

13. LAND CONTAMINATION

13.1 Relevant Environmental Legislation

13.1.1 EPD ProPECC Note No. 3/94

13.1.1.1 The Practice Note for Professional Persons issued by the Environmental Protection Department on Contaminated Land Assessment and Remediation advises that Environmental Impact Assessment reports for new industrial developments including oil depots should :

- ◆ identify possible sources of contamination; and
- ◆ formulate appropriate operational practices, waste management strategies and precautionary measures for the prevention of contamination problems.

13.1.1.2 It further advises that measures for the contamination of land contamination problems are relatively simple, mainly relying on good engineering practice, well developed waste management strategies and established industrial guidelines.

13.1.2 Hong Kong Code of Practice for Oil Storage Installations, 1992

13.1.2.1 The Hong Kong Code of Practice for Oil Storage Installations, 1992 issued by the Building Authority sets down the requirements for the design, construction and maintenance of oil storage installations in Hong Kong so as to reduce the risk of environmental pollution. It deals with key design features such as foundations, containment bunds, tanks and drainage. In addition it addresses inspection and repair requirements and provisions for contingency planning to deal with spillage and other environmental pollution incidents.

13.2 Description of Existing Conditions

13.2.1 The PAFF site at Tuen Mun Area 38 currently comprises undeveloped reclaimed land with was produced using public fill material. Thus, there is no reason to believe that the land is in any way contaminated at present.

13.3 Key Issues

13.3.1 No contaminated ground should be exposed or excavated during construction of the project and thus, the key issue with regard to land contamination is to ensure that construction works or the operation of the facility at the site will not cause any land contamination in the future.

13.3.2 The PAFF site will ultimately provide for the storage of about 388,000m³ of aviation fuel. Leakage or spillage of this material could result in serious contamination of the underlying ground and possibly seepage to sea, where it could pollute the coastal environment. It is therefore essential to ensure that the fuel storage facilities are secure, provided with robust leakage detection systems and that effective spill control measures are implemented.

13.3.3 There will be no direct discharge of any wastewater anywhere on site. However, uncontrolled polluted surface drainage from the site roads and workshops also has the potential to contaminate the ground. These risks are relatively minor in comparison to the risk of bulk fuel spills and leaks and can easily be minimised by appropriate design of the storm water system.

13.3.4 No other chemicals will be held on site in any significant quantity except for fire-fighting foam.

13.4 Assessment of Impacts

13.4.1 Pollution from surface drainage from the site roads and workshops can be controlled by the drainage from all areas of hardstanding, including fuel storage and handling facilities, areas of vehicular traffic, sites used for vehicle or plant maintenance or adjacent to covered workshops being diverted through an oil/water interceptor prior to discharge. In order to reduce the amount of runoff to be treated, uncontaminated runoff such as from the building roof and landscaped areas should be collected separately and discharges to the storm water drain.

13.4.2 However, spills and leaks from storage tanks and pipework pose the principal potential contamination threat to the ground. The tank farm would be provided with bundwalls and contained drainage. There are 2 main bunds, each containing 6 tanks each. Each bund would contain 4 tanks initially, increasing to 6 in future. The height of the bundwalls has also been increased from the previous April 2002 EIA in order to improve the retention of any fuel spillage from the tanks within the PAFF boundary. The initial bund containment with 4 tanks in each bund would amount to at least 180% of the volume of the largest tank (in contrast to a 110% requirement) and ultimately (2040) this would be 150% of the volume of the largest tank with 6 tanks in each bund. This provides the principal mitigation against sizeable spills. Fuel oil losses to the surface of the facility outside the bunded area would be contained in the first instance by the stormwater drainage system providing the opportunity for clean up before any seepage into the underlying ground occurs.

13.4.3 Leakage from the bunded area could only occur following primary failure of tanks or pipework within the bund coupled with a secondary failure or overtopping of the bund wall or liner system. Possible sources of contamination can be identified as follows :

- ◆ failure of tank walls;
- ◆ failure of pipelines;
- ◆ leaking pipejoints;
- ◆ failed seals within gaskets, pumps or valves;
- ◆ overfilling; and
- ◆ leakage from sampling points.

13.4.4 Prevention of losses from these sources will principally be addressed by design and adherence to international standards in the plant specification. Once commissioned all storage facilities will require to be subjected to a regular inspection and maintenance programme. The risk of spills and leaks from these sources has been examined in

Section 10 and found to be very low (see Section 10 for quantification of the frequency of such spills and leaks occurring).

13.4.5 To prevent seepage of lost fuel into the ground it is essential that any leaks are promptly identified and cleaned up. With such measures in place no significant contamination of the underlying ground would be expected even in the event of a spillage. Recommended mitigatory measures to this effect are identified in the following section.

13.5 Mitigation Measures

13.5.1 The implementation of appropriate mitigation for the oil storage facilities and pipework is required to ensure that risk of ground contamination as a result of oil spills or leaks is kept to a practical minimum. Such measures should include the following. These measures are also summarised in the Environmental Mitigation Implementation Schedule in Appendix B:

- ◆ bunding of all fuel storage areas;
- ◆ adherence to relevant design standards for storage tanks, pipework, containment and drainage;
- ◆ regular plant inspections and maintenance;
- ◆ impermeable lining of tank pits;
- ◆ leak detection systems;
- ◆ controlled surface drainage and the provision of emergency shut off valves;
- ◆ emergency spill response plans; and
- ◆ provision of spill control materials and equipment on site.

