

APPENDIX 8B

**SAMPLE CONTAMINATION ASSESSMENT PLAN
FOR GFS HANGAR**

Introduction

This Contamination Assessment Plan was developed with reference to the “Guidance Notes for Investigation Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops” (Guidance Notes) and Practice Note for Professional Persons ProPECC PN 3/94 “Contaminated Land Assessment and Remediation” (PN3/94) published by Environmental Protection Department.

Nature of Contamination

The site was used for helicopter and fixed wing aircraft operation and maintenance. Fuels, lubricating oils, cleaning solvents and anticorrosive paints were used and stored within the site and disposed through collection by Enviropace Co. Ltd which is a registered chemical waste disposal agent. There have been no regulatory violation or complaints on environmental performance and no spillage or leakage incidence during the length of operation. The site had been returned to Government Property Agency after the closure of Kai Tak Airport. All ground surface was covered by concrete. The level of contamination should likely be very much localized. Contaminants may enter soil through cracks, broken surface, damaged drains (if contaminants were illegally disposed at drains).

Soil characteristics influence the movement of contaminants. Key factors affecting the migrating of contamination include: soil particle size, organic matter content, groundwater level and hydraulic conductivity. Fine soil generally slows down the migration of contaminants. Ground conditions may vary in different area of the site.

Potential sources of land contamination in relation to the site were the handling of fuels (petroleum and LPG), lubricating oils, hydraulic fluids, and solvents including anticorrosive paints and thinners. Land contamination may be caused by accidental spillage, mis-handling and improper disposal of these chemicals. Hence, it is recommend that the soil and groundwater samples collected at the hangar site be tested for lead, chromium, copper, halogenated solvents, non-halogenated solvents, polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbon and BTEX (benzene, toluene, ethylbenzene and xylene).

Sampling Strategy

The size of the GFS hangar is about 7,300 sq.m. With reference to the *Guidance Notes* (as copied in **Tables A8B.1 and A8B.2** below), a full-scale investigation may be necessary as the GFS hangar is not less than 5 years old. Moreover, as GFS hangar stopped operation since June 1998, it is difficult to assess the operation and practice for determining the likely chance of contamination induced. Based on a site area of about 7,300 sq.m, 20 sampling locations are suggested.

Table A8B.1 Minimum Number of Sampling Points (*Table 3.3 of the Guidance Notes*)

Area of Site (m ²)	Minimum Number of Sampling Points	
	Full Scale	Simplified*
100	2	2
500	4	3
1000	8	4
5000	15	10
>5000	**	

* Subject to agreement with EPD (See Table 2.3)

** To be agreed with EPD

Table A8B.2 Criteria for Adopting Full-scale or Simplified Site Investigation (Table 2.3 of the Guidance Notes)

Criteria	Yes/No
1. Length of operation of the site is less than 5 years.	<i>No</i>
2. There is practice of recording spill incidents or monitoring chemical storage.	<i>Yes</i>
3. Waste disposal is carried out in accordance with Government requirements.	<i>Yes</i>
4. Absence of underground storage tank on the site.	<i>Not Sure</i>
5. Absence of surface contamination indicators which include:	
i) Stained areas;	<i>Not Sure</i>
ii) Uncontrolled chemical drum storage;	<i>Not Sure</i>
iii) Cracked concrete near storage of chemical drums;	<i>Not Sure</i>
iv) Unnatural colours and odours; and	<i>Not Sure</i>
v) Abandoned piping/mechanical components or cans	<i>Not Sure</i>

Note: If the answer to any one of the criteria is "No", a full-scale site investigation will probably required.

Groundwater level is expected to be around 1.5m to 2.5m depth in this area. Soil samples should be collected at 1) 0.5m below surface; 2) level immediately above the groundwater level; and 3) level in between 1) and 2) above for each sampling point. A groundwater sample should also be collected at each sampling point. The actual sampling locations should be located by on-site observation of hotspots. Sampling points would be placed at areas most likely to be contaminated, such as locations of heavy stains, floor cracks and drains.

Sampling Procedures

All field personnel should wear adequate personal protective equipment when working in contaminated areas.

Soil Sampling

Trial Pit Construction

Trial pits should be constructed on site for soil and groundwater sampling. Trial pits can be constructed either manually or by an excavator, as judged as suitable by the site investigation contractor. Exact location of soil sampling should be determined on site by the consultant based on observations. The trial pits should be constructed to allow soil samples to be collected at

- 1) 0.5m below surface;
- 2) level immediately above the groundwater level; and
- 3) level in between 1) and 2) above for each sampling point.

Inspection of soil should also be made at 0.5m intervals. The depth of the trial pit should be determined by the groundwater level and should be at least 0.5 meter below groundwater level.

Equipment Cleaning

The excavator or other mechanical equipment must be in sound mechanical order and free of oil leaks. It must have a current registration and warrant of fitness. All equipment must be steam cleaned upon arrival at the site, before commencing each new hole and before leaving the site. If contamination is evident during trial pit construction, the equipment should be cleaned between holes.

Soil Sampling

Sampling of soil should be carried out with stainless steel spoons. The sampling spoons should be cleaned between samples.

Field personnel should wear clean PVC/latex gloves whilst handling sampling equipment and carry out sampling. All sampling equipment should be cleaned prior to obtaining each sample. A clean area immediately adjacent to the sample location should be established, using a clean plastic sheet, on which all cleaned, and foil wrapped equipment may be placed. Samples of sub-surface material should be recovered from the depths specified above.

Sufficient sample (ie. 400 grams or about 30 mL) should be placed in a pre-cleaned glass sample jar. The jar lid should be covered with laboratory solvent washed aluminium foil and lids. The jar must be filled with no void space (or otherwise if specified by the lab) for samples to be tested for VOCs.

Each sample jar should be labelled. Records should be made of the details of the sampling location and other pertinent data. A chain-of-custody form should be completed for the samples. All samples should be stored on ice in portable ice chests between 0 – 4 °C whilst in the field or in transit.

Groundwater Sampling

The trial pit should be purged by removal of enough volumes of water to remove any stagnant water or water which is not representative of the aquifer. A hand operated water pump may be used for this purpose. The presence of floating product and its thickness should also be recorded at each sampling point before and after groundwater purging. Care should be taken to avoid pumping too much groundwater as this may draw contaminants from outside areas into the trial pit and cause the groundwater sample to be unrepresentative of the sampling location.

Prior to commencement of sampling a clean piece of plastic should be placed on the ground beside the well. All equipment should be placed on this sheet when not in use and all cleaning should be carried out on the plastic sheet. As sampling equipment is removed from the well, care should be taken to place it on the plastic sheet.

Samples should be collected in a teflon/stainless steel downhole bailer which should be decontaminated between sampling sites by cleaning in accordance with the procedures specified before. Care should be taken when sampling to avoid any opportunity for excess aeration of the sample.

Observations should be recorded in the form of strata log.

Water samples should be placed in appropriate containers as supplied by the analytical laboratory. Containers should be filled to over-flowing except those which have preservatives already added.

Samples for VOCs (i.e. hydrocarbons or BTEX) should be filled to overflowing and the foiled cap gently placed over and screwed down. The bottle should be inverted and gently tapped - if any air bubbles are present, the sample must be recollected.

All samples collected should be stored at <4°C. Transfer to the analytical laboratory should be completed within 24 hours of sample collection.

Testing Parameters

Soil and groundwater samples collected at each sampling point should be analyzed for the parameters listed in **Table A8B.3** below by a HOKLAS accredited laboratory.

Table A8B.3 Testing Requirements for Soil and Groundwater Samples

Parameters	Test Methods*
Metal – Lead	USEPA 6020 ICPMS
Metal – Chromium	USEPA 6020 ICPMS
Metal – Copper	USEPA 6020 ICPMS
Metal – Nickel	USEPA 6020 ICPMS
Metal – Zinc	USEPA 6020 ICPMS
Metal – Arsenic	USEPA 6020 ICPMS
Metal – Cadmium	USEPA 6020 ICPMS
Metal – Tin	USEPA 6020 ICPMS
Phenol	USEPA 8270 GPC
Aliphatic chlorinated hydrocarbons	USEPA 8270 GPC
Chlorobenzenes	USEPA 8270 GPC
Chlorophenols	USEPA 8270 GPC
Polyaromatic Hydrocarbons (PAH)	USEPA 8270 GPC
Total Petroleum Hydrocarbon (TPH) & BTEX (benzene, toluene, ethylbenzene, xylene)	USEPA Method 8260 and 8015 Modified

Note : * equivalent international recognized standard methods could also be used.

Storage of Surplus Soil Samples

It is envisaged that the likely scale of contamination should be very much localized, if found. The volume of soil expected to require cleanup should be of small quantities. Landfill disposal may be a practical option and should be considered as the last resort. Additional tests in terms of Toxicity Characteristic Leaching Procedure (TCLP) would be required to meet the criteria for disposal to landfills.

Hence, surplus soil samples obtained during the site investigation would be stored for subsequent TCLP tests if identified necessary. TCLP tests for cadmium, chromium, copper, nickel, lead, zinc, mercury, tin, silver, antimony, arsenic, beryllium, thallium, vanadium selenium and barium, using ASTM-E1391-90 method may need to be carried out.

Contamination Assessment Report (CAR)

After the site investigations is completed and the sample testing results are obtained, interpretation of the results in accordance with PN3/94 should be carried out and the conclusions summarized in a CAR for submission to EPD. The CAR should include:

- Report on site investigation procedure;
- Field results;
- Laboratory results;
- Interpretation of results; and
- Plans showing contaminant distribution.