the shore. With this balanced system, under normal circumstances, no hydrocarbons will be released to the atmosphere from ship or shore.
- The carrier and shore Emergency Shut Down (ESD) systems will be interlinked such that an unusual event on either will automatically activate a transfer system shutdown (ESD I) and in a severe case will also disconnect the unloading arms (ESD II). An ESD I test will be completed

before the start of unloading operations. In the event of an ESD II unloading arm disconnection, LNG spillage would be very small due to the activation of isolation valve.

- Appropriate handling procedures for hazardous substances (chemicals, oils, paints, etc.) will be implemented to reduce potential contamination from spillages from maintenance areas, workshops and storages.

#### 14.4

##### LAND CONTAMINATION PREVENTION AND CONTROL MEASURES

In accordance with **Clause 3.4.10.1 (ii)** of the Study Brief, the following measures are proposed to reduce the potential for land contamination when the terminal becomes operational.

- Fuel, lubricating oil, chemical and chemical waste storage areas present on the site shall be provided with secondary containment;
- Individual drainage from lines, pumps, compressors, vessels, heat exchangers and instruments shall be connected to an on-site Coalescing Plate Interceptor (CPI) type oil water separator
- Stationary equipment that could release hydrocarbons and that are not located in containment areas will be installed on skids containing drain pans. An open drain system will collect spillage/leakage/contaminated storm water from these areas and will connect to the oil water separator;
- Spill containment and clean up equipment shall be provided in all areas where oils, chemicals and chemical wastes are handled and stored;
- Training shall be provided to relevant personnel on hazardous materials handling and spill control and clean up; and
- Contaminated materials and dispensed spill control and clean-up equipment shall be collected and disposed of in accordance with the WDO.

Details of practices to handle chemical wastes are discussed in *Part 2 - Section 7 - Waste Management*, measures to prevent contamination of adjacent water bodies are discussed in *Part 2 - Section 6 - Water Quality Impacts* and the impacts associated with accidental spills of LNG are discussed in *Part 2 - Section 13 - Quantitative Risk Assessment*.

#### 14.5

##### PROTECTIVE SYSTEMS

##### 14.5.1

##### Gas Detection, Alarm, Firefighting and ESD Systems

A centralized spill, fire and combustible gas alarm and control system will provide input to an information management system. Automatic detection devices, manual alarms and audible and visual signalling devices will be

strategically located throughout the terminal. Automatic detection devices will include flame, fire and heat, smoke, low temperature and combustible gas detectors. CCTV monitors will be installed to allow a visual surveillance of critical facilities from the central control room. An emergency shutdown system (ESD) will be incorporated in the design of the terminal and provide the operators with the capability of remotely shutting down the entire or selective portions of the terminal. The unloading arms will also be equipped with Powered Emergency Release Couplers (PERCs). The PERC maintains containment integrity and prevents damage to the unloading arms in the event of an emergency as discussed in *Part 2 - Section 13 - Quantitative Risk Assessment* of this EIA Report.

#### 14.6 RESIDUAL IMPACTS

With the above recommended measures in place to prevent, contain and clean-up spills and leaks, no land contamination or environmental concern would be expected to arise and no adverse residual impacts are predicted. Accidental spills of LNG are not considered to cause contamination as the LNG will vaporize quickly leaving behind no contaminating residue.

#### 14.7 ENVIRONMENTAL MONITORING AND AUDIT

Based upon the integrated mitigation measures and procedures which will be put in place to prevent, contain, clean-up and dispose of any spillage, significant environmental effects are highly unlikely to arise. No specific EM&A measures are therefore required.

#### 14.8 CONCLUSIONS

Potential sources of contamination during the operational phase have been identified for the LNG terminal associated facilities. Mitigation measures and controls will be installed to reduce the likelihood of a spill or leak. In the unlikely event of a spill, the installed mitigation measures and controls are designed to reduce the environmental impacts associated with land contamination. No land contamination or environmental concern would be expected to arise.