13.5.2 Key mitigation recommendations for the bunded containment have been identified in Section 6.7. The most important features are that all tanks shall be bunded to an ultimate capacity of at least 150% of the largest individual tank in each compound. Following completion of the first phase of works, the bund capacity will be as high as 180% of the largest individual tank in each compound, a only 4 tanks will be present within each bund. Tank pits shall be protected by an impermeable bed (e.g. geotextile sheeting, bitumen lining) to prevent seepage of oil to ground and a leak detection system shall be installed beneath the containment membrane. A concept design for a tank incorporating these features is provided in Figure 13.1.

13.5.3 The facility operator shall be required to draw up detailed contingency plans based upon an approach of prevention and detection in the first instance and to ensure containment and safe disposal if any fuel is lost from tanks or pipework. The Emergency Response Plan for the PAFF will be developed for the approval of the Authorities. The rationale for the plan is detailed in Table 13.1 below:

Table 13.1 Spill Management Plan Rationale

Operation	Approach	Method	Monitoring
Oil Leaks/ Spills	Prevention	Established practices & operator training	Regular ground water assessment through selected bore holes
	Detection		

Operation	Approach	Method	Monitoring
Pipelines	Early detection and isolation	Automatic shut down	Pressure of line Frequency and duration of pumping
Tankage	Early detection	Removal from service	Under tank hydrocarbon monitors
	Prevention	Containment bunds	
Transfer operations	Prevention	High level liquid shutoffs	Visual inspections
Oil Spills Response	Containment and disposal	Response team training and pre-positioned equipment	Visual inspections

13.5.4 The key features which should be included in the plan are summarised below and an outline Fuel Spill Contingency Plan is provided in Appendix J3:

- ◆ organization of the spill response team and the responsibilities of each member.
- ◆ response procedures to be adopted in the case of a spill, including:
 - identification of the source of spill;
 - reporting to relevant Authorities;
 - containment of leaking fuel;
 - recovery and processing of free fuel;
 - clean up methodology; and
 - handling and disposal protocols.
- ◆ establishment of an emergency control centre on the PAFF site;
- ◆ establishment of effective communication emergency mechanisms and a 24-hour emergency contact list;
- ◆ training and competence level requirement of PAFF staff; suitable and regular spill response training to be provided to the operating personnel and regular spill response drills to be conducted to test and exercise the responses;
- ◆ provision and maintenance of spill equipment at the PAFF land site, on the PAFF jetty at the Sha Chau reception point and at the HKIA site;
- ◆ drills and exercise requirements; and
- ◆ follow-up procedures and post spill recordings.

13.5.5 Other key mitigation measures for the protection against contaminated land include the following:

- ◆ run off from the roofs of site buildings and landscaped areas shall be conveyed in closed drains to the nearest storm water drain to prevent the generation of

excessive quantities of surface water which may be polluted;

- ◆ suitable absorbent materials (e.g. sand or earth) shall be kept on site to deal with spills. Chemical dispersants shall not be employed;
- ◆ the facility shall be designed, constructed, operated and maintained in full accordance with the Code of Practice for Oil Installations, 1992;
- ◆ tank pressure testing shall be carried out routinely to check for possible tank leaks. Product inventory monitoring shall be integrated into site management procedures to check for any abnormal or unexpected product loss;
- ◆ tank overfill monitoring systems shall be installed and regularly tested. Inlet valves should automatically shutdown on exceedance of “high-high level” to prevent over-filling;
- ◆ pipe leakages shall be routinely checked for by means of a pressure sensitive leak detection system and routine inventory control;
- ◆ drainage from areas of hardstanding shall be treated by means of oil / water separators prior to discharge to storm drain. All surface drainage shall be fitted with closure valves to provided additional containment and facilitate clean up of any leaks; and
- ◆ it is recommended that the delivery pipeline from the jetty and the supply line to the airport shall be fitted with pressure sensitive leak detectors.

13.6 Residual Impacts

- 13.6.1 With the recommended mitigatory measures in place to prevent, contain and clean-up spills and leaks of fuel oil stored or conveyed to and from the site, no ground contamination of environmental concern would be expected to arise and no adverse residual impacts are predicted.

13.7 Environmental Monitoring and Audit

- 13.7.1 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. However, design phase audit of the spill response plan to ensure it includes the necessary elements and of the design of the pipelines, tanks and jetty to ensure key spill detection and control elements are included is recommended. As much of the prevention for leakages and spillages on land are based upon the design and construction of PAFF following the latest technology, standards and guidelines. In order to ensure that the required design measures are taken into account during the planning and design for the future tank development, a review of the EIA report will be undertaken at the planning stage for the future expansion (around 2025 as required). The review is required only if the latest technology, standards and statutory requirements are deemed to have changed by that time.

13.7.2 Also, in order to ensure the on-going adequacy of the fuel spill contingency plan and that it is being implemented as required, it is proposed that an Environmental Management System be set up for the operational phase of the project to allow regular audits of the systems/mitigation measures incorporated in the project and the fuel spill contingency plan. Further details are provided in Section 15 of this report and in the EM&A Manual.

13.7.3 In addition, the following regular inspections and audits will be undertaken during the operational phase of the facility:

- ◆ two inspections every year of the tank farm, jetty and pipelines including one undertaken pursuant to the Joint Inspection Group (JIG) explained above;
- ◆ inspection of the whole sub sea pipelines every 5 to 10 years;
- ◆ Health, Safety and Environmental audit of the facility once every 3 years; and
- ◆ inspection of the structural integrity of the tanks once per year